Reliable Power
FROM
Cooper Power Systems

Transformer Products Group

COOPER Power Systems
Cooper Power Systems, with its combination of McGraw-Edison®, Kyle®, Kearney™ and RTE® product lines, provides an unequaled array of electrical distribution equipment for substation, overhead, underground and in-plant electrical distribution systems.

Among the products manufactured by Cooper Power Systems are:

- Capacitors and capacitor banks
- Distribution transformers
- Voltage regulators
- Pad-mounted switchgear
- Oil switches and circuit reclosers
- Protective relays, fuses, fault indicators, surge arresters
- Line construction materials
- Molded rubber products and hardware

As the only supplier in the industry with this depth of capabilities, we can provide you with the product you want, when you want it.

Transformer Products

Cooper Power Systems Transformer Products Group manufactures:

- Single-phase overhead transformers
- Single-phase pad-mounted transformers
- Three-phase overhead transformers
- Three-phase pad-mounted transformers
- Single-phase substation transformers
- Three-phase substation transformers
- Single-phase step-voltage regulators
- Single-phase pad-mounted step-voltage regulators
- Single-phase auto-boosters
- Transformer fluids
- Voltage regulators controls

Transformer Products Group leads the industry with over 50 years of experience in design innovation, product development and quality manufacturing. Because we’ve been making high-performance products for a long time, our products have a field proven track record for durability and reliability that is recognized as the best in the industry.
Field-Proven Performance and Reliability

Our commitment to the future of the industry is demonstrated by our significant investment in facilities, product and process improvements. They include the installation of the industry’s most sophisticated coating system, which results in a long-life paint finish you don’t have to worry about. We have also invested in new core and coil designs, tank fabrication and state-of-the-art test equipment—all designed to increase transformer reliability, cut losses, and save you money.

We participate on industry committees and with related technical groups to preserve and improve the industry and its level of technology. This is evident by the long list of innovations and new products we have introduced. In 1958 RTE introduced the industry’s first single-phase pad-mounted transformer for underground distribution. A few years later the three-phase pad-mounted transformer was introduced.

This commitment to innovation is still apparent today with our continuing development of new products, including the Single-Phase Pad-Mounted Voltage Regulator, providing all the functionality of the traditional round tank regulator with the convenience of pad mounting; the “FM Approved Transformer, the first “Code Listed & Labeled” liquid-filled transformer; the VFI Transformer that combines a conventional transformer with the Kyle Vacuum Fault Interrupter to provide voltage transformation and overcurrent protection in one space-saving, money-saving package; and the Envirotran™ Transformer that is filled with Envirotemp® FR3, an edible seed oil-based dielectric coolant that combines the benefits of enhanced fire-safety with the superior environmental characteristics of edible oils.

Product Support

Our Customer Service Department provides helpful technical support and up-to-date information on product availability. Each of our customers is assigned a trained representative, so you’re always talking to a person who knows your account. Your representative uses real-time information to communicate your delivery dates and expedite your orders.

Because they’ve had extensive training, our reps can answer many of your technical questions. When they can’t, our apparatus engineers and product specialists are available to provide the technical expertise to solve any product or system problem.

A World-Renowned Resource

The Thomas A. Edison Technical Center, one of the most respected high-voltage research and development centers in the world, supports our new products and materials development and testing. Both electrical utilities and industrial complexes draw on the expertise and knowledge of the highly skilled engineers at the Center for site studies, measurements on new and existing electrical systems, diagnostic software, measurement equipment, workshops and technical assistance.

* FM-Factory Mutual Research Corporation
High Performance Inside and Out

Our transformers’ cores and coils are designed to provide the best field performance. Precision machinery is used to cut the core to exacting measurements. Burr-free, silicon steel optimizes core loss efficiency. Coils are wound with the highest quality electrical grade epoxy coated, thermally upgraded kraft paper. Computer controlled winding machines provide exacting tension control and conductor placement for superior short-circuit strength and maximum efficiency. Each coil is pressed and baked to fuse thermoset epoxy adhesives, for stronger coils with superior dielectric properties. Each core and coil assembly is clamped under pressure to further assure mechanical integrity. Excellent short-circuit test results verify our design, production processes and equipment.

Our transformers are also designed for exterior longevity. Tanks are cut using computerized equipment, producing error-free cutouts. Full-welded external parts eliminate corrosion caused by moisture entrapment. Our tank coating systems include processes such as corrosion-resistant epoxy primer (E-Coat), impact-and abrasion-resistant polyester powder coat (P-Coat), and a urethane top coat that seals and protects the finish from ultraviolet rays. Our durable coating systems exceed ANSI and CSA/CEA Standards, and more importantly, provide years of maintenance-free service.

Today’s Solution: Not Tomorrow’s Problem

Our transformers can be filled with standard electrical grade mineral insulating oil, R-Temp® fluid, or Envirottemp® FR3 fluid.

For fire-sensitive locations, our transformers can be filled with R-Temp fire-resistant natural hydrocarbon fluid, or Envirottemp FR3 fluid, a fire-resistant natural ester-based fluid. Envirottemp FR3 fluid offers the environmental benefits of an edible seed oil-based dielectric coolant with food grade additives. In addition, it provides increased fire safety and insulation life when compared to conventional mineral oil.

All transformers are filled using a vacuum-process filling procedure that heats, dries and vacuum impregnates the transformer, removing moisture more effectively than other dryout systems.

