



## Automatic Voltage Control

Automatic voltage control heightens system efficiency and power quality by automatically monitoring and controlling busbars, transformers, and tertiary reactors. On a power distribution system experiencing varying loading conditions, this sophisticated substation automation application can effectively maintain a steady transformer secondary voltage (LV) within preset limits.

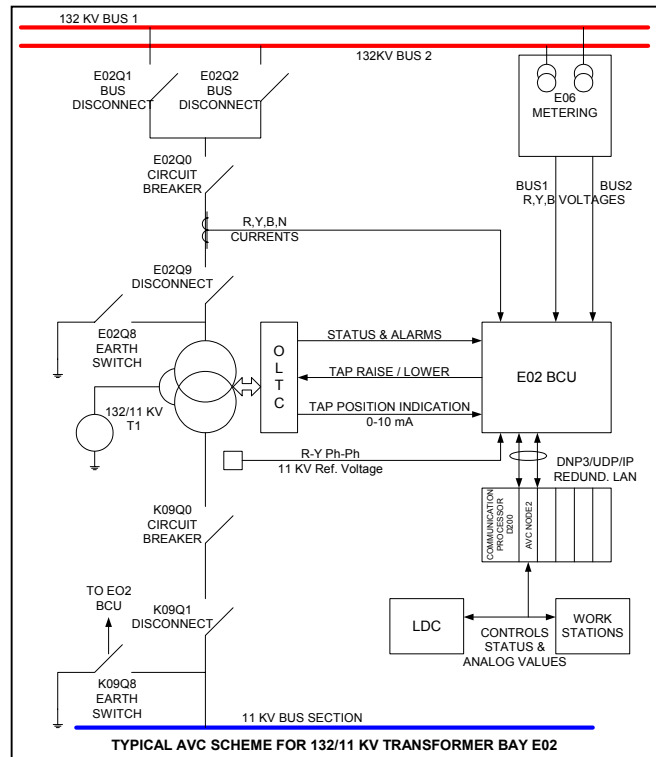
This highly intelligent tap change control mechanism regulates LV voltage by:

- Automatically balancing load across connected transformers
- Continuously monitoring busbar and tertiary reactor connections
- Dynamically reacting to changes in switching arrangements
- Providing line drop voltage compensation due to load current
- Predicting the effect of a LV transformer tap on the voltage level

### Dynamic Voltage Regulation

This voltage regulation scheme is flexible and scalable to accommodate a range of transmission and distribution system topographies – up to 16 transformers across four busbars. The automatic voltage control (AVC) software operates on a D200 substation control system, typically located in the substation control building. The D200 polls distributed input/output panels (or GE D25 multifunction IEDs) located at designated transformer on-load tap changers for status information. The AVC application computes a regulated transformer output voltage based on the transformers' current measured voltage and loading conditions.

It then issues controls to the distributed panels to raise or lower the transformers' tap positions as necessary to obtain a voltage that is closest to the programmed voltage targets.



Ideal in unmanned substations, the AVC scheme runs independently to provide safe parallel operation of transformers. The AVC application recognizes all switchgear connected to reactors, busbars and transformers. It polls the switchgear connected to the secondary windings to select logical groups for the transformers. Transformer groups are controlled through monitoring the voltage and MVARs associated with each transformer. The available tapping methods (voltage control, tap stagger and tap patterning) depends on the number of transformers in the group.

Fault and alarm details, site information, transformer and switchgear displays are available to the system operator through a local user interface and/or the remote master station.

### Integral Part of a Substation Automation Program

As a component of a GE substation control system, the automatic voltage control application offers the security, reliability and flexibility inherent to GE substation automation platforms. Implementing automatic voltage control also brings the following benefits:

- Decreased system losses by minimizing voltage fluctuation and out-of-limit operation
- Extended life of older primary equipment by optimizing functionality
- Reduced space requirements by eliminating the automatic tap changer control panel.

## Automatic Voltage Control Features

### Platforms

D200 substation control system

### Implementations/attributes supported

Maximum four busbars  
Maximum 16 transformers (four per busbar)  
Positive resistance compounding factors (per busbar)  
Negative/positive reactance compounding factors (per busbar)  
Busbar priorities  
Switchgear connections  
Existence of ARS system  
Homing enable/disable  
Voltage target increase gradient (expressed as kV per minute)

### Functions

Dynamically determine site topography  
Control transformers in parallel, tap stagger or tap pattern operation  
Control transformers connected to remote LV busbars  
Maintain voltage of LV busbars at preset values  
Automatically select and control transformer groups  
Coordinate tap changes  
Compensate for resistive and reactive elements  
Detect faults and report alarms.  
Maintain voltage limits for single fault conditions  
Supervise control commands  
Detect and respond to hunting or unexpected taps

### Features

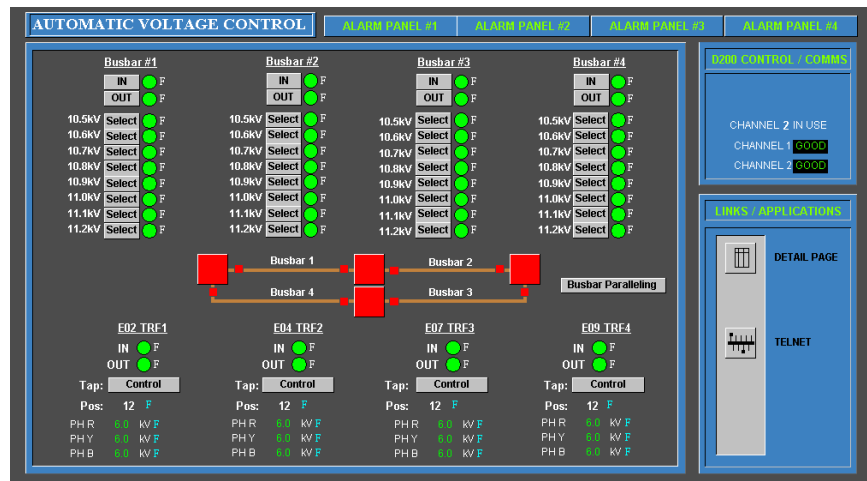
Configurable substation topography  
Configurable transformer attributes  
Selectable voltage targets  
Busbar in/out control switch  
Switchable automatic or manual control  
Fault list display  
AVC/ transformer status display  
Standing fault display  
Alarm display (PowerLink)  
Clear fault list button (PowerLink)

### Interfaces Supported

On-load tap changer  
Remote master station  
Local/remote workstation  
Bay control units/peripheral control boards  
Wesmaint  
Delayed auto-reclosers

### Options

Local/remote PowerLink GUI  
Tap stagger on/off switch



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GEA-13287 Printed in Canada