DYNAMIC
Measurement & Control Solutions, LLC

# Automatic Voltage Equalizer – AVE

## Voltage Balancing | Surge Suppression | Network Analyzer

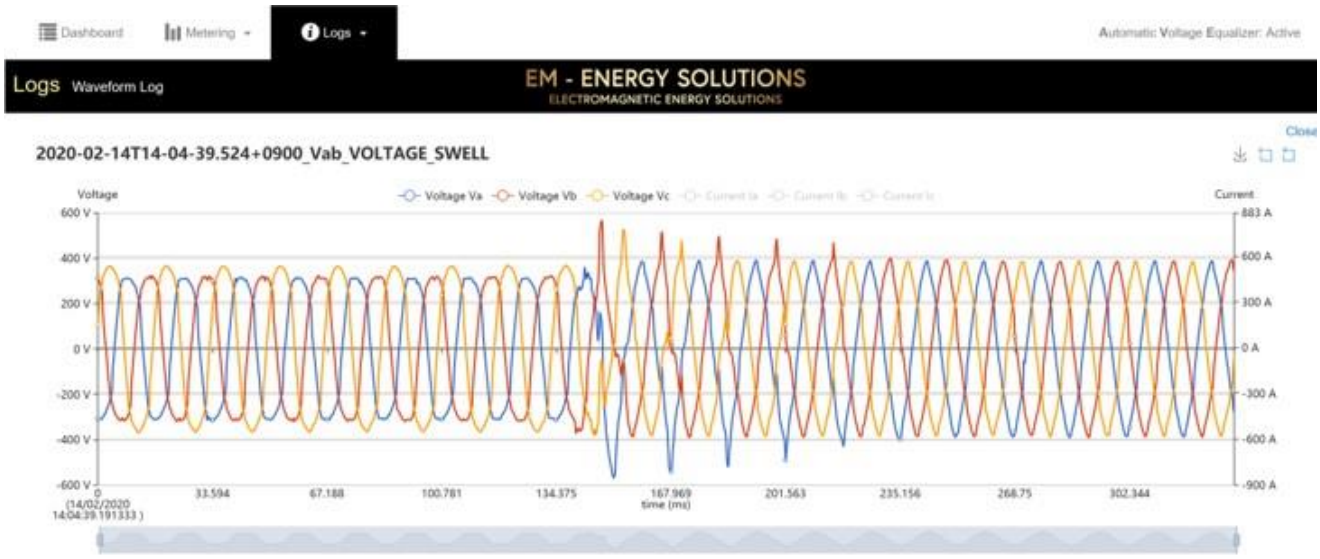
## Low, Medium & High Voltage Systems


The Automatic Voltage Equalizer is an outgrowth of Wye Broken-Delta grounding transformer technology, in use for many years in industries utilizing three-phase ungrounded power. This type of system grounding has several very important benefits. Fault current can usually be limited to less than ten amps, thus preventing a) significant equipment damage, and b) by limiting incident fault-energy, arc-flash is not possible. Tests of this type of system grounding reveal that such units may react in as little as 1 ms to a voltage balance upset while correcting the loss of phase voltage. The AVE then re-balances the system voltages, thus restoring the proper phasor relationships. This is offered in order to minimize production systems upset and avoid heat stress on rotating equipment.

The AVE is a parallel-connected device connected to your main switchgear fed by a 30 amp three-phase breaker and equipment ground.

