Precipitator Optimization System User Manual

POS 10 User Manual

Rev 2 – December 20, 2018

Neundorfer, Inc.

Table of Contents

1. Software License Agreement 7
2. Warranty Statement 7
3. POS Software Update & Upgrade Policy 7
4. POS Basics 8
Components of Overall System 8
POS Communications Components 8
POS Software Components - Data Logging 9
Status Monitoring 9
Remote Control and Programming 9
Feedback Based Optimization Modules (some modules optional) 9
External Interface Options 10
5. Applying a ChangeSet 11
6. Starting POS 12
7. POS Overview 13
POS Overview Page 13
Logging on to POS 14
Precipitator Icon 16
T/R Set Icon 17
MicroRap Rapper Control Icon 18
PLC Rapper Control Icon 19
Rapper Icon 20
Performance Lane Icon 21
POS Task Bar 21
8. 3D Graph 23
Overview 23
3D Graph Parameters 25
Historical Data 25
Multiple Graphs – “Local Only” Options 26
9. Oscilloscope 27
Overview 27
Trace Options 27
Waveforms 28
Creating a Waveform Trace 29
Store and Print Oscilloscope Traces 30
10. Remote View 31
Remote Control 31

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11. Trend 32
Overview 32
PlotView Features 32
PlotView Pen Legend 33
PlotView Pen Properties 33
Scale Range and Style Options 33
Legend Value Options 34
PlotView Add Data Value Marker 35
PlotView Toolbar 36
PlotView Time Scrollbar 38
GridView Features 38
GridView Toolbar 39
Notebook Tags and Notes 39
Display the Contents of a Note 40
Adding a Note in PlotView 40
Adding a Note in GridView 40
Selecting What the Trend Window Displays 41
Export Wizard 42
12. V-I Curve 43
Overview 43
Pen Details 44
Set Axis 44
Printing V-I Curves 45
Example: 45
13. Data Log 46
Overview 46
Precipitator tab 47
Time Selector 47
Trending from the Data Log Precipitator Tab 47
Printing the Data Log Precipitator Tab 48
T/R Sets (Voltage Controls) Data Log Tab 49
T/R Set Trip Log 49
Time Selector 49
Trending from the Data Log T/R Set Tab 50
14. T/R Setup 52
Overview 52
15. Communication Status 53

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Specifications and features subject to change without notice

16. Individual T/R Set Control 54
17. Whole Precipitator T/R Set Control 54
18. Scattergram 55
19. Performance Optimization 56
Overview 56
Status Tab 57
Control Toolbar 57
Graphic Displays 57
Log Tab 58
Precipitator Tab 58
Configure Tab 59
Performance Optimization Parameters: 59
Full Power Sampling 60
Savings 61
T/R Sickness 61
Program Tab 62
Editing Individual T/R Set Setpoints 63
Editing T/R Set Setpoints by Field 63
Editing All T/R Set Setpoints 63
Adding and Deleting Steps 63
20. Start-up/Shutdown 65
Overview 65
Status Tab 66
Log Tab 67
Precipitator Tab 67
Program Tab 68
Start-up/Shutdown Wizard 69
Test Tab 74
21. T/R Set Auto Adjust 75
Overview 75
Status Tab 75
Control 75
Configuration 76
Graphical Status 77
Status 77
Log Tab 77
22. MicroRap Rapper Control Status 78

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Specifications and features subject to change without notice

Status Tab 78
Configuration Tab 79
23. MicroRap Rapper Control Configuration Wizard 80
24. MicroRap Rapper Programming 83
MicroRap Programming Wizard 85
25. PLC Rapper Programming 89
PLC Programming Wizard 91
26. Print Rapping Program 93
27. Single Rapper Activation 94
MicroRap Single Rapper Activation 94
PLC Single Rapper Activation 95
28. Rapper Opacity Plot 96
Overview 96
Data Selections 96
Opacity and Rapper Activity Graphs 97
Select Rapper Activity to Display 97
Print the Rapper/Opacity Plot 97
29. MicroRap Rapping Optimization 98
Overview 98
Rapping Optimization Control 99
Conditional Profiles 99
Configuring Rapping Optimization Profiles 100
Configure Rapping Optimization Common Parameters 101
On MicroRap Optimization Shutdown 101
On Invalid Load or Opacity Signals 101
Precipitator Power Interaction 101
MicroRap Optimization Alarm Configuration 101
30. Power-Off Rapping 102
Overview 102
Schedule Tab 103
POR Wizard 104
Configure Tab 107
31. MicroRap Specialized Rapping 109
Overview 109
Program Select 109
Sequence 110
On Time 110

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Specifications and features subject to change without notice

Repeat 111
Duration 111
Save 112
32. Failed Rapper Report 113
33. MicroRap Control 114
34. Utilities 115
35. Reporting 116
Report Wizard 117
36. Graphics 124
Overview 124
TR Set Graphics - Icons 124
TR Set Graphics - Trending 125
Rappers Graphic Options 125
Electrical Fields Graphic Options 126
Precip Icon Graphic Options 127
37. Precipitator Data 128
Overview 128
Editing Precipitator Data 129
38. Alarm Setup 130
Overview 130
Precipitator Alarms 131
Global T/R Set Alarms 132
Individual T/R Set Alarms 133
Rapper Control Alarms 135
39. Status 136
40. DCS Configuration 137
Overview 137
Status Tab 137
Configuration Tab 138
41. Start Interaction 139
Overview 139
Configuring Function Interactions 140
42. History Snapshot 141
43. Alarms Page 142
Alarm Reports 145
Alarm Details 147

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1. Software License Agreement

Precipitator Optimization System (POS) is a copyrighted software product of Neundorfer, Inc., and also contains purchased copyrighted modules. The Neundorfer Software License Agreement protecting Neundorfer and its suppliers specifies that each copy of the POS software provided by Neundorfer may be run on a single PC. Copies may be made for backup purposes only. The licensee may move, not copy, the POS software to a different PC than originally installed, but may not transfer the software to a different owner without written permission from Neundorfer, Inc.

2. Warranty Statement

a) The original manufacturer's warranty applies to all computer equipment, software and related hardware. Neundorfer, as the original purchaser of the hardware, may intervene on behalf of a customer to resolve warranty issues with the equipment. The customer is required to pay all shipping costs to and from Neundorfer incurred in resolving warranty issues with the equipment. Additional costs (including but not limited to parts and labor) not covered under the original equipment manufacturer's warranty shall be paid by the customer.

b) Neundorfer's "Standard Terms and Conditions of Sales and Service" applies to all POS equipment manufactured by Neundorfer.

c) Neundorfer does not warrant that the POS application will meet a customer's needs or that it will be free from defects.

d) Neundorfer shall not be held liable for any damages, data loss or product loss arising from a customer's use, misuse or inability to use the POS application.

3. POS Software Update & Upgrade Policy

Neundorfer also provides POS upgrades at a customer's request as they become available, for a charge. A software upgrade is defined as a major functional improvement of the software. These improvements may be in the form of add-on modules to an existing version of POS or a new version of the POS application.

POS is available through a Service Support Agreement, which includes automatic updates, automatic version upgrades, annual system evaluation, and eight hours onsite once a year for customer training and upgrades installation.

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4. POS Basics

Components of Overall System

A typical POS control system has two major components:

- The POS application software, running on a computer with Windows operating system.
- Hardware connected to the POS control system. This hardware may consist of Neundorfer equipment including MVC voltage controls and MicroRap rapper controls, high frequency T/R Set controls or other manufacturer's voltage controls, along with PLC equipment for rapping, hopper evacuation, soot blowing, and flue gas conditioning systems.

NOTE: Refer to Neundorfer MVC voltage control, MicroRap rapper control or other specific equipment user manuals for more information about these hardware components.

NOTE: Antivirus software is known to interfere with POS. If you plan to use antivirus software on your POS computer, it should be instructed not to scan the C:\VTS directory or any of its subdirectories on the hard drive. Neundorfer is not responsible for any problems that arise as a result of antivirus software being installed.

POS Communications Components

Neundorfer voltage and rapper controls are linked together with an RS-485 multi-drop network. The RS-485 interfaces are built into the controls. On POS computers, the interface may be an internal card or the output from the computer may be RS-232, which is then converted to RS-485 by an external converter. **NOTE: Refer to drawings supplied with the system for specific details about this network structure.**

Each device within a family of devices requires a unique address number on the multi-drop network. The voltage control addresses are set on the voltage control front panel and range from 1 to 255. Each rapper control also requires a unique address number from 1 through 32, and is set using the handheld programmer supplied with the control.

The POS computer is the master on each control network. It is the only device that can initiate a message. The MVC voltage and MicroRap rapper controls only send messages after being addressed by POS. Baud rate and protocol must be the same on each network. The POS computer can control multiple Neundorfer and third party networks.

When the POS computer initiates communication with a control, POS will wait for a valid response or a communications error. A communication error will occur if the addressed control does not respond within an allotted time or the message received is invalid.

For MVC4 voltage controls the data link between the POS computer and the voltage control should be a fiber optic link or other link providing electrical isolation to prevent ground loops between the MVC4 cabinets and the POS computer.

PLCs and other components may be connected via Ethernet or additional serial links with the POS computer.

Many POS software modules require external signals provided by other plant systems. These inputs can be hardware wired electrical signals (such as a 4-20mA input) or digital communications (such as OPC or Modbus protocols). How these signals are brought into POS is very plant-dependent and therefore customized for your installation. Custom drawings are provided for each specific installation.

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POS Software Components - Data Logging

POS is configured to log the following information on the hard drive:

- Voltage control operating parameters including primary and secondary voltages, power level, control status (communication error, running, tripped, and off.), spark rate, operating mode and IE ratio along with all Voltage control parameters, limits, and set points
- Precipitator data including average and totals of voltage control operating parameters, and power optimization information
- Rapper actuations and rapper control actions such as program changes
- Unit Load, Stack/Duct opacities, other auxiliary analog and/or digital inputs
- All actions for all Optimization Modules
- Soot blower actuations

Actual data logged in your system will vary depending on which modules were purchased and how the system is configured.

Status Monitoring

POS monitors the status of individual voltage controls, rapper controls and each rapper in the system, and displays information about these components in various methods:

- Overview screens (customized to reflect actual layout of the unit(s) being monitored) show color-coded components for quick status check along with rapper program information.
- Remote Face Panel, Data Log, Historical Trend, and other windows show the voltage controls' and precipitator operating parameters, including control limits or set points.
- 3D graph representation shows a plan view of the precipitator, displaying parameters for each voltage control. Useful for locating problem fields and verifying control setup parameters.
- POS also can display the status information of soot blowers, hopper evacuation systems, rapper motors and flue gas conditioning systems.

Remote Control and Programming

POS can be used for remote control and programming voltage and rapper controls:

- Start, stop and reset voltage controls
- Access all control face panel functions using remote view
- Change the rapper control's active program, suspend/ resume rapping, reset failed rappers and rapping alarms
- Rapper control programming to create, modify and save unlimited rapping programs for later transfer to any of six MicroRap program slots
- Control soot blowers, hopper evacuation systems, and flue gas conditioning systems

Feedback Based Optimization Modules (some modules optional)

"Performance Optimization" automatically adjusts the voltage control's secondary current limit by a user set percentage of nameplate current rating. T/R Set power is incrementally adjusted to ensure the most appropriate power is being applied to the precipitator based on stack opacity and unit load or stack opacity and precipitator power.

"MicroRap Optimization" allows POS to automatically switch rapping programs based on process conditions defined by the user.

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"Power-Off Rapping" can automatically reduce the power to an electrical section and simultaneously cause the rappers to rap that section, ensuring the best cleaning in difficult resistivity situations.

"Start-Up/Shut-Down" watches input signals from the process to determine which T/R Sets should be energized and at what power level to ensure the precipitator is functioning as well as it can during the beginning and end of unit outages.

"T/R Auto-Adjust" can broadcast update parameters to all voltage controls to adjust a limit or set point based on changes in process conditions.

"SO_3 Optimization" adjusts parts per million (PPM) of SO_3 injection. POS monitors precipitator performance and, when conditions warrant, adjusts PPM. This system requires an interface to the SO_3 controls.

External Interface Options

All the information POS gathers from the voltage and rapper controls, as well as any other systems connected to POS, can be made available to large control systems such as a plant wide DCS system (Ovation, Foxboro, Honeywell) or historian such as OSIsoft PI.

POS can communicate using many protocols including OPC, ModBus RTU, ModBus+, ModBus TCP/IP, Allen-Bradley DF1, Allen-Bradley DH+, and GE Series 90 TCP/IP.

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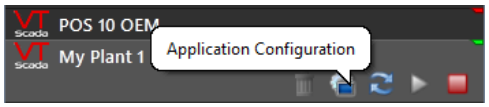
5. Applying a ChangeSet

POS software comes pre-installed on the POS computer. There are instances when a change may be required for your plant's POS 10 application and Neundorfer will send a ChangeSet file containing the updates. By applying the ChangeSet to your application, the changes will be implemented instantly. A ChangeSet file can have either a ".changeset" or ".snapshot" file format.

Applying a ChangeSet Steps:

1) In the VTS Application Manager, stop your plant's application by clicking the red stop button
2) Click on the **Application Configuration** for your plant's application
3) Provide login credentials for POS with the administrator privilege
4) After the Application Configuration window appears, click **Apply ChangeSet File** in the left column
5) Click **Select** in the lower right corner of the Application Configuration window
6) In the Windows Explorer window that opens, navigate to the location of the ChangeSet file, click the file and click **Open** (or double-click the file)
7) VTScada will then ask how to resolve conflicts should the arise. The options are:
    - Use ChangeSet revision – If a conflict occurs that can't be otherwise resolved, use the changes in the ChangeSet, and over-write your local changes.
    - Use local changes: discard ChangeSet changes – If a conflict can't be otherwise resolved, use your local changes, and ignore the changes in the ChangeSet. They will not be applied.
8) After selecting the conflict resolution option, click **OK** and the ChangeSet will be applied. "Operation Completed" will be displayed in the bottom center of the Application Configuration window
9) Close the Application Configuration window and back in the VTS Application Manager window, you can restart your plant's application. Click the green play button to start the application.



VTS APPLICATION MANAGER APPLICATION CONFIGURATION

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6. Starting POS

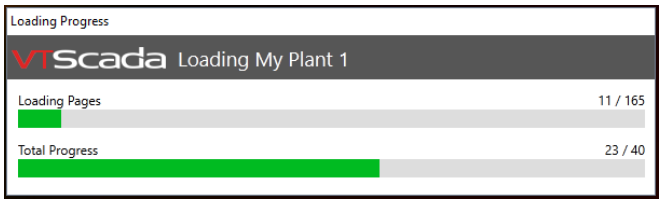
POS is designed to run continuously and can be installed as an interactive program or a Windows service. Installing as an interactive program requires a user logon. Logon rights are site specific but usually "Users" rights are sufficient for all normal POS functions so long as the "Users" group may read/write to C:\VTS*. Domain auto logoff's should not be enabled.

POS can be installed to run as a Windows service. Once installed, it can be stopped and then re-started as either a service or interactive program. The service will automatically start when Windows starts, with a short delay configured by default. When running as a service, all operational access is done through another workstation with POS & VTScada installed running as an interactive program, or through VTScada Thin Client connections. Your Windows account must have administrative privileges to issue service commands.

1) From the Windows desktop, double-click the VTS icon.

2) Highlight your plant's POS 10 application in the VTS Application Manager menu and click the Start button.

VTS APPLICATION MANAGER
START APPLICATION BUTTON



APPLICATION LOADING AND INITIALIZATION

Once your plant's application is started, you will see the loading and initialization displays.

When the application is completely loaded it will display the overview screen.

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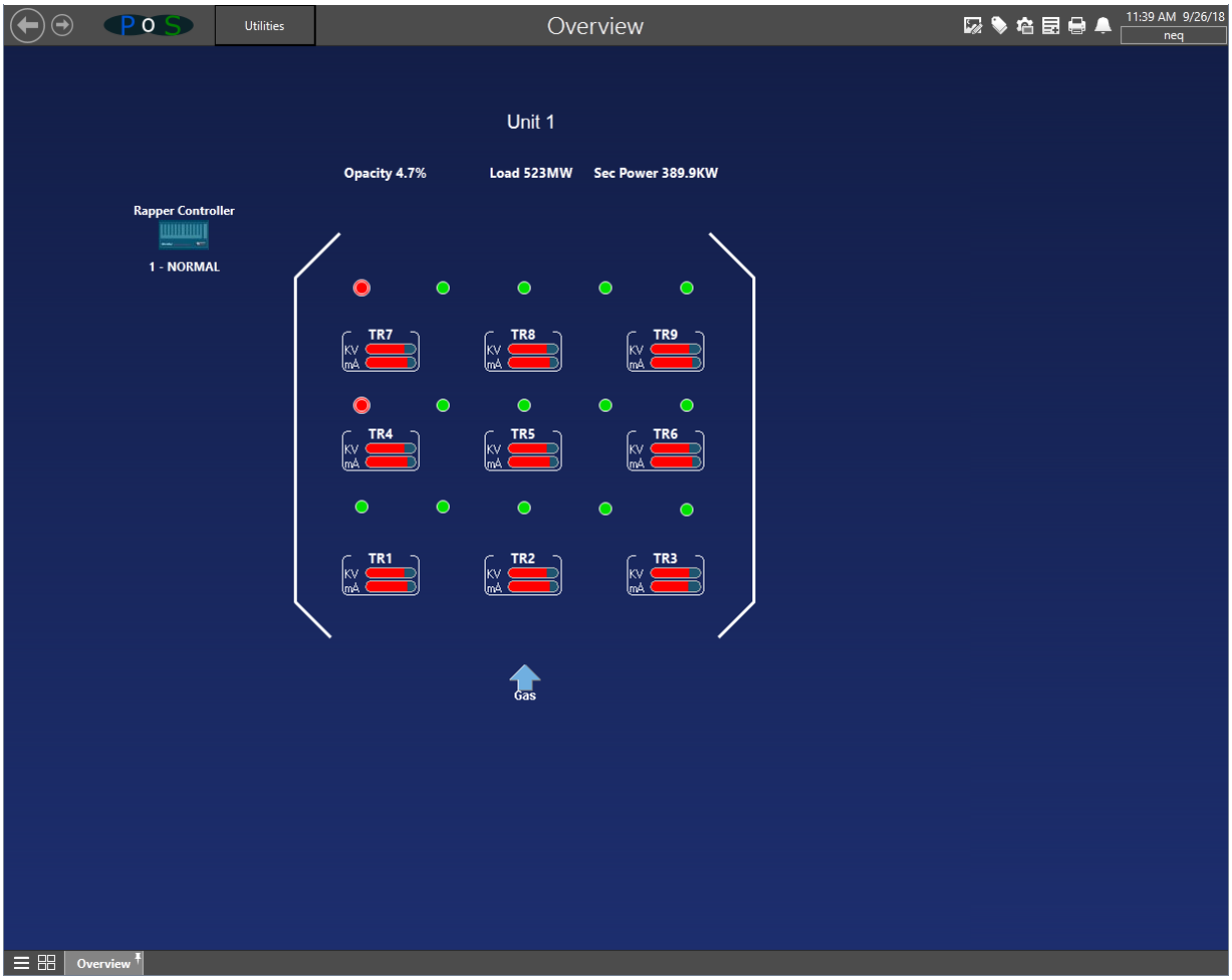
7. POS Overview

POS Overview Page



POS OVERVIEW PAGE

The overview page shows a plan view of the precipitator. There should be a plan view configured for each precipitator in your system. Small precipitators may allow more than one precipitator plan view on a single overview page. Large precipitators may require more than one page to display the entire plan view.

Your overview page(s) may include additional icons, data displays, controls for ash collection, SO_3, PLC rapping controls, and other process information and controls.

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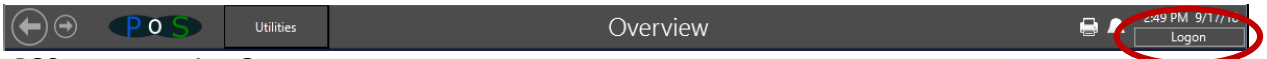
Logging on to POS

Many POS features and functions are based on the privileges of the user logged into the software. Depending on the privileges configured for each user, some options may not be available after logging in with a different User account.

Follow these instructions to log on to POS:

1) Click the Log On button in upper right-hand corner of the page.

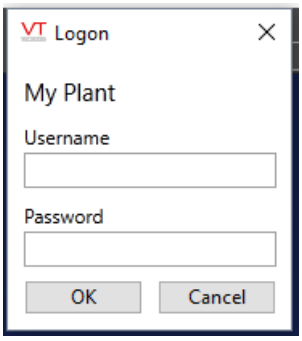


POS PAGE HEADER LOG ON BUTTON

2) Type your username in the Username field.

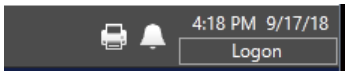
3) Type your password in the Password field.

Click the OK button or press the Enter key on your keyboard.

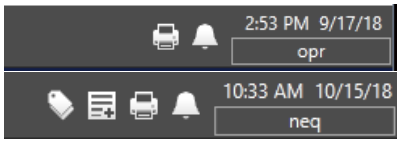


LOGON WINDOW

After you have logged on, the Logon button changes to a button with the username displayed. The icons to the left of the time and date may change based on user privileges. To log off, click the username button and then click Log Off.



PAGE HEADER BEFORE LOG ON

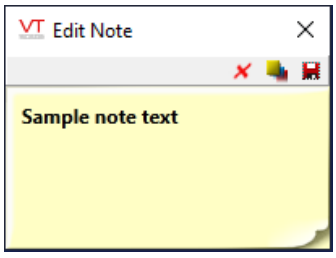


PAGE HEADER AFTER LOG ON

The buttons to the left of the Logon/Username button are the *Tag Browser*, *Add Page Note*, *Print Screen* and *Alarms* (from left to right). The *Tag Browser* simply brings up a dialog box showing all tags.

The *Add Page Note* will add a note directly to the current page. Clicking the red "X" icon will delete the note. Clicking the floppy disk icon will save the note to the screen. The middle button opens the *Page Note Properties* dialog box.

Adding a note to the current screen will dynamically add a new *Show/Hide Page Notes* button to the tool bar. This will show/hide the page notes from view on the current screen.



PAGE NOTE

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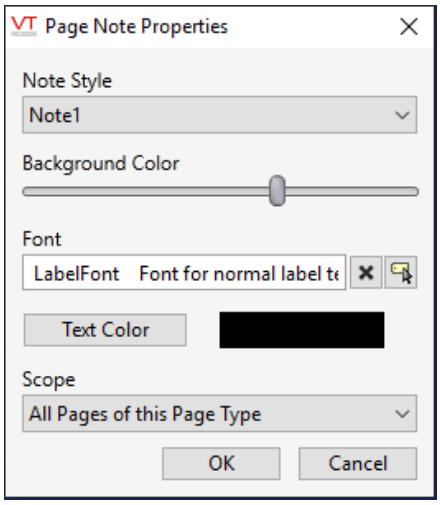

PAGE NOTE PROPERTIES

Print Screen will bring up a confirmation dialog to print the current screen in view.

Alarms will open the Alarms page. See Section 43 for more information.

An unlimited number of User Accounts can be created in the software to allow everything from View Only access, Control Operation, or Full Control and Programming and Optimization privileges. Most applications have at least an Operator Level User Account to start and stop T/R Sets and acknowledge alarms and a Super User Account with configuration and account set-up privileges.

Note: Contact Neundorfer for information about creating User Accounts and modifying User Account Privileges.

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Precipitator Icon

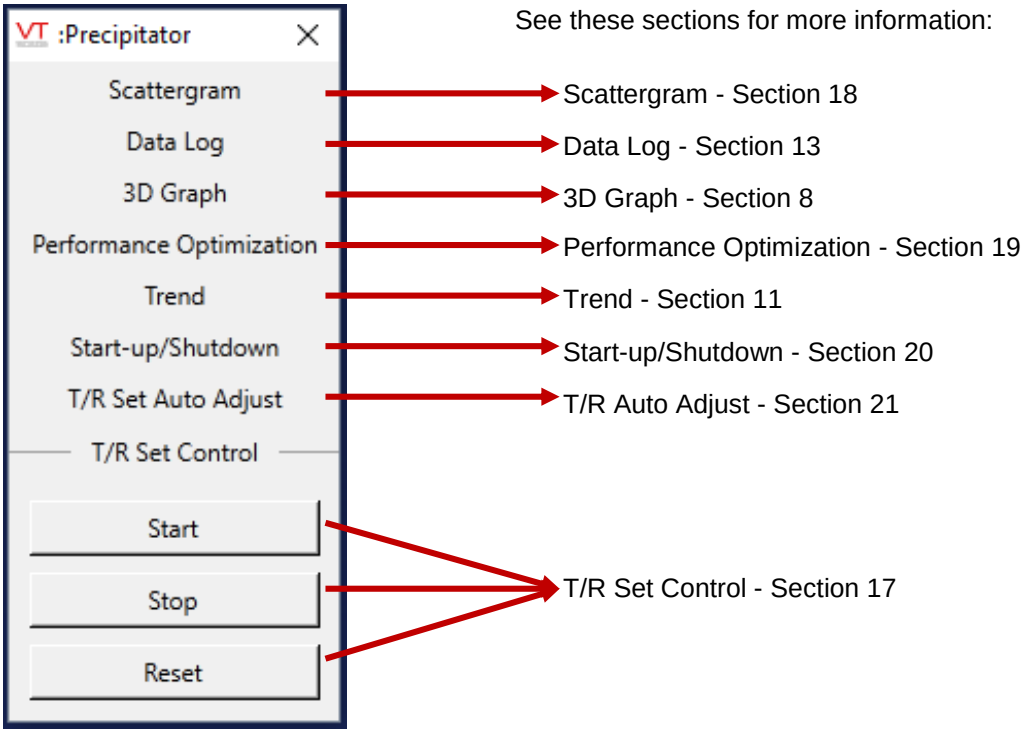
On each precipitator plan view page is a section with the precipitator unit name and a display of live data. This area is referred to as the precipitator icon.

PRECIPITATOR ICON

The data that the precipitator icon displays can be customized for each User Account. (See Graphics - Section 36)

NOTE: Power and other values displayed on the precipitator icon are for the entire precipitator, not just the controls displayed on that particular page.

Click on the precipitator icon to open the menu as seen below. This menu gives you access to many control functions and diagnostics screens for the precipitator.



PRECPITATOR MENU

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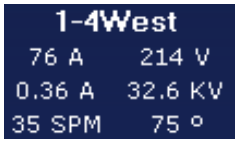
T/R Set Icon

On plan view pages, each T/R Set is represented by an icon. While the T/R Set is energized the icon will display live T/R operating data in graphically or numerically.

POS automatically determines if the T/R Set is single or dual bushing, and adjusts the standard icon to display one or both KV feedback signals.

Icon style and data grid display parameters can be customized for each User Account. (See Graphics - Section 36)

STANDARD T/R SET ICON

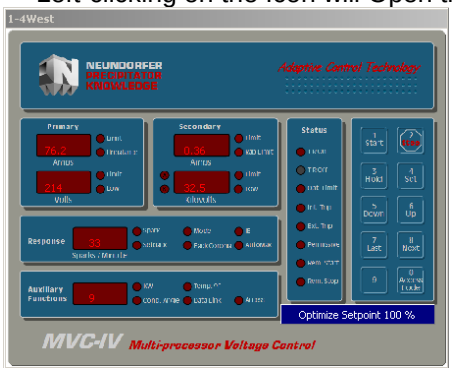


DATA GRID STYLE T/R SET ICON

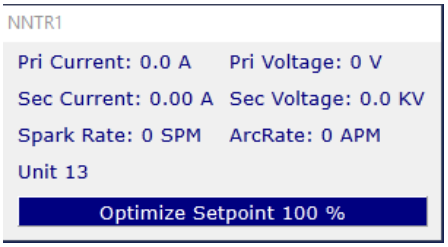
If the voltage control has tripped the T/R Set the icon will display “Tripped”. If the T/R Set is not energized the icon will display “Off”. The icon will display “Com” if a communications error exists with the voltage control.

Mouse over the T/R Set Icon to see a Pop-Up display of the voltage control face panel. For Non-Neundorfer controls (such as High Frequency T/R Sets) a generic display will appear.

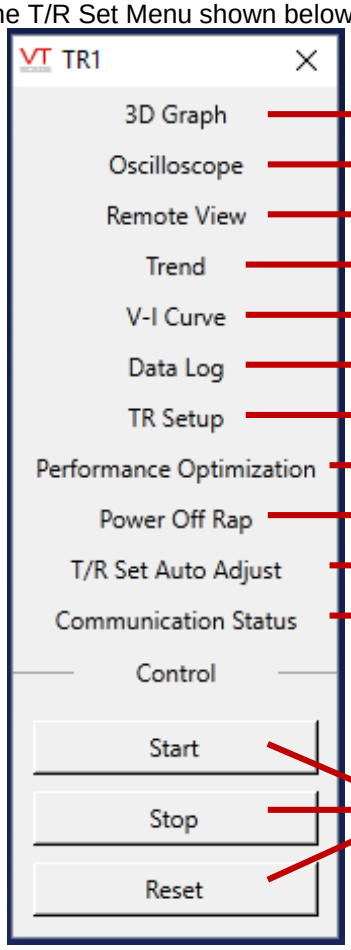
Left-clicking on the Icon will Open the T/R Set Menu shown below.



MVC4 POP-UP



NON-NEUNDORFER CONTROL POP-UP



T/R SET MENU

See these sections for more information:

- 3D Graph - Section 8
- Oscilloscope - Section 9
- Remote View - Section 10
- Trend - Section 11
- V-I Curve - Section 12
- Data Log - Section 13
- TR Setup - Section 14
- Optimization - Section 19
- Power-Off Rapping - Section 30
- T/R Set Auto Adjust - Section 21
- Comm Status -Section 15
- T/R Set Control - Section 16

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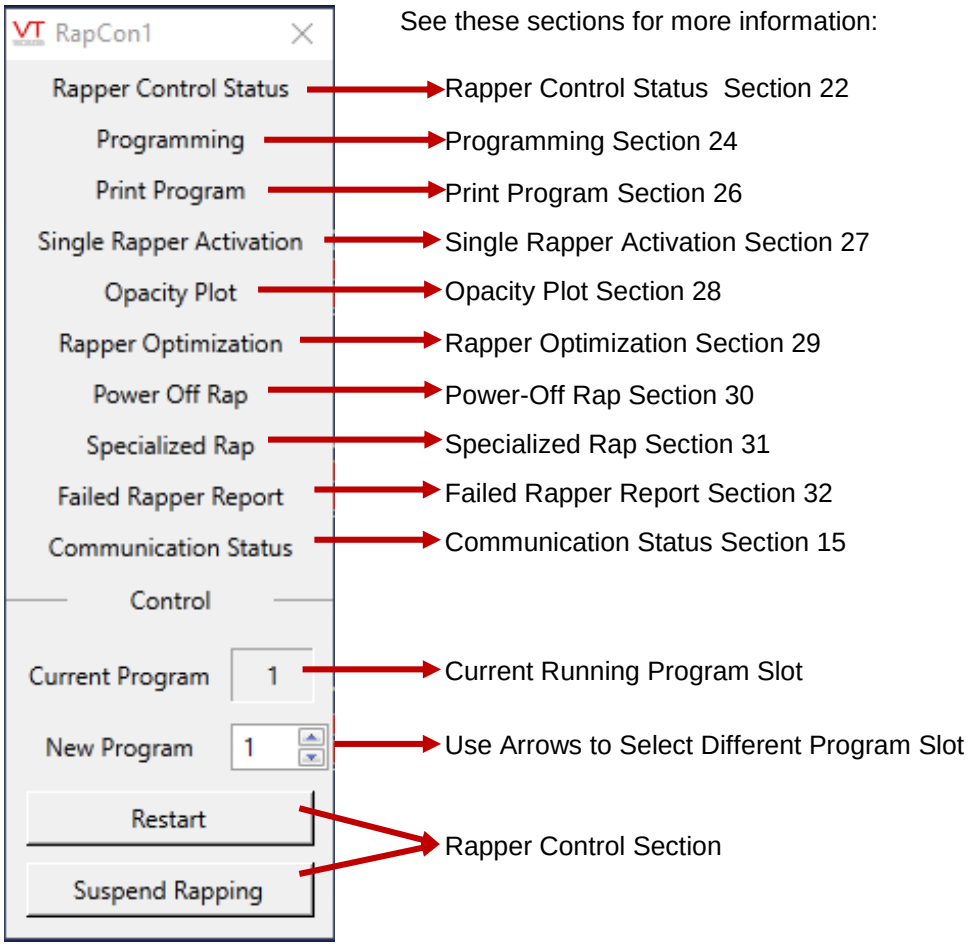
MicroRap Rapper Control Icon

If Neundorfer MicroRap rapper controls are configured on your POS software you will see MicroRap icon(s) on the page. Above the icon is a description of the rapper control. Below the icon the current rapping program slot number and program name are displayed. The Rapper Control will display the word "Suspended" while rapping is suspended and "Comm Error" if POS loses communications with the control.

MICRORAP CONTROL ICON

Left-clicking on the Rapper Control icon opens the rapper control menu, shown below.



RAPPER CONTROL MENU

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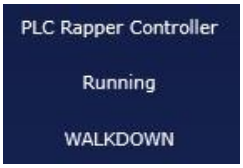
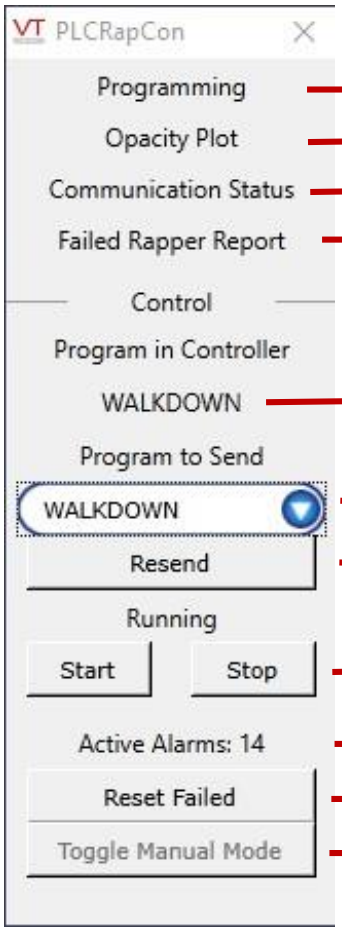
PLC Rapper Control Icon

For PLC rapper controls configured on POS software there is a PLC rapper control icon(s) on the page. Above the icon is a description of the rapper control. Below the icon the current rapping program name is displayed. The Rapper Control will display the word “Running” while running, “Stopped” while rapping is suspended/stopped and “Comm Error” if POS loses communications with the control.



PLC RAPPER CONTROL ICON

Left-clicking on the Rapper Control icon opens the rapper control menu, shown below.



RAPPER CONTROL MENU

See these sections for more information:

- Programming → PLC Programming Section 25
- Opacity Plot → Opacity Plot Section 28
- Communication Status → Communication Status Section 15
- Failed Rapper Report → Failed Rapper Report Section 32
- WALKDOWN (Program in Controller) → Current Running Program Name
- WALKDOWN (Program to Send) → Program to Send Dropdown
- Resend → Resend/Send Program to Control Button
- Start / Stop → Start/Stop Rapping Program Buttons
- Active Alarms: 14 → Number of Active Alarms (Failed Rappers)
- Reset Failed → Reset Failed Rappers Button
- Toggle Manual Mode → Toggle Manual Mode Button – Manual Mode allows motors to operate without time constraints. Can only be enabled if the PLC is stopped and in Remote.

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Rapper Icon

Rapper types on plan view pages typically are represented by shape:

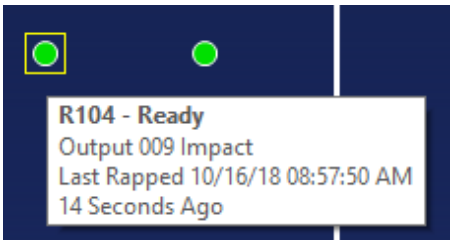
●	Plate (collecting electrode) rapper
■	Wire (discharge electrode) rapper
◆	Other types of rappers (such as inlet and outlet baffle rappers, and sonic horns)

Rapper status is color-coded:

Green	Ready to rap
Red	Has rapped
Magenta	Rapper failed—shorted
White	Communication error between POS & control
Yellow	Rapper failed—open

Rapper status colors are customized for each installation. Colors may be different on your POS configuration.

Mouse over a rapper icon to display its name, state, output number, type, and status.



RAPPER ICON POP-UP

Left-click on a rapper icon to open its *Single Rapper Activation* window. (See Section 27.)

SINGLE RAPPER ACTIVATION WINDOW

Other rapping devices and statuses from other sources like PLC's may be configured on your POS. These icon shapes, colors, popups, and other properties are site specific.

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Performance Lane Icon

If Performance Lanes are configured on the POS software you may see Performance Lane icon(s). Performance Lanes use sophisticated modeling algorithms and live TR Set readings along with process data to estimate the efficiency of a series of electrical sections in the precipitator. The icon can display values such as Efficiency, Mass Emissions, Lane Power, or Corona Power. The icon will display the text "Running" while it is calculating values.

PREFORMANCE LANE ICON

Left-clicking on the Performance Lane icon launches a trend window with related information

POS Task Bar

The familiar task bar in the lower left-hand area of POS has changed. The POS Task Bar is split between the upper left-hand area and the lower left-hand area. These areas contain icons for accessing tools and information.

UPPER LEFT-HAND TASK BAR

Click to navigate forward and back between viewed pages

Click to open the *Utilities* window (Section 34)

LOWER LEFT-HAND TASK BAR

The 'hamburger' icon will bring up a text list of available pages. The 'four square' icon will show a zoomed-out overview menu of all available pages.

Pinned Pages will display with an 'x'

Unpinned Pages will display with a pin icon. Unpinned pages will only show here when they are currently in view

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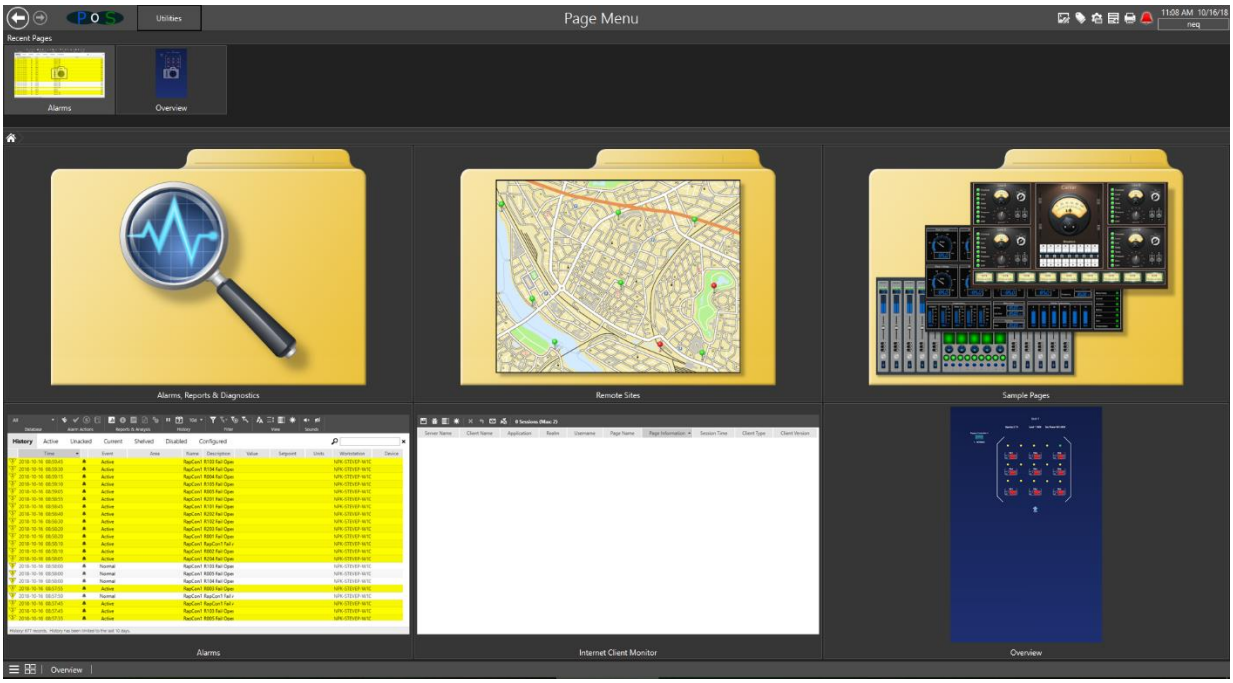
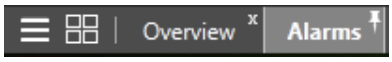


ZOOMED-OUT MENU PAGE

Configuring Page Icons:

Use the Pin icon button in the upper right-hand corner of the page name in the lower left-hand corner of the screen to pin pages to the task bar. Use the 'x' icon to remove the pin. Some configurations may not have the Add/Remove Page buttons.



ADD/REMOVE PAGE ICON SAMPLES

To add a page to the task bar, click on the Menu icon and select the page you wish to add, then click the Pin icon. The tab for that page will now appear in the taskbar.

To remove a page from the task bar, click on the 'x' Remove Page button. The page icon will no longer appear in the task bar when not active but it can still be accessed by clicking on the Menu icon and selecting the page. When the page is the active and in view, it will appear as a tab in the list.

POS remembers page icon preferences for each User Account. Different Users may have different Page Icons displayed when they are logged in.

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8. 3D Graph

Overview

Access the **3D Graph** from the precipitator menu or the T/R Set menu: on the plan view page, click on the Precipitator icon or any T/R Set icon and then click 3D Graph.

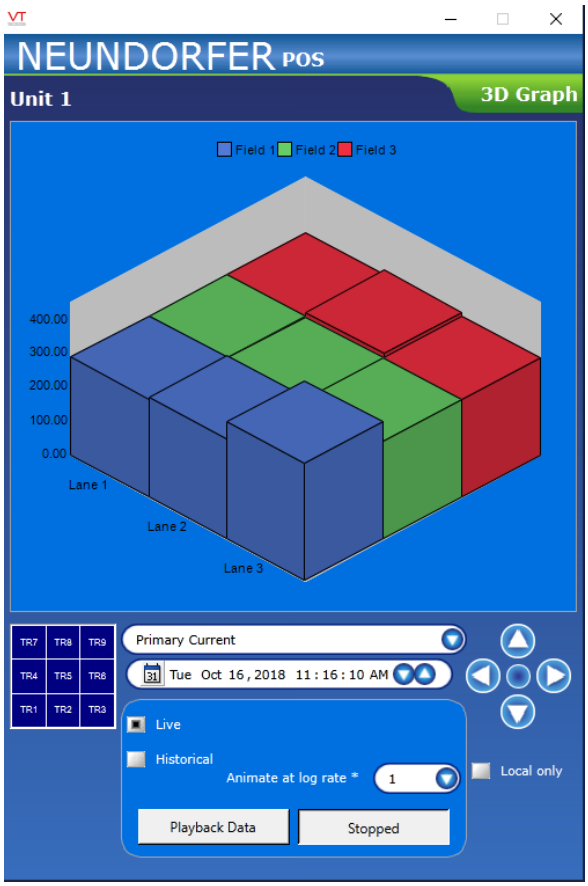
In the **3D Graph** window, the area powered by each T/R Set (electrical section) may be represented by one or more bars. Refer to the plan view representation (small blue box on left-hand side, underneath the graph).

In the example shown here, the inlet mechanical field is sectionalized into four electrical sections, each powered by its own T/R Set. Each of the four blue bars represents one of these electrical sections. The second, third and outlet mechanical fields, however, are divided into two electrical sections each. Each electrical field is represented by two bars that are linked together.

The default 3D graph parameter is Primary Current. When the **3D Graph** window is closed, graphs hold their position for the next time it is opened.

The 3D graph can display many different parameters. Use the dropdown menu to select the desired parameter. See page 23 for a list of available parameters.

Use the four arrow buttons to rotate the 3D bar graph. To return the graph to the center position, click on the circle in the center of the arrows.



3D GRAPH WINDOW

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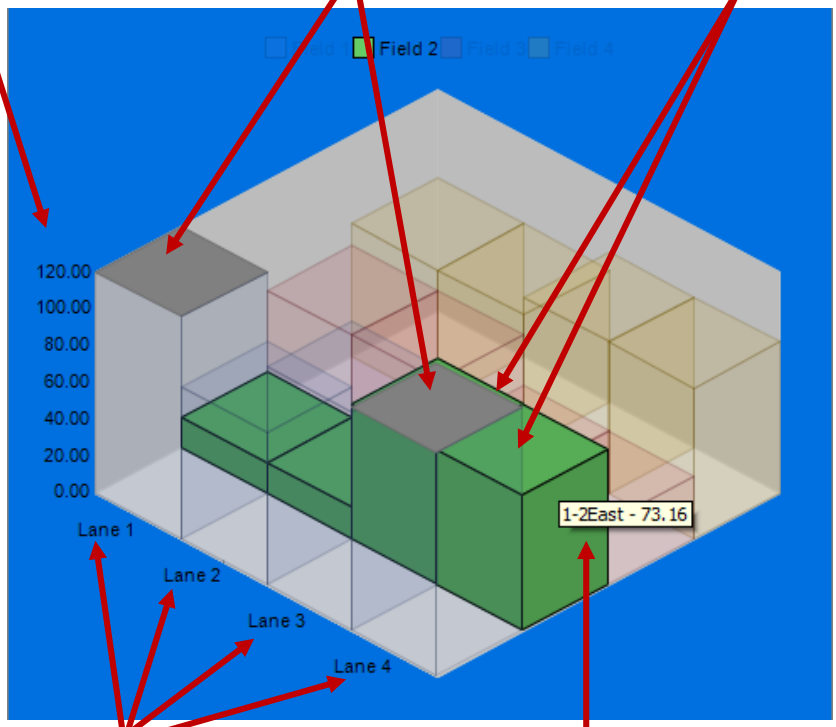
If you mouse over an electrical section in a row of the graph, the rows behind and/or in front of it become transparent, changing the view to something like the example screenshot shown below. In this case, the mouse is hovered over the electrical section powered by T/R Set 1-2East (in the second mechanical field), which at that point in time was running at primary current of 73.16 amps.

The Y-Axis scale may be different for each parameter. It is based on limit set in the voltage control.

These electrical sections (1-1AWest and 1-1BEast in the inlet mechanical field) are running above set limit of the selected parameter (here, primary current)

Electrical field powered by T/R Set 1-2East



Lanes

Name of T/R Set and value of selected parameter (here, primary current)

3D GRAPH WINDOW: MOUSING OVER AN ELECTRICAL SECTION

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3D Graph Parameters

Live data 3D graphs are available for 24 different parameters. In the list below, parameters with a red **H** next to them can also be viewed as historical data 3D graphs.

H	**Primary Current**	Primary current of the precipitator's T/R Sets
H	**Primary Volts**	Primary voltage of the precipitator's T/R Sets
H	**Secondary Current**	Secondary current (mA) of the precipitator's T/R Sets
H	**Secondary KVa**	Secondary voltage (kV) of the T/R Sets' A bushing
H	**Secondary KVb**	Secondary voltage (kV) of the T/R Sets' B bushing
H	**Primary KW**	Primary kilowatts of the precipitator's T/R Sets
H	**Secondary KW**	Secondary kilowatts of the precipitator's T/R Sets
H	**SCR Angle**	Conduction angle of the T/R Sets' silicon controlled rectifiers
H	**Actual Sparks/Min**	Sparks per minute rate at which ESP fields are operating
H	**Sparks Sensitivity**	How the voltage control responds to sparking
H	**Optimization Percent**	Level that Optimization is set to
	Secondary Current Limit	Secondary current limit set for each voltage control
	Primary Current Limit	Primary current limit (mA) set for each voltage control
	Primary Over Volts Limit	Primary over-voltage limit set for each voltage control
	Primary Under Volts Limit	Primary under-voltage limit set for each voltage control
	Secondary Current Limit StPt	Secondary current limit (mA) set by POS
	Rap Limit	Secondary current limit set for power-off or reduced rapping
	Secondary KV Limit	Secondary kilovolt limit for each voltage control
	Spark per minute setpoint	Sparks per minute set point for each voltage control
	Spark Response Mode	Spark mode set for each voltage control
	SCR Cond angle Limit	Conduction angle limit set for each voltage control's SCR
	T/R Set Device Number (Aux)	Address of each voltage control
	Full Scale Secondary Current	Full scale secondary current (mA) for each voltage control
	Secondary Current Density	Ratio of secondary current over collecting plate size

Historical Data

Use the dropdown menu to select the desired parameter. In the screenshot shown below (next page), the parameter is Secondary KVa.

Use the time entry to select the desired time. Click on any component of the date and time (day of week, month, day, year, HH, MM, SS) to select it and then use the up and down arrows to right of the date/time field to move backward or forward in time. Repeat as needed to set desired date and time.

To animate historical data, select a playback rate from the Animate at log rate * dropdown menu; a log rate of 1 it will take much longer to play back data from the same period than it will at a log rate of 10.

- 1 = Show the data points that were captured every 5 seconds
- 2 = Show the data points that were captured every 10 seconds
- 5 = Show the data points that were captured every 25 seconds
- 10 = Show the data points that were captured every 50 seconds

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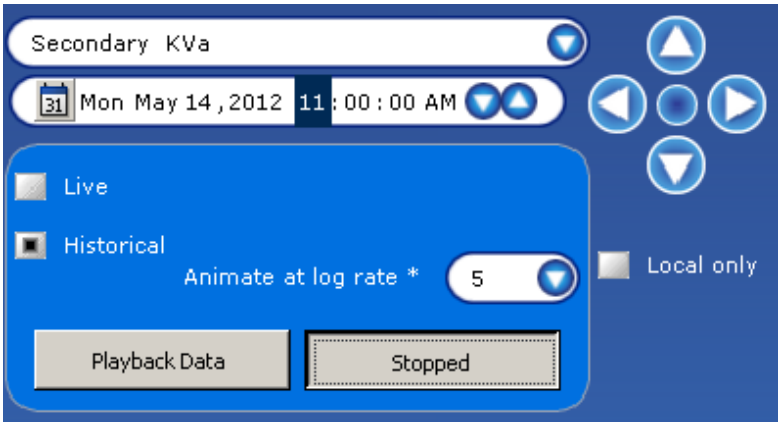
Click the Playback Data button to animate the graph. While animated it will show changing data starting at the date/time selected, for the selected parameter at the selected log rate. In the screenshot below, when Playback Data is clicked the graph will show Secondary KVa data points that were captured every 25 seconds starting at 11:00 AM on May 14, 2012.



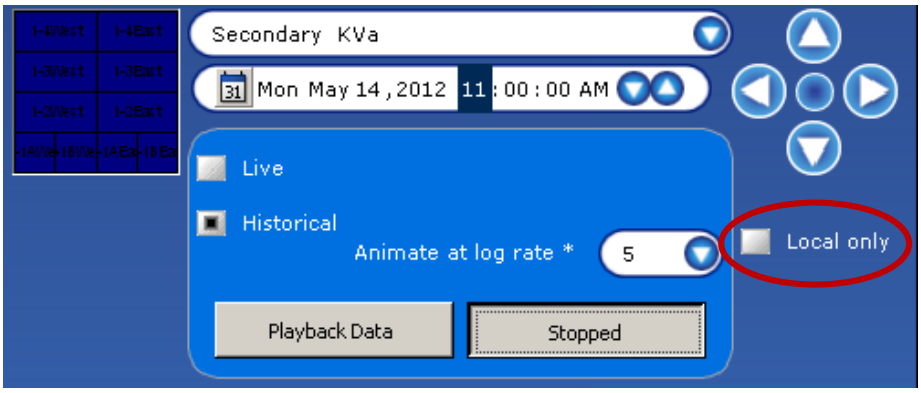
SECTION OF 3D GRAPH WINDOW

Once playback begins, the Playback Data button changes to the Playing button. To pause playback, click the Stop Playback button.

To switch back to live view of data for the selected paremeter, click the Live checkbox button.

Multiple Graphs – "Local Only" Options

It is possible to have multiple **3D Graph** windows open at the same time. By default, when changes are made in one **3D Graph** window (graph orientation, historical data playback), they also change displays in the other open **3D Graph** windows. To make changes that affect only the window you are working with, first click the Local only box.



"LOCAL ONLY" BUTTON IN THE 3D GRAPH WINDOW

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9. Oscilloscope

Overview

The **Oscilloscope** window displays traces similar to those captured by a digital oscilloscope. This provides a way to check how well a given T/R Set is performing and contributing to overall precipitator performance, by looking at the shape of the electrical waveforms.

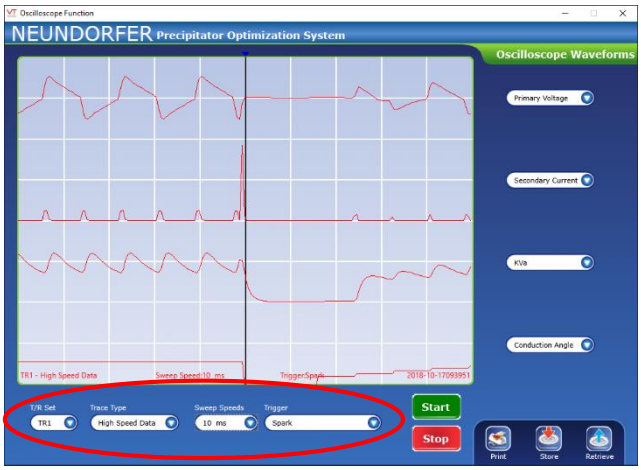
To access the Oscilloscope window: click any T/R Set icon and then click Oscilloscope.

