

Optimal Voltage Regulator Placement

Install your voltage regulators at optimal locations on your distribution feeder

The necessity to maintain voltage within specified limits has always been an essential part of distribution planning. Among the solutions commonly used is the installation of voltage regulators. To help engineers tackle this problem efficiently from both an economical and technical point of view, CYME offers the Optimal Voltage Regulator Placement module.

Handling the challenge of voltage regulation

Distribution engineers seek to maintain and improve the power quality of the distribution network to deal with the ever increasing demand. Distribution generators, different load characteristics, single-phase sections and unbalanced lines all contribute to the complexity of the voltage regulation problem.

Keeping the voltage within specified limits has the benefit to reduce energy losses and to prevent voltage collapse. A flatter voltage profile also helps achieve power efficiency improvement.

Common techniques employed include network reconfiguration, phase balancing, placing shunt capacitors and voltage regulators on the network.

Optimal Voltage Regulator Placement

Placing voltage regulators on the network is not always an easy task. Selecting the regulator location, setting its tap position and determining the amount of regulators required while making sure the solution achieves energy cost savings or a flatter voltage profile can be a challenge.

The CYME Optimal Voltage Regulator Placement module handles the complexity of the problem to give engineers one simple and indispensable tool to achieve voltage regulation efficiently.

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Robust Calculations

Using the robust CYME Load Flow Analysis, the module provides a weighted-objective optimization technique that allows to:

- Flatten voltage profile at a specified target voltage and to minimize abnormal conditions
- Minimize active power losses

The Optimal Voltage Regulator placement provides two algorithms:

- Sequential Search – find optimal location for one regulator at a time
- Iterative Search – An exhaustive analysis which evaluates each possible location to give the overall best solution

Features

To make the analysis more comprehensive, multiple user-defined options are available:

- Install single or multiple regulators
- Install different types of regulators
- Specify search distance for the addition of a regulator
- Include or ignore existing regulators
- Evaluate locations downstream to feeders, specific sections or specific nodes
- Define voltage regulator control settings
- Set user-defined constraints such as under- or over-voltage limit margin, maximum buck and boost limits, ignore sections or laterals

The Optimal Voltage Regulator Placement module is centered on robust algorithms and used-defined criteria to provide users with results that are both trust-worthy and operationally acceptable.

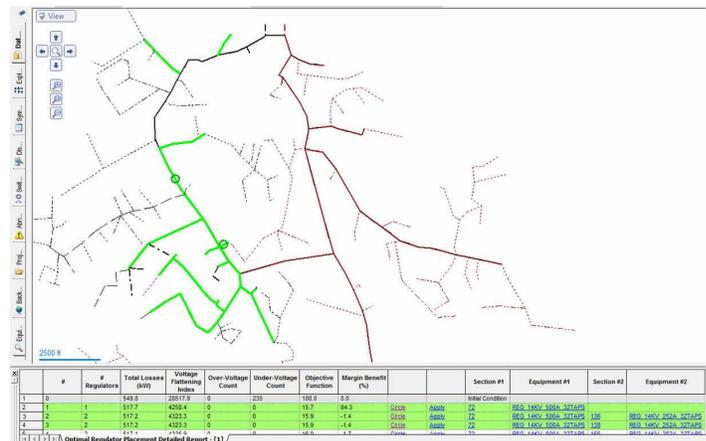
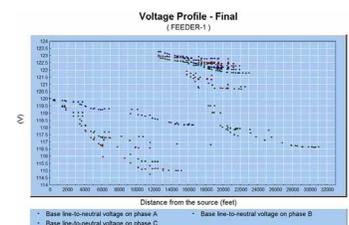
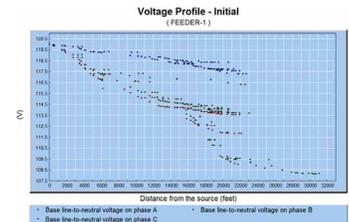
Customization of the reports is possible to allow:

- The results display of the optimal solution, of all tested solutions or of a maximum number of solutions
- Show active power losses for each result displayed
- Report abnormal voltages count for each result displayed

Charts and display on the one-line diagram are other means to help visualize the results.

The user can display the voltage profile chart of the initial network and that of the best solution to see whether voltage regulation is achieved as expected.

The one-line diagram can be color-coded to highlight evaluated sections. The voltage regulator suggested by the module can be applied to the network via buttons in the report.



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