A Wide Array of Protection Options

Cooper Power Systems manufactures a complete line of transformer components and accessories. Four complete fuse product lines—RTE, McGraw-Edison, Kearney and Combined Technologies, Inc.™ provide complete fusing protection for any application. Surge arresters designed by Cooper employ the latest technology, giving you all the overvoltage protection that you need. The VFI (Vacuum Fault Interrupter) developed by Kyle incorporates the latest electronic technology in transformer and loop overcurrent protection. Developed with our transformers in mind, these products provide optimum flexibility and transformer performance.
Reliability and Quality

The quality of design, materials and workmanship of a transformer's core and coil assembly and its tank and cabinet are basic to its long term performance and durability. Transformer connectors, switches and protective equipment also play an important role in transformer reliability. Cooper transformers utilize componentry designed, manufactured and tested by Cooper. We are the only manufacturer with such depth and breadth of in-house component manufacturing capability. Not only does this level of internal component sourcing result in optimally coordinated designs, it also helps guarantee the quality of each unit we produce—from start to finish.

Advanced quality management, combined with exhaustive testing, assure our customers of the most reliable performance and the industry’s lowest failure rate. Our certified manufacturing facility, combined with our leadership in transformer design, assures the highest quality transformer.

Completely integrated testing of each transformer results in the most reliable performance in the industry. All transformers are tested according to ANSI C57.12.90 and include the following tests:

- Impulse
- Applied potential
- Induced potential
- Loss tests
- Leak test

Additional tests are performed on each design, assuring performance will meet all applicable standards. Testing includes temperature, audible sound level, tank integrity and others.
Dependable Overhead Transformers

Conventional Transformer
Completely Self-Protected Transformer (CSP)
Lightning Protected Transformer (LPT™)
Step-Down and Autotransformer
Three-Phase Transformer

Transformers from Cooper Power Systems are known for their outstanding performance in a wide variety of applications.

Standard Features
The following features ensure product quality and longevity.

- Meets or exceeds ANSI, NEMA, IEEE standards and CSA/CEA specifications
- EPRI recommended interlaced core-type design (5-50 kVA)
- Tank coating exceeds ANSI C57.12.31
- Cover with a minimum dielectric strength of 8 kV
- Tin-plated high-and low-voltage bushing terminals to accommodate aluminum or copper conductors
- Laser-scribed anodized aluminum nameplate
- Wet process porcelain high-voltage bushings resistant to high-voltage corona
- Tank grounding provisions
- Electrical grade mineral oil
- Heavy-duty lifting lugs and hanger brackets per ANSI and CSA/CEA requirements
- Visible cover ground on units with cover-mounted bushings
- Recessed tank bottom that offers protection when sliding over rough surfaces
- Automatic pressure relief device
- Polymer low-voltage bushings (5-50 kVA)
- Arrester mounting and grounding provisions
- Secondary leads are stamped to ensure proper identification
- Stainless steel loops on cover band

Optional Features
For increased convenience, safety and longevity you can choose from this large selection of options to tailor your overhead transformer to specific application needs.

- Taps: either two 2.5% above and below; four 2.5% below; NEMA standard or special taps
- Multiple voltage primaries
- Externally-operable, multiple voltage switches for safe operation (except Auto, and 200 or 250 kV BIL primaries)
- High corrosion area protection with extra creep bushings, stainless steel hardware and tanks
- Handwheel and birdguards
- Cover with a minimum dielectric strength of 15 kV
- Cover mounted high-voltage bushings for ≤ 75 kV BIL primary
- Porcelain low-voltage bushings
- Rural Utilities Service (RUS) design
- CSA/CEA design
- Special designs to meet international specifications
- Drain/sampling valve
- Pressure vacuum gauge (tank size limitations apply)
- Filter press connections
- Base bars for platform mounting
- Temperature gauge (tank size limitations apply)
- Liquid level gauge (tank size limitations apply)
- Dual primary or secondary voltages through 150 kV BIL
- Wye or delta connections
- FM Approved and Code Listed transformer
- R-Temp fluid, a fire-resistant dielectric coolant
- Envirotemp FR3 fluid, a fire-resistant dielectric seed oil-based coolant with desirable environmental characteristics
Overcurrent Protection

- Secondary breaker with weak link for secondary fault and overload protection (5-167 kVA) (except Step-Down, and 200 or 250 kV BIL primaries)
- Primary weak-link fuse
- Current-limiting fuse for high interrupting ratings and limiting fault currents
- MagneX® Interrupter (Primary Breaker) with isolation link
- MagneX Interrupter (Primary Breaker) with partial range current-limiting fuse

Overvoltage Protection

- Low-voltage distribution class MOV arrester – internally or externally mounted (except Step-Down)
- Lightning arresters for primary over-voltage protection: direct connected, normal or heavy duty, metal oxide varistor (MOV) either internal (VariSTAR®), or external VariSTAR or VariGAP® with polymer UltraSIL® or porcelain housing
Single-Phase Conventional Transformer

TYPE: Single-Phase, 50 or 60 Hz

LIQUID TYPE: R-Temp Fluid, Mineral Oil or Envirotemp FR3 Fluid

kVA: 5-500

PRIMARY VOLTAGE: 2400-46,000 V

SECONDARY VOLTAGE: 120-600 V

The single-phase conventional overhead transformer is designed with an interlaced core (5-50 kVA) recommended by *EPRI. Polymer low-voltage bushings are standard at 5-50 kVA. Radiators are included at 250 kVA and above.

Single-Phase Completely Self-Protected Transformer (CSP)

TYPE: Single-Phase, 50 or 60 Hz

LIQUID TYPE: R-Temp Fluid, Mineral Oil or Envirotemp FR3 Fluid

kVA: 5-167

PRIMARY VOLTAGE: 2400-19,920 V

SECONDARY VOLTAGE: