*Rev. 1, 9/2012*

# Table of Contents

# 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. Software 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 provides free POS software updates within the version of software purchased. Software updates are defined as small incremental improvements to fix defects and/or add limited additional functionality. Neundorfer does not automatically send software updates to all users. Neundorfer personnel may at their discretion, and with a customer's approval, install software updates while at the customer site. Generally, software updates are only supplied at the customer's request. Occasionally, POS software updates require the purchase or upgrade of third party software. Charges for third party software are passed on to the customer.

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.

# 4. POS Basics

## a. Components of Overall System

A typical POS control system has two major components:

1) The POS application software, running on a computer with Windows operating system.
2) 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 hopper evacuation, soot blowing, rapping, and flue gas conditioning systems.

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

## b. POS Communications Components

Neundorfer voltage and rapper controls are linked together with an RS-485 multi-drop network. The RS-485 interface is built into the rapper controls and voltage 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 of this network; it is the only device that can initiate a message. The voltage controls and rapper controls can only send messages after specifically addressed by POS using their control type and unit number.

When the POS computer initiates communication with a control, POS will wait for one of two events to occur before sending another message:
- A valid response from the control
- A communication error

A communication error will occur if the addressed control does not respond within the allotted time or the message received is invalid.

For MVC4 voltage controls the data link between the POS computer and the voltage controls 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 built custom for your installation. Custom drawings and equipment are provided for each specific installation.

## c. 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, etc.), spark rate, operating mode and IE ratio
- Precipitator data including average and totals of voltage control operating parameters, opacity and load signals and power optimization information
- Rapper actuations
- Auxiliary analog and/or digital inputs
- $SO_3$ Optimization actions
- Soot blower actuations

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

## d. 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.

## e. Remote Control and Programming

POS can be used for (password protected) remote control and programming:

- 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 valid MicroRap user programs
- Control soot blowers, hopper evacuation systems, and flue gas conditioning systems

## f. Feedback Based Optimization (some modules optional)

Performance Optimization is a powerful feature of POS. It automatically adjusts the voltage control's operating limits based on stack opacity and unit load, or stack opacity and precipitator power. POS continually adjusts the control's secondary current limit by a user-set percentage of full power. Total precipitator power is incrementally stepped down while monitoring opacity and load to ensure the most appropriate power is being applied to the precipitator to achieve the lowest possible opacity.

MicroRap optimization allows POS to automatically switch between six stored MicroRap programs based on a set of conditions configured by the user.

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 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 send broadcast changes to all voltage controls to adjust a limit or set point based on changes in process conditions.

With $SO_3$ optimization, POS adjusts parts per million (PPM) of $SO_3$ injection to improve precipitator performance. POS monitors precipitator performance and, when conditions warrant, tunes PPM to improve operations. This system requires an interface to the $SO_3$ controls.

## g. 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 or historians such as plant DCS systems or OSIsoft PI historian. POS can communicate using many protocols including OPC, Allen-Bradley data highway, Allen-Bradley DF1, ModBus RTU, ModBus+, ModBus TCP/IP and GE Series 9030 TCP/IP.
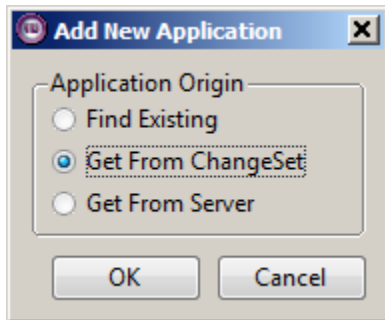
# 5. Installation

POS software comes pre-installed on the POS computer, or a Neundorfer technician will come onsite to install the software for the first time. In the case of a reinstallation after a hard disk failure or a system upgrade, we recommend returning the computer to Neundorfer or to have a Neundorfer technician onsite to perform the reinstallation.

NOTE: Due to the large amount of data being collected by POS, 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 if antivirus software is installed.
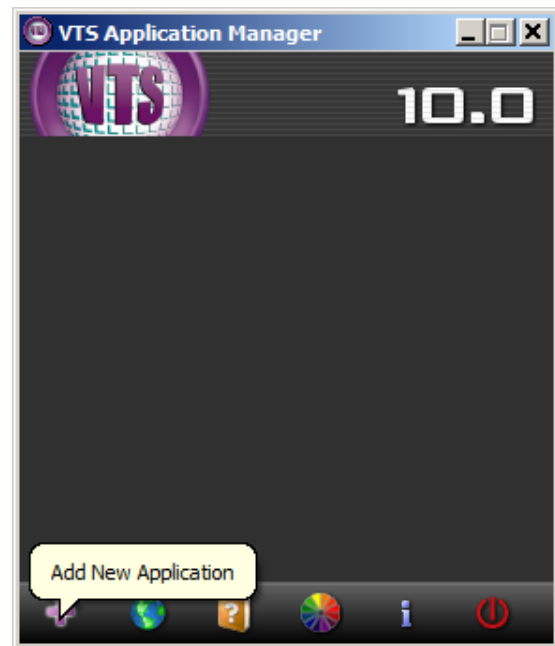
If re-installation is necessary, contact Neundorfer to support following the instructions below:

1) Install VTS by running the VTSXX.XXSetup.EXE program. Follow the VTS Installation Wizard instructions and prompts. The installation key can be provided by Neundorfer.

2) Add POS 8 OEM Layer to the VTS Application Manager.



*ADD NEW APPLICATION WINDOW*



*VTS APPLICATION MANAGER*
*ADD NEW APPLICATION*

    a. Double-click the VTS icon on your desktop.
    b. In the **VTS Application Manager** window, click the **Add New Application** button.
    c. In the **Add New Application** window, select **Get From Changeset,** then click **OK**.
    d. Select the *POS8OEMINSTALL* file provided by Neundorfer; and click **OK**.
    e. You should now see POS 8 OEM as an application in the **Application Manager** window.
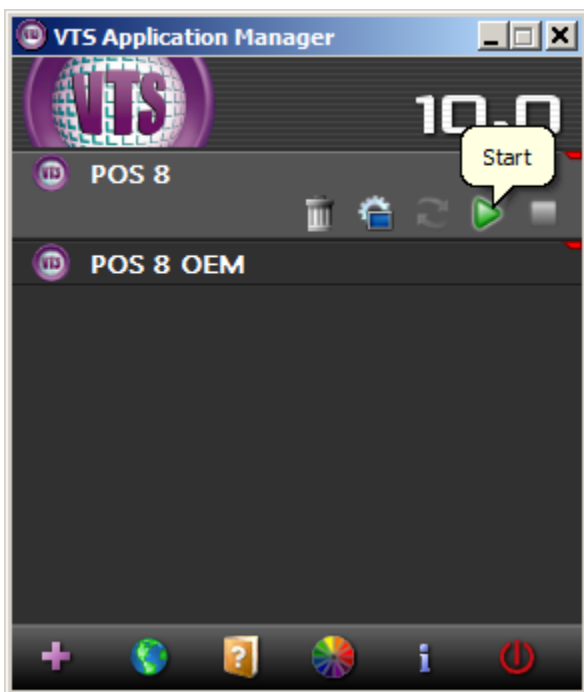
3) Add the POS 8 Application to the VTS Application Manager.

    a. Follow the instructions from 2b through 2e but select the *POS8.changeset* file provided by Neundorfer in step 2d.

NOTE: To display POS screen properly, your computer monitor's display resolution must be set to no less than 1280x1024. If the screen resolution is set to less than 1280x1024, some POS items will be completely or partially off the display area. Most POS applications have been configured for widescreen monitor resolutions up to 1920x1200. Some custom configurations have smaller screens created for viewing on remote clients.

# 6. Starting POS

1) From the Windows desktop, double-click the POS or VTS icon.
2) If POS is not set to automatically start when VTS is launched, highlight *POS 8* in the **VTS Application Manager** menu and click the *Start* button.



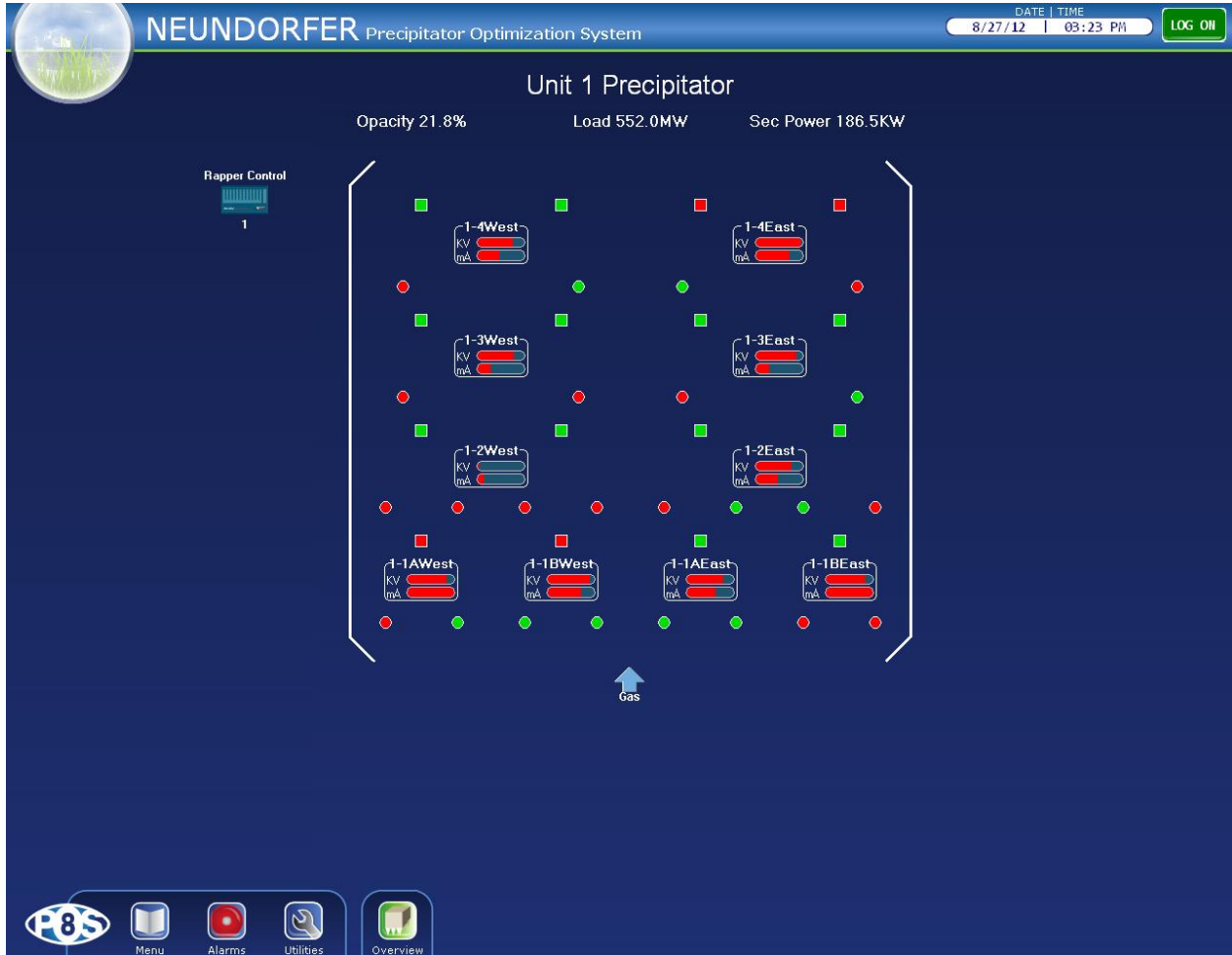*VTS APPLICATION MANAGER*
*START POS 8*

# 7. POS Overview

## Plan View Page



*POS PLAN VIEW PAGE*

The main POS screen shows a plan view of the precipitator. There is a plan view page for each precipitator in your system. Very large precipitators may require more than one page to display all the information.

The plan view page for each precipitator defaults to display the status of voltage controls, rapper controls, and individual rappers. Precipitator information such as opacity, load and total secondary kilowatts is also displayed on each page. NOTE: Kilowatts and other precipitator values indicated are for the entire precipitator, not just the controls displayed on that particular page.

## Logging on to POS

Many POS features and functions are based on the privileges of the user logged into the software. Depending on permissions set for each user, some options may not be available after logon. Follow these instructions to log on to the POS software:
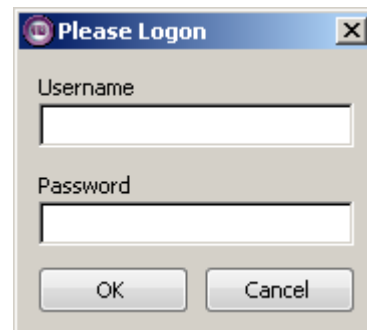
1) Click the **Log On** button in upper right-hand corner of the plan view page.



*POS PAGE HEADER WITH LOG ON BUTTON*

2) Type your username in the **Username** field.

3) Type your password in the **Password** field.

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

NOTE: POS ships with *"neq"* as the default username and password. This grants the user complete access to all POS functions. This password may have been changed during installation.



*LOGON WINDOW*

After you have logged on, the green **Log On** button changes to a red **Log Off** button and the logged on username displays to the left of the date and time. To log off, click the red **Log Off** button.
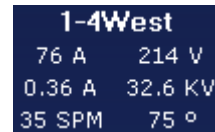


*PAGE HEADER BEFORE LOGON*



*PAGE HEADER AFTER LOGON*

## T/R Set Icons

On plan view pages, each T/R set is represented by an icon. There are two icon styles, which show live T/R operating data in different ways.
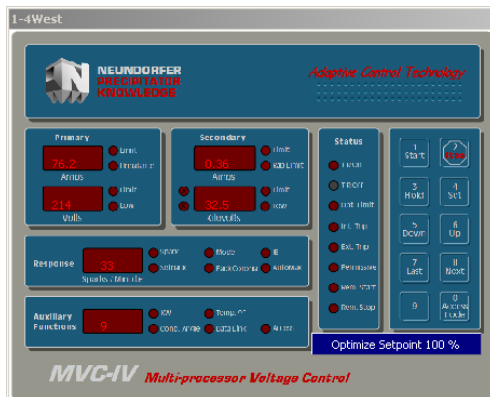
Icon styles can be changed and data grid style icons can be customized for each user. (See page 131.)



*STANDARD STYLE*
*T/R ICON*



*DATA GRID STYLE*
*T/R ICON*

POS uses T/R configuration data to automatically determine if the T/R set is single or dual bushing, and adjusts the icon appropriately.
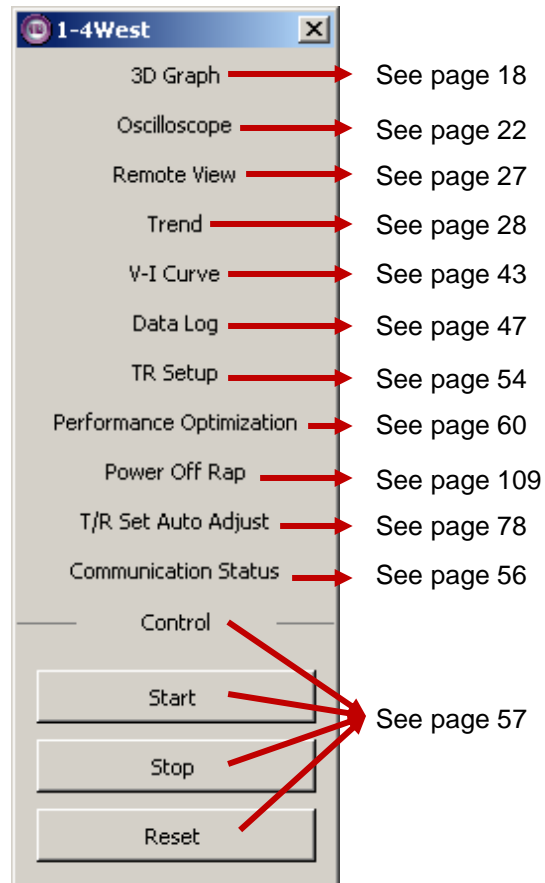
Mouse over any T/R set icon to display a pop-up display of the voltage control face panel. Left clicking on a T/R set icon opens the T/R set menu. This contains many diagnostic and control functions.

Mouse over:



*T/R SET LIVE DISPLAY OF MVC*
*CONTROL FACEPLATE DATA*

Left-click:



3D Graph ———— See page 18
Oscilloscope ———— See page 22
Remote View ———— See page 27
Trend ———— See page 28
V-I Curve ———— See page 43
Data Log ———— See page 47
TR Setup ———— See page 54
Performance Optimization —— See page 60
Power Off Rap ———— See page 109
T/R Set Auto Adjust ———— See page 78
Communication Status ———— See page 56
Control
Start ⎫
Stop ⎬ See page 57
Reset ⎭

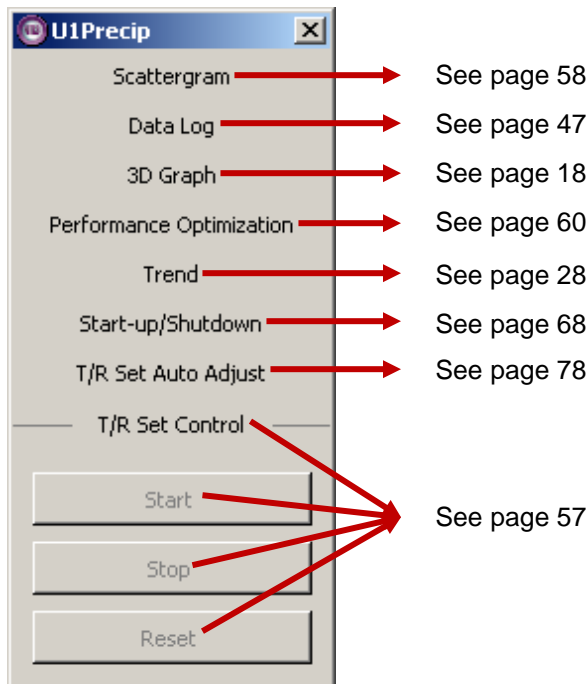*T/R SET MENU*

# Precipitator Icon

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



**Unit 1 Precipitator**

Opacity 21.8%          Load 552.0MW          Sec Power 186.5KW

*PRECIPIATOR ICON*

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



Scattergram — See page 58
Data Log — See page 47
3D Graph — See page 18
Performance Optimization — See page 60
Trend — See page 28
Start-up/Shutdown — See page 68
T/R Set Auto Adjust — See page 78
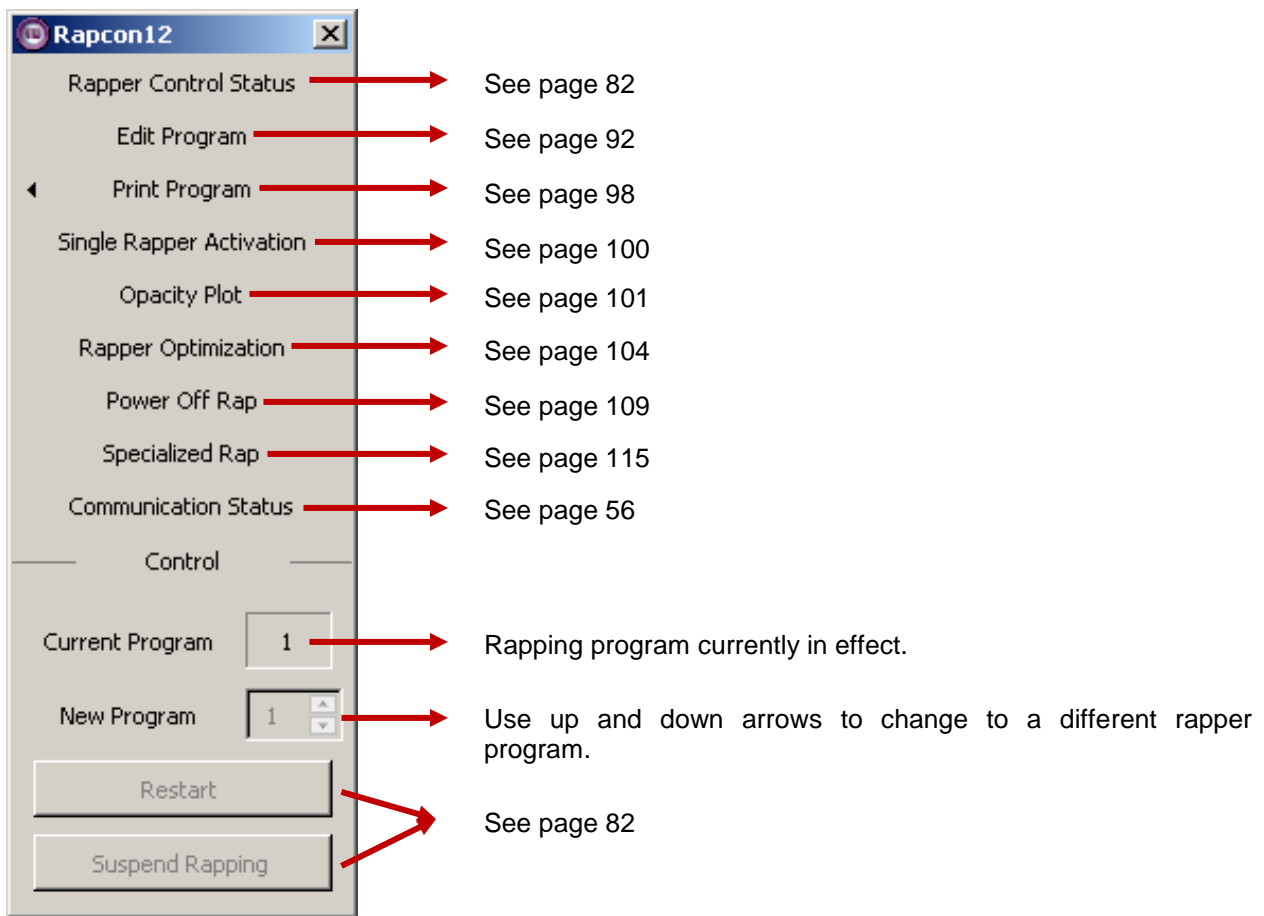T/R Set Control
Start / Stop / Reset — See page 57

*PRECIPITATOR MENU*

# Rapper Control Icon

If Neundorfer MicroRap rapper controls are configured on your POS software you will see a **Rapper Control** icon on the plan view page. This icon displays the current running rapping program and the rapper control name. Left clicking on the **Rapper Control** icon opens the rapper control menu, shown below. This menu gives access to various MicroRap functions, including rapper programming, suspending individual rappers, and checking communications status.



**RAPPER CONTROL ICON**



| Menu item | Reference |
|---|---|
| Rapper Control Status | See page 82 |
| Edit Program | See page 92 |
| Print Program | See page 98 |
| Single Rapper Activation | See page 100 |
| Opacity Plot | See page 101 |
| Rapper Optimization | See page 104 |
| Power Off Rap | See page 109 |
| Specialized Rap | See page 115 |
| Communication Status | See page 56 |
| Current Program | Rapping program currently in effect. |
| New Program | Use up and down arrows to change to a different rapper program. |
| Restart / Suspend Rapping | See page 82 |

**RAPPER CONTROL MENU**

## Rapper Icons

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

- ● Plate (collecting electrode) rapper
- ■ Wire (discharge electrode) rapper
- ◆ Other types of rappers (such as sonic horns, inlet and outlet baffle rappers)
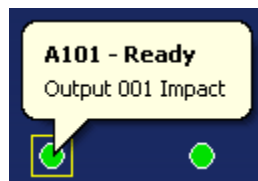
Rapper status is color-coded:

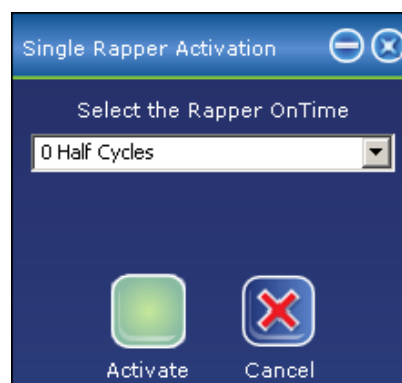| Green | Ready to rap |
|---|---|
| Red | Has rapped |
| Magenta | Rapper failed—shorted |
| White | Communication error between POS & control |
| Yellow | Rapper failed—open |

Icon appearance also indicates rapper status:

- Plate rapper: transitioning from "ready" to "has rapped"
- Plate rapper: has rapped
- Wire rapper: transitioning from "ready" to "has rapped"
- Wire rapper: has rapped

Rapper status colors can be customized for each installation and may be different on your particular configuration.

Mouse over a rapper icon to display its name, output card, output number, and status:

A101 - Ready
Output 001 Impact

Left click on a rapper icon to open its **Single Rapper Activation** window. (See page 100.)

*SINGLE RAPPER ACTIVATION WINDOW*

## POS Task Bar

In the lower left-hand area of each plan view page is the task bar. This contains icons for accessing tools and information. (Your installation may show additional icons.)



*TASK BAR*

Click to access list of all available pages.

Click to open the **Alarms** page (see page 151).

Click to open the **Utilities** window (see page 120).

Each precipitator in your system has its own overview (plan view) icon; click the icon to change to that precipitator's plan view page.

Use the **Add/Remove Page** buttons in the lower right hand corner of the screen to add or remove pages from the task bar. Some configurations may not have the **Add/Remove Page** buttons.

To add a page to the task bar, click on the **Menu** icon and select the page you wish to add, then click the "+" **Add Page** button. The icon for that page should now appear in the taskbar.



*ADD/REMOVE PAGE BUTTONS*

To remove a page from the task bar, click on the page icon, then click the "-" **Remove Page** button. The page icon will no longer appear in the task bar but it can still be opened by clicking on the **Menu** icon and selecting the page.

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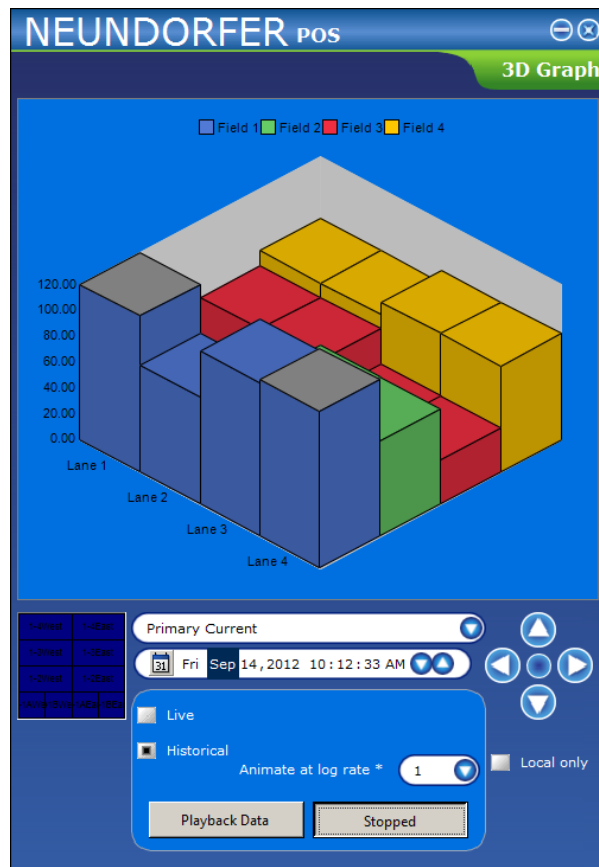
In the **3D Graph** window, the area powered by each T/R set (electrical section) may be represented by one or more bars. Refer to the plan view representation (small blue box on left-hand side, underneath the graph).

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 Chart** window is closed, graphs hold their position for the next time it is opened.