Trace Options

Trace options are selected with dropdown menus located at the bottom of the window.

- *T/R Set* – The T/R Set that launched the oscilloscope becomes the default. However any other T/R Set can be "scoped" by picking it from the dropdown.
- *Trace Type* – choses input signal pen properties:
  - Primary Averages captures high resolution readings form the primary and secondary side of the T/R Set.
  - KvMin/Max plot half cycle minimum and maximum secondary voltage values
  - High Speed Data displays traces like a traditional oscilloscope
- *Sweep Speeds* – selects the sampling sweep rate. The vertical grid lines on the graph represent the sweep speed. Sweep speed selections vary by trace type
- *Trigger* – selects the event that will cause the waveforms to be captured from the control.

NOTE: The scope trace generation is event-driven. The user must select a trigger event that actually occurs in the voltage control for data capture to begin and be transferred to POS.



TRACE OPTIONS

Primary voltage goes over limit
Primary current limit is reached
Secondary current limit is reached
Secondary KV limit is reached
Conduction angle limit is reached
A spark occurs in the electrical segment
The T/R Set trips

TRIGGER OPTIONS

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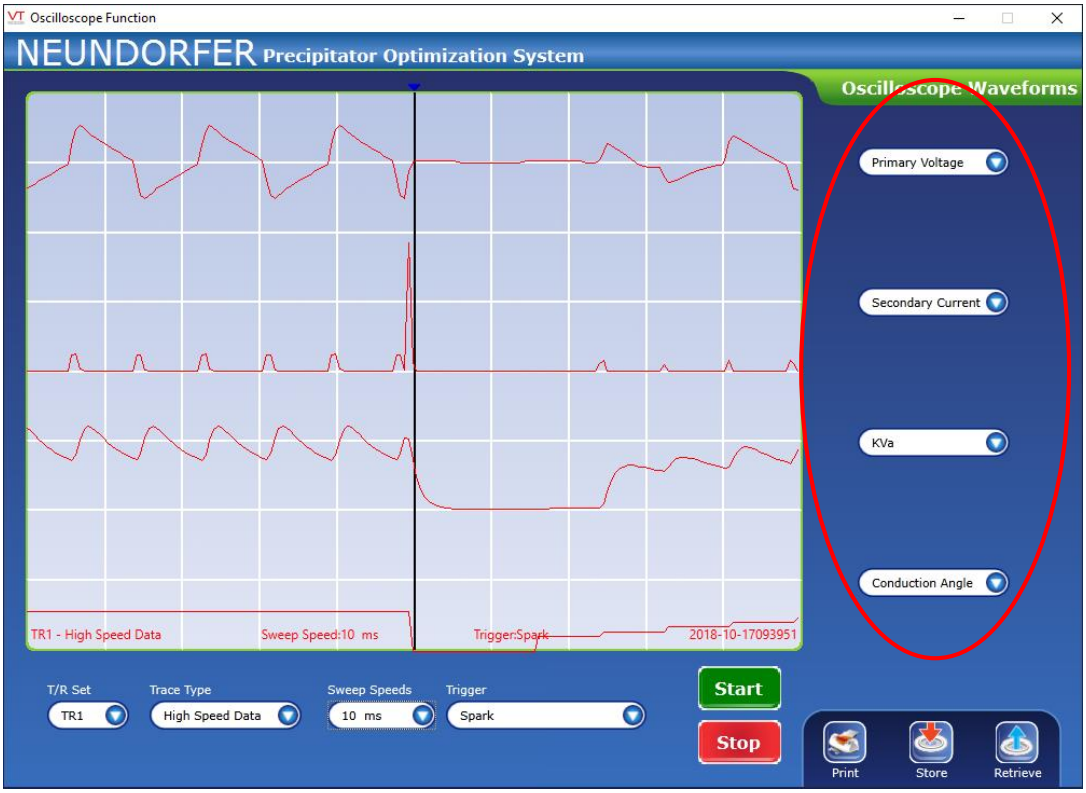
Waveforms



WAVEFORMS

Four selectable waveforms are shown on every graph, each one representing an input signal chosen from the dropdown menu to the right of the waveform. The input signals in these dropdown menus change depending on Trace Type. The table below lists which *Waveform* input signals can be included with each trace type:

Waveform Input Signal	Trace Type		
	Primary Averages	***KV Min/Max***	***High Speed***
Primary Voltage	Included		Included
Primary Current – (amps)	Included		Included
Secondary Current – (mA)	Included	Included	Included
KVa – voltage on secondary A bushing			Included
KVb – voltage on secondary B bushing			Included
Conduction Angle	Included	Included	Included
SCR On Status – internal sensor state on control	Included	Included	Included
KVa Max – Max KV during each half-cycle on A bushing		Included	
KVb Max – Max KV during each half-cycle on B bushing		Included	
KVa Min – Min KV during each half-cycle on A bushing		Included	
KVb Min – Min KV during each half-cycle on B bushing		Included	
Peak Spark Sensing – Internal value read from the voltage control	Included	Included	Included

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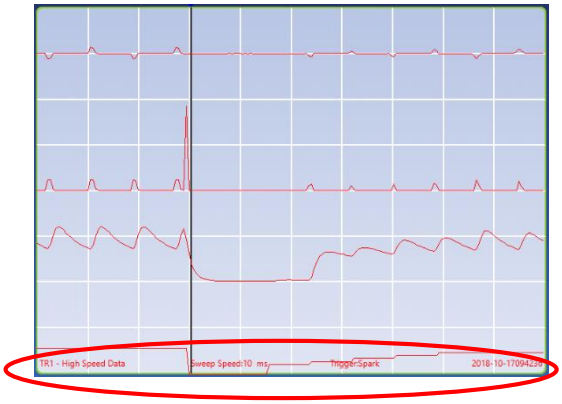
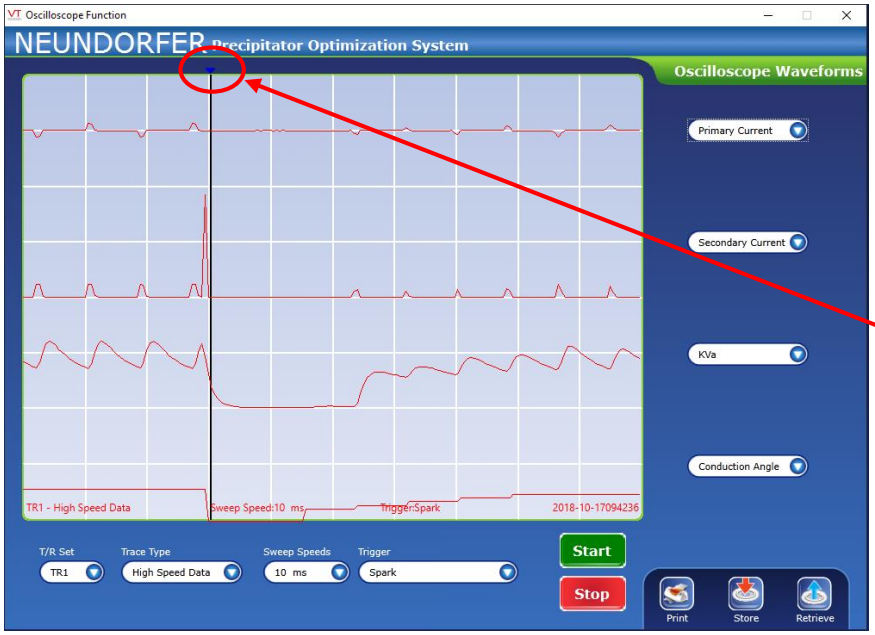
Creating a Waveform Trace

1) Select the parameters for the Scope Trace:
    a. T/R Set
    b. Trace Type
    c. Sweep Speed
    d. Trigger
2) Click ***Start***. You can abort the trace anytime by clicking ***Stop*** again
3) The waveforms will only appear after the trigger event occurs. For Example, if you select spark for the trigger, the trace will not appear until the voltage control senses a spark. If conduction angle is selected for the trigger and the T/R Set is always being limited by secondary current then the trigger will not be reached.



TRACE HAS BEEN TRIGGERED WHEN TEXT IS RED



The trigger point for the scope trace is indicated by a solid black line. The trigger point can be moved before or after the trace is generated by clicking and dragging the blue triangle at the top of the line.

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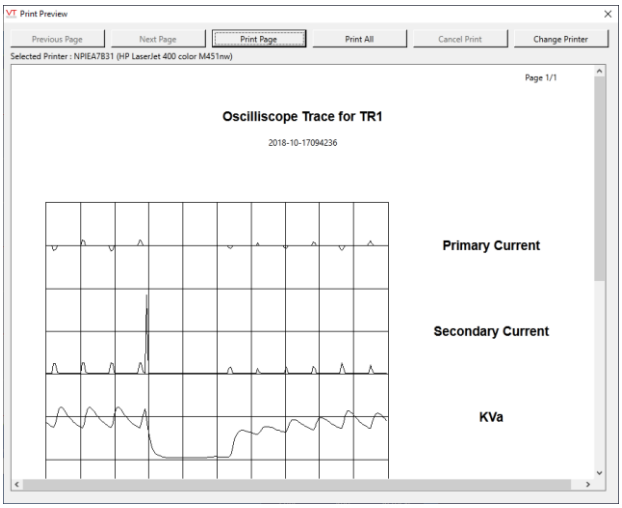
Store and Print Oscilloscope Traces

Oscilloscope Traces can be printed or stored to be viewed at a later date.

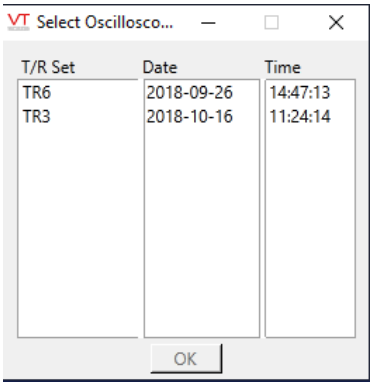
Click the Print button to send the image on the screen to a print preview window. The scope trace can be printed to any printer from the preview window

Click the Store button to save a .CSV file of the trace data to ..\Oscope directory in the POS Application Folder on the hard drive.

Click the Retrieve button to retrieve and display a previously saved scope trace.



PRINT PREVIEW WINDOW



RETRIEVE SCOPE TRACE WINDOW

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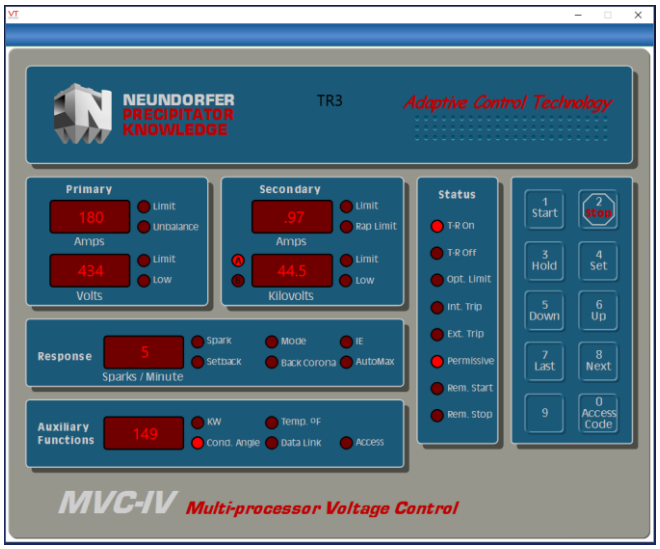
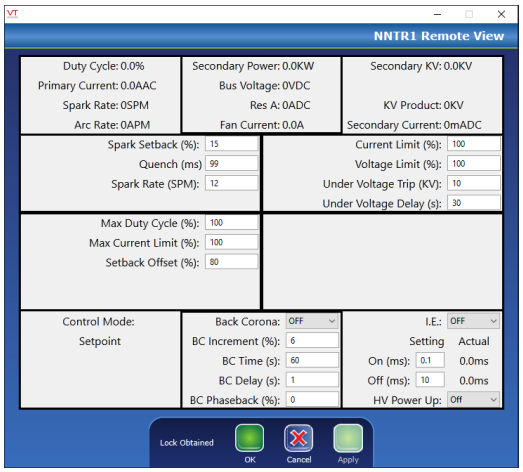
10. Remote View

This POS function displays a window showing a faceplate panel with a live display. For Neundorfer controls the actual MVC display will display exactly what the local display does. For Non-Neundorfer controls there is a collection of gages that show live operating data.

Access **Remote View** from the T/R Set menu: click on the T/R Set icon then click *Remote View*.



NEUNDORFER MVC4 REMOTE VIEW



NON-NEUNDORFER TR SET REMOTE VIEW

Remote Control

The buttons that appear in the **Remote View** for Neundorfer MVC controls are live. All users have access to the next and last buttons to scroll through the MVC parameters. User Accounts with Remote Control privileges will have access to all of the buttons and are able to modify control limits and set points.

Note: The MVC Control must be set up for remote access to allow POS users to modify limits and setpoints through the Remote View window. See MVC manual for information on enable remote access.

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11. Trend

Overview

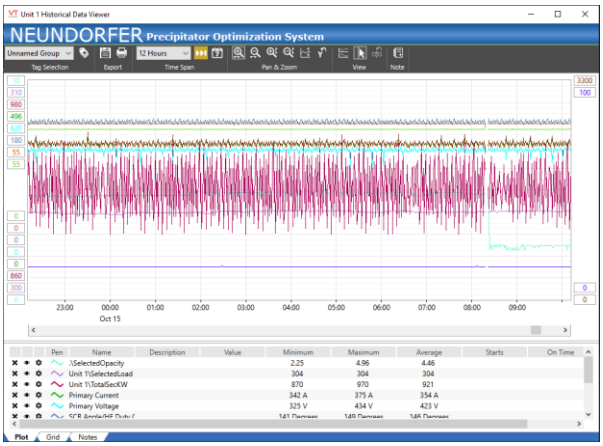
Trend windows are a way to view logged historical data. POS logs information for all precipitators, T/R Sets, rapper controls, digital and analog inputs, and any other configured equipment.

Trends can be accessed from Precipitator icon and T/R Set icon menus, from the Data Log screen, from the TR Setup screen, and directly from some digital and/or analog tags drawn on the page.

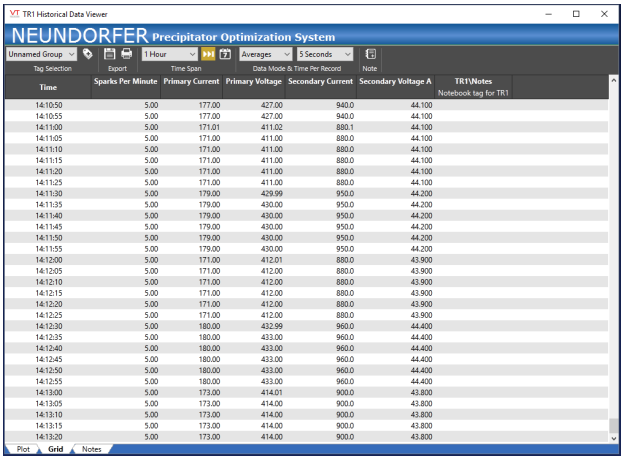
Multiple trend windows can exist at the same time. If a trend window is open and a second trend is launched from a T/R Set or Precipitator icon menu the user will be prompted to add the new pens to the existing window or open a new window.

Historical data can be displayed in the PlotView graphically as drawn pens or in the GridView as text in a table format.

DISPLAY SELECTION



PLOTVIEW



GRIDVIEW

PlotView Features

Plot View shows historical data in a line graph format with each configured pen represented by its own line, in its own color.

Along the bottom of the window is the pen legend, showing the name of each trended pen and associated value based on mouse position over the graph. The legend can be customized for each pen. (See page 31)

Along the bottom (X-axis) of the graph is a legend denoting increments of time. This legend will be labeled according to the duration selected. This is set using the Duration dropdown menu in the toolbar. (See page 34)

Along the left-hand side (Y-axis) of the graph, are numbers representing the range of the scale for each of the pens. These can be modified for each pen in its **Pen Properties** window. (See page 31)

Along the bottom of the window is the ***Time Scrollbar***. Use the left/right arrows at either end to move forward and backward in time. The duration of the trend displayed will remain the same while the start and end time of the data changes. (See Page 36)

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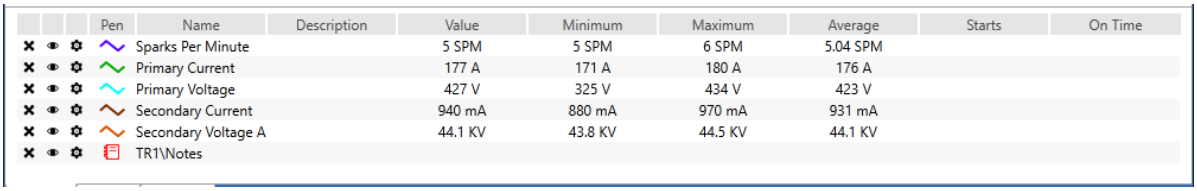
PlotView Pen Legend

In the **Trend** window, the data sets shown in the trend graph are called pens. In **Plot View**, each pen has its own color, shown in the graph viewer as a line graph. Pen colors and what each represents are shown in the pen legend area of window, along the bottom of the window. Each pen represents a specific item of data that has been logged to the hard drive.

Placing the cursor in the **Plot View** will show the time at the cursor with a date and time stamp. As the cursor is moved through the **Plot View**, the time stamp will dynamically update. The cursor will draw a vertical line within the **Plot View** and show the value for each tag shown in the plot.

In the *Pen Legend* window, the 'x' icon will remove the tag from the current plot. The 'eye' icon will toggle between hiding and showing the specific tag in the **Plot View**. A hidden tag will be displayed in the *Pen Legend* window with faded, gray text. The 'gear' icon is used to open the **Pen Properties**. The amount of data displayed for each pen depends on how its properties are configured.



Pen	Name	Description	Value	Minimum	Maximum	Average	Starts	On Time
	Sparks Per Minute		5 SPM	5 SPM	6 SPM	5.04 SPM		
	Primary Current		177 A	171 A	180 A	176 A		
	Primary Voltage		427 V	325 V	434 V	423 V		
	Secondary Current		940 mA	880 mA	970 mA	931 mA		
	Secondary Voltage A		44.1 KV	43.8 KV	44.5 KV	44.1 KV		
	TR1\Notes							

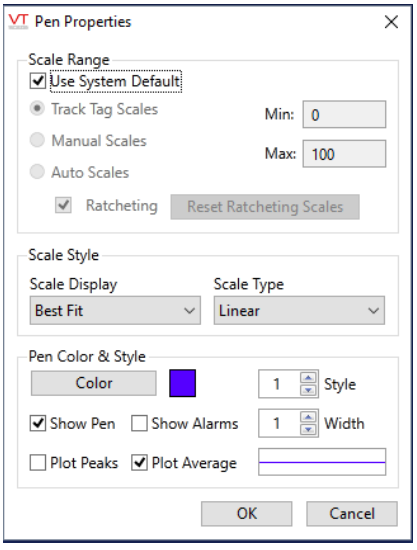
PEN LEGEND

PlotView Pen Properties

Scale Range and Style Options
Min and Max – manually enter the minimum and maximum scale values for this pen (**Track Tag Scales** radio button must be deselected)
Scale Display dropdown selections (see example images below):

- **Best Fit** – automatically adds a min and a max value to the scale ranges column
- **All Scales** – changes the min and max to for the pen to a measure type scale. The scale ranges column and the right margin are used.
- **No Scales** – no entry in scales column

Scale Type – Select Linear, Logarithmic, or Square root. If Logarithmic or Square root is selected, you must deselect the **Track Tag Scales** option and manually enter non-zero values for min and max.



PEN PROPERTIES

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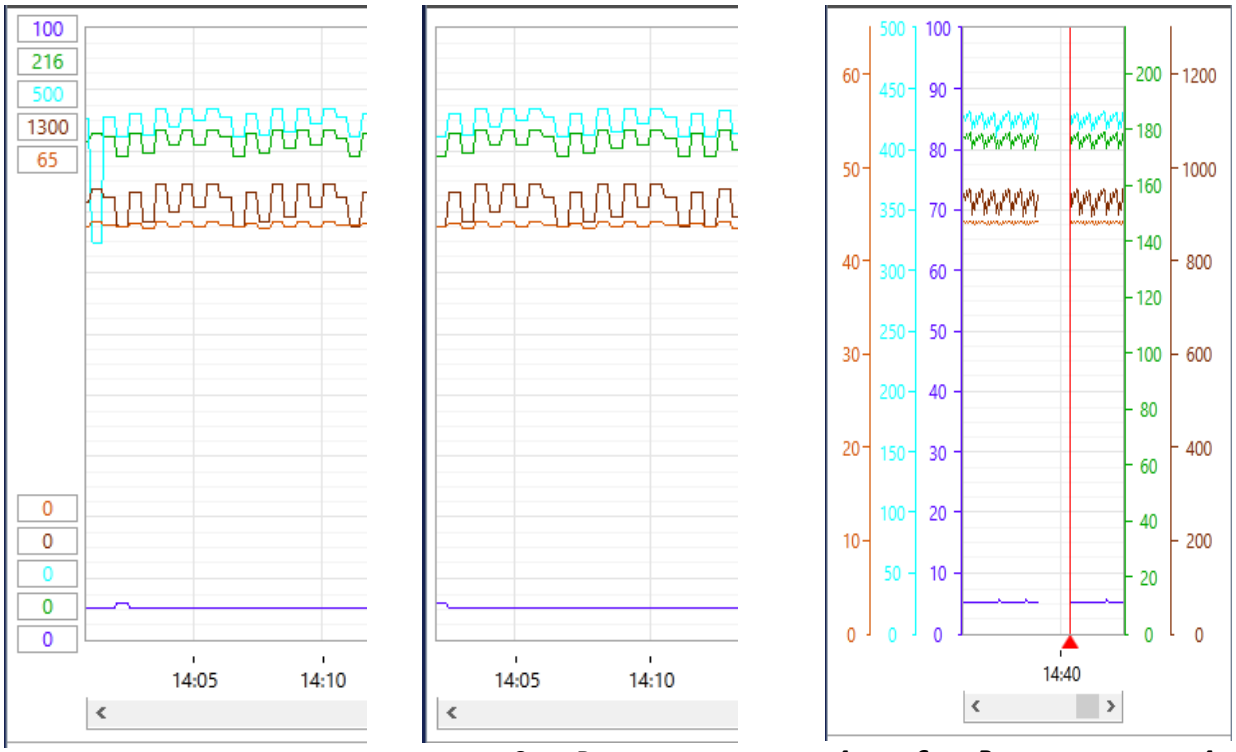

ALL PENS SCALE RANGE COLUMN SET TO BEST FIT

ALL PEN SCALE RANGE COLUMN SET TO NO SCALES

ALL PEN SCALE RANGE COLUMN SET TO ALL SCALES.

EXAMPLE OF THE THREE OPTIONS IN SCALE RANGE AND STYLE OPTIONS

Color– opens a color pallet to select a color for this pen.

Style - selects a pen line pattern. When you select a solid line (Style = 1) you can also adjust the width of the line.

THE 5 DIFFERENT LINE STYLES

Legend Value Options

These are the four checkboxes within the *Pen Color & Style* section of the properties.

- **Show Pen** – Display or hide the pen on the plot
- **Show Alarms** – Draw alarm setpoints if they are configured. T/R Set and Precipitator data pens do not have alarm setpoints that can display in the trend.
- **Plot Peaks** – Displays the highest value for the displayed time period.
- **Plot Average** – Displays the average value for the time period.

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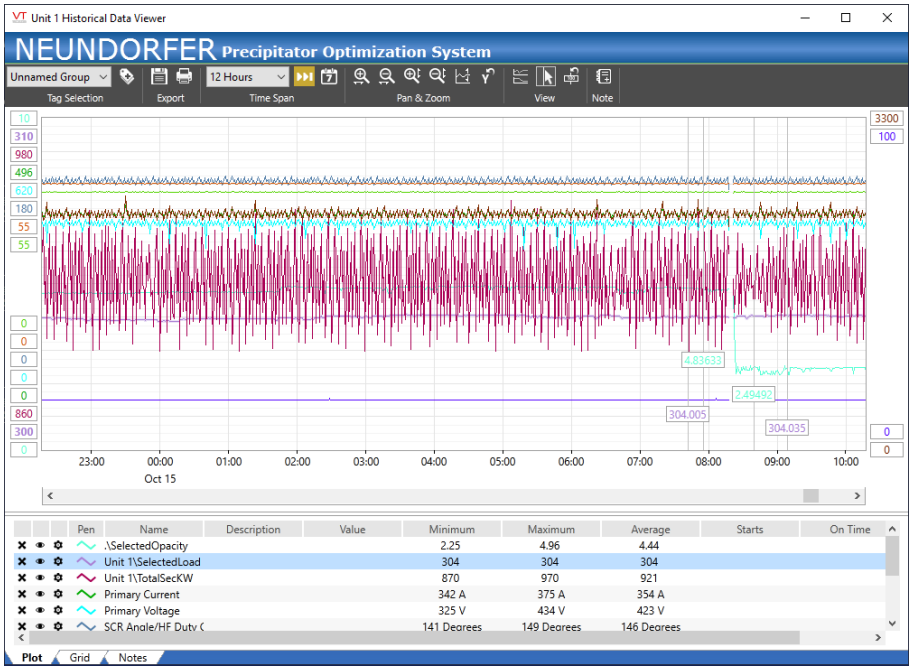
PlotView Add Data Value Marker

To add a data marker to the trend, select a pen and click in the plot area. The value at the time of the mouse position will be displayed. Click on a displayed value marker to make it disappear, or click the ***Hide Data Value*** button in the toolbar to hide all markers.



DATA VALUE MARKERS

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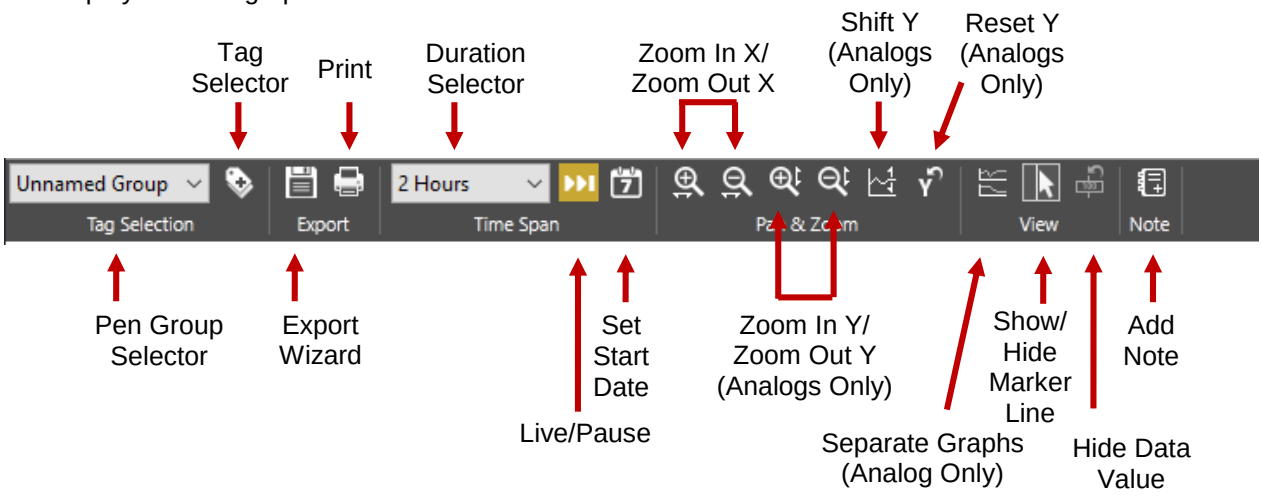
PlotView Toolbar

Along the top of the **Trend** window is a toolbar with options that allow you to manipulate the way data is displayed in the graph and other areas of the window.



- Group Selector – Use this dropdown menu to load a previously saved group of pens. Pen groups can be configured and saved using the tag selector tool. (See page 39 for more detail.)
- Tag Selector – Opens the **Tag Selector** window. See page 39 for more about **Tag Selector**.
- Export Wizard – Opens the **Export Wizard** to export data for currently displayed data to an ODBC-compliant database or comma-separated value (CSV) file. (See page 40 for more about **Export Wizard**.)
- Print – Click this button to send an image of the complete trend window to the default printer.
- Duration Selector – Use this dropdown menu to choose the time period for data that appears on the trend window.
- The ***Live/Paused Button*** is a toggle that changes appearance.
  - when the trend display is live. Click to pause the trend and prevent scrolling with new data.
  - when paused. Click to move the scroll button full right and return the display to live.
- Set Start Date – Opens calendar to select the start date for duration of data shown in the trend graph. Use the << and >> buttons in the window to navigate backward or forward in time. Click a date to select it. The trend will display the selected duration starting at 00:00 of the selected date.
- Zoom In X-Axis/Zoom Out X-Axis – Click the X-axis "**+**" button to switch the mouse cursor to "zoom in" for the X-axis. Clicking in the trend graph will change the duration to a shorter time period and center on the clicked data. The "–" button works the same way but will change to a longer duration.
- Zoom In Y-Axis/Zoom Out Y-Axis – Click the Y-axis "+" button to switch the mouse cursor to "zoom in" for the Y-axis. Clicking in the trend graph will change the scale to a smaller range for all analog pens on the graph. The Y-axis "–" button works the same way but will change the Y Scale to a broader range. Select an individual pen in the legend to modify only that pens scale.
- Shift Y-axis – Click this button to switch the mouse cursor to a hand. Clicking and dragging in the trend window will shift the position (up/down along the Y-axis) of the selected analog pen on the graph so it is not obscured by (or does not obscure) other pens on the graph.
- Reset Y-axis – Click this button to return all shifted analog pens to the original position and resets Y-Axis zoom pens to the original scale. Select an individual pen in the legend to reset only that pen.
- Separate Graphs – Click this button to display each pen in its own graph.
- Show/Hide Marker Line – Toggles between showing and hiding the marker line in the plot at the location of the cursor.

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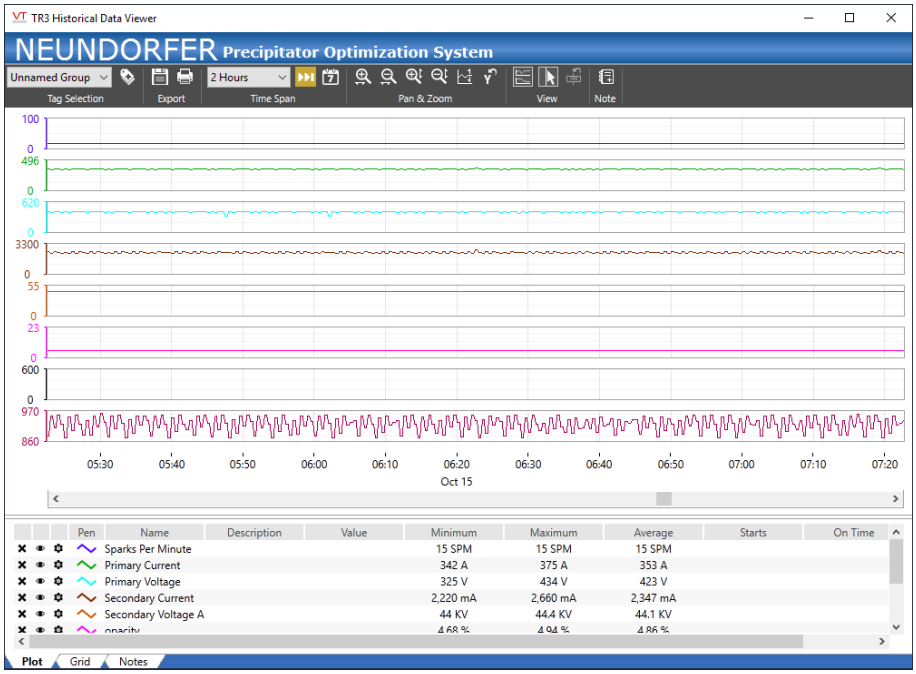
- Hide Data Value – Click this button to hide all ***Data Value Markers***. See page 33 for information on data value markers.
- Add Note – Click this button to add a note to a selected Notebook tag. See page 38 for more about adding notes.



PLOT VIEW WITH SEPARATE GRAPHS

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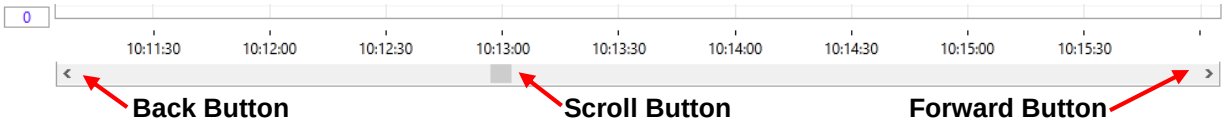
PlotView Time Scrollbar

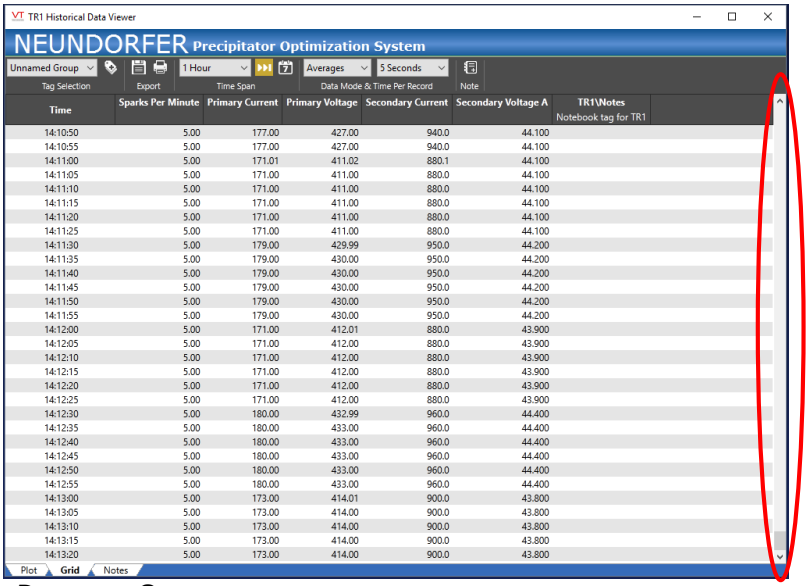
Use this scroll bar to adjust the time period for the data displayed on a trend.



- The ***Scroll Button*** - - shows the trend in relation to time. When the Scroll button is all the way to the right (just to the left of the Forward Button) the trend is live. When the Scroll Button is moved left then historical data is shown.
  - Click and drag the Scroll Button to quickly move the time display
  - A click in the "groove" used by the Scroll Button will move the trend display one duration period. In the scroll bar pictured above the duration period is 1 hour (about 6:34 – 7:34). One click in the left "groove" will move the trend display back one hour to 5:34.
- The ***Back Button*** - - and the ***Forward Button*** - - move the Scroll Button. How far in time each click will move depends on the duration selection. Click and hold to continuously move the Scroll Button.

GridView Features

GridView shows historical data as text in a table format. The left-most column shows timestamps for each point of data collected. Remaining columns each display data for each of the tags selected.



DURATION SCROLLBAR

The newest data will appear at the bottom of the page, with older data above.

All of the data for the selected duration will not fit in the trend window while in GridView.

Use the ***Duration Scrollbar*** to scroll through all of the data for the selected duration.

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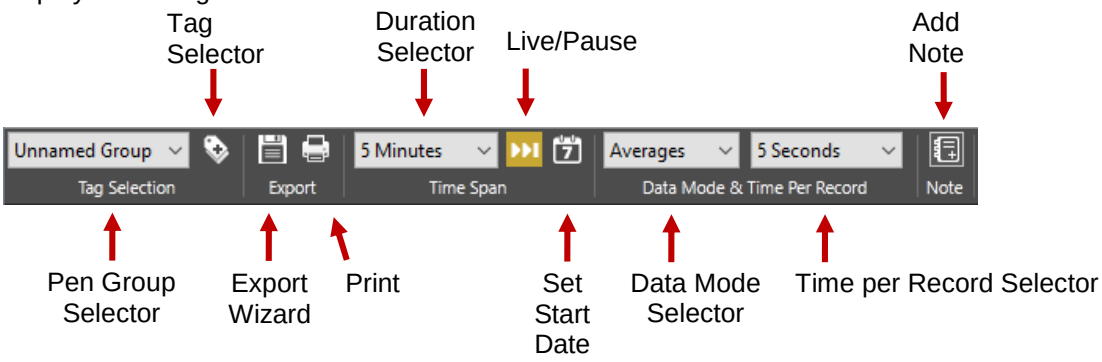
GridView Toolbar

Along the top of the **Trend** window is a toolbar with options that allow you to manipulate the way data is displayed in the grid and other areas of the window



- Group Selector – Use this dropdown menu to load a previously saved group of pens. Pen groups can be configured and saved using the tag selector tool. (See page 39 for more detail.)
- Tag Selector – Opens the **Tag Selector** window. See page 39 for more about **Tag Selector**.
- Export Wizard – Opens the **Export Wizard** to export data for currently displayed data to an ODBC-compliant database or comma-separated value (CSV) file. (See page 40 for more about **Export Wizard**.)
- Print – Click this button to send an image of the complete trend window to the default printer.
- Duration Selector – Use this dropdown menu to choose the time period for data that is gathered for the table.
- The ***Live/Paused Button*** is a toggle that changes appearance.
  - when the trend display is live. Click to pause the trend and prevent scrolling with new data.
  - when paused. Click to move the scroll button full right and return the display to live.
- Set Start Date – Opens calendar to select the start date for duration of data shown in the trend graph. Use the << and >> buttons in the window to navigate backward or forward in time. Click a date to select it. The table will display the selected duration starting at 00:00 of the selected date.
- Data Mode Selector – Choose between Averages, Minimums, Maximums, and Raw Data.
- Time per Record Selector – Choose between various times to view more/less data within a time period.
- Add Note – Click this button to add a note to a selected Notebook tag. See page 38 for more about adding notes.

Notebook Tags and Notes

Notebook tags are used to store text information at a particular time in historical data. Many notes in T/R Set and Rapper Control notebook tags are generated automatically by actions taken by operators or optimization modules in POS. User Accounts with the Add Note privilege can also add their own notes to notebook tags.

Notes appear in the PlotView as an arrow at the bottom of the plot with a vertical line above it. In the GridView Notes appear as Note Icon in the Notebook column.

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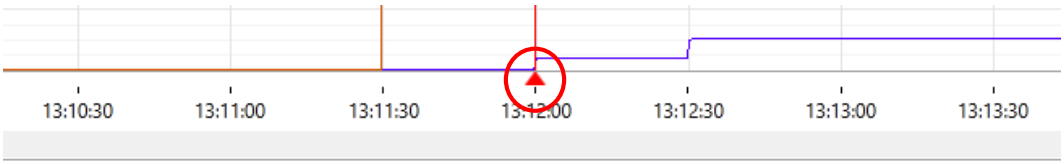
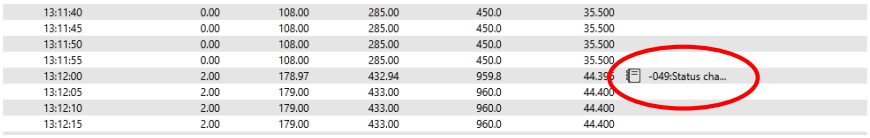


PLOTVIEW NOTE INDICATION



GRIDVIEW NOTE INDICATION

Display the Contents of a Note

Click on the note indication arrow in plot view or the note indication icon in Grid view to display the contents of the note. If the duration of the trend window is large there is a chance that multiple notes will be displayed by a single indication. In this case multiple note windows will open; one for each note.

Adding a Note in PlotView

To add a note to the trend a Notebook tag must exist in the Pen Group.

1. Click the add note icon - Note. (pointer changes)

NOTES POINTER

2. Position the Notes Pointer in the trend area so the time at cursor is the timestamp you want on the note.
3. Click to select the time. An Add Note window will pop up.
4. Type the note in the Add Note window
5. Click OK to insert the note

ADD NOTE WINDOW

Adding a Note in GridView

To add a note to the table a Notebook tag must exist in the Pen Group.

1. Click the add note icon - Note. (pointer changes)
2. Position the Notes Pointer in the notes tag column in the row with the timestamp where you want to record the note.
3. Click to select the time. (An Add Note window will pop up.)
4. Type the note in the Add Note Window
5. Click OK to insert the note

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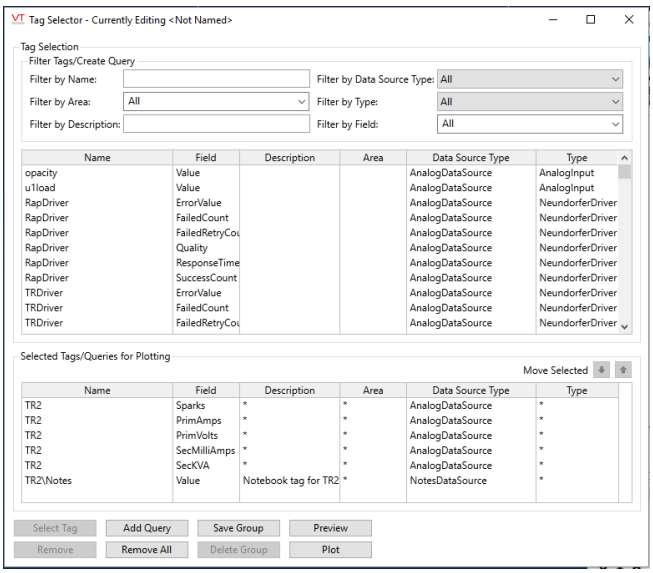
Selecting What the Trend Window Displays

A trend window launched form the T/R Set icon menu will automatically add a set of pens defined in the trending section of **TR Set Graphics Options** (see section 36). Default pens are: Sparks, Primary Current, Primary Voltage, Secondary Current, Secondary Voltage, and T/R Set Notes. A trend launched from the Precipitator icon menu will automatically add a set of pens determined by what is displayed by the Precipitator Icon **Precipitator Icon Graphics Options** (see section 36). The default pens are Load, Opacity, and Total Secondary Power.

The **Tag Selector** window gives you options for changing, adding or deleting pens shown in the currently selected tag group, or creating a new tag group. Click the Tag Selector toolbar button to get started.

TAG SELECTOR TOOLBAR BUTTON



TAG SELECTOR WINDOW

The Tag Selector displays all of the available values that POS stores as historical data. The hundreds of tags can be overwhelming. Use the Filter Tags/Create Querry section to narrow the tags displayed to select from.

Wild cards are permitted in the Name and Description filters. Use **east** to display all tags that have the word "East" anywhere in the name. Use *east** to display all tags that have a name that starts with the word "East". The searches are not case sensitive.

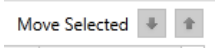
Filter by Type to display all the tags of one type such as T/R Set, Analog Input, or Notebook tags.

Filter by Field to see all records of a specific value such as Sparks, or Average Load

Click on a tag in the Tag Selection area and then click the ***Select Tag*** button to add it to the Selected Tags/Querries for Plotting list. You can also double click the tag to add it to the list.

To remove a tag from the Selected Tags/Querries for Plotting list click on the tag and then click the ***Remove*** button. Click the ***Remove All*** button to remove all selected tags and start from scratch.

Click the ***Add Query*** to add all tags that are defined by the filters. Be careful when doing this as it could add many more tags than expected. Click ***Preview*** to display the actual tags that will appear in the final plot.

Use the ***Move Selected*** tool - 

. to change the position of tags in the list. Select a tag in the list then use the Up or Down arrows to change position. On PlotView the tags move up or down in the legend. In GridView the tag columns move right or left

Click ***Plot*** to close the tag selector and display the selected tags in the GridView or PlotView window.

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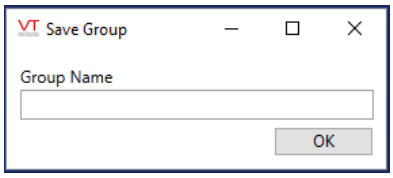
Click ***Save Group*** to save the selected group of pens so they can be retrieved later. A window will appear to prompt for a Group Name.



SAVE GROUP NAME PROMPT

Enter a name and click OK to save the group. This name will appear in the ***Pen Group Selector*** drop down list in the toolbar.

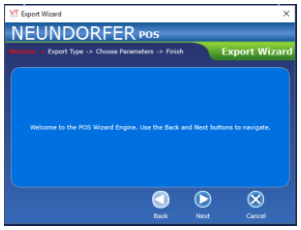
Click ***Delete Group*** to remove the current saved group from the list in the ***Pen Group Selector***.

Export Wizard

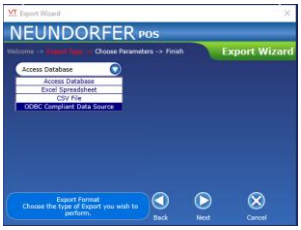
The **Export Wizard** allows the user to export data for the currently displayed trend graph or table to an Access Database, Excel Spreadsheet, comma-separated value (CSV) file, or ODBC-compliant database.

EXPORT WIZARD TOOLBAR BUTTON

Follow the prompts in the wizard to select the type of export and location for the resulting file or database.

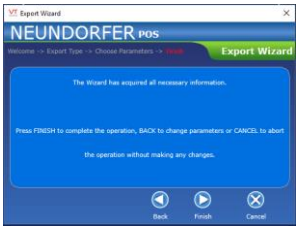


WELCOME SCREEN



SELECT TYPE SCREEN.

CHOOSE PARAMETERS SCREEN



FINISH SCREEN

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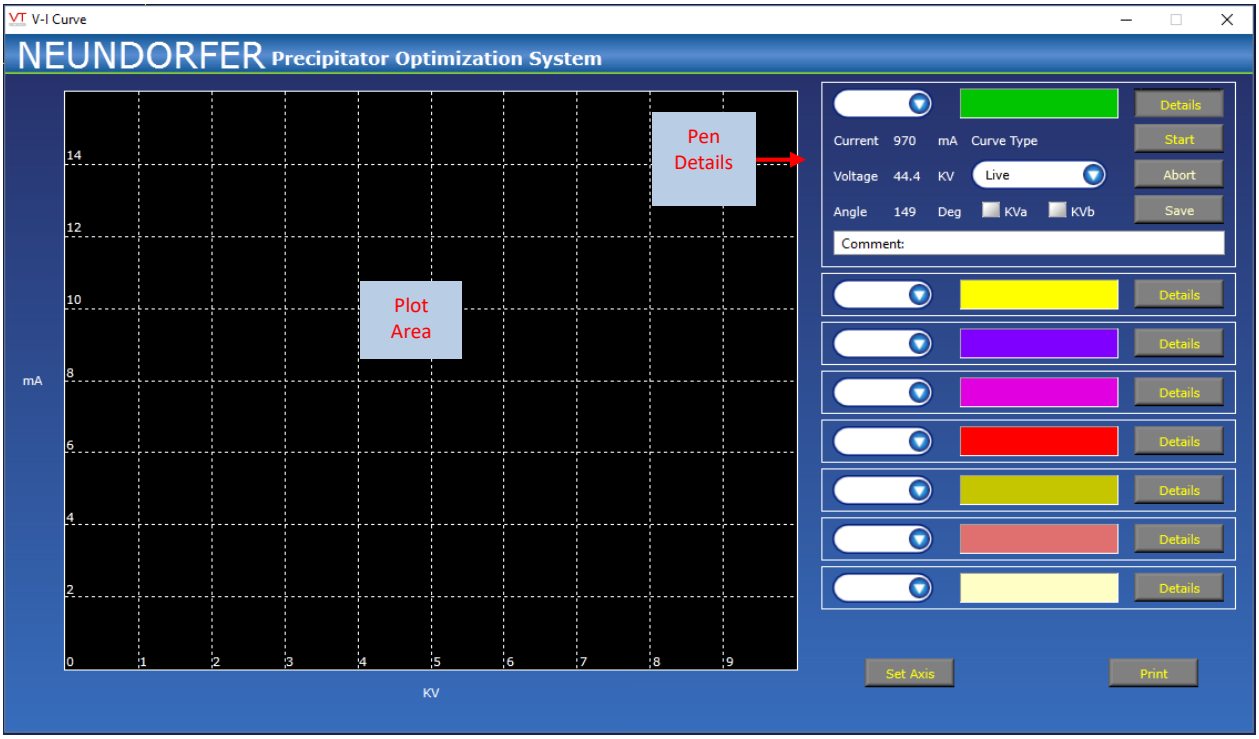
12. V-I Curve

Overview

The **V-I Curve** window is a tool that allows you to view and generate V-I curves (line graphs showing relationship between voltage and current) for the selected T/R Sets. Each V-I curve by itself—based on shape of curve and field the T/R Set is associated with—gives an indication of how well that T/R Set is operating and how well the precipitator is performing. Comparing multiple V-I curves from the same T/R Set or multiple T/R Sets can provide additional context and insight into system performance.

To access the **V-I Curve** window click any T/R Set icon and then click V-I Curve.



V-I CURVE WINDOW

The Plot Area displays the curves

The Pen Details area is used to configure, save and retrieve the curves. V-I curves for other T/R Sets or historic Curves from the same T/R Set can be added or changed using the dropdown menu in the details area for each pen color.

The ***Set Axis*** button configures the Y axis

The ***Print*** button is used to print the curves

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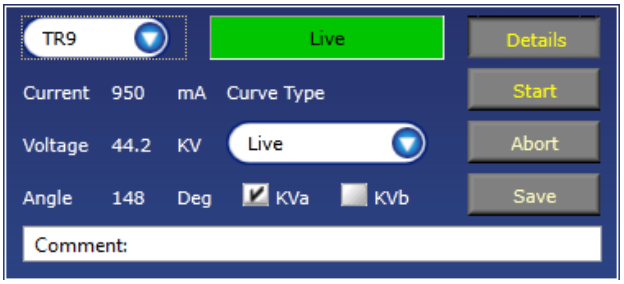
Pen Details

The Pen Details for each pen can be accessed by clicking the **Details** Button next to a pen color. Only one Pen Details area may be opened at a time. To compare curves, click the details button next to the pen color box, create or recall a curve, then click on the details button next to another color. Several curves can be displayed at the same time.

The **T/R Set Drop menu** selects the T/R Set to plot. All the T/R Sets in the precipitator are listed in the menu. The T/R Set's icon menu that launched the V-I curve determines the default on the first pen.

Current, Voltage and (Conduction) **Angle** are live readings for the T/R Set selected from the drop menu. The readings are blank when communications are lost or no T/R Set is selected.



PEN DETAILS

The **Pen color box**, yellow in the figure above, shows the color of the V-I curve on the graph. When generating a curve the display changes to "Retrieving Data" and to "VI Data Complete" when the curve is finished. When a curve is retrieved, "Live" changes to "History Data".

The ***Comment*** area text entry is for adding optional user comments to include with a saved curve. Curves are automatically saved with a date and time stamp.

The ***Start*** button starts the creation of the V-I curve for the selected T/R Set. You can abort a curve at any time with the ***Abort*** button.

The ***Save*** Button saves the curve, and optional user comment. Saved curves are recalled by time stamp.

The ***Curve Type*** drop menu is used to select a Live curve or previously saved curve.

KVa and ***KVb*** check boxes are used to select which bushing(s) to display. Single bushing T/R Sets or T/R Sets with only one KV feedback signal only use KVa.

Set Axis

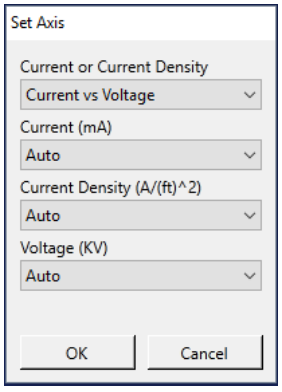
Click the ***Set Axis*** button to open the **Set Axis** window. You can adjust the axes of the plot area.

The ***Current or Current Density*** dropdown selects the type of plot. Either *Current vs Voltage* or *Current Density* ($\frac{miliamps}{collection\ area}$) *vs Voltage*.

Note: *Current Density vs Voltage* requires that the T/R Set tag's *Collecting Plate Area* property is assigned a value.

Current (mA) and ***Current Density*** dropdown assigns a range for the Y axis of the plot. If ***Auto*** is selected, POS will pick a best fit scale.

Voltage (KV) assigns the range for the X axis at the bottom of the graph. If Auto is selected, POS will assign a best fit scale.



SET AXIS WINDOW

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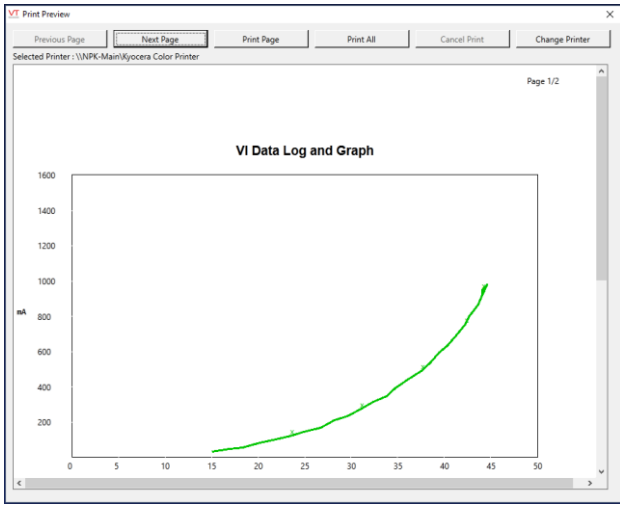
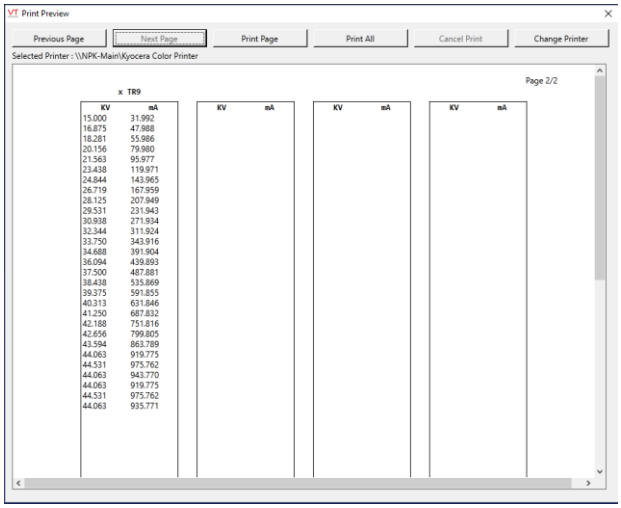
Printing V-I Curves

Click the ***Print*** button to view a print preview of all the curves and numerical data for all of the currently displayed curves.



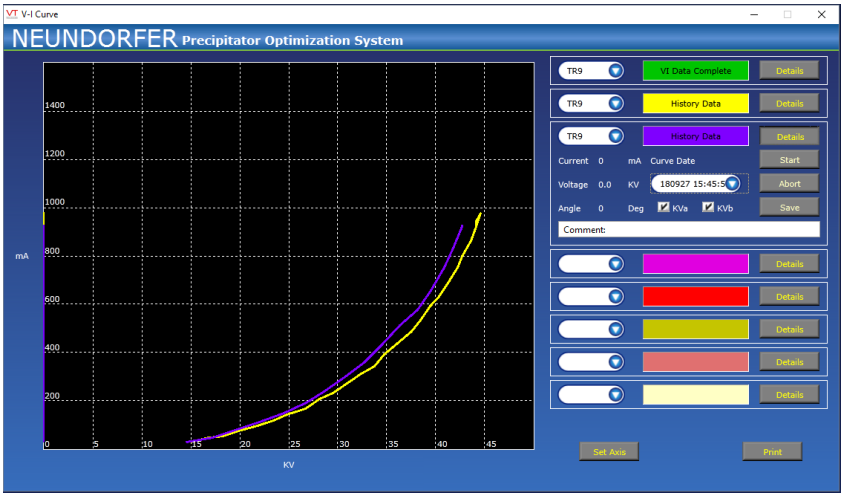
PAGE 1



PAGE 2+

Use the ***Next Page*** and ***Previous Page*** buttons to navigate through the Print Preview window. The ***Print Page*** button prints the currently viewed page to the selected printer. The ***Print All*** button prints the graph and table pages. The ***Change Printer*** button opens a Windows dialog box to select an available printer.

Example:



The example shows two historic V-I curves for two T/R Sets using MVC4 voltage controls. KVb was unchecked because the sets are single bushing. The mA and KV scales were auto selected.

Curves from MVC4 controls plot high and low KV signals in thin lines as well as the average KV reading as the bold line. MVC2 and MVC3 controls only plot an average KV signal.

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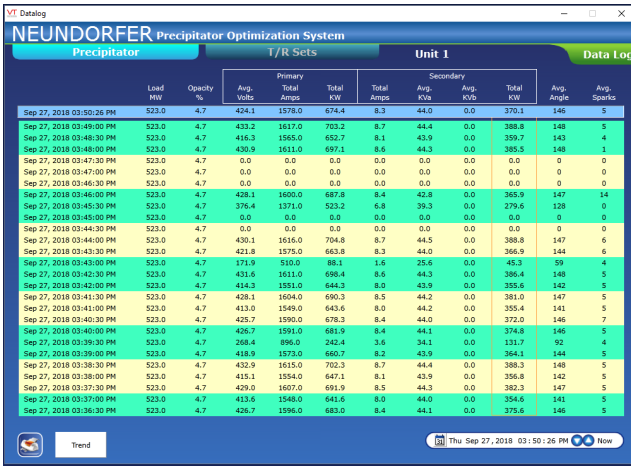
13. Data Log

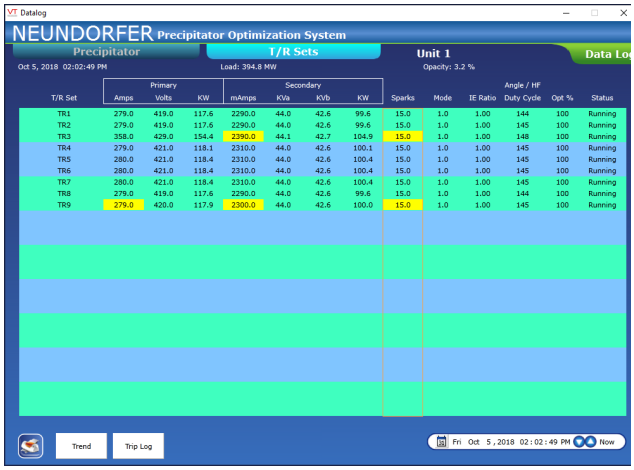
Overview

POS continually communicates with voltage controls and other devices and logs that data to the hard drive every 5 seconds. **Data Log** provides a way to view live and historical data, print data, and generate trend graphs of precipitator and T/R Set data.

Access the **Data Log** window from the Precipitator Icon menu or the T/R Set Icon menu. Click on the icon and select ***Data log*** from the menu.



DATA LOG PRECIPITATOR TAB



DATA LOG T/R SET TAB

When launched from a precipitator menu, the **Data Log** will open on the precipitator tab. When launched from a T/R Set menu, the **Data Log** will open on the T/R Set tab.

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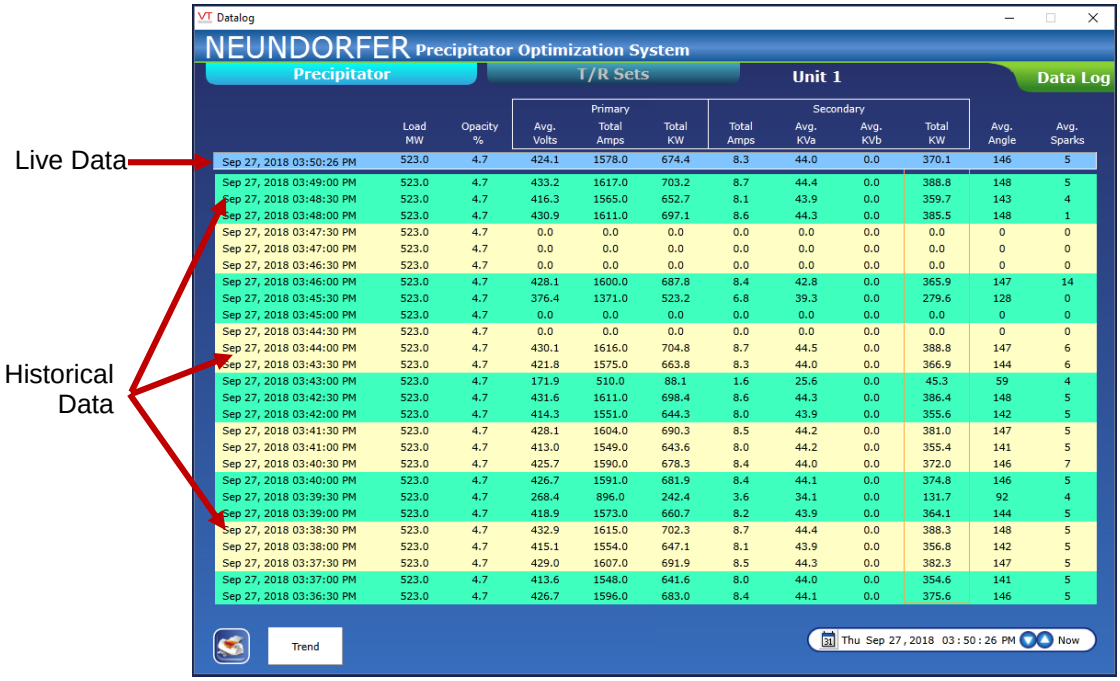
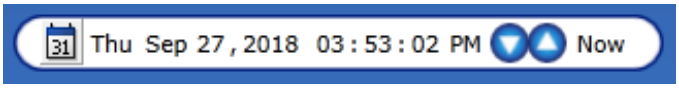
Precipitator tab



The **Precipitator** tab displays totals for all the T/R Set's primary and secondary power measurements, averages for conduction angle and sparks per minute, and measurements for load and opacity. The top row, with a light blue background, displays live data.. The rows below display historical data.

Time Selector

In the bottom right-hand corner of the screen is date/time selector. Click on day of week, month, calendar day, year, hour, minute, second, and/or AM/PM. Then use the up/down arrows to view data from a specific date and time. Click "***Now"*** to return the view to the current day and time.



DATE/TIME NAVIGATION

Trending from the Data Log Precipitator Tab

You can create a customized trend of data displayed on the Data Log window. Click the *Trend* button (lower left-hand corner of screen, just to right of ***Print*** button) to open the **Select Trend variables** window

Click any value or the heading just above the live data row to select that parameter. This will be added to the **Select Trend variables** window and the value will be highlighted. To remove a value from the list click the X to the right of the value in the **Select Trend variables** window or click the highlighted value in the **Data Log** window.

When you are done selecting variables to trend, click the ***Launch Trend*** button. A Trend window will open displaying a plot of the selected variables. See Section 11 for more information on Trends.

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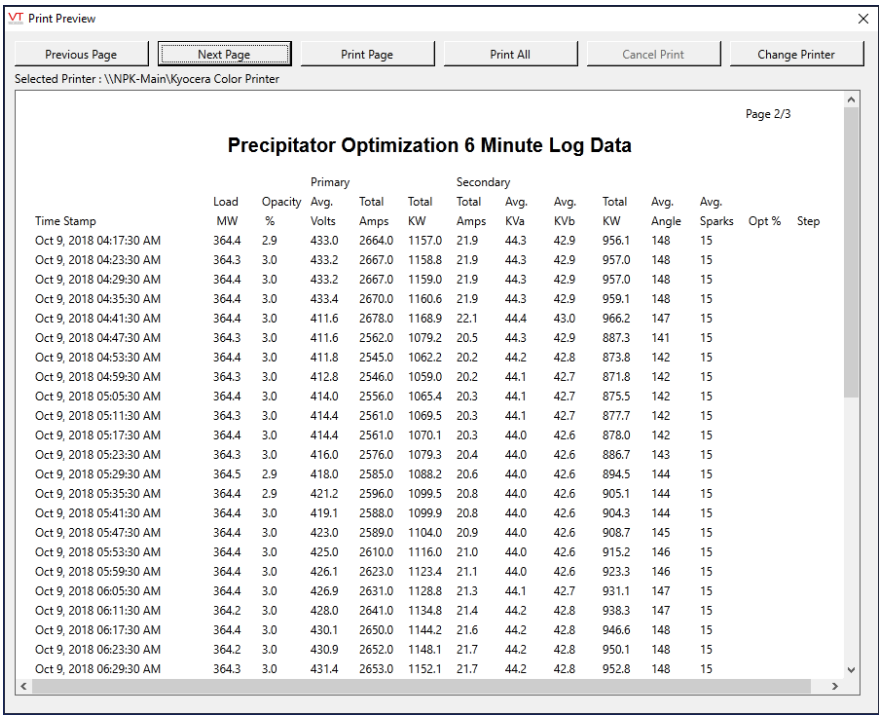
Printing the Data Log Precipitator Tab

Click the ***Print*** button (lower left-hand corner of window) to open a **Print Preview** window for the data. The data starts at midnight and displays values in 6 minute intervals. Today's data will display from midnight to the present time. Historic data will display all 24 hours of the selected day.



			Primary			Secondary							
Time Stamp	Load MW	Opacity %	Avg. Volts	Total Amps	Total KW	Total Amps	Avg. KVa	Avg. KVb	Total KW	Avg. Angle	Avg. Sparks	Opt %	Step
Oct 9, 2018 04:17:30 AM	364.4	2.9	433.0	2664.0	1157.0	21.9	44.3	42.9	956.1	148	15		
Oct 9, 2018 04:23:30 AM	364.3	3.0	433.2	2667.0	1158.8	21.9	44.3	42.9	957.0	148	15		
Oct 9, 2018 04:29:30 AM	364.4	3.0	433.2	2667.0	1159.0	21.9	44.3	42.9	957.0	148	15		
Oct 9, 2018 04:35:30 AM	364.4	3.0	433.4	2670.0	1160.6	21.9	44.3	42.9	959.1	148	15		
Oct 9, 2018 04:41:30 AM	364.4	3.0	411.6	2678.0	1168.9	22.1	44.4	43.0	966.2	147	15		
Oct 9, 2018 04:47:30 AM	364.3	3.0	411.6	2562.0	1079.2	20.5	44.3	42.9	887.3	141	15		
Oct 9, 2018 04:53:30 AM	364.4	3.0	411.8	2545.0	1062.2	20.2	44.2	42.8	873.8	142	15		
Oct 9, 2018 04:59:30 AM	364.3	3.0	412.8	2546.0	1059.0	20.2	44.1	42.7	871.8	142	15		
Oct 9, 2018 05:05:30 AM	364.4	3.0	414.0	2556.0	1065.4	20.3	44.1	42.7	875.5	142	15		
Oct 9, 2018 05:11:30 AM	364.3	3.0	414.4	2561.0	1069.5	20.3	44.1	42.7	877.7	142	15		
Oct 9, 2018 05:17:30 AM	364.4	3.0	414.4	2561.0	1070.1	20.3	44.0	42.6	878.0	142	15		
Oct 9, 2018 05:23:30 AM	364.3	3.0	416.0	2576.0	1079.3	20.4	44.0	42.6	886.7	143	15		
Oct 9, 2018 05:29:30 AM	364.5	2.9	418.0	2585.0	1088.2	20.6	44.0	42.6	894.5	144	15		
Oct 9, 2018 05:35:30 AM	364.4	2.9	421.2	2596.0	1099.5	20.8	44.0	42.6	905.1	144	15		
Oct 9, 2018 05:41:30 AM	364.4	3.0	419.1	2588.0	1099.9	20.8	44.0	42.6	904.3	144	15		
Oct 9, 2018 05:47:30 AM	364.4	3.0	423.0	2589.0	1104.0	20.9	44.0	42.6	908.7	145	15		
Oct 9, 2018 05:53:30 AM	364.4	3.0	425.0	2610.0	1116.0	21.0	44.0	42.6	915.2	146	15		
Oct 9, 2018 05:59:30 AM	364.4	3.0	426.1	2623.0	1123.4	21.1	44.0	42.6	923.3	146	15		
Oct 9, 2018 06:05:30 AM	364.4	3.0	426.9	2631.0	1128.8	21.3	44.1	42.7	931.1	147	15		
Oct 9, 2018 06:11:30 AM	364.2	3.0	428.0	2641.0	1134.8	21.4	44.2	42.8	938.3	147	15		
Oct 9, 2018 06:17:30 AM	364.4	3.0	430.1	2650.0	1144.2	21.6	44.2	42.8	946.6	148	15		
Oct 9, 2018 06:23:30 AM	364.2	3.0	430.9	2652.0	1148.1	21.7	44.2	42.8	950.1	148	15		
Oct 9, 2018 06:29:30 AM	364.3	3.0	431.4	2653.0	1152.1	21.7	44.2	42.8	952.8	148	15		

PRECIPITATOR DATA LOG PRINT PREVIEW WINDOW

Use the ***Next Page*** and ***Previous Page*** buttons to navigate through the **Print Preview** window. The ***Print Page*** button prints the currently viewed page to the selected printer. The ***Print All*** button prints all of the pages. The ***Change Printer*** button opens a Windows dialog box to select an available printer.

Click ***Cancel Print*** to close the window.

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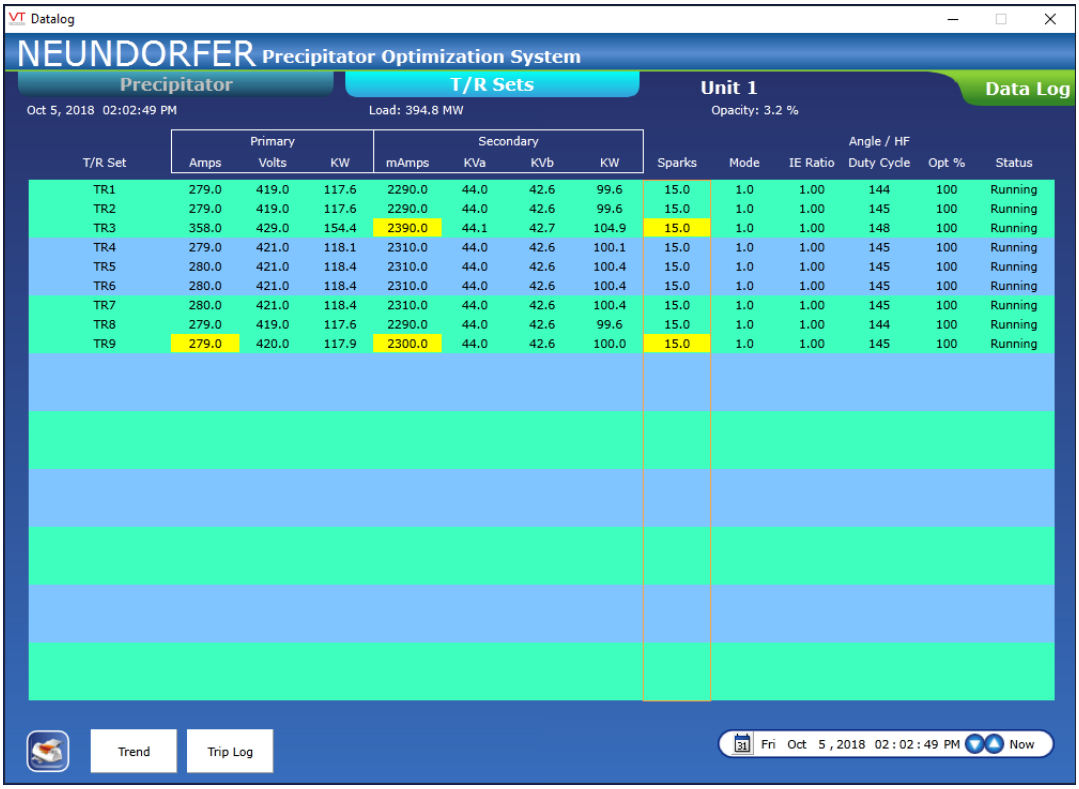
T/R Sets (Voltage Controls) Data Log Tab

The T/R Sets tab in the **Data Log** window displays individual live or historical data for all T/R Sets associated with the same precipitator. Each row in the table represents data for one T/R Set. By default, this tab opens showing live data. Values highlighted in yellow indicate what voltage control parameter is limiting T/R Set output. Live data has a blue and green background; Historic data has a yellow and green background. For precipitators with many T/R Sets the window will have a scroll bar that can be used to shift the display to view all of the T/R Sets' data.



DATA LOG WINDOW T/R SETS TAB

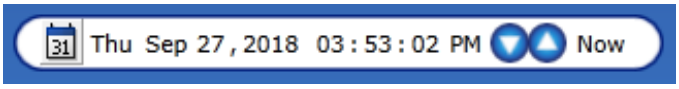
T/R Set Trip Log

The ***Trip Log*** button creates a report showing how many times and the reason each T/R Set tripped on the selected date. Use the date/time navigation bar to select the desired day. Then click the ***Trip Log*** button; a **Print Preview** window opens with the report.

TRIP LOG BUTTON

Time Selector

In the bottom right-hand corner of the screen is date/time selector. Click on day of week, month, calendar day, year, hour, minute, second, and/or AM/PM. Then use the up/down arrows to view data from a specific date and time. Click ***Now*** to return the view to the current day and time.



DATE/TIME NAVIGATION

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Trending from the Data Log T/R Set Tab

You can create a customized trend of data displayed on the **Data Log** window. Click the ***Trend*** button (lower left-hand corner, just to right of ***Print*** button) to open the **Select Trend variables** window

Values from the **Data Log** T/R Set Tab can be added to the trend in three different ways

1 - Click any individual value to choose *that specific parameter for that specific T/R Set*. The value will be added to the **Select Trend variables** window and will be highlighted.

2 - Click any column heading to add *that parameter for ALL T/R Sets* to the list. All of the individual values will be added to the **Select Trend variables** window and will be highlighted.

3 - Click any T/R Set name to add *all parameters for that T/R Set* to the list. All individual values will be added to the **Select Trend variables** window and will be highlighted.

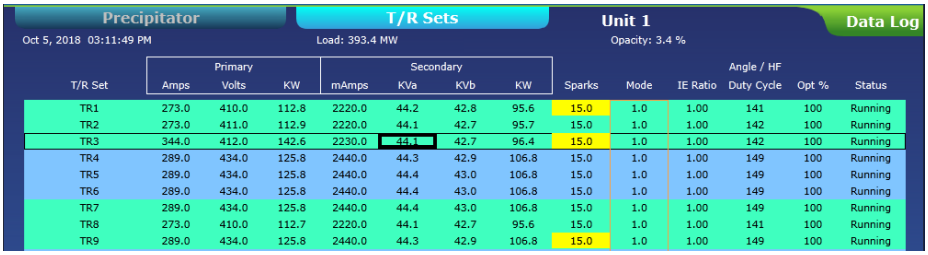
Values can be selected from the T/R Set tab as well as the Precipitator tab.

To remove any value from the list click the ***X*** to the right of the value in the **Select Trend variables** window or click the highlighted value in the **Data Log** window.

When you are done selecting variables to trend, click the ***Launch Trend*** button. A Trend window will open displaying a plot of the selected variables. See chapter 11 for more information on Trends.

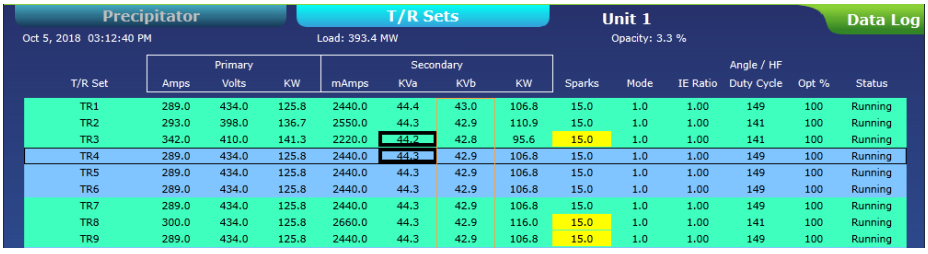
Example: Trend of secondary KV, and opacity for two T/R Sets.

- Open the Data Log for any T/R Set
- Click on the trend button
- Move the select trend variables out of the way
- Click on the value at the intersection of Secondary KVa and TR3



T/R Set	Primary Amps	Primary Volts	Primary KW	Secondary mAmps	Secondary KVa	Secondary KVb	Secondary KW	Sparks	Mode	IE Ratio	Angle / HF Duty Cycle	Opt %	Status
TR1	273.0	410.0	112.8	2220.0	44.2	42.8	95.6	15.0	1.0	1.00	141	100	Running
TR2	273.0	411.0	112.9	2220.0	44.1	42.7	95.7	15.0	1.0	1.00	142	100	Running
TR3	344.0	412.0	142.6	2230.0	44.1	42.7	96.4	15.0	1.0	1.00	142	100	Running
TR4	289.0	434.0	125.8	2440.0	44.3	42.9	106.8	15.0	1.0	1.00	149	100	Running
TR5	289.0	434.0	125.8	2440.0	44.4	43.0	106.8	15.0	1.0	1.00	149	100	Running
TR6	289.0	434.0	125.8	2440.0	44.4	43.0	106.8	15.0	1.0	1.00	149	100	Running
TR7	289.0	434.0	125.8	2440.0	44.4	43.0	106.8	15.0	1.0	1.00	149	100	Running
TR8	273.0	410.0	112.7	2220.0	44.1	42.7	95.6	15.0	1.0	1.00	141	100	Running
TR9	289.0	434.0	125.8	2440.0	44.3	42.9	106.8	15.0	1.0	1.00	149	100	Running

- Click on the value at the intersection of Secondary KVa and TR4



T/R Set	Primary Amps	Primary Volts	Primary KW	Secondary mAmps	Secondary KVa	Secondary KVb	Secondary KW	Sparks	Mode	IE Ratio	Angle / HF Duty Cycle	Opt %	Status
TR1	289.0	434.0	125.8	2440.0	44.4	43.0	106.8	15.0	1.0	1.00	149	100	Running
TR2	293.0	398.0	136.7	2550.0	44.3	42.9	110.9	15.0	1.0	1.00	141	100	Running
TR3	342.0	410.0	141.3	2220.0	44.2	42.8	95.6	15.0	1.0	1.00	141	100	Running
TR4	289.0	434.0	125.8	2440.0	44.3	42.9	106.8	15.0	1.0	1.00	149	100	Running
TR5	289.0	434.0	125.8	2440.0	44.3	42.9	106.8	15.0	1.0	1.00	149	100	Running
TR6	289.0	434.0	125.8	2440.0	44.3	42.9	106.8	15.0	1.0	1.00	149	100	Running
TR7	289.0	434.0	125.8	2440.0	44.3	42.9	106.8	15.0	1.0	1.00	149	100	Running
TR8	300.0	434.0	125.8	2660.0	44.3	42.9	116.0	15.0	1.0	1.00	141	100	Running
TR9	289.0	434.0	125.8	2440.0	44.3	42.9	106.8	15.0	1.0	1.00	149	100	Running

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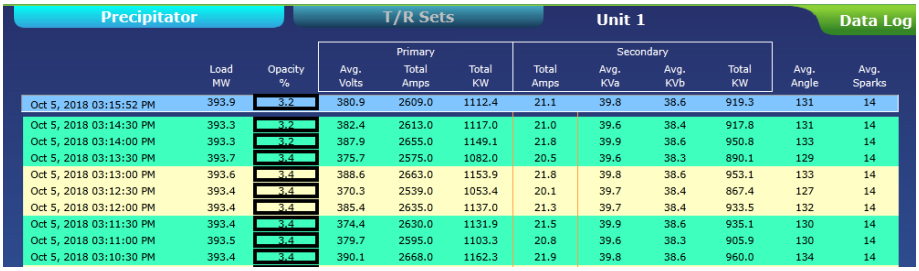
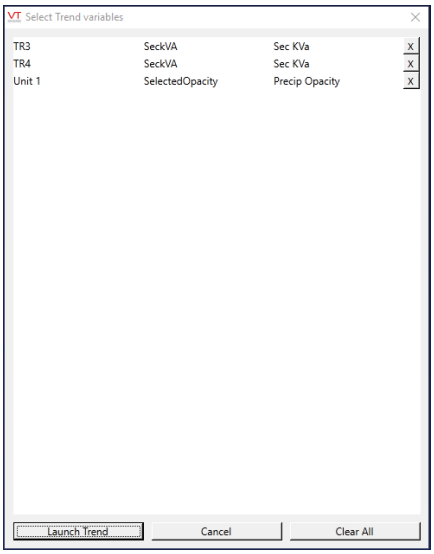
- Click on the Precipitator Tab
- Click on any value in the Opacity % column

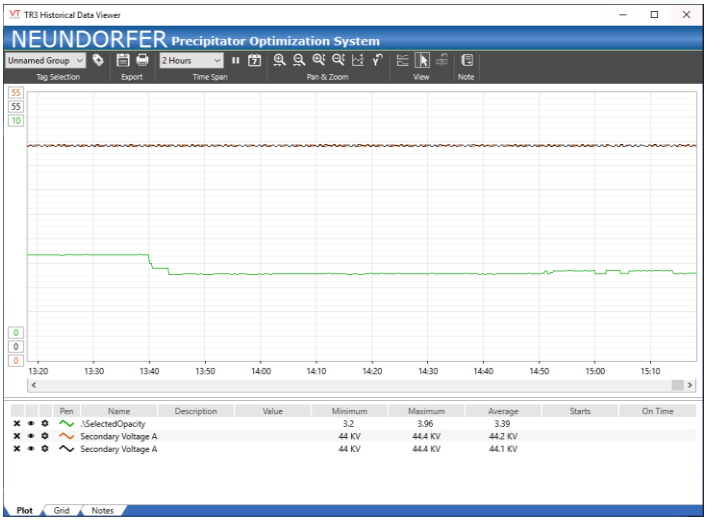


	Load MW	Opacity %	Primary Avg. Volts	Primary Total Amps	Primary Total KW	Secondary Total Amps	Secondary Avg. KVa	Secondary Avg. KVb	Secondary Total KW	Avg. Angle	Avg. Sparks
Oct 5, 2018 03:15:52 PM	393.9	3.2	380.9	2609.0	1112.4	21.1	39.8	38.6	919.3	131	14
Oct 5, 2018 03:14:30 PM	393.3	3.2	382.4	2613.0	1117.0	21.0	39.6	38.4	917.8	131	14
Oct 5, 2018 03:14:00 PM	393.3	3.2	387.9	2655.0	1149.1	21.8	39.9	38.6	950.8	133	14
Oct 5, 2018 03:13:30 PM	393.7	3.4	375.7	2575.0	1082.0	20.5	39.6	38.3	890.1	129	14
Oct 5, 2018 03:13:00 PM	393.6	3.4	388.6	2663.0	1153.9	21.8	39.8	38.6	953.1	133	14
Oct 5, 2018 03:12:30 PM	393.4	3.4	370.3	2539.0	1053.4	20.1	39.7	38.4	867.4	127	14
Oct 5, 2018 03:12:00 PM	393.4	3.4	385.4	2635.0	1137.0	21.3	39.7	38.4	933.5	132	14
Oct 5, 2018 03:11:30 PM	393.4	3.4	374.4	2630.0	1131.9	21.5	39.9	38.6	935.1	130	14
Oct 5, 2018 03:11:00 PM	393.5	3.4	379.7	2595.0	1103.3	20.8	39.6	38.3	905.9	130	14
Oct 5, 2018 03:10:30 PM	393.4	3.4	390.1	2668.0	1162.3	21.9	39.8	38.6	960.0	134	14

- Click on the Launch Trend button at the bottom of the select trend variable window.



- Results



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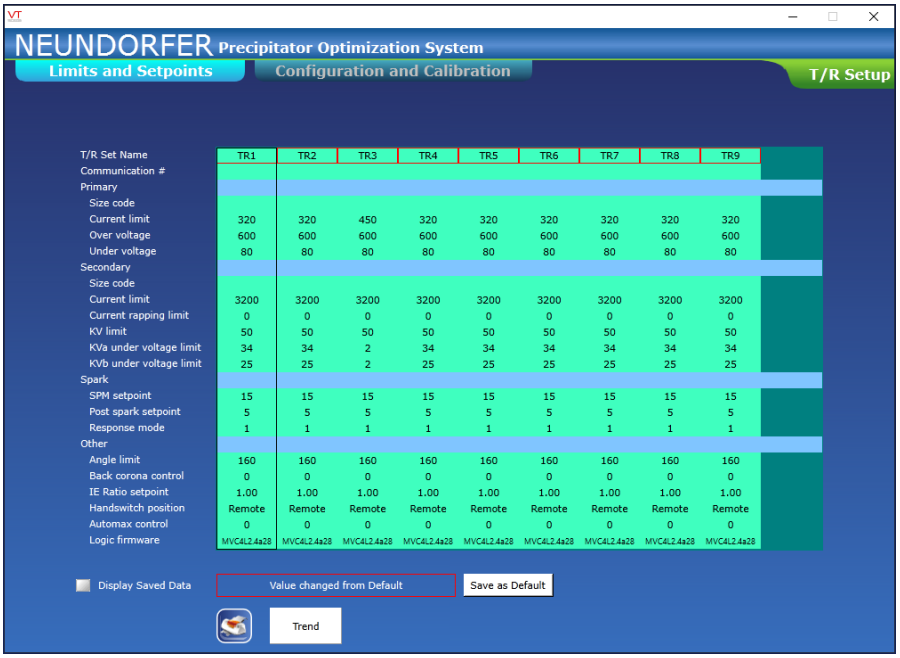
14. T/R Setup

Overview

The **T/R Setup** window provides a display of all the limits and set points for each voltage control associated with a precipitator. This allows comparison of voltage control settings for different T/R Sets.

Access the **T/R Setup** window by clicking on any T/R Set icon and selecting ***T/R Setup*** from the menu.



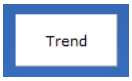
T/R SETUP WINDOW

The **T/R Setup** window has two tabs: **Limits and Setpoints** and **Configuration and Calibration**. In each of the tabs, names of the T/R Sets are listed along top of the table. A scroll bar is used to view controls not on the screen if needed. Parameters are listed in each row, labeled on the left-hand side.

POS can store limits and set points so they can be compared with current values. To save the current values, click the ***Save as Default*** button. If POS detects that any parameters on any T/R Set was changed to a value different from the default saved configuration, that parameter will be outlined in red like so: 3200

Use the ***Display Saved Data*** checkbox to toggle between saved data and live data.

The ***Print*** button launches a print preview window for the data on the current tab.

The ***Trend*** button 

launches a **Select Trend variables** window that works exactly like the Trend button on the Data Log T/R Sets tab. See chapter 13

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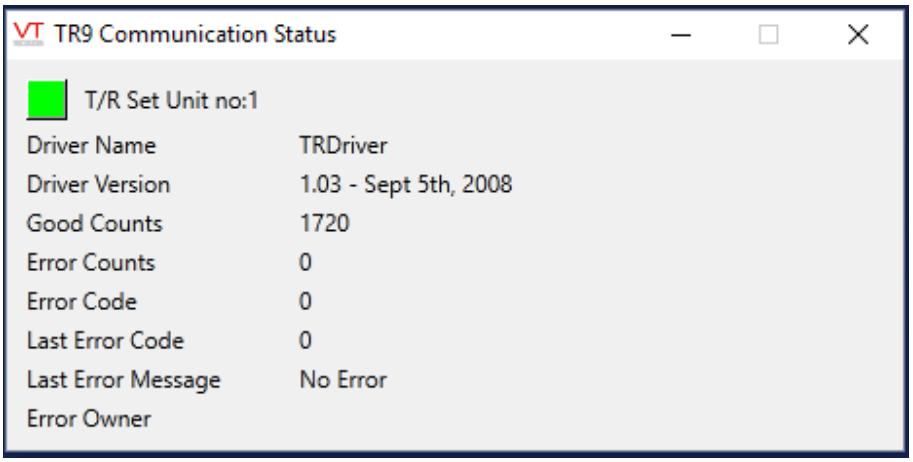
15. Communication Status

POS provides a status window for the drivers used to communicate with the precipitator rapper controls and voltage controls.

Access the **Communication Status** windows from the T/R Set menu or Rapper Control menu. Click on a T/R Set icon or Rapper Control icon and select ***Communication Status*** from the menu.



COMMUNICATION STATUS WINDOW

The colored square to left of the control's name indicates the status of the driver. If a communication error occurs, this square will be yellow. If communications are functioning correctly the square will be green.

The unit number of the selected control is displayed next to the name of the device.

The Good Counts number indicates how many good communications interactions that occurred between POS and the control.

The Error Counts number indicates how many communication errors have occurred.

The Error Code, Last Error Code, and Last Error Message can be used to understand the communication problems that are occurring and to troubleshoot the errors.

Non-Neundorfer voltage controls such as High-Frequency T/R Sets have additoinal troubleshooting information available from the **Communications Status** window.

Note: Contact Neundorfer for assistance with Communications Troubleshooting

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16. Individual T/R Set Control

Individual T/R Sets can be remotely started, stopped or reset from the POS software. To access these controls, click on a T/R Set icon from the plan view page to open the T/R Set menu.

The lower portion of the menu window displays control buttons:

- Click Start to start the selected T/R Set
- Click Stop to stop the selected T/R Set
- Click Reset to reset the selected T/R Set after a trip has occurred

Note: Only User Accounts with the MVC Control privilege can turn on, off, or reset T/R Sets.

Note: The Voltage Control must be set up to allow remote access for users to control the T/R Set from POS

T/R SET MENU

17. Whole Precipitator T/R Set Control

All T/R Sets associated with a precipitator can be remotely started, stopped or reset all at once from the POS software. To access the whole precipitator T/R Set controls, click on the precipitator icon on the plan view page to open the precipitator menu.

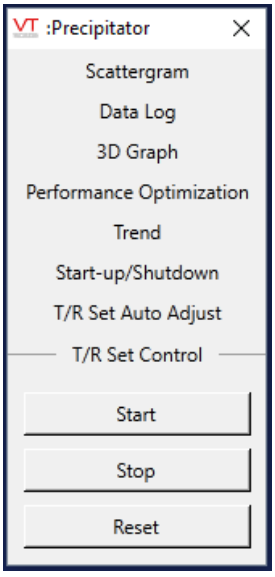
The lower portion of the menu window displays the control buttons:

- Click Start to start all T/R Sets
- Click Stop to stop all T/R Sets
- Click Reset to reset all T/R Sets after a trip has occurred

You will be prompted to confirm that you do wish to start, stop, or rest all T/R Sets associated with this precipitator. Be careful when using this function to control all T/R Sets.

Note: Only User Accounts with the Precip Start Stop privilege can turn on, off, or reset ALL T/R Sets.

Note: The Voltage Controls must be set up to allow remote access for users to control the T/R Sets from POS



PRECIPITATOR MENU

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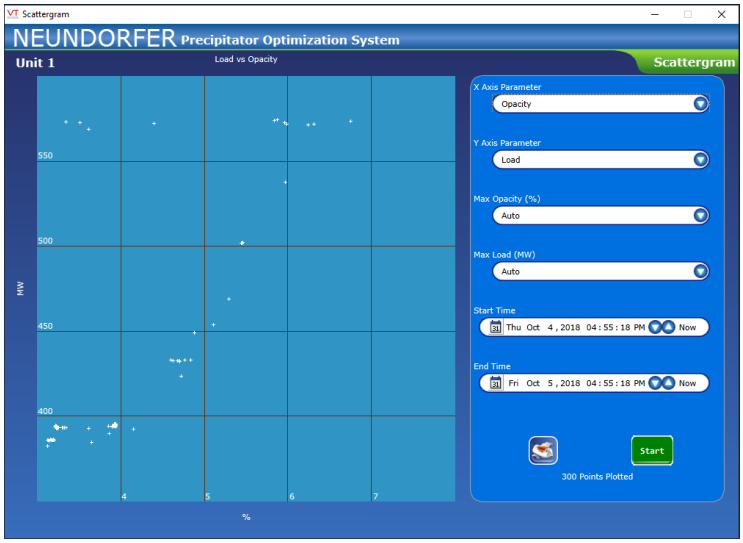
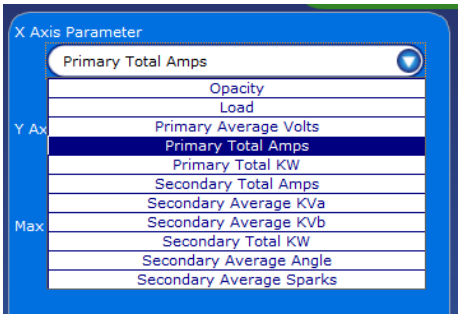
18. Scattergram

Scattergram is a tool in POS that allows you to visually see how two precipitator performance parameters relate to each other over time. All values for the two selected parameters that were recorded over the selected timeframe are displayed as a scatter plot on an XY plane.

Access the **Scattergram** from the precipitator menu: on the planview page, click the precipitator icon and then click ***Scattergram*** in the menu.



SCATTERGRAM WINDOW



AVAILABLE PARAMETERS FOR EACH AXIS

Scattergram can plot a graph showing any two of the above logged precipitator historical data sets.

Use the following steps to generate a scattergram:

1) Use the ***X Axis Parameter*** dropdown menu to choose a parameter for the X-axis. Then, do the same thing for Y Axis Parameter.

2) Use the ***Start Time*** and ***End Time*** fields to set start and end time for data displayed in the scattergram. Data is retrieved from log files and can span any historical range. Click into each area of the Start Time field (day of week, month, day, year, hour, minute, second, AM/PM) and use up/down arrows to set a value. To select a specific date, click the calendar button to open calendar, and click on the desired date. Click ***Now*** to set the date and time to the present. Repeat for End Time.
3) Click ***Start*** to generate a scattergram using the values selected.

To print a hard copy of the scattergram, click the ***Print*** button (looks like a printer). The first page shows a graph of the scattergram, and subsequent pages show a table of data point values used in the graph. Use the ***Next Page*** and ***Previous Page*** buttons to navigate through the **Print Preview** window. The ***Print Page*** button prints the currently viewed page to the selected printer. The ***Print All*** button prints the graph and table pages. The ***Change Printer*** button opens a Windows dialog box to select an available printer.

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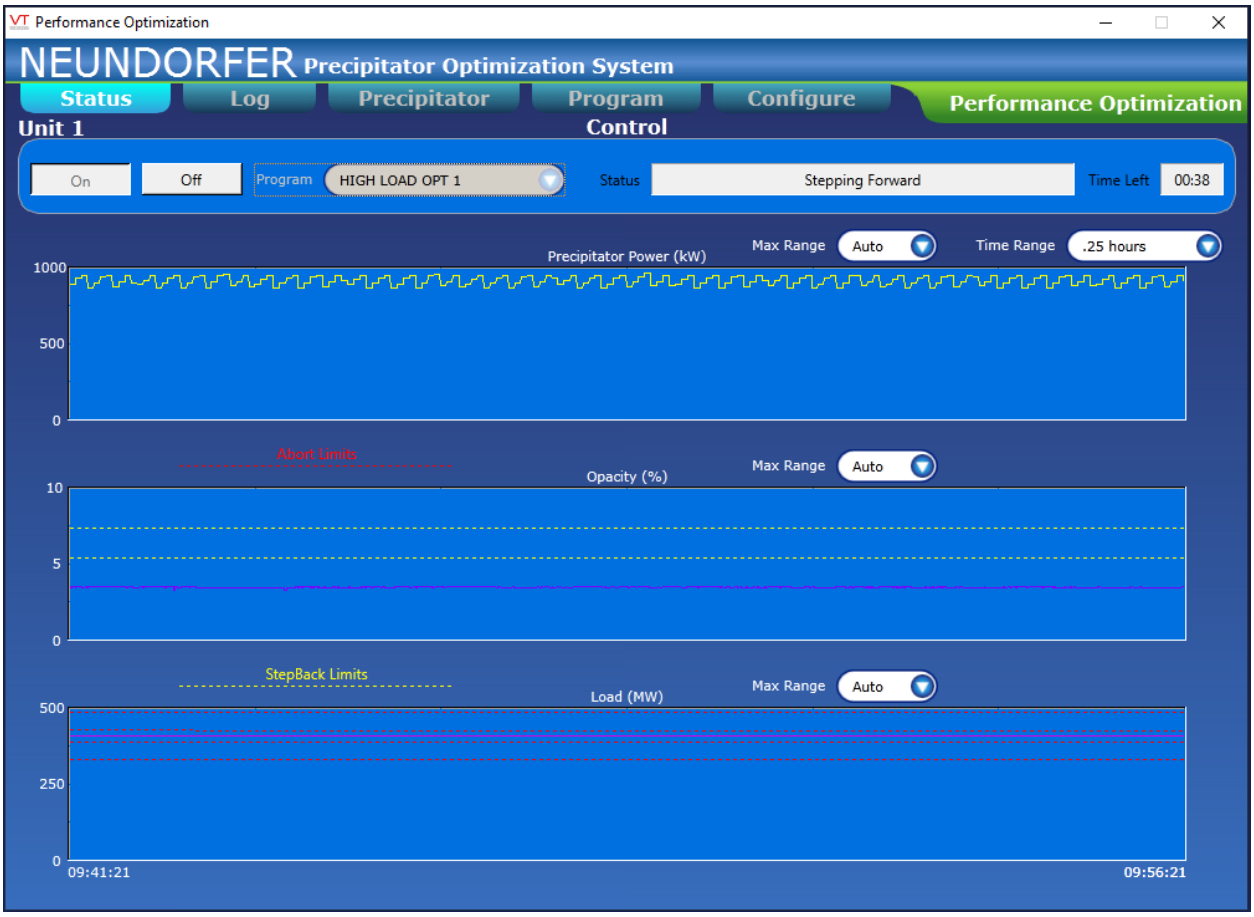
19. Performance Optimization

Overview

The **Performance Optimization** module is used to achieve the best possible particulate collection efficiency at the most appropriate power level in the precipitator. It uses a programmed set of steps to change secondary current limits on voltage controls to optimize power usage while responding to changes in precipitator loading and opacity.

Access the **Performance Optimization** module from the Precipitator Icon menu or any T/R Set icon menu. Click on the icon then select ***Performance Optimization*** from the menu.

Note: All User Accounts can view the Performance Optimization Module, but Only User Accounts with the Performance Optimization Control and Performance Optimization Programming privileges will be able to start and stop the module or create/modify programs and configure Optimization.



PERFORMANCE OPTIMIZATION WINDOW

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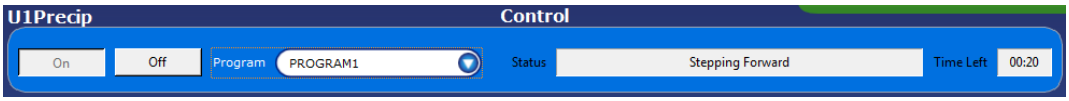
Status Tab

Control Toolbar

The Control toolbar is located at the top of the Status tab.



CONTROL TOOLBAR

Use the ***On*** button to start running the selected Performance Optimization program.

Use the ***Off*** button to stop Performance Optimization

Use the ***Program*** dropdown menu to select an optimization program. Performance Optimization must be Off to change programs.

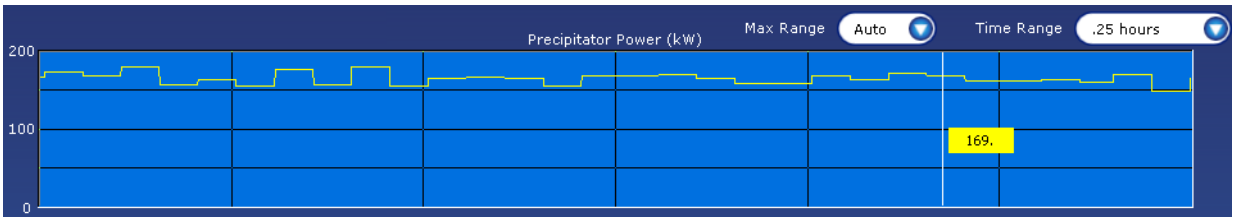
The **Status** display shows the most recent status message from the optimization module.

The **Time Left** display counts down the time remaining in the current step before attempting the next optimization program step.

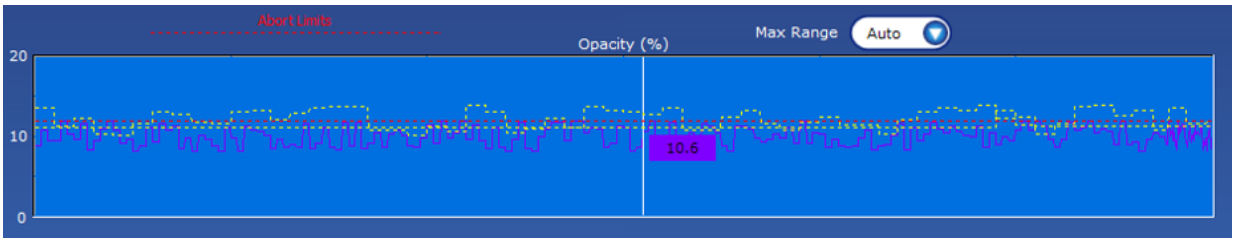
Graphic Displays

The three graphs display trends of current operating data. Moving the mouse over any of the graphs displays the value for each measured parameter at the timestamp displayed at the bottom of the lower graph.

Use the ***Time Range*** dropdown to adjust the amount of data displayed on the graphs. Each graph has a ***Max Range*** dropdown that can be used to select a specific maximum for the Y-Axis, or Auto to automatically adjust for displayed data.



The top graph **Precipitator Power (kW)** displays the Secondary Power in the precpitator.



The center graph **Opacity (%)** displays the opacity reading for the associated precipitator. When Performance Optimization is running the Opacity Abort And Stepback limits are recorded to be displayed here. The dashed Red Line shows the Maximum Opacity Abort limit. The two dashed yellow lines show the Maximum Step Opacity Stepback and the Maximum Total Opacity Stepback limits. These values change

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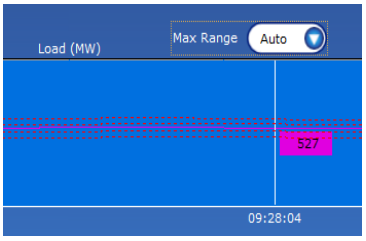
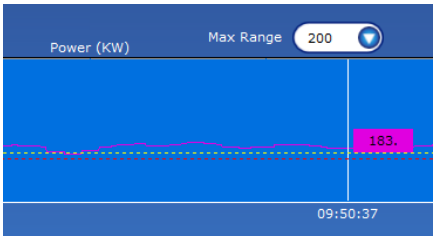
based on the current opacity reading during the course of optimization. See Configuration page 57 for information on these values



LOAD BASED OPTIMIZATION



POWER BASED OPTIMIZATION

The lower graph displays **Load** or **Power** based on how optimization is configured. The Load graph will display the Total Load Change and Step Load Change abort limits as dashed red lines. The Power graph will display Minimum Power Stepback limit as a dashed yellow line and the Minimum Power Abort limit as a dashed red line. See Configuration page 57 for information on these values

Log Tab

LOG TAB

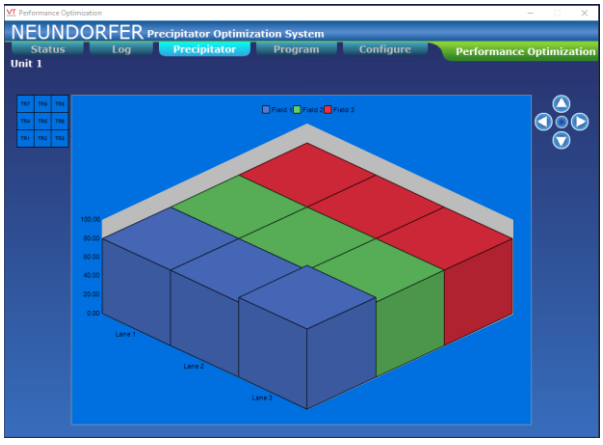
POS logs actions taken by the **Performance Optimization** module. These can be viewed in the alarms page (see chapter 40) and in the **Log** Tab.

This tab will always open to the current day. To view log data from another day, use the time selector in the lower right-hand corner of the window. Click into the area of the date fields (day of week, day, month, year) and use up/down arrows, or click the calendar symbol, to change by date. Click Today to return to the current day's log.

Precipitator Tab

The **Precipitator** tab displays a real-time live 3D bar graph representing the precipitator. Depending on layout of your precipitator, each T/R Set may be represented by more than one bar in the graph. The height of the bars represent the voltage control's Optimization Setpoint, which is the percentage of secondary current limit that the controls currently affected by optimization are using.

You can rotate the orientation of the graph by clicking the up/down/left/right arrows in the upper right-hand corner of the window. Click the circle in middle of the arrows to return to default orientation. Mousing over any bar will display the T/R Set name it represents and the current Optimization Setpoint for that control.



PRECIPITATOR TAB

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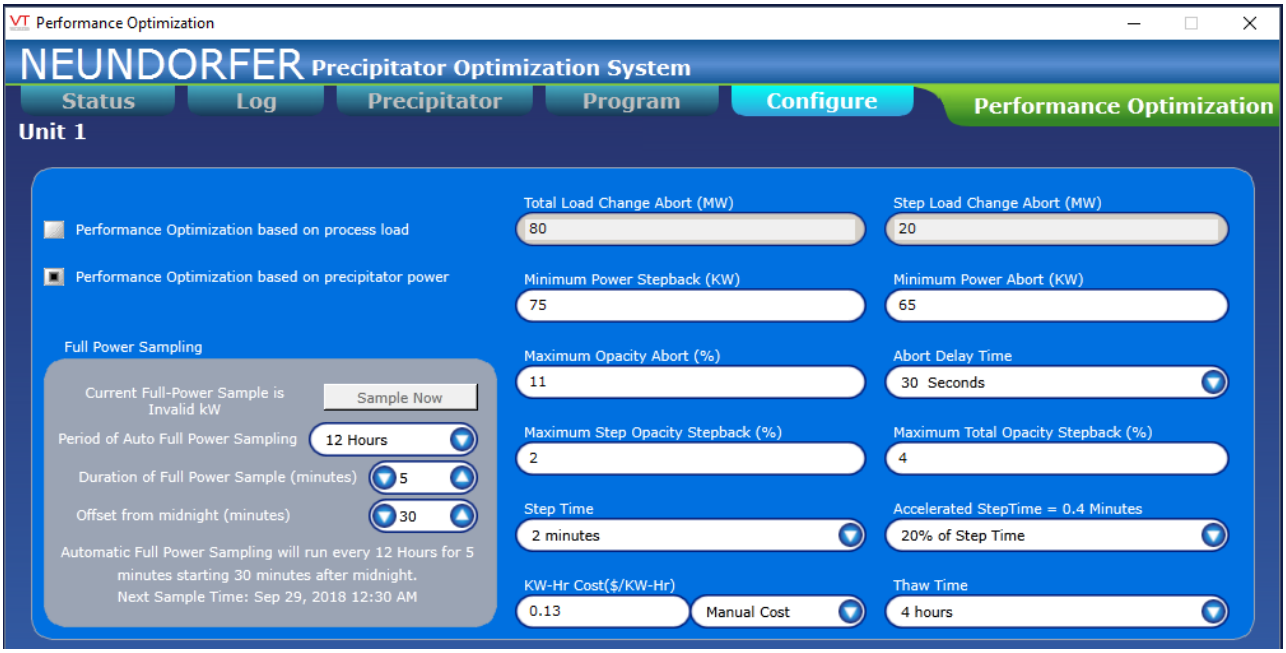
Configure Tab

The **Configure** tab is used to view and set up operating parameters and limits that affect all **Performance Optimization** programs.



CONFIGURE TAB - UPPER SECTION

Performance optimization can run based on process load or precipitator power. Select **Performance Optimization based on process load** to cause the module to react to changes in loading. Most utility plants base optimization on process load to ensure that the precipitator will respond to changes in demand.

Select **Performance Optimization based on precipitator power** to cause optimization to control around a minimum power setting regardless of load. This option is selected by some plants because they must maintain a specific power level in the precipitator for permitting reasons.

Performance Optimization Parameters:

- ***Total Load Change Abort*** – If load changes by the value entered in this field since the start of the optimization program, the program will abort, set new baselines and restart from the beginning. This number is checked continuously and can cause an abort at any time while optimization is running. It is used only when optimization is based on process load.
- ***Step Load Change Abort*** – If load changes by the value entered in this field since the start of the current step, the program will abort, set new baselines and restart from the beginning. This check is performed at the end of every step and will only cause an abort at the end of the step. It is used only when optimization is based on process load.
- ***Minimum Power Stepback (kW)*** – When precipitator power level falls below this value, the optimization program will step back to the previous step. It is only used when optimization is based on precipitator power.
- ***Minimum Power Abort (kW)*** – When precipitator power falls below this value, the program will abort, set new baselines and restart from the beginning. This value is checked continuously and can cause the program to abort at any time while optimization is running. It is used only when optimization is based on precipitator power.

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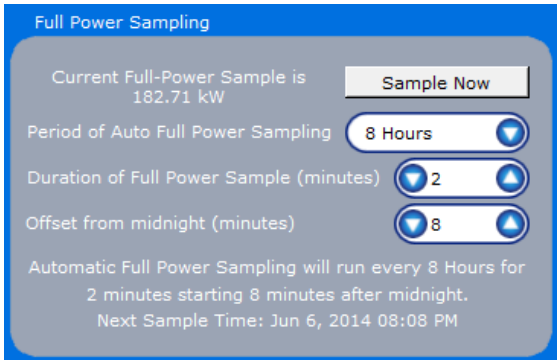
- ***Maximum Opacity Abort (%)*** – If opacity exceeds this value for longer than the ***Abort Delay Time***, the program will abort, set new baselines and restart from the beginning. This number is checked continuously and can cause the program to abort at any time while optimization is running.
- ***Abort Delay Time*** – Sets the amount of time the ***Maximum Opacity Abort*** limit must be exceeded before aborting. This prevents aborting during short opacity spiking.
- ***Maximum Step Opacity Stepback (%)*** – This number is checked at the end of each step time. If opacity is greater the value at the beginning of the step by the number of percentage points entered in this field, the optimization program will step back to the previous step.
- ***Maximum Total Opacity Stepback (%)*** – This number is checked only at the end of each step time. If opacity is greater than the current baseline by the number of percentage points entered in this field, the optimization program will step back to the previous step. This baseline is re-evaluated at the beginning of each step if opacity decreses.
- ***Step Time*** – This dropdown sets the length of time for optimization program steps.
- ***Accelerated Step Time*** – This dropdown selects a multiplier for the normal ***Step Time*** parameter. If **Performance Optimization** was suspended (due to Full Power Sampling or other POS modules interactions), when it resumes the A***ccelerated Step Time*** is used to step forward to return to the step the program was on when suspended. If a step back is needed before reaching that step, then step time returns to normal. ***Accelerated Step Time*** choices are percentages of ***Step Time*** but will never be less than 5 seconds.
- ***KW-Hr Cost($/KW-Hr)*** – This value is used to calculate optimization savings. The dropdown can be used to select Manual for a manual entry, or to select an analog input tag (must contain “cost” in the name of the tag) that reflects changing cost values.
- ***Thaw Time*** – This dropdown menu selects how long performance optimization will wait to “unfreeze” frozen lanes to return them to the optimization program. Select Disabled to only allow frozen lanes to return to service upon an abort or when optimization is turned off. See T/R Sickness bellow for more information on frozen lanes.

Full Power Sampling



FULL POWER SAMPLE DETAIL

Calculating power reduction due to running optimization programs requires a baseline level of precipitator power usage while optimization is not running. Data is kept continuously on power usage while optimization is turned off or suspended. This creates the **Current Full-Power Sample**. If Optimization runs continuously the Full Power sample may no longer accurately reflect precipitator power usage. The ability to sample the full power usage manually or at regular intervals helps ensure that the optimization savings are as accurate as possible.

During a full power sample the optimization program is suspended and all controls are returned to full power. After the sample duration passes the optimization program will use the accelerated step time to return to the preciously running step in the program. To trigger a full power sample event at any time click the ***Sample Now*** button. For automatic sampling use the ***Period*** dropdown to select how often a sample will be taken. Select ***Manual*** to disable automatic Full Power Sampling.

Use the ***Duration*** spin box to select the number of minutes the controls remain at full power during a sample.

Use the ***Offset from midnight*** spin box to select the number of minutes after midnight to start the sample

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Savings

SAVINGS DETAIL

The **Current Realtime Savings** value is the difference between the Current Full Power Sample and precipitator primary power usage.

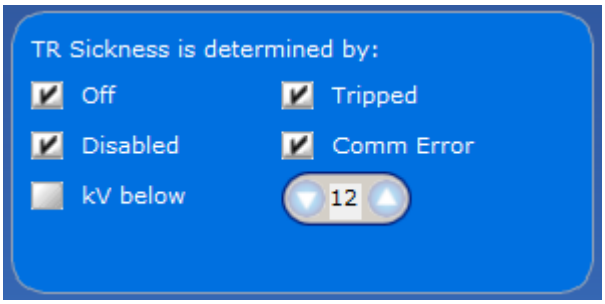
The **Total KW-hr Savings** value is calculated based on the cumulative realtime savings since the last Reset.

The **LifeTime Cost Savings** value is calculated based on the cumulative realtime savings and the KW-Hr Cost ($/KW-Hr) parameter since the last Reset.

These values are estimates and their accuracy is dependent on the accuracy of the full power sample value. The more often a sample is taken, the more accurate the data.

The ***Reset*** buttons will reset the individual values to 0 and begin accumulating again while optimization is running.

T/R Sickness



T/R SICKNESS DETAIL

T/R Sickness is used by Performance Optimization to determine a likely cause of optimization step back due to an opacity increase. When a step back occurs Optimization looks for any T/R Sets that have the T/R sickness determining factors. It then freezes all of the T/R Sets in the same lane as the sick T/R Set at their current setpoints in the program step. T/R Sets in the frozen lanes will be prevented from stepping forward in the program until the configured ***Thaw Time*** period, or optimization stops or aborts.

Use the check boxes next to each one of the conditions to configure what Performance Optimization will consider a “Sick” T/R Set.

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Program Tab

The **Program** tab is used to create new **Performance Optimization** programs or to view or modify existing programs.

An optimization program is a series of steps. Each step defines the Optimization Setpoint (as a percentage of secondary current limit) for each voltage control in the precipitator. If **Performance Optimization** is turned on after each step time it will determine to move forward in the program to the next step or step back to a previous step based on the parameters defined in the **Configure** tab.

PROGAM TAB

The main area of the **Program Tab** dispalys the selected program. The center grid is the active step and can be edited, the left grid displays the previous step, and the right grid displays the next step. The grid are layed out to represent the area energized by each T/R Set in the precipitator. Each area in the grid displays a T/R Set name and the optimization setpoint for the step.

Use ***the First, Prev, Next*** and ***Last*** buttons to navigate through the program steps.

Use the ***Select Program*** dropdown menu to select which program to display or edit. If the current program has been modified you cannot select another program until the changes are saved or cancelled.

To create a new performance optimization program, click the ***New Program*** button. To delete the selected program, click the ***Delete Program*** button.

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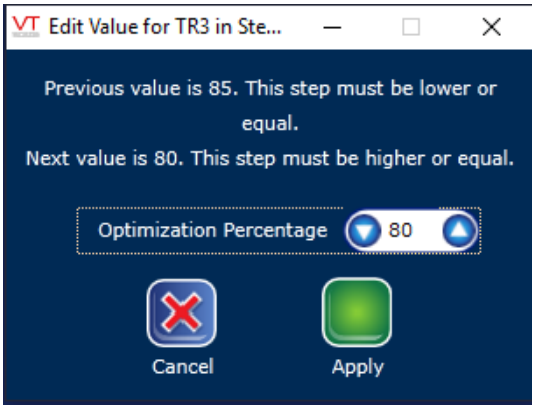
Editing Individual T/R Set Setpoints

To change the setpoint for an individual T/R Set click on the box in the active step grid with that T/R Sets name. This will launch the **Edit Value** window.

Use the up and down arrows to select the Optimization Percentage or click into the field, type a value, and press the <**Enter**> key on the keyboard to set the value. The value must be less than or equal to the setpoint in the previous step and must be greater than or equal to the value in the next step.

Click Apply to save and close the **Edit Value** window, or click the Cancel button to close without saving the change.



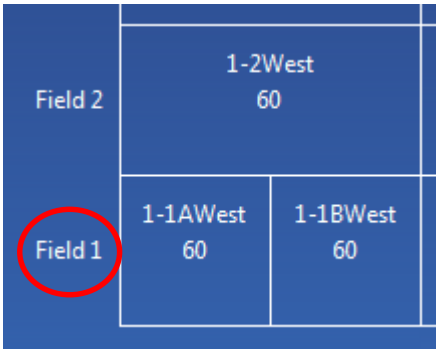
EDIT VALUE WINDOW

Editing T/R Set Setpoints by Field

To change the setpoint for all T/R Sets in a field at one time click on the "Field X" label to the left of the T/R Sets in the grid. This will launch the **Edit Value** window.

Use the up and down arrows to select the Optimization Percentage or click into the field, type a value, and press the <**Enter**> key on the keyboard to set the value. If the value entered is higher than the previous step or lower than the next step for any individual T/R Set within the field it will be set equal to that value.

Click Apply to save and close the **Edit Value** window, or click the Cancel button to close without saving the change.



EDIT BY FIELD DETAIL

Editing All T/R Set Setpoints

To change the setpoint for all T/R Sets in the precipitator at once click on the ***Edit All*** button. This will launch the **Edit Value** window.

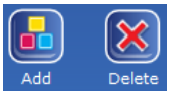
Use the up and down arrows to select the Optimization Percentage or click into the field, type a value, and press the <**Enter**> key on the keyboard to set the value. If the value entered is higher than the previous step or lower than the next step for any individual T/R Set within the field it will be set equal to that value.

Click Apply to save and close the **Edit Value** window, or click the Cancel button to close without saving the change.

EDIT ALL BUTTON

Adding and Deleting Steps

The only place to add a step or delete a step from the optimization program is from the end of the program. When the current step is the last step of the program the ***Add*** and ***Delete*** buttons replace the ***Next*** and ***Last*** buttons. Use the ***Add*** button to add an additional step to the optimization program. The new step will have all of the same setpoint values as the current step. Use the ***Delete*** button to delete the last current step.



ADD AND DELETE BUTTONS

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Use the ***Save*** button

to overwrite the current program with the changes.

Use the ***Save As*** button

to save the modifications under a different program name.

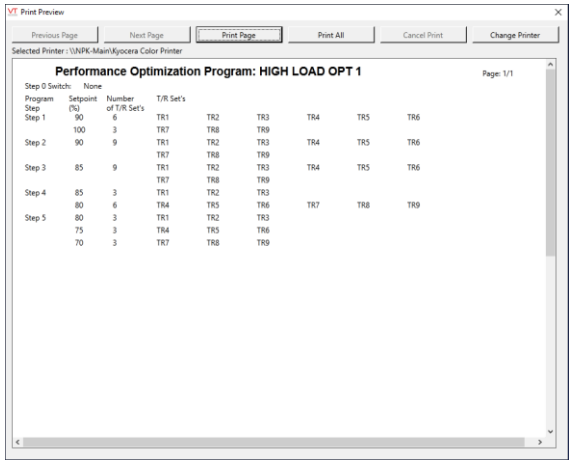
Use the ***Cancel*** button

to cancel all changes to the selected program.

If changes have been made to the currently running optimization program the new changes will not take effect until **Performance Optimization** is stopped and re-started.

Use the ***Print*** button

to launch a **Print Preview** window displaying the steps in the optimization program. Use the ***Next Page*** and ***Previous Page*** buttons to navigate through the **Print Preview** window. The ***Print Page*** button prints the currently viewed page to the selected printer. The ***Print All*** button prints the graph and table pages. The ***Change Printer*** button opens a Windows dialog box to select an available printer.



PRINT PREVIEW

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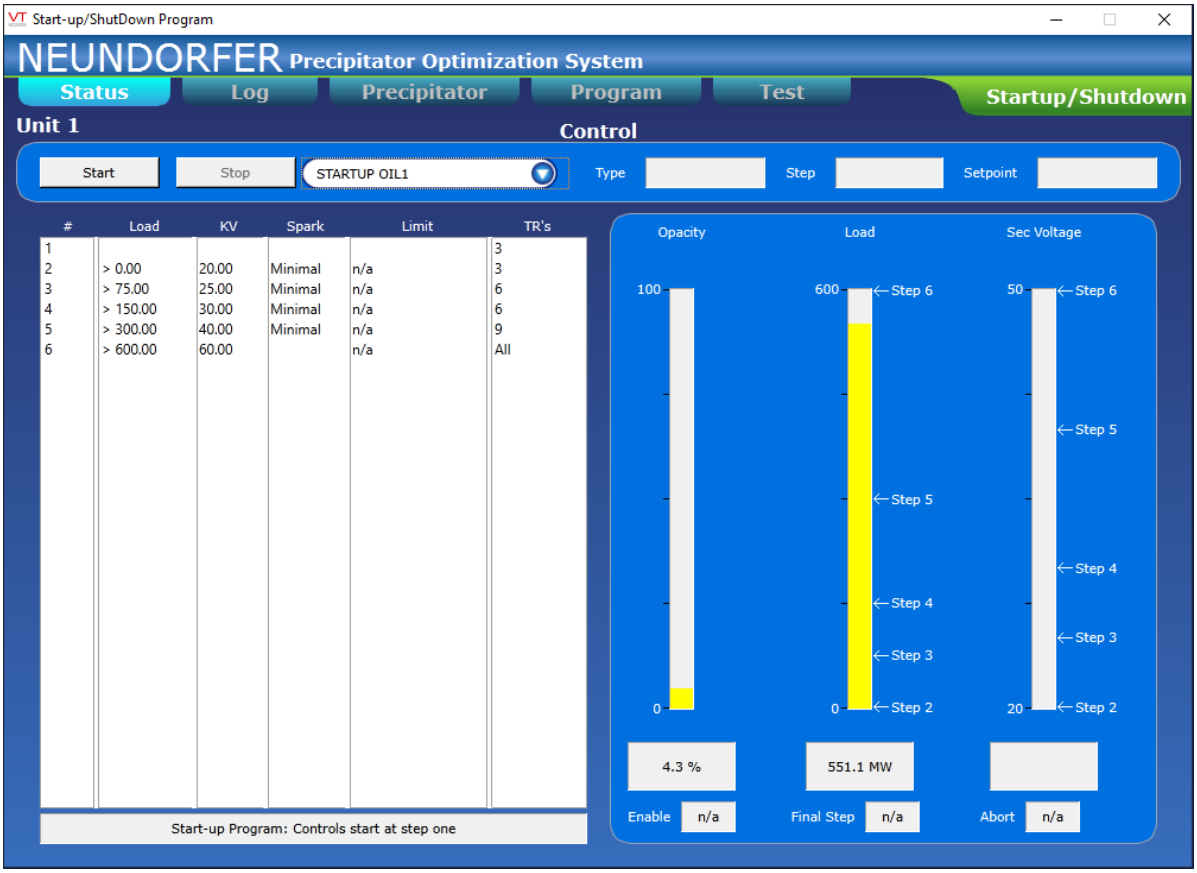
20. Start-up/Shutdown

Overview

The **Start-up/Shutdown** module is used to automatically set T/R Set operating levels based on analog and/or digital inputs to POS during changes in process. A start-up program takes T/R Sets from the 'Off' state to full power in a series of steps when the process is starting up. A shutdown program takes the T/R Sets from normal operating levels to the 'Off' state in a series of steps while the process is shutting down. The programs adjust secondary voltage or SCR conduction angle limits and can be set to minimize sparking.

Access the **Start-up/Shutdown** module from the precipitator menu. On the plan view page, click on the precipitator icon and then click Start-up/Shutdown.

Note: All User Accounts can view the Start-Up/Shutdown Module, but Only User Accounts with the Start-Up/Shutdown Control and Start-Up/Shutdown Programming privileges will be able to start and stop the module or create and modify programs.



START-UP/SHUTDOWN

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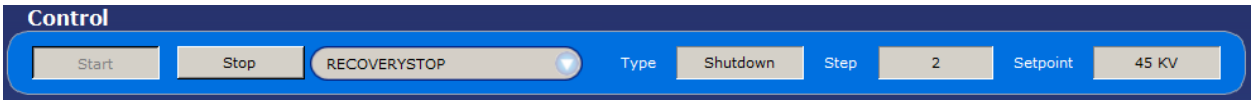
The descriptions below explain the basic concepts of the **Start-up/Shutdown** module.

- Controlling Inputs: Analog and digital inputs can be used as controlling parameters to allow the module to step through the program. You have the option to use one or both types of inputs. An analog input selects which program step is active. Digital inputs can be used for Enable, Abort and End Signal actions. Digital inputs, if used, have priority over analog inputs.
- Programs: A start-up or shutdown program consists of a series of steps, each involving one or more voltage controls set to a specific operating level for that step. The program advances through the steps based on values of the controlling inputs. The program will continue in its current step until the condition in another step becomes true. When a start-up program reaches its final step, all controls are set to full power and the module goes to the 'off' state. When a shutdown program reaches its final step, all controls are set to off, and the module goes to the 'off' state.
- Minimizing Sparking: Each step in a program contains the option to minimize sparking or opacity. Spark minimization is handled by each voltage control. When a control detects a spark, it adjusts the secondary voltage operating level to avoid further sparks until the next step is executed. **NOTE: Minimizing sparking will not eliminate 100 percent of sparks; instead, when a spark occurs, the voltage control will attempt to prevent another spark from occurring.**
- Minimizing Opacity: Each step in a program contains the option to minimize opacity or sparking. To minimize opacity, POS increases voltage control operating levels by a user-selectable percentage, at a user-selectable rate, any time opacity is above a specified percentage. When opacity is below that percentage, power levels remain steady. If the control is trying to minimize sparks, POS cannot minimize opacity. If POS has increased power levels of the voltage controls to minimize opacity, it will maintain those levels when it advances to the next step in the program, assuming the next step is also set to minimize opacity and the setpoints for the next step are greater than setpoints in the previous step but lower than actual power levels.

Status Tab

Along the top of the **Status** tab is the **Control** area that contains start and stop buttons as well as program selection and status indications.



CONTROL AREA OF STATUS TAB

Click the Start button to begin the selected program. Click the Stop button to abort the currently running program. Use the dropdown menu to select a program. The Type indication shows the type (start-up or shutdown) of the selected program. Step shows the currently active program step number. Setpoint shows voltage control limit level for controls contained in currently active program step number.

On left-hand side of the **Status** tab are six columns showing configuration for each step of the currently selected program. From left to right, the columns show: step number, analog input control value, voltage control setpoint, spark rate setting, opacity limit for the step, and number of controls in the step. If the program selected is running, the currently 'active' step is highlighted.

On right-hand side of the Status tab are three bar graphs showing current opacity value, analog input control value, and voltage control setpoint. Each step in the selected program is represented on the graph with an arrow and name of the step number. Underneath the bar graphs are displays showing status of digital inputs for Enable, Final Step and Abort.

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Log Tab

LOG TAB

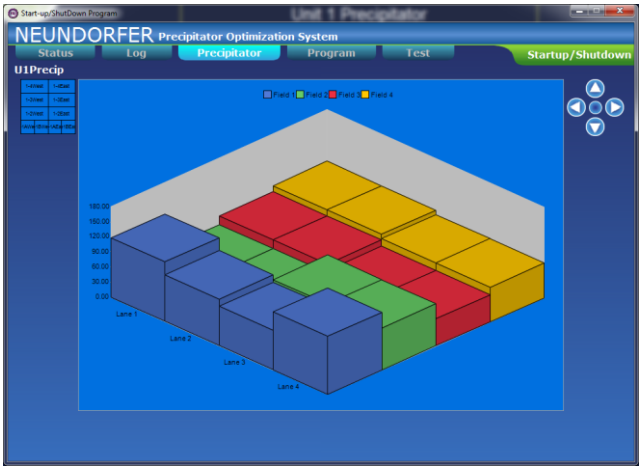
POS logs actions taken by the **Start-up/Shutdown** module. These can be viewed in the alarms page (see Section 43) and in the **Log** tab.

This tab will always open to the current day. To view log data from another day, use the time selector in the lower right-hand corner of the window. Click into the area of the date fields (day of week, day, month, year) and use up/down arrows, or click the calendar symbol, to change by date. Click Today to return to the current day's log.

Precipitator Tab

The **Precipitator** tab displays a real-time live 3D bar graph representing the precipitator. Depending on layout of your precipitator, each T/R Set may be represented by more than one bar in the graph. The height of the bars represent the voltage control's Conduction Angle or Secondary KV Limit based on the parameter the program is using for control.

You can rotate the orientation of the graph by clicking the up/down/left/right arrows in the upper right-hand corner of the window. Click the circle in middle of the arrows to return to default orientation. Mousing over any bar will display the T/R Set name it represents and the current Start-up/Shutdown setpoint for that control.



PRECIPITATOR TAB

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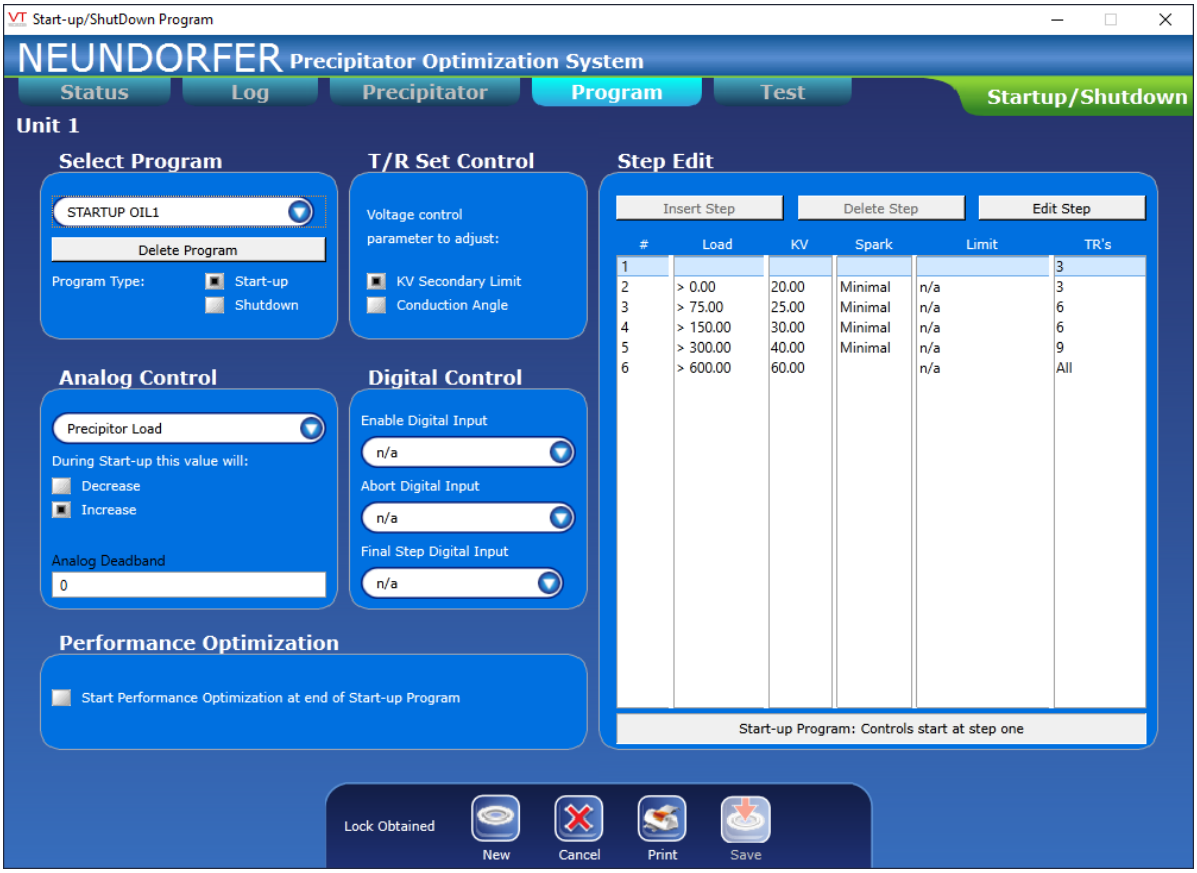
Program Tab

The **Program** tab is used to create new programs or view and modify existing programs.



PROGRAM TAB

Use the Select Program dropdown menu to select an existing program to view and edit. See the next section, “Start-up/Shutdown Wizard,” to create a new program.

Use the Radio buttons in the **T/R Set Control** area to select KV Secondary Limit or Conduction Angle as the voltage control parameter to adjust during the program.

Use the dropdown menu in the **Analog Control** area to select the analog value used to monitor and select whether this value will increase or decrease to advance through the program steps. Enter a number into the Analog Deadband field to set a buffer around the analog value to avoid the program bouncing into and out of a step based on a small fluctuation in the analog value.

Use the options in the **Digital Control** area to configure digital inputs for the program. These inputs can be used with or without an analog value. If used with an analog value, then the digital inputs take higher priority. Enable Digital Input allows the program to begin advancing through the steps. Abort Digital Input aborts the start-up or shutdown process. Final Step Input causes the program to advance to the last step and then terminate. If no digital inputs are configured in your POS installation, there will be no editable fields in this section.

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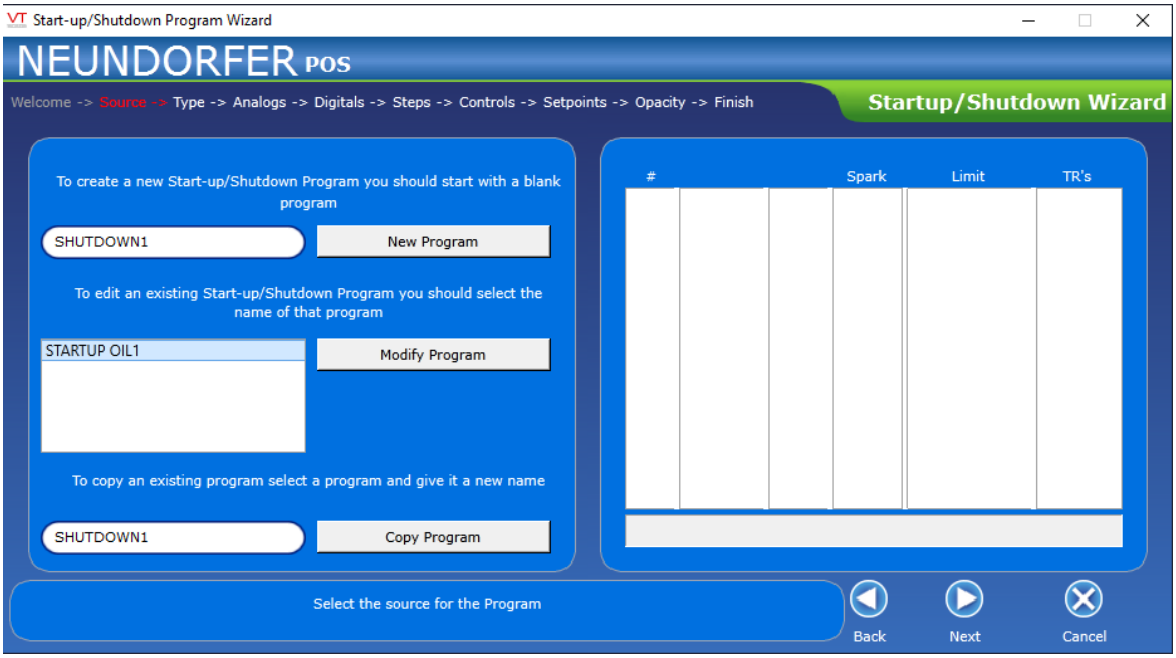
In the **Step Edit** area, you can insert, delete or edit steps for the selected program. Select a step from the list by clicking on it. Click ***Insert Step*** to add a new step after the selected step. Initial parameters for the new step will be the halfway point between the prior step and the next step. Click ***Edit Step*** to change the levels and limits, T/R Sets, and other parameters for the selected step. Click ***Delete Step*** to remove the selected step from the program.

When finished editing the selected program, click ***OK*** to save changes and close the window, ***Cancel*** to close the window without saving changes, or ***Apply*** to save changes without closing the window.

Click the ***Print*** button to open a **Print Preview** window for printing the program.

Start-up/Shutdown Wizard

To create new programs with **Start-up/Shutdown Wizard**, click the New button at the bottom of the screen in the **Program** tab. This will launch the **Start-up/Shutdown Wizard.** The first screen is a welcome splash screen. To turn this off in the future, click the Don't show this page again box in lower right-hand corner. Click Next to proceed.



SOURCE SCREEN

On the **Source** screen of the **Start-up/Shutdown Wizard**, select what to do with the wizard. To create a new program, type a name for the program in the field in upper left-hand corner and click ***New Program***. POS automatically inserts three program steps with default values, shown on right-hand size of the screen. To edit an existing program, select the program name from the list and then click ***Modify Program***. To begin a new program based on an existing program, select a program name from the list and click ***Copy Program***. This will use all of the existing program configuration parameters but will allow the program to be saved under a different name. Once a program is displayed click ***Next*** to proceed.

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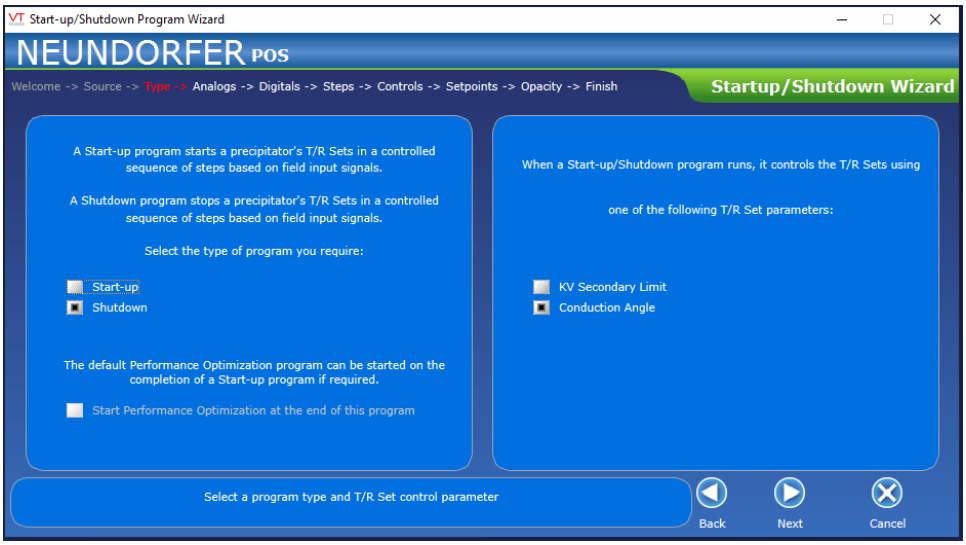
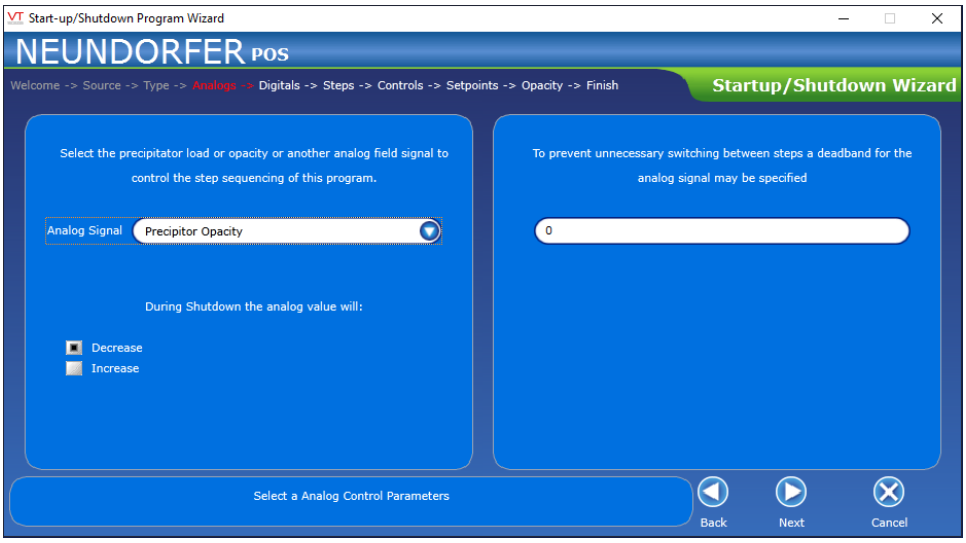


TYPE SCREEN

On the **Type** screen of the **Start-up/Shutdown Wizard**, set the type of program (Start-up or Shutdown), and specify whether or not the program should control T/R Sets based on KV Secondary Limit or Conduction Angle. Use the Start Performance Optimization at end of this program checkbox to select whether to have POS launch the default **Performance Optimization** program when a start-up program is complete. (See Section 19 for more information on Performance Optimization.) After making your selections, click ***Next*** to proceed with the wizard.



ANALOGS SCREEN

On the **Analogs** screen of the **Start-up/Shutdown Wizard**, select an analog signal to control step sequencing of the program, specify if that analog value will increase or decrease during start-up or shutdown, and enter a deadband range for the analog signal. The deadband number is used to create a range around the analog value in which the program will not move forward or backwards through steps. This prevents the program from bouncing into and out of a step because of small fluctuations in the analog value. When done making selections, click ***Next*** to proceed.

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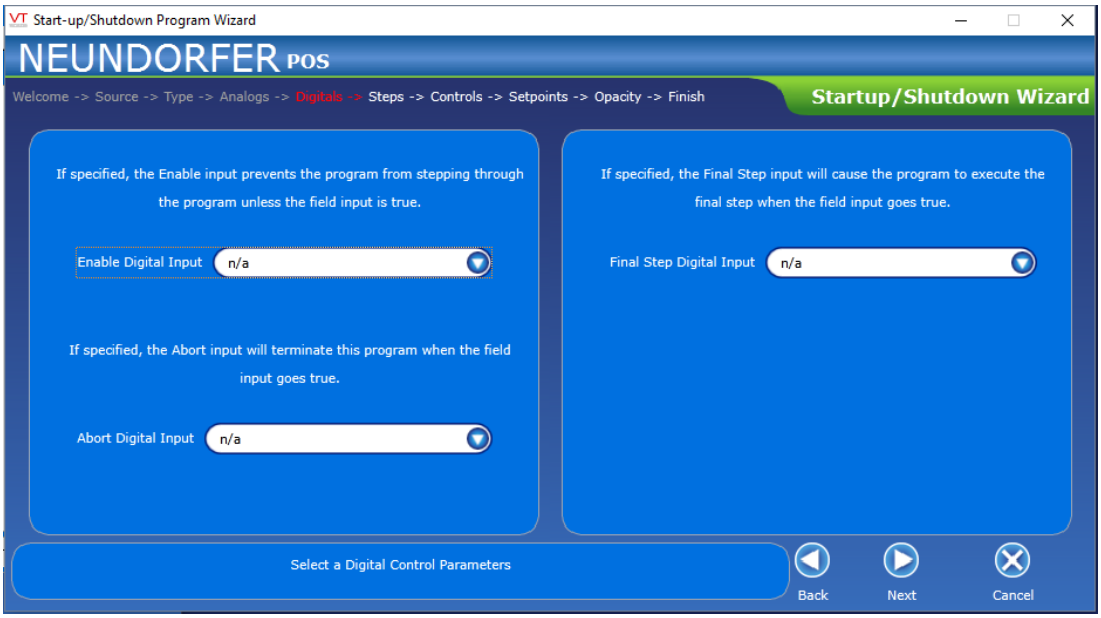
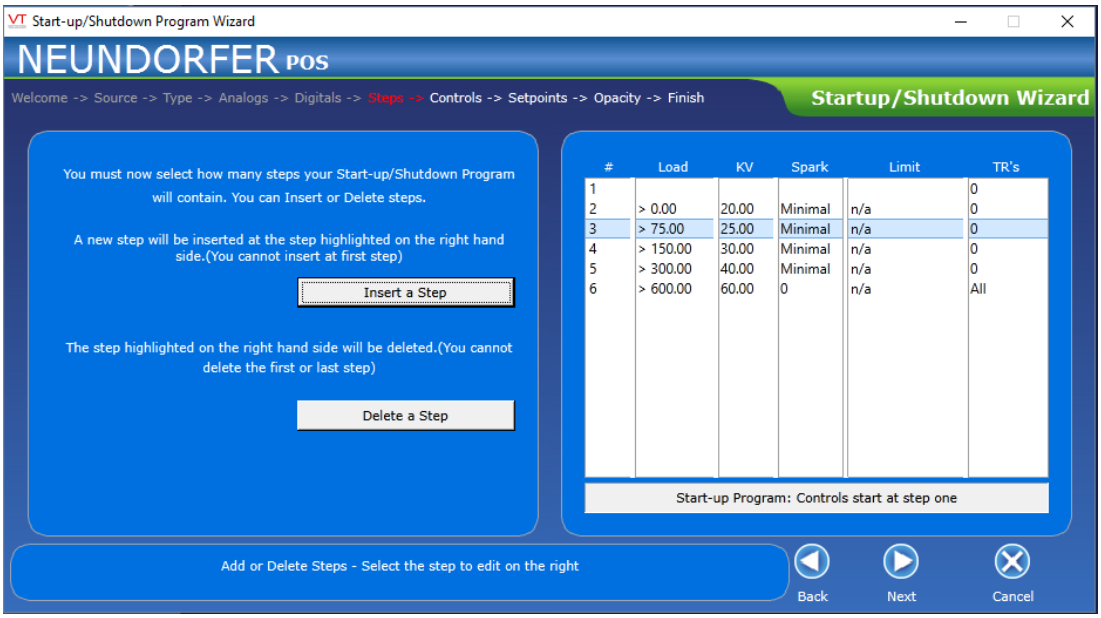


DIGITALS SCREEN

On the **Digitals** screen of the **Start-up/Shutdown Wizard** use the dropdown menus to select digital inputs for the three functions. Digital inputs are not necessary and may not be configured for all POS installations.



STEPS SCREEN

On the **Steps** screen of the **Start-up/Shutdown Wizard**, you can add or delete program steps. Click one of the existing steps and click ***Insert a Step*** to add another step after the one selected. Initial parameter values for the new step will be the halfway point between the prior step and the next step. T/R Sets and values for each step are edited further into the wizard.

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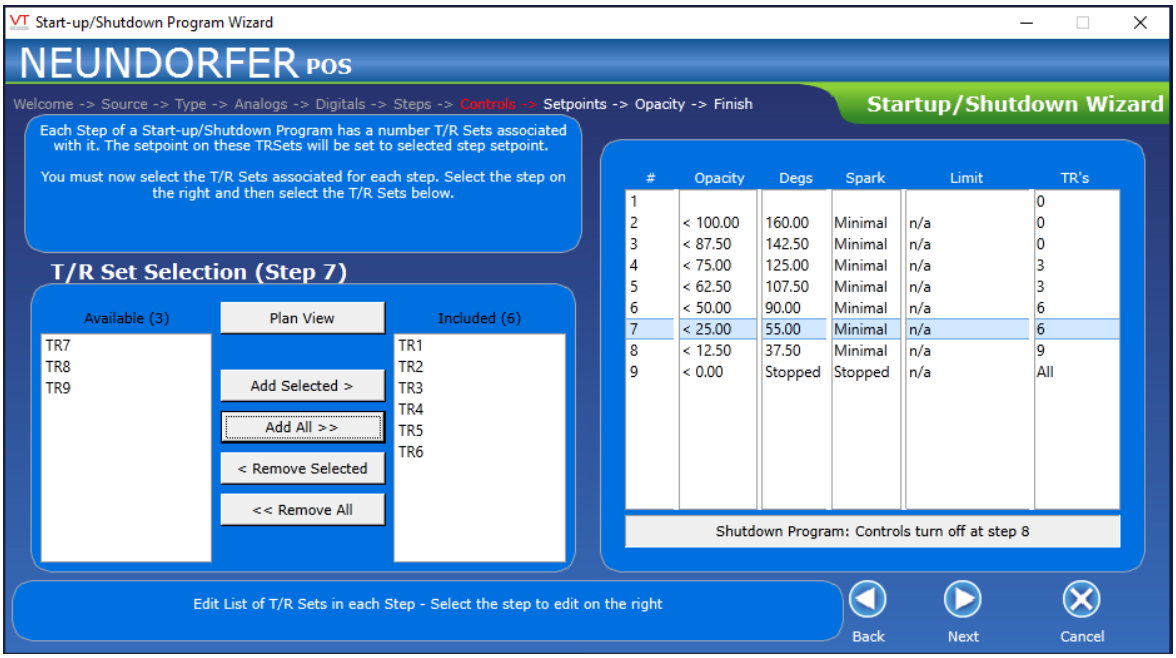
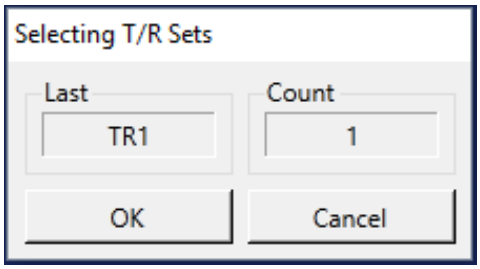


CONTROLS SCREEN

On the **Controls** screen of the **Start-up/Shutdown Wizard**, select which T/R Sets should be associated with each step in the program. In the list on the right-hand side, click a step to select it. Then, use the **Available** and **Included** lists on the left-hand side to add or delete T/R Sets for the selected step. To add only some of the available T/Rs, click each one to select it and then click ***Add Selected***. To add all available T/R Sets, click ***Add All***. Do the same in reverse for ***Remove Selected*** or ***Remove All***. Repeat for each step in the program.

You can also use the Plan View tool to select T/R Sets. Clicking this button returns you to the plan view page, with a **Selecting T/R Sets** window floating on top. Click each T/R Set you wish to add; the Count display on the **Selecting T/R Sets** window will increase by one number each time you add a T/R Set, indicating how many you have included. When done, click ***OK***; you will be returned to the **Control** page of the **Start-up/Shutdown Wizard**.



SELECTING T/R SETS WINDOW

When done selecting T/R Sets, click ***Next*** to proceed with the wizard.

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SETPOINTS SCREEN

The **Setpoints** screen of the **Start-up/Shutdown Wizard** is used to configure values for the analog input and the corresponding voltage control setpoint limit for each T/R Set in the step. The **Step Value** (left-hand graph) is compared to the analog signal to determine which step is active. The **Step Setpoint** (right-hand graph) is sent to the selected controls in the specified step. Use the arrows or type a number in the field and press the Enter key on your keyboard key to change these settings. Repeat for each step in the program. When done, click ***Next*** to proceed with the wizard.

OPACITY SCREEN

On the **Opacity** screen of the **Start-up/Shutdown Wizard**, specify a spark rate for each step in the program. If you set **Spark Rate** to Minimal the program will instruct the T/R Sets in that step to keep the levels below the spark rate. If you set **Spark Rate** greater than minimal use the additional fields to specifying that if opacity exceeds a certain percentage, the program should increment setpoint for the selected step by a specified amount every half or one minute.

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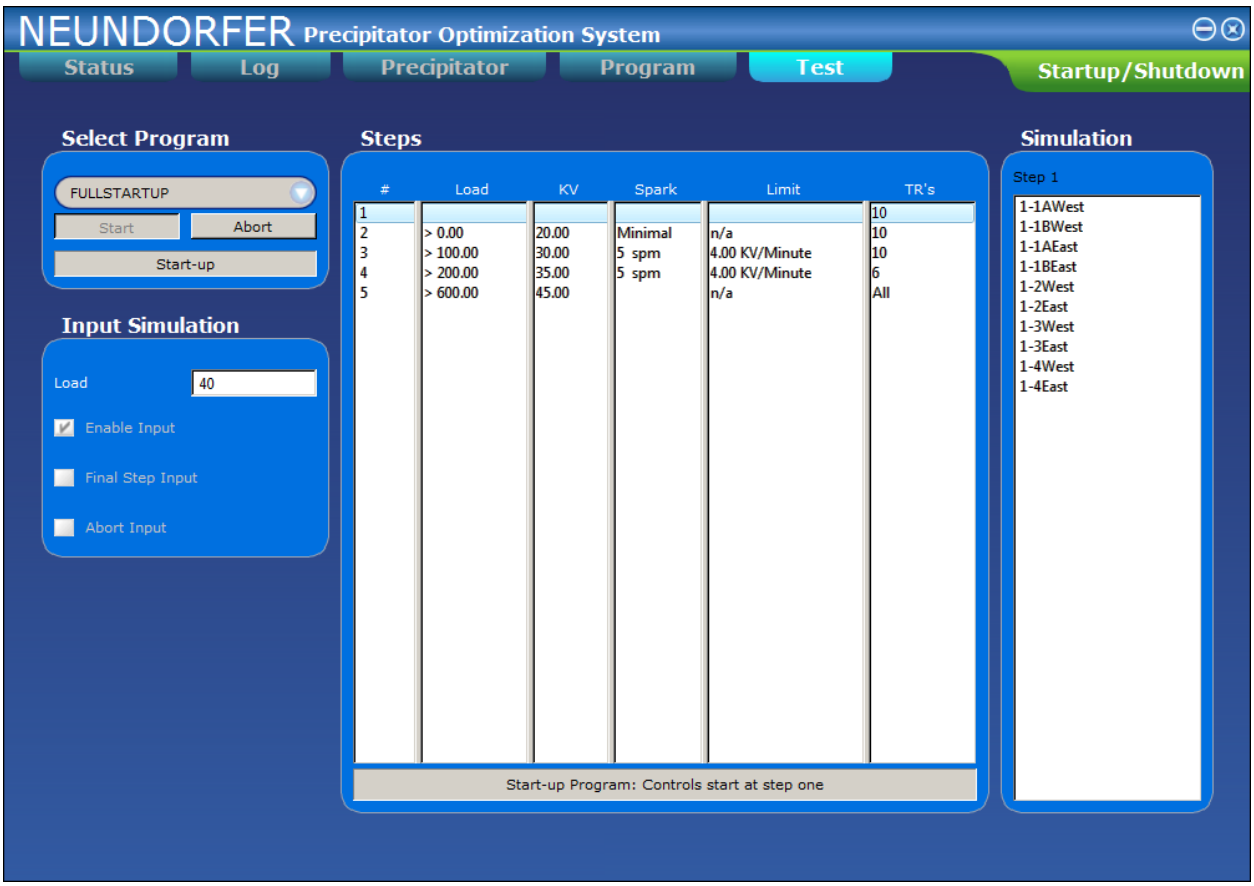
The **Finish** screen of **Start-up/Shutdown Wizard** is simply a confirmation screen indicating that all parameters for the program are complete. Click ***Finish*** to save and return to the **Program** tab.

Test Tab

In the **Test** tab, you can test out a start-up or shutdown program without affecting precipitator operation.



TEST TAB

In the **Select Program** area, select a program from the dropdown list. Click ***Start*** to begin testing the program. Click ***Abort*** to stop testing.

Use the selections in the **Input Simulation** to change the inputs. Enter values for the analog input to see the program walk through the steps and see how the T/R Set limits would be affected. Use the checkboxes to simulate digital inputs if they are configured for the selected program.

The **Steps** area displays all steps for the selected program. From left to right, the columns show (each step in its own row): step number, analog input control value, voltage control setpoint, spark rate setting, opacity limit for the step, and number of controls in the step. The step that is currently 'true' is highlighted.

The **Simulation** area shows the results of the simulated values. The active step is displayed at the top along with a list of T/R Sets that will be adjusted for that step.

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21. T/R Set Auto Adjust

Overview

The **T/R Set Auto Adjust** module is used to automatically adjust the precipitator's voltage controls based on an analog or digital input. When the configured input condition is met the adjustment is broadcast to all the voltage controls associated with this precipitator. When the input condition is no longer met or the Auto Adjust Module is turned off, the controls are told to revert to their normal operating parameters.

Access the **T/R Set Auto Adjust** module from the precipitator menu T/R Set icon menu. On the plan view page, click on the icon and then click ***T/R Set Auto Adjust***.

Note: All User Accounts can view the Auto Adjust Module, but Only User Accounts with the Auto Adjust privilege will be able to control or configure the module.

T/R SET AUTO ADJUST SATUS TAB

Status Tab

Control

The **Control** area at the top of the **Status** tab allows you to turn the module on and off, and displays its status. To enable **T/R Auto Adjust**, click the ***On*** button. To disable **T/R Auto Adjust**, click the ***Off*** button.

The status of the module is shown as 'Running' if the module is enabled or 'Stopped' if it is turned off. The status of the Performance Optimization module is also displayed as an easy reference.

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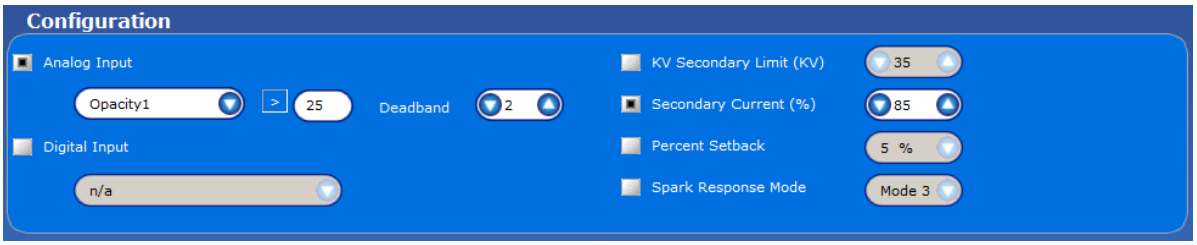
Configuration

The left hand side of the **Configuration** area is used to set the parameters that determine if the module should be active or inactive. The right hand side sets the action of the module when it is activated.



CONFIGURATION AREA

To select an analog input as the monitored parameter, click the ***Analog Input*** checkbox. Use the dropdown to select the input to monitor. Click the "**<>**" selector to choose whether to monitor greater than or less than. Type a value into the field and press the Enter key on your keyboard. Use the up or down arrows to select a deadband. This now reads like an instruction: in the example above if Opacity1 input is greater than 25 with a 2 % deadband, then the module will be active; if Opacity1 drops below 25%, the module will be inactive.

To select a digital input as the monitored value, click the ***Digital Input*** checkbox. Use the dropdown to select the digital input to be monitored. When that digital input is true, the module will be active; when it is false, the module will be inactive.

Select the action taken when the module is activated by using the radio buttons on the right hand side of the **Configuration** area.

Select ***KV Secondary Limit (KV)*** and use the up and down arrows to set the KV upper limit on the voltage controls when the module is active.

Select ***Secondary Current (%)*** and use the up and down arrows to set the secondary current limit to a percentage of the maximum secondary current limit in the voltage controls when the module is active.

Select ***Percent Setback*** and use the dropdown to select a setback value to change the spark setback value on the voltage controls when the module is active.

Select ***Spark Response*** mode and use the dropdown menu to select mode 1, mode 2 or mode 3 in the voltage controls when the module is active.

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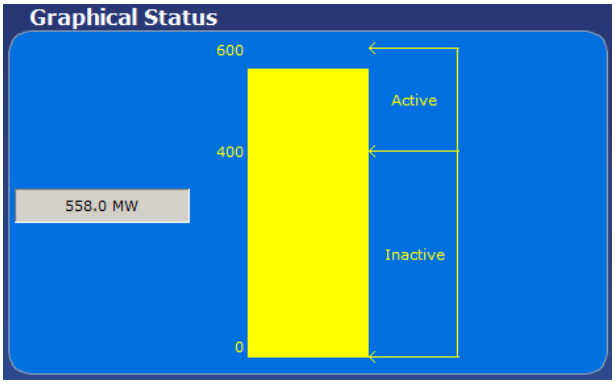
Graphical Status



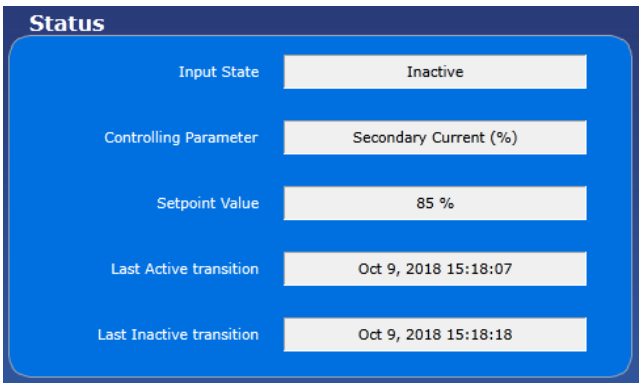
GRAPHICAL STATUS AREA

When an Analog Input is used, the **Graphical Status** area displays a bar graph for that value. The live value is displayed as text and as the height of the bar. The setpoint is displayed and the ranges where the module will be Inactive and Active are displayed. This is an easy reference to see the state of the analog value controlling the module.

When a Digital Input is used a box displaying the status of the input is shown. The box will appear Green when the input is false and the module is Inactive.

The box will display Red when the input is True and the module is active.

Status

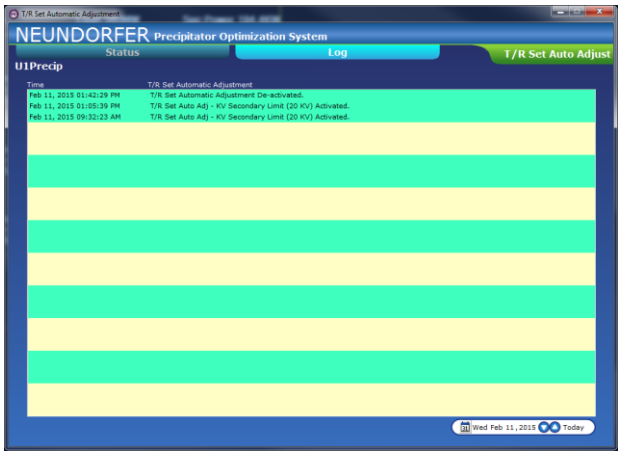


STATUS AREA

The **Status** area shows a summary of the module.

- **Input State** shows whether the module is Active or Inactive.
- **Controlling Parameter** displays the selected parameter
- **Setpoint Value** displays the value that will be set when Auto Adjust is Active.
- **Last Active Transition** is when Auto Adjust last entered an active state (on).
- **Last Inactive transition** is when Auto Adjust last changed to an Inactive state (off).

Log Tab



LOG TAB

All **T/R Set Auto Adjust** module actions are logged by POS. They are displayed in the **Log** tab and in the alarm log. When you first open this tab, data is displayed for the current day.

To see data for a different date, click into each of the date fields in lower right-hand corner (day of week, month, day, year) and use up/down arrows, or click the calendar symbol to select a different day. Click ***Today*** to return to the present time.

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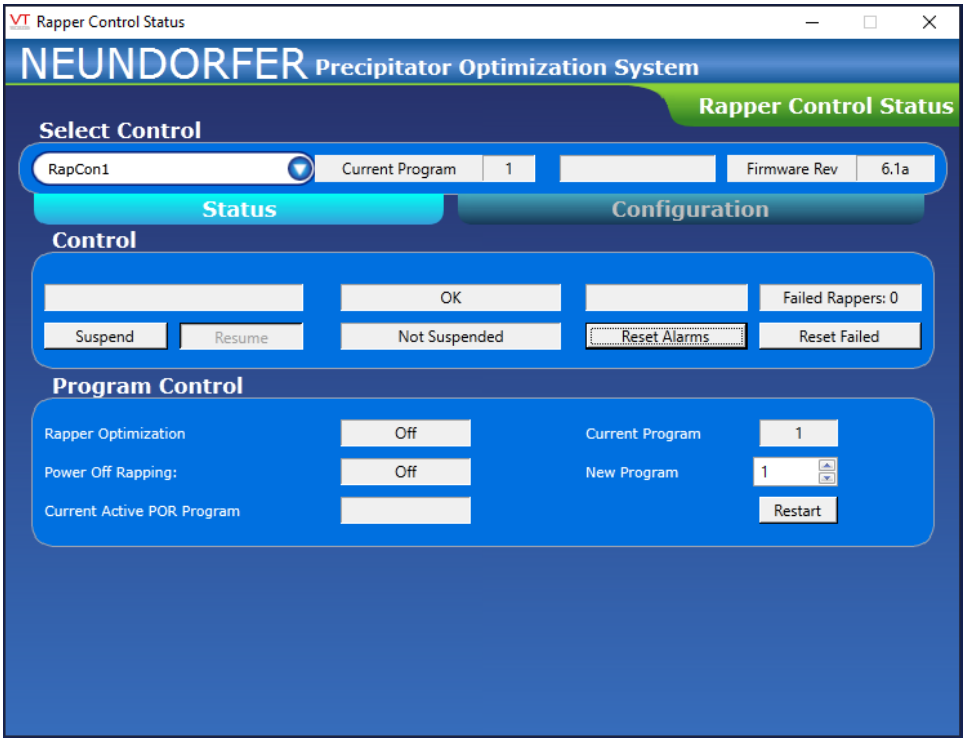
22. MicroRap Rapper Control Status

The **Rapper Control Status** window displays the state of the selected MicroRap rapper control. There is also access to reset alarms and failed rappers, change the rapping program, suspend rapping, and update the MicroRap configuration.

Access this window by clicking on any MicroRap icon and selecting ***Rapper Control Status*** from the menu. The selected control defaults to the MicroRap control that launched the menu.



To the right of the selected control, the current program slot is displayed as well as rapper status and Firmware revision.

Status Tab

The Control section of the status tab contains (from left to right):

- Rapper control name (description of the rapper control)
- Communication status of the rapper control
- Alarm indicator (displays alarm alerts)
- Number of current failed rappers
- ***Suspend*** button – click to pause the currently active rapping program
- ***Resume*** button – click to resume the rapping sequence where the program left off
- Suspend status for rapping program
- ***Reset Alarms*** button – click to reset alarm actuated within the rapper control
- ***Reset Failed*** button – click to clear the “failed” status of any rappers. They will be ready for the next rapping cycle

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The left side of the Program Control section displays the status of POS modules related to the selected MicroRap.

- Rapper Optimization indicator shows if rapper optimization is turned on or off
- Power-Off Rapping indicator indicates if Power-Off rapping is running or not
- Current Active POR Program indicator shows name of the currently active Power-Off Rapping program, if one is running.

The Right side of the Program Control section has controls for switching rapping programs.

- Current Program indictor shows which rapping program is currently active
- ***New Program*** selector – enter a number or use the up/down arrows to select which rapper program number to run. If you change to a rapper program number different than the one currently running, the Restart button under this field changes to a Start button; click ***Start*** to change to the new program.
- ***Start/Restart*** button – click Start to start a new program, or Restart to reload the currently active rapping program from the MicroRap's memory if it has been changed. If the program being run by MicroRap is the same as the program stored in the MicroRap's EPROM, clicking Restart has no effect.

NOTE: All User Accounts can view the Rapper Control Status window but only User Accounts with the Rapper Control privilege can Suspend/Resume rapping or change rapping programs.

NOTE: The Suspend and Resume buttons do not turn the actual control on or off. You must use the MicroRap's On/Off switch to work on the control itself, or on individual rappers.

NOTE: To change rapping programs or suspend/resume rapping from POS, the MicroRap control's face panel thumb wheel switch must be set to position 0 to enable remote control.

Configuration Tab

The **Configuration** Tab allows access to the Configuration Wizard (see section 23).

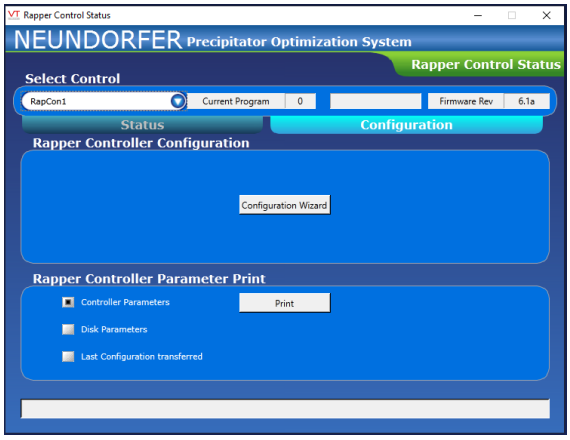
The user can also Print control parameters.

Select ***Control Parameters*** to upload the parameters form the control for printing.

Select ***Disk Parameters*** to read the parameters stored in POS for printing.

Select ***Last Configuration Transferred*** to use the most recent uploaded or downloaded configuration for printing.

Click ***Print*** to launch a **Print Preview** window of the selected parameters.



CONFIGURATION TAB

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23. MicroRap Rapper Control Configuration Wizard

The **Rapper Control Config Wizard** is used to change parameters on a rapper control. To prevent damaging the hardware, these parameters should only be modified by experienced users. If the incorrect parameters are sent to the rapper control, rappers and rapper control cards could be damaged.

To access the **Rapper Control Config Wizard** click on a rapper control icon and select Rapper Control Status. Then, click on the **Configuration** tab and click the Configuration Wizard button.

NOTE: All User Accounts can view the Rapper Control Status window but only User Accounts with the Rapper Control privilege can Suspend/Resume rapping or change rapping programs.

The initial welcome screen in the wizard can be turned off by clicking the ***Don't show this page again*** box. Click ***Next*** to continue.

CHOOSE CONFIGURATION SCREEN

On the **Choose Configuration** screen, selecting the ***Get from Control*** button to load the configuration stored in the rapper control hardware into the POS memory so it can be viewed and edited. The ***Get from Computer*** button loads the configuration stored on the POS computer.

The status indicator at the bottom of the screen will display the data loading status. After the configuration data is read from the source, click the ***Next*** button to continue.

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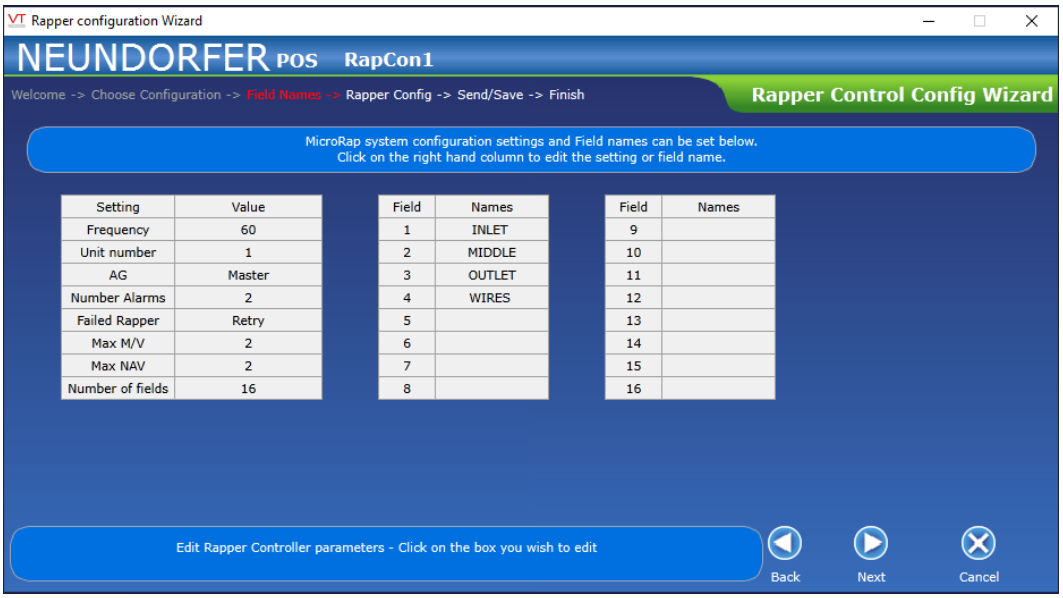
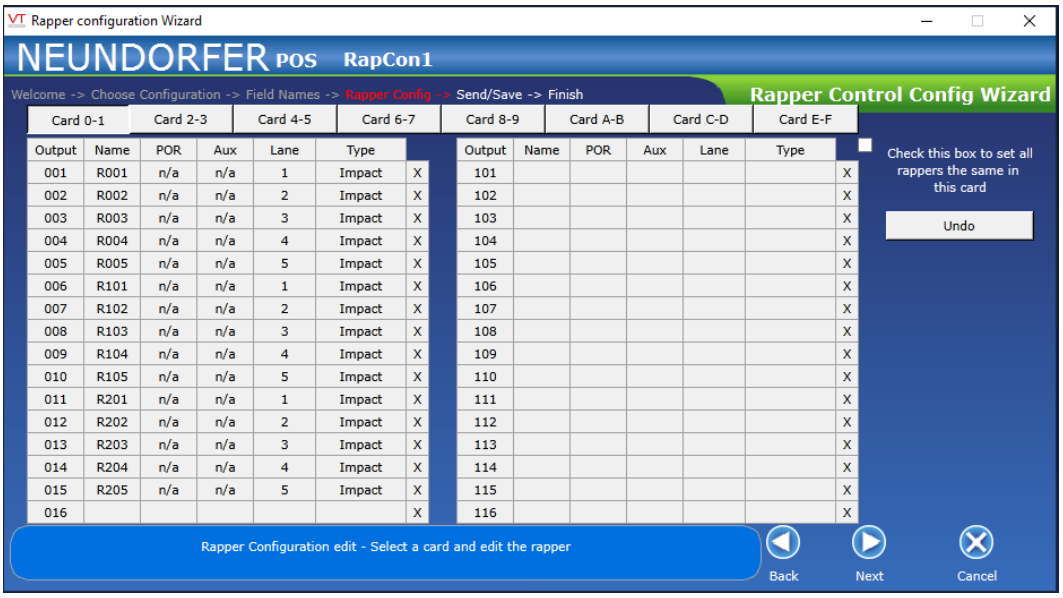


FIELD NAMES SCREEN

The **Field Names** screen contains the configuration data for the rapper control. Click on any of the boxes to modify the parameters. The field names are only used as references and don't necessarily correspond to electrical or mechanical fields. They are used for programming purposes. See the MicroRap manual for more information about these parameters. When you have finished editing this information click ***Next*** to continue with the wizard.



RAPPER CONFIG SCREEN

The Rapper Config screen contains the configuration for each output card for the MicroRap. Click on the pairs of cards across the top of the screen to select what cards to edit. Then click in any of the fields to make changes. See the MicroRap manual for more information about these parameters. When you have finished editing this information click ***Next*** to continue with the wizard.

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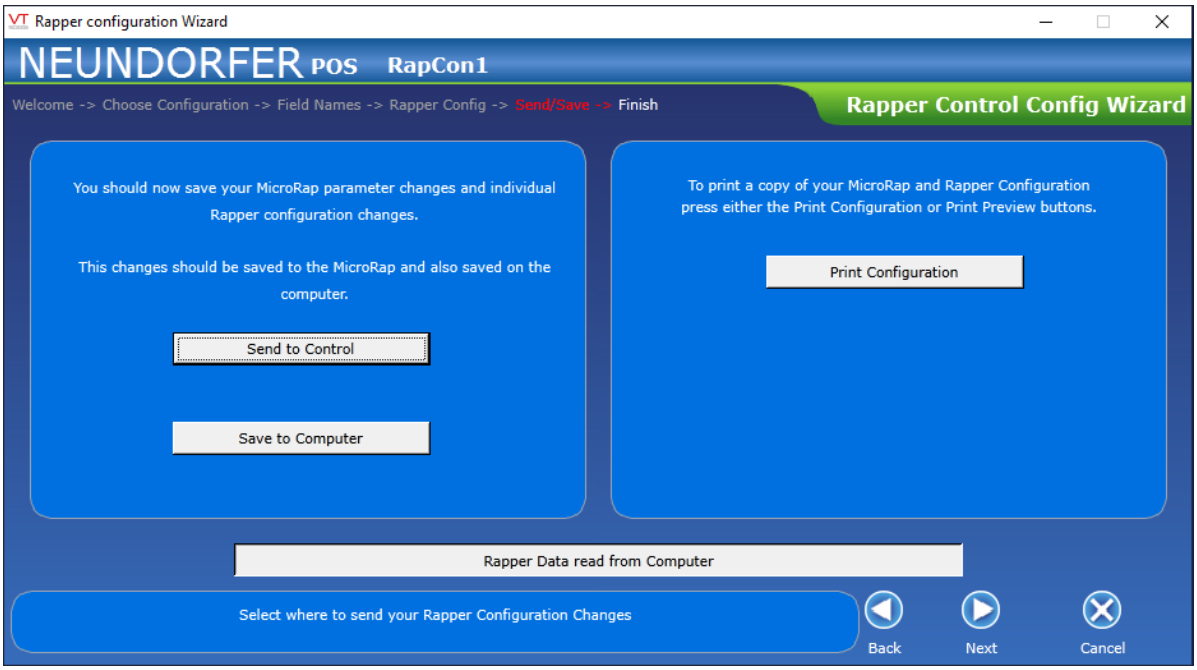

SEND/SAVE SCREEN

Once you have completed editing parameters for the MicroRap rapper control, use the selections on the **Send/Save** screen to apply the changes. Be sure to confirm that all configuration parameters and rapper output card information is correct before sending to the control. Incorrect configuration parameters can cause damage to rappers and output cards.

Click the ***Send to Control*** button to send the new configuration parameters to the MicroRap rapper control.

Click the ***Save to Computer*** button to save the new configuration parameters to the POS computer.

Click the ***Print Configuration*** button on the right hand side of the screen to open a **Print Preview** window of the MicroRap configuration paramters. From there you can select a printer and print the information.

Click the ***Next*** button to finish the wizard.

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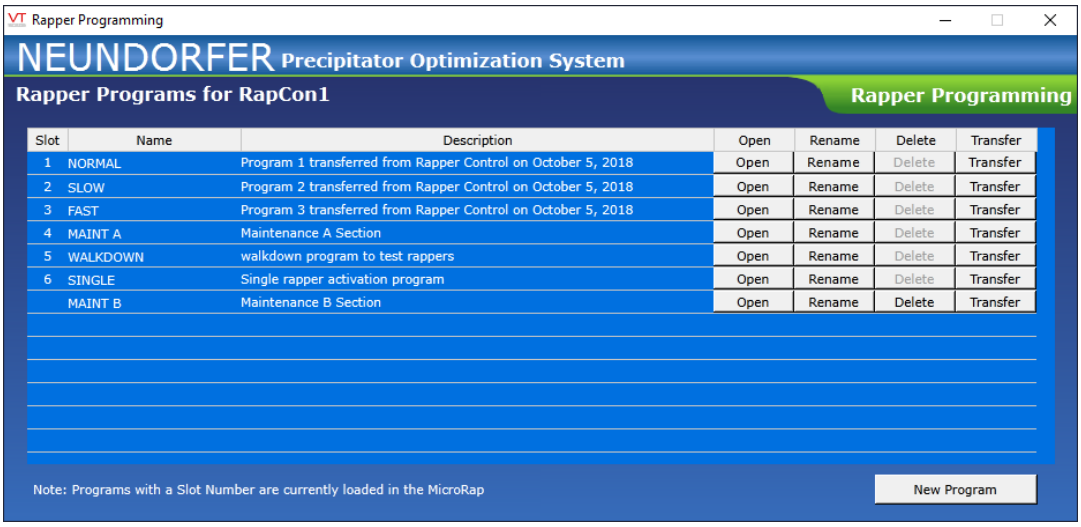
24. MicroRap Rapper Programming

The **Rapper Programming** window provides tools for creating, editing, and transferring rapping programs to, from, and on MicroRap controls.

Access the **Rapper Programming** window from the rapper control menu. Click on a rapper control icon then click ***Programming***.



RAPPER PROGRAMMING WINDOW

The Programming Window displays a list of all of the Rapping Programs stored on the hard drive of the POS computer. The first six rows of the list have Slot Numbers indicating that those programs are stored on the MicroRap control.

Slot – indicates the slot where the program is stored on the MicroRap. If no program is stored in a slot or when communications have stopped, the program name displays as “Unavailable”. If there is no entry in the slot column then the program is only stored on the POS hard drive and not in the MicroRap.

Name – Name of the rapping program. Names that display with the Neundorfer logo icon are factory configured and cannot be deleted.

Description – is used to describe the rapping program in more detail.

Click the ***Open*** button to open the program in the **Rapper Programming Wizard**.

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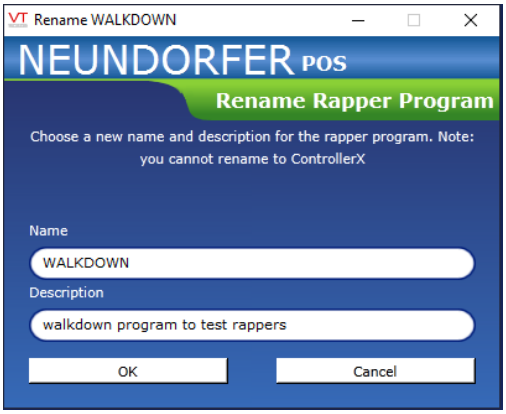
Click the ***Rename*** button to open the **Rename Popup** window. In the **Rename Popup** window you can edit the Name and/or the Description of the program.

If an unusable character is used in the name it will be replaced with a "_" character.

Click ***OK*** to save the changes, or click ***Cancel*** to close the window without saving changes.



RENAME POPUP WINDOW

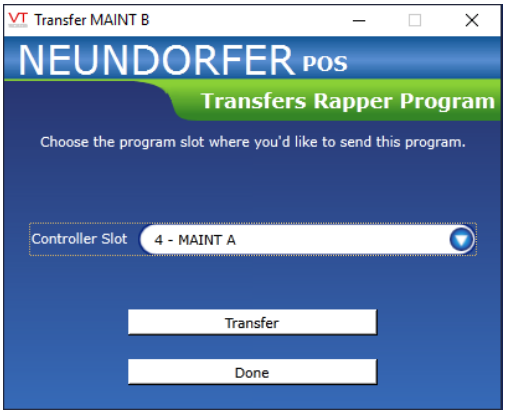
Click the ***Delete*** **b**utton to delete the program. Programs stored in the MicroRap cannot be deleted until another program has been transferred to that slot. Neundorfer configured programs cannot be deleted.

Click the ***Transfer*** button to open the **Transfer Popup** window. Use this window to transfer the program to a slot in the MicroRap control.

Use the drop down menu to select which slot to transfer the program. The existing program in the selected slot will be overwritten by the new program but will still exist on the POS hard drive and will appear lower down in the list.

Click the ***Transfer*** button to execute the transfer command.

Click the ***Done*** button to close the window.



TRANSFER POPUP WINDOW

Click the ***New Program*** button at bottom right of the **Rapper Programming** window to open the **Rapper Programming Wizard** with a blank program.

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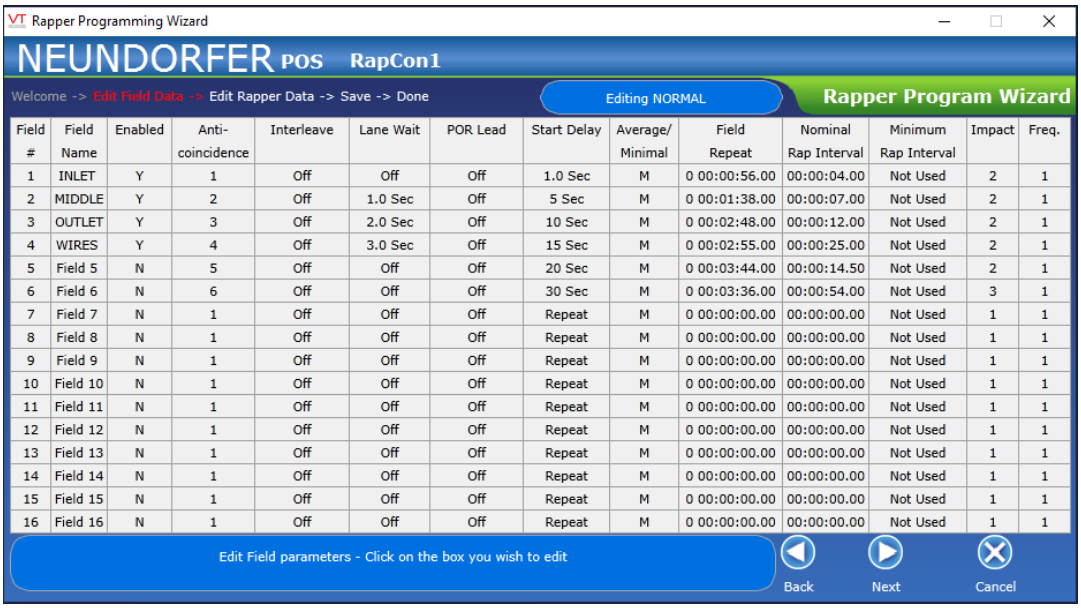
MicroRap Programming Wizard

The **Rapper Programming Wizard** is used to view or modify existing programs, or to create new MicroRap programs. A rapper program contains the information that tells the MicroRap how and when it should energize rappers. Each program contains 1 to 16 groups of rappers (Fields) that independently run through their sequence then repeat. The parameters that define the Field and the sequence of rappers for each field are defined in the rapping program. See the MicroRap manual for additional information on rapper programs.

Note: All User Accounts can open a program for viewing, but to save any changes the User Account must have the Rapper Programming privilege.

The initial welcome screen in the wizard can be turned off by clicking the ***Don't show this page again*** box. Click ***Next*** to continue.



Field #	Field Name	Enabled	Anti-coincidence	Interleave	Lane Wait	POR Lead	Start Delay	Average/ Minimal	Field Repeat	Nominal Rap Interval	Minimum Rap Interval	Impact	Freq.
1	INLET	Y	1	Off	Off	Off	1.0 Sec	M	0 00:00:56.00	00:00:04.00	Not Used	2	1
2	MIDDLE	Y	2	Off	1.0 Sec	Off	5 Sec	M	0 00:01:38.00	00:00:07.00	Not Used	2	1
3	OUTLET	Y	3	Off	2.0 Sec	Off	10 Sec	M	0 00:02:48.00	00:00:12.00	Not Used	2	1
4	WIRES	Y	4	Off	3.0 Sec	Off	15 Sec	M	0 00:02:55.00	00:00:25.00	Not Used	2	1
5	Field 5	N	5	Off	Off	Off	20 Sec	M	0 00:03:44.00	00:00:14.50	Not Used	2	1
6	Field 6	N	6	Off	Off	Off	30 Sec	M	0 00:03:36.00	00:00:54.00	Not Used	3	1
7	Field 7	N	1	Off	Off	Off	Repeat	M	0 00:00:00.00	00:00:00.00	Not Used	1	1
8	Field 8	N	1	Off	Off	Off	Repeat	M	0 00:00:00.00	00:00:00.00	Not Used	1	1
9	Field 9	N	1	Off	Off	Off	Repeat	M	0 00:00:00.00	00:00:00.00	Not Used	1	1
10	Field 10	N	1	Off	Off	Off	Repeat	M	0 00:00:00.00	00:00:00.00	Not Used	1	1
11	Field 11	N	1	Off	Off	Off	Repeat	M	0 00:00:00.00	00:00:00.00	Not Used	1	1
12	Field 12	N	1	Off	Off	Off	Repeat	M	0 00:00:00.00	00:00:00.00	Not Used	1	1
13	Field 13	N	1	Off	Off	Off	Repeat	M	0 00:00:00.00	00:00:00.00	Not Used	1	1
14	Field 14	N	1	Off	Off	Off	Repeat	M	0 00:00:00.00	00:00:00.00	Not Used	1	1
15	Field 15	N	1	Off	Off	Off	Repeat	M	0 00:00:00.00	00:00:00.00	Not Used	1	1
16	Field 16	N	1	Off	Off	Off	Repeat	M	0 00:00:00.00	00:00:00.00	Not Used	1	1

EDIT FIELD DATA SCREEN

The **Edit Field Data** Screen displays all of the parameters for the 16 independent fields in the rapping program. The **Field #** and **Field Name** cells are locked, but click on any of the other cells to edit the parameter. Mousing over a column header gives a brief explanation of the parameter.

Enabled – Fields that are marked with a "Y" will execute in the rapping program. Fields marked with an "N" will not run.

Anti-coincidence (AG) – Prevents two rappers in a designated grouping from operating at the same time. Use the dropdown menu to select group 1 through 6. If there are multiple rapper controls wired together with global anti-coincidence enabled, you can use select Global to use the anti-coincidence group that spans multiple rapper controls.

Interleave – Interleave time is the duration between operations of any two rappers in different fields in the same anti-coincidence group (AG). Use the dropdown menu to select an interleave time delay from 0.5 seconds to 63.5 seconds, or turn the interleave option off to prevent this field from running while any other field within the same Anti-Coincidence group is running

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Lane Wait –Prevents two rappers in the same lane from rapping at the same time. When the lane wait option is configured simultaneous rapping is avoided by delaying a rapper in this field from firing within .5 to 63.5 seconds of a rapper with the same lane designation. Lane wait can also be turned off for each field.

POR Lead – **P**ower-**O**ff **R**apping (POR) Lead time sets how many seconds rapping should be delayed when a hard wired signal is sent to a voltage control to reduce power before the rapper fires. POR Lead is only used for systems that have hard wired POR cards installed.

Start Delay – Sets the time this field will wait before the sequence begins. Use the dropdown to select 1 second to 270 minutes, or select "Repeat" to wait one field repeat time before starting. This parameter is used to prevent every field from immediately rapping when a program is first started. The start delay only occurs once when the program starts.

Average/Minimal - Determines how the rapping sequence of this field will react to delays in the sequence due to Anti-Coincidence interleave or lane wait. If set to ***A*** (average), the control will attempt to catch up if it falls behind in the rapping sequence, by shortening the interval between rappers as low as the ***Minimum Rap Interval***. If set to ***M*** (minimum), the control will not attempt to make up any time if it falls behind in rapping sequences.

Field Repeat – Sets the time interval for when a field starts to rap and when the field will repeat its rapping sequence. Use the dropdown menus for days, hours, minutes, and seconds to set the repeat time then click the **OK** button to save.

Nominal Rap Interval – Sets the desired time between each rapper in the field's sequence. Use the dropdown menus for hours, minutes, and seconds to set the interval then click the **OK** button to save.

Minimum Rap Interval – Sets the shortest time allowed between each rapper in the field's sequence. Use the dropdown menus for hours, minutes, and seconds to set the interval then click the **OK** button to save.

The ***Impact*** and ***Frequency*** parameters apply only to impact rappers.

Impact – the number of strikes, 1 to 8, per rapping event.

Freq. – the frequency per second of the impacts. For example if Impact = 2 and Freq. = 4 then a rapping event is 2 strikes 0.25 seconds apart. If Impact = 4 and Freq. = 2 then an event would be 4 strikes spaced .5 seconds apart.

Click the ***Next*** button when you are finished editing field data.

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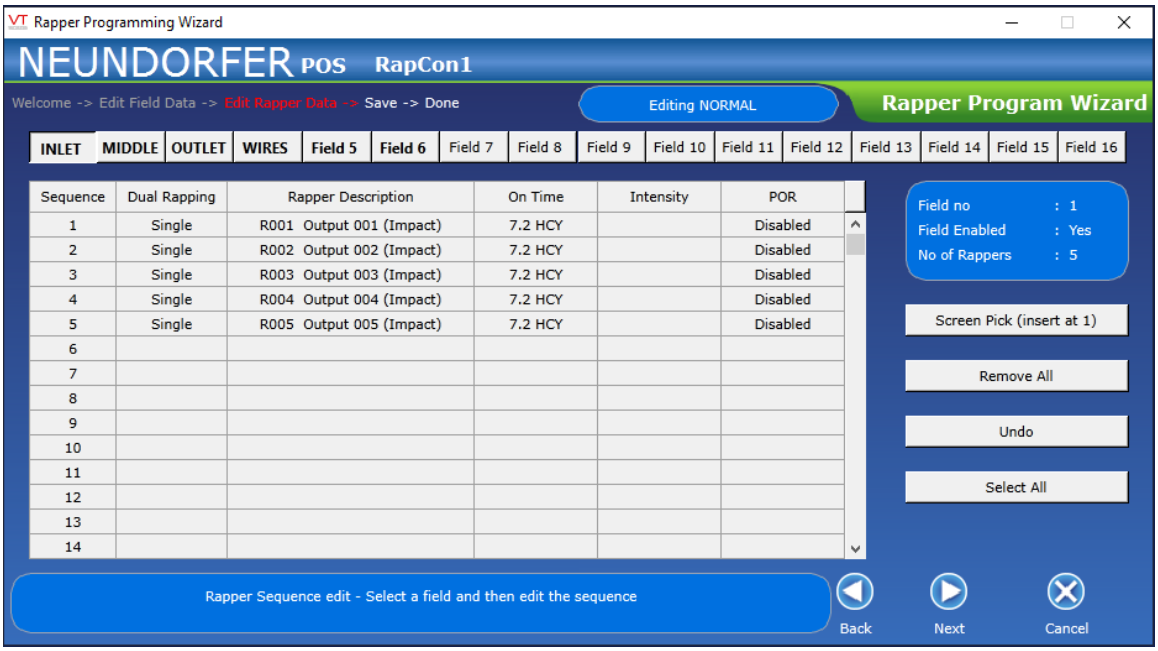

EDIT RAPPER DATA SCREEN

The **Edit Rapper Data** screen of the **Rapper Program Wizard** is used to set the sequence for rappers in each field.

Along the top of the screen is a row of buttons, each representing a group of rappers (Field) from the **Edit Field Data** screen. Click a field button to select that field and view rappers set to be part of its rapping sequence. Buttons with bold labels indicate that the fields are enabled.

On the right-hand side of the screen are buttons for editing entries in the rapper sequence table.

Rows in the rapper sequence table represent order of rapping sequence. Columns designate the name of each rapper and its settings, as follows:

- **Sequence –** Order of rapping sequence (not editable)
- **Dual Rapping** – Allows the controls to energize two rappers in unison. Click into the cell and use the dropdown menu to choose ***Single*** or ***Dual***. Dual rappers work in pairs, If a rapper is set to Dual Rap then the rapper after it will fire at the same time.
- **Rapper Description** – Name of rapper. To change the rapper associated with a given sequence number, click the Rapper Description cell in the table, and use the dropdown menu to choose a different rapper. Click on a blank row and select a rapper from the dropdown to add the rapper at that spot in the sequence.
- **On Time** – Sets the on time for output on the rapper card. For impact rappers, the setting in half cycles determines lift height. For vibrators, the setting is in seconds to determine run time.
- **Intensity** – This applies only to phase-fired vibrators—it does not affect operation of impact rappers. Sets the conduction angle of the phased-fire outputs. Click into the cell and use the dropdown menu to select intensity, from 7 percent to 100 percent, in 3 percent increments.
- **POR** – This only applies to hard-wired Power-Off rapping using a POR card in the MicroRap. Enables Power-Off rapping output for the rapper. When enabled, MicroRap will send a Power-Off rapping signal to the voltage control, according to the POR Lead Time parameter for this field.

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The Buttons on the right-hand side of the screen assist in adding or deleting rappers from the sequence table for the selected field.

Click the ***Screen Pick (insert at X)*** button to use the plan view to select rappers to add to the sequence. The **Programming Wizard** window will disappear and the **Selecting Rappers** popup will appear. Use the mouse to click on rappers on the plan view to add them to the sequence. When you are finished click OK or click Cancel to cancel without making any additions. The **Selecting Rappers** window will close and the **Programming Wizard** will reappear. Rappers can be inserted anywhere in the sequence by clicking on a sequence number before clicking the ***Insert*** button.

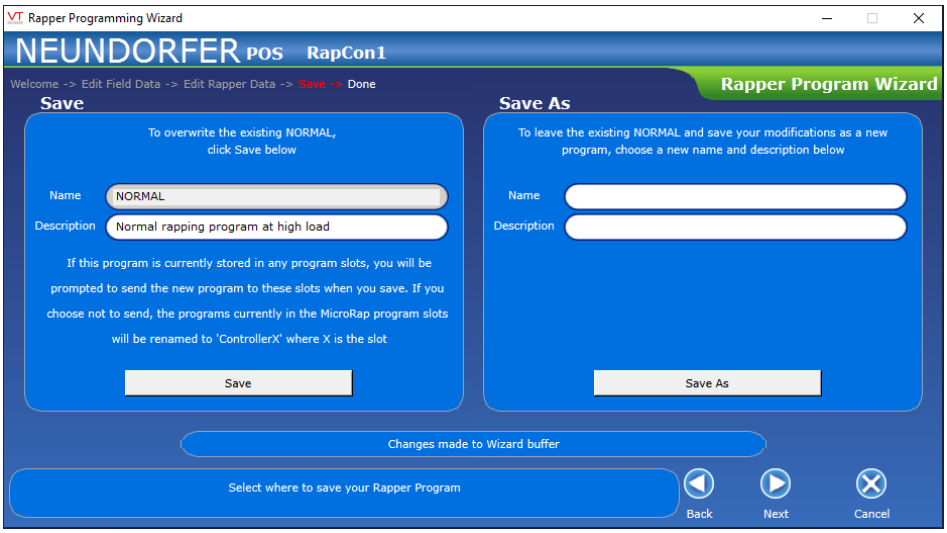
SELECTING RAPPERS WINDOW

To delete rappers from the sequence click on the sequence number and click the ***Remove Selected*** button. To delete multiple rappers use the Shift or Ctrl and click on multiple sequence numbers, then click the ***Remove Selected*** button. If no sequence numbers are selected this becomes a ***Remove All*** button. Click the ***Remove All*** button to clear the rapping sequence.

To change parameters for all of the rappers in the sequence click the ***Select All*** button, then change the parameters. When done editing all parameters, click the ***Un-Select All*** button.

When you have finished editing the rapping sequence for a single field, click on another field at the top of the screen to edit rapping sequence data in that field.

When you are done setting rapper sequences for all fields, click the ***Next*** button to proceed with the wizard.



SAVE SCREEN

To overwrite the existing program click the ***Save*** button. The description can be modified. If the program is in a MicroRap slot you will be prompted to download the new version of the program to that slot.

Enter a new Name and Description and click the ***Save As*** button to save the new or modified program under a new name.

Click the ***Next*** button to finish the wizard.

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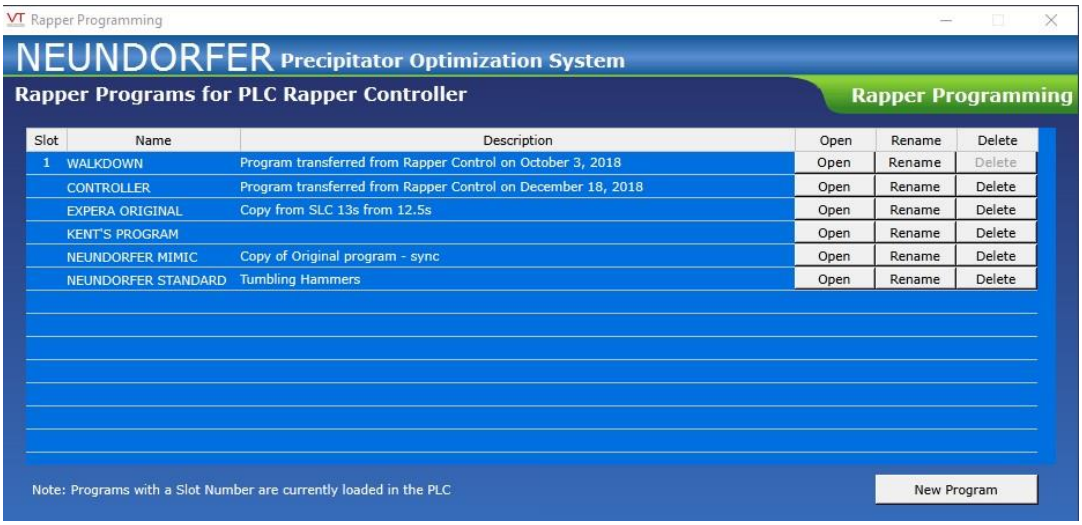
25. PLC Rapper Programming

The **Rapper Programming** window provides tools for creating, editing, and transferring rapping programs to, from, and on PLC rapper controls.

Access the **Rapper Programming** window from the rapper control menu. Click on a rapper control icon then click ***Programming***.



RAPPER PROGRAMMING WINDOW

The Programming Window displays a list of all of the Rapping Programs stored on the hard drive of the POS computer. The first row of the list has a single Slot Number indicating that program is stored on the PLC rapper control.

Slot – indicates the slot where the program is stored on the control.

Name – Name of the rapping program.

Description – is used to describe the rapping program in more detail.

Click the ***Open*** button to open the program in the **Rapper Programming Wizard**.

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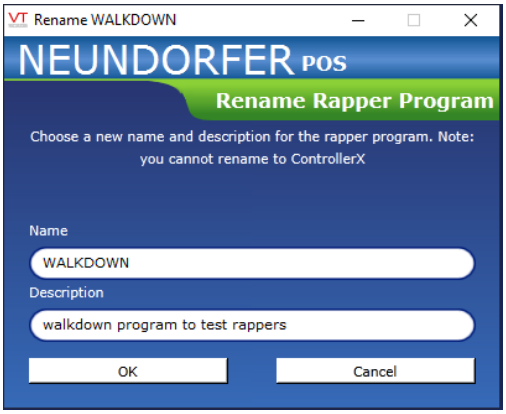
Click the ***Rename*** button to open the **Rename Popup** window. In the **Rename Popup** window you can edit the Name and/or the Description of the program.

If an unusable character is used in the name it will be replaced with a "_" character.

Click ***OK*** to save the changes, or click ***Cancel*** to close the window without saving changes.



RENAME POPUP WINDOW

Click the ***Delete*** **b**utton to delete the program. Programs stored in the control cannot be deleted until another program has been transferred to that slot.

Click the ***New Program*** button at bottom right of the **Rapper Programming** window to open the **Rapper Programming Wizard** with a blank program.

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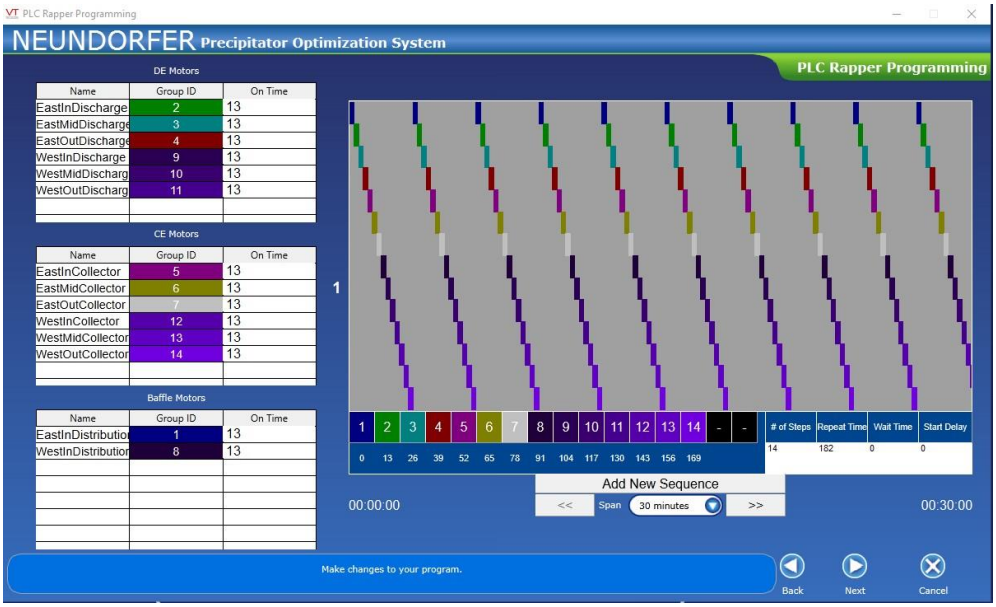
PLC Programming Wizard

The **Rapper Programming Wizard** is used to view or modify existing programs, or to create new rapper programs. A rapper program contains the information that tells the PLC how and when it should energize rappers. Each program contains 1 to 16 Sequences of rappers that independently run through their sequence then repeat. The parameters that define the Sequence and the order of rappers for each field are defined in the rapping program.

Note: All User Accounts can open a program for viewing, but to save any changes the User Account must have the Rapper Programming privilege.

The initial welcome screen in the wizard can be turned off by clicking the ***Don't show this page again*** box. Click ***Next*** to continue.



PLC RAPPER PROGRAMMING SCREEN

The **PLC Rapper Programming** Screen displays all of the parameters for the configured rapper motors. Each rapper can be in a group 1 through 94, set via the Group ID. The groupings allow for multi-rapper activation in a single sequence step. The On Time next to the rapper is the amount of time, in seconds, that the rapper will activate for at each step within any sequence. These settings are all found on the left side of the programming wizard window.

The graph shows a relative time frame (selected via a drop-down below the ***Add New Sequence*** button). A Sequence can have up to 16 steps of rapper activations, each activation done by Group ID. Clicking one of the squares below the graph will show all configured Group IDs available to select for that sequence step. To add wait times between rapper activations, simply leave one or more of the steps set to "Off". The Sequence Repeat Time, in seconds, is entered below the Repeat Time heading. The Wait Time is the time at the end of the sequence, in seconds, before starting the sequence over from the beginning. This time will occur at the end every time. The Start Delay, in seconds, will only occur once the first time the sequence begins. The Start Delay is used to stagger the initial activation of a sequence.

Click the ***Add New Sequence*** button to create a new sequence of rappers. There can be up to 16 sequences.

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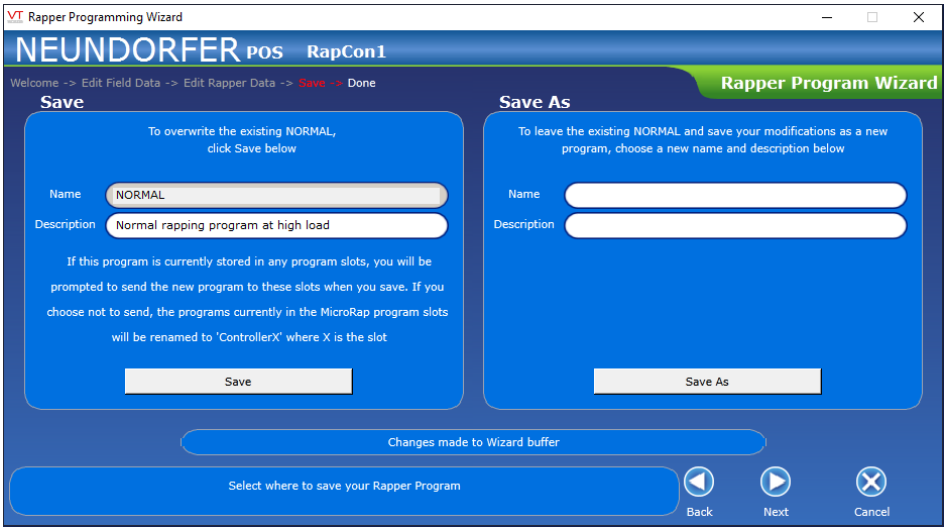
After completing the rapper sequences for all fields, click the ***Next*** button to proceed with the wizard.



SAVE SCREEN

To overwrite the existing program click the ***Save*** button. The description can be modified.

Enter a new Name and Description and click the ***Save As*** button to save the new or modified program under a new name.

Click the ***Next*** button to finish the wizard.

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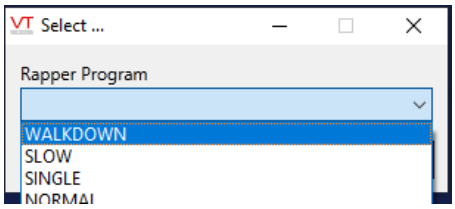
26. Print Rapping Program

Use the **Print Rapping Program** function to print a hard copy of the rapping program.

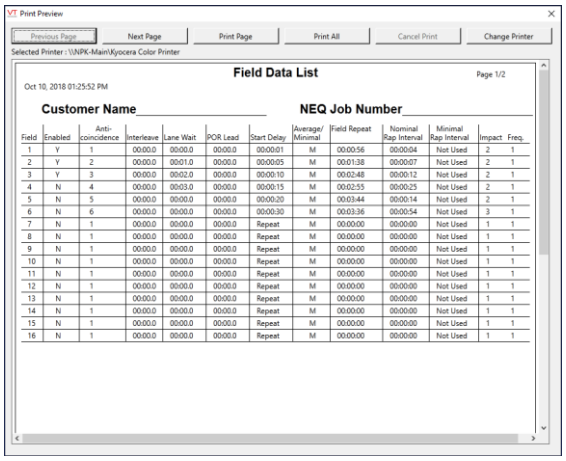
Access the **Print Rapping Program** function by clicking on a MicroRap icon then selecting ***Print Rapping Program*** from the menu.

This will open the **Select** window that contains a dropdown list of all of the programs for the MicroRap. Select a program from the list and click ***OK***. Click ***Cancel*** to close the window.

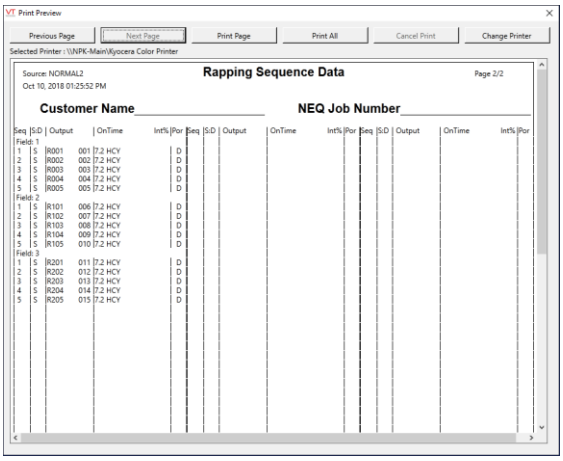


SELECT RAPPER PROGRAM TO PRINT

A Print Preview window will appear with the program data. The field configuration data is on the first page of the display. The rapping sequencing data is shown on subsequent pages.



FIELD DATA



RAPPING SEQUENCE DATA

Use the ***Next Page*** and ***Previous Page*** buttons to navigate through the **Print Preview** window. The ***Print Page*** button prints the currently viewed page to the selected printer. The ***Print All*** button prints all pages. The ***Change Printer*** button opens a Windows dialog box to select an available printer.

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27. Single Rapper Activation

MicroRap Single Rapper Activation

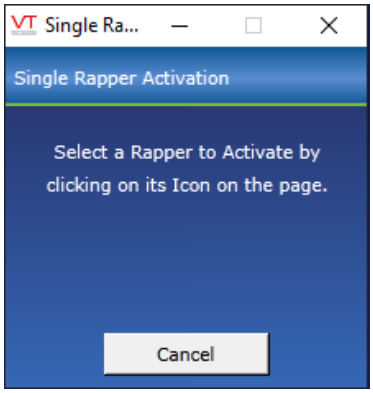
Single Rapper Activation allows you to fire a single rapper output without having to create a program. This can be very useful for testing rapper lift height or troubleshooting individual rappers. During rapper activation, the currently running rapping program will pause. When **Single Rapper Activation** is cancelled, the running program will resume.

Access **Single Rapper Activation** from the rapper control menu or from any rapper icon. On the plan view page, click on a rapper control icon and then select ***Single Rapper Activation*** from the menu. Or click on any rapper icon to launch the **Single Rapper Activation** window. The "Prompt for Single Rapper Activation" option must be checked in the rapper tab of the graphics menu to select directly from a rapper icon. See Graphics - Section 36 for more information.

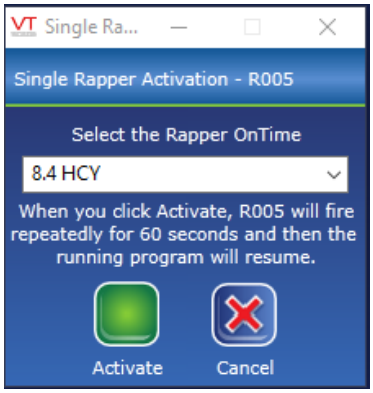
Note: Only User Accounts the Specialized Rap privilege can access Single Rapper Activation.

When launching **Single Rapper Activation** from the rapper control menu, you will have to select the rapper you would like to activate. The selection window pops up over the plan view page. Click on any rapper icon to select it for this function.

The **Single Rapper Activation** window contains a dropdown menu to select the on time for the rapper, an ***Activate*** button and a ***Cancel*** button.



SELECT A RAPPER



SINGLE RAPPER ACTIVATION WINDOW

Use the dropdown menu to select the ***Rapper OnTime***. For impact rappers, the OnTime selection will be in half-cycles; for vibrators it will be set in seconds.

Click the ***Activate*** button to start firing the selected rapper. The current running rapper program will halt and the rapper will impact for 60 seconds. After 60 seconds the rapper will stop firing and the rapper control will run the previous program.

While the rapper is activated click ***Cancel*** or close the window to stop the rapper from firing. The rapper control will return to the previously running program.

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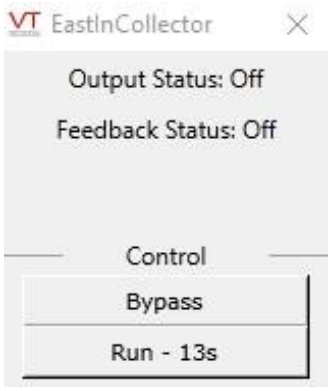
PLC Single Rapper Activation

Single Rapper Activation allows you to fire a single rapper output without having to create a program. This can be very useful for troubleshooting individual rappers.

Access **Single Rapper Activation** from any rapper icon. On the plan view page, click on a rapper icon and the ***Single Rapper Activation*** window will open.

Note: Only User Accounts the Specialized Rap privilege can access Single Rapper Activation.



SINGLE RAPPER ACTIVATION WINDOW

Click the ***Run*** button to start activating the selected rapper. The rapper will run for the specified time shown on the button.

Click the ***Bypass*** button to prevent the selected rapper from running in the rapping program.

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28. Rapper Opacity Plot

Overview

The **Rapper Opacity Plot** is a tool to visually compare rapping events with stack opacity. This is a useful tool for troubleshooting opacity problems by seeing how they relate to rapping re-entrainment in the precipitator.

Access **Rapper Opacity Plot** from the rapper control icon menu. On the plan view page, click on a rapper control icon and then select ***Rapper Opacity Plot*** from the menu***.***

OPACITY PLOT

Data Selections

By default, **Opacity/Rapper Plot** displays live data. To display historical data, click into each of the date/time area fields (day of week, month, day, year, hour, minute, AM/PM) and use the up/down arrows to change the setting. This specifies at what point in time the interval (duration) ends. The start time is determined by what is set for ***Duration***. After you have made a selection click the ***Retrieve Data*** button. To return to live data click the ***Live Data*** button

Use the ***Opacity Range*** dropdown to select a specific value for the maximum range for the Opacity plot. Select ***Auto*** to let POS determine the most appropriate range.

To change the duration of the data displayed, use the ***Duration*** dropdown to select an interval for the Opacity and rapping data displayed: .5 hour, 1 hour, or 2 hours.

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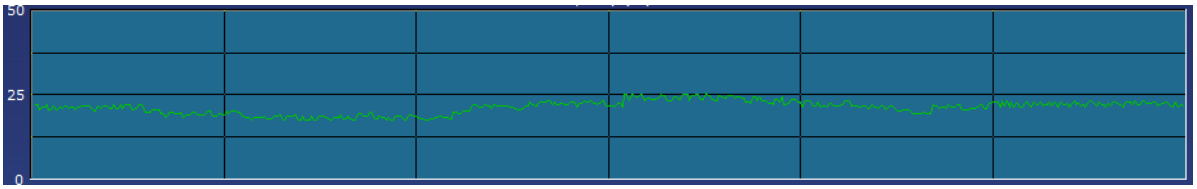
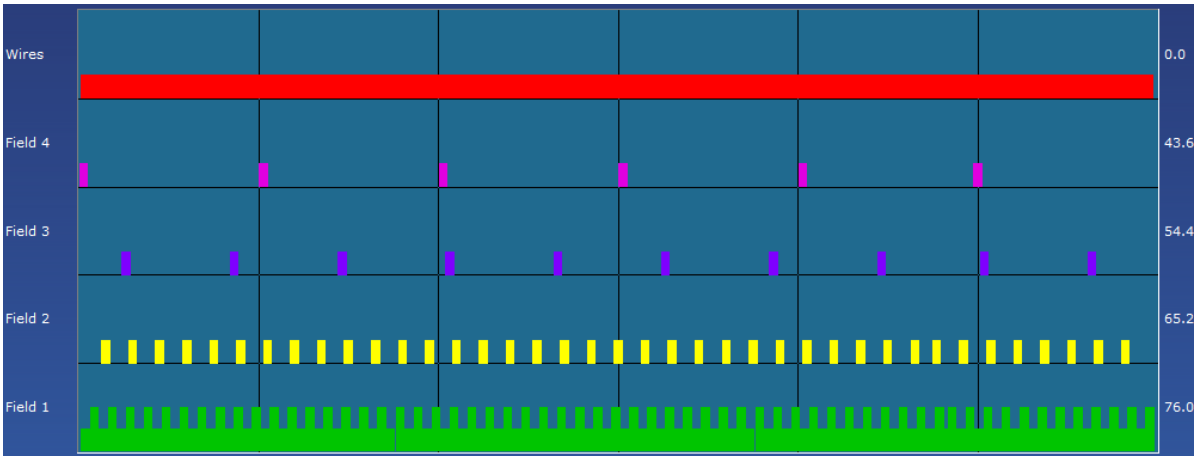
Opacity and Rapper Activity Graphs

The top graph shows Opacity % during the specified time interval:



The bottom graph shows when rappers rapped during the specified time interval:



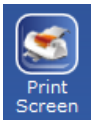
Moving the mouse pointer over either graph causes a vertical line to appear running through both graphs. A timestamp just under the **Opacity %** graph updates and moves with the line. The opacity value is displayed at the timestamp, and all the names of specific rappers in each field that fired at that time are shown.

Select Rapper Activity to Display

The **Rapper Activity** plot displays rapper activity only for the fields selected. Field Names are set up in the **Precipitator Data** utility (see Section 37). Depending on configuration of your system, there may also be a clickable checkbox for SootBlowers. Click to check or uncheck boxes for the fields you want to display in the graph.

Print the Rapper/Opacity Plot

Click the ***Print Screen*** button to send a copy of the **Opacity/Rapper Plot** display directly to the default printer configured for your POS computer.



PRINT SCREEN BUTTON

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29. MicroRap Rapping Optimization

Overview

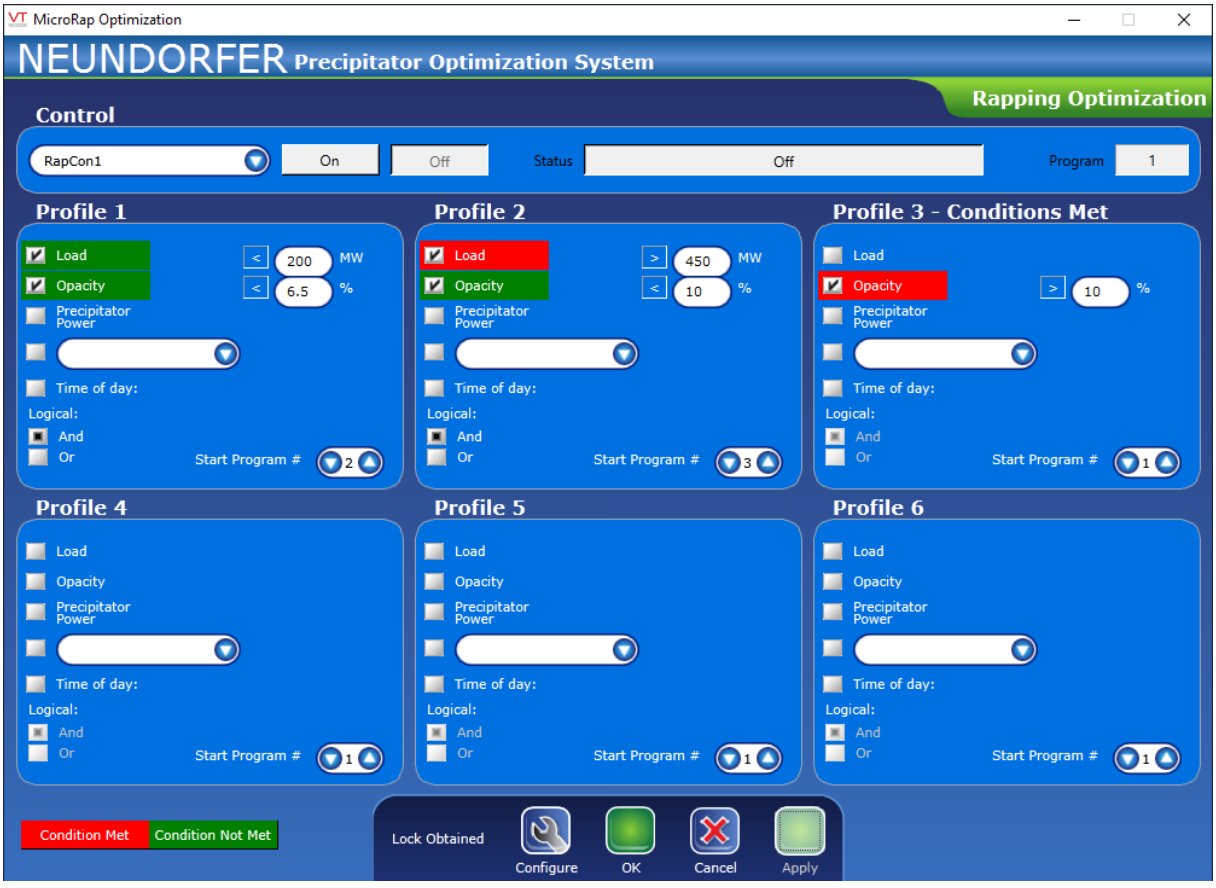
The **Rapping Optimization** module is used to direct a MicroRap rapper control to automatically change between rapping programs stored in the control based on logic conditions set by the user. When enabled, **Rapping Optimization** relies on a hierarchy of up to six profiles using load, opacity, precipitator power or time of day as logic conditions to determine which program will run.

When the conditions in any of the configured profiles are met, the rapping program associated with the highest ranked profile will automatically be started. When the conditions becomes false, the program will continue running until another condition becomes true that specifies running a different program.

Note: All User Accounts can view MicroRap Optimization conditions, but to turn MicroRap Optimization on or off or save any changes the User Account must have the Rapper Optimization privilege.

Note: The thumb-wheel switch on the MicroRap face panel must be set to "0" to allow POS to remotely change programs.

Access **Rapping Optimization** from the rapper control menu. On the plan view page, click on a rapper control icon and then select ***Rapper Optimization*** from the menu.



RAPPING OPTIMIZATION WINDOW

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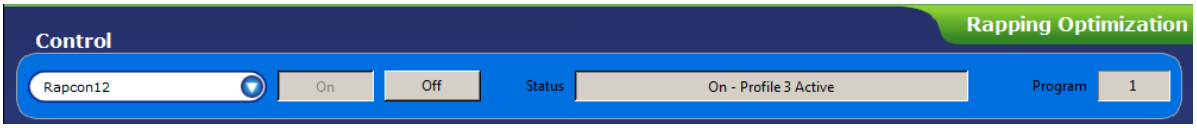
Rapping Optimization Control

Along the top of the **Rapping Optimization** window is the **Control** area.



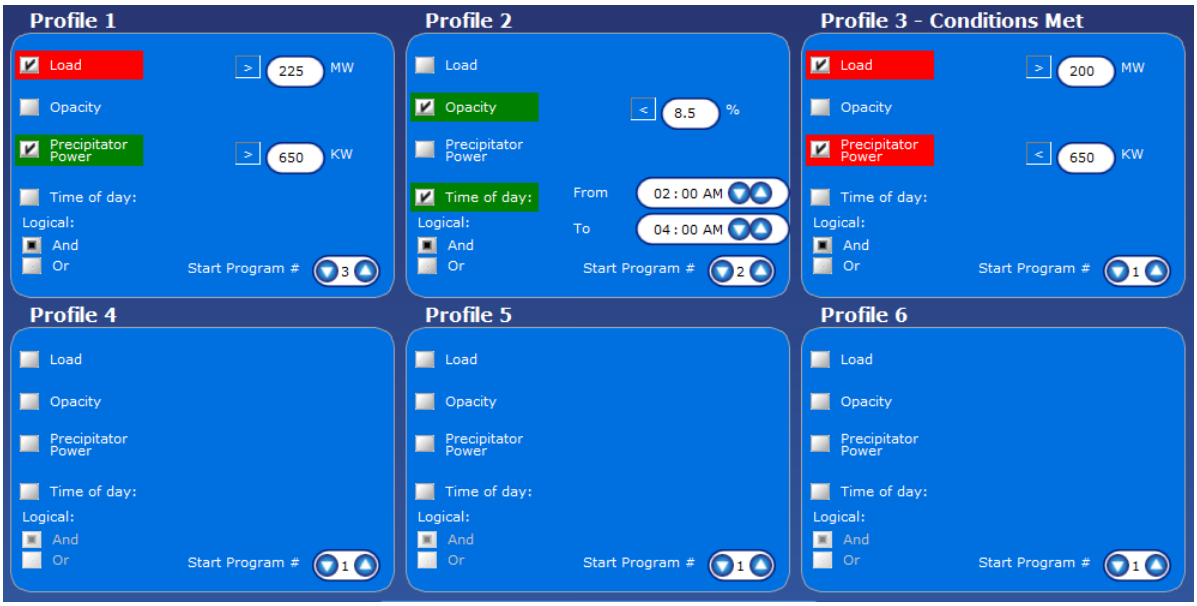
CONTROL AREA

Use the drop down menu to select a rapper control. Click the ***On*** button to enable **Rapping Optimization** for the selected rapper control. Click the ***Off*** button to turn off **Rapping Optimization**.

The **Status** display shows the current state of **Rapping Optimization** and **Program** field displays the currenttly running rapper program.

Conditional Profiles

The middle area of the window is used to set up conditions for the six profiles that direct the MicroRap to run different programs.



PROFILES

The **Profiles** area of the window shows status of conditions for each configured profile. A condition highlighted in red means that condition is true. A condition highlighted in green indicates that condition is false. When all conditions for a specific profile are met, the title of the profile changes to indicate “Conditions Met.”

When conditions are met for a profile, the MicroRap control is directed to run the associated program. The profiles are ordered with Profile 1 as the highest priority, and Profile 6 as the lowest priority. If more than one condition is true the highest priority profile will determine which rapping program is run by the MicroRap.

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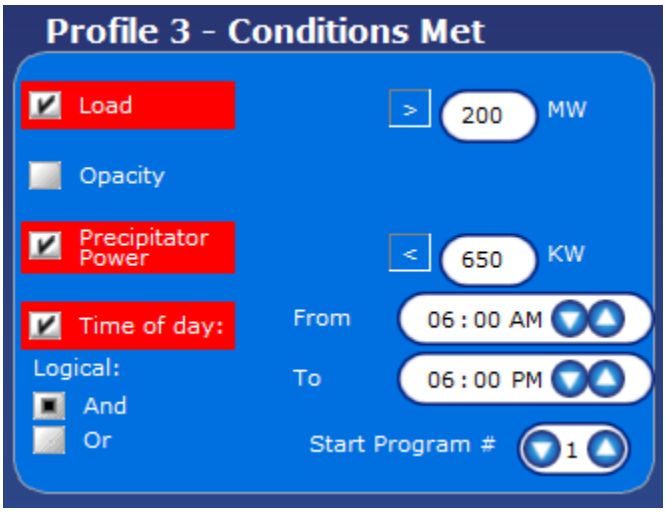
Configuring Rapping Optimization Profiles

Rapping Optimization relies on at least one profile being configured. A profile is configured by selecting and entering values for one or more conditions in the profile: Load, Opacity, Precipitator Power, and/or Time of Day.

To change the settings for any of the conditions, click one or more checkboxes to enable the conditions you want considered for a particular profile. For each condition, enter parameters using the buttons or fields provided.

Load, Opacity and Precipitator Power each has a toggle for greater than/less than and a field for entering a value (MW, %, KW).

Time of Day has two sections to set the start time and end time. To configure these times, click into each section of the time field (hour, minute, AM/PM) and use the up/down arrows to set a value.



EXAMPLE RAPPER OPTIMIZATION PROFILE

Conditions are logically connected using either the And operative or the Or operative. And means all of the configured conditions in the profile must be met before it goes into effect. Or means that if any one of the conditions in the profile are met, it will go into effect.

The Start Program # field is used to specify which rapping program on the MicroRap will be started when the profile's condition(s) are met. Use the up/down arrows to set a value, from 1 to 6. (MicroRap can store up to six rapping programs.)

In the example profile shown above, rapping program #1 will be started if Load is less than 200 MW and Precipitator Power is less than 650 KW and it is between 6:00am and 6:00pm. All of these example conditions are met so they all appear with a red highlight behind the condition. Also, because all conditions are met, the title of the profile shows "Conditions Met." If this is the highest priority profile that has all conditions met, the MicroRap will be directed to switch to program #1. If a higher priority profile has all conditions met, the MicroRap will be directed to run the program associated with the higher priority profile.

When you are done configuring profiles, click the ***OK*** button to save changes and close the **Rapping Optimization** window, ***Apply*** to save changes and keep the window open, or ***Cancel*** to close the window without saving changes.

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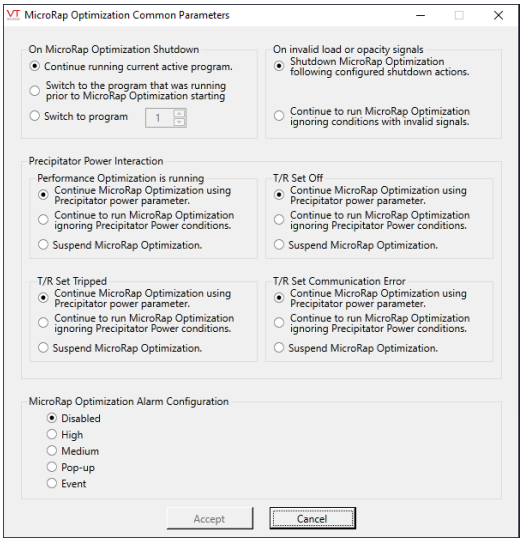
Configure Rapping Optimization Common Parameters

Click the Configure button at the bottom of the screen to open the **MicroRap Optimization Common Parameters** window. Here, you can configure a variety of settings, including what happens when there are invalid signals or T/R Sets trip.



MICRORAP OPTIMIZATION COMMON PARAMETERS WINDOW

On MicroRap Optimization Shutdown

(What happens when MicroRap Optimization is turned off.)

- ***Continue running current active program*** – The rapper control continues running the currently active program.
- ***Switch to the program that was running prior to MicroRap Optimization starting*** – The rapper control switches back to the program that was running when optimization was first turned on.
- ***Switch to program [x]*** – The rapper control runs the selected program (use up/down arrows to set a program number).

On Invalid Load or Opacity Signals

- ***Shutdown MicroRap Optimization following the configured shutdown actions*** – Optimization shuts down.
- ***Continue to run MicroRap Optimization ignoring conditions with invalid signals*** – Optimization continues running, but ignores any conditions based on the invalid load or opacity signals.

Precipitator Power Interaction

- ***Continue MicroRap Optimization using Precipitator power parameter*** – MicroRap Optimization continues to function as if there was no change.
- ***Continue to run MicroRap Optimization ignoring Precipitator Power conditions*** – MicroRap Optimization continues running but ignores all conditions using precipitator power parameters.
- ***Suspend MicroRap Optimization*** – MicroRap Optimization is temporarily suspended during the situation; when the situation is resolved, Optimization resumes running normally.

MicroRap Optimization Alarm Configuration

(MicroRap Optimization triggers an alarm when it is turned on or off, and when a condition becomes true causing a program change. The options here let you to disable or set priority level of these alarms. (See Section 43 for more on alarms.)

- ***Disabled*** – MicroRap Optimization will not send any messages to the alarm log.
- ***High*** – Trigger a high priority alarm message and a continuous audible indicator.
- ***Medium*** – Trigger a medium priority alarm message and a short audible indicator.
- ***Pop-up*** – Trigger a low priority alarm and pop-up window for the alarm message
- ***Event*** – Log an event in the alarm log.

When you are done configuring **Rapping Optimization** parameters, click the ***Accept*** button to save changes and close the window, or ***Cancel*** to close the window without saving changes.

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30. Power-Off Rapping

Overview

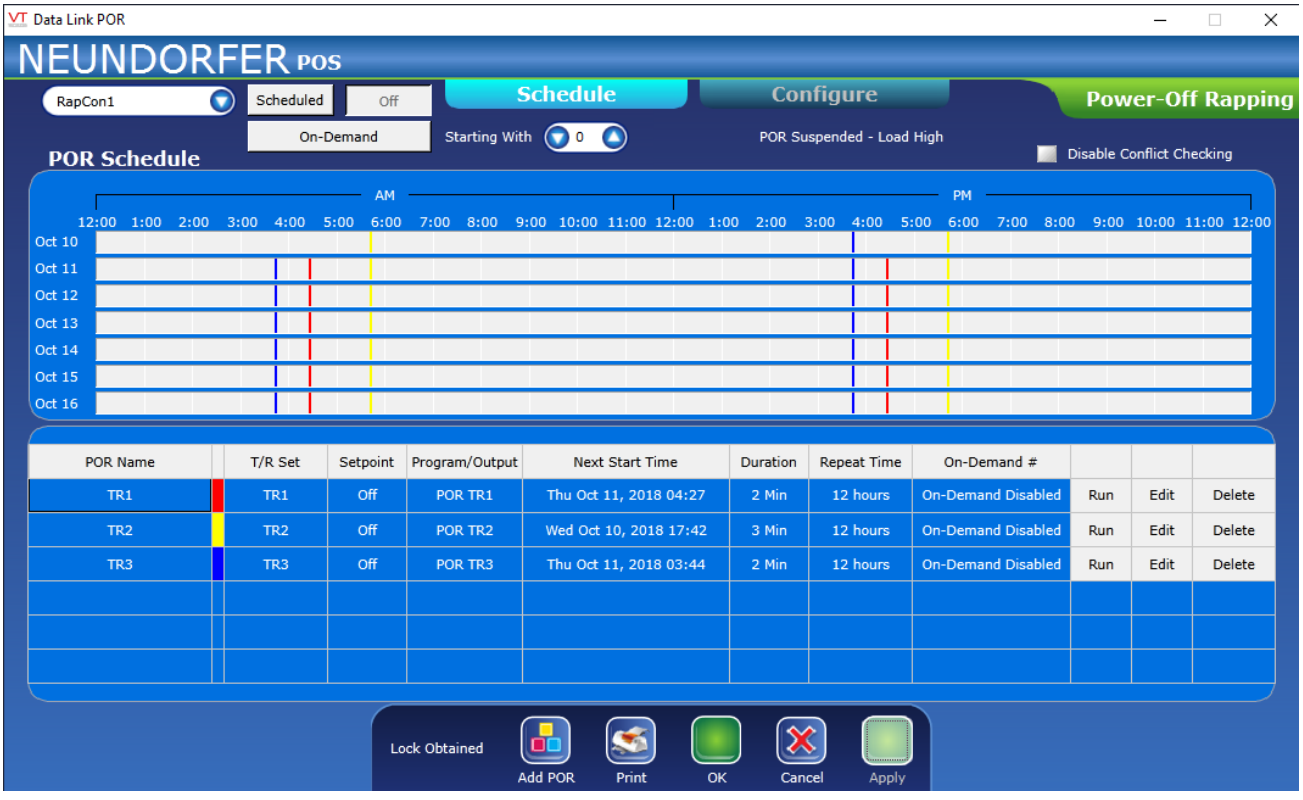
The **Power-Off Rapping** (POR) module allows POS to automatically reduce the power of individual T/R Sets a preset amount of time while executing a specialized rapping program. This is a useful technique for removing excess particulate from collecting plates in a precipitator, particularly when collecting highly resistive material. Using the **POR wizard**, you can configure any number of independent POR events.

Each event can be **Scheduled** to run at a set time interval or run **On-Demand**.

When POR events are enabled for **On-Demand POR** a sequence number is automatically assigned the event. Events will continue to fire in sequence order until each event has fired a configured number of cycles or fire continuously if stop after number of cycles is not enabled.

Access the **Power-Off Rapping** module from the rapper control or T/R Set menu. On the plan view page, click on a rapper control icon or T/R Set icon and then select ***Power Off Rap*** from the menu.

Note: All User Accounts can view the Power Off Rapping module, but to turn it on or off or make any changes the User Account must have the Power Off Rapping privilege.



POWER-OFF RAPPING WINDOW

Change to a different rapper controller to configure by selecting it from the dropdown menu. The "Scheduled", "Off" and "On-Demand" buttons select the state of the POR module. The "Starting with" dropdown selects which event in the On-Demand sequence # to start On-Demand POR. The greyed out button shows the current state. Pictured above, POR is off.

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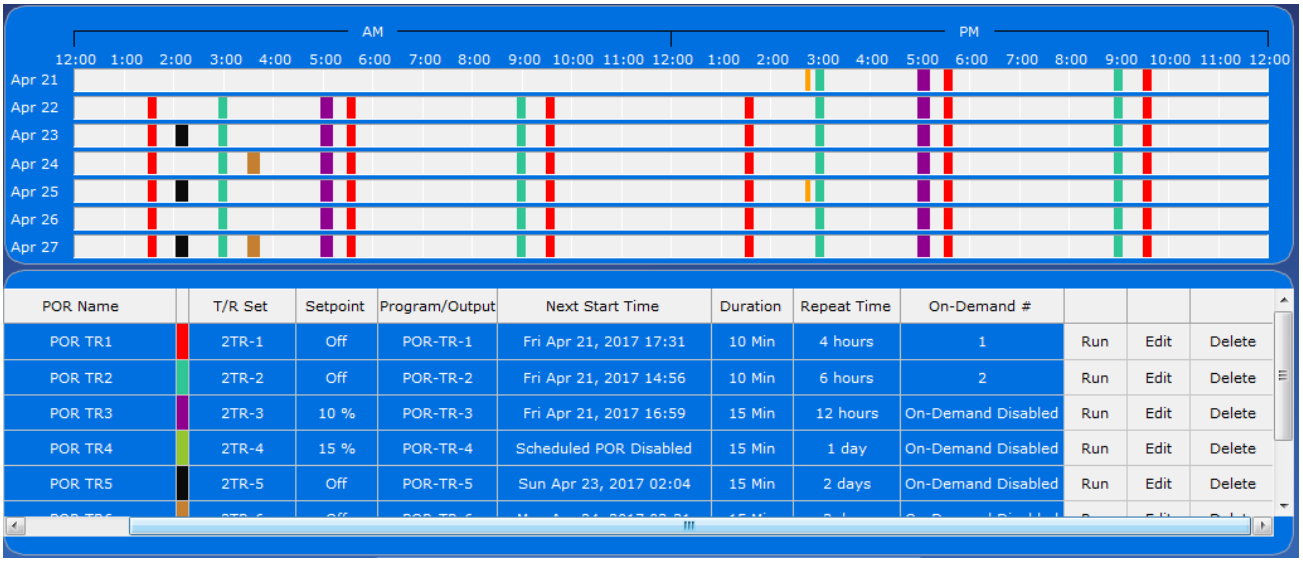
Because it is possible for POR events to cause conflicts if they overlap in time, by default **Power-Off Rapping** is set to alert you if there are conflicts when creating new events. You can turn this off by clicking the ***Disable Conflict Checking*** box (upper right-hand corner of screen).

Schedule Tab

The Power-Off Rapping **Schedule** tab shows POR events set to run on the current day, and six days into the future. All scheduled POR events are displayed on the 7 day schedule. Five events at a time are displayed on the table. Scroll the table to see all the POR events.



POR Name	T/R Set	Setpoint	Program/Output	Next Start Time	Duration	Repeat Time	On-Demand #			
POR TR1	2TR-1	Off	POR-TR-1	Fri Apr 21, 2017 17:31	10 Min	4 hours	1	Run	Edit	Delete
POR TR2	2TR-2	Off	POR-TR-2	Fri Apr 21, 2017 14:56	10 Min	6 hours	2	Run	Edit	Delete
POR TR3	2TR-3	10 %	POR-TR-3	Fri Apr 21, 2017 16:59	15 Min	12 hours	On-Demand Disabled	Run	Edit	Delete
POR TR4	2TR-4	15 %	POR-TR-4	Scheduled POR Disabled	15 Min	1 day	On-Demand Disabled	Run	Edit	Delete
POR TR5	2TR-5	Off	POR-TR-5	Sun Apr 23, 2017 02:04	15 Min	2 days	On-Demand Disabled	Run	Edit	Delete

POWER-OFF RAPPING SCHEDULE TAB

Each line of the table shows information about the particular event:

1. Name of POR event
2. Display color on the 7 day schedule
3. T/R Set(s)
4. Secondary Current Setpoint
5. Rapping Program or Digital output tag name
6. Next Start time or if this event is not enabled in the schedule
7. Event Duration
8. Repeat time
9. On-Demand POR sequence number or if this event is not enabled for On-Demand POR

POWER-OFF RAPPING SCHEDULE TABLE COLUMN HEADINGS

Click the ***Run*** button to execute a POR event now (as opposed to waiting for the next scheduled activation).

Click the ***Edit*** button to launch the POR Wizard and make modifications to an existing event.

Click the ***Delete*** button to remove the POR event from the schedule and table of events.

Click the ***Print*** button at the bottom of the page to print a copy of the table listing POR events.

Click the ***Add POR button*** at the bottom of the page to launch the **POR Wizard**.

If any changes have been made, click the green ***Apply*** button to save the changes. Click the ***Cancel*** button to discard changes and close the window.

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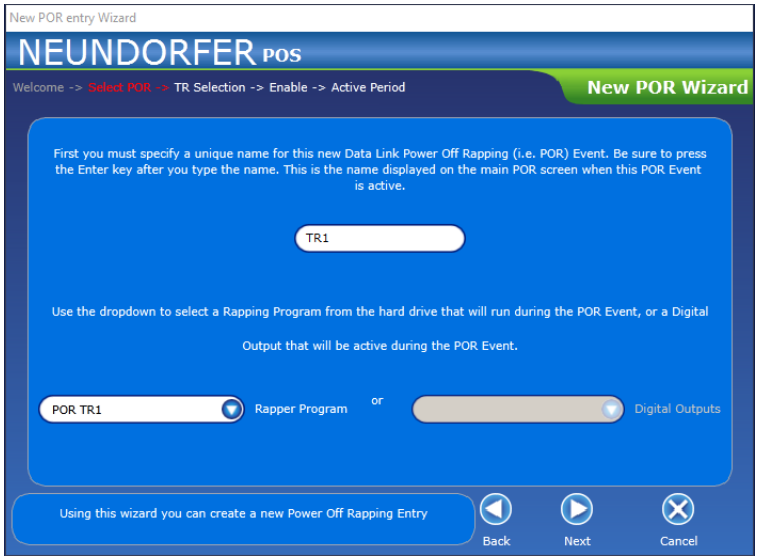
POR Wizard

The **POR Wizard** is used to create a new Power-Off Rapping event or modify an existing event. Click the Add POR button at the bottom of the window to create a new POR event, or highlight any POR event then click Edit button to launch the **POR Wizard.**

The **POR Wizard** starts off with a welcome splash screen. You can turn this off for future use by clicking the ***Don't show this page again*** button.

In the **Select POR** screen, type a name for the event and press the Enter key on your keyboard. Then use the dropdown menu on the left to select a rapping program stored on the hard drive that will be sent to the rapper control during the POR event, or select a digital output from the dropdown menu on the right that will be sent during the POR event. Rapper programs are more commonly used. Your POS system may not have any digital outputs configured for use with POR.

Click the ***Next*** button to proceed with the wizard.



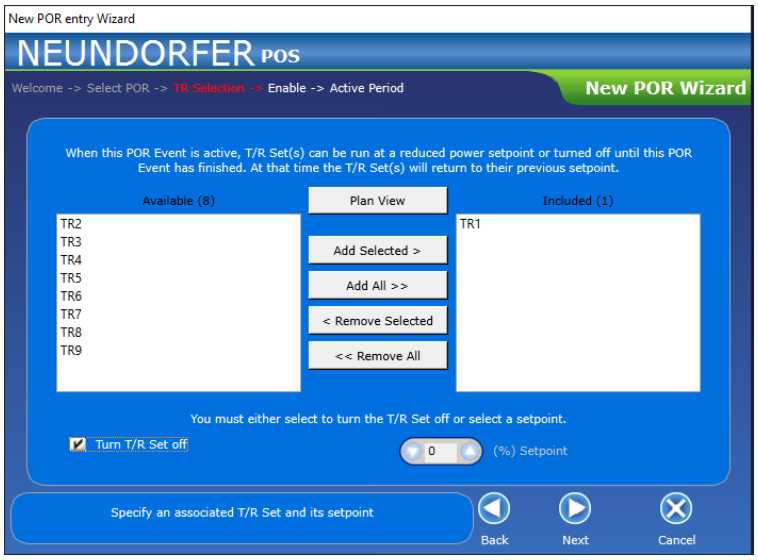
SELECT POR SCREEN

In the **TR Selection** screen, select which T/R Set(s) should be run at reduced power or turned off while the specified rapping program is being run.

One method to select TR Sets is to click the name of a T/R Set in the Available list, and click the ***Add Selected*** button to add this T/R to the Included list.

To include all T/R Sets, click ***Add All***.

Use the ***Remove Selected*** or ***Remove All*** buttons to remove T/R Sets from the included list.



T/R SELECTION SCREEN

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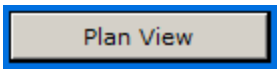
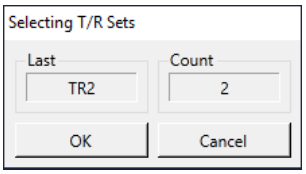
The other method is to click the ***Plan View*** button to choose T/R Sets visually. This switches to the plan view, with a floating **Selecting T/R Sets** window. Click on each T/R Set you want to include. When you are done selecting T/R Sets, click ***OK*** to save the list or ***Cancel*** to discard the list and return to the **POR Wizard**.



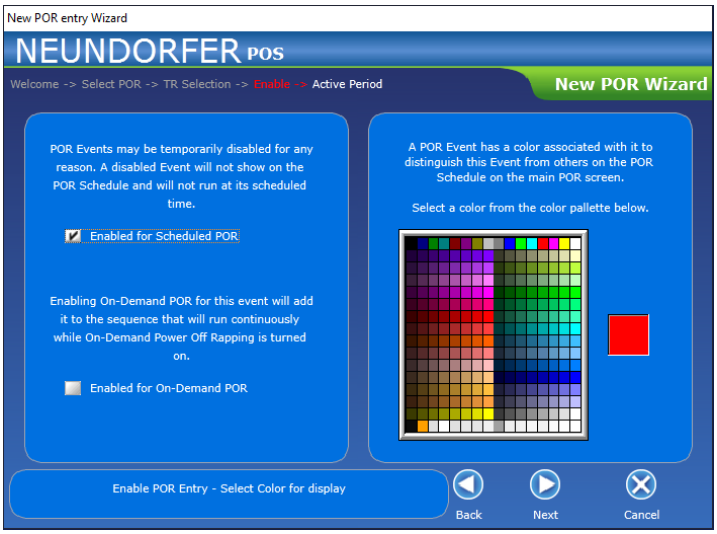
PLAN VIEW BUTTON



SELECTING T/R SETS WINDOW

Before proceeding to the next screen, specify what should happen to the selected T/R Set(s) during the event. Check the ***Turn T/R Set Off*** box to completely de-energize the T/R Set. Or in the ***% Setpoint*** enter a percent of T/R Set secondary current limit to adjust to during the event.

Click the ***Next*** button to proceed with the wizard.



Enable screen

In the **Enable screen** select the color for the 7 day POR schedule with a single click on the color swatch. Be sure to select contrasting colors so events are easy to distinguish on the screen.

When **"Enabled for Scheduled POR"** is checked, the event will appear on the 7 day chart and will run when POR is running.

When **"Enabled for On-Demand POR"** is checked, the event will automatically be assigned an On-Demand sequence number and will run when On-Demand POR is running

You can enable events for scheduled and on demand. If neither are checked the event will be stored but disabled.

Click **Next** to proceed with the wizard.

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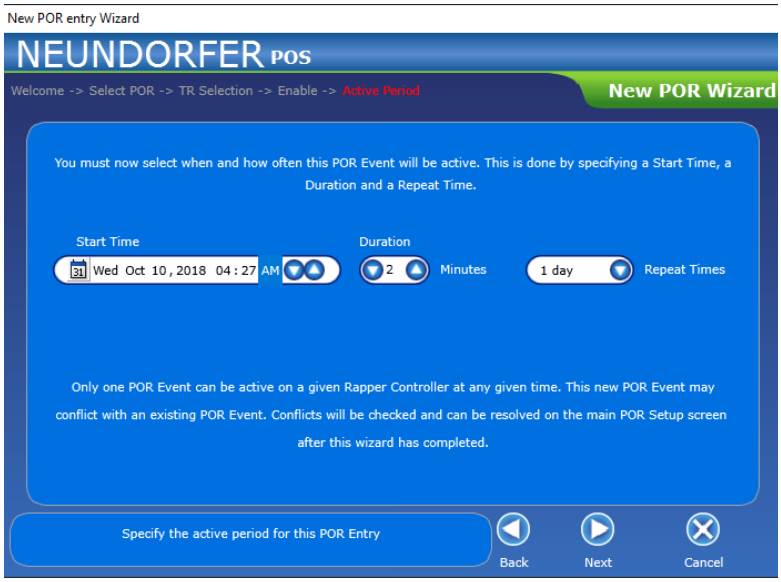

ACTIVE PERIOD SCREEN

In the **Active Period screen**, schedule timing for the event.

Click into each section of the Start Time field (day of week, month, day, hour, minute, AM/PM) and use up/down arrows to set start time for the POR event.

Click into the ***Duration*** field and use up/down arrows, or type in a value and press the Enter key on your keyboard, to set how long the POR event should last in minutes.

Use the ***Repeat Times*** dropdown menu to select how often the POR event should repeat. Time intervals can be from once an hour to once a week.

When you are done setting the active period, click ***Next*** to proceed with the wizard.

The final screen of the **POR Wizard** confirms all settings for the POR event are complete. Click ***Finish*** to return to the **Power-Off Rapping** window. Once the wizard has modified an existing POR event or created a new POR event it will be displayed in the table at the bottom of the screen and in the 7 day schedule if applicable.

Be sure to click the ***Apply*** button to save the changes. Click ***OK*** to save changes and close the wizard. Click ***Cancel*** to discard the changes and close the wizard.

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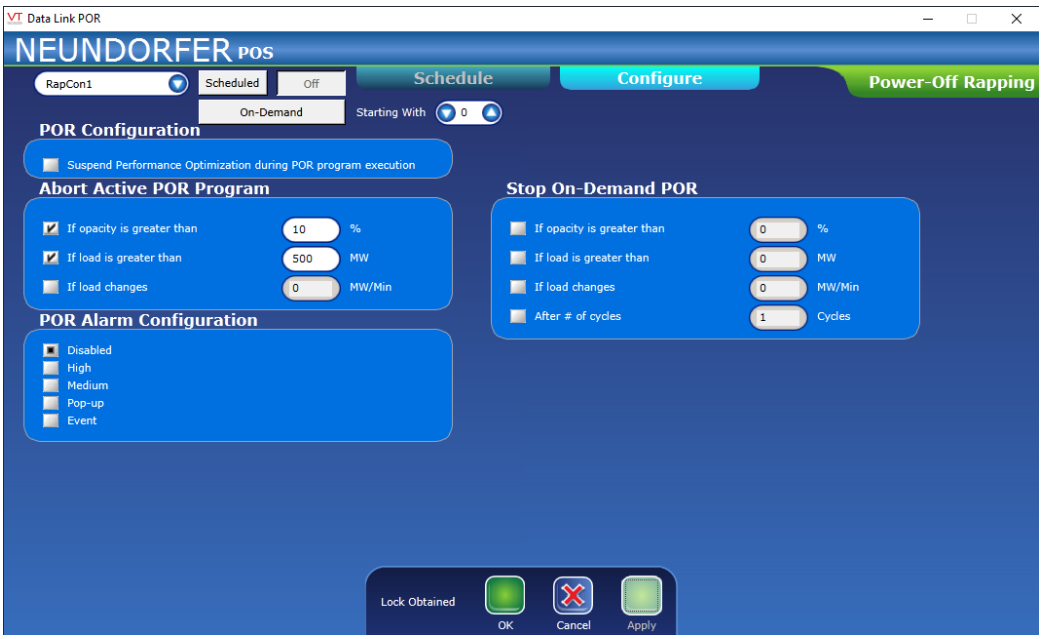
Configure Tab

The **Configure** tab of **Power-Off Rapping** contains settings that define how **Scheduled** and **On-Demand** rapping interact with other POS modules and how they react to changes in the process.



POWER-OFF RAPPING: CONFIGURE TAB

In the **POR Configuration** section, click the checkbox to ***Suspend Performance Optimization during POR program execution***; this temporarily suspends Performance Optimization when POR events are being executed. See Section 19 for more about Performance Optimization.

The settings in the **Abort Active POR Program** section define how **Power-Off Rapping** should react to changing process conditions. Click the checkboxes to enable or disable and enter values for opacity, load, and load changes. If POS detects these values are out of range it will halt the current POR event and not let another event begin until the conditions return to normal.

POR Alarm Configuration defines if an entry in the Alarm log is made when initiating or aborting a POR event. The setting applies to Scheduled and On-Demand POR events. Use the selection to decide the priority of the alarm that is recorded. See Section 43 for more about alarms.

- ***Disabled*** – no record of the action will be recorded
- ***High*** – POS adds a high priority entry to the alarm log and makes a continuous audible tone
- ***Medium*** – POS adds a medium priority entry to the alarm log and a short audible tone
- ***Pop-up*** – a pop-up window appears on screen with detail of alarm conditions
- ***Event*** – POS adds an event entry note in the alarm log

Stop On-Demand POR configures when **On-Demand POR** will stop based on changing process conditions. Click the checkboxes to enable or disable and enter values for opacity, load, and load changes. If a process condition causes On-Demand POR to stop, the module will return to the off or scheduled state depending on which was enabled when On-Demand was started.

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A check on the "**After # of Cycles**" box configures **On-Demand POR** to run each not disabled event it finds in the "On-Demand #" column to run from 1 to 999 times then return the POR module back to the state it was in when On-Demand was started.

If the "**After # of cycles**" box is not checked **On-Demand POR** will run until an operator stops the function.

When you are done configuring these variables click ***OK*** to save changes and close the window, ***Cancel*** to close the window without saving, or ***Apply*** to save changes without closing the window.

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31. MicroRap Specialized Rapping

Overview

Specialized Rapping is a POS wizard that allows you to configure, save, and run short rapping programs. These programs are typically run for short durations to clean specific parts of the precipitator. Normal rapping is suspended while a specialized rapping program is being run. When the special program is complete, the original program resumes where it left off.

Access **Specialized Rapping** from the MicroRap rapper control menu. On the plan view page, click on a rapper control icon and then select ***Specialized Rap*** from the menu.

Note: Only User Accounts the Specialized Rap privilege can access Specialized Rapping.

The **Specialized Rapping** window opens with a welcome splash screen. To turn this off for future use, click the ***Don't show this page again*** box. Click ***Next*** to proceed with the wizard.

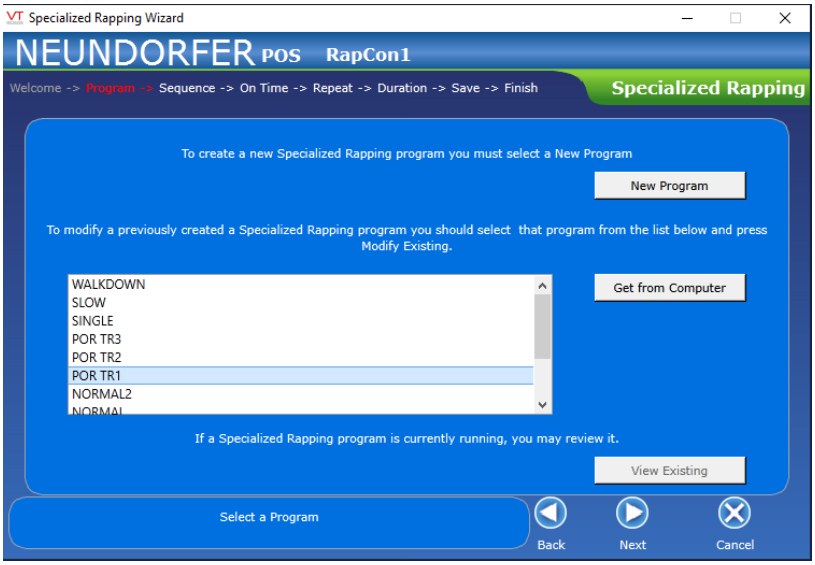
Program Select

In the **Program** screen you select whether to create a new rapping program or run an existing program already stored on the hard drive.

Click the ***New Program*** button to start with a blank specialized rapping program.

To modify an existing program, click a program name in the list and then click the ***Get from Computer*** button

Click the ***Next*** button to proceed with the wizard.



PROGRAM SCREEN

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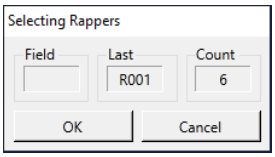
Sequence

The **Sequence** screen sets the order for the rappers in the program. The list displays rapper names in the order they will rap.

Click ***Pick from Screen*** to return to the plan view, then click each rapper you want to include. When done adding rappers, click ***OK*** to save selections, or ***Cancel*** to return without saving the rapper selections.



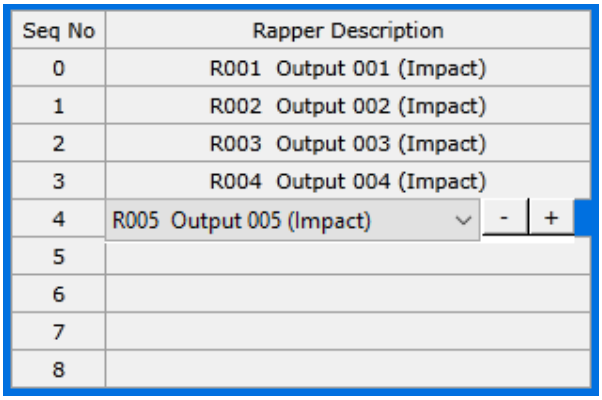
SELECTING RAPPERS WINDOW (PLAN VIEW)

SEQUENCE SCREEN

Another way to add rappers is to click the first empty line in the list of rappers, or an already-filled line in the list. Use the dropdown menu to select a rapper. Click the – button to delete this rapper from the sequence. Click the + button to insert a rapper in the sequence.

Click ***Clear Sequence*** to remove all rappers from the sequence.

When you are satisfied with the rappers in the sequence click ***Next*** to proceed with the wizard.



ADDING A RAPPER TO THE SEQUENCE

On Time

ON TIME SCREEN

The **On Time** screen allows you to set the on time (in half cycles or seconds) for rappers in the sequence. This setting is applied to all rappers in the program, and corresponds to the rapper type of the first rapper in the sequence.

Use the dropdown menu to select on time in half cycles for magnetic impulse rappers, or seconds for vibrators.

Click the ***Next*** button to proceed with the wizard.

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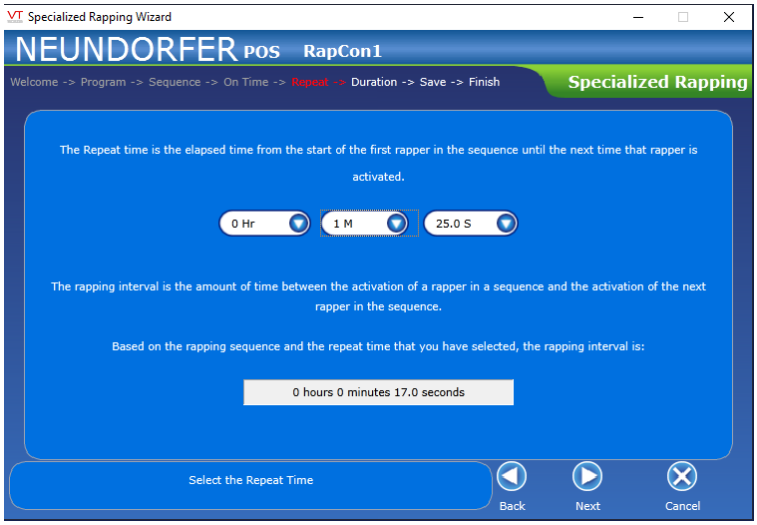
Repeat

In the **Repeat** screen of **Specialized Rapping**, you set how long it takes to go through the program one time: the elapsed time from the start of the first rapper in the sequence until the next time that rapper is activated.

Use the dropdown menus to set hours, minutes and seconds for repeat time. At the bottom of the screen (based on the rapping sequence and repeat time you set), POS calculates the rapping interval: the average amount of time between activation of one rapper in the sequence and activation of the next rapper in the sequence.



REPEAT SCREEN

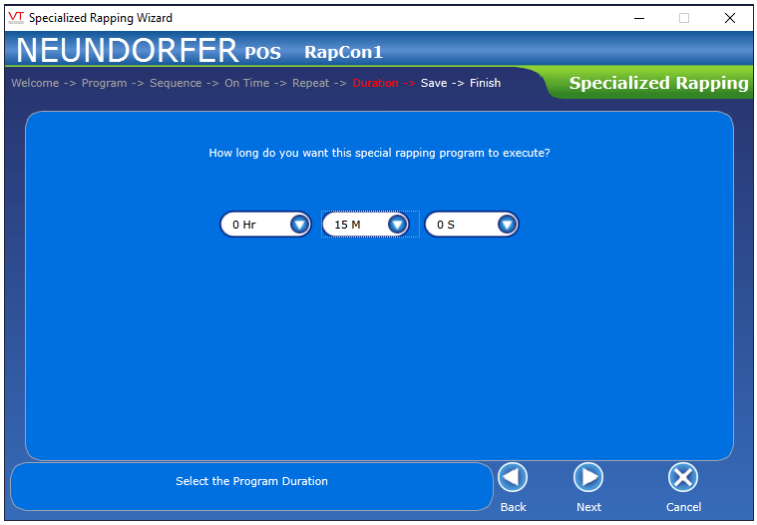
When you are done setting repeat time, click the Next button to proceed with the wizard.

Duration

In the **Duration** screen of **Specialized Rapping**, you set how long the rapping program should run. Use the dropdown menus to set hours, minutes and seconds.

The **Specialized Rapping** sequence will run through as many times as it can based on the repeat time and the duration.

When you are done setting duration for the rapping program, click ***Next*** to proceed with the wizard.



DURATION SCREEN

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Save

SAVE SCREEN

The **Save** screen allows you to execute the new program or save it to the hard drive. If you execute the program, details are displayed about the status of the running program.

Click the ***Execute*** button to begin running the specialized rapping program.

To save the program, type a name in the field, press the Enter key on your keyboard, and then click the ***Save to Computer*** button.

Click ***Abort*** to stop whatever specialized rapping program is currently running (if any).

On the right-hand side of the screen are three status bars for the running program:

- Current status of any specialized rapping program currently running
- End time when the current specialized program will be complete
- A Progress bar showing % complete of the currently running specialized rapping program

When you are done saving the rapping program, and reviewing status of specialized rapping programs, click the ***Next*** button to proceed with the wizard.

The final screen of the **Specialized Rapping** wizard is simply a confirmation that you're done. Click the ***Finish*** button to exit.

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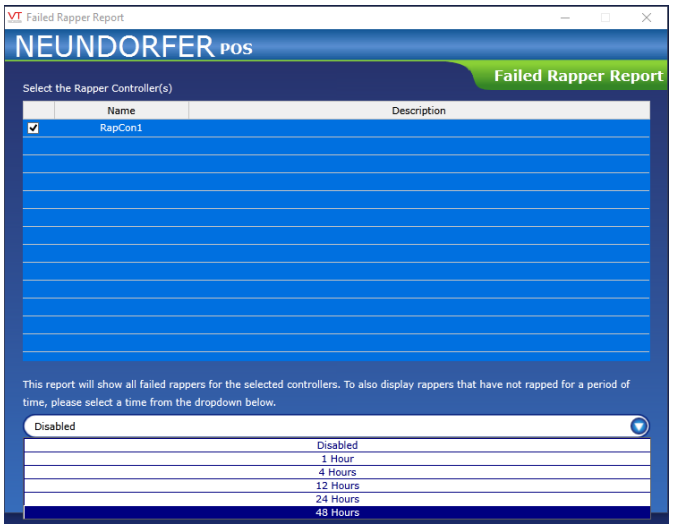
32. Failed Rapper Report

The Failed Rapper Report is designed to display all rappers that currently are indicating as failed or have not rapped.

Access **Failed Rapper Report** from the rapper control menu. On the plan view page, click on a rapper control icon and then select ***Failed Rapper Report*** from the menu.



FAILED RAPPER REPORT WINDOW

All configured MicroRap and PLC based Rapper Controls that are configured in POS appear in the list of available Rapper Controls.

Use the checkboxes to select which rapper controls to include in the report.

To include rappers that have not rapped for a 1 to 48 hours in the report use the dropdown to select the time period. If you do not want to include rappers that haven't rapped select the ***Disabled*** option.

Click the ***Run Report*** button to display the results.