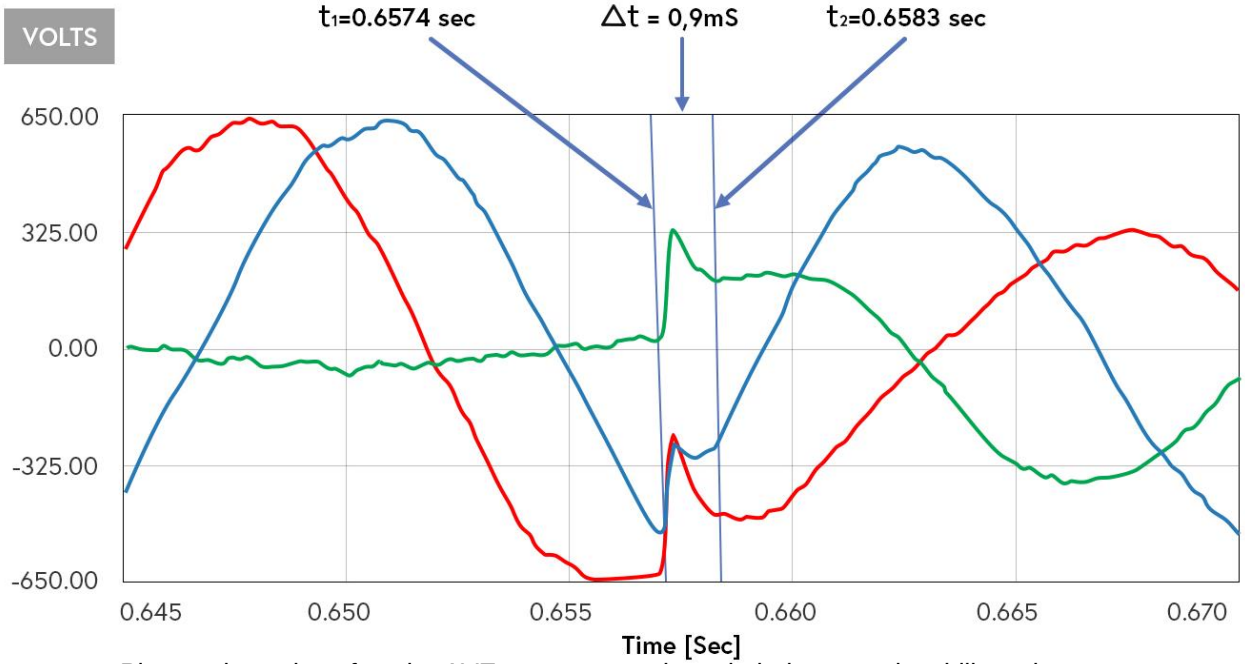
AVE
AUTOMATIC VOLTAGE EQUALIZER

# Voltage Balancing




The Waveform log above is captured by EMES PQA during welding machine operation and shows the exact moment when AVE is activated. The Waveform before the AVE activation is distorted with a high voltage unbalance (8-9%). After AVE activation, we see a short transitional period of 30-40ms where the unit stabilizes the system, mitigates harmonic distortion, eliminates transients, and reduces voltage unbalance (0.5%). After the AVE is activated, we can see a perfect sine wave and a 100% balanced system.

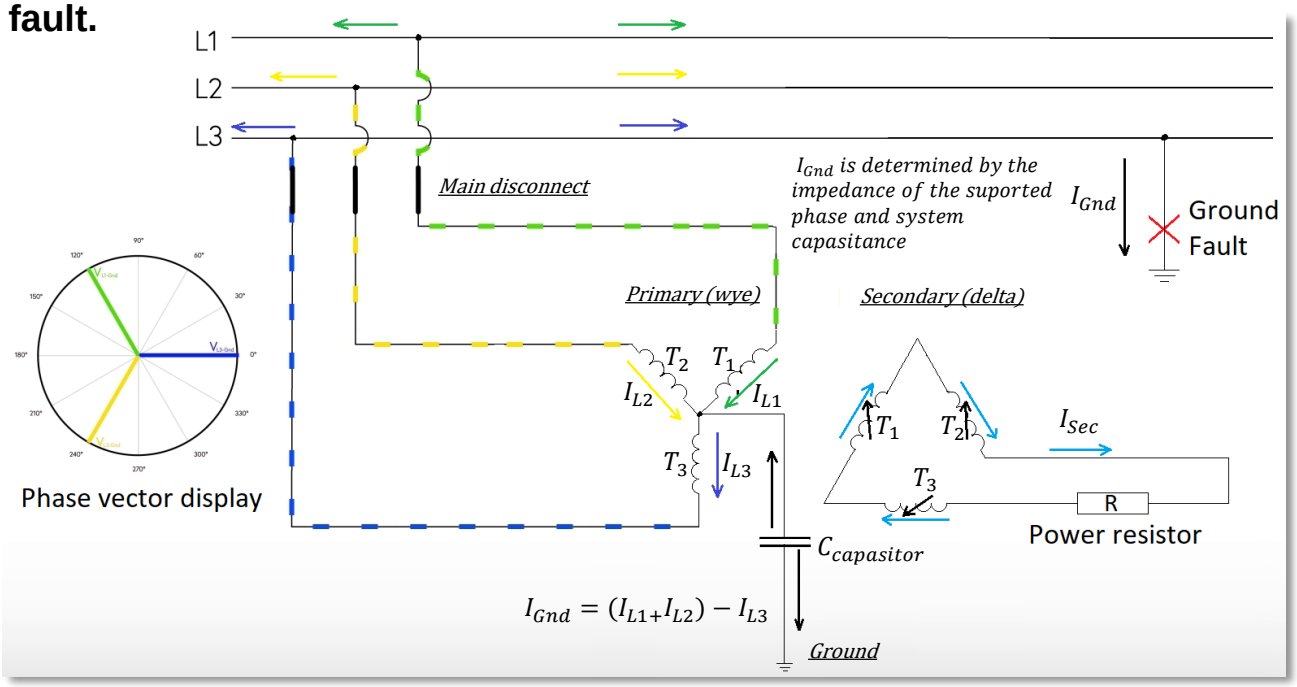
## Loss of Phase (grounded) speed of operation



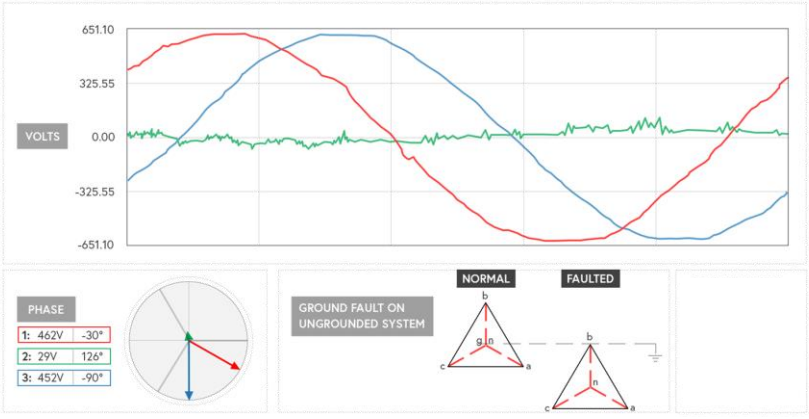

Picture shows how fast the AVE reacts to a voltage imbalance and stabilizes the system. The reaction time is less than 0.9ms.

# Reacting to Ground Fault

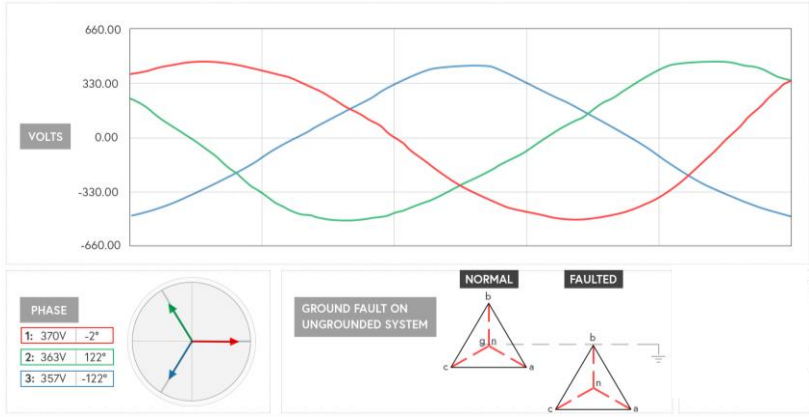
## Basic circuitry of AVE during ground fault.




## Ground fault recovery with AVE




Graph shows waveform and phasor diagram for a 3-phase distribution system with ground fault on phase B with AVE deactivated.




Graph shows waveform and phasor diagram for a 3-phase distribution system with ground fault on phase B when AVE is activated.

# Product range and benefits

AVE AUTOMATIC VOLTAGE EQUALIZER

AVE FIXED AUTOMATIC VOLTAGE EQUALIZER

AVE MINI AUTOMATIC VOLTAGE EQUALIZER

AMO AUTOMATIC MOTOR OPTIMIZER





AVE AUTOMATIC VOLTAGE EQUALIZER HIGH VOLTAGE


## Benefits

- Stabilize and balance phase voltage
- Eliminate transients and short circuit
- Reduce dangers of arc flash
- Reduce harmonic distortion
- Cancel out harmonic frequencies
- Reduce energy consumption
- Extend lifespan of electrical motors and components
- Permit greater cable lengths between VFD and motor
- Eliminate VFD transients and distortions
- Reduced $I^2R$ losses
- Reduced downtime
- Save costs
- Reduces $CO_2$ emissions

| Unit type | AVE | AVE Fixed | AVE Mini | AVE High Voltage | AMO |
|---|---|---|---|---|---|
| Voltage class [Vac] | 250/480 | 250/480/690 | 250/480 | 1500/5000/7500 /15000 | 250/480/690 |
| kVA rating [kVA] | 3000/6000 | 1200/3000/6000 | 400/800/1200 | - | 100//200/400 |
| Power quality meter | ✓ | ✓ | Optional | ✓ | × |
| Web interface | ✓ | ✓ | Optional | ✓ | × |
| Cloud solution | Optional | Optional | Optional | ✓ | × |
| Floor mounting | Optional | Optional | Optional | ✓ | Optional |
| Weight [lbs/kg] | 308/140 | 364/165 | 198/90 | - | - |
| Size [Inch/mm] | 31,5×47,2×15,8/800x1200x400 | 31,5×47,2×15,8/800x1200x400 | 23,6×39,37×15,8/600x1000x400 | - | - |
| Distribution system | Gr/Ungrounded | Gr/Ungrounded | Gr/Ungrounded | Gr/Ungrounded | Gr/Ungrounded |