The 3D graph can display many different parameters. Use the drop-down menu to select the desired parameter. See page 20 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.
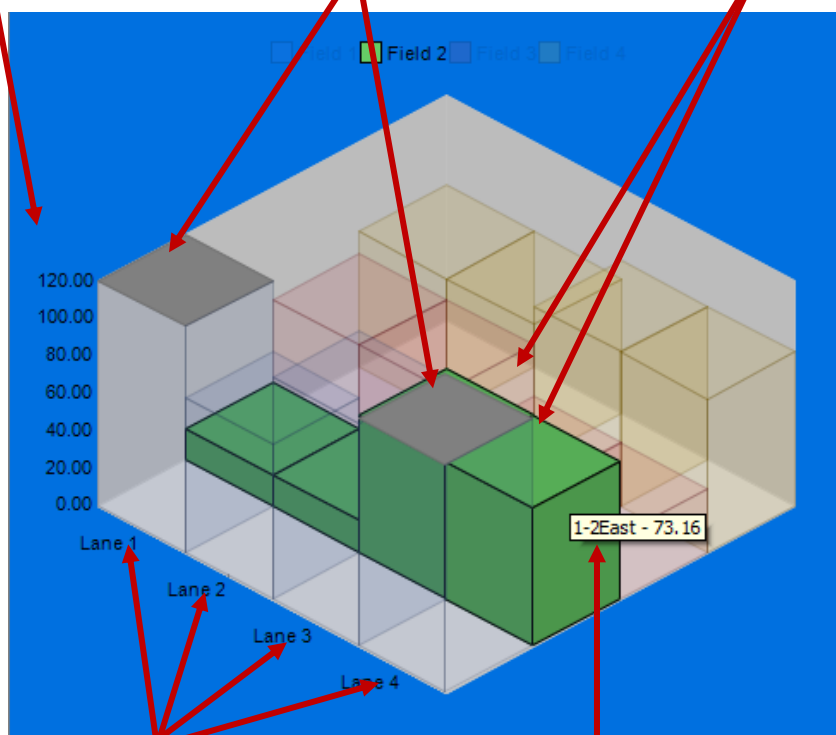


*3D GRAPH WINDOW*

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 82.46 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*

## 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.

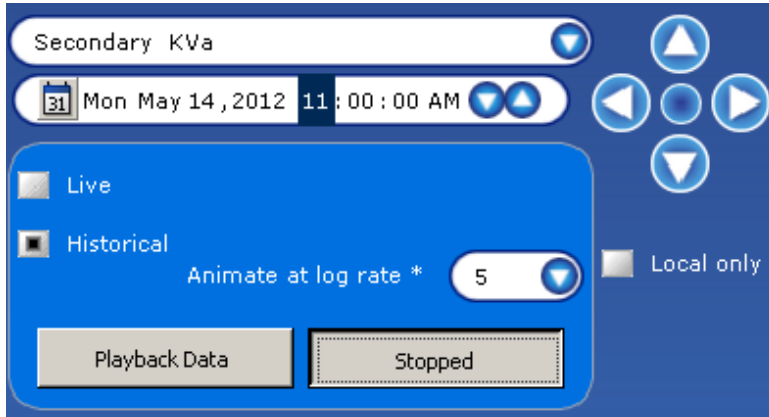| | | |
|---|---|---|
| **H** | *Primary Current* | Primary current of the precipitator's T/R sets |
| **H** | *Primary Volts* | Primary voltage of the precipitator's T/R sets |
| **H** | *Secondary Current* | Secondary current (mA) of the precipitator's T/R sets |
| **H** | *Secondary KVa* | Secondary 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 drop-down 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* * drop-down 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

Click the **Playback Data** button to animate the graph; 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.
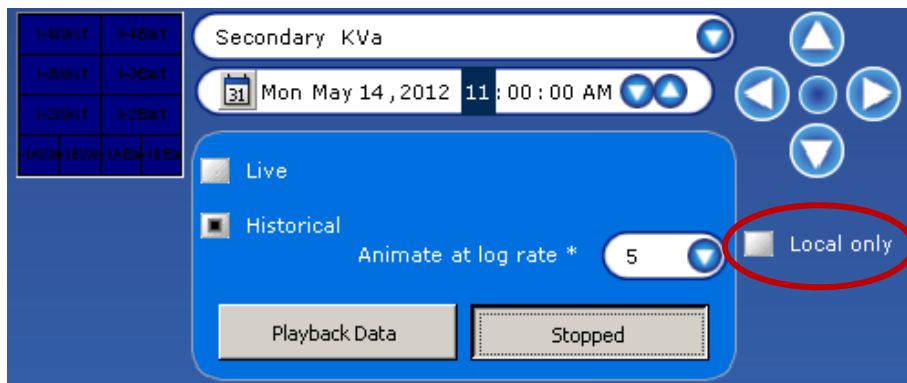


*SECTION OF 3D GRAPH WINDOW*

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*

# 9. Oscilloscope

## Overview

To access the **Oscilloscope Waveforms** window: On the plan view page, click any T/R set icon and then click *Oscilloscope* in the T/R set menu.

Left-click, hold and drag the top bar of the window to reposition the **Oscilloscope** window. During repositioning, the window is replaced with a dotted white line, allowing full view of the page underneath.
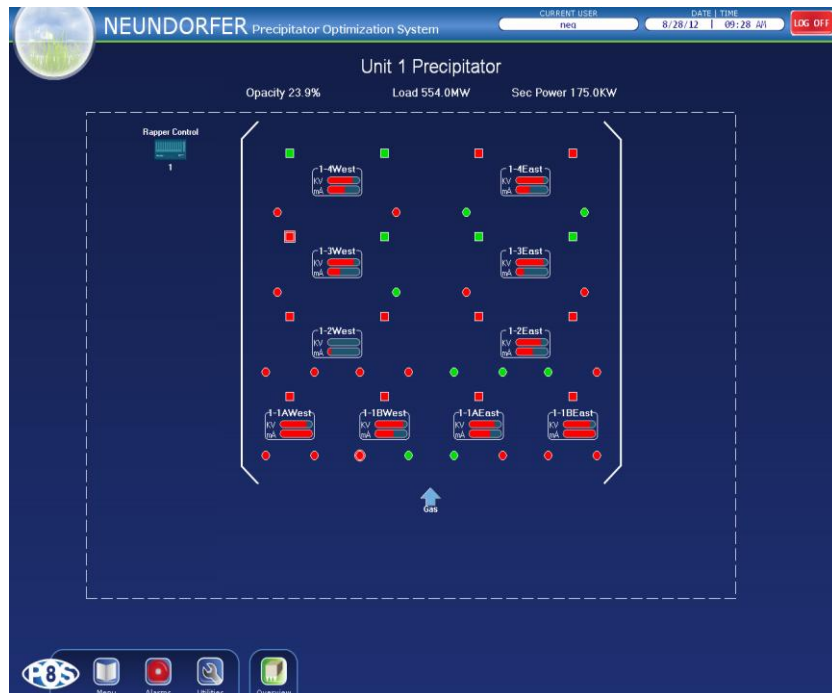
POS plots scope waveforms in the grid area of the **Oscilloscope** window. The vertical black line on the graph indicates position of the trigger point when the data is plotted. At top of the vertical line is a small, downward-pointing blue triangle.

To move the trigger point line, left-click and hold on this triangle, and drag left or right to change its location.



*OSCILLOSCOPE WINDOW*



*OSCILLOSCOPE WINDOW BEING REPOSITIONED*

## Trace Options

The **Oscilloscope** window displays traces similar to those captured by an actual 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.
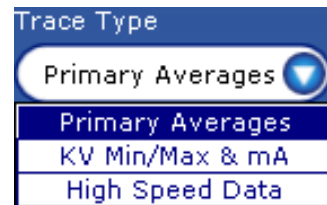


*OSCILLOSCOPE WINDOW*

Four waveforms are shown on the graph, each one representing the signal selected in the drop-down menu to the right of the waveform. The options in these drop-down menus change depending on what is selected for **Trace Type** (second drop-down menu from the left along bottom of the window).

Use the **Trace Type** menu to select what type of data to display in the scope trace:

- A **Primary Averages** trace type is similar to a trend graph or face panel data graph, except the data is captured at a much higher speed.

- A **KvMin/Max** trace type plots a graph of the secondary voltage minimum and maximum values of each half cycle of the line.

- A **High Speed Data** trace type displays traces like those captured with a traditional oscilloscope.



*TRACE TYPE MENU*

---

The lists below indicate which scope drop-down menu options are available for each of the three trace types.

Primary Averages Trace Type:

| | |
|---|---|
| **Primary Voltage** | Primary voltage for selected T/R set |
| **Primary Current** | Primary current (amps) for selected T/R set |
| **Secondary Current** | Secondary current (mA) for selected T/R set |
| **Conduction Angle** | Conduction angle for selected T/R set |
| **SCR On Status** | Internal voltage control reading for SCR Status |
| **Peak Spark Sensing** | Internal voltage control reading for spark sensing |

KV Min/Max & mA Trace Type:

| | |
|---|---|
| **KVa Max** | Max KV during each half-cycle for A bushing |
| **KVb Max** | Max KV during each half-cycle for B bushing |
| **KVa Min** | Min KV during each half-cycle for A bushing |
| **KVb Min** | Min KV during each half-cycle for B bushing |
| **Secondary Current** | Secondary current (mA) for selected T/R set |
| **Conduction Angle** | Conduction angle for selected T/R set |
| **SCR On Status** | Internal voltage control reading for SCR Status |
| **Peak Spark Sensing** | Internal voltage control reading for spark sensing |

High Speed Data Trace Type:

| | |
|---|---|
| **Primary Current** | Primary current (amps) for selected T/R set |
| **Primary Voltage** | Primary voltage for the selected T/R set |
| **Secondary Current** | Secondary current (mA) for selected T/R set |
| **KVa** | Secondary Voltage on A Bushing |
| **KVb** | Secondary Voltage on B Bushing (if configured) |
| **Conduction Angle** | Conduction angle for selected T/R set |
| **SCR On Status** | Internal voltage control reading for SCR Status |
| **Peak Spark Sensing** | Internal voltage control reading for spark sensing |

In addition to the **Trace Type** drop-down menu, there are three other drop-down menus along the bottom of **Oscilloscope** window, underneath the grid. Click the arrow just to the right of each menu name to pull it down, and then click on the desired option.
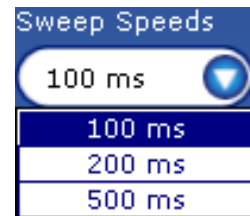
**T/R Set** drop-down menu:
Oscilloscope traces will be generated for the selected T/R set. Use the up and down arrows to navigate through list in the drop-down menu, and then click the desired T/R set.

*T/R SET*
*DROP-DOWN MENU*

**Sweep Speeds** drop down menu:
Use this menu to select the rate at which data will be gathered and displayed in the scope. Speed options vary depending on which Trace Type is selected.

*SWEEP SPEEDS*
*DROP-DOWN MENU*

**Trigger** drop-down menu:
Use this list to select which event will trigger the T/R control to begin data capture: *Primary Current Limit*, *Primary Voltage Over Limit*, *Secondary Current Limit*, *KV Limit*, *Conduction Angle Limit*, *Spark*,or *Trip*. 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.

## Generate a Trace

1) Using the **T/R Set** drop-down menu, select which T/R set you want to generate a trace for.

2) Using the **Trace Type** drop-down menu, select the type of trace to generate.

3) Using the **T/R Set** drop-down menu, choose the T/R set to generate a scope trace for.

*TRIGGER DROP-DOWN MENU*

4) Using the **Trigger** drop-down menu, choose the trigger to begin data capture.

5) Using the **Sweep Speeds** drop-down menu, choose the rate at which data will be gathered for the trace.

6) Using the four signal drop-down menus, choose the desired parameters to plot in the waveform graph.

7) Click the *Start* button. This begins the data capture and transfer from the voltage control to the POS computer. Begin another trace anytime by changing the options configured and clicking *Start* again. (This aborts the running data capture and begins a new one.)

8) The line of red text at the bottom of the trace shows status and setup information for the displayed scope trace:

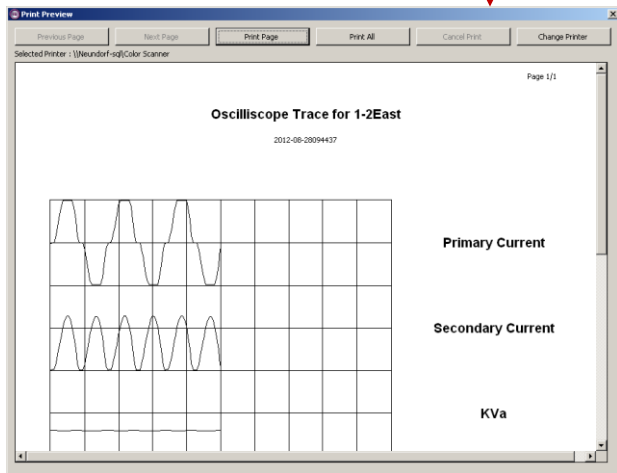1-2East - High Speed Data | Sweep Speed:5 ms | Trigger:Primary Current Limit | 2012-08-28092603

## Store and Print Oscilloscope Traces

Click the ***Store*** button to save the scope data as a CSV file (in the CSV directory configured for the POS computer)
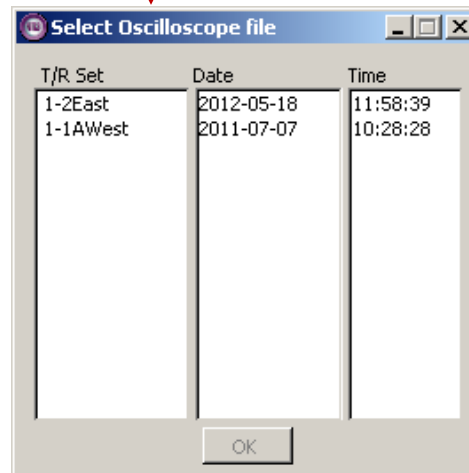


Click the ***Print*** button to send the scope graph image to any printer available from the POS computer.

Click the ***Retrieve*** button to display previously captured scope traces. Raw scope CSV files can be opened in a spreadsheet program. Typical location for CSV files: ***c:\vts\pos8\csv*** directory.



*PRINT PREVIEW WINDOW*



*SELECT OSCILLOSCOPE FILE WINDOW*

# 10. Remote View

This function in POS displays a window showing an MVC faceplate panel, with currently active operating values. The window shows you exactly what you would be looking at if you were physically standing in front of the actual voltage control display panel.

Access **Remote View** from the T/R set menu: on the plan view page, click on any T/R Set icon and then click **Remote View**.

If you are logged in to POS and have sufficient access permissions, you can actually click buttons on the faceplate to change operating set points. These buttons function exactly as if you were standing in front of the voltage control display board. Please refer to the MVC user manual that shipped with the control.



*REMOTE VIEW WINDOW*

# 11. Trend

## Overview

The **Trend** window provides a way to view historical precipitator or T/R set data in a graphical format.

There are several different ways to open a **Trend** window. Access the **Trend** window from the precipitator menu or the T/R set menu: on the plan view page, click the precipitator icon or any T/R set icon and then click *Trend*. **Trend** can also be accessed from within **Data Logging** (see page 49 and 52). A **Trend** window can also be displayed by clicking on analog values displayed on auxiliary equipment screens such as SmartPurge and $SO_3$ interface screens.

If you access **Trend** from the precipitator menu, the window loads with default graph of opacity, load, secondary power and total secondary current. If you access **Trend** from the T/R set options menu, the window loads with default graph of spark rate, primary amps, primary volts, secondary milliamps and secondary kilovolts for the selected T/R set. In both cases, the pens (data parameters displayed) can be changed manually.

## Views

The **Trend** window provides two ways to view historical data for the selected pens: **Plot View** and **Grid View**. Switch back and forth between the two views using the *Plot View* and *Grid View* tabs in lower left-hand corner of the window.

**Plot View** shows the data in a line graph, with each value/pen represented by its own line, in its own color:



Along the left-hand side of the window is the pen legend, showing the name of each trended pen and associated value (for example, spark rate for a specific T/R set) shown in the graph.

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* drop-down menu in the toolbar. (See pages 36 and 37.)

Along the left-hand side (Y-axis) of the graph, at top and bottom, are numbers representing the maximum and minimum values, as displayed in the graph, for each of the pens. These can be modified for each pen in its **Pen Properties** window. (See page 32.)

Along the bottom of the window is the timeline scrollbar. Use the left/right arrows at either end to move forward and backward in time. By default, data in the graph is updated in live time, beginning on the date set using the *Set Start Date* tool on the toolbar. (See pages 36 and 37.). Scrolling backward in time switches the mode from "live" to "paused," indicated by appearance of button all the way to the right:

Live Mode          Paused Mode

If the **Show Marker Line** box is checked and you hover the mouse arrow over the trend graph, a vertical line appears indicating position of the mouse arrow in the timeline. The line moves as you move the mouse left or right. This is a quick way to eye up the relationship between two data inputs.



Another way to compare data points is to add visual tags to the graph, indicating the selected pen's data value at a given point in time. First click the desired pen to select it. Then, position the mouse at the desired point in time on the graph, and click to add a visual tag.



To clear value tags from the graph, click the **Hide Data Value** toolbar button.



*HIDE DATA VALUE BUTTON*

The **Grid View** tab shows trend graph data in table format:



The left-most column shows timestamps for each point of data collected. Remaining columns each represent one of the pens, as configured in the **Plot View** tab. The default width of these columns may not be sufficient to display full title of the pen's input. To widen a column, position the mouse between two columns, in the header area, and drag to the right to widen column to the left of the mouse.

## Pen Legend and Properties

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 left-hand side. Each pen represents a specific item of data that has been logged to the hard drive. For example, in the screenshot here, the first pen represents spark rate for T/R set 1-4East.

At the top of the pen legend is a box that says *Time at cursor:*. If you hover the mouse arrow anywhere over the graph display in **Plot View**, this box will also display date and time, indicating where the cursor is located on the timeline.

Underneath *Time at cursor* is the *Show Marker Line* checkbox. When this box is checked, a vertical line is attached to the mouse pointer when you hover it over the graph display, to help guide you as you move the mouse arrow left or right.

The amount of data displayed for each pen depends on how its properties are configured. To configure a pen, click its name in the legend (it will then be surrounded by a box to indicate it's selected), and right-click. The pen options menu lists 12 display options you can turn on or off by clicking that item in the menu; a check box next to the item indicates it is active. These options are described in more detail on pages 33-35.
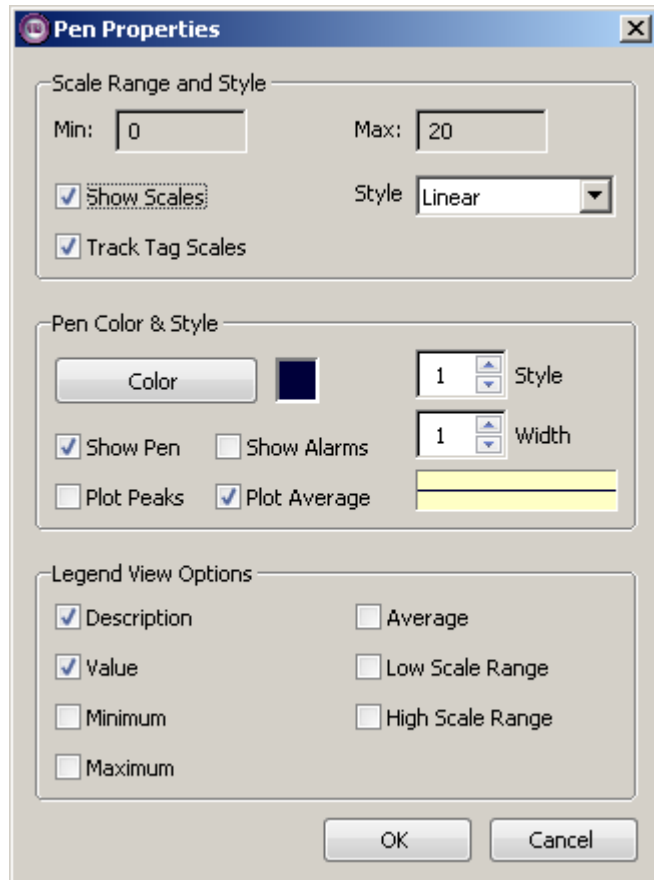


*PEN LEGEND*

- **Show Scales** – Show min/max scale values for selected pen along Y-axis of the graph.

- **Show Pen** – Show selected pen in the graph.

- **Show Alarms** – Show setpoint alarms for pen in the graph.

- **Plot Peaks** – Show data peaks for pen in the graph.

- **Plot Average** – Show average data points for pen in the graph.

- **Description** – Show description line in pen legend.

- **Value** – Show value (at selected time in graph) for pen in the legend.

- **Minimum** – Show min value for the pen's input in the legend, as set to display in the graph. (See page 35).

- **Maximum** – Show max value for the pen's input in the legend, as set to display in the graph. (See page 35).

- **Average** – Show in the legend average value for the pen during time period in the graph.

- **Low Scale Range** – Show in the legend low scale range for the pen's input. (See page 35).

- **High Scale Range** – Show in the legend high scale range for the pen's input. (See page 35.)



*PEN OPTIONS MENU*

The last item on the pen options menu is *Properties*. Click this to open the **Pen Properties** window. This window's options (some of which are the same as items in the pen options menu) are divided into three areas: Scale Range and Style, Pen Color & Style, and Legend View Options.

Scale Range and Style:

- *Min:* - If the pen's ***Track Tag Scales*** checkbox is selected, this box shows default value preconfigured for the pen's Scaled Process Data Min. If the pen's ***Track Tag Scales*** checkbox is not selected, this box turns into an editable field; click into it and type the minimum scale range value you want displayed on the graph for the selected pen.

- *Max:* - If the pen's ***Track Tag Scales*** checkbox is selected, this box shows default value preconfigured for the pen's Scaled Process Data Max. If the pen's ***Track Tag Scales*** checkbox is not selected, this box turns into an editable field; click into it and type the maximum scale range values you want displayed on the graph for the selected pen.

*PEN PROPERTIES WINDOW*

- ***Show Scales*** – If this box is checked, the minimum and maximum scale values for the selected pen are displayed along the Y-axis of the graph. If the box is unchecked, these values won't be displayed on the Y-axis.

- ***Track Tag Scales*** – If this box is checked, default values preconfigured for the tag's Scaled Process Data Min and Scaled Process Data Max properties will be displayed in the ***Min*** and ***Max*** boxes, and will be used as minimum and maximum scale range values on the graph. If this box is not checked, the ***Min*** and ***Max*** boxes become editable fields; click into each one and type a value to use as minimum and maximum scale range values for selected pen on the graph.

- ***Style*** – Click an option in this drop-down menu to set how POS should calculate values used in the trend graph. There are three plot styles available: Linear, Logarithmic, and Square Root.
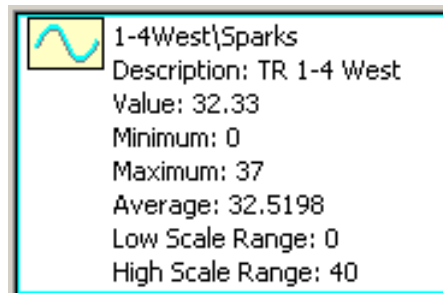
Pen Color & Style:

- **Color** – Click the **Color** button to change color for the selected pen. In the **Select Color** window, roll mouse over a color in the swatches to preview it in the lower right-hand corner. Click the color to select. When done, click **OK** to return to the **Pen Properties** window.

- **Style** – Use the up/down arrows to select from one of five pen styles: solid line or four types of dotted lines. Selected style is previewed in the box just below Width.

- **Width** – Use the up/down arrows to choose one of nine line thicknesses for the pen. The selected width is displayed in box just below Width.

- **Show Pen** – Check this box to show the selected pen in the trend graph. Uncheck it to not display the pen in the graph.



*SELECT COLOR WINDOW*

- **Show Alarms** – Check this box to display alarm setpoints for the selected pen in the trend graph. Uncheck it to not show alarm setpoints for the pen.

- **Plot Peaks** – If this box is checked, the trend graph for the selected pen will show data peaks (highest values achieved for the input within the selected time period). If this box is unchecked, data peaks for the pen won't be displayed in the graph. You can select both Plot Peaks and Plot Average to display both in the graph, but if neither option is selected, no line will show for the selected pen in the graph.

- **Plot Average** – If this box is checked, the trend graph for the selected pen will show average data points for the input within the selected time period. If this box is unchecked, average data points for the pen won't be displayed in the graph. You can select both Plot Average and Plot Peaks to display both in the graph, but if neither option is selected, no line will show for the selected pen in the graph.

Legend View Options:

- **Description** – When this box is checked, a "Description" line shows up in the pen legend for the selected pen, listing name of the associated input (T/R set or precipitator).

- **Value** – When this box is checked, a "Value" line shows up in the pen legend for the selected pen. When "Value" is turned on, and you hover mouse anywhere over the trend graph, this line is populated with value associated with the input at that point in time (for example, spark rate for a specific T/R set).



*EXAMPLE OF PEN LEGEND FOR A SPECIFIC T/R SET, WITH ALL LEGEND VIEW OPTIONS TURNED ON*

- **Minimum** – When this box is checked, a "Minimum" line shows up in the pen legend for the selected pen, listing minimum value for the associated input, as set to display in the trend graph (for example, minimum secondary milliamps for a specific T/R set).

- **Maximum** – When this box is checked, a "Maximum" line shows up in the pen legend for the selected pen, listing maximum value for the associated input, as set to display in the trend graph (for example, maximum opacity for a specific precipitator).

- **Average** – When this box is checked, an "Average" line shows up in the pen legend for the selected pen, listing the average value of the associated pen during the time period shown in the trend graph.

- **Low Scale Range** – When this box is checked, a "Low Scale Range" line shows up in the pen legend for the selected pen, listing low scale range for the associated input, as configured using the **Min** field in the **Pen Properties** window (see explanation for **Min** in the Scale Range and Style section on page 33).

- **High Scale Range** – When this box is checked, a "High Scale Range" line shows up in the pen legend for the selected pen, listing high scale range for the associated input, as configured using the **Min** field in the **Pen Properties** window (see explanation for **Max** in the Scale Range and Style section on page 33).

## Toolbars

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. Toolbar options vary somewhat depending on whether you're in the **Plot View** tab or the **Grid View** tab. (See Views, page 29, for more about the two tabs.) The two versions of the toolbar are shown below. Tools are described in detail on pages 37-38.

Toolbar – Plot View:



Toolbar – Grid View:

Toolbar Options:

- ***Pen Group Selector*** – Use this drop-down menu to select and load a preconfigured group of pens. You can configure and save pen groups to this list using the tag selector tool. (See below, and page 39 for more detail.)

- ***Tag Selector*** – Click this toolbar button to open the **Tag Selector** window. From this window, you can select tags (data sets for specific inputs) you wish to display data for in the **Trend** graph. Essentially, this is the tool you use to add pens to the list, or modify already configured pens. **Tag Selector** also allows you to configure and save groups of pens to load using the ***Pen Group Selector*** toolbar menu. (See page 39 for more about **Tag Selector**.)

- ***Export Wizard*** – Click this button to open the **Export Wizard** window, which allows you to export data for currently displayed trend graph, to an ODBC-compliant database or comma-separated value (CSV) file. (See page 41 for more about **Export Wizard**.)

- ***Duration Selector*** – Use this drop-down menu to choose from 31 preset time periods or durations for data plotted in the trend graph. The duration you select applies to time scale on the graph for all pens (digital and analog inputs). Preset durations range from two minutes to five years. Use the Set Start Date tool (see below) to specify on what date the duration should begin.

- ***Set Start Date*** – Click this button to open calendar where you select start date for duration of data shown in the trend graph. The calendar automatically opens in the current month; use the **<<** and **>>** buttons in the window to navigate backward or forward in time. When you get to the desired month, click a date to select it. Then, click anywhere on the title bar of the **Trend** window to close the calendar.

- ***Zoom In X-Axis/Zoom Out X-Axis*** – Click the x-axis **+** button to turn on "zoom in" for the x-axis. Then, hover the mouse anywhere over the trend graph and click to zoom in. Each mouse click changes the time scale on the X-axis to display a shorter time period. The x-axis **–** button works the same way in reverse.

- ***Zoom In Y-Axis/Zoom Out Y-Axis*** – Click the Y-axis + button to turn on "zoom in" for the Y-axis. Then, hover the mouse anywhere over the trend graph and click to zoom in. Each mouse click zooms in to displays a lower minimum scale range for analog inputs on the graph. The Y-axis – button works the same way in reverse.

- ***Shift Y-axis (Analogs Only)*** – This button enables you to shift the position (up/down along the Y-axis) of a selected pen (analog input only) on the graph so it is not obscured by (or does not obscure) other pens on the graph. To use this tool, first select a pen by clicking its name in the pen legend. Then, click the ***Shift Y-axis*** button. Then, hover the mouse the graph; it is now a hand shape rather than an arrow. Click, hold and drag up or down to reposition the pen.

- ***Reset Y-axis (Analogs Only)*** – Clicking this button resets the graph shifted scale ranges and zoomed analog ranges to their original state.

- *Add Note* – If you have one or more notebook pens configured in the pen legend (see 39 for more on adding pens to the legend), you can select one of them and use this button to add a note in the graph at a specific point in time. First, select the notebook pen you want to add a note for. Then, click the *Add Note* button. Then, hover the mouse over the graph; it is now a hand shape rather than an arrow. Move the left or right until it is at the location where you want to add a note. Click that location to open the **Add Note** window. Type a description in the *Note* field, and then click *OK*. Notice that a new arrow, the same color as the associated note pen, shows up along bottom of the trend graph, indicating location of the note. Click the arrow to read the note.

- *Print* – Click this button to print a hard copy of trend graph currently displayed in the **Trend** window.

- *Hide Data Value* – If you selected a particular pen, and then clicked on the trend graph in one or more locations to add visual tags showing value of that input at different points in time, you can clear those tags from the graph by clicking the *Hide Data Value* button.

# Tag Selector

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.

At top of the window are six different fields and drop-down menus with options for filtering the list of tags in the list so it's easier to locate the one you want. These provide multiple ways to sort for the same or similar tags. For example, if you want to locate a notebook tag, you could click into the **Filter By Name** field and type *Notes* and then press the *Enter* key on your keyboard, or pull down the **Filter By Data Source Type** menu and click **NotesDataSource**.

The middle portion of the window displays available tags, each on its own line with columns labeled indicating the tag's attributes. By default, the list shows all available tags; if you filter the list using option at top of the screen, it will only show listed tags that match your filter criteria.

The bottom portion of the window displays tags currently configured for the selected tag group in the **Plot View** tab.



*Tag Selector window*

Add a tag to current group:
1) Use up/down arrows in tag list to locate the tag you want.
2) Click name of the tag in list to select it.
3) Click the *Select Tag* button. The tag is added to list of *Selected Tags/Queries for Plotting*.
4) Click the **Save Group** button to save changes. In the **Save Group** window, type name of the group. (To re-save current group with changes, be sure to type the group's name exactly. (The group's name is shown in tittle bar of the **Tag Selector** window).

Delete a tag from current group:
1) In the *Selected Tags/Queries for Plotting* list, click the tag you want to delete.
2) Click the *Remove* button.
3) Click the **Save Group** button to save changes. In the **Save Group** window, type name of the group. (To re-save current group with changes, be sure to type the group's name exactly. (The group's name is shown in tittle bar of the **Tag Selector** window).

Move a tag up or down in the list for current group:
1) In the *Selected Tags/Queries for Plotting* list, click the tag you want to move up or down.
2) Use the *Move Selected* up/down arrows to move the tag up or down until it is in the desired position in the list.
3) Click the **Save Group** button to save changes. In the **Save Group** window, type name of the group. (To re-save current group with changes, be sure to type the group's name exactly (the group's name is shown in tittle bar of the **Tag Selector** window).

Create a new group:
1) You create a new group by resaving the group you're working on, using a new name, or clearing the group of all tags, saving it with a new name, and then adding tags.
2) To resave the group with a new name, click the **Save Group** button, and type a new name into the **Save Group** window. Then, make whatever changes you want and re-save it again with the new name.
3) To clear the group and save it with a new name, click the *Remove All* button. Then, click the **Save Group** button and type a new name into the **Save Group** window. Make whatever changes you want by adding tags to the group, and then re-save it again with the new name.

Whatever changes you make and save in the **Tag Selector** window will show up for the selected group in the **Trend** window pen legend and trend graph. If you have more than one tag group defined and saved, you can switch between groups using the *Pen Group Selector* drop-down menu in the toolbar.

## Export Wizard

**Export Wizard** is a **Trend** tool that allows you to export data for the currently displayed trend graph to an ODBC-compliant database or comma-separated value (CSV) file. Click the ***Export Wizard*** toolbar button to get started.

***EXPORT WIZARD***
***TOOLBAR BUTTON***

The **Export Wizard** window opens with a welcome splash screen. Click the right arrow button to proceed.



***EXPORT WIZARD: WELCOME SCREEN***

In second screen of **Export Wizard**, use the drop-down menu to select what type of file you want to export data to: ***Access Database***, ***CSV File***, or ***ODBC Compliant Data Source***. Then, click the right arrow button to proceed.



***EXPORT WIZARD: TYPE OF EXPORT SCREEN***

In third screen of **Export Wizard**, select location where you want to save the data file. You can accept the default location, or choose a new location by clicking the *Browse* button. Then, click the right arrow button to proceed.



*EXPORT WIZARD: FILE LOCATION SCREEN*

The final screen of **Export Wizard**, confirms that everything is set for data export. Click the right arrow button to complete the wizard and return to the **Trend** window.



*EXPORT WIZARD: CONFIRMATION SCREEN*

# 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.

Access the **V-I Curve** window from the T/R set menu: on the plan view page, click any T/R set icon and then click **V-I Curve**.

The **V-I Curve** window opens with the T/R set you clicked selected set as default for generating a V-I curve. V-I curves for other T/R sets can be added to the display using the drop-down menus along the right-hand side of the window, and selected one at a time to generate V-I curves without closing the window.



***V-I CURVE WINDOW***

There are three areas to the **V-I Curve** window. The left-hand side of the window shows a grid plot area where the generated curves are displayed. To the right of the grid are details for each of the selected T/R set curves (indicated by its name in drop-down menu in upper left-hand corner of this section).

## Generate a V-I Curve

Select one of the pens by clicking its *Details* button (to right of the pen color). This expands the **Details** area in the list to show live operating data and options (see below) for generating a curve. Select a T/R set from the drop-down menu in the upper left.

Drop-down menu showing name of selected T/R set

Pen color and status for selected T/R set

Live current (mA) data for selected T/R set

Click *Start* to generate V-I curve for selected T/R set

Live voltage (kV) data for selected T/R set

Live conduction angle data for selected T/R set

Click *Save* to save completed V-I curve for future reference

Click into the *Comment* field and type a comment to show on printout of V-I curve

Checkboxes for including kVa and/or kVb in V-I curve

Use the appropriate checkbox to include kVa and/or kVb, and add a comment to show in the V-I curve printout.

Click *Start* to generate a new V-I curve for the selected T/R set. In the *Details* area for that T/R set, the pen color box status temporarily changes from "Live" to "Retrieving Data." Once the V-I curve is complete, the pen color box status changes again to "VI Data Complete." (To stop generation of V-I curve in progress, click the *Abort* button.)

To display a historical V-I curve use the drop-down menu to change from Live to a previously saved curve for the selected T/R set.

Repeat the process with each other pen to select any additional V-I curves. Previously generated V/I curves remain displayed on the grid as long as you keep the window open. The grid can display up to eight V/I curves at once (corresponding to the eight pen colors).

## Save a V-I Curve

V-I curves can be saved for display in the future. To save a curve click **Save** in the details window for the selected pen. V-I curves are saved to the V-I curve directory (typically C:\VTS\POS8\VICurves) as a CSV file. You can retrieve these curves for display in this module, or you can load the raw CSV data into a spreadsheet application.



*COMPLETED V-I CURVE*

## Print V-I Curves

To print V-I curves shown in the grid, and associated data, click the **Print** button. This will open a **Print Preview** window showing the grid area and displayed curves as well as the data used to generate the V-I curves. Click **Print Page** to print only the current page (use **Previous Page** and **Next Page** buttons to navigate forward and backward) or **Print All** to print all pages.



*PRINT PREVIEW WINDOW*

The display of the grid showing the V-I curves can be changed using the *Set Axis* button.

In the **Set Axis** window you can change both current and voltage scales on the grid's two axis, and set the V-I curve to be graphed in kV vs. mA or kV vs. current density.



*SET AXIS WINDOW*

- *Current or Current Density* – use this drop-down menu to choose between two options for X-axis and Y-axis values on the grid: Current (Y-axis) vs. Voltage (X-axis) or Current Density (Y-axis) vs. Voltage (X-axis). The Current Density option requires that a value is configured for collecting plate area associated with each T/R set. This may have been configured during POS installation; contact Neundorfer for more information.

- *Current (mA)* – if you selected *Current vs. Voltage* for the X-axis and Y-axis values, use this drop-down menu to choose a maximum current (mA) value for the grid's Y-axis. Select *Auto* to let POS decide the appropriate range.

- *Current Density (A/ft)^x)* – if you selected Current Density vs. Voltage for the X-axis and Y-axis values, use this drop-down menu to choose a maximum current density value for the grid's Y-axis. Select *Auto* to let POS decide the appropriate range.

- *Voltage (KV)* – use this drop-down menu to choose a maximum voltage (kV) value for the grid's X-axis. Select *Auto* to let POS decide the appropriate range.

# 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 **Data Log** 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 **Data Log**. When accessed from the precipitator menu, the **Data Log** window automatically opens with the **Precipitator** tab selected. When accessed from a T/R set icon, it will open with the **T/R Sets** tab selected.

| | | | Primary | | | Secondary | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Load MW | Opacity % | Avg. Volts | Total Amps | Total KW | Total Amps | Avg. KVa | Avg. KVb | Total KW | Avg. Angle | Avg. Sparks |
| Aug 27, 2012 02:32:52 PM | 545.0 | 17.0 | 235.1 | 1013.5 | 219.9 | 5.1 | 32.1 | 0.0 | 184.5 | 81 | 36 |
| Aug 27, 2012 02:32:45 PM | 545.0 | 17.5 | 234.8 | 1011.3 | 219.9 | 5.1 | 32.2 | 0.0 | 184.5 | 81 | 36 |
| Aug 27, 2012 02:32:40 PM | 545.0 | 18.0 | 235.1 | 1014.1 | 219.9 | 5.1 | 32.2 | 0.0 | 184.5 | 81 | 36 |
| Aug 27, 2012 02:32:35 PM | 544.0 | 19.0 | 240.5 | 1052.2 | 233.0 | 5.4 | 32.6 | 0.0 | 196.1 | 83 | 36 |
| Aug 27, 2012 02:32:30 PM | 544.0 | 19.3 | 239.9 | 1046.1 | 233.0 | 5.3 | 32.6 | 0.0 | 196.1 | 83 | 36 |
| Aug 27, 2012 02:32:25 PM | 544.0 | 19.4 | 240.0 | 1046.8 | 233.0 | 5.3 | 32.6 | 0.0 | 196.1 | 83 | 36 |
| Aug 27, 2012 02:32:20 PM | 544.0 | 19.4 | 240.6 | 1052.9 | 233.0 | 5.4 | 32.6 | 0.0 | 196.1 | 83 | 36 |
| Aug 27, 2012 02:32:15 PM | 544.0 | 19.2 | 240.6 | 1052.5 | 233.0 | 5.4 | 32.6 | 0.0 | 196.1 | 83 | 36 |
| Aug 27, 2012 02:32:10 PM | 544.0 | 19.1 | 239.6 | 1043.4 | 233.0 | 5.3 | 32.6 | 0.0 | 196.1 | 83 | 36 |
| Aug 27, 2012 02:32:05 PM | 545.0 | 19.4 | 233.1 | 1063.4 | 236.6 | 5.4 | 32.6 | 0.0 | 198.4 | 82 | 35 |
| Aug 27, 2012 02:32:00 PM | 545.0 | 19.4 | 232.5 | 1056.7 | 236.6 | 5.4 | 32.7 | 0.0 | 198.4 | 82 | 35 |
| Aug 27, 2012 02:31:55 PM | 545.0 | 19.6 | 232.5 | 1057.4 | 236.6 | 5.4 | 32.7 | 0.0 | 198.4 | 82 | 35 |
| Aug 27, 2012 02:31:50 PM | 545.0 | 18.5 | 232.7 | 1058.9 | 236.6 | 5.4 | 32.7 | 0.0 | 198.4 | 82 | 35 |
| Aug 27, 2012 02:31:45 PM | 545.0 | 19.6 | 232.9 | 1060.8 | 236.6 | 5.4 | 32.6 | 0.0 | 198.4 | 82 | 35 |
| Aug 27, 2012 02:31:40 PM | 545.0 | 19.6 | 233.5 | 1066.6 | 236.6 | 5.4 | 32.7 | 0.0 | 198.4 | 82 | 35 |
| Aug 27, 2012 02:31:35 PM | 547.0 | 19.4 | 229.6 | 984.1 | 209.4 | 4.9 | 31.9 | 0.0 | 175.8 | 79 | 34 |
| Aug 27, 2012 02:31:30 PM | 547.0 | 18.2 | 229.0 | 978.5 | 209.4 | 4.9 | 31.9 | 0.0 | 175.8 | 79 | 34 |
| Aug 27, 2012 02:31:25 PM | 547.0 | 18.6 | 229.7 | 985.3 | 209.4 | 4.9 | 31.9 | 0.0 | 175.8 | 79 | 34 |
| Aug 27, 2012 02:31:20 PM | 547.0 | 19.1 | 229.0 | 978.2 | 209.4 | 4.9 | 32.0 | 0.0 | 175.8 | 79 | 34 |
| Aug 27, 2012 02:31:15 PM | 547.0 | 18.2 | 229.2 | 980.4 | 209.4 | 4.9 | 32.0 | 0.0 | 175.8 | 79 | 34 |
| Aug 27, 2012 02:31:10 PM | 547.0 | 18.9 | 229.0 | 978.2 | 209.4 | 4.9 | 31.9 | 0.0 | 175.8 | 79 | 34 |
| Aug 27, 2012 02:31:05 PM | 551.0 | 19.0 | 227.9 | 1016.4 | 222.8 | 5.2 | 32.3 | 0.0 | 188.0 | 80 | 35 |
| Aug 27, 2012 02:31:00 PM | 551.0 | 18.1 | 227.8 | 1015.0 | 222.8 | 5.2 | 32.2 | 0.0 | 188.0 | 80 | 35 |
| Aug 27, 2012 02:30:55 PM | 551.0 | 18.4 | 227.7 | 1014.3 | 222.8 | 5.2 | 32.2 | 0.0 | 188.0 | 80 | 35 |
| Aug 27, 2012 02:30:50 PM | 551.0 | 19.8 | 228.0 | 1016.6 | 222.8 | 5.2 | 32.3 | 0.0 | 188.0 | 80 | 35 |
| Aug 27, 2012 02:30:45 PM | 551.0 | 19.1 | 227.8 | 1015.5 | 222.8 | 5.2 | 32.3 | 0.0 | 188.0 | 80 | 35 |
| Aug 27, 2012 02:30:40 PM | 551.0 | 18.6 | 228.2 | 1018.6 | 222.8 | 5.2 | 32.2 | 0.0 | 188.0 | 80 | 35 |

Trend

Mon Aug 27, 2012  02:32:52 PM    Now

*DATA LOG WINDOW: PRECIPITATOR TAB*

## Precipitator Data Log Tab

The **Precipitator** tab in the **Data Log** window displays live and historical precipitator data. Precipitator data refers to totals and averages of data collected from all of the T/R sets and voltage controls associated with the precipitator. When you first open this tab, data is displayed for the current day. In the table of data, the first row (blue background) shows live data. Data in rows with green or yellow background is historical.



*DATA LOG WINDOW: PRECIPITATOR TAB*

In the bottom right-hand corner of the screen is date/time navigation for displaying data according to a specified date and time. Click into areas of the date/time bar (day of week, month, day, year, hour, minute, second, AM/PM) and use up/down arrows to set view for data from a specific date and time. Click **Now** to return to view of data from the current day. Use the calendar button to jump to data from a specific day.



*DATE/TIME NAVIGATION*

## Trending from the Data Log Precipitator Tab

Click the **Trend** button (lower left-hand corner of screen, just to right of **Print** button) to generate a trend graph of selected data variables. A blank **Select Trend variables** window opens on top of the **Data Log** window. This window can be repositioned as needed (to see data variables in the **Data Log** window) by clicking and holding on its title bar, and dragging the mouse to reposition.

By clicking anywhere on a column for a particular data parameter listed in the **Data Log** window (**Load MW**, **Opacity %**, **Primary Avg. Volts**, **Primary Total Amps**, **Primary Total KW**, **Secondary Total Amps**, **Secondary Avg KVa**, **Secondary Avg. KVb**, **Avg. Angle**, **Avg. Sparks**), you add it to the trend variables list. In the example show below, **Load** and **Opacity** are selected as variables. To remove a variable from the list, click the **X** next to its line in the **Select Trend variables** window.



*DATA LOG: PRECIPITATOR TAB - SELECTING VARIABLES FOR TREND GRAPH*

Variables from either the **Precipitator** tab or **T/R Set** tab can be combined when selecting trend variables.

When you are done selecting variables to trend, click the **Launch Trend** button in the **Select Trend variables** window. This opens a **Trend** window displaying a plot of the selected variables. For details about interacting with the **Trend** window, see page 28.

*TREND WINDOW*

## 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. In the **Precipitator** tab this will display six minute data for a whole day. In the **Print Preview** window, click *Print Page* to print the current page. Click *Previous Page* to go back in time to older data for the selected date. Click *Print All* to print all data for the selected date.



*PRINT PREVIEW WINDOW*

## T/R Sets (Voltage Controls) Data Log Tab

The **T/R Sets** tab in the **Data Log** window displays live and historical data for individual T/R sets. Each row in the table represents data for one T/R set. (T/R set names are listed in the first column). By default, this tab opens showing live data. Values highlighted in yellow indicate factors limiting T/R set output.



| T/R Set | Primary | | | Secondary | | | | Sparks | Mode | IE Ratio | Angle / HF Duty Cycle | Opt % | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Amps | Volts | KW | mAmps | KVa | KVb | KW | | | | | | |
| 1-1AWest | 209.0 | 281.0 | 52.5 | 1160.0 | 35.8 | 0.0 | 43.8 | 32.0 | 1.0 | 0.00 | 109 | 100 | Running |
| 1-1BWest | 91.1 | 287.1 | 21.5 | 470.1 | 38.6 | 0.0 | 19.2 | 63.0 | 1.0 | 0.00 | 99 | 100 | Running |
| 1-1AEast | 114.7 | 231.7 | 23.1 | 558.7 | 34.5 | 0.0 | 19.8 | 65.0 | 1.0 | 0.00 | 80 | 100 | Running |
| 1-1BEast | 233.7 | 277.7 | 58.0 | 1350.7 | 35.8 | 0.0 | 49.8 | 7.0 | 1.0 | 0.00 | 114 | 100 | Running |
| 1-2West | 25.2 | 167.2 | 4.0 | 99.2 | 0.0 | 0.0 | 0.0 | 64.0 | 1.0 | 0.00 | 57 | 100 | Running |
| 1-2East | 81.9 | 226.9 | 16.2 | 398.9 | 33.7 | 0.0 | 13.9 | 32.0 | 1.0 | 0.00 | 79 | 100 | Running |
| 1-3West | 60.5 | 201.5 | 10.1 | 250.5 | 35.7 | 0.0 | 8.8 | 10.0 | 1.0 | 0.00 | 64 | 100 | Running |
| 1-3East | 41.7 | 191.7 | 6.4 | 151.7 | 35.5 | 0.0 | 5.7 | 32.0 | 1.0 | 0.00 | 60 | 100 | Running |
| 1-4West | 84.4 | 229.4 | 16.2 | 401.4 | 33.8 | 0.0 | 13.9 | 32.0 | 1.0 | 0.00 | 79 | 100 | Running |
| 1-4East | 93.4 | 253.4 | 20.0 | 430.4 | 40.0 | 0.0 | 16.8 | 12.0 | 1.0 | 0.00 | 81 | 100 | Running |

*DATA LOG WINDOW: T/R SETS TAB*

In the bottom right-hand corner of the screen is date/time navigation for displaying data according to a specified date and time. Click into areas of the date/time bar (day of week, month, day, year, hour, minute, second, AM/PM) and use up/down arrows to set view for data from a specific date and time. Click **Now** to return to view of data from the current day. Use the calendar button to jump to data from a specific day.



*DATE/TIME NAVIGATION*

## Trip Log

The **Trip Log** button provides access to a report showing how many times a specific T/R set tripped on a specific date. First, use the date/time navigation bar to display historical data. Second, click the name of a specific T/R set in the **T/R Set** column. Finally, click the **Trip Log** button; a **Print Preview** window opens with report of how many times the selected T/R set tripped that day.
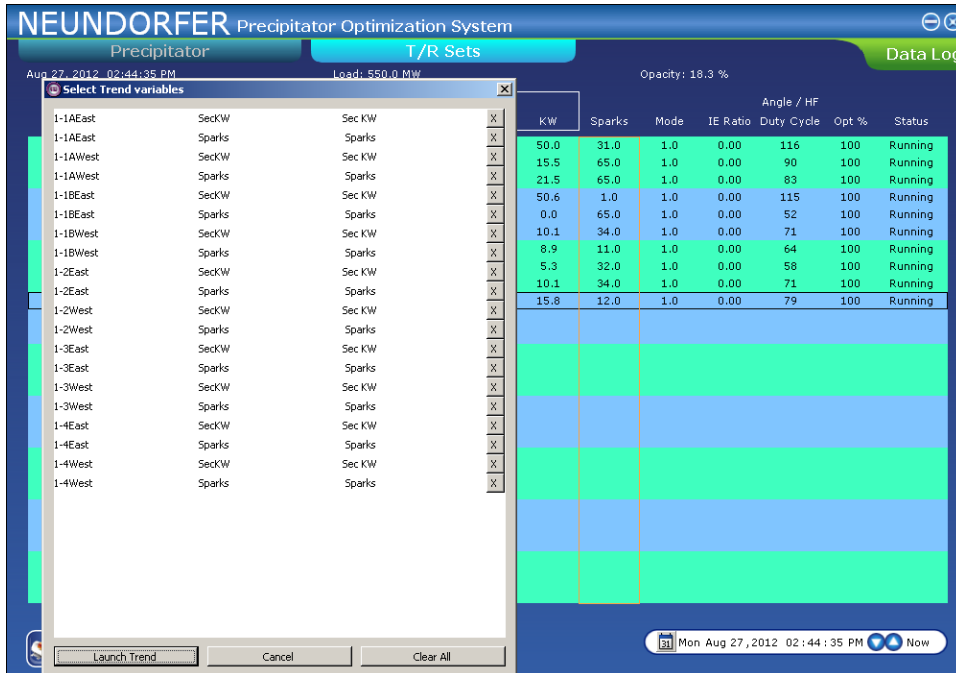


*TRIP LOG BUTTON*

## Trending from the Data Log T/R Set Tab

Click the **Trend** button (lower left-hand corner of the window, just to right of **Print** button) to generate a trend graph of selected data variables. A blank **Select Trend variables** window opens on top of the **Data Log** window. This window can be repositioned as needed (to see data variables in the **Data Log** window) by clicking and holding on its title bar, and dragging the mouse to reposition.

Populate the trend variable list from the **Data Log** window **T/R Sets** tab by clicking a specific variable (**Primary Amps**, **Primary Volts**, **Primary KW**, **Secondary mAmps**, **Secondary KVa**, **Secondary KVb**, **Sparks**, **Mode**, **IE Ratio**, **Angle/HF Duty Cycle**, **Opt %**, **Status**) for any T/R set in the table. As you click each one, the variable for that T/R set is added to the list. Click on the name of a T/R set to add all of the variables for that T/R set, or click on a column heading to add that particular variable for all T/R sets in the precipitator to the selected trend variables list.

In the example show below, **Sparks** and **Secondary KW** are selected as variables for each of the precipitator's T/R sets. To remove a variable from the list, click the **X** next to its line in the **Select Trend variables** window.



*DATA LOG: T/R SETS TAB – SELECTING VARIABLES FOR TREND GRAPH*

When you are done selecting variables to trend, click the **Launch Trend** button in the **Select Trend variables** window. This opens a **Trend** window displaying a plot of the selected variables. For details about interacting with the **Trend** window, see page 28.

*TREND WINDOW*

## Printing from the Data Log T/R Set Tab

Click the **Print** button (lower left-hand corner of the window) to open a **Print Preview** window showing on-screen data for the time selected. In the **Print Preview** window, click **Print Page** to print current page.
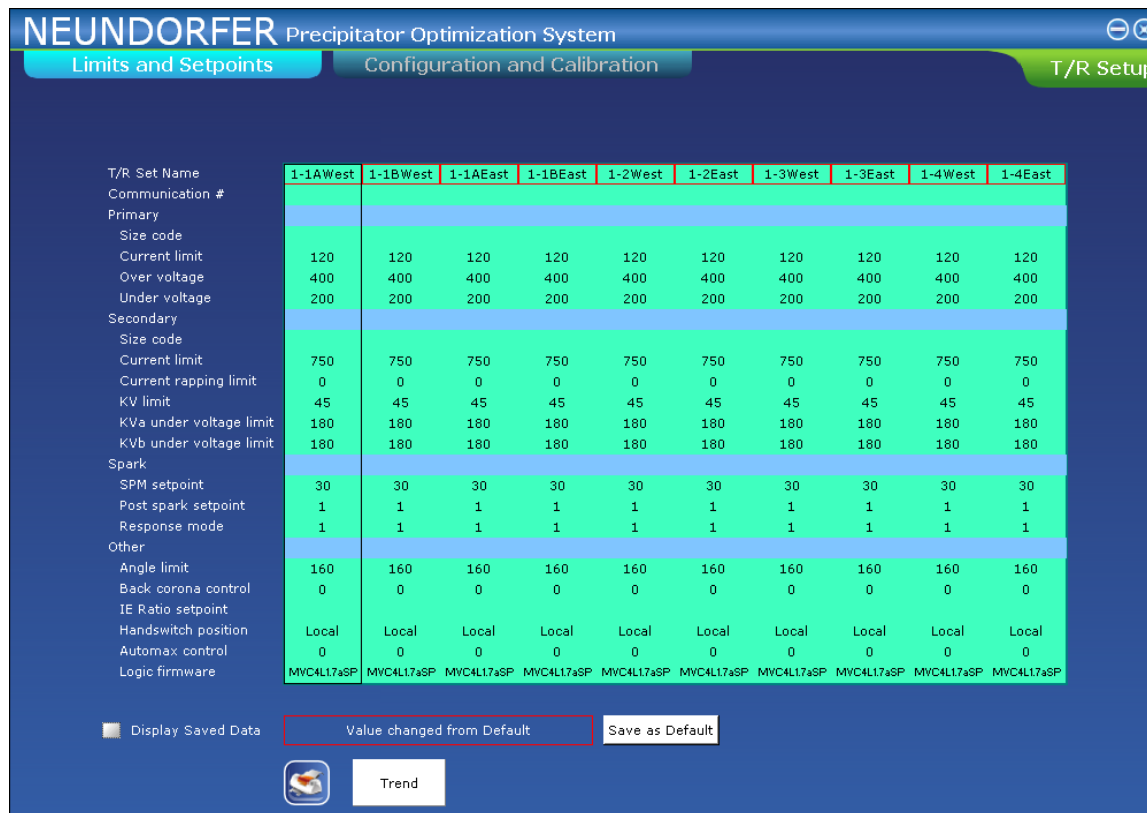


*PRINT PREVIEW WINDOW*

# 14. T/R Setup

The **T/R Setup** window displays configuration parameters for each of the precipitator's voltage controls. Its purpose is to provide you with a view of all limits and set points in one place to allow comparison between voltage control settings. Using this tool, it is also easy to spot any changes made to voltage control set points and limits.

Access the **T/R Setup** window from the T/R set menu: on the plan view page, click any T/R set icon and then click *T/R Setup*.

The **T/R Setup** window has two tabs: **Limits and Setpoints** and **Configuration and Calibration**.

| T/R Set Name | 1-1AWest | 1-1BWest | 1-1AEast | 1-1BEast | 1-2West | 1-2East | 1-3West | 1-3East | 1-4West | 1-4East |
|---|---|---|---|---|---|---|---|---|---|---|
| Communication # | | | | | | | | | | |
| Primary | | | | | | | | | | |
| Size code | | | | | | | | | | |
| Current limit | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| Over voltage | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Under voltage | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| Secondary | | | | | | | | | | |
| Size code | | | | | | | | | | |
| Current limit | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 750 |
| Current rapping limit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| KV limit | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| KVa under voltage limit | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| KVb under voltage limit | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| Spark | | | | | | | | | | |
| SPM setpoint | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| Post spark setpoint | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Response mode | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Other | | | | | | | | | | |
| Angle limit | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| Back corona control | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IE Ratio setpoint | | | | | | | | | | |
| Handswitch position | Local | Local | Local | Local | Local | Local | Local | Local | Local | Local |
| Automax control | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Logic firmware | MVC4L1.7aSP | MVC4L1.7aSP | MVC4L1.7aSP | MVC4L1.7aSP | MVC4L1.7aSP | MVC4L1.7aSP | MVC4L1.7aSP | MVC4L1.7aSP | MVC4L1.7aSP | MVC4L1.7aSP |

*T/R SETUP: LIMITS AND SETPOINTS TAB*

In each of the tabs, names of the T/R sets are listed along top of the table, and parameters are listed in each row, labeled on the left-hand side. This may not be a complete list of all voltage control parameters; refer to the voltage control manual for descriptions.

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. Use the *Display Saved Data* checkbox to toggle between saved data and live data.
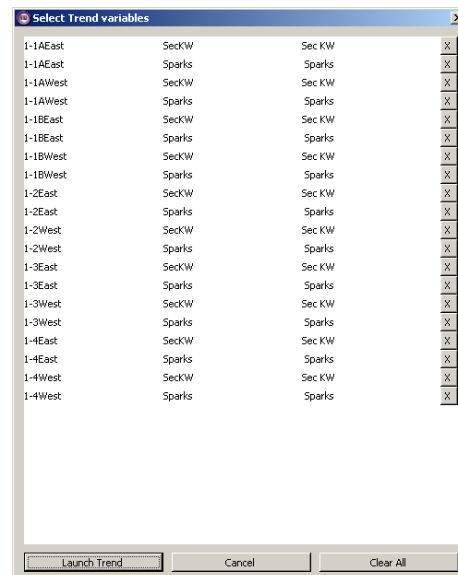
*T/R SETUP: CONFIGURATION AND CALIBRATION TAB*

## Trending from the Data Log Precipitator Tab

Click the **Trend** button to generate a trend graph of T/R set parameters. A blank **Select Trend variables** window opens on top of the **Data Log** window. This window can be repositioned as needed (to see data variables in the **T/R Setup** window) by clicking and holding on its title bar, and dragging the mouse to reposition.

Add variables by clicking on them in the **T/R Setup** window: click the name of a T/R set to add all parameters to the trend, or click the cell for a specific variable for a specific T/R set to add only that variable. You can delete an individual variable from the **Select Trend Variables** window by clicking the **X** button to its right, or remove all variables by clicking **Clear All**.

Click **Launch Trend** to open a **Trend** window displaying the selected variables. (See page 28 for more on **Trend.**)
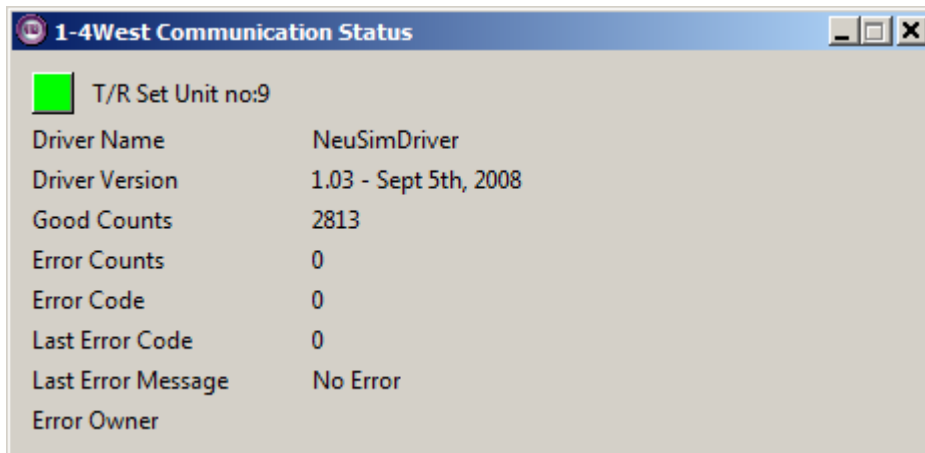


*SELECT TREND VARIABLES WINDOW*

In either tab, click the **Print** button to open a **Print Preview** window for printing on-screen parameters.

# 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. On the plan view page, click on a T/R set icon or rapper control icon and select *Communication Status*.



*COMMUNICATION STATUS WINDOW*

The colored square to left of the controller'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 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.
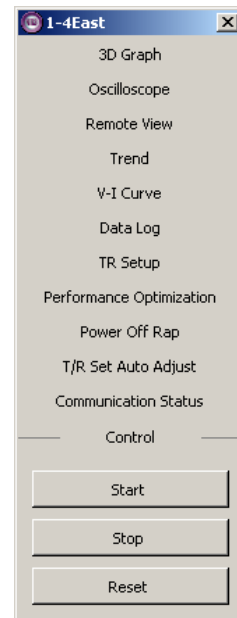
# 16. Individual T/R Set Control

Individual T/R sets can be remotely started, stopped or reset from the POS software. To access the 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:

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

T/R set control is password protected and the logged in user must have appropriate privileges to turn on, off, or reset T/R sets.

*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:

- o  Click **Start** to start all T/R sets
- o  Click **Stop** to stop all T/R sets
- o  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.

Precipitator T/R set control is password protected and the logged in user must have appropriate privileges to turn on, off, or reset T/R sets.
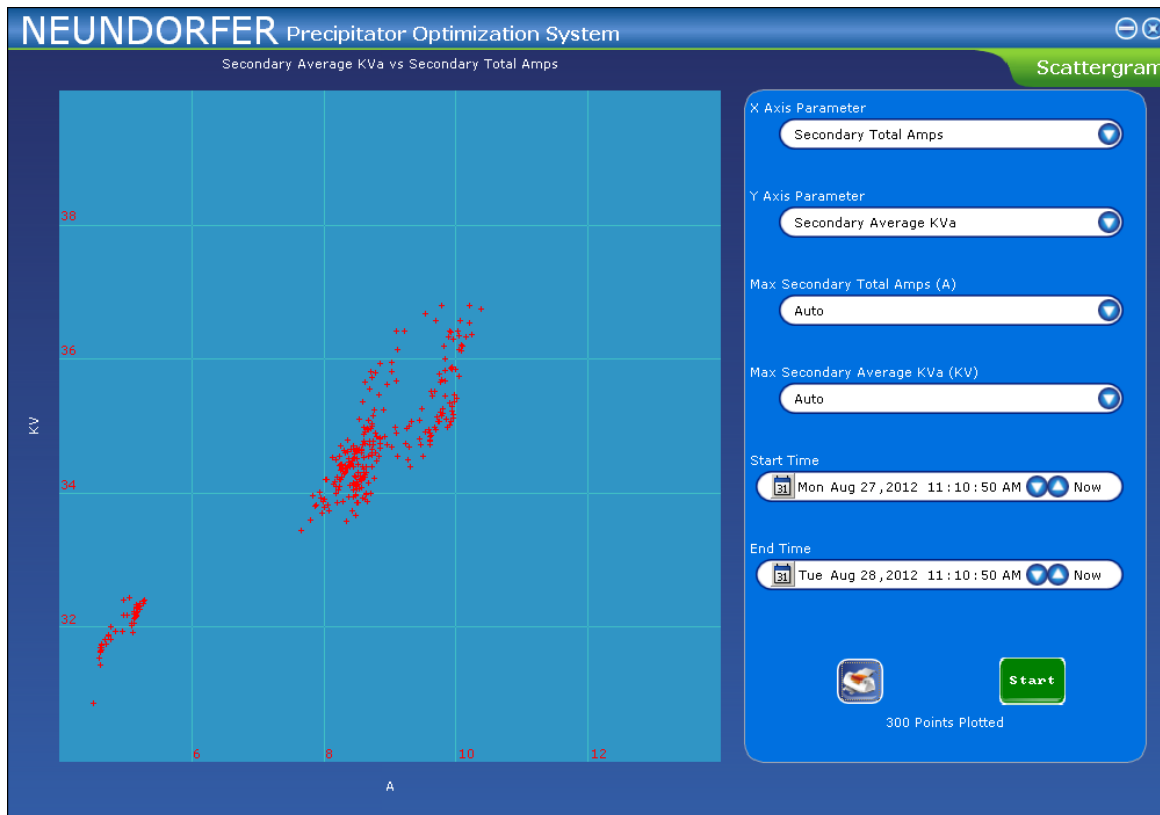
*PRECIPITATOR MENU*

# 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 plan page, click the precipitator icon and then click *Scattergram* in the menu.



*SCATTERGRAM WINDOW*

**Scattergram** can plot a graph showing any two of the following precipitator performance parameters:

- Load
- Opacity
- Primary Average Volts
- Primary Total Amps
- Primary Total Kilowatts
- Secondary Total Amps
- Secondary Average Kva
- Secondary Average KVb
- Secondary Total KW
- Secondary Average angle
- Secondary Average sparks

Use the following steps to generate a scattergram:

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

2) Select scaling/range factors for the **X Axis Parameter** and **Y Axis Parameter** using the next two drop-down menus. They will change for the selected parameters. For example, if you set the X-axis to show **Secondary Total Amps**, the corresponding drop-down menu will list a variety of values for maximum secondary total amps value to include in the scattergram. Selecting **Auto** will allow POS to use axis ranges that best fit the data.

3) 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**.

4) 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. Click **Print Page** to print only the current page (use **Previous Page** and **Next Page** buttons to scroll through the pages) or **Print All** to print all pages.
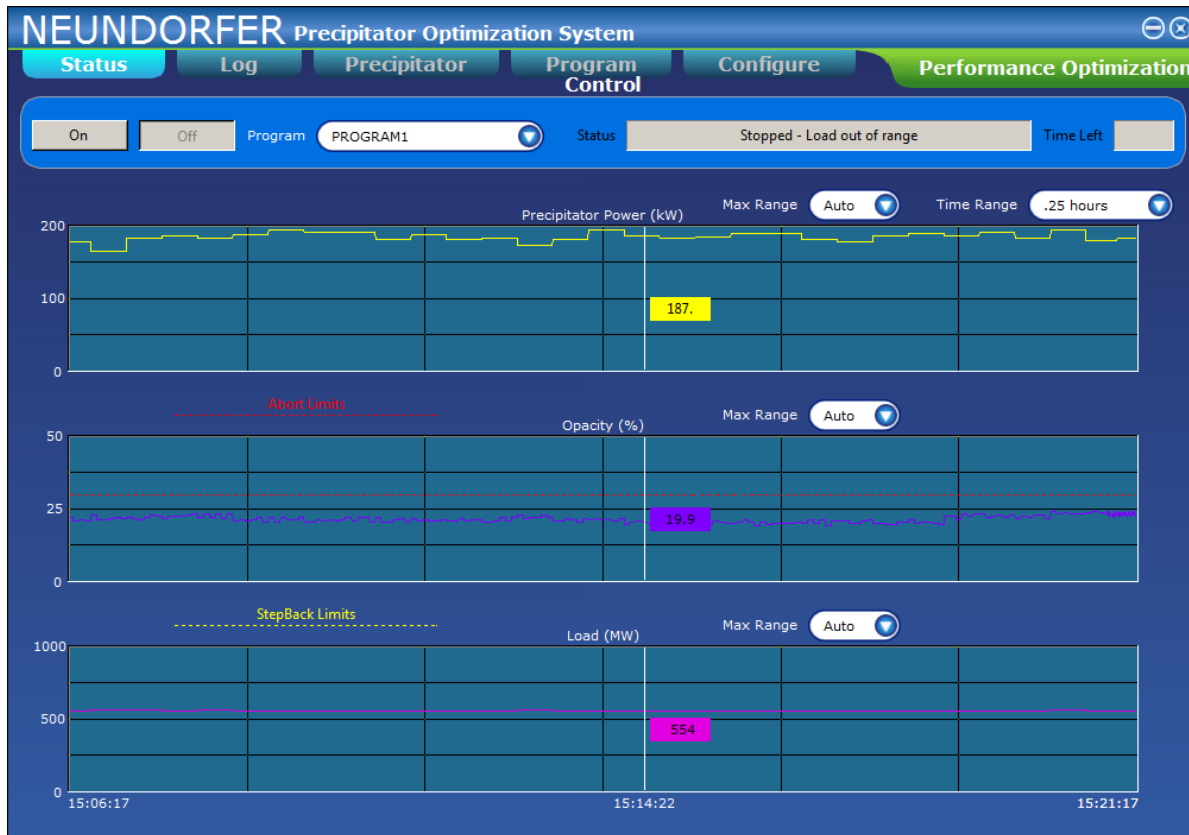
# 19. Performance Optimization

## Overview

**Performance Optimization** is used to automatically change power levels of selected T/R sets in response to changes in opacity and load levels, or opacity and precipitator power levels. When running, an optimization program reduces power levels while monitoring opacity levels and load signals. The goal of **Performance Optimization** is to achieve the best possible collection efficiency at the most appropriate power level.

NOTE: Performance Optimization is a password-protected module. You must be logged in and have adequate permissions to start, stop or configure Performance Optimization.

Access the **Performance Optimization** module 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 **Performance Optimization**.



*PERFORMANCE OPTIMIZATION WINDOW: STATUS TAB*

The **Performance Optimization** window has five tabs: **Status** (shown above, explained on page 61), **Log** (page 62), **Precipitator** (page 63), **Program** (pages 64-65) and **Configure** (pages 66-67).

## Status Tab

The **Control Toolbar** is located at the top of the **Status** tab. Click the *On* button to enable **Performance Optimization** and start the selected program. Click *Off* to stop the current optimization program (T/R sets return to full power). Use the drop-down menu to select an optimization program. The program will not change unless optimization is turned off. The **Status** display shows current status of the **Performance Optimization** module.
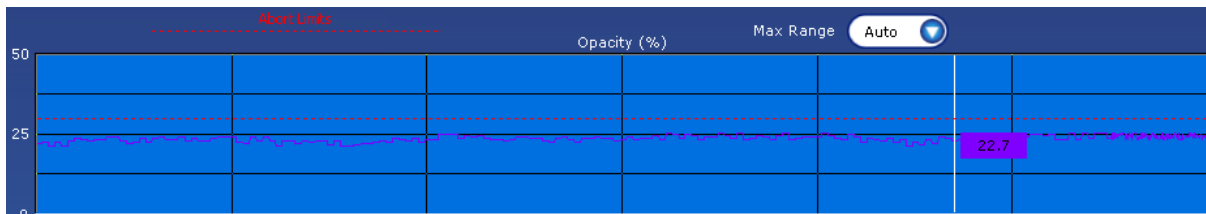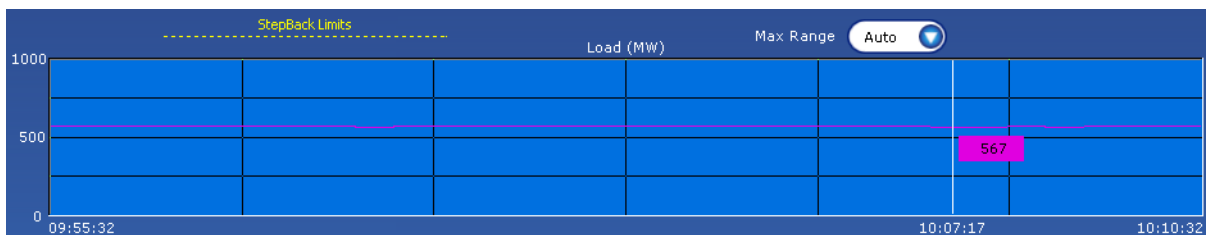


*CONTROL TOOLBAR*

The **Precipitator Power** area shows a trend graph of precipitator power and optimization set point:



The **Opacity %** area shows a trend graph of opacity and its Abort Limit values:



The **Load (MW)** area shows a trend graph of load and its StepBack Limit values. Limits that cause a program abort are shown in red. Limits that cause the program to step backwards are shown in yellow:



Each of these graphs shows trends over the time period (X-axis), as set using the *Time Range* drop-down menu just above the **Precipitator Power** (KW) graph. The Y-axis range for each graph can be set using its *Max Range* drop-down menu. (When set to *Auto,* POS chooses an appropriate range.)

Hold the mouse pointer anywhere over any of the three graphs to bring up a vertical line that runs through all the graphs, each with a tag specifying the value of that graph's measured parameter at that point in time. Moving the mouse to left or right shifts the line and shows values at other points in time.
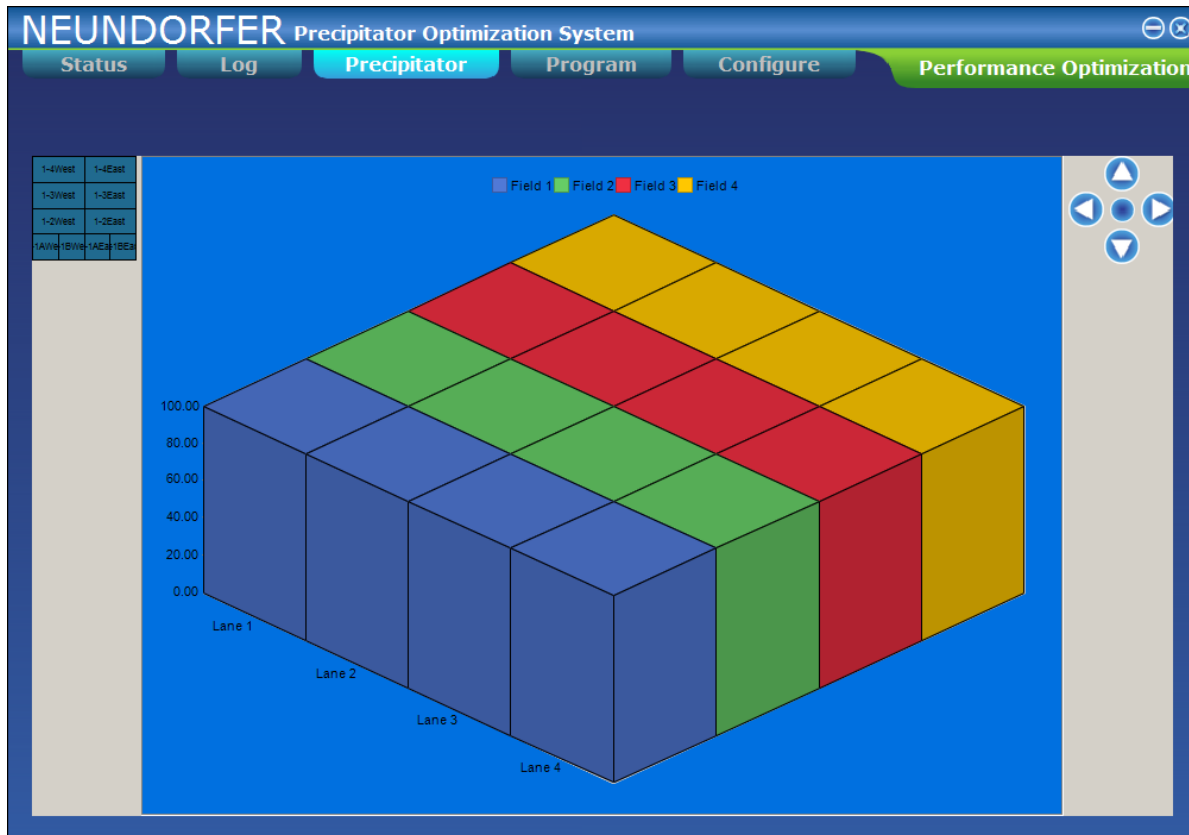
## Log Tab



*LOG TAB*

POS logs all actions taken by the **Performance Optimization** module. These actions can be viewed in the alarm log (see page 151) and in the **Log** tab. The **Log** tab shows a text log of performance optimization actions take on a specified day. 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 each area of the date fields (day of week, day, month, year) and use up/down arrows, or click the calendar symbol, to change dates for historical data. Click *Today* to return to the current day's log.

## Precipitator Tab

The **Precipitator** tab displays a 3D bar graph layout of the precipitator voltage controls, showing each T/R set. The bars represent current optimization percentage of each T/R set. (Depending on layout of your precipitator, each T/R set may be represented by more than one bar in the graph.)

In this graph, X-axis numbers indicate lane numbers, and Y-axis numbers indicate optimization percentage. Each color (row) represents a field in the precipitator. Mousing over any part of a field highlights it by making bars in the other fields mostly transparent.



***PRECIPITATOR TAB***

You can rotate orientation of the graph by clicking up/down/left/right arrows in the upper right-hand corner of the window. Click circle in middle of the arrows to return to default orientation.

In upper left-hand corner of the window is a miniature diagram showing layout of the precipitator, with each T/R set labeled in its own box.

## Program Tab

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

An optimization program contains a series of steps. In each step, POS adjusts voltage control secondary current limits to a certain percentage of the full-scale limit. A step can adjust any number of voltage controls on the precipitator.

The main area of the **Program** tab is used to display grids representing each step in the program. Each square or rectangle in a grid represents a T/R set. (Each is labeled with the name of the T/R, and the optimization percent set for that T/R.) The grid in the center, which is larger than the two on either side, is the "active" step and can be edited. The grids on either side represent the program steps immediately before and after the active step.

To view and edit a different program than the current program use the *Select Program* drop-down menu. If the current program has been modified you cannot select another program until the changes are saved or cancelled.

The screenshot above shows three steps of an optimization program named "PROGRAM1." Each step in the program sets all T/R controls to the same percentage of secondary current. In Step 1, all T/Rs are set to 85 percent. In Step 2, all T/Rs are set to 75 percent. In Step 3, all T/Rs are set to 70 percent.
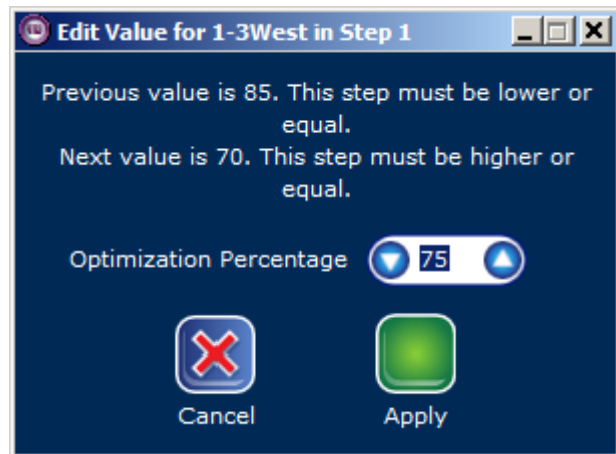
To create a new performance optimization program, click the **New Program** button. To delete the selected program, click the **Delete Program** button.

To edit an optimization program, interact with the selected program displayed in the **Program** tab. The editable step is displayed in the center of the tab. Use the **First**, **Prev**, **Next** and **Last** buttons to navigate to the step you want to edit.

Click in any of the boxes with a T/R set name to change the percentage setpoint for this step. This opens the **Edit Value** window for the T/R set.

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.
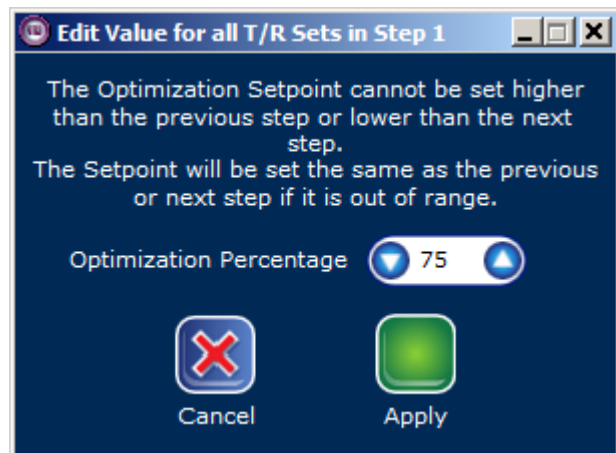

*EDIT VALUE WINDOW*

Repeat this process for each T/R set you want to set a percentage for in the current step.

To change the percentage for all of the sets in the step to the same value, click the **Edit All** button to the left of the navigation buttons. This opens the **Edit Value for all T/R Sets** 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 for all T/R Sets** window, or click the **Cancel** button to close without saving the change.


*EDIT VALUE FOR ALL T/R SETS WINDOW*

When you are done making changes to the performance optimization program, click the **Save** button to save the changes. Click the **Save As** button to save the changes under a different program name and leave the original program unchanged. Click the **Cancel** button to discard the changes.

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

## Configure Tab

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



*CONFIGURE TAB*

Performance optimization can run based on process load or precipitator power. Click the box for **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.

Click the box for **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 to burn waste fuel.

The displays for **Total KW-hr** shows the total number of kilowatt hours that were not used based on reductions to operating levels caused by running the **Performance Optimization** module. The **Lifetime Cost Savings** display shows a value calculated by POS based on the Total KW-hr number and the value entered in the **KW-Hr Cost ($/KW-Hr)** field. Use the **Reset** buttons next to either of these displays to reset the value to 0.

The remaining fields are used to specify limiting parameters for performance optimization.

- ***Total Load Change Abort (MW)*** – If, since the start of optimization, load changes by the number of megawatts entered in this field, optimization aborts and restarts the program from the beginning. This number is checked continuously and can cause abort at any time while optimization is running. It is used only when optimization is based on process load.

- ***Step Load Change Abort (MW)*** – If, since the start of the current program step, load changes by the number of megawatts entered in this field, optimization will abort and restart from the beginning. This number is checked at the end of a step and will only cause abort at the end of a 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 go back one step. This number, which is a percentage of full-scale power, is only checked at the end of a step and is only used when optimization is based on precipitator power.

- ***Minimum Power Abort (KW)*** – When precipitator power falls below this value, the optimization program aborts to full power. This number, a percentage of full-scale power, 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.

- ***Maximum Opacity Abort (%)*** – If opacity exceeds this value, optimization aborts and all controls return to full power. This number is checked continuously and can cause the program to abort at any time while optimization is running.

- ***Abort Delay Time*** – This value sets a time delay for optimization abort commands. If a limit is exceeded, optimization will wait this time period before aborting. If the limit is still out of range after the time delay runs out, optimization aborts. This is useful to prevent optimization from aborting during brief opacity excursions, such as those caused by rapping.

- ***Maximum Step Opacity Stepback (%)*** – If, during a single step, precipitator opacity levels change by the number of opacity points entered in this field, the optimization program will go back one step. This number is checked only at the end of a step.

- ***Maximum Total Opacity Stepback (%)*** – If, since the start of optimization, precipitator opacity level changes by the number of percentage points entered in this field, the optimization program will go back one step. This number is checked only at the end of a step.

- ***Step Time*** – This value sets the length of time for optimization program steps. Values available in the drop-down menus are even multiples of POS log data intervals.

- ***Accelerated StepTime*** – This value sets a multiplier affecting step time. This new step time is used after optimization has been suspended or aborted; it will be used until optimization returns to the program step it was running before suspension, or until optimization has to step back in the program a configurable number of times.

- ***KW-Hr Cost ($/KW-Hr)*** – This field is where you enter the cost per kilowatt hour in dollars—a value is used to calculate ***Lifetime Cost Savings***, displayed on the left-hand side of the window. Just above this display is **Total KW-Hr**, showing total power saved. Both these values can be reset by clicking the **Reset** button next to them.

- ***Thaw Time*** – This value sets how often the optimization algorithm will "unfreeze" frozen lanes and attempt to optimize them again. To completely turn off this function, click ***Disabled*** in the drop-down menu.

# 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: Access to Start-up/Shutdown programming and control is password protected. Log in with the appropriate privileges to access the functions in this module.



*START-UP/SHUTDOWN WINDOW: STATUS TAB*

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.
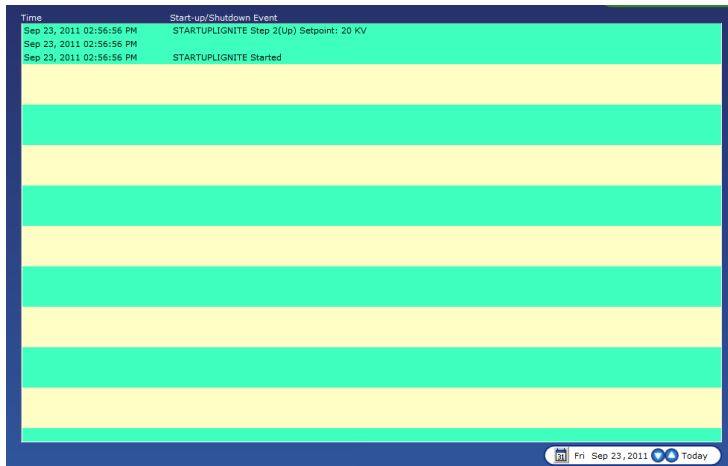


*CONTROL AREA OF STATUS TAB*

Click the *Start* button to begin the selected program. Click the *Stop* button to abort the currently running program. Use the drop-down 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 'true' 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.
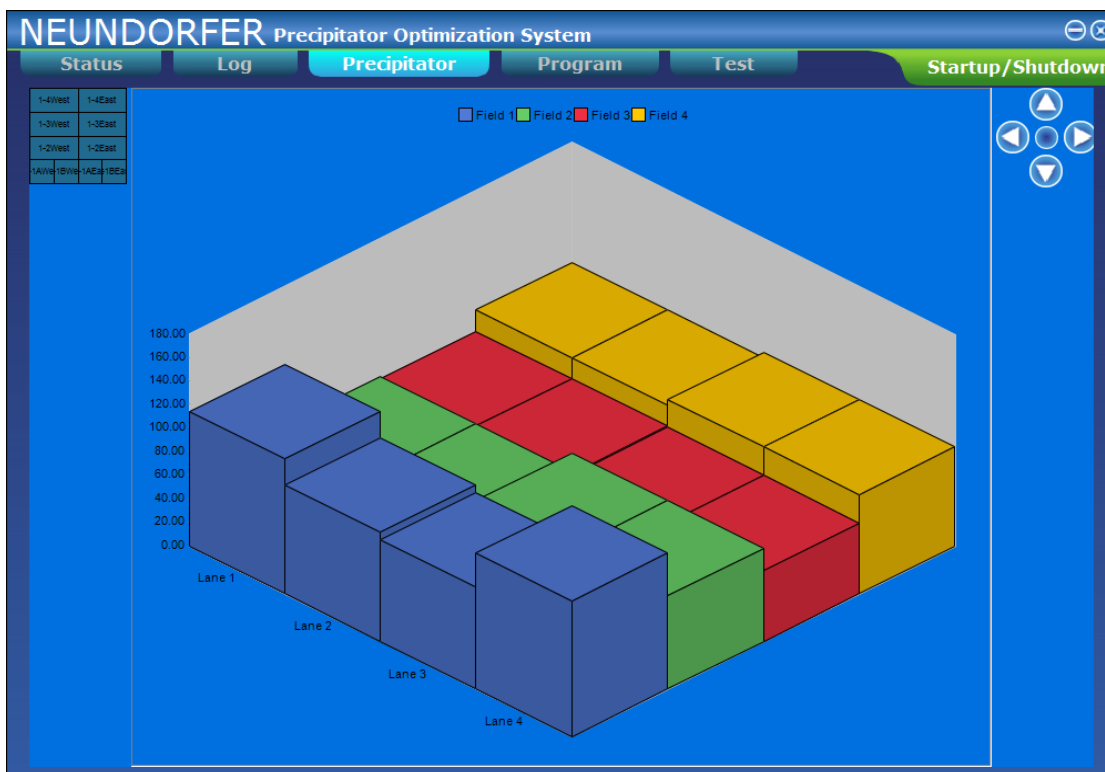
## Log Tab



*LOG TAB*

All **Start-up/Shutdown** module actions are logged by POS. They displayed in the **Log** tab and in the alarm log. When you first open this tab, data is display 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.

## Precipitator Tab



*PRECIPITATOR TAB*

The **Precipitato**r tab displays a 3D bar graph layout of voltage controls, showing each T/R set. The bars represent current operating level of each T/R set, based on the parameter the selected program is using as a limit. You can rotate view of the graph using the up/down/left/right arrows in upper right-hand corner of the tab. Click circle in middle of the arrows to return to default orientation.

## Program Tab

The **Program** tab is used to view and edit existing start-up and shutdown programs or create new programs.



*PROGRAM TAB*

Use the **Select Program** drop-down 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 the voltage control parameter to adjust during the program: *KV Secondary Limit* or *Conduction Angle*.

Use the drop-down 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 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.

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.

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.

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*. Copy and re-save an existing program with a new name by selecting a program name from the list and clicking *Copy Program*. Click *Next* to proceed.



*SOURCE 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 page 60 for more information on Performance Optimization.) After making your selections, click *Next* to proceed with the wizard.



*TYPE 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.



*ANALOGS SCREEN*

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



*DIGITALS 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.



*STEPS 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.



*CONTROLS PAGE*

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**.
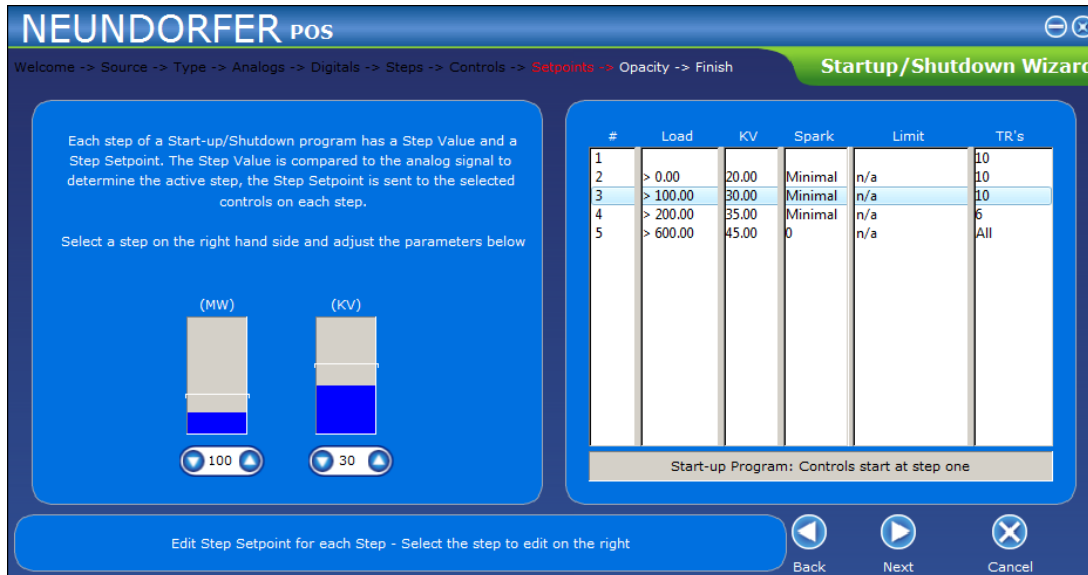


*SELECTING T/R SETS WINDOW*

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

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.