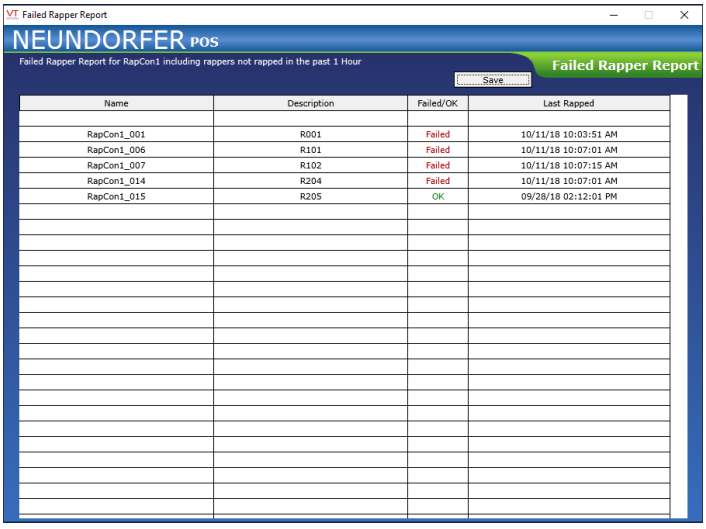
The rapper results appear as a table.

The **Name** column shows the POS rapper tag name.

The **Description** column shows the Rapper name. For reports that contain multiple rappers the description of the rapper control will appear before the listing for those rappers in the **Description** column.

The **Failed/OK** column displays "Failed" for Rappers that have a failed status, or "OK" for rappers that do not have a failure.

The **Last Rapped** column indicates the last time POS saw the rapper fire successfully without failing. "Unknown" will appear in this column if POS has never seen the rapper fire successfully.



FAILED RAPPER RESULTS

The report can be saved in .CSV format to be reviewed later. Click the ***Save*** button to open a file dialog box and select a location to save the file.

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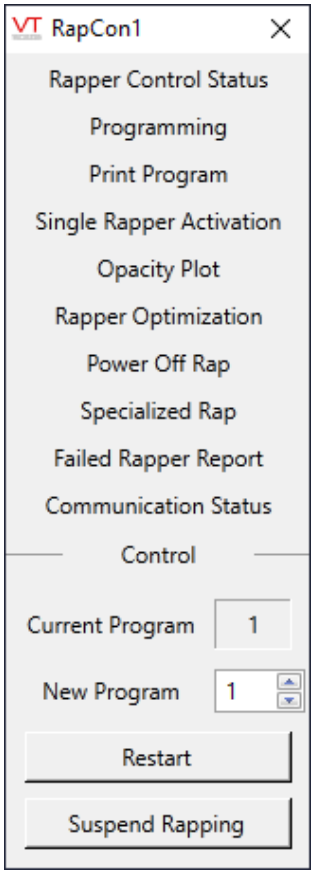
33. MicroRap Control



MICRORAP ICON MENU

POS allows remote control of MicroRap rapper controls. The rapper control can be told to change or restart rapping programs, and rapping can be suspended or resumed from POS. To access the controls, click on a rapper control icon on the plan view page to open the rapper control menu.

The lower portion of the menu window displays the control buttons:

Note: Only User Accounts with the MVC Control privilege can turn on, off, or reset T/R Sets.

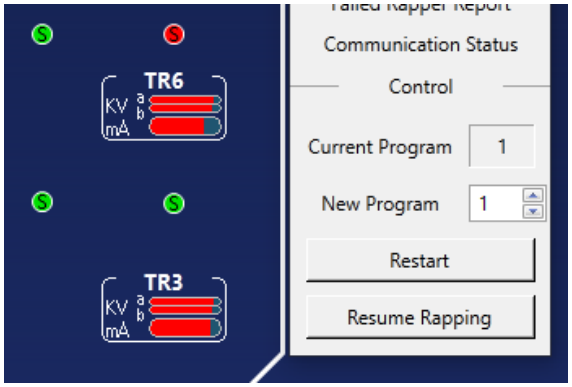
Note: The thumbwheel on the MicroRap control must be set to "0" to allow remote control from POS.

The **Current Program** indictor shows the slot number of the rapping program that is currently active.

Use the New Program selector to select a different rapping program. Enter a number or use the up/down arrows to select which rapper program number to run. Click Start to start a new program, or Restart to reload the currently active rapping program from the MicroRap's memory if it has been changed. If the program being run by MicroRap is the same as the program stored in the MicroRap's EPROM, clicking Restart has no effect.

To suspend rapping, click the Suspend Rapping button. The currently running rapping program will pause and each rapper icon will display an "S" in the center. While rapping is suspended the ***Suspend Rapping*** button will change to ***Resume Rapping***.

If rapping is suspended, click the ***Resume Rapping*** button to resume rapping where the program left off.



RAPPING IS SUSPENDED

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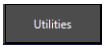
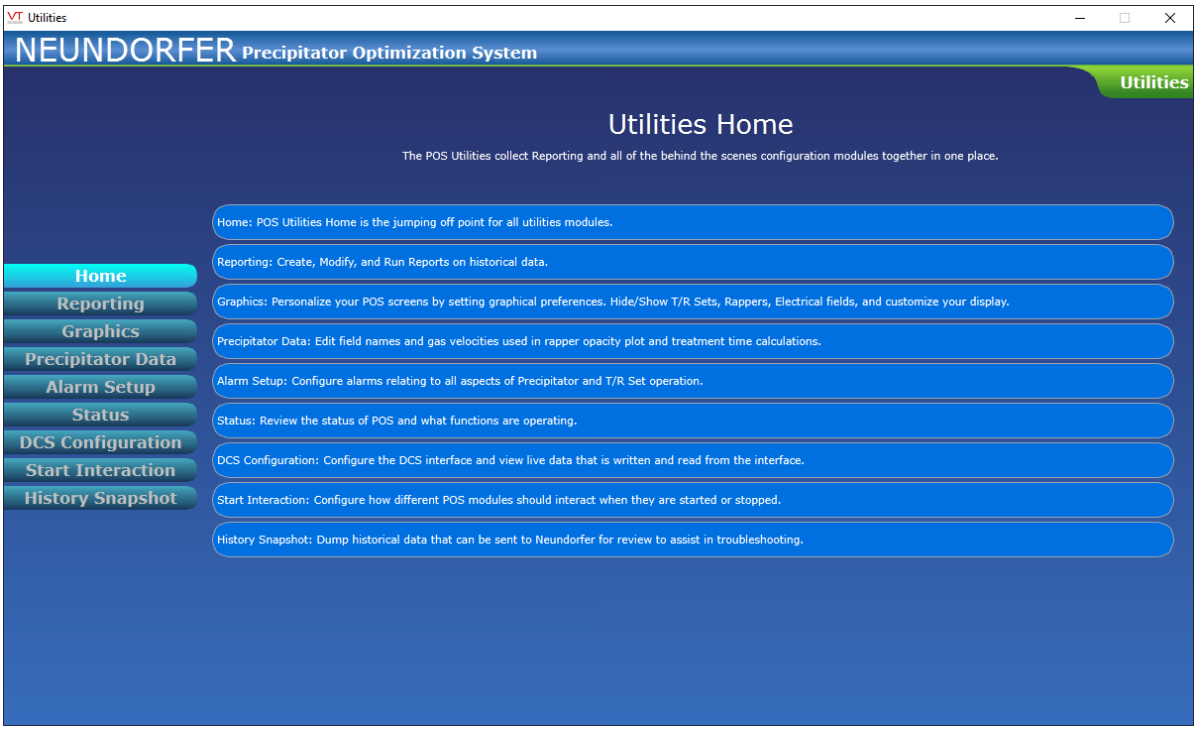
34. Utilities

The **Utilities** window provides access to several modules in POS that are not specifically attached to individual T/R Set, precipitator, or rapper controls.



UTILITIES ICON

To access the **Utilities** window, click the ***Utilities*** button in the taskbar in the upper left-hand corner of the plan view page.



UTILITIES WINDOW

Use the buttons on left side of the screen to access the different modules.

- ***Reporting***: Create Modify and Run Reports on historical data (Section 35)
- ***Graphics***: Personalize your POS screens by setting graphical preferences. Hide/Show T/R Sets, Rappers, Electrical fields, and customize your display. (Section 36)
- ***Precipitator Data***: Edit field names and gas velocities used in rapper opacity plot and treatment time calculations. (Section 37)
- ***Alarm Setup***: Configure alarms relating to all aspects of Precipitator and T/R Set operation. (Section 38)
- ***Status***: Review the status of POS and what functions are operating. (Section 39)
- ***DCS Configuration***: Configure the DCS interface and view live data that is written and read from the interface. (Section 40)
- ***Start Interaction***: Configure how different POS modules should interact when they are started or stopped. (Section 41)
- ***History Snapshot***: Dump historical data that can be sent to Neundorfer for review to assist in troubleshooting. (Section 42)

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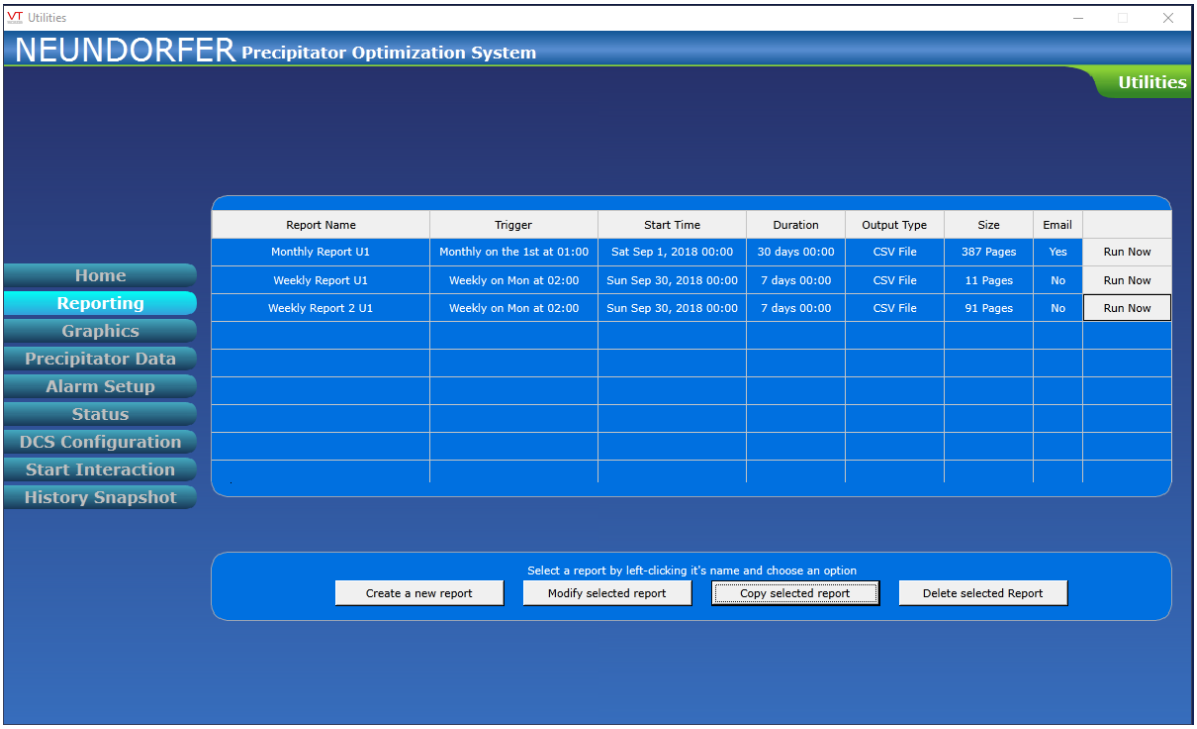
35. Reporting

The **Reporting** module in the POS **Utilities** provides tools for creating, modifying and running reports on historial data logged by POS. Reports can be customized in a variety of ways, including length, data interval, data sources included, display options, and report trigger.

To access **Reporting** click the ***Utilities*** button in the taskbar in the upper left-hand area of the plan view screen. Then, select ***Reporting*** from the menu on the left.



REPORTING MODULE

The main display shows a list of existing reports. Use the scroll bar to access the complete list.

To run a report, click the ***Run Now*** button for the row that contains that report.

To create a new report, click the ***Create New Report*** button. This will launch the **Report Wizard**.

To modify a report first click on the report name. Then click the ***Modify Selected Report*** button. This will launch the **Report Wizard** with this reports configuration.

To use an existing report as the basis for a new report first click on an existing report name. Then click the ***Copy Selected Report*** button. This will launch the **Report Wizard** with a new report that contains the configuration of the selected report.

To delete a report from the list click the report name, then click the ***Delete Selected Report*** button.

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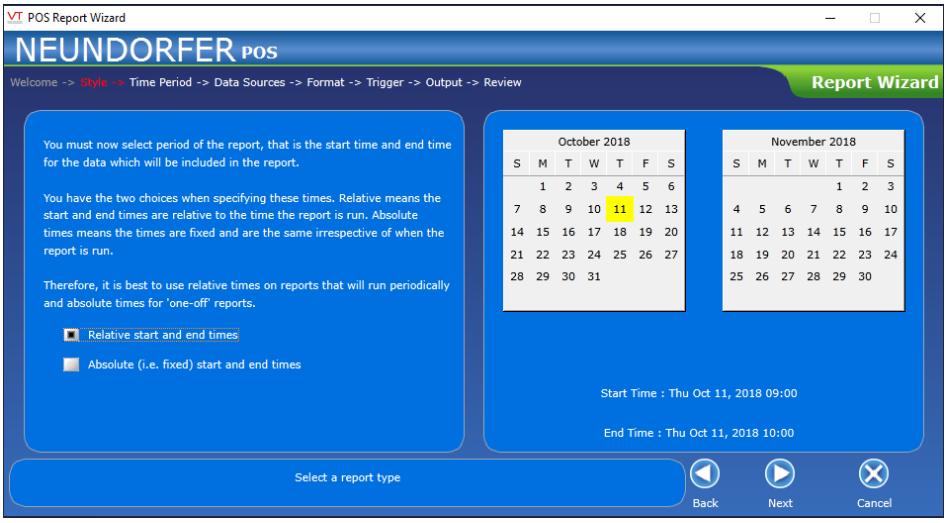
Report Wizard

The **Report Wizard** is launched creating a new report, modifying an existing report, or copying a report.

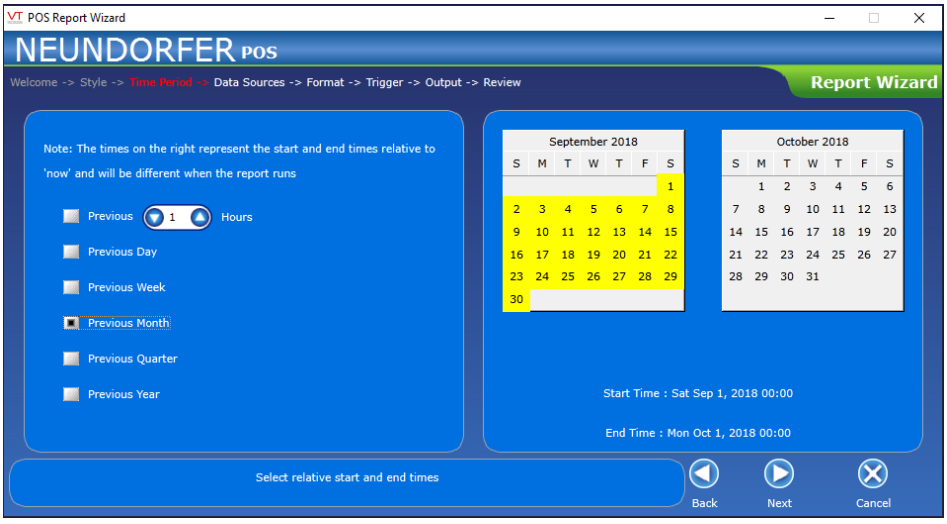
The initial welcome screen in the wizard can be turned off by clicking the ***Don't show this page again*** checkbox.



STYLE SCREEN

The **Style** screen is used to specify the type of report.

- Select Relative start and end times ***for recurring reports that are planned to be re-used. These reports will always use a time period relative to the execution of the report.***
- Select Absolute start and end times ***for one-off reports that are targeted for a specific time period***



TIME PERIOD SCREEN – RELATIVE

When ***Relative start and end times*** are selected, the **Time Period** screen displays a list of time selections. Use the checkboxes to select a time period that is relative to when the report will run. The calendar should help display the selected time period.

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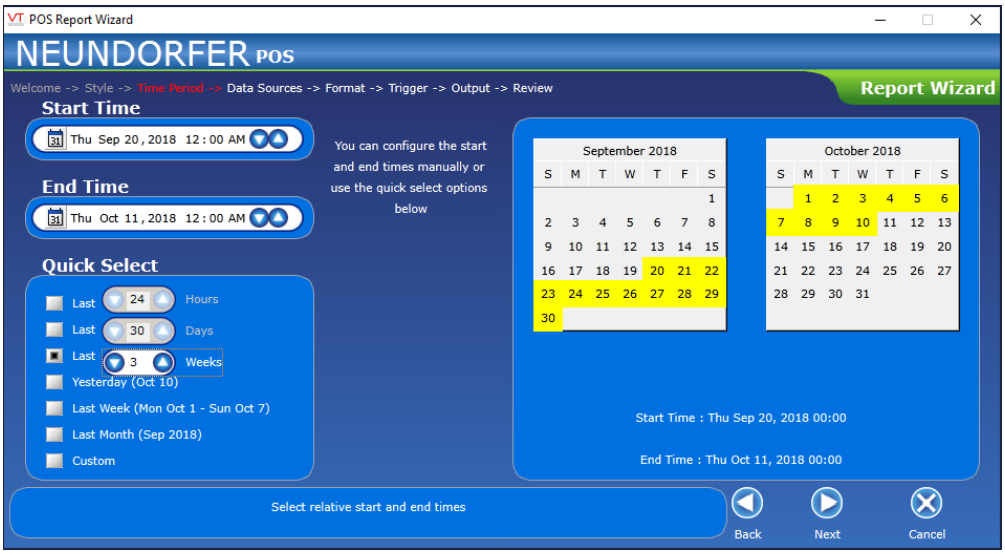
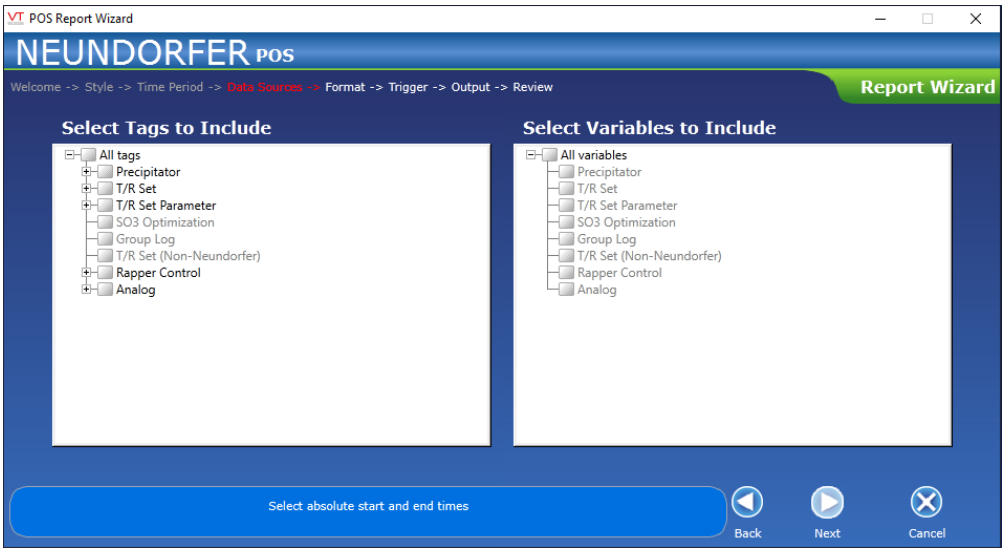


TIME PERIOD SCREEN – ABSOLUTE

When ***Absolute start and end times*** are selected, the **Time Period** screen has the ability to specify start and end times for the report.

Use the ***Start Time*** and ***End Time*** selectors to enter specific dates and times. Click the day of week, month, day, year, hour, minute, and AM/PM section and then use the up/down arrows to make your selection.

Use the **Quick Select** checkboxes to get a starting point for the start and end time selections.



DATA SOURCES SCREEN

The **Data Sources** screen is where you select the information that will go into the report. Select from the available tags on the left hand side of the window and then select the logged variables to include in the report on the right side of the window. Not all types of tags are configured on all POS systems. The available tags will reflect your system configuration.

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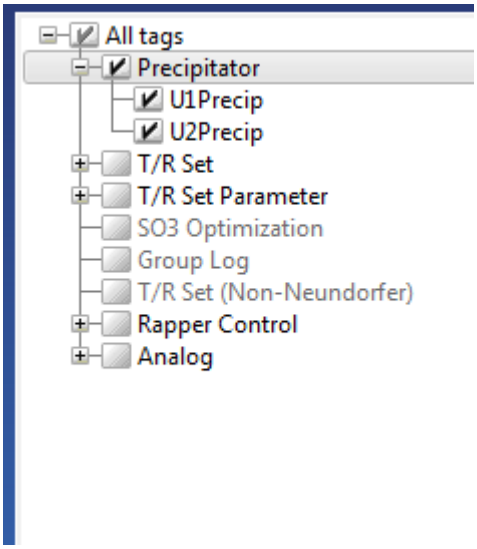
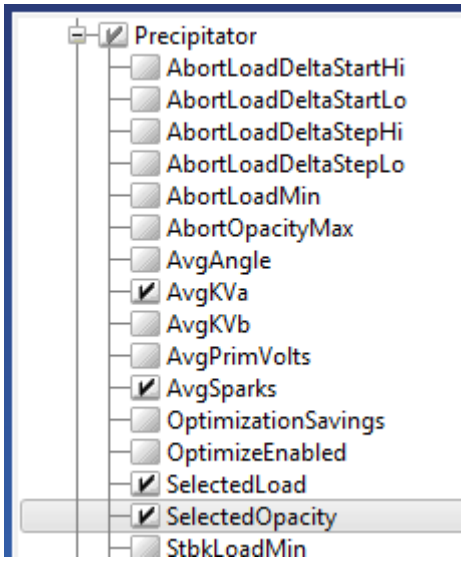
Use the tree menu in the **Select Tags To Include** area to select specific tags for the report. Clicking the "**+**" sign will expand the category to reveal all devices or inputs of that tag type. Checking the box for the category will select all tags of that type for the report. Check the box for each tag to select individual tags.



ALL PRECIPITATORS SELECTED



INDIVIDUAL PRECIPITATOR VARIABLES SELECTED

The categories are:

Precipitators – Precipitator data including averages and total power readings

T/R Sets – Operating data for T/R Sets controlled by Neundorfer MVC2,MVC3, and MVC4 Voltage controls

T/R Set Parameter – Limit and setpoint data any T/R Sets and Non-Neundorfer T/R Sets

SO3 Optimization – Operating data for the SO3 Optimization module

Group Log – Specific multi-variable log tags

T/R Set (Non-Neundorfer) – operating data for T/R Sets not controlled by Neundorfer voltage controls such as High Frequency T/R Sets

Rapper Control - Binary data for rapper actuations on each output card

Analog – Values for logged analog inputs

The right side of the **Data Sources** screen is for selecting Variables specific to each tag type. Use the tree menu in the **Select Variables to Include** area to select specific information for each tag type Clicking the "**+**" sign will expand the category to reveal all variables available for that tag type. Checking the box for the category will select all variables for that tag for the report. Check the box for each variable to select individual variables.

All variables selected for a tag type will be reported for all selected tags of that type.

Variables cannot be selected until a tag of that type has been selected for the report.

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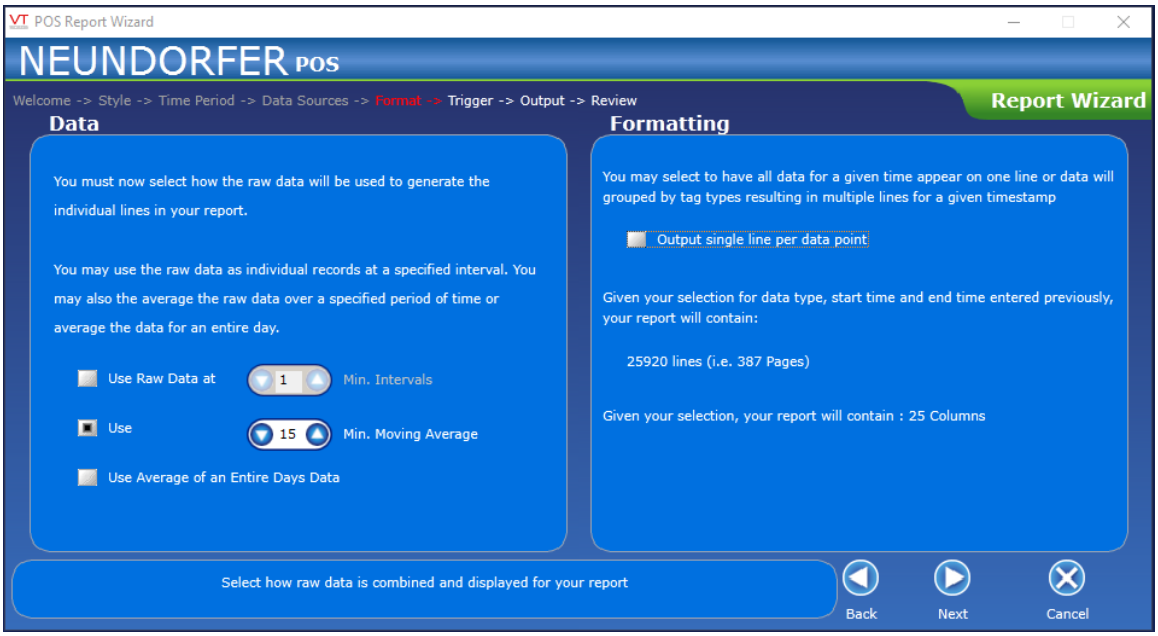

FORMAT SCREEN

The **Format** Screen is used to specify how the selected data will be used in the report.

Select ***Use Raw Data at XX Min. Intervals*** to report only the value the beginning of each specified time period.

Select ***Use XX Min. Moving Average*** to report the average of all logged data over each specified time period.

Select ***Use Average of an Entire Days Data*** to have a single data point per day. This is useful for very long reports.

In the Formatting selection check the ***Output Single line per data*** point checkbox to output data for all tags on a single line for each timestamp. Leave the box unchecked to allow multiple lines, one for each tag, with the same timestamp.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1			Precip	Precip		Opt	Prim	Prim	SCR	Sec	Sec	Sec	Spark			Opt	Prim	Prim	SCR	Sec	Sec	Sec	Spark		
2	Date/Time	Device	Load	Opacity	Device	%	Amps	Volts	Angle	KVa	KVb	MilliAmps	Mode	Sparks	Device	%	Amps	Volts	Angle	KVa	KVb	MilliAmps	Mode	Sparks	Device
3	Oct 5 2018	Unit 1	572.2	5.7	TR1	100	262	399.3	138	42.5	41.2	2132.8	1	11	TR2	100	262	398.7	137	42.5	41.1	2131.3	1	11	TR3
4	Oct 5 2018	Unit 1	572.9	3.5	TR1	100	282	424.5	146	44.2	42.8	2349.7	1	15	TR2	100	282	424	146	44.1	42.7	2350.7	1	15	TR3

EXAMPLE OF REPORT WITH OUTPUT SINGLE LINE PER DATA POINT CHECKED

	A	B	C	D	E	F	G	H	I
1			Precip	Precip		Opt	Prim	Prim	SCR
2	Date/Time	Device	Load	Opacity	Device	%	Amps	Volts	Angle
3	Oct 5 2018 13:45:00	Unit 1	394.4	3.2	TR1	100	282	421.7	146
4	Oct 5 2018 13:45:00				TR2	100	281	422.8	146
5	Oct 5 2018 13:45:00				TR3	100	354	423.7	145
6	Oct 5 2018 13:45:00				TR4	100	282	422.7	146
7	Oct 5 2018 13:45:00				TR5	100	282	423.9	146
8	Oct 5 2018 13:45:00				TR6	100	282	422.8	146
9	Oct 5 2018 13:45:00				TR7	100	282	423.3	146
10	Oct 5 2018 13:45:00				TR8	100	282	422.6	146
11	Oct 5 2018 13:45:00				TR9	100	282	421.8	146

EXAMPLE OF SAME REPORT WITH OUTPUT SINGLE LINE PER DATA POINT UNCHECKED

Based on the time period, tags, variables, and data intervals the Format section will calculate the number of rows and columns in the finished report. This is a useful reference to understand how much information is contained in the report.

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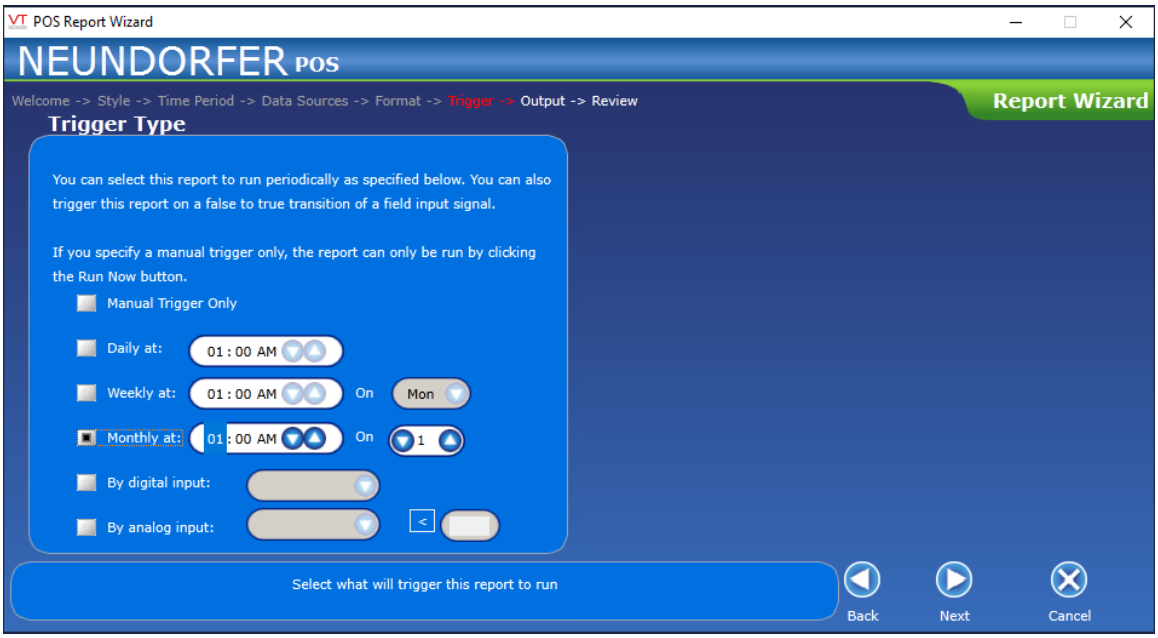

TRIGGER SCREEN

Use the **Trigger** screen to select the trigger for the report. All reports can be triggered manually by clicking the ***Run Report*** button from the list of reports in the **Reporting** module.

Select ***Manual Trigger Only*** to prevent the report running automatically.

Select ***Daily at: Time*** to have the report generated every day at the specified time.

Select ***Weekly at: Time on Day*** to have the report generated automatically each week at the specified time on the specified day.

Select ***Monthly at: Time on Date*** to have the report generated automatically each month at the specified time on the specified date.

Select ***By Digital Input:*** and select an input to have the report generated each time the digital input goes “True”

Select ***By Analog Input:*** and select an input and setpoint to have the report generated each time the analog input is greater than or less than the setpoint.

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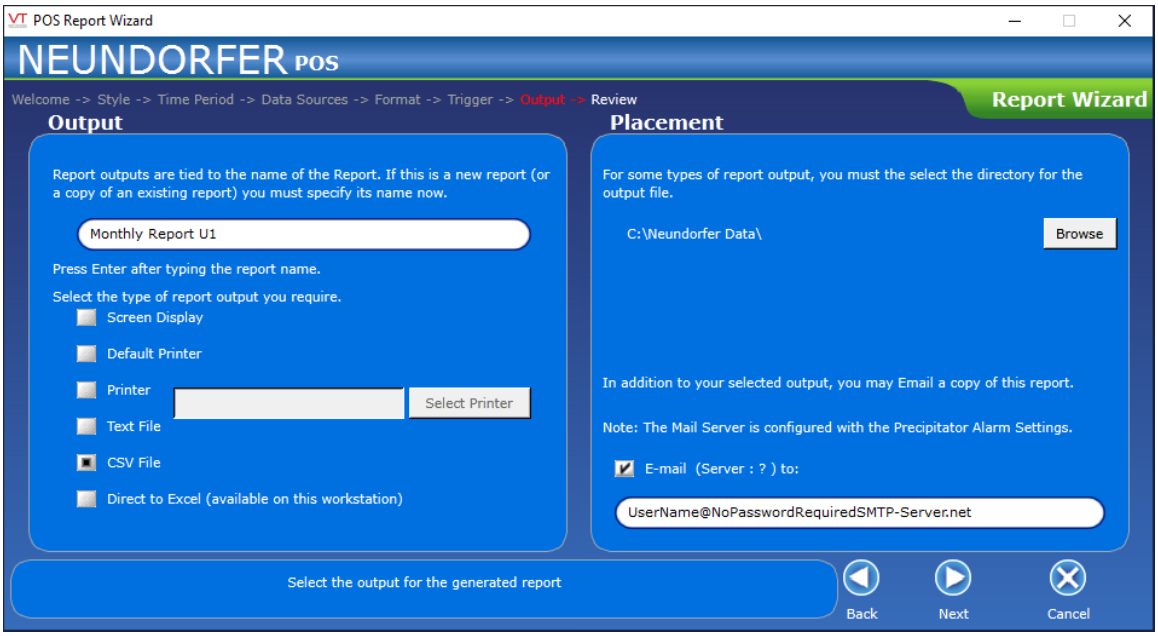

OUTPUT SCREEN

The **Output** screen lets you select how to get the report results.

New reports require a name before they can be saved. Enter a name for the report in the field and press the enter key. You will not be able to continue in the wizard without a valid report name. The name field will already have a name when modifying an existing report.

Select ***Screen Display*** to have the report display in a **Print Preview** window on the screen. The report results can be printed from the Screen Display window. It is recommended to test all new reports with Screen Display output to ensure the report is as expected before sending it to a file or printer.

Select Default Printer to send the report results directly to the default printer for the POS computer.

Select Printer then specify a printer with the ***Select Printer*** button to send the report results to the specified printer.

Select Text File to save the report results as an ASCII text format file. The file is saved in the output directory specified in the **Placement** section. Text file names follow this format: (reportname)(yyyymmdd).txt. Example: Precip_Data20120611.txt

Select CSV File to save the report results as a Comma Separated Values (CSV) file. CSV files are commonly used to open the report results as a spreadsheet. The file is saved in the output directory specified in the **Placement** section. CSV file names follow this format: (reportname)(yyyymmdd).csv. Example: Precip_Data20120611.csv.

Select Direct to Excel to launch Microsoft Excel and populate a new Spreadsheet with the report results. This requires the POS computer to have Microsoft Excel installed on it. From Excel, you can then edit and save the file.

For reports that are saved as Text or CSV files, the directory they will be saved is displayed in the **Placement** area. Use the ***Browse*** button to select a different location.

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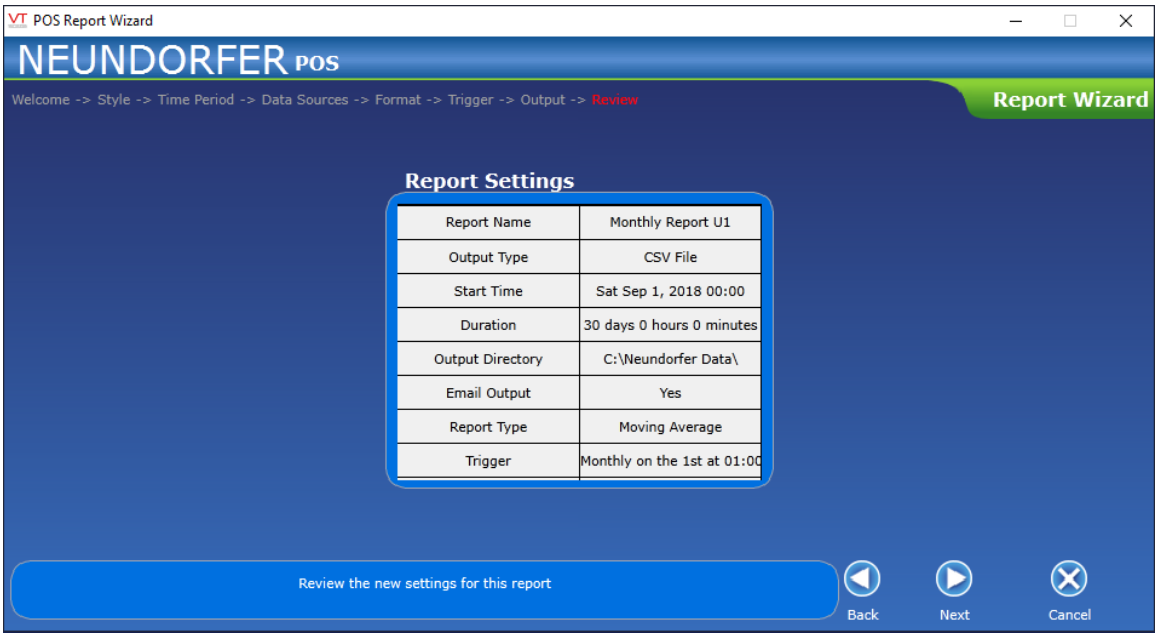
In addition to the selected **Output**, the report results can sent in an e-mail. Check the ***E-mail*** checkbox and then enter email addresses (separated by semicolons) into the field. The email server used by POS needs to be specified in the **Precipitator Alarm Settings** tab (see Section 38 for more information).

Note: Emailing a report that has a file output will not email the file. All report data will be included in the body of the email in ASCII text format.



REVIEW SCREEN

The **Review** screen of the **Report Wizard** displays a summary of the report's configuration. If you need to make changes, click the Back button. When you are done reviewing the report's configuration, click the Next button.

The final screen of the **Report Wizard** indicates that report configuration is complete. Click the ***Complete*** button to save all the settings you made. POS now returns to the main **Reporting** screen, with listing of saved reports.

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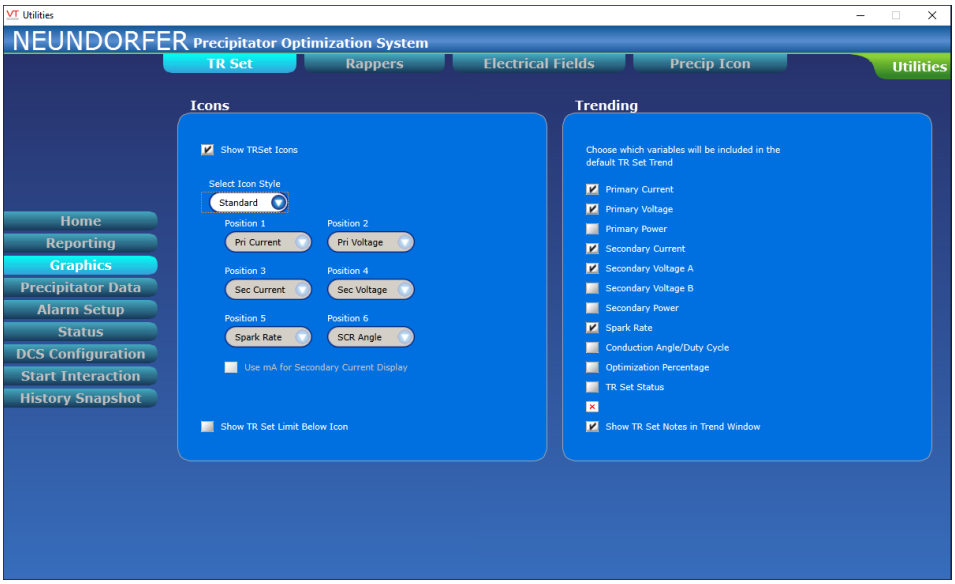
36. Graphics

Overview

The **Graphics** utility allows users to personalize POS plan view pages by setting a variety of graphical preferences. Graphics for T/R Sets, Rappers, Electrical Fields, and Precipitator Icons can all be customized for each User Account. Modified **Graphics** properties remain in effect only for the User Account that made changes while logged in. If changes are made to **Graphics** while no user is logged in the "Logged Off" user graphics will revert to defaults when an actual user logs in.

To access **Graphics** click the ***Utilities*** button in the taskbar in the upper left-hand area of the plan view screen. Then select **Graphics** from the menu on the left.



GRAPHICS MODULE TR SET TAB

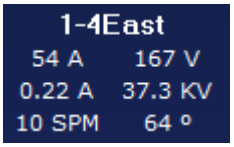
TR Set Graphics - Icons

Use the Show T/R Set Icons check box to hide or show T/R Set icons on the plan view pages.

T/R Set icons can be displayed in one of two styles on plan view pages. Use the ***Select Icon Style*** dropdown menu to choose between the ***Standard*** or ***Data Grid*** style.

If the Data Grid icon style is selected, use the drop-down menus for Position 1 through Position 6 to select the information that will be displayed in each of the six positions for the icon.

STANDARD T/R ICON

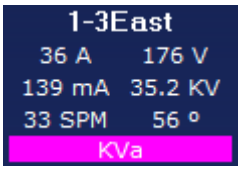


DATA GRID T/R ICON

Check the ***Use mA for Secondary Current Display*** checkbox to display secondaray current readings in milliamps as opposed to amps in the Data Grid icon style.

Check the ***Show TR Set Limit Below Icon*** checkbox to display the current limiting condition for the voltage control below the TR Set icon. Reference your Voltage Control manual for more information about limiting conditions.

STANDARD T/R ICON WITH LIMIT CONDITION



DATA GRID T/R ICON WITH LIMIT CONDITION

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TR Set Graphics - Trending

The **TR Set Trending** section is used to determine what is displayed in the trend window when selecting ***Trend*** from the **TR Set Icon Menu**. The default pens are Primary Current, Secondary Current, Primary Voltage, Secondary KVa, and Spark Rate (actual sparks per minute). Use the check boxes next to each paramter to select which pens will be added to the trend. Checked paramters will appear in the trend, un-checked parameters will not.

Use the ***Show TRSet Notes in Trend Window*** checkbox to hide or display notes about each T/R Set when selecting Trend form the T/R Set menu.

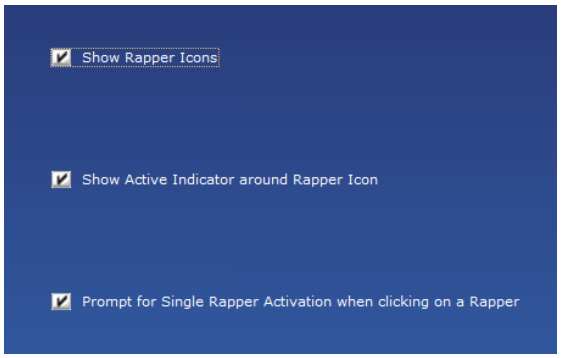
See Section 11 for more about the **Trend Window**.

Rappers Graphic Options

Check the ***Show Rapper Icons*** checkbox to display rapper icons on the planview screens. Rapper icons will not appear if this box is not checked.

Check the ***Show Active Indicator around Rapper Icon*** checkbox to display the active indicator around rappers that recently changed from *ready* to *rapped* status. The active indication will not display if this box is not checked.

The active indicator is a small halo around the rapper icon like this:



GRAPHICS MODULE RAPPERS TAB

Check the ***Prompt for Single Rapper Activation when clicking on Rapper*** checkbox to allow the **Single Rapper Activation** interface to launch when a rapper is clicked. The popup window will not appear if this box is not checked. See Section 27 for more information regarding **Single Rapper Activation**.

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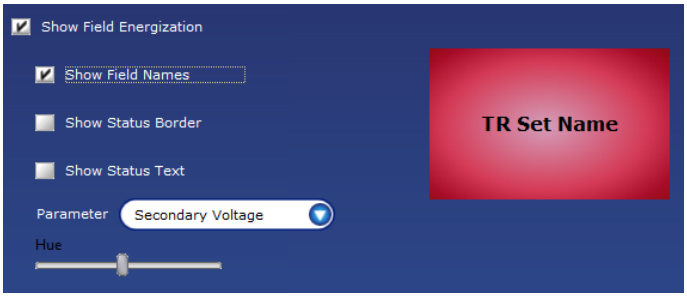
Electrical Fields Graphic Options

Electrical fields are drawn on plan view pages for each T/R Set in a precipitator. Each field indicates the area of the precipitator energized by the specified T/R Set. Electrical fields have a very strong high intensity color if the selected parameter is close to its limit, and will appear faded/greyed-out if the parameter is running very low.



GRAPHICS MODULE ELECTRICAL FIELDS TAB

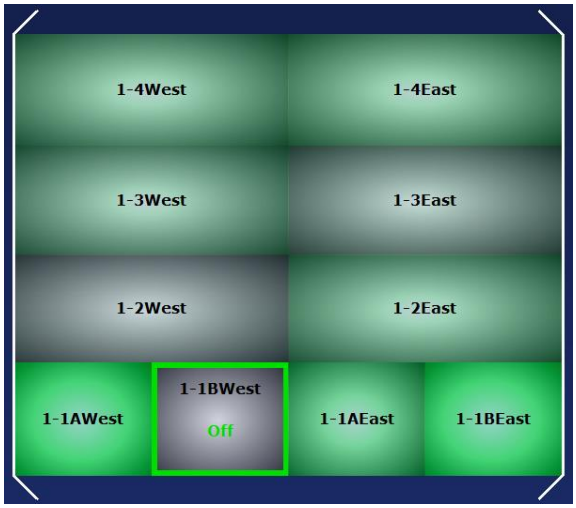
Use the ***Show Field Energization*** checkbox to hide or display electrical fields on plan view pages. This box must be checked to see the effects of any of the other selections on this tab.

Use the ***Show Field Names*** checkbox to show or hide the name of the T/R Sets in the center of the electrical field.

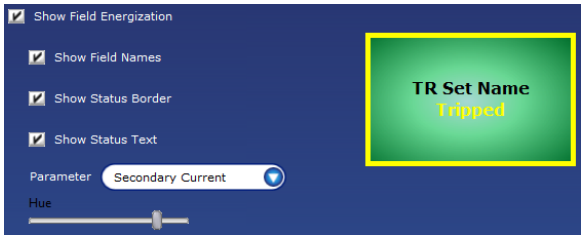
Use the ***Show Status Border*** checkbox to display a border around the electrical field to indicate the status of the T/R Set when it is not running. The border will appear green when the T/R is off, yellow when it is tripped, and white if the control is not communicating.

Use the ***Show Status Text*** checkbox to display a text description of the status of the T/R Set in the center of the electrical field.

Use the ***Parameter*** dropdown menu to select the parameter used to set the intensity of the elecrical field's color. Select from Secondary Voltage (KV), Secondary Power (KW), Secondary Current (mA), Primary Power (KW), Primary Current (A), SCR Angle (°), or Optimization Percent (%).
Use the ***Hue*** slider to change the base color of the electrical field.



EXAMPLE PLAN VIEW



SAMPLE ELECTRICAL FIELDS OPTIONS

This example shows electrical fields options (above) and the resulting display on the plan view page (left). Rapper icons and T/R Set icons have been hidden.

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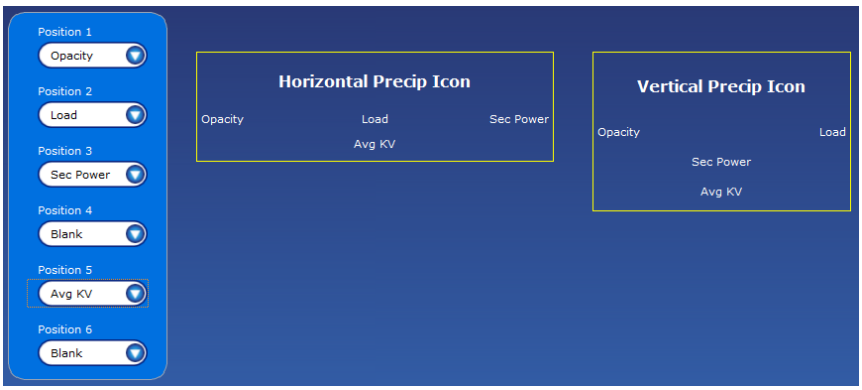
Precip Icon Graphic Options

Use the **Precip Icon Graphics** options to select the information displayed in the precipitator icon. The Horizontal/Vertical layout will depend on how your POS software is configured.



PRECIP ICON GRAPHICS OPTIONS

Use the Position 1 through Position 6 dropdown menus to select the information that will be displayed under the precipitator name on plan view pages. Select Blank to leave that position blank.

The selected parameters will also determine what data will be displayed in the trend window when selecting ***Trend*** from the **Precipitator Icon Menu**.

See Section 11 for more about the **Trend Window**.

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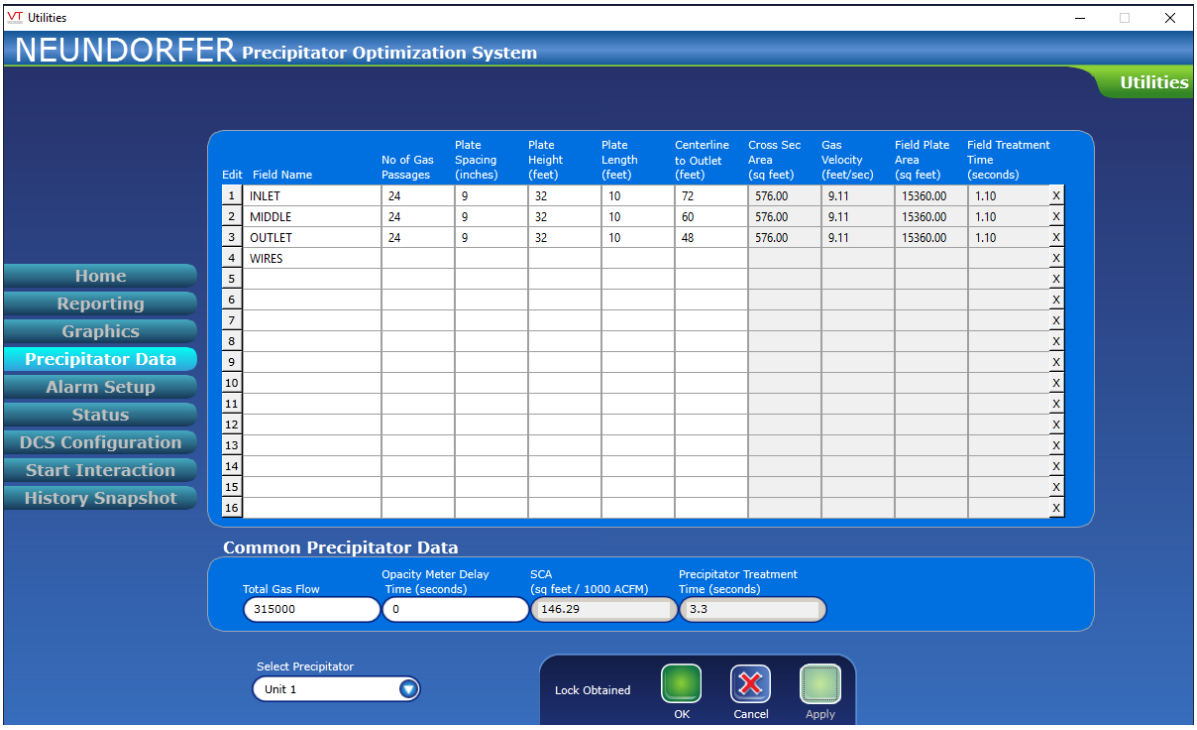
37. Precipitator Data

Overview

The **Precipitator Data** module of **Utilities** allows you to edit parameters used to describe the precipitator to POS. This includes field names and gas velocities used in rapper opacity plot and treatment time calculations.

To access **Precipitator Data** click the ***Utilities*** button in the task bar in the upper left-corner of the preciptiator's plan view page. Then, select ***Precipitator Data*** from the menu on the left.



PRECIPITATOR DATA MODULE

Data entered on this screen is used by POS to determine how much to offset rapper actuations on the rapper opacity plot (see Section 28) to allow for the time it takes the ash to travel from rapper location to the opacity meter.

Note: All User Accounts can view Precipitator Data, but to make any changes the User Account must have the Precip Data Entry privilege.

Use the ***Select Precipitator*** dropdown at the bottom of the screen to select the precipitator that you want to view or edit.

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Editing Precipitator Data

In the first section of the **Precipitator Data** screen, you can edit field data including field names, plate dimensions, and gas velocity.

Edit	Field Name	No of Gas Passages	Plate Spacing (inches)	Plate Height (feet)	Plate Length (feet)	Centerline to Outlet (feet)	Cross Sec Area (sq feet)	Gas Velocity (feet/sec)	Field Plate Area (sq feet)	Field Treatment Time (seconds)	
1	Field 1	16	9	30	8	50	360.00	0.93	7680.00	8.64	X
2	Field 2	16	9	30	8	40	360.00	0.93	7680.00	8.64	X
3	Field 3	16	9	30	8	30	360.00	0.93	7680.00	8.64	X
4	Field 4	16	9	30	8	20	360.00	0.93	7680.00	8.64	X
5	Wires										X

FIELD DATA SECTION

- ***Field Name*:** POS uses field names entered here to create names for the fields in the rapper **Opacity Plot** module, and in the rapper properties.
- ***Number of Gas Passages*:** Enter the number of gas passages for the specified field.
- ***Plate Spacing (inches)*:** Enter the number of inches between plates for the specified field.
- ***Plate Height (feet)*:** Enter the height of the plates (feet) for the specified field.
- ***Plate Length (feet)*:** Enter the length of the plates (feet) for the specified field.
- ***Centerline to Outlet (feet)*:** Calculate the distance from the center of the specified field to the outlet of the precipitator. Enter this value here.
- ***Cross Sectional Area (square feet)*:** POS automatically calculates a value here, using this equation: Number of Gas Passages * Plate Spacing * Plate Height.
- ***Gas Velocity (feet per second)*:** POS automatically calculates a value here, using this equation: Total Gas Flow / Cross Sectional Area.
- ***Field Plate Area (square feet)*:** POS automatically calculates a value here, using this equation: Plate Height * Plate Length * Number of Gas Passages * 2
- ***Field Treatment Time (seconds)*:** POS automatically calculates a value here, using this equation: Plate Length / Gas Velocity.

The second section of the **Precipitator Data** Screen contains the Common Precipitator Data. Click into each of the data fields you wish to edit, and enter values.

Common Precipitator Data

Total Gas Flow	Opacity Meter Delay Time (seconds)	SCA (sq feet / 1000 ACFM)	Precipitator Treatment Time (seconds)
20000	22	1536.00	34.6

COMMON PRECIPITATOR DATA SECTION

- ***Total Gas Flow***: Enter a value for total gas flow in actual cubic feet per minute (ACFM). This value is used to determine other values, such as treatment time and SCA.
- ***Opacity Meter Delay Time (seconds)***: Enter the number of seconds it takes for gas to travel from the precipitator to the stack opacity meter.
- ***SCA***: Specific Collecting Area (SCA) is calculated based on data entered in other parts of the **Precipitator Data** screen.
- ***Precipitator Treatment Time (seconds)***: POS automatically calculates a value here based on data entered in other parts of the **Precipitator Data** screen.

When you are done entering/editing data on the **Precipitator Data** screen, click the ***OK*** button to save changes and return to Utilities Home, or click the ***Apply*** button to save changes and remain on the **Precipitator Data** screen.

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38. Alarm Setup

Overview

The **Alarm Setup** utility allows you to configure alarms relating to all aspects of precipitator and T/R Set operation. This includes opacity spikes, load changes, T/R Set power fluctuations, and rapper failures.

To access **Alarm Setup** click the ***Utilities*** button in the task bar in upper left-hand area of the plan view page. Then select ***Alarm Setup*** from the menu on the left.

Before setting up any alarms, use the ***Select Precipitator*** dropdown (bottom of screen, left-hand side) to select a precipitator. Any alarms configured will only apply to the selected precipitator.

SELECT PRECIPITATOR DROPDOWN MENU

Each alarm in POS can be configured to have one of five priorities (listed below). The alarm priority determines what action is taken when the alarm conditions become true.

Alarm Priority	Alarms Icon	Sound	Log entry text color	Acknowledge
Disabled	None	None	No log entry	-
High	Alarm icon flashes until acknowledged	Continuous two tone until acknowledged	Logged in Red text	Silence or ack from alarms window
Medium	Alarm icon flashes until acknowledged	Two tone for 4 cycles then stops	Logged in Green text	Silence or ack from alarms window
Pop-up	Alarm icon flashes until acknowledged	Two tone for 4 cycles then stops	Logged in Yellow text	Silence or ack from alarms window
Event	None	None	Logged in White text	Acknowledgement not required

For each Alarm use the ***Alarm Priority*** dropdown menu to select the desired priority. Disalbed alarms will be ignored by POS.

ALARM PRIORITY DROPDOWN MENU

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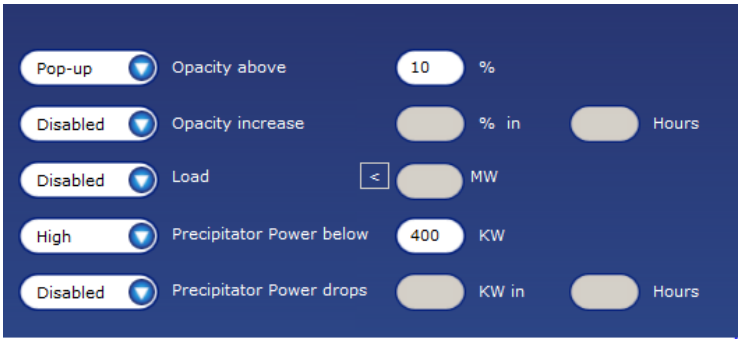
Precipitator Alarms

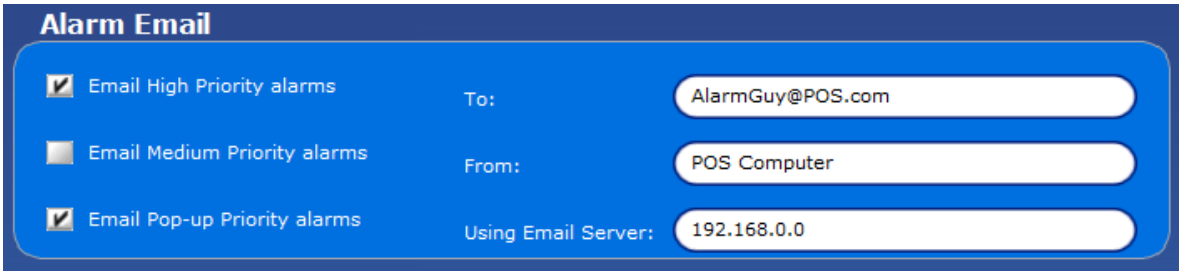


CONFIGURATION AREA OF PRECIPITATOR ALARMS SCREEN

After selecting a priority, fill in the blank field or fields with value to set what triggers each alarm.

- Opacity above [x] % - Enter a limit that opacity can reach before the alarm will trigger. For example, if you enter 12, any opacity level above 12% will trigger the alarm.
- Opacity increase [x] % in [y] Hours – Enter a specific change in opacity over a set time that triggers the alarm. For example, a five percent rise over 12 hours.
- Load >< [x] MW – Enter a boiler load value, in megawatts, above or below which the alarm is triggered. Click the greater than/less than button to toggle it between < and >. For example, if you select > and enter 500, the alarm will trigger if the load is greater than 500 MW.
- Precipitator Power below [x] KW – Enter a precipitator power level, in kilowatts, below which the alarm will be triggered. For example, if you enter 400, the alarm will go off if precipitator power drops below 400 KW.
- Precipitator Power drops [x] KW in [y] Hours – Enter a specific KW power change over a set time to trigger the alarm. For example, an 80 KW drop in 12 hours.

Use the **Alarm Email** section of the **Precipitator Alarms** tab to set up e-mail alerts for high priority, medium priority, and pop-up priority alarms.



ALARM EMAIL SECTION OF PRECIPITATOR ALARMS TAB IN ALARM SETUP UTILITY

You can click none, one or multiple boxes to enable e-mail alerts for each of the three alarm priorities.

- In the **To:** field, enter the e-mail address where alarm alerts should be sent.
- In the **From:** field, enter a tag that identifies the origin of the e-mail. For example, POS Computer.
- The **Using Email Server:** field should contain the address of your SMTP server or other server for e-mail authentication. Contact your network administrator to see if this function is available on your plant's network.

When done setting up precipitator alarms, click ***OK*** to save changes and return to Utilities home, ***Apply*** to save changes and remain on this screen, or ***Cancel*** to return to Utilities home without saving changes.

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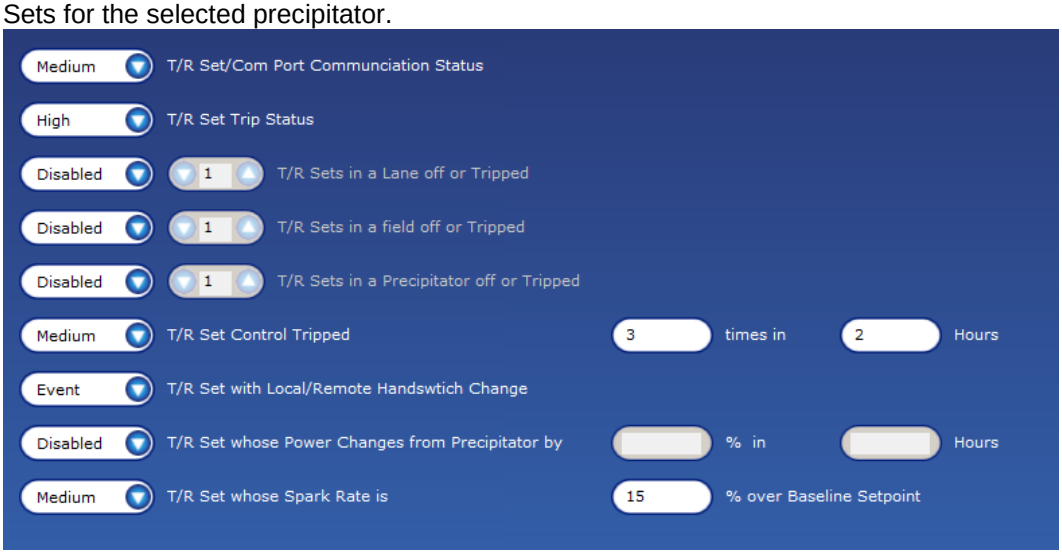
Global T/R Set Alarms

The **Global T/R Set Alarms** tab of **Alarm Setup** allows you to configure alarms common across all T/R Sets for the selected precipitator.



GLOBAL T/R SET ALARMS CONFIGURATION

After selecting a priority, fill in the blank field or fields with value to indicate what triggers each alarm.

- T/R Set/Com Port Communication Status – This alarm will trigger if there is a voltage control communication failure or communication port problem.
- T/R Set Trip Status – This alarm will trigger if a T/R Set changes to a tripped status.
- [x] T/R Sets in a Lane off or Tripped – This alarm will trigger if the specified number of T/R Sets in any lane are turned off or tripped. The alarm is based on the same lane information used to build 3D graphs.
- [x] T/R Sets in a field off or Tripped – This alarm will trigger if the specified number of T/R Sets in any precipitator field are turned off or tripped. The alarm is based on the same field information used to build 3D graphs.
- [x] T/R Sets in a Precipitator off or Tripped – This alarm is triggered if the specified number of T/R Sets in the whole precipitator are turned off or tripped.
- T/R Set Control Tripped [x] times in [y] Hours – This alarm is triggered if any individual T/R Set trips a specified number of times in a given time frame. For example, you could set it to alarm if a T/R Set trips four times in 24 hours.
- T/R Set with Local/Remote Handswitch Change – This alarm is triggered if any control is toggled between remote and local modes.
- T/R Set whose Power Changes from Precipitator by [x] % in [y] Hours – This alarm is triggered when the power level for any T/R Set drifts from total precipitator power level by the specified percentage in the specified time frame. For example, you could set it to alarm if any T/R Set's power level drifts from total precipitator power by 15% over a span of 12 hours.
- T/R Set whose Spark Rate is [x] % over Baseline Setpoint – This alarm is triggered if the voltage control for any T/R Set indicates sparking at the specified percentage above its spark rate set point.

When done setting up Global T/R Set alarms, click ***OK*** to save changes and return to Utilities home, click ***Apply*** to save changes and remain on this screen, or click ***Cancel*** to return to Utilities home without saving changes.

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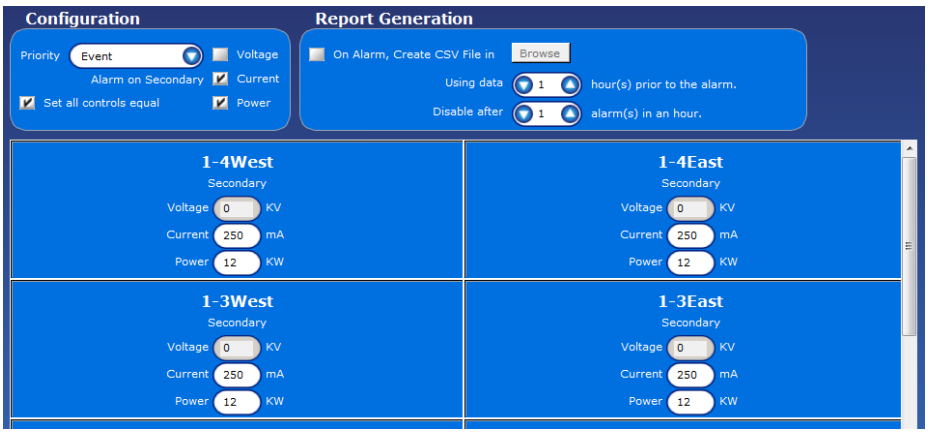
Individual T/R Set Alarms

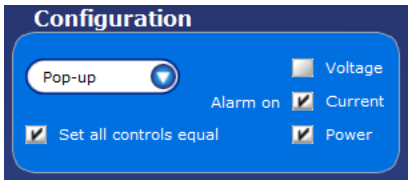
The **Individual T/R Set Alarms** tab of **Alarm Setup** provides options to set alarms specific to each individual T/R Set for the selected precipitator.



INDIVIDUAL T/R SET ALARMS CONFIGURATION

Configuration

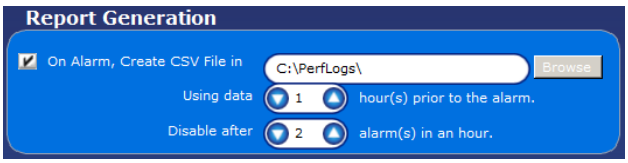
This area is used to set priority level for individual alarms, and what condition or conditions trigger alarms. If you check the ***Set all controls equal*** box, values entered in a given field (e.g. Voltage) for an individual T/R Set will be automatically copied to that field for the other T/R Sets.



CONFIGURATION AREA DETAIL

Check one or more of the ***Alarm on*** boxes (Secondary Voltage, Secondary Current, Secondary Power). Individual T/R Set alarms will be triggered for these parameters based on the minimum value secondary electrical limits set for each.

Report Generation



REPORT GENERATION AREA DETAIL

A Report can be triggered when an individual T/R Set alarms occurs. Reports contain data from a specified time period. Report generation can be disabled if more than a specified number of alarms are triggered in a specified time period to prevent nuisance reports.

To activate **Report Generation**, check the ***On Alarm, Create CSV File box***. Click the ***Browse*** button to choose a location for alarm report CSV files. Choose an existing folder on the POS computer, or use the New Folder button to create a new folder.

Enter a value in the ***Using data [x] hour(s) prior to the alarm*** field (or use up/down arrows) and the ***Disable after [x] alarm(s) in an hour*** field (or use up/down arrows). For example, you might specify that the report should include data from two hours prior to the alarm, and no CSV file should be generated if there are more than 2 alarms in an hour.

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Individual T/R Set Minimum Alarm Limits (Secondary Electrical Conditions)

INDIVIDUAL T/R SET ALARMS SETUP DETAIL

This area of the screen is used to set minimum secondary electrical conditions for each individual T/R Set in the selected precipitator. Layout of T/R Sets in this area of the screen is the same as plan view pages. Depending on your precipitator setup, you may or may not have to use scroll bar on the right or bottom to view all the T/R Sets.

For each T/R Set, there are fields for secondary Voltage (KV), Current (mA) and Power (KW). These fields are shown as activated (white) or inactivate (gray) depending on which boxes you checked in the **Configuration** area. Click into each field and enter desired number.

The alarm for each T/R Set will be triggered when specified parameters drop below the number entered. For example, if for a specific T/R Set you enter 30 for secondary Voltage (KV), the alarm will trigger if that T/R Set's secondary voltage drops below 30 KV.

When done setting up Individual T/R Set alarms, click ***OK*** to save changes and return to Utilities home, ***Apply*** to save changes and remain on this screen, or ***Cancel*** to return to Utilities home without saving changes.

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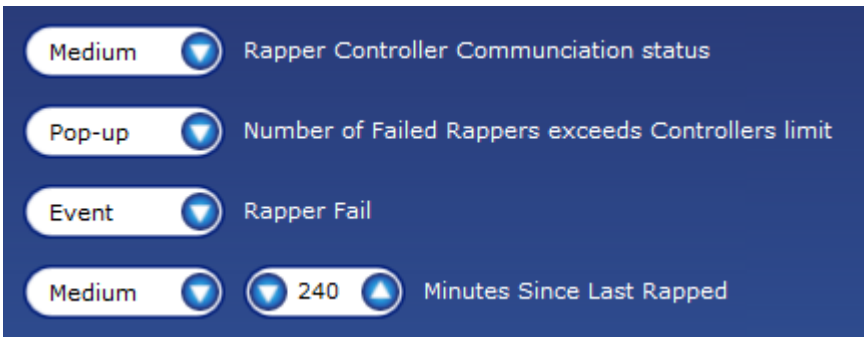
Rapper Control Alarms

The **Rapper Control Alarms** tab of **Alarm Setup** provides several options for setting up alarms. These alarms affect all rapper controls associated with the selected precipitator.



RAPPER CONROL ALARMS CONFIGURATION

Select a priority for each of the alarms.

- Rapper Control Communications status – This alarm is triggered if there are any rapper control communication failures or communication port problems.
- Number of Failed Rappers exceeds Controls limit – This alarm is triggered if the actual number of failed rappers on a MicroRap control is greater than the number used to generate the MicroRap rapper fail alarm. That alarm is configured from within MicroRap; see the MicroRap manual for more information.
- Rapper Fail – This alarm is triggred if the MicroRap indicates an individual rapper has failed open or failed shorted. The rapper failure will also be indicated on the plan view page. (See Section 7 for rapper status colors.)
- XX Minutes Since Last Rapped ***– This alarm is triggered if a rapper has not successfully rapped for the specified time period.***

When done setting up Rapper Control alarms, click ***OK*** to save changes and return to Utilities home, ***Apply*** to save changes and remain on this screen, or ***Cancel*** to return to Utilities home without saving changes.

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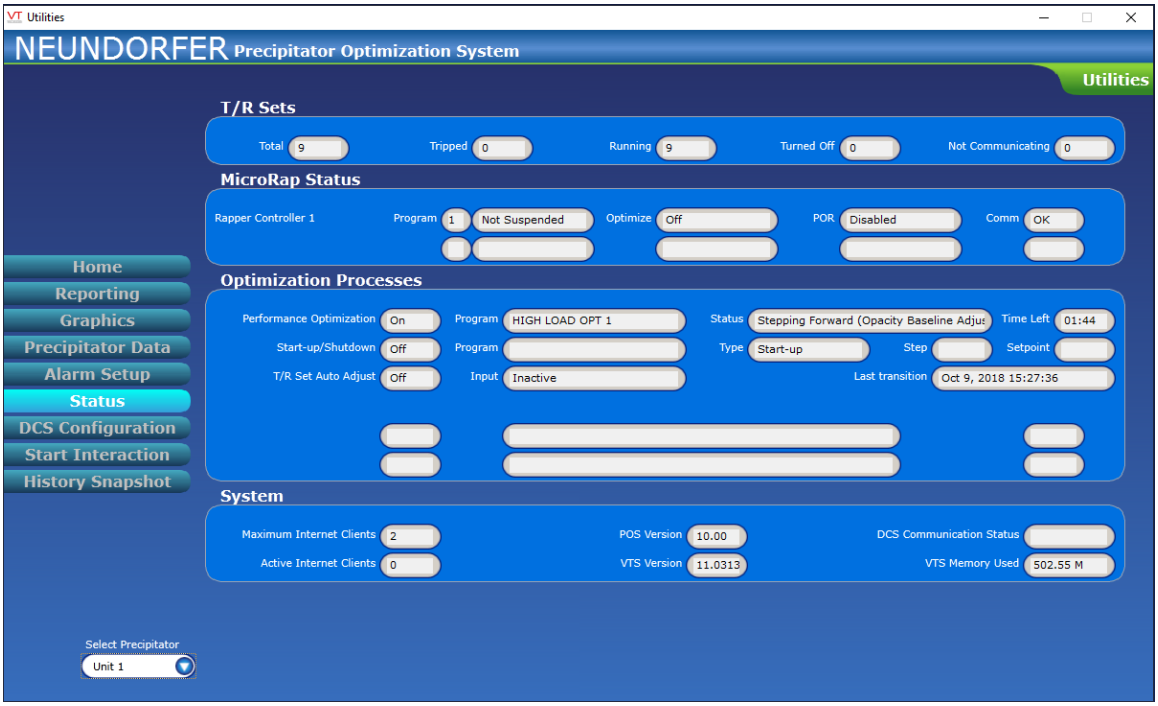
39. Status

The **Status** utility provides an at-a-glance overview of the POS software.

To access **Status** click the ***Utilities*** button in the task bar in upper left-hand area of the plan view page. Then select ***Status*** from the menu on the left.



STATUS UTILITY WINDOW

Use the **Select Precipitator** dropdown menu located in the bottom left hand side of the screen to select a precipitator.

The statuses of the T/R Sets associated with the selected precipitator are displayed at the top of the window. The number of running, off, tripped, or not communicating T/R Sets are displayed along with the total number of T/R Sets.

The statuses of any MicroRap rapper controls associated with the precipitator are displayed next. Each MicroRap shows the current program number, the status of **Rapping Optimization** and **Power-Off Rapping**, as well as communication status.

The statuses of any optimization processes are displayed next, in the center of the window.

System information is displayed at the bottom of the window.

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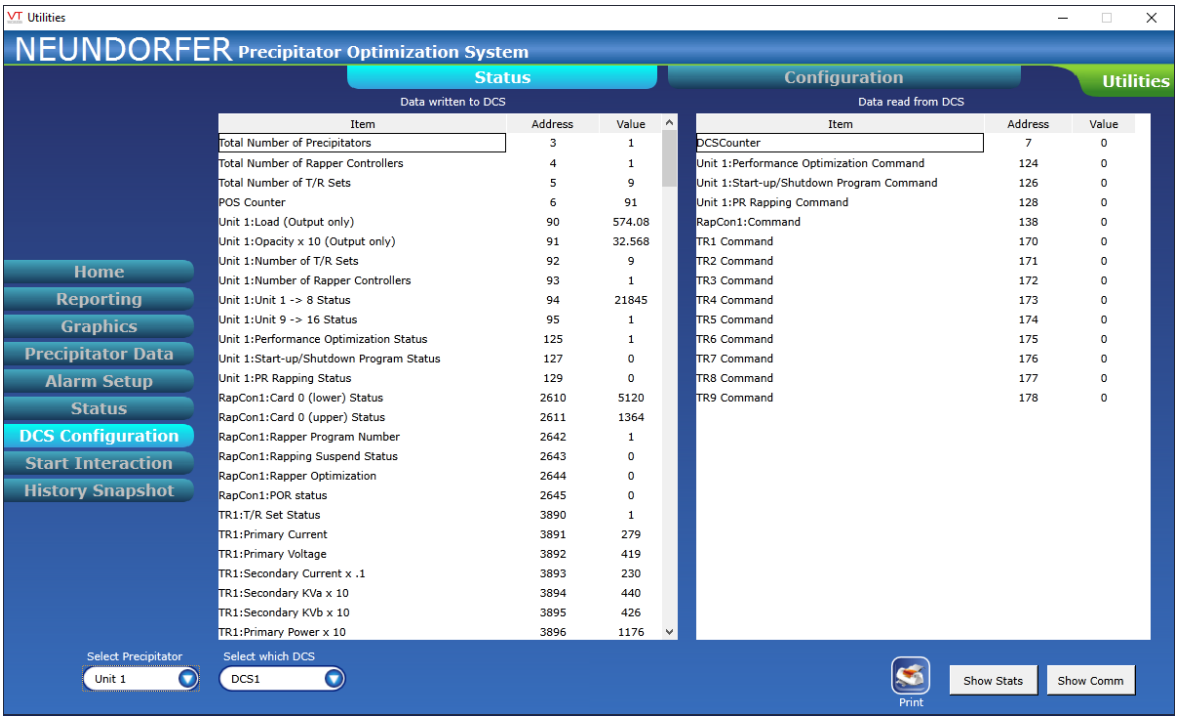
40. DCS Configuration

Overview

The **DCS Configuration** utility is used to monitor information POS makes available to external control systems or data historians. All data gathered by POS from voltage controls and rapper controls can be configured to be written to internal or external registers so DCS or plant information systems or historians can gather this information.

To access **DCS Configuration** click the ***Utilities*** button in the task bar in upper left-hand area of the plan view page. Then select ***DCS Configuration*** from the menu on the left.

Status Tab



DCS CONFIGURATION – STATUS TAB

The **Status** tab shows the configured DCS addresses and current values in POS. The left-hand area of the screen displays data that POS is writing out to the DCS interface. The right-hand side shows data configured to come in across the DCS Interface. Use the scroll bar to see all information.

If more than one precipitator or more than one DCS is configured on your POS system, use the ***Select Precipitator*** and ***Select which DCS*** dropdown menus (lower left-hand area of the window) to select which ones you want to view.

Click the ***Show Stats*** button to open the **Driver Statistics** window, which displays a summary of communications between POS and the DCS Driver

Click the ***Show Comm*** button to open the **DCS Communication Messages** window, which shows communication messages being sent and received by the DCS Driver.

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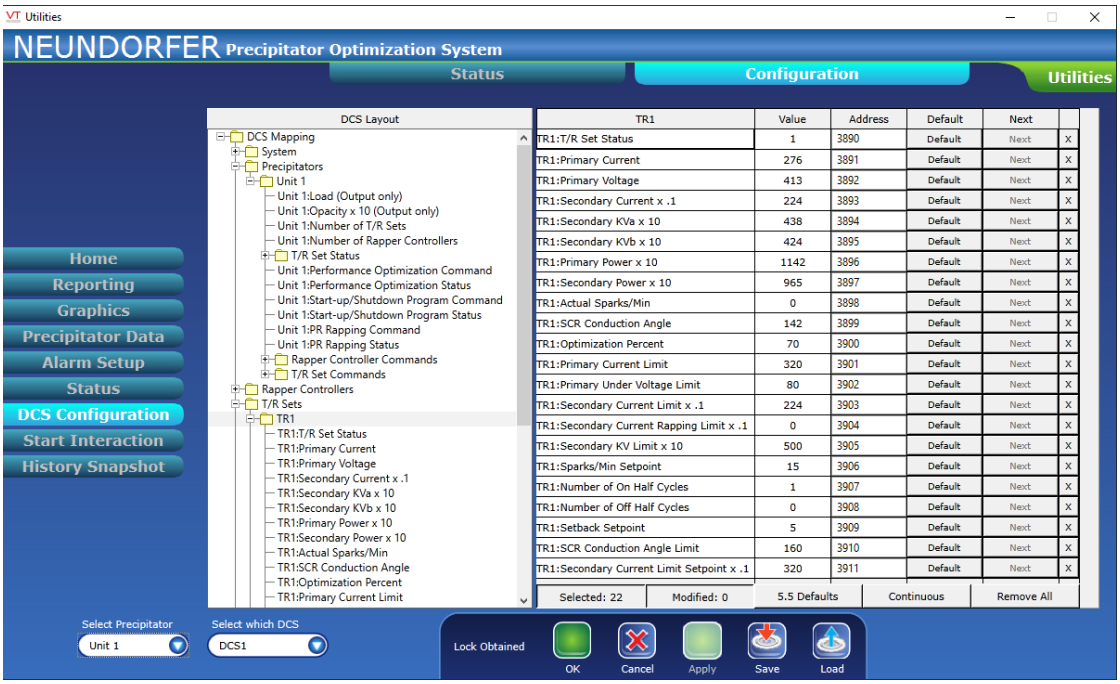
Configuration Tab

The **DCS Layout** section of the **Configuration** tab contains a tree menu to navigate through all of the types of data being written to the DCS Interface. Select a device to see the individual input and output value displayed in a table on the right side of the screen. The **Value** column shows the actual value written to the DCS interface. The **Address** column shows the address where that value will be written. If the address field is empty, that value will not be written to the interface.

Note: All User Accounts can view DCS Configuration, but to make any changes the User Account must have the DCS Configure privilege.



DCS INTERFACE – CONFIGURATION TAB

To configure addresses for multiple values at once select the section you want to configure on the **DCS Layout** tree. Click the ***5.5 Defaults*** button to apply the default addresses or click the **Continuous** button to fill in the addresses in a continuous order. To clear the entire section, click the ***Remove All*** button.

To configure individual addresses first select the section you want from the **DCS Layout** tree to get parameter you would like to configure on the right hand chart. Then click on the **Address** field and manually type in the address desired. You can also click the ***Default*** button to use the POS 5.5 default address. Click the ***Next*** button to use the next unused sequential address. Click the ***X*** button to clear the address for this parameter.

When done making address configuration changes, click the ***Apply*** button to save the changes.

When you are done making DCS configuration changes, click ***OK*** to save changes and return to Utilities Home, ***Apply*** to save changes and stay on this screen, or ***Cancel*** to clear changes and return to Utilities Home.

Click the Save button to store the DCS configuration as a .CSV file on the hard drive. This will be saved in the *C:\VTS\[POS10application]\Config* folder. Click the Load button to reload a configuration that has previously been saved to the hard drive.

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41. Start Interaction

Overview

The **Start Interaction** utility allows you to configure interactions between the POS functions that may conflict with one another. While these functions are running they may be telling voltage controls to change set points or rapper controls to change rapping programs. The following functions can be told what to do if one of them is running and another function wants to start.

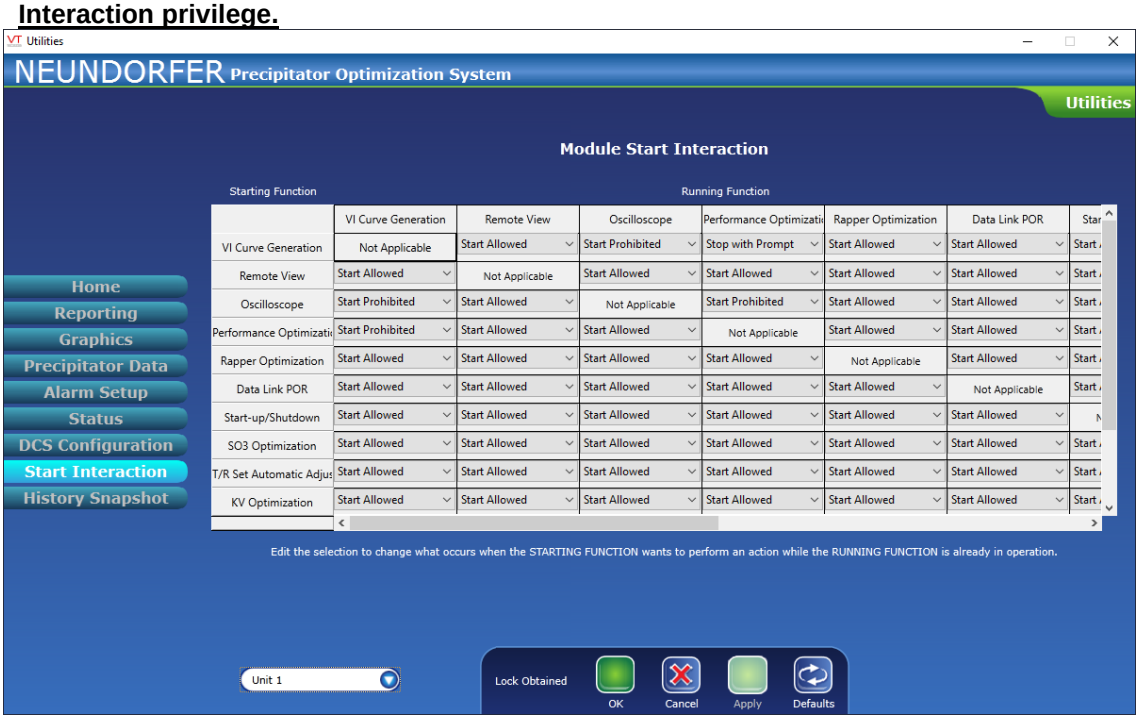
- VI Curve Generation
- Remote View
- Oscilloscope
- Performance Optimization
- Rapper Optimization
- Data Link POR
- Start-up/Shutdown
- SO_3 Optimization
- T/R Set Automatic Adjust

To access **Start Interaction utility** click the ***Utilities*** button in the task bar in upper left-hand area of the plan view page. Then select ***Start Interaction*** from the menu on the left.

Before changing any start interactions, use the ***Select Precipitator*** dropdown menu (bottom of screen, left-hand side) to select a precipitator.

SELECT PRECIPITATOR DROPDOWN MENU

<u>Note: All User Accounts can view Start Interaction Data, but to make any changes the User Account must have the Start Interaction privilege.</u>



START INTERACTION UTILITY

The **Start Interactions** screen is laid out in a table with **Starting Function** items down the left-hand side, and **Running Function** items across from left to right. Use the scroll bars to view all functions.

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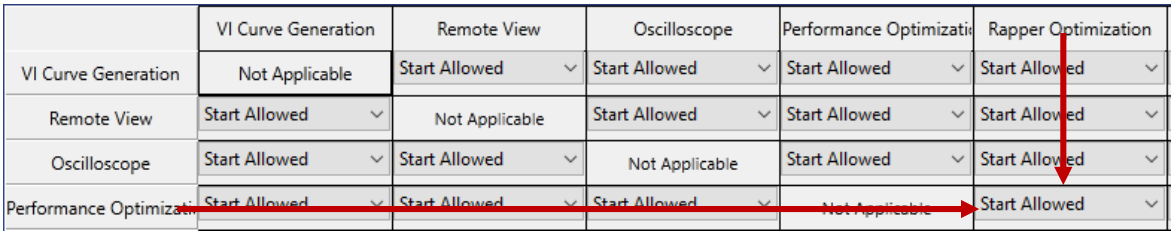
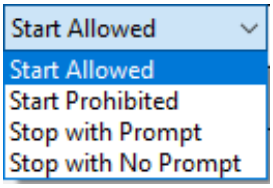
Configuring Function Interactions

The **Start Interactions** configuration table is used to specify what happens when a Starting Function ***wants*** to perform an action while a Running Function is already in operation. For example, the Performance Optimization function lowers precipitator power, while the Rapper Optimization function may be using precipitator power to control rapping. These functions conflict with each other.



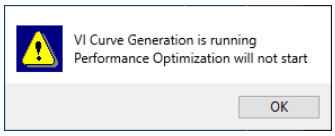
EXAMPLE OF CONFLICTING FUNCTIONS



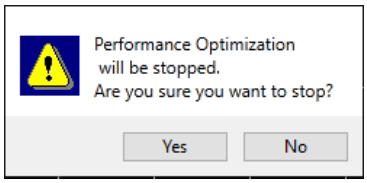
DROPDOWN MENU FOR SETTING INTERACTIONS

At the intersection of each Starting Function and Running Function is a dropdown menu for setting interaction type, as follows:

- ***Start Allowed*** – This setting (default for all functions in POS) allows both functions to run simultaneously.
- ***Start Prohibited*** – This setting prevents the Starting Function from beginning.
- ***Stop with Prompt*** – This setting stops the Running Function and alerts the user with a pop-up window with a message to confirm that the Running Function should be stopped.
- ***Stop with No Prompt*** – This setting stops the Running Function without alerting the user of this action.



EXAMPLE 1 - START PROHIBITED



EXAMPLE 2 - STOP WITH PROMPT

In the Example1 above the user attempted to start a VI Curve while Performance Optimization was running. The interaction was set to ***Start Prohibited***.

In Example 2 above the user attempted the same thing but the interaction was set to ***Stop With Prompt***.

Click the ***Defaults*** button to return all selections to the default of Start Allowed.

When you are done making **Start Interaction** changes, click ***OK*** to save changes and return to Utilities Home, ***Apply*** to save changes and stay on this screen, or ***Cancel*** to clear changes and return to Utilities Home.

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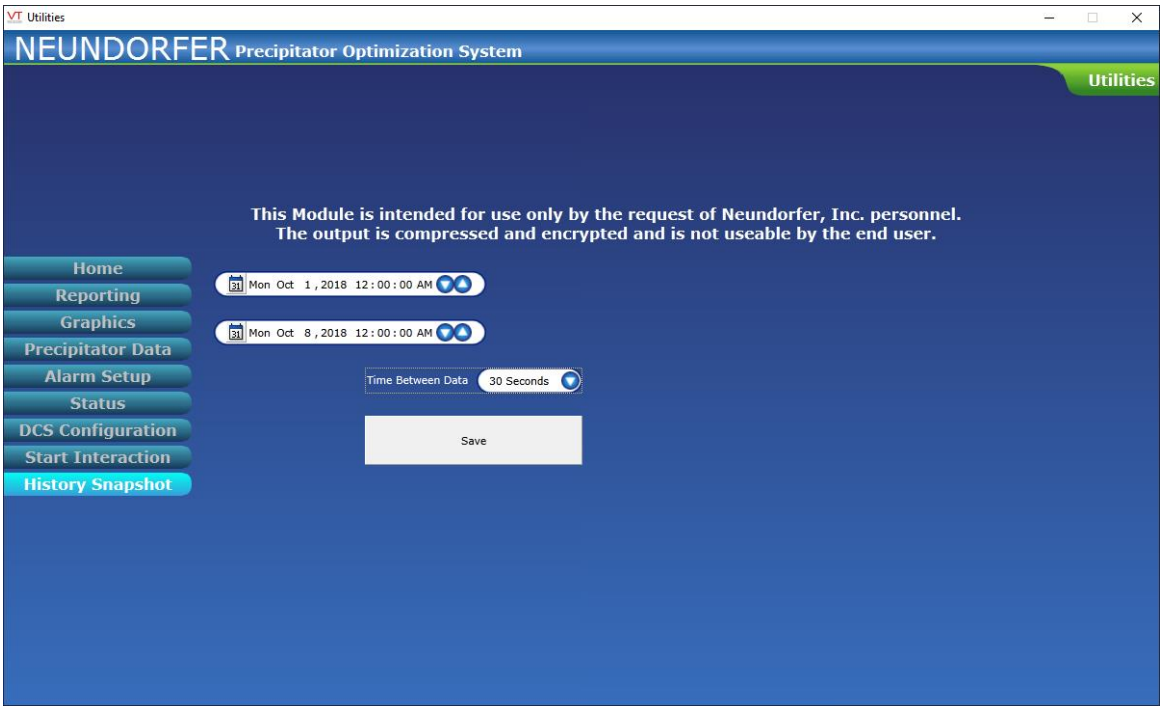
42. History Snapshot

The history snapshot module is use to create an encrypted file containing historic data from the POS software. This module is intended for debugging and process consulting in special cases where a large amount of raw data is needed for analysis. Neundorfer will advise how to use this module and handle the file it creates should the need arise.

To access **History Snapshot utility** click the ***Utilities*** button in the task bar in upper left-hand area of the plan view page. Then select ***History Snapshot*** from the menu on the left.



HISTORY SNAPSHOT

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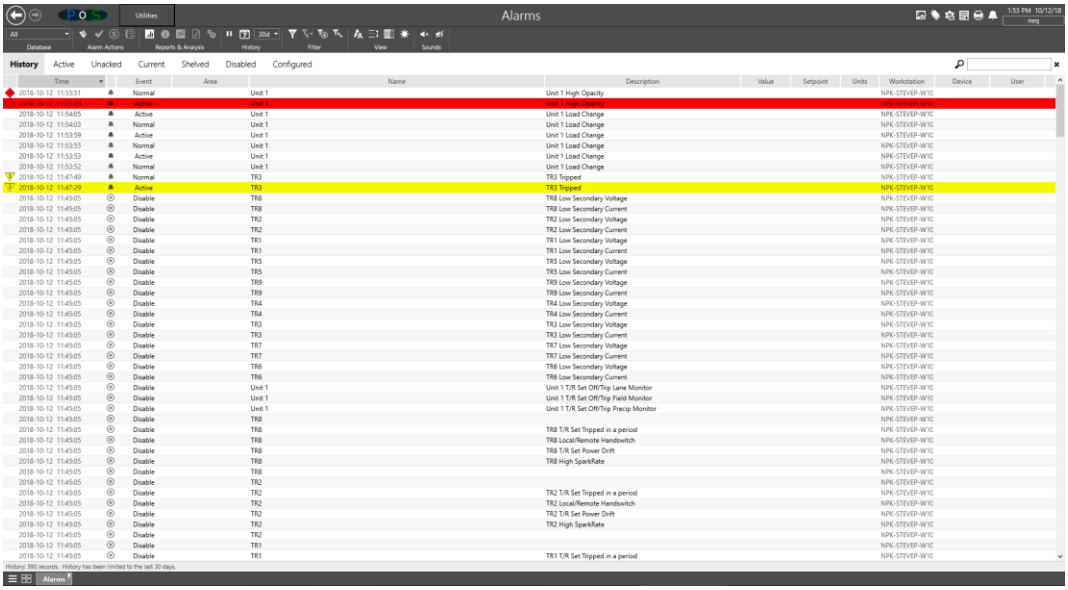
43. Alarms Page

The **Alarms** page provides an area for viewing and acknowledging alarms generated by the POS software, and for reviewing actions performed by many of the feedback based optimization modules in POS. See Section 38 to set up POS alarms.

To access the **Alarms** page, click the ***Alarms Bell*** icon button in the task bar in the upper right-hand corner of the plan view page.

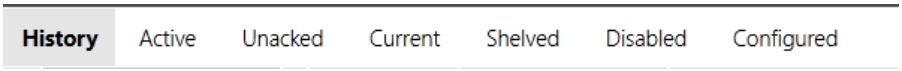
If there is an active alarm, the ***Alarms Bell*** icon button will flash red on and off.

ALARMS PAGE ICON



ALARMS PAGE

Along top of the **Alarms** page are buttons and menus for configuring the display of the alarm list, acknowledging alarms, and turning on or off alarm sounds.



The **List Options** area of the toolbar contains buttons for filtering alarms shown in the list:

- ***History*** – Show all alarm actions including acknowledged and normal conditions
- ***Active*** – Show all active alarms (conditions currently in alarm state)
- ***Unacked*** – Show all unacknowledged alarms regardless of their current alarm state
- ***Current*** – Show all active and unacknowledged alarms (combination of Active and Unacked lists)
- ***Shelved*** – Show all shelved alarms; alarms that are temporarily silenced while still being recorded
- ***Disabled*** – Show all alarms that are disabled
- ***Configured*** – Show a complete list of alarms that exist in POS with their current status and priority

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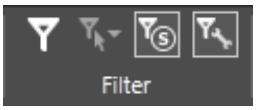
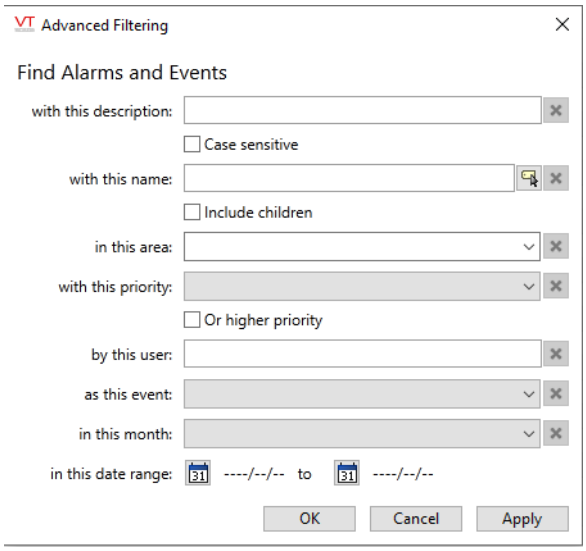
The **Filter** section of the tool bar allows you to filter the alarm list to show alarms matching various characteristics. Use the ***Advanced Filtering*** button (left most filter button) to open a dialog box to filter by description, name, priority, dates and more.



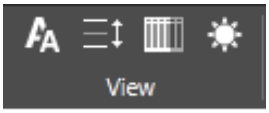
FILTER TOOL BAR

Use the ***Advanced Filtering*** to only show the alarms of interest based on any number of the filter items listed. Wild cards are permitted in any of the text box filters. Use an asterisk (*) to indicate a wild card. Use *east* to display all alarms or events that have the word "East" anywhere in the given filter section. Use east* to display all alarms or events that have a name that starts with the word "East". The filters are not case sensitive unless the *Case sensitive* check box is checked.

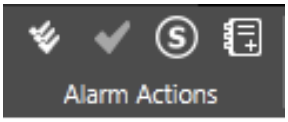


ADVANCED FILTERING DIALOG BOX

You can also adjust size of the font the alarms and more in the **View** section of the tool bar. The first button will toggle between three font sizes. The second button will toggle between narrow row width and widened rows. The third button will toggle extra columns between hidden/shown. The fourth button will toggle between day/night mode.



VIEW TOOL BAR



ALARM ACTIONS TOOL BAR

The ***Alarm Actions*** section of the toolbar contains buttons for clearing and acknowledging alarms. The following list covers the buttons from left to right.

- ***Acknowledge All*** – Acknowledge all unacknowledged alarms
- ***Acknowledge*** – Acknowledge selected alarm
- ***Shelve*** – Temporarily shelve the selected alarm
- ***Add Note*** – Add a note to the selected alarm

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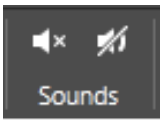
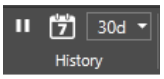


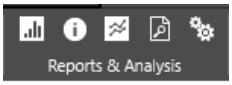
SOUNDS TOOL BAR

The ***Sounds*** section of the tool bar is used to silence or mute alarms. Silencing will stop all alarm sounds until the next alarm event occurs. Muting will mute all alarm sounds indefinitely.



HISTORY TOOL BAR

The ***History*** section of the tool bar is used to adjust the time frame of the displayed alarms and events or even pause the alarms screen. The drop-down allows a quick access way to show alarms for the last 10, 30 or 90 days. The *Pause* button will prevent new alarms from showing up on the current screen. This button will change to a different icon when paused; pressing it again will bring it back to real time alarms and display the past alarms. Use the *History Date Selector* button to pick a specific day to view all alarms from that day.



REPORTS & ANALYSIS TOOL BAR

The ***Reports & Analysis*** section of the tool bar is used to evaluate alarms and generate reports on alarms. Select an alarm then use the last four buttons in this tool bar section to gather more information about it. From left to right, the buttons in this section are:

- **Alarm Reports** – Displays an Alarm Report dialog box. See below for more info
- **Show Details** – Shows the Alarm Details dialog box. See below for more info
- **Plot** – Displays a trend window, plotting relevant data based on the cause of alarm
- **Go to Page** – Redirects to the page with the tag that the alarm is based on
- **Properties** – Displays a dialog box of the properties for the tag of the alarm

Note: All User Accounts can view the Alarm page. A User Account needs the Alarm Acknowledge privilege to acknowledge alarms, the Alarm Shelve privilege to shelve alarms, the Alarm Mute privilege to mute all alarm sounds, and the Alarm Silence privilege to silence a selected alarm.

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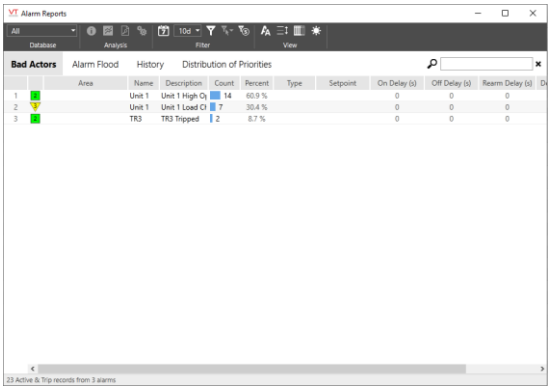
Alarm Reports

The **Alarm Reports** are useful in identifying the bad actors, alarm floods, history and distribution of alarm priorities.

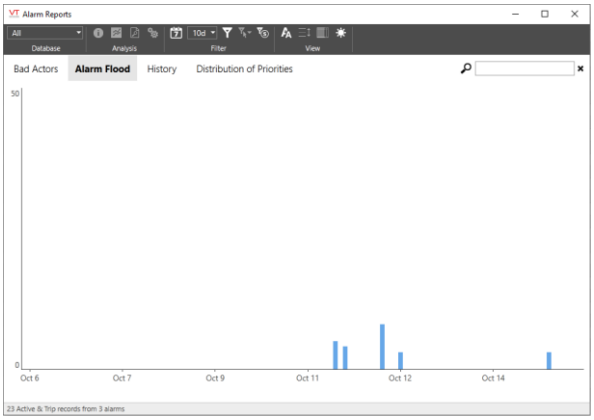
A 'bad actor' is an alarm that is tripped excessively indicating problems with equipment, processes, or alarm configuration.



BAD ACTORS TAB ON ALARM REPORTS DIALOG BOX

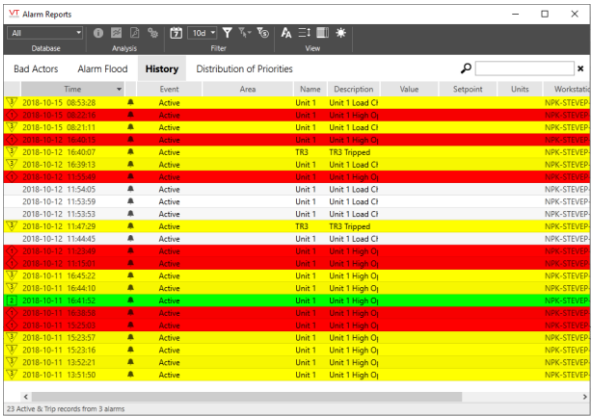
An 'alarm flood' occurs when there are more alarm events in a specific period than operators can reasonably handle.

Quickly identify floods by moving your mouse over the blue bars to see the number of alarms tripped within periods of time. Click a bar to zoom into that period.



ALARM FLOOD TAB ON ALARM REPORTS DIALOG BOX

The History tab displays a pre-filtered list of only Active and Trip alarm events. Select an alarm then use the tools in the Analysis Toolbar to gather more information about it.



HISTORY TAB ON ALARM REPORTS DIALOG BOX

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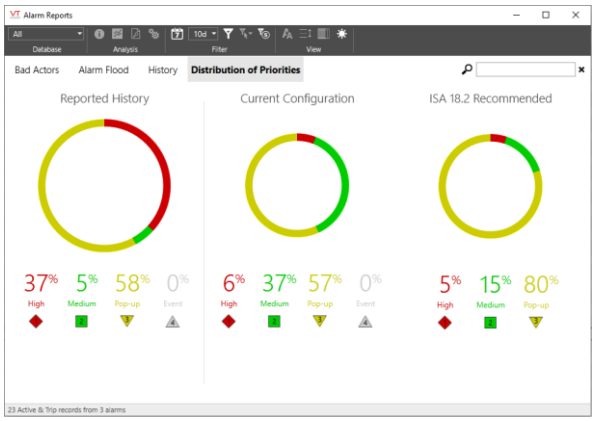
Easily compare your application's alarm priority distribution with the ISA 18.2-2009 Alarms Management Standard.

Compare the priority distribution for both your reported history and current configuration with the distribution recommended in the ISA 18.2-2009 standard.



DISTRIBUTION OF PRIORITIES TAB ON ALARM REPORTS DIALOG BOX

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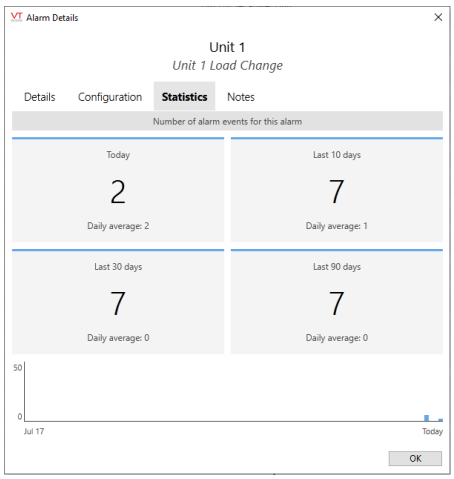
Alarm Details

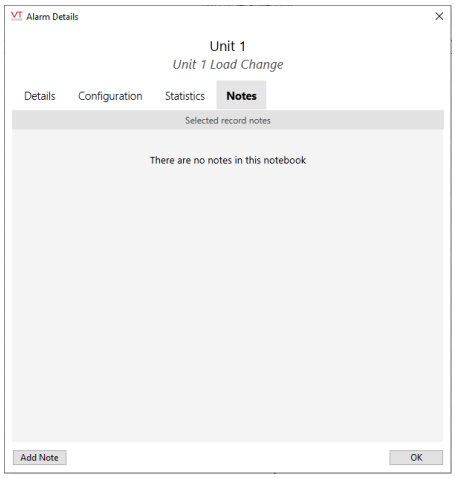
The **Alarm Details** dialog box is useful in examining the details, configuration, statistics and notes for a specific alarm.

The Statistics tab shows the occurrences of the specific alarm for the past day as well as the past 10, 30, and 90 days. Below this table is a graph showing the date of the occurrences for this alarm.



STATISTICS TAB ON ALARM DETAILS

The Notes tab shows all user entered notes for this alarm. Easily add a new note for the specified alarm by clicking the 'Add Note' button on the bottom of the window.



NOTES TAB ON ALARM DETAILS

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