

PRISM™ Voltage Reduction



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PRISM™ Voltage Reduction (VR) is an application designed to decrease the total load during a system peak by reducing the voltage at the substation feeder breaker or at designated feeder zones outside the substation. This type of voltage reduction can be deployed with minimal costs using existing automation infrastructure and can often pay for itself in less than a year based on cost avoidance of associated demand charges. Many utilities have already shown that by installing voltage reduction applications at the feeder level, the peak demand can be reduced by as much as 4%, representing a significant savings on the wholesale power cost.

PRISM Voltage Reduction accomplishes this via direct set point control of tap settings for feeder regulators and transformer LTC controllers. Voltage Reduction is configured simply based on the following basic parameters:

- Start and end times for each demand period
- On-trigger load setting representing the beginning of the peak load low limit (to begin shaving)
- Off-trigger load setting to terminate peak load low limit control (the difference represents the dead band)

Operation

The Voltage Reduction application program monitors system conditions to automatically issue voltage reduction commands. As the real-time system load approaches the peak within a user-defined threshold, the system is configured to automatically go onto VR mode. If the system load is higher than the start target load limit, the program will increment the reduction step command to the LTC, assuming the specified criteria for voltage reduction are met. The user-defined criteria include days of the week and time of day windows for VR activation. After issuing the setpoint control, the program will delay for a user configurable time to allow for accurate load feedback, and then check the system load point against the set targets. If the load remains higher than the start limit, VR will proceed to the next step in load reduction by sending another setpoint. This process continues until reaching the highest defined step for reduction. If the subsequent check of the load versus the target is lower than the stop target, the program will back off one step on the LTC. This "step out" process will continue until the lowest step is reached. The VR application continues to operate in this way if it is armed. The specified "on" and "off" load values provide a dead band to prevent tap setting from being changed too often if the load is fluctuating around the target value. The application can also be used to manually perform VR based on a specified reduction value.

Key Benefits

- Reduce system peaks for immediate savings on demand charges
- Passive program requires no customer involvement or incentive
- Installed and operational rapidly and with minimal effort
- Defer capital costs to meet increased peak demand
- Supports closed loop control with EOL voltage readings for even better results

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Configuration

The graphical operator interface for PRISM VR enables the user to specify the control parameters and view information about the state of the application. The operator configures devices and time ranges for voltage reduction. Once the configurations have been set the program monitors the system devices to determine if any of the voltage reduction criteria have been met. If the criteria have been met the voltage reduction functions are activated. Before the Voltage Reduction program can perform system monitoring, operators must first define all monitoring parameters. The Voltage Reduction editing function is designed to help users to enter the information.

The user interface includes three main areas of definition:

- Time Period Definition (set by specific date or day-of-week)
- Device Control Parameters (IEDs to be controlled, with links to associated RTDB points)
- Application Settings (max. steps, delay times, start/stop values, etc.)

Input Parameters

Time Period Definition

- Day or dates for potential voltage reduction
- Time of day ranges for reduction (2 ranges)

Device Control Parameters

- List of devices to be controlled
 - Flag for enable/disable of device from within program
 - Point references for any returned status/analog data from device
- Auto mode/Supervisory mode
- Current level of reduction
- Point reference for load
- Point reference for reduction armed indication (output)
- Point reference for heartbeat (output)
- Point reference for active reduction step (0- >n) (output)
- EOL monitoring points for voltage

Application Settings

- Target Load Value for start of reduction (MW or units just match input)
- Target Load Value for stop of reduction (MW or units just match input)
- Max value of load reduction step - (0- >n)
- Monitor time delay (secs) (monitor delay when not controlling)
- Delay time after step in reduction (secs)

Minimum System Requirements

- PRISM v11 or later
- RHEL 6.5 or later
- Real-time system load point (SCADA)
- LTCs with SCADA control
- Monitoring/control of monthly peak

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