**SETPOINTS 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.
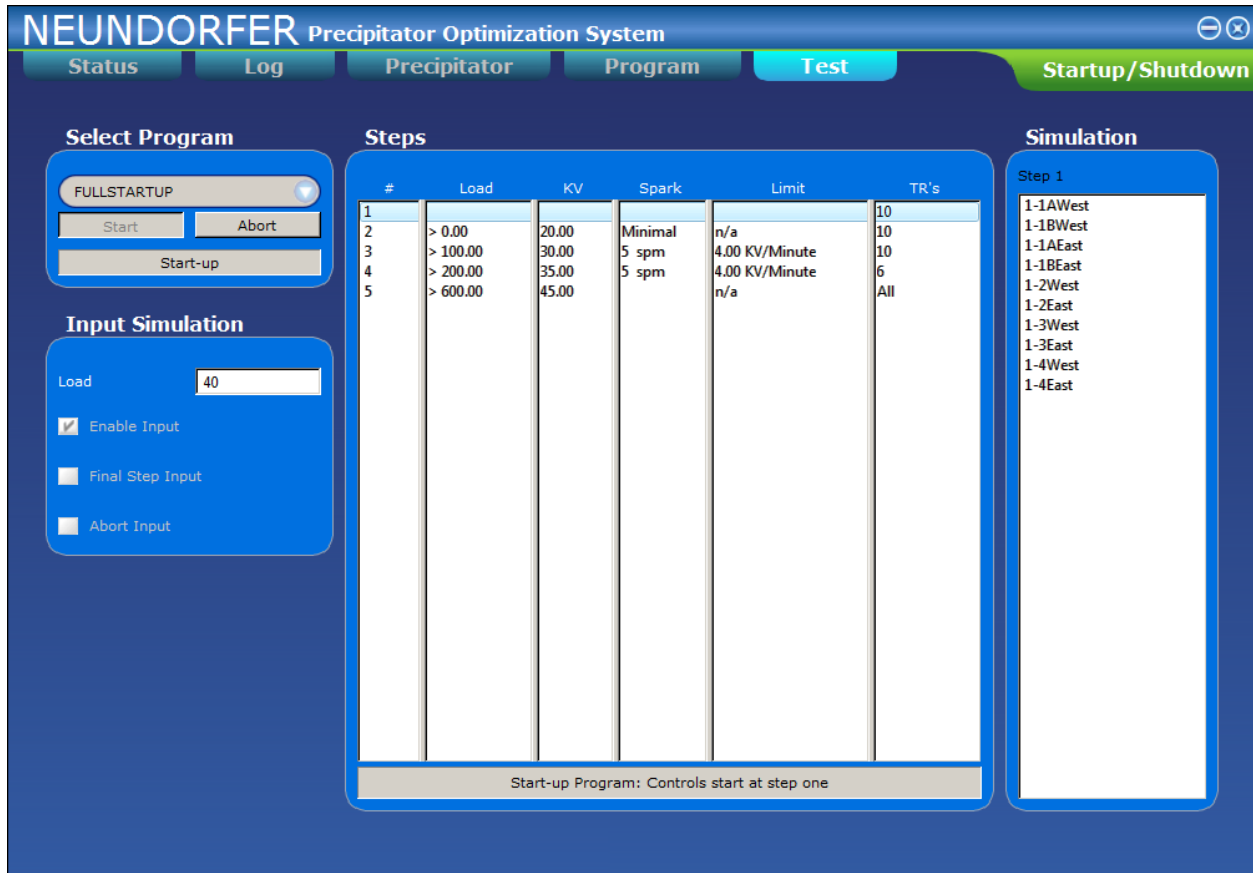


**OPACITY SCREEN**

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 drop-down 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 are 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.

# 21. T/R Set Auto Adjust

## Overview

The **T/R Set Auto Adjust** module is used to automatically change T/R set voltage control settings based on analog or digital inputs to POS. When the configured condition becomes true, the changes are broadcast to all T/R sets associated with the same precipitator. When the condition returns to a false state, the T/R sets are told to revert to their normal operating condition.

Access the **T/R Set Auto Adjust** module 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 *T/R Set Auto Adjust*.

NOTE: Access to T/R Set Auto Adjust configuration and control is password protected. Log in with the appropriate privileges to access the functions in this utility.



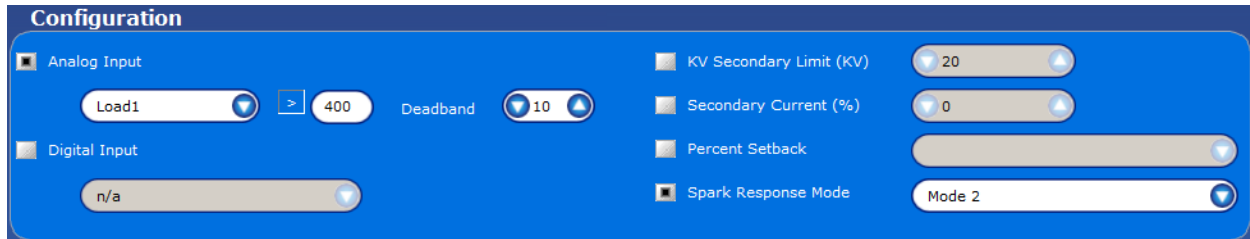*T/R SET AUTO ADJUST: STATUS TAB*

## Status Tab: Control

The **Control** area at the top of the window 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.

## Status Tab: Configuration

The left hand side of the **Configuration** area (bottom third of the **Status** tab) 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 drop-down menu 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 Load1 input is greater than 400 with a 10 MW deadband, then the module will be active; if load drops below 400, the module will be inactive.

To select a digital input as the monitored value, click the ***Digital Input*** checkbox. Use the drop-down menu 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.
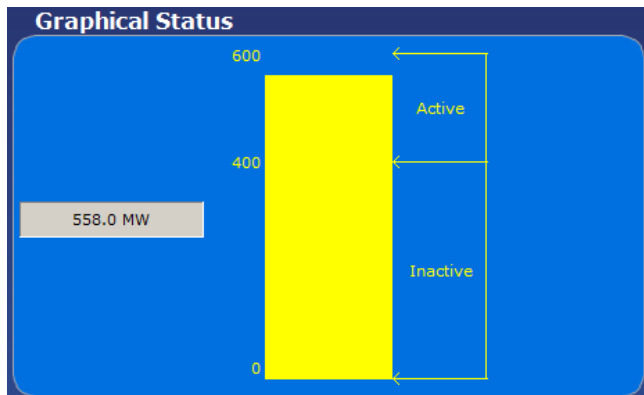
Select ***KV Secondary Limit (KV)*** and use the up and down arrows to set the KV upper limit on the voltage controls when the module is active.

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 drop-down menu 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 drop-down menu to select mode 1, mode 2 or mode 3 in the voltage controls when the module is active.

## Status Tab: Graphical Status



*GRAPHICAL STATUS AREA*

When an analog parameter is selected in the configuration, 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.
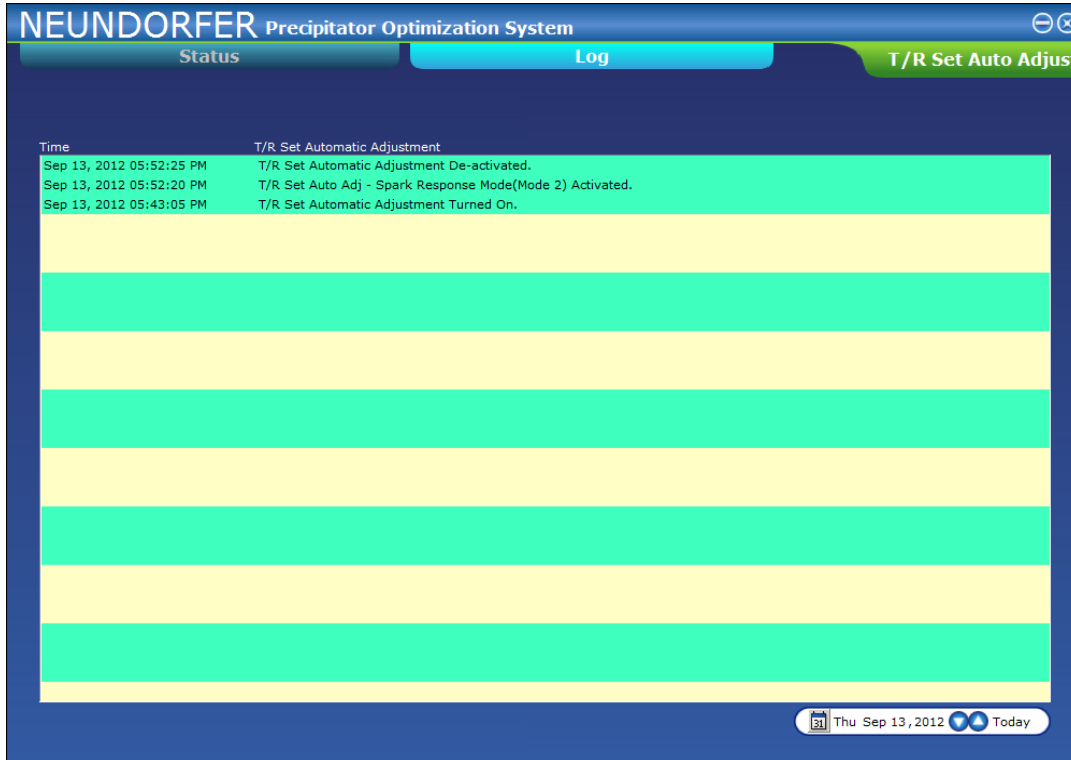
## Status Tab: Status



*STATUS AREA*

The **Status** area shows a summary of the module, including the last active and inactive transition points.

## Log Tab



*LOG TAB*

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

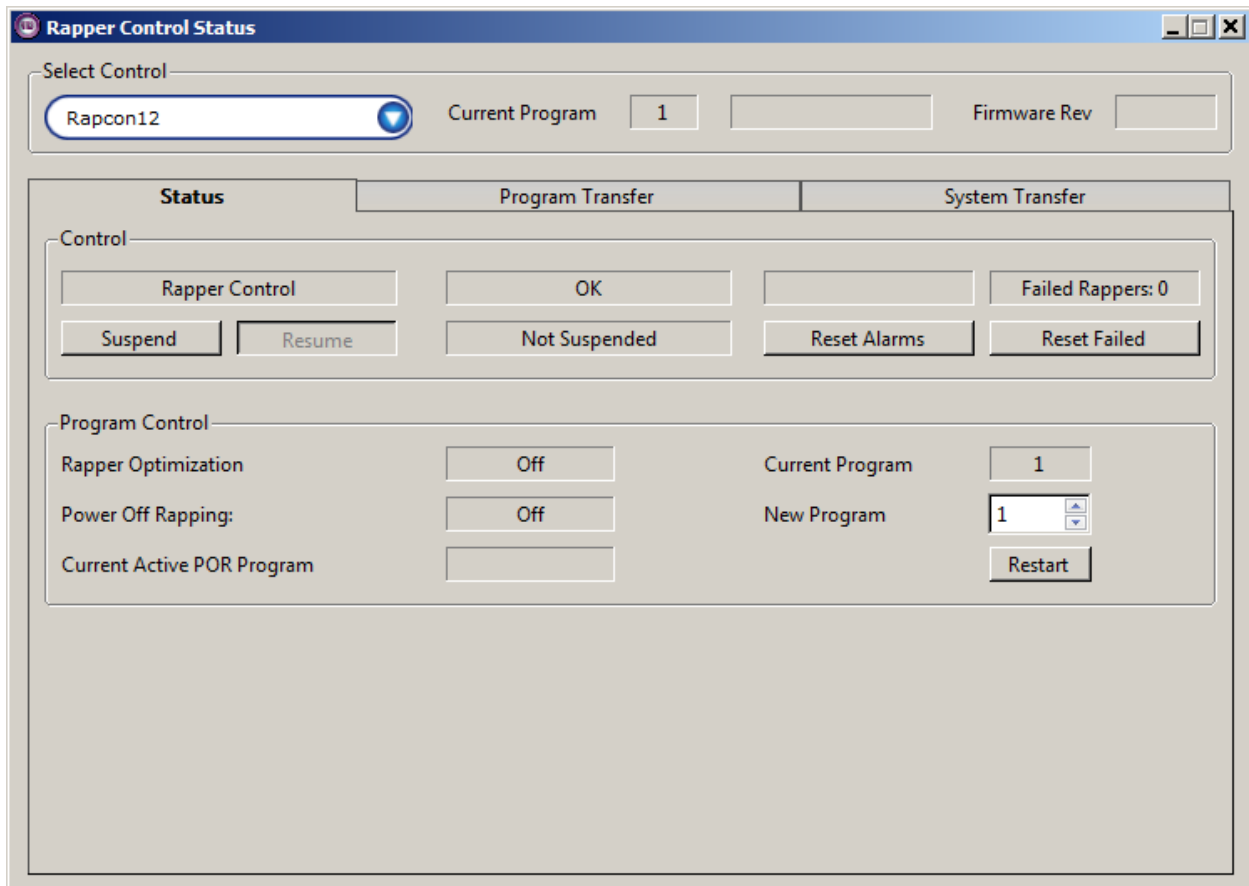# 22. Rapper Control Status

## Overview

The **Rapper Control Status** window displays status of the selected rapper control. From this window, you can also switch rapper programs and reset control alarms, transfer rapping programs between the rapper control and the POS computer, and update rapper control configuration settings

Access **Rapper Control Status** from the rapper control menu. On the plan view page, click on a rapper control icon and then click **Rapper Control Status**. Access to many **Rapper Control Status** controls requires logging in with an account that has appropriate security privileges.

The **Rapper Control Status** window has two sections. Along the top is a drop-down menu for selecting a specific control. If there is more than one rapper controller associated with the precipitator, use this menu to select the correct rapper control before proceeding.

To the right of the **Select Control** drop-down menu are areas showing currently active rapping program, control status, and firmware revision for the selected control.

There are three tabs in this window: **Status**, **Program Transfer**, and **System Transfer**. These tabs and the information and actions on them all relate to the selected rapper control.
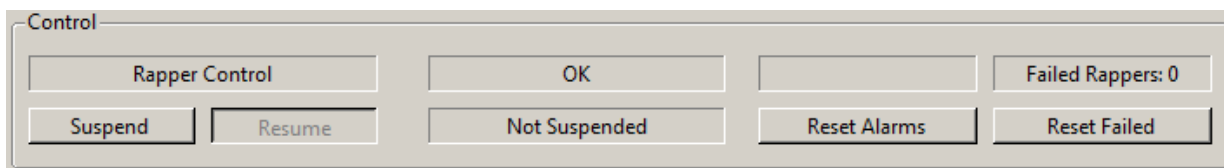


*RAPPER CONTROL STATUS WINDOW, STATUS TAB*

## Status Tab

The first section of the **Status** tab, **Control,** contains the following items:

- Rapper control name (description of the rapper control)
- Communication status of the rapper control
- Alarm indicator (displays alarm alerts)
- Number of failed rappers indicator
- *Suspend* button – click to pause the currently active rapping program
- *Resume* button – click to resume the rapping sequence where the program left off. External inputs from the DCS or other digital inputs can also be used to suspend and resume rapping.
- Suspend status for rapping program
- *Reset Alarms* button – click to reset alarm actuated within the rapper control
- *Reset Failed* button – click to reset status of rapper that failed to operate properly during the last rapping cycle, setting to 'ready' status for the next rapping cycle

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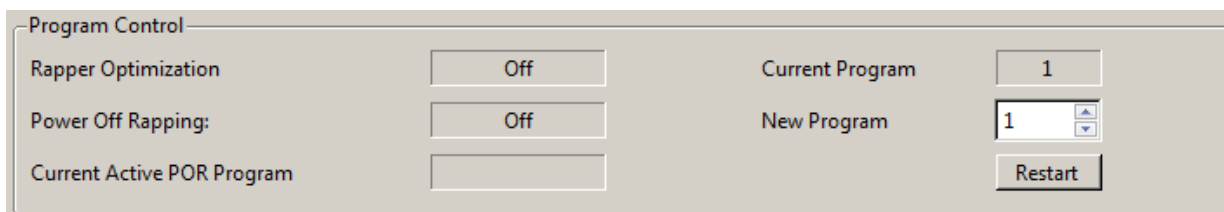
NOTE: To change rapping programs or suspend/resume rapping from POS, the MicroRap control's face panel thumb wheel switch must be set to position 0 to enable remote control.



*CONTROL AREA OF STATUS TAB IN RAPPER CONTROL STATUS*

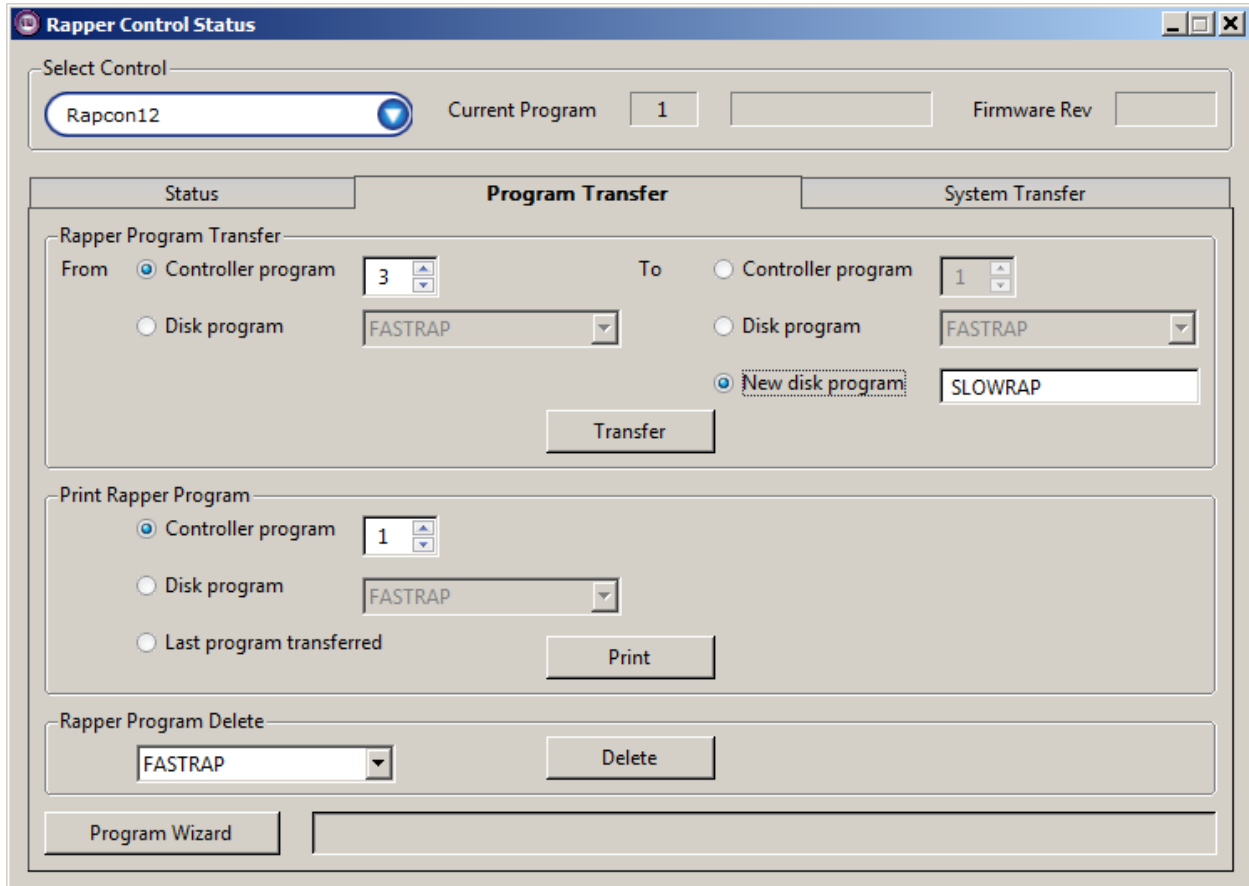The second section of the **Status** tab, **Program Control,** contains the following items:

- Rapper Optimization indicator shows if rapper optimization is turned on or off
- Current Program indictor shows which rapping program is currently active
- Power Off Rapping indicator indicates if power off rapping is running or not
- *New Program* selector – click into this field and type a number, or use the up/down arrows, to set which rapper program number to run. If you change to a different rapper program number than the one currently running, the *Restart* button under this field changes to a *Start* button; click that to apply the change.
- Current Active POR Program indicator shows name of the currently active Power Off Rapping program, if one is running.
- *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.



*PROGRAM CONTROL AREA OF STATUS TAB IN RAPPER CONTROL STATUS WINDOW*

## Program Transfer Tab

The **Program Transfer** tab of the **Rapper Control Status** window is used to manage rapping programs for the selected rapper controller. From here, you can transfer programs between the MicroRap controller and hard drive on the POS computer, print rapping programs, or delete rapping programs.
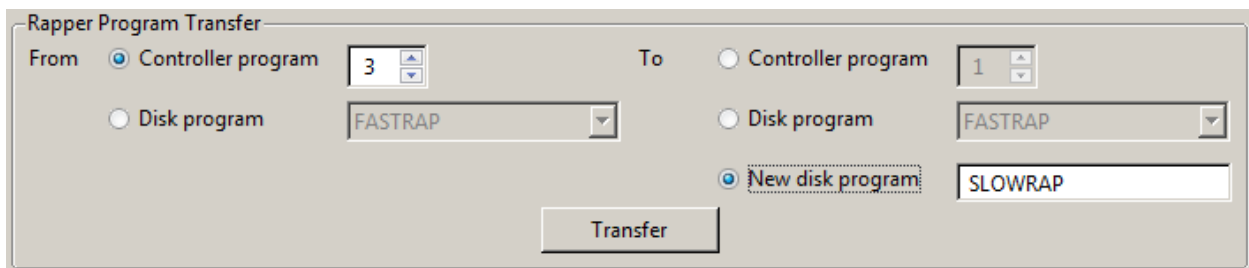


*PROGRAM TRANSFER TAB OF RAPPER CONTROL STATUS WINDOW*

The first section of the **Program Transfer** tab is used to transfer rapping program sequence and timing data between the rapper controller (MicroRap) and disk files (the POS computer). This function is useful because MicroRap only executes programs stored locally at the control, and can only store six programs at once.



*RAPPER PROGRAM TRANSFER SECTION OF PROGRAM TRANSFER TAB*

To transfer rapping program data, click one of the radio buttons on the left-hand side of the screen to select source where the program data is being transferred from.
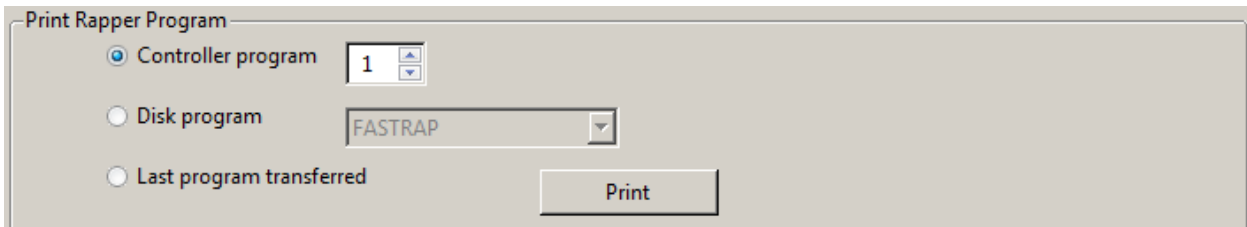
- If you select **Controller program** (MicroRap) as the source, click into the number field and type the desired program number, or use up/down arrows to set the number. (The MicroRap identifies rapping programs by number, from 1 to 6.)
- If you select **Disk program** (POS computer) as the source, use the drop-down menu to select a rapping program name. (The POS computer identifies rapping programs by name.)

Use the radio button on the right-hand side of the screen to select where the rapping program data is being transferred to.

- If you select **Controller program** as the destination, click into the number field and type the desired program number, or use up/down arrows to set the number. (The MicroRap identifies rapping programs by number, from 1 to 6.)
- If you select **Disk program** as the destination, use the drop-down menu to select a rapping program name. (The POS computer identifies rapping programs by name.) This will overwrite the existing program.
- If you select **New Disk program** as the destination, type a new program name and press the enter key. This will create a new program file under that name.

Once the source and destination have been selected, click the **Transfer** button to perform the transfer.

The second section of the **Program Transfer Tab** is used to print rapping program details from three different sources: a specific **Controller program** number (MicroRap), a **Disk program** file (POS computer), or the **Last program transferred**.
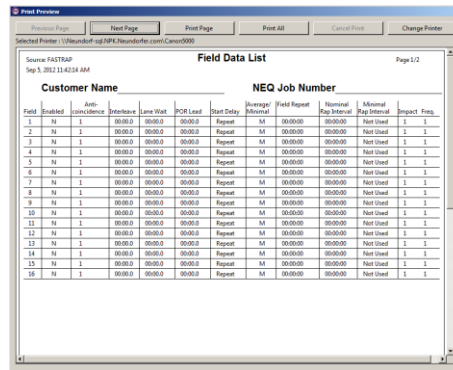


*PRINT RAPPER PROGRAM SECTION OF PROGRAM TRANSFER TAB*

Click one of the three radio buttons to choose the rapping program source.

- If you select **Controller program** (MicroRap), click into the number field or use the up/down arrows to specify a program number. (The MicroRap identifies rapping programs by number, from 1 to 6.)
- If you select **Disk program**, use the drop-down menu to choose the program name. (The POS computer identifies rapping programs by name.)
- Select **Last program transferred**, to select the last program transferred as the source

After choosing the program source, click the **Print** button to open a **Print Preview** window displaying the rapping program.
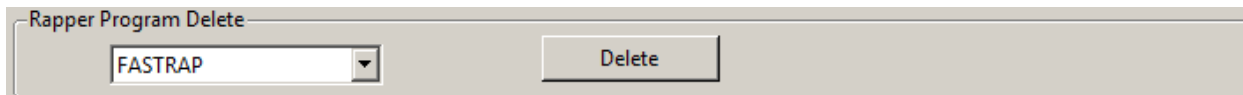
From the **Print Preview** window, you can choose to print a single page or all pages, and you can change printers if others are available.



*PRINT PREVIEW WINDOW*

The third section of the **Program Transfer** tab is used to delete rapping programs. Rapping programs can only be deleted from the POS computer, not the MicroRap controller.
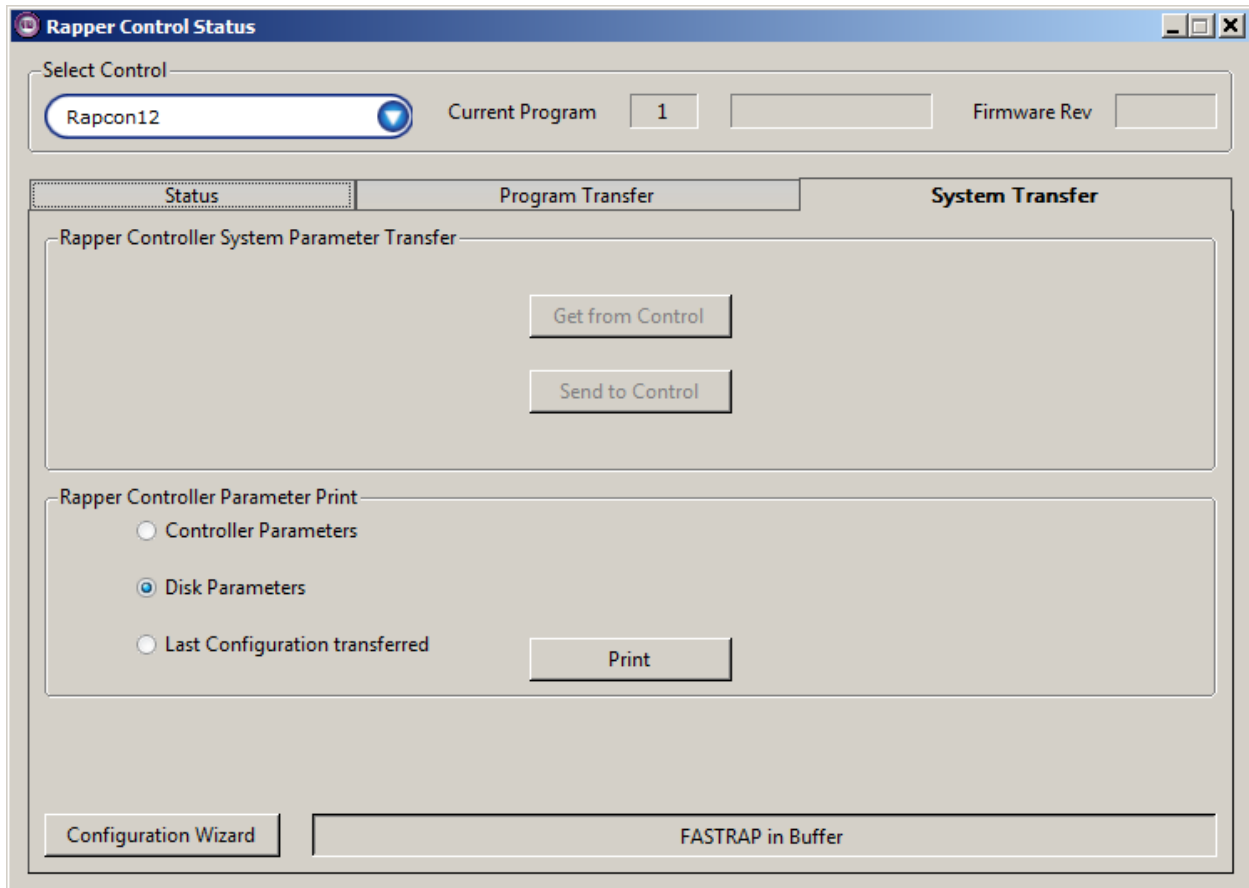


*RAPPER PROGRAM DELETE SECTION OF PROGRAM TRANSFER TAB*

To delete rapping program use the **Rapper Program Delete** drop-down menu to select a rapping program to delete, and then click the **Delete** button.

At the very bottom of the **Program Transfer** tab is the **Program Wizard** button. Click this to launch the **Rapper Program Wizard** to create a new rapping program or modify and existing rapping program. (See page 92.)

## System Transfer Tab

The **System Transfer** tab of the **Rapper Control Status** window is used to transfer rapper control system parameters between the controller (MicroRap) and the POS computer, and to print rapper controller parameters.



*SYSTEM TRANSFER TAB OF RAPPER CONTROL STATUS WINDOW*

The first section of the **System Transfer** tab is used to transfer rapper control setup information (independent of rapping programs) between the control (MicroRap) and the POS computer. These parameters include rapper type, number of retries for failed rappers, and line frequency.

To transfer rapper control system parameters from the rapper control to the POS computer click the ***Get from Control*** button. To transfer rapper control system parameters from the POS computer to the rapper control click the ***Send to Control*** button.
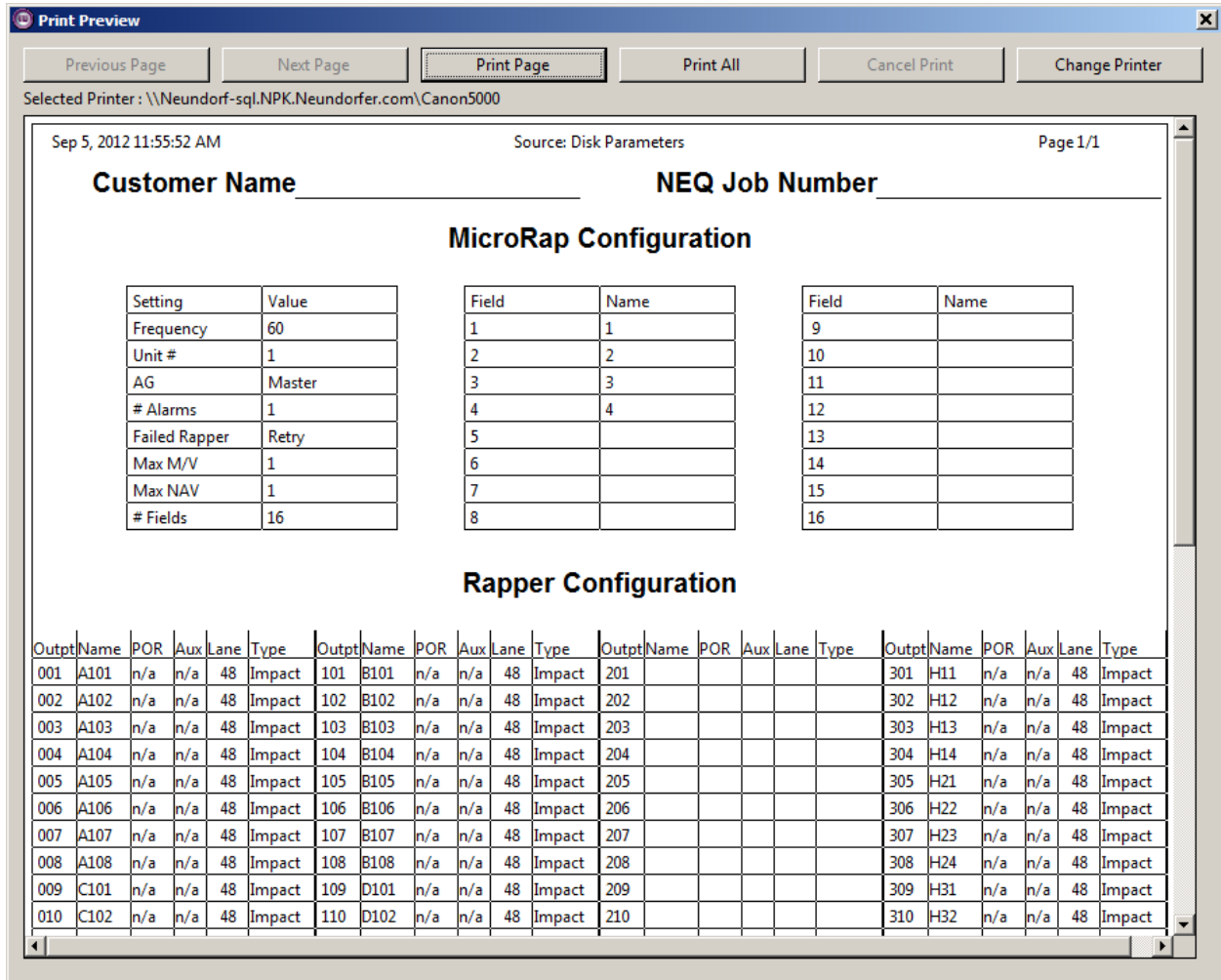
NOTE: Be careful to ensure that all system parameters stored in the POS computer reflect the parameters of the actual rapper control.  Incorrect parameters may cause damage to the rapper control or rappers.

The second section of the **System Transfer** tab is used to print rapper controller (MicroRap) parameters from three different sources: ***Controller Parameters*** (MicroRap), ***Disk parameters*** (POS computer), or the ***Last Configuration transferred***.

To print rapper controller parameters click one of the three radio buttons to select source of rapper controller parameters:

- **Controller Parameters** prints from the rapper control (MicroRap).
- **Disk Parameters** prints form the POS computer.
- **Last Configuration transferred** prints information from the last set of paramaters transferred

Click the **Print** button to open a **Print Preview** window. From this window, you can choose to print a single page or all pages, and you can change printers if others are available.



| Previous Page | Next Page | Print Page | Print All | Cancel Print | Change Printer |

Selected Printer : \\Neundorf-sql.NPK.Neundorfer.com\Canon5000

Sep 5, 2012 11:55:52 AM     Source: Disk Parameters     Page 1/1

**Customer Name** _____ **NEQ Job Number** _____

### MicroRap Configuration

| Setting | Value |
|---|---|
| Frequency | 60 |
| Unit # | 1 |
| AG | Master |
| # Alarms | 1 |
| Failed Rapper | Retry |
| Max M/V | 1 |
| Max NAV | 1 |
| # Fields | 16 |

| Field | Name |
|---|---|
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | |
| 6 | |
| 7 | |
| 8 | |

| Field | Name |
|---|---|
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |

### Rapper Configuration

| Outpt | Name | POR | Aux | Lane | Type | Outpt | Name | POR | Aux | Lane | Type | Outpt | Name | POR | Aux | Lane | Type | Outpt | Name | POR | Aux | Lane | Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001 | A101 | n/a | n/a | 48 | Impact | 101 | B101 | n/a | n/a | 48 | Impact | 201 | | | | | | 301 | H11 | n/a | n/a | 48 | Impact |
| 002 | A102 | n/a | n/a | 48 | Impact | 102 | B102 | n/a | n/a | 48 | Impact | 202 | | | | | | 302 | H12 | n/a | n/a | 48 | Impact |
| 003 | A103 | n/a | n/a | 48 | Impact | 103 | B103 | n/a | n/a | 48 | Impact | 203 | | | | | | 303 | H13 | n/a | n/a | 48 | Impact |
| 004 | A104 | n/a | n/a | 48 | Impact | 104 | B104 | n/a | n/a | 48 | Impact | 204 | | | | | | 304 | H14 | n/a | n/a | 48 | Impact |
| 005 | A105 | n/a | n/a | 48 | Impact | 105 | B105 | n/a | n/a | 48 | Impact | 205 | | | | | | 305 | H21 | n/a | n/a | 48 | Impact |
| 006 | A106 | n/a | n/a | 48 | Impact | 106 | B106 | n/a | n/a | 48 | Impact | 206 | | | | | | 306 | H22 | n/a | n/a | 48 | Impact |
| 007 | A107 | n/a | n/a | 48 | Impact | 107 | B107 | n/a | n/a | 48 | Impact | 207 | | | | | | 307 | H23 | n/a | n/a | 48 | Impact |
| 008 | A108 | n/a | n/a | 48 | Impact | 108 | B108 | n/a | n/a | 48 | Impact | 208 | | | | | | 308 | H24 | n/a | n/a | 48 | Impact |
| 009 | C101 | n/a | n/a | 48 | Impact | 109 | D101 | n/a | n/a | 48 | Impact | 209 | | | | | | 309 | H31 | n/a | n/a | 48 | Impact |
| 010 | C102 | n/a | n/a | 48 | Impact | 110 | D102 | n/a | n/a | 48 | Impact | 210 | | | | | | 310 | H32 | n/a | n/a | 48 | Impact |

*PRINT PREVIEW WINDOW FOR PARAMETERS*

Click the **Configuration Wizard** button at the bottom of the page to launch the **Rapper Control Config Wizard** to edit parameters (see page 89).
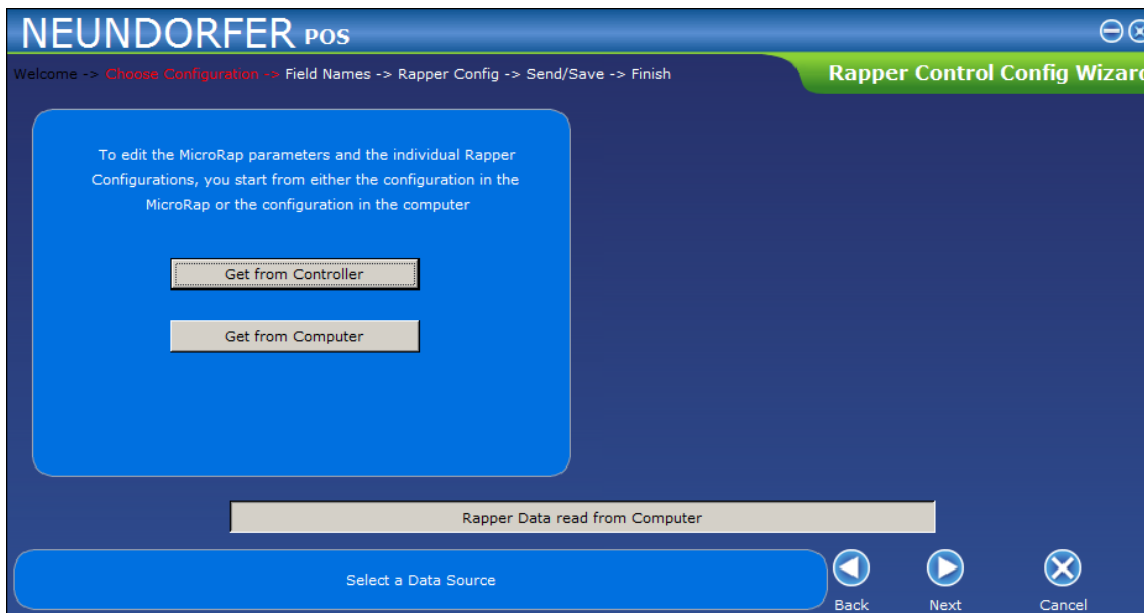
# 23. Rapper Control Config Wizard

The **Rapper Control Config Wizard** is used to change parameters for the MicroRap rapper control. These parameters control how the MicroRap functions and 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.

Access the **Rapper Control Config Wizard** from the rapper control menu. On the plan view page, click on a rapper control icon and select *Rapper Control Status.* Then, click on the **System Transfer** tab and click the **Configuration Wizard** button in the lower left hand corner. Or click on a rapper control icon and select *Edit Program* then click the *MicroRap Configuration Wizard* on the right hand side of the screen.

NOTE: Access to Rapper Control Config Wizard is password protected. Log in with the appropriate privileges to access the functions in this wizard.

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*

The **Choose Configuration** screen is used to slelect the source for the rapper control configuration.

Click the *Get from Controller* button to download the configuration stored in the MicroRap.

Click the *Get from Computer* button to load the configuration information stored on the POS computer.

The status indicator at the bottom of the screen will display that data has been loaded. When the configuration data is ready, click the *Next* button to continue.

*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.

When you have finished editing this information click **Next** to continue with the wizard.
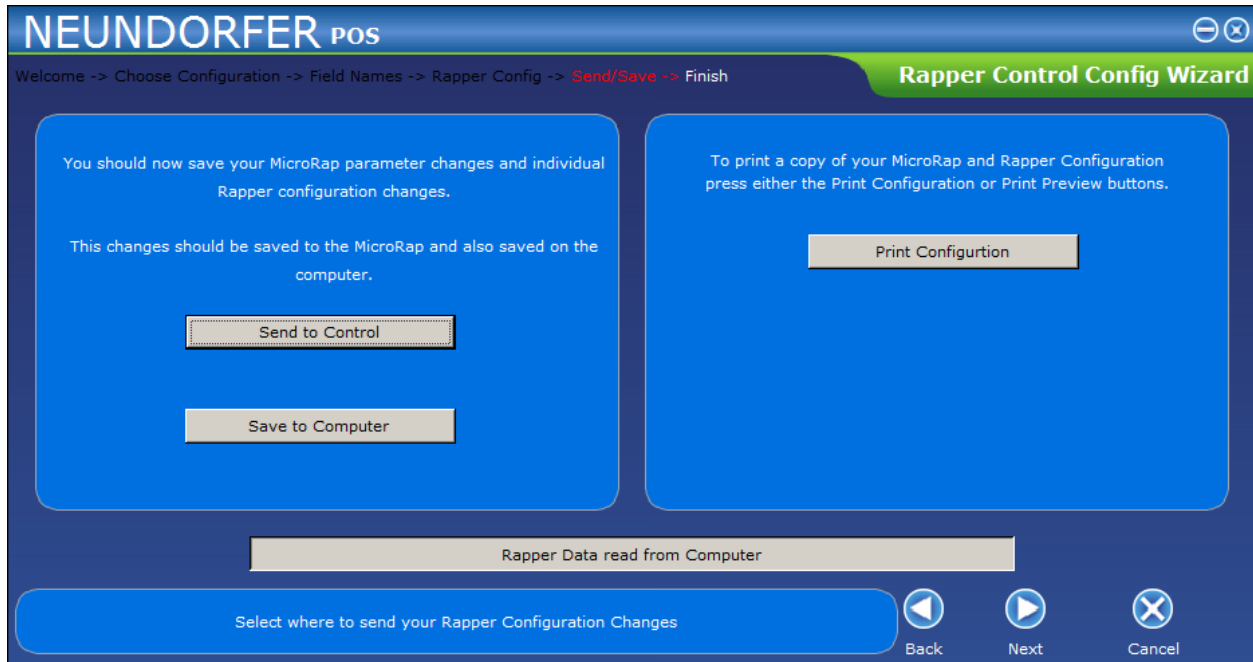


*RAPPER CONFIG SCREEN*

The **Rapper Config** screen is used to configure each output for each card in the MicroRap. Use the **Card X-X** buttons to select pairs of cards to edit. Click in the boxes to edit parameters.

When you have finished editing rapper config data, click **Next** to continue.

*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 controller.

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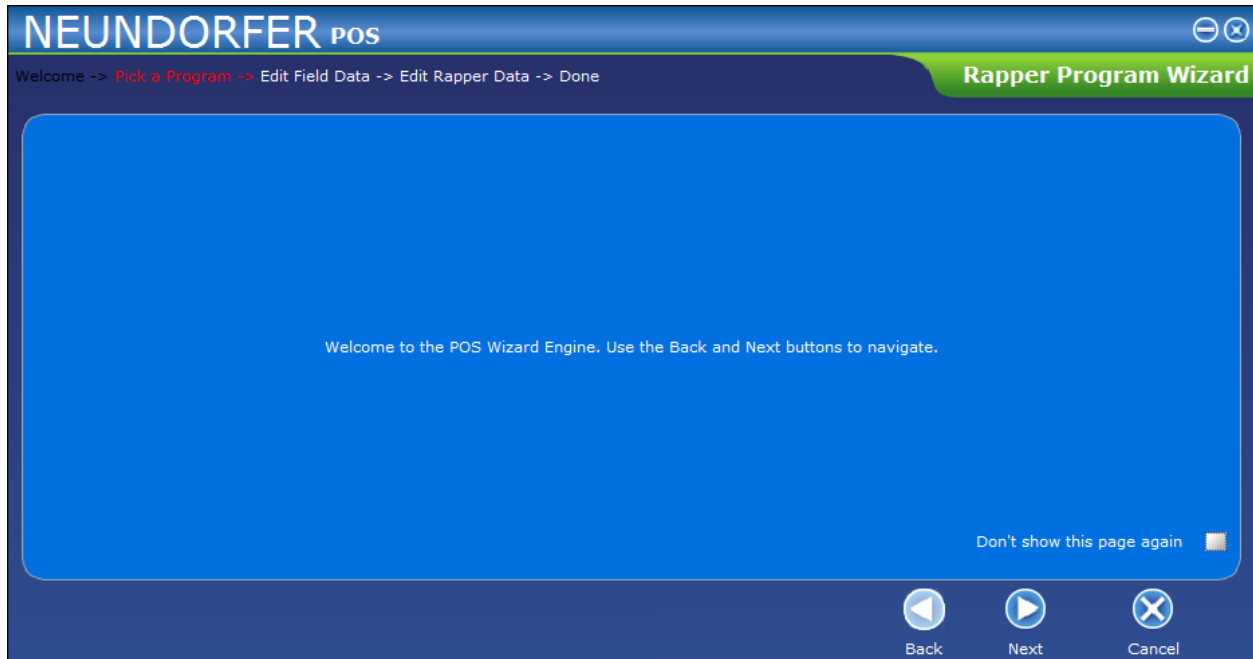
Click the **Next** button to finish the wizard.

# 24. Rapper Program Wizard

## Overview

The **Rapper Program Wizard** provides tools for creating and editing MicroRap rapping programs.

Access the **Rapper Program Wizard** from the rapper control menu. On the plan view page, click on a rapper control icon and then click **Edit Rapper Program**. Access to many **Rapper Program Wizard** controls require logging in with an account that has appropriate security privileges.



*RAPPER PROGRAM WIZARD WELCOME SCREEN*

The **Rapper Program Wizard** is made up of four parts, each with its own screen for selecting various options. Along the top of the window is line of text that indicates where you are in the wizard; the currently active part is in red:
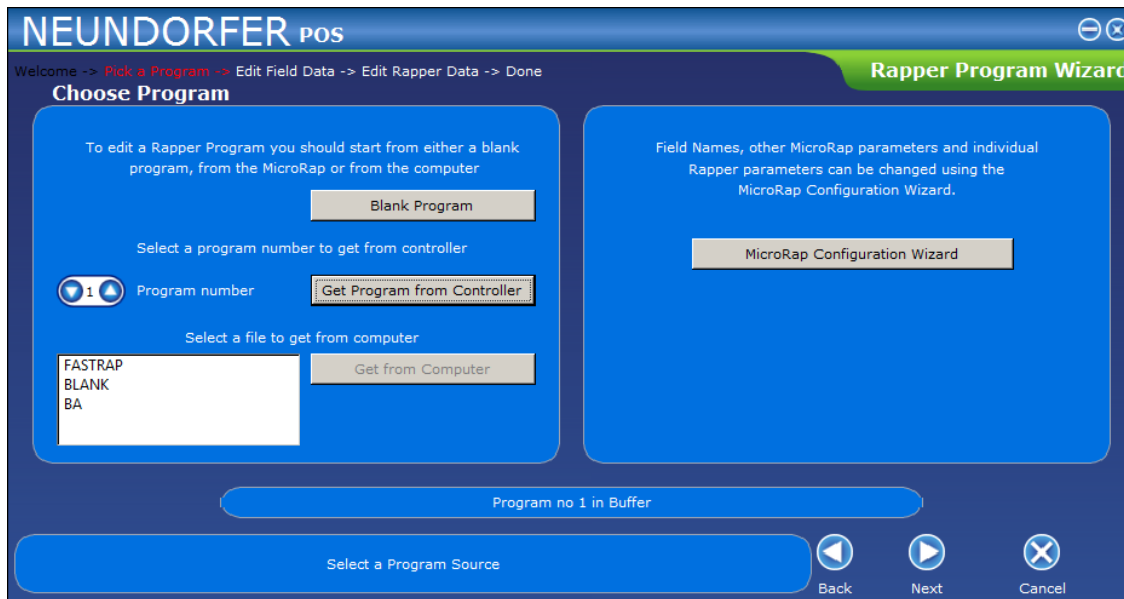


The initial welcome screen in the wizard can be turned off by clicking the **Don't show this page again** box.

## Pick a Program

The first step is to select a program to edit. In the **Choose Program** section there are three choices:
- To start a new, blank rapping program, click the **Blank Program** button.
- To modify a MicroRap program, click into the **Program number** field and type a program number or use the up/down arrows. Then, click the **Get Program from Controller** button.
- To modify a program on the POS computer, click the desired program name in the list on the left, and then click the **Get From Computer** button.

From this screen you can also click the ***MicroRap Configuration Wizard*** button to launch the **Rapper Control Config Wizard**. (See page 89.)
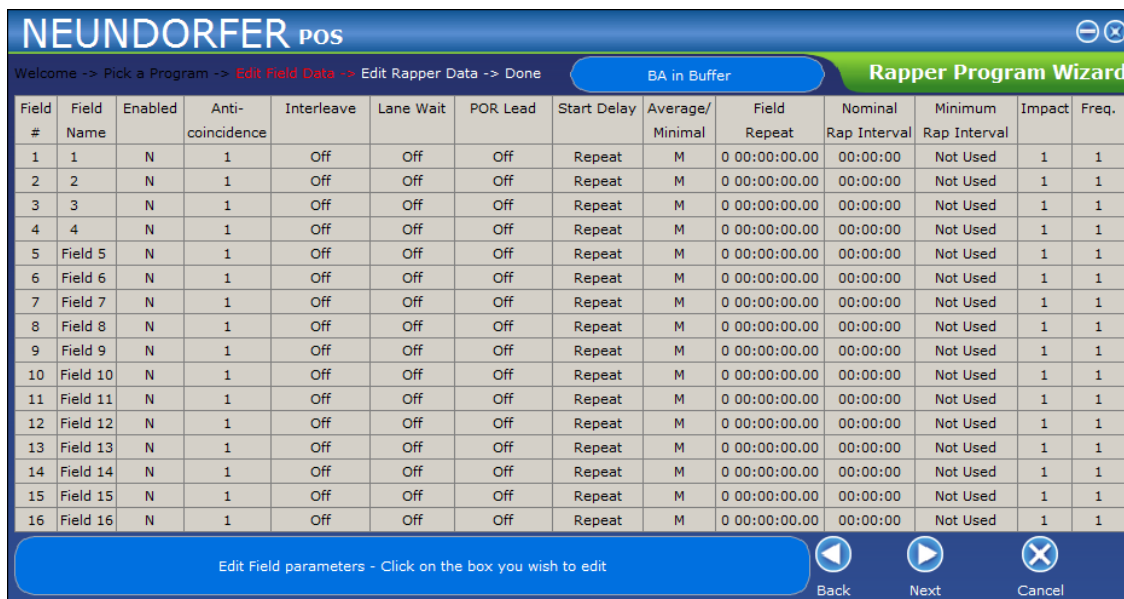


***PICK A PROGRAM SCREEN***

When you are done choosing a program you should see an indication at the bottom of the screen that information is in the Buffer. Click the ***Next*** button to proceed with the wizard.

## Rapper Program Wizard: Edit Field Data

The **Edit Field Data** screen of the **Rapper Program Wizard** is where you set the timing and anti-coincidence parameters for each group of rappers (field) for the rapping program. Options are laid out in a table, with field numbers down the left-hand side (rows), and parameter labels along the top (columns).



***EDIT FIELD DATA SCREEN***

*Field #* and *Field Name* cells are locked, but if you click into any other cell on the table, input options pop up for editing that parameter for the associated field.

Mousing over any of the column headings will show a brief explanation of that parameter in the rapping program. Explanations for each of the parameters are listed below.

- *Enabled* – Used by MicroRap to enable (Y) or disable (N) rapping in a particular field. To enable a given field, rapper and rapping sequence must be assigned to the field; see Edit Rapper Data (next section) for details. NOTE: If *Enabled* is set to *N*, rappers for the specified field will not run.
- *Anti-coincidence* – Prevents two rappers in a designated grouping from operating at the same time. Each group is designated by a number. Use the drop-down menu to select a group number. MicroRap can store up to six anti-coincidence groups. If you have multiple rapper controllers with global anti-coincidence enabled, you can use the Global option to for anti-coincidence groups that span the multiple rapper controllers.
- *Interleave* – Enables the controller to rap two or more fields in the same anti-coincidence group at the same time, while preventing simultaneous rapper operations. Interleave time is the duration between operation of any two rappers in different fields in the same anti-coincidence group (AG). Use the drop-down menu to select an interleave time delay from 0.5 seconds to 63.5 seconds, or turn the interleave option off.
- *Lane Wait* – If turned on, this parameter prevents two rappers in the same lane from rapping at the same time. To set the time delay for rapper sequencing in a lane, use the drop-down menu to set lane wait time, from 0.5 seconds to 63.5 seconds, or turn the *Lane Wait* option off.
- *POR Lead* – Sets how much time elapses between when power off rapping signal is sent to the voltage control, and when signal is sent to operate the rapper. Use the drop-down menu to set the lead time from 0.5 seconds to 63.5 seconds, or to turn off lead time. This is only for hard-wired Power Off Rapping.
- *Start Delay* – Sets a delay between the time the field is set to begin rapping, and when the program is first begun. Use the drop-down menu to set start delay from 1 second to 270 minutes, or to repeat without a delay.
- *Average/Minimal* – Determines how the *Field Repeat* time interval is applied. If set to *A* (average), the controller will attempt to catch up if it falls behind in the rapping sequence, using duration set for *Minimum* instead of duration set for *Nominal*. If set to *M* (minimum), the controller will not attempt to make up any time if it falls behind in rapping sequences. Anti-coincidence considerations can cause rapping to fall behind schedule.
- *Field Repeat* – Sets how much time elapses between when the field starts rapping, and when the field will start rapping again. Use drop-down menus (or click into space and type a number) to specify days, hours, minutes and seconds. Then, click the *OK* button.
- *Nominal Rap Interval* – Sets how much time elapses between rappers in the field. Use the top-down menus (or click into space and type a number) to specify hours, minutes and seconds. Then, click the *OK* button.
- *Minimum Rap Interval* – Sets minimum time elapse between rappers in the field when *Field Repeat* is specified and *Average/Minimal* is set to *A* (average). Use the drop-down menu to set minimal rap interval from 1 second to 75 minutes, or click *Not Used* to turn off.
- *Impact* – Sets the number of strikes per rapping event. Use the up/down arrows to set a number. This setting applies only to electric impact rappers.
- *Freq.* - Sets the frequency of impact for multiple-impact rappers. Use the up/down arrows to set a number. This setting applies only to electric impact rappers.

When you are done editing rapper program field parameters, click the *Next* button to proceed with the wizard.
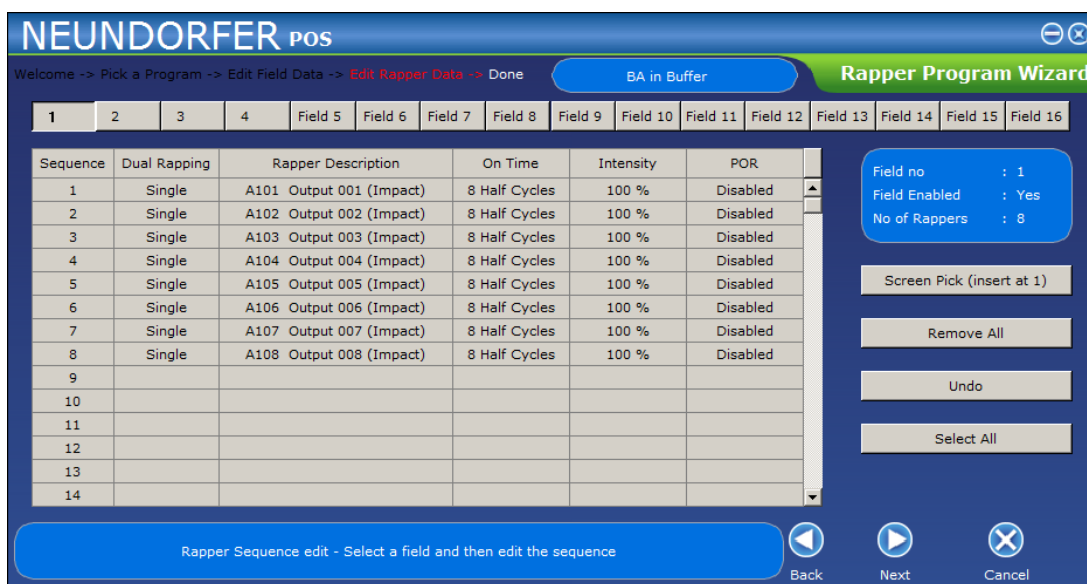
# Rapper Program Wizard: Edit Rapper Data

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.

Most of the screen is filled with a table displaying a list of rappers and their settings for the selected field, in order of rapping sequence.

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



*EDIT RAPPER DATA SCREEN*

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.
- *Dual Rapping* – Allows the controllers to energize two rappers in unison. Click into the cell and use the drop-down menu to choose *Single* or *Dual*.
- *Rapper Description* – Name of rapper. To add or change the rapper associated with a given sequence number, click the *Sequence* number to select that row in the table. Then, click the *Rapper Description* cell in the table, and use the drop down menu to choose or change the rapper name.
- *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 drop-down 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.
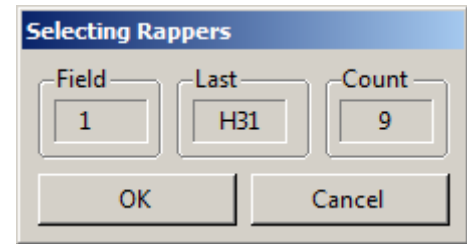
Buttons on the right-hand side of the screen assist in adding or deleting rappers from the sequence table for the selected field, as follows.

- Insert a single rapper:
  a) **Method 1** - Click on a **Sequence** number in the table to select that row. Click the **Screen Pick** button. POS switches to the plan view page, with floating **Selecting Rappers** window. On plan view, click the icon for the desired rapper to auto-fill the **Last** field in the window. Click **OK** to return to the **Rapper Program Wizard**. Note that the row selected in the sequence table is now filled in with details for the selected rapper.



*SELECTING RAPPERS FLOATING WINDOW*

  b) **Method 2** - Click into the **Rapper Description** cell in table for a sequence number that does not have a rapper name associated with it. Use the drop-down menu to select a rapper name.

- Delete a single rapper:
  a) **Method 1** - Select the rapper's row in the sequence table by clicking on its **Sequence** number. Click the **Remove Selected** button.
  b) **Method 2** - Click into the **Rapper Description** cell in table for a sequence number assigned to a rapper number, and click the **-** button next to the drop-down menu to delete the rapper name and its settings.

- Delete multiple rappers:
  1) Hold down the *Ctrl* key on your keyboard, and click one at a time on the **Sequence** number for rappers you want to delete from the table. Selected rows will have a yellow box around them.
  2) Click the **Remove Selected** button.

- Delete all rappers:
  1) Click the **Select All** button.
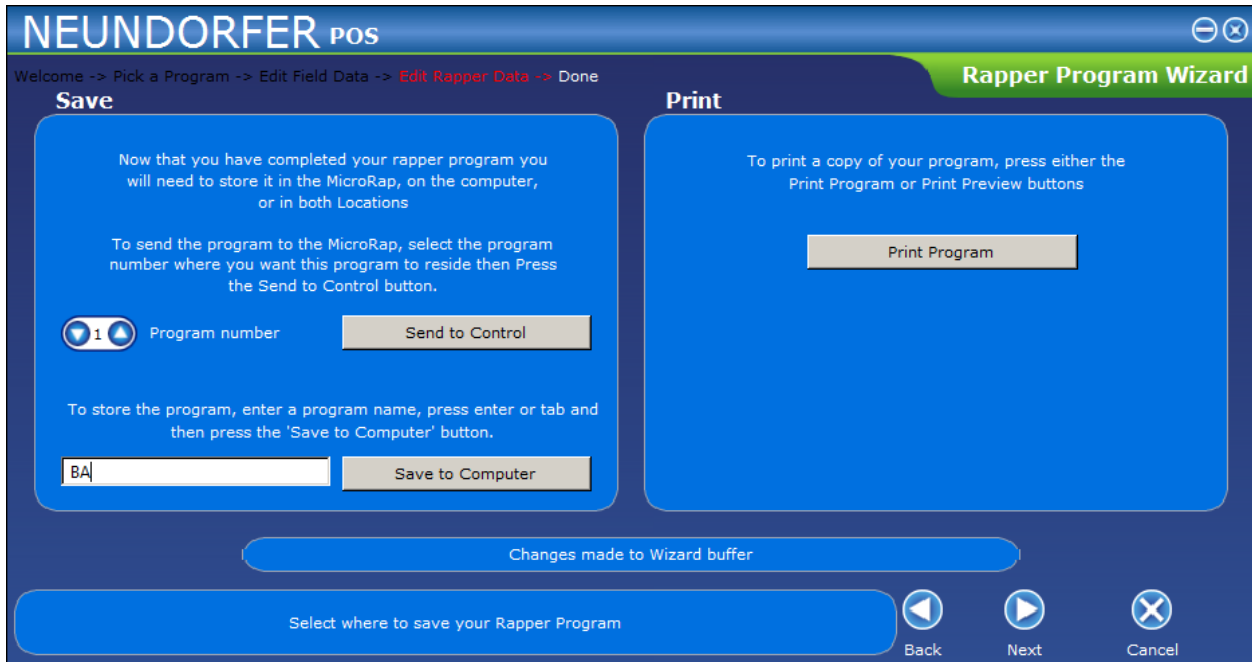  2) Click the **Remove Selected** button.

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.

## Rapper Program Wizard: Save and Print

The final step in the **Rapper Program Wizard** is to decide what to do with the rapping program you created or modified. From the **Save and Print** screen, you can save the program to the controller (MicroRap) or to the POS computer. You can also print a copy of the rapping program.



*SAVE AND PRINT SCREEN*

To send the modified rapping program directly to the rapper controller (MicroRap):
1) Use the up/down arrows to assign a program number, or click into the number field and type a number.
2) Click the **Send to Control** button.

NOTE: If the program is sent into the slot on the MicroRap that holds the currently running program the program will need to be re-started for the new program to begin running.

To save the modified rapping program to the POS computer:
1) Click into the empty field (lower left-hand side of screen) and type a name for the rapping program.
2) Click the **Save to Computer** button.

To print a copy of the rapping program:
1) Click the **Print Program** button.

After you are done saving or printing the rapping program, click the **Next** button to finish the wizard. One last screen is shown, letting you know the rapping program is completed. Click the **Finish** button to close the **Rapper Program Wizard** window.

# 25. Print Program

## Overview

Use the rapper control **Print Program** menu to print system parameters and rapping program details from the MicroRap or the POS computer.

Access the **Print Program** menu from the rapper control menu. On the plan view page, click on a rapper control icon and then click *Print Program*. Four options slide out from the side of the menu; click the appropriate option to perform desired action, as described below.
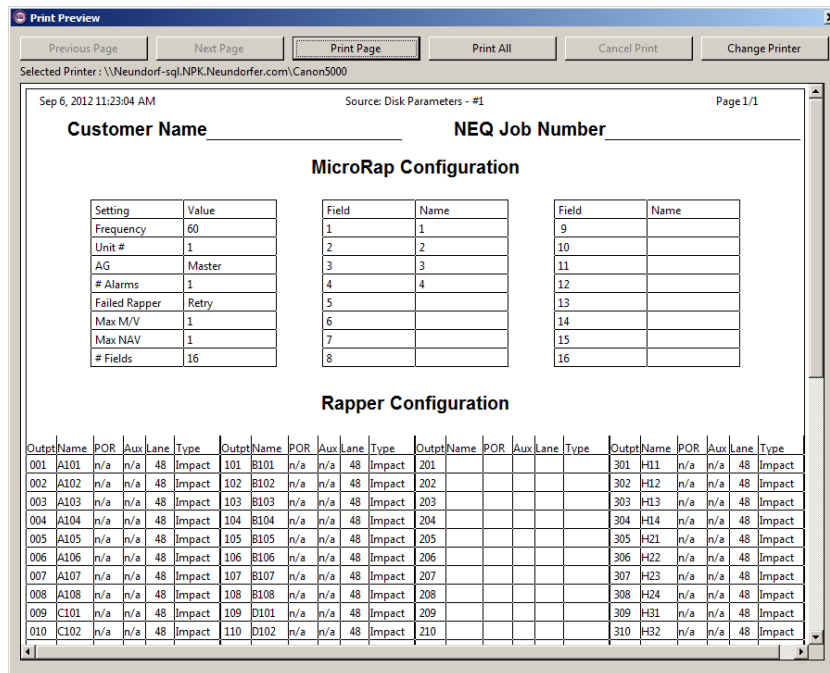


***RAPPER PRINT PROGRAM MENU***

## Print Parameters

Rapper control parameters (settings, configuration, etc.) can be printed from two sources: data stored on the POS computer, or data stored on the controller.

- To print parameters from the POS computer, select *POS Parameter Print* from **Print Program** options in the rapper control menu.

- To print parameters from the controller, select *Controller Parameter Print* from Print Program options in the rapper control menu.

Clicking either of these options opens a **Print Preview** window. The source of the parameter data is identified at the top of the first page (Disk or Controller).

From the **Print Preview** window, you can select a printer and print individual or all pages.



***RAPPER CONTROL PARAMETER PRINT PREVIEW WINDOW***

## Print Rapping Programs

Rapping program details can be printed from two sources: data stored on the POS computer, or data stored on the controller.

- To print rapping program details from the POS computer, select *File Program Print* from **Print Program** options in the rapper control menu. Then, in the **Select...** window, open the drop-down menu and click on a program number. Finally, click the *OK* button.

- To print rapping program from the controller, select *Controller Program Print* from **Print Program** options in the rapper control menu. Then, in the **Select...** window, click open the drop-down menu and click on a program name. Finally, click the *OK* button.



*FILE PROGRAM PRINT:*

*SELECT A PROGRAM NUMBER*



*CONTROLLER PROGRAM PRINT:*

*SELECT A PROGRAM NAME*



*RAPPER CONTROL PROGRAM PRINT PREVIEW WINDOW*

Selecting either of these **Print Program** options opens a **Print Preview** window containing the rapping program data. The source of the rapping program is identified at the top left of the first page (program name for POS or program number for Controller).

From the **Print Preview** window, you can select a printer and print individual or all pages.
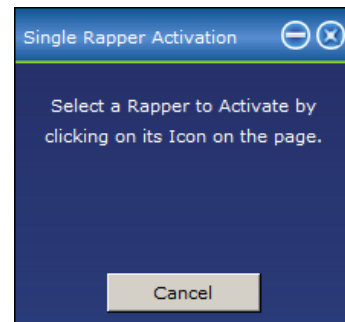
# 26. Single Rapper Activation

## Overview

**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 click *Single Rapper Activation*. Or click on any rapper icon to launch the **Single Rapper Activation** window.

NOTE: Access to Single Rapper Activation is password protected. Login with a username and password that has the appropriate privileges to access this function.

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 drop-down 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 drop-down menu to select the *Rapper On time*. 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.

# 27. Rapper/Opacity Plot

## Overview

**Rapper/Opacity Plot** is a graphical display that correlates rapper actuations with opacity. This is a useful tool for troubleshooting opacity problems by seeing how they relate to rapping re-entrainment in the precipitator.
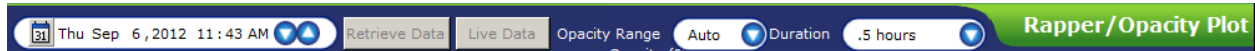
Access **Rapper/Opacity Plot** from the rapper control menu: on the plan view page, click on a rapper control icon and then click *Opacity Plot*.



*RAPPER/OPACITY PLOT WINDOW*

Along the top of the **Opacity/Rapper Plot** window are options for viewing historical or live data, the amount of data displayed, and the opacity plot range. Below those selections is a line plot of precipitator opacity. Below the opacity plot is a graphical plot of all rapping events for the selected fields. Along the bottom are options for sending a screenshot of the plot to the default printer on your POS computer, and checkboxes to choose which rapper groups (fields) to display data for in the graphical rapper plot. Depending on your system configuration, checkboxes available may be labeled differently than shown in the screenshot above, and there may also be an active checkbox for displaying sootblowers on the plot.

## Data Selections



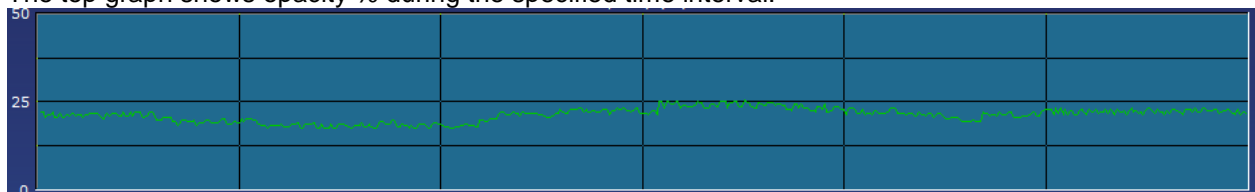By default, **Rapper/Opacity Plot** displays live data; it can also be set to display historical data.

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

To change the Y-axis of the opacity line plot, use the **Opacity Range** drop-down menu to select a specific value. Select *Auto* to let POS determine the most appropriate range.

To change the duration of the data displayed, use the **Duration** drop-down menu to set an interval for the opacity data displayed in the graph: .5 hour, 1 hour, or 2 hours.

## 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. This represents a specific point in time. The opacity plot will be labeled with the percentage opacity at that time. The rapper plot will display the names of specific rappers in each field that fired at that time. Move the mouse left or right to see specifics for different points in time on the X-axis (duration). A timestamp just under the **Opacity %** graph updates and moves with the line.
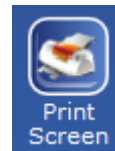
## Select Rapper Activity to Display

The Rapper Activity plot displays rapper activity only for the fields selected. Each configured field has a checkbox in the area along the bottom of the window. Click to check or uncheck boxes for the fields you want to display in the graph. There are sixteen available field slots for rappers and each configuration will be different. Field names and designations are set up in the **Precipitator Data** utility (see page 134). Depending on configuration of your system, there may also be a clickable checkbox for sootblowers.



## 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*

# 28. Rapping Optimization

## Overview

**Rapping Optimization** is used to direct the selected MicroRap rapper control to automatically change between rapping programs stored in the controller 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 rank 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: Rapping Optimization is a password-protected feature of POS; users must log in to turn optimization on or off, or to edit any of the profiles.

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 click *Rapper Optimization*.



***RAPPING OPTIMIZATION WINDOW***

## Rapping Optimization Control

Along the top of the **Rapping Optimization** window is the **Control** area. The **Control** area contains controls for selecting a rapper controller, turning optimization on or off, and displays showing the status of **Rapping Optimization** and the currently running rapping program on the selected rapper control.
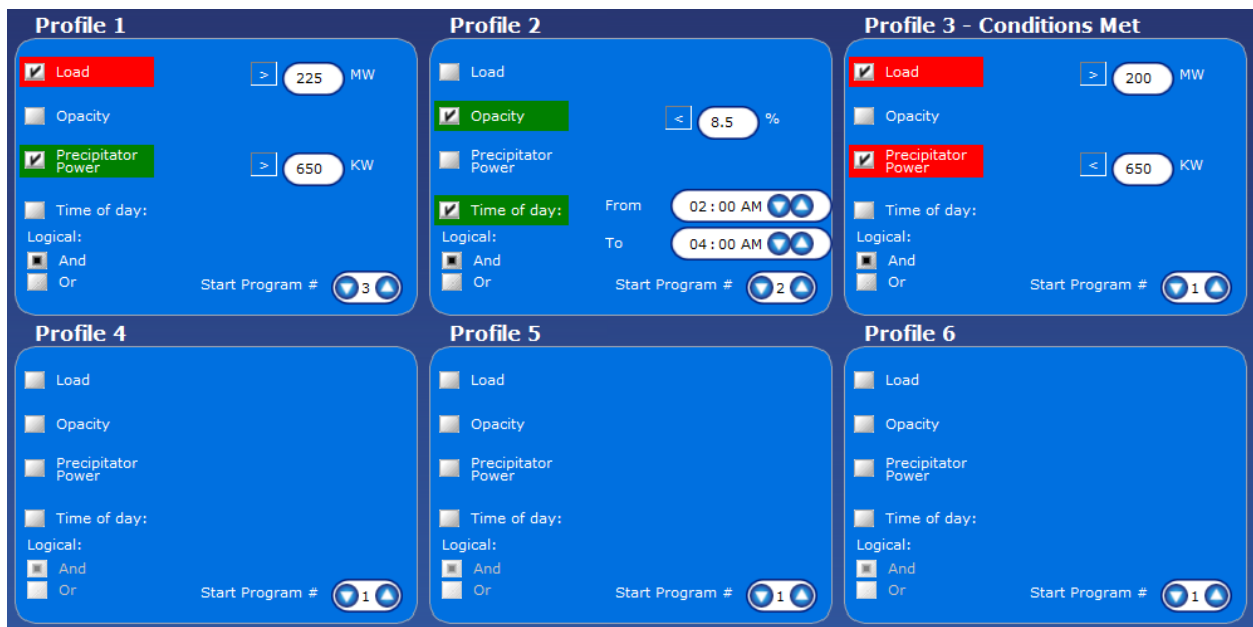


*CONTROL AREA*

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**.

## 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 controller 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.
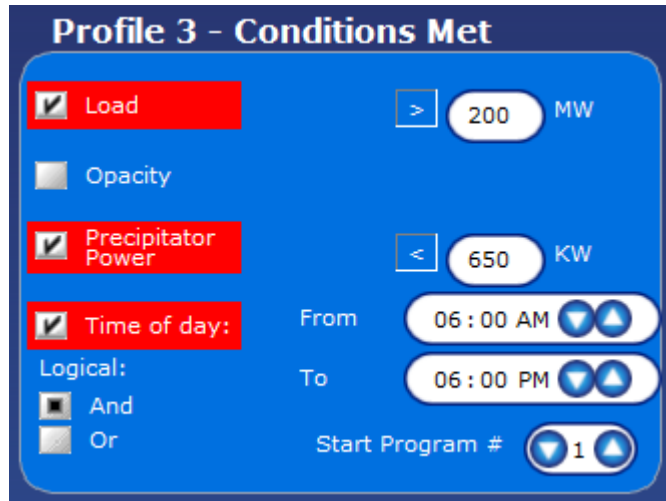
## Configuring Rapping Optimization Profiles

**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.

## 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. This area of POS is password protected; users must log in to make changes.

The configuration window is split into multiple sections. Use the radio buttons to indicate the actions and reactions of **Rapping Optimization**.

**On MicroRap Optimization Shutdown**
(What happens if 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**
(What happens if a load or opacity signal is invalid.)
- ***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**
(What happens if precipitator power is unstable, resulting from four situations: **Performance Optimization is running**, **T/R Set Off**, **T/R Set Tripped**, and **T/R Set Communication Error**. Each situation has its own set of radio buttons for the options listed below.)
- ***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 COMMON PARAMETERS WINDOW***

**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 page 151 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.

# 29. Power-Off Rapping

## Overview

The **Power-Off Rapping** module allows POS to automatically reduce the power of individual T/R sets for a short 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 **Power-Off Rapping** tools, you can configure any number of independent POR events. Each event is scheduled to run at a set time interval to reduce or turn off the power to specified T/R sets while initiating a specific rapping program.

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 click *Power Off Rap*. **Power-Off Rapping** controls and programming require logging in with an account that has the appropriate security privileges.



*POWER-OFF RAPPING WINDOW*

Use the drop-down menu in the upper left-hand corner of the window to select the rapper control. Click the *On* button to enable **Power-Off Rapping**. Click the *Off* button to turn off **Power-Off Rapping**.

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. POR events are color coded. The list on the bottom half of the screen shows which color corresponds to which event.

POR events are displayed in a table at the bottom of the window. Each line of the table shows information about the particular event: POR name, T/R sets that are controlled, set-point for the control(s), rapping program or digital output to run, next start time, duration, repeat time, and whether or not the event is enabled.

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 completely.

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

## New POR Wizard

Click the **Add POR** button at the bottom of the window to create a new POR event.  This launches the **New POR Wizard**.

**New 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** box.

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



*NEW POR WIZARD WELCOME SCREEN*

In the **Select POR** screen, type a name for the event and press the *Enter* key on your keyboard. Then use the drop-down 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 input (drop-down menu on the right) configured in POS from the that will be energized during the POR event. Your POS system may or may not have any digital outputs configured.

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



*SELECT POR SCREEN*

In the **TR Selection** screen, select which T/R sets should be run at reduced power or turned off while the specified rapping program is being run at its scheduled time.

There are two ways to select T/R sets to include in the POR event:

1. Click 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*

2. 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 be returned to **New POR Wizard**.



*PLAN VIEW BUTTON*

Before proceeding to the next screen, specify what should happen to the selected T/R sets during the event. Check the **Turn T/R Set off** box to completely de-energize the T/R set. Or enter a number in the **% Setpoint** or use the up/down arrows to set a percentage to turn down the T/R set secondary current limit during the event.

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



*SELECTING T/R SETS WINDOW*

**NEW POR WIZARD: ACTIVE PERIOD SCREEN**

In the **Active Period** screen, set the start time for the event, its duration, and how often it should repeat.

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* drop-down menu to select how often the POR event should repeat.

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

In the **Enable** screen, enable or disable the POR event you're creating, and assign it a color to distinguish it on the **Schedule** tab of the main **Power-Off Rapping** window:

Click the *Enabled* box to enable this POR event. Uncheck it to disable.

Click one of the color swatches to assign a color to the POR event. The color selected shows up in the larger square just to the right of the palette. Be sure to select a different color than other events so they are easy to distinguish on the schedule.

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



**NEW POR WIZARD: ENABLE SCREEN**

The final screen of the New POR Wizard simply informs you that all settings for the POR event are ready to go. Click *Finish* to return to the **Power-Off Rapping** window. Once you have modified an existing POR event or created a new POR event it will be displayed in the table at the bottom of the screen. Be sure to click the *Apply* button to save the changes and add the event to the POR Schedule. Click *OK* to save changes and close the window. Click *Cancel* to discard the changes and close the window.

## Configure Tab

The Configure tab of **Power-Off Rapping** contains settings that define how **Power-Off Rapping** interacts with other POS modules and how it reacts to changes in the process.

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 page 60 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 conditions and enter values for opacity, load, and load changes. If POS detects these conditions it will halt the current POR event and not let another event begin until the conditions are below the limits.

**Power-Off Rapping** can be configured to make an entry in the Alarm log when initiating or aborting a POR event. Use the selection to decide the priority of the alarm that is recorded. See page 151 for more about alarms.

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



*POWER-OFF RAPPING: CONFIGURE TAB*

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.

# 30. 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 rapper control menu. On the plan view page, click on a rapper control icon and then click **Specialized Rap**.

NOTE: Specialized Rapping is a password-protected feature of POS; users must log in using an account with appropriate security privileges to create or run Specialized Rap programs.

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*

## 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.

**SEQUENCE SCREEN**

**SELECTING RAPPERS WINDOW**
**(PLAN VIEW)**

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 drop-down 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 drop-down 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.

## 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 drop-down 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 drop-down 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*

## 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.

## Finish

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

# 31. Rapper Control

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 area. The **Current Program** area shows the currently running rapping program.

Rapper control is password protected and you must be logged in using an account with appropriate privileges to change the current rapping program or suspend and resume rapping.

To change to a different program, use the up and down arrows next to **New Program** to select a new program.  Then click the ***Start*** button.

If the **Current Program** and **New Program** areas show the same program number, you can re-start the current program. Click the ***Re-Start*** button to reload the program from memory.  If the program has not been changed, the program will not start from the beginning and will continue form the current point.

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.

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

*RAPPER CONTROL MENU*

# 32. 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.

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

*UTILITIES ICON*

The **Utilities Home** screen is the first to appear in the window.



*UTILITIES HOME*

Left-click, hold and drag to reposition the **Utilities Home** window. During repositioning, the window is replaced with a dotted white line, allowing full view of the page underneath.



*UTILITIES HOME WINDOW BEING REPOSITIONED*

On the left-hand side of the Utilities Home screen is a menu with eight buttons. The top one (**Home**) returns you to the **Utilities Home** screen if you are in another module.

The other buttons in the menu are for accessing utilities for reports, graphics (display options), precipitator data options, alarm setup, POS operation status, DCS configuration and start up configuration of POS modules. See the descriptions to the right of the menu to get an idea of what each module is used for.

See page 122
See page 131
See page 134
See page 137
See page 144
See page 145
See page 149

*UTILITIES MENU*

# 33. Reporting

## Overview

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 lower left hand area of the plan view screen. Then, in **Utilities**, click *Reporting*.



*REPORTING MODULE*

The initial screen in **Reporting** displays a list of existing configured reports. From here, you can manage and run existing reports, and create new reports.

To run an existing report, click the *Run Now* button to the right of the report on its row in the table list.

To delete an existing report, locate the report to delete in the list. Click the report's name to select it, and then click the *Delete selected Report* button.

To modify an existing report, locate the report to modify in the list. Click the report's name to select it and then click the *Modify selected report* button.

To create a new report based on an existing report, locate the existing report in the list. Click the existing report's name to select it and then click the *Copy selected report* button.

To create a new, blank report, click the *Create a new report* button.

## Report Wizard: Welcome

Clicking the *Copy selected report*, *Create a new report*, or *Modify selected report* buttons launches the **Report Wizard** window. The initial welcome screen in the wizard can be turned off by clicking the *Don't show this page again* box.



*REPORT WIZARD WELCOME SCREEN*

The **Report Wizard** has eight parts to it, each with its own screen for selecting various options. Along the top of the window is line of text that indicates where you are in the wizard; the currently active part is in red:



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

## Report Wizard: Report Style

The first part of the **Report Wizard**, **Style**, requires specifying whether the report will use the same date range each time it is run (***Absolute start and end times***) or if the dates included will be based on the date and time the report is run (***Relative start and end times***). We recommend selecting ***Relative start and end times*** for reports that will be run periodically, and ***Absolute start and end times*** for one-off reports.



*REPORT STYLE SCREEN*

After checking the box for the desired time period, click the ***Next*** button to proceed to the **Time Period** screen. Options on the **Time Period** screen are different depending on which time period option you selected.

If you selected ***Relative start and end times***, the **Time Period** screen looks like this:



*RELATIVE TIME PERIOD SCREEN*

Use the check boxes to select how far back in time from "now" you want the report to go. The largest allowed timeframe is one year, and the shortest is one hour. The **Previous [x] Hours** option goes all the way up to 24 hours; click the up or down arrows choose the desired increment. The Start and End times are automatically set based on the selection. Each of the selections is for the whole time period previous to the current time. So **Previous 1 Hours** will be the last complete hour before the current hour, **Previous Month** will be the last complete month prior to the current month, etc.

If you selected **Absolute start and end times**, the **Time Period** screen looks like this:



*ABSOLUTE TIME PERIOD SCREEN*

Use the **Start Time** and **End Time** selectors to enter specific dates and times. Each of these is divided into seven sections: day of week, month, day, year, hour, minute, and AM/PM. Click each section and then use the up/down arrows to make your selection.

Or, you can use the **Quick Select** section to choose a preset option: **Last x Hours** (up to 24), **Last x Days**, **Last x Weeks**, **Yesterday** (midnight of previous date through midnight of current date), **Last Week** (seven days prior to current date), **Last Month** (previous month), or **Custom** (enter selections using **Start Time** and **End Time**).

After selecting **Relative start and end times** or **Absolute start and end times**, click the **Next** button to proceed with the wizard.

## Report Wizard: Report Data Sources

The **Data Sources** screen of the **Report Wizard** is where you select what data goes into the report. You can include data logged from T/R sets, precipitators, or other components such as the hopper system or $SO_3$ optimization. Specific data categories available will depend on your system configuration.
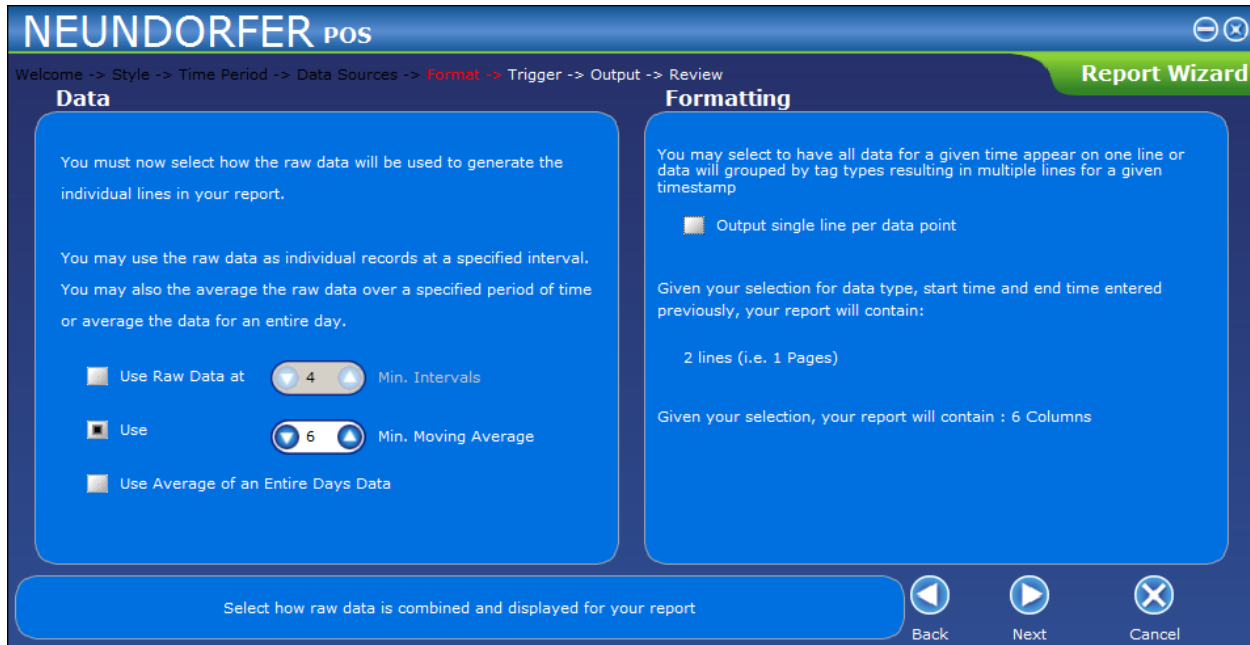


*DATA SOURCES SCREEN*

The left side of the **Data Sources** screen is for selecting *Tags*: systems and system components for which POS logs data. This includes precipitators and T/R sets. Click the **+** or **–** next to each tag to expand a list of sub-components, if available. (Not all tags have sub-categories.) Check the boxes for the tags you wish to include in the report.

The right side of the **Data Sources** screen is for selecting *Variables*: specific data associated with each tag. For example, variables for T/R set tags include primary voltage, secondary voltage, and secondary KW. Like tags, variables are grouped by category; click the **+** or **–** next to each group to expand it. Click boxes for the variables you want to include for selected tags. All of the **Variables** selected for each tag type will be reported for all of the **Tags** selected of that type

After selecting the tags and variables you want to include in the report, click the *Next* button to proceed with the wizard.

## Report Wizard: Report Format

The **Format** screen of the **Report Wizard** is where you set how the data selected will be used in the report, and how the report will be formatted.

The left-hand side is the **Data** section. This is where you select one of three options for how POS uses raw data to generate individual lines in the report. (Check the box for the option you want.)

- *Use Raw Data at [x] Min. Intervals*: The report will display actual recorded data for the selected time intervals. Use the up and down arrows to specify minute intervals (minimum 1 minute) between data points.

- *Use [x] Min. Moving Average*: The report will display data averaged over the selected time interval. Use the up and down arrows to set the number of minutes.

- *Use Average of an Entire Days Data*: The report will display data averaged over a 24 hour period. This is useful for looking at data spanning a long period of time.

The right-hand side of the screen is the **Formatting** section. This is where you select how the report should be formatted. It also indicates, based on data included and options selected, how many lines/pages long your report will be, and how many columns will be in the report.

- *Output single line per data point*: if you select this box, the report will be formatted with one line of data for each given time instance. If you do not select this box, the report will be formatted with multiple lines per time, grouped by device. Checking the box to generate one line of data is useful if you will be saving the report as a CSV file and importing it into a spreadsheet application.
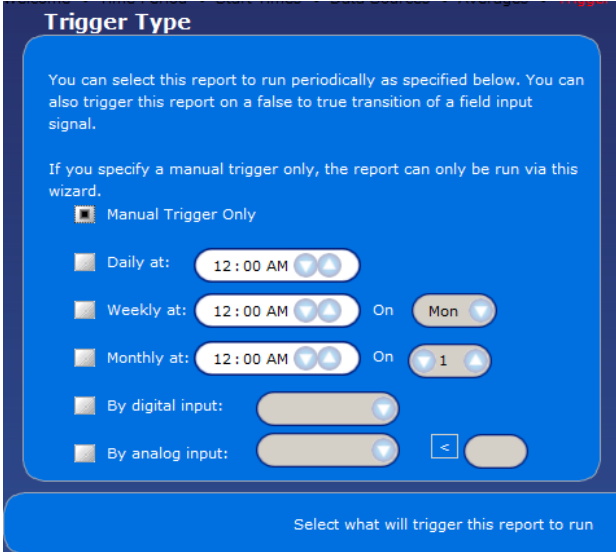
After making **Data** and **Formatting** selections, click the *Next* button to proceed with the wizard.

## Report Wizard: Trigger Type

The **Trigger Type** screen of the **Report Wizard** lets you select what causes a report to run. Reports can be set to run manually only, or to run automatically based on triggers such as time of day and day of week.

This screen lets you select one of six trigger options:

- *Manual Trigger Only* – The report will only run when you select it in the list of saved reports and click the **Run Now** button.

- *Daily at: [time]* – The report will run automatically each day at the specified time. Click the box to select this option. Then, click on hour and type in a number, or use the up/down arrows, to set time. Repeat for minute, and for AM/PM.

- *Weekly at: [time] on [day of week]* – The report will run automatically each week, on the specified weekday at the specified time. Click on the box to select this option. Then, click on hour and type in a number, or use the up/down arrows, to set time. Repeat for minutes and AM/PM. Click down arrow next to weekday to select from drop-down list.
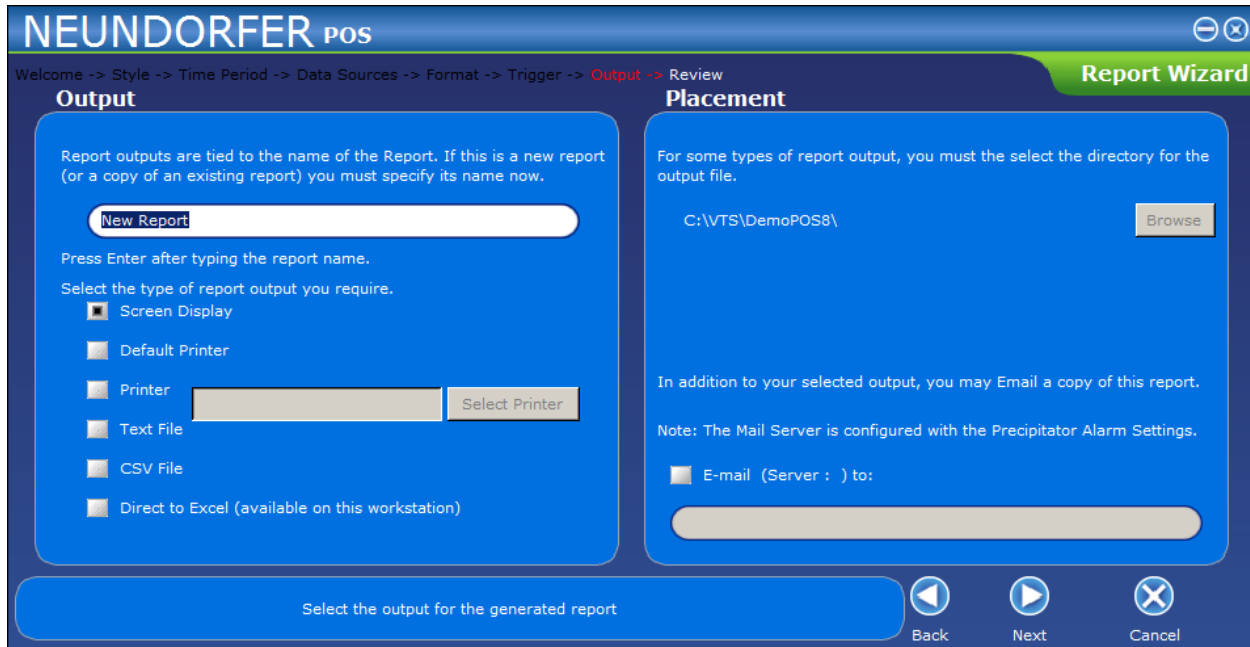


*TRIGGER TYPE SCREEN*

- *Monthly at: [time] on [day of month]* – The report will run each monthly on the specified day, at the specified time. Click this box to select this option. Then, click on hour and type in a number, or use the up/down arrows, to set time. Repeat for minute and for AM/PM. Use up/down arrows (or type in a number) to select day of month.

- *By digital input: [x]* – The report will run when the digital input selected from the drop-down menu changes to a true state. Click the box to select this option. Then, click the down arrow to open drop-down menu and click on one of the digital input options to select it. There may not be any digital inputs configured on your POS system.

- *By analog input: [x] < [y]* – The report will run when the analog input selected is greater than or less than the value specified. Click the box to select this option. Then, click the down arrow to open drop-down menu and click on one of the analog inputs options to select it. By default, the "less than / greater than" button is set to **<**. Clicking the button toggles it to **>**. After setting this as desired, click the empty field to the right of the button and type in a value. For example, if you select *Opacity* as the input, and enter **>** *20*, the report will trigger when opacity rises above 20%.

## Report Wizard: Report Output

The **Output** screen of the **Report Wizard** lets you select how to see the report: on screen, print hard copy, save as text or CSV, or import directly into Excel. If you choose to save the report, the screen also provides an option for where to save the file and, optionally, an e-mail address to send a copy to.



*OUTPUT SCREEN*

To create a new report, type a name for the report into the blank field near the top of the **Output** section. Be sure to press the *Enter* key after typing the report name.

Select an output option by clicking the box next to the desired item:

- **Screen Display** – The report will be displayed on screen in a **Print Preview** window. It is useful to preview a report before printing or saving to be sure it contains the correct data and formatting.
- **Default Printer** – A copy of the report will be printed on the default printer set for the POS computer.
- **Printer** – A copy of the report will be printed to the selected printer, if printers other than the default are accessible to the POS computer. Click the box for this option, and then click the **Select Printer** button to open a **Print** window showing available printers. Choose the printer you want, and click the *Printer* button in the **Print** window.
- **Text File** – The report is output 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
- **CSV File** – The report is output as a Comma Separated Values (CSV) file. 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.
- **Direct to Excel** – If the POS computer has Microsoft Excel installed on it, this option outputs the report data directly to Excel. From Excel, you can then edit and save the file.
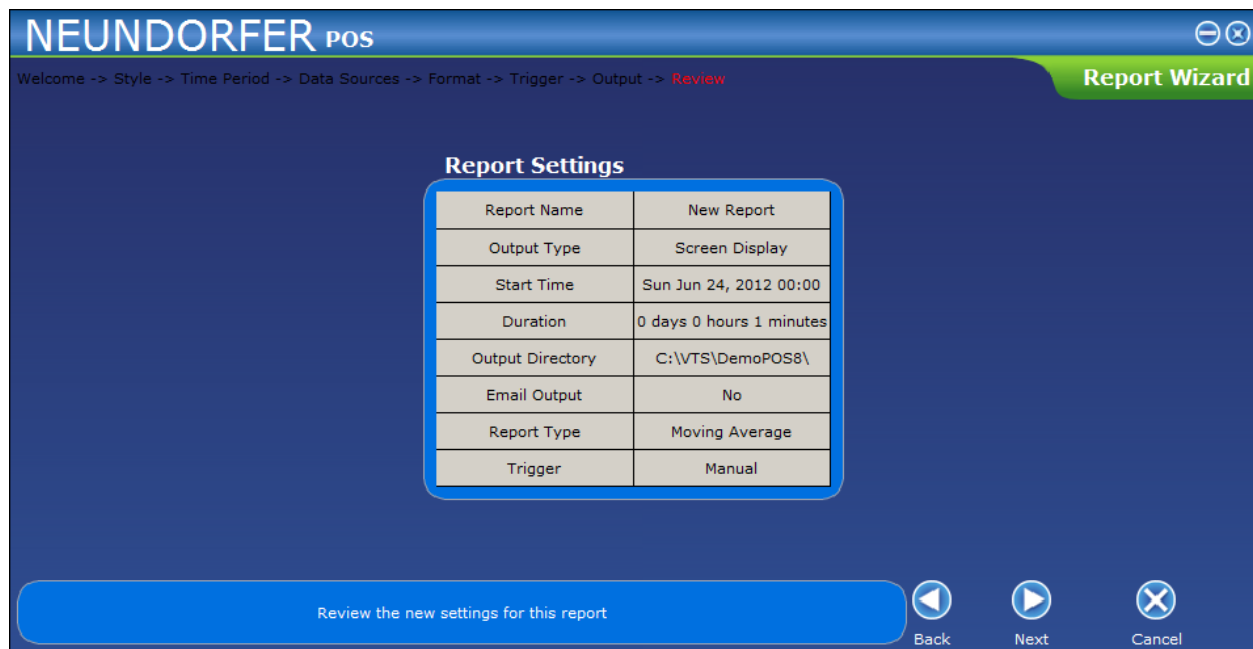
Use the **Placement** area to specify where to save text or CSV files. The default directory is C:\VTS\POS8\. Click the *Browse* button to select a different directory.

Select the **E-mail** option and enter an e-mail address (or multiple addresses, separated by semicolons ;) to specify where to send an e-mail of the report. E-mail server settings are configured in the **Alarm Setup** utility. (See page 137.) When the report is run, the report data will be put into the body of the e-mail and sent to the specified recipients.

When you are done setting **Output** and **Placement** options, click the *Next* button to proceed with the wizard.

## Report Wizard: Report Review

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.



*REVIEW SCREEN*

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.

# 34. 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 that logs in to POS. Modified **Graphics** properties remain in effect only for the user who made changes while logged in. If changes are made to **Graphics** properties when no user is logged in, when another user logs in or POS is restarted, graphics will revert to defaults.

To access **Graphics** click the *Utilities* button in the task bar in lower left-hand area of the plan view screen. Then, in the **Utilities** window, click *Graphics* in the menu on the left hand side of the window.



*GRAPHICS UTILITY*

## TR Set Graphics Options

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

If the Data Grid icon style is selected, use the dropd-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.

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

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 page 38 for more about notes.)

## Rapper Graphics Options

There are two graphics selections for rapper icons.

Use the **Show Rapper Icons** checkbox to hide or show rapper icons on plan view pages. If this box is not checked no rappers will be displayed. This can be useful if there are many rappers on the precipitator, giving a cleaner look to the screen.

Use the **Show Active Indicator around Rapper Icon** checkbox to show or hide the 'halo' that appears when rappers transition from ready to rap to rapped in the rapping program. If this box is checked, with every scan of the MicrRap, POS will will display the active indicator for any rapper transitioning between the two states.



*RAPPER GRAPHICS OPTIONS*

  *"ACTIVE" RAPPER ICON*

## Electrical Fields Graphics Options

Electrical fields are shown on plan view pages for each T/R set in a precipitator. Each field indicates area of the precipitator energized by the specified T/R set. Electrical fields show a very strong high intensity color if the selected parameter is close to its limit, and will show as faded and greyed-out if the parameter is low (indicating that the section is underperforming). Use options in the **Electrical Fields** tab of **Graphics** to choose how electrical field graphics look.



*ELECTRICAL FIELD GRAPHICS OPTIONS*

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* drop-down 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 (%)*.
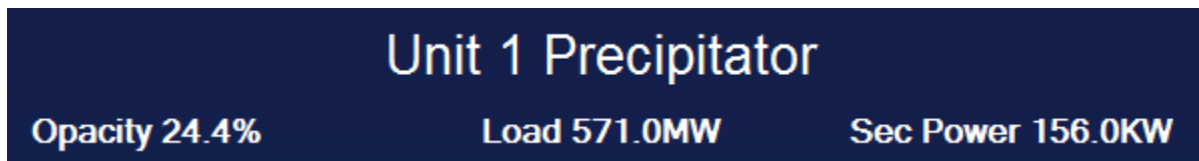
Use the *Hue* slider to change the base color of the electrical field.



*ELECTRICAL FIELDS OPTIONS*



*PLAN VIEW*

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 by selecting (on their respective **Graphics** tabs) not to show.

## Precipitator Icon Graphics Options

At the top of each plan view page is an area referred to as the precipitator icon: it shows name of the precipitator along with several live data displays. By default, there are three posiitons for live data under the ESP name, showing opacity, load and secondary power.



*DEFAULT PRECIPITATOR ICON*

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



*PRECIPITATOR ICON DISPLAY OPTIONS*

# 35. 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 lower left corner of the preciptiator's plan view page. Then, in the **Utilities** window, click *Precipitator Data*.



**PRECIPITATOR DATA MODULE**

Editing precipitator data is a password-protected function in POS; you need to log in with the proper security privileges before making any changes.

Data entered on this screen is used by POS to determine how much to offset rapper actuations on the rapper opacity plot (see page 101) to allow for the time it takes the ash to travel from rapper location to the opacity meter.

## Editing Precipitator Field Data

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

First, use the **Select Precipitator** drop-down menu (bottom of screen, left-hand side) to choose the unit you wish to edit data for.

Then, click into each of the data fields you wish to edit, and enter values.



*SELECT PRECIPITATOR DROP-DOWN*

| 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*.

## Editing Common Precipitator Data

COMMON PRECIPITATOR DATA SECTION

Click into each of the data fields you wish to edit, and enter values.

- **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**: POS automatically calculates a value here 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.

## Saving Changes to Precipitator Data

When you are done entering/editing data on the **Precipitator Data** screen, click the **OK** button (bottom of screen, right-hand side), and then click the **Apply** button.

# 36. 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 lower left hand area of the plan view page. Then, in the **Utilities** window, click *Alarm Setup*.

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

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.

*SELECT PRECIPITATOR
DROP-DOWN MENU*

- *Disabled* – The alarm is disabled. No noise or indication will occur and no record will be logged.
- *High* – POS adds a high-priority entry to the alarm log. The alarm icon will flash and a two tone sound will cycle until the alarm is acknowledged.
- *Medium* –POS adds a medium-priority entry to the alarm log. The alarm icon will flash and a two tone sound will cycle four times.
- *Pop-up* – POS adds a pop-up priority alarm entry to the alarm log. A pop-up window appears on screen with detail of alarm conditions; from this pop-up, you can acknowledge or silence the alarm. The alarm icon will flash and a two tone sound will cycle four times.
- *Event* – POS adds an event entry in the alarm log. The alarm icon will NOT flash and the event alarm will not need to be acknowledged.

## Precipitator Alarms



*PRECIPITATOR ALARMS TAB*

In the **Precipitator Alarms** tab, five alarms are provided, with fields to specify values that trigger them. Each has a drop-down menu used to set the priority level for the alarm.



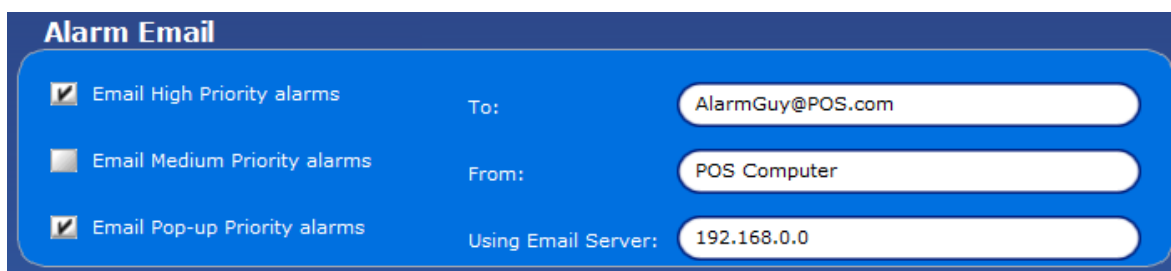***ALARM PRIORITY***

***DROP-DOWN MENU***



*CONFIGURATION AREA OF PRECIPITATOR ALARMS SCREEN*

After selecting a priority, fill in the blank field or fields with value to indicate 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. This should be configured when POS is installed, or set up by someone in your IT department.

When done setting up precipitator alarms, click **OK** to save changes and close the window, **Apply** to save changes but not close the window, or **Cancel** to close the window without saving changes.
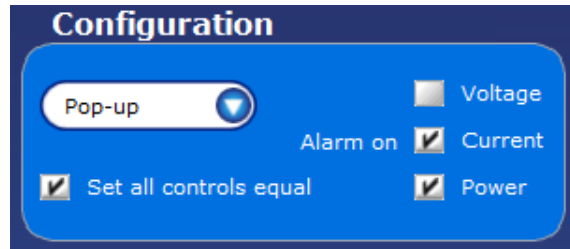
## Global T/R Set Alarms

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. Each has a drop-down menu used to set the priority level for the alarm.



*GLOBAL T/R SET ALARMS TAB*

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 you are done setting up global T/R set alarms, click the **OK** button to save changes and close the window, the **Apply** button to save changes but not close the window, or the **Cancel** button to close the window without saving changes.

## Individual T/R Set Alarms

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



*INDIVIDUAL T/R SET ALARMS TAB OF ALARMS SETUP UTILITY*

**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.

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.



*CONFIGURATION AREA OF INDIVIDUAL T/R SET ALARMS*

**Report Generation**



*REPORT GENERATION AREA OF INDIVIDUAL T/R SET ALARMS*

This area is used to generate CSV report files, saved in a specified location, when individual T/R set alarms are triggered. 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 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 five or more alarms in an hour.

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



*AREA OF INDIVIDUAL T/R SET ALARMS TAB FOR SPECIFYING SECONDARY ELECTRICAL CONDITION LIMITS*

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 you are done setting up individual T/R set alarms, click the **OK** button to save changes and close the window, the **Apply** button to save changes but not close the window, or the **Cancel** button to close the window without saving changes.

## 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 TAB OF ALARM SETUP UTILITY*

Select a priority for each of the alarms.

- *Rapper Controller Communications status* – This alarm is triggered if there are any rapper control communication failures or communication port problems.

- *Number of Failed Rappers exceeds Controllers 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 page 16 for rapper status colors.)

When you are done setting up rapper control alarms, click the **OK** button to save changes and close the window, the **Apply** button to save changes but not close the window, or the **Cancel** button to close the window without saving changes.

# 37. Status

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

To access the **Status** utility, click on the *Utilities* icon in task bar at bottom of the plan view page, then select *Status* from the menu on the left of the **Utilities** window.



*STATUS UTILITY WINDOW*

Use the **Select Precipitator** drop-down 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.

# 38. 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. Many protocols are provided, including Modbus serial or TCP/IP, Allen Bradley DF1, OPC, and others.

Access **DCS Configuration** by clicking the *Utilities* button in task bar (lower left hand area) on the plan view screen, and then clicking *DCS Configuration* in menu on left-hand side of the **Utilities** window.

## 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 from the DCS. 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 data for.

Click the **Show Stats** button to open the **Driver Statistics** window, which displays a summary of communications between the DCS and POS. The first three lines display the DCS interface driver information. Remaining lines show other data:

- **Counts** – Show the number of messages received or sent.
- **Timestamp** and **Date Stamp** – Shows the time and date of the last message.
- **Dt** – The time between reads.
- **Error** – If there is currently a read or write error, this line displays the error number.
- **Error Mess** – Displays a brief message describing the error.
- **Last Error** – Displays the error number of the last error that has occurred.
- **Last Error Mess** – Displays a brief message describing the last error that occurred.
- **Error Counts** – The number of errors that have occurred.
- **Error Time** and **Error Date** – Displays time and date when the last error occurred.
- **Error Owner** – Shows the read or write statement that generated the error.
- **Error Station** – Displays the PLC address of the station that generated the error.
- **Error Mem Addr** – Displays the memory address or register number that generated the error.
- **Serial Error** – If there is an error with the serial port, the error number will be displayed here.



**DCS STATISTICS WINDOW**

Click the **Show Comm** button to open the **DCS Communication Messages** window, which shows communication messages being sent and received through the DCS port. The **Hold Data** button freezes the screen so you can analyze the messages received and sent. The **Data Type** radio buttons let you change how the data is displayed.

To understand what is being displayed in this window, it is best to think of the DCS interface as a separate application from POS. Messages shown in this display are messages originating from POS being written to the DCS interface, and messages originating from the DCS being written to the DCS interface.



**DCS COMMUNICATION MESSAGES WINDOW**

## Configuration Tab

The **DCS Layout** section of the **Configuration** tab functions the same as Windows Explorer in that sections can be expanded and collapsed by clicking on the plus and minus icons next to each folder. Each section contains its relevant output points for the DCS. When you select a section that has parameters that can be configured for output, the individual output parameters will display in the chart on the right side of the screen. The **Value** section of the chart shows the actual value that will be written to the DCS interface. The **Address** section is the address that that value will be written to. If the address field is empty, that value will not be written to the interface.

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 configure.



*DCS INTERFACE – CONFIGURATION TAB*

There are several options for configuring the **Address** field. The **5.5 Defaults** button loads default addresses for POS versions 5.5 and 6.

To configure an entire section:
Select the section you want to configure on the **DCS Layout** portion of the screen. Then, click the **5.5 Defaults** button. To clear an entire section, click the **Remove All** button. The DCS mapping section can be selected to configure or remove every entry on the DCS interface. Select sections further down the list to edit smaller sections.

To configure individual addresses:
With the parameter you would like to configure displayed on the right hand chart, 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 advances to the next sequential DCS interface address. When done making address configuration changes, click the *Accept* button to save the changes.

When you are done making DCS configuration changes, click *OK* to save changes and close the **DCS Configuration**, *Cancel* to clear changes and close the window, or *Apply* to save changes and keep the window open. 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\POS8\Config\ folder. Click the *Load* button to reload a configuration that has previously been saved to the hard drive.

# 39. 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 lower left-hand area of the plan view page. Then, click **Start Interaction**.

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

NOTE: Access to Start Interactions is password protected. Log in with the appropriate privileges to access the functions in this utility.



*SELECT PRECIPITATOR DROP-DOWN MENU*



*START INTERACTION UTILITY*

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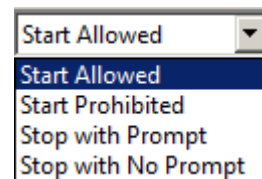
## Configuring Function Interactions

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*

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



*DROP-DOWN MENU FOR SETTING INTERACTIONS BETWEEN TWO FUNCTIONS*

- ***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.
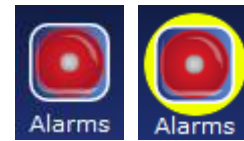
When you are done configuring interactions, click the **OK** button to save changes and close the window, the **Apply** button to save changes but not close the window, the **Cancel** button to close the window without saving changes, or the **Defaults** button to reset all the functions to their defaults.
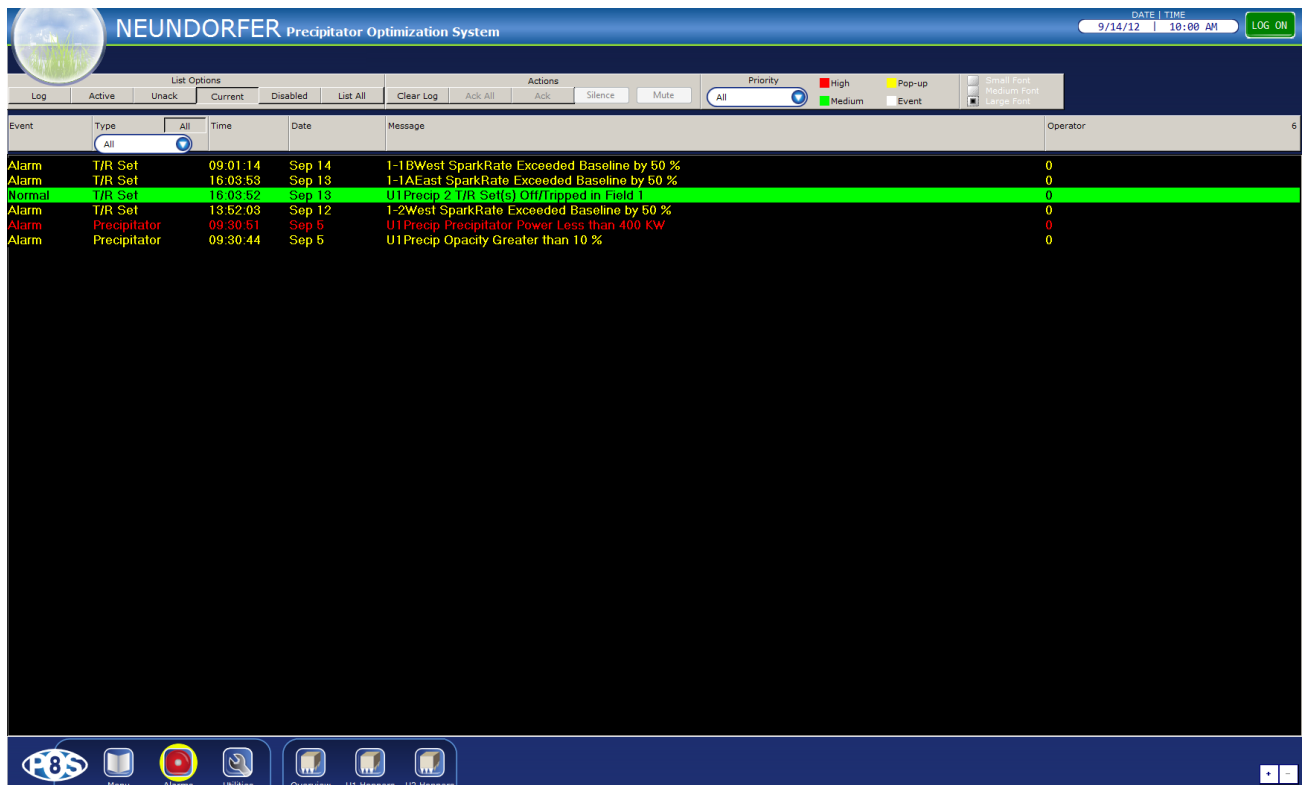
# 40. Alarms Page

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.

To access the **Alarms** page, left click the *Alarms* button in the task bar in the lower left-hand corner of the plan view page..

If there is an active alarm a yellow circle will flash on and off surrounding the *Alarms* button.



*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. By default, this page is set to show the *Current* alarms list.
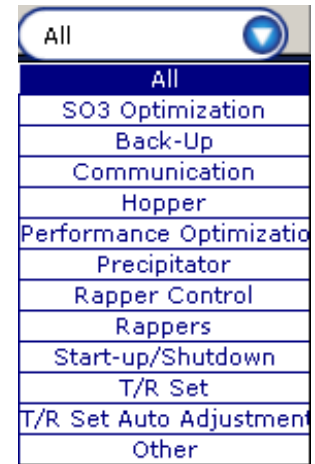
The List Options area of the toolbar contains buttons for filtering alarms shown in the list:

- *Log* – Show all alarm actions including acknowledged and normal conditions
- *Active* – Show all active alarms (conditions currently in alarm state)
- *Unack* – Show all unacknowledged alarms regardless of their current alarm state
- *Current* – Show all active and unacknowledged alarms (combination of Active and Unack lists)
- *Disabled* – Show all alarms that are disabled
- *List All* – Show a complete list of alarms in POS with their current status and priority

The **Type** drop-down menu allows you to filter the alarm list to show alarms generated by specific POS modules. Depending on configuration of your POS installation, options in this menu may differ from the screenshot shown here.
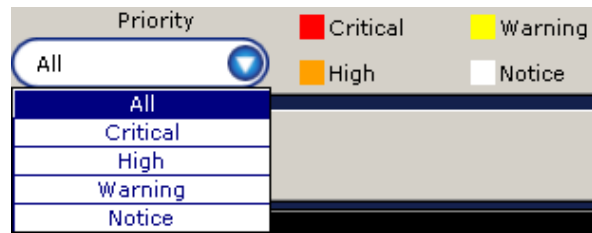
The Actions area of the toolbar contains buttons for clearing and acknowledging alarms, and silencing or muting alarm sounds. You must have sufficient privileges to use Actions functions.

- **Clear Log** – Clears all alarms from the log. This does not silence the alarms, just hides all alarm actions logged before the button was clicked. (Right click to re-display alarms.)
- **Ack All** – Acknowledge all unacknowledged alarms
- **Ack** – Acknowledge selected alarm
- **Silence** – Silences alarm sound for selected alarm
- **Mute** – Mutes all alarm sounds permanently for user logged in



*TYPE DROP-DOWN MENU*

Use the **Priority** drop-down menu to filter the alarm list to display only alarms with a selected priority level—**Critical** (shown in red), **High** (shown in orange), **Warning** (shown in yellow), or **Notice** (shown in white). Click **All** to remove the priority filter and display all alarm priorities.



*PRIORITY DROP-DOWN MENU*

You can also adjust size of the font the alarms are listed in, by clicking one of the three font size radio buttons on right-hand end of the menu bar: **Small Font**, **Medium Font**, or **Large Font**.



*FONT SIZE*

*RADIO BUTTONS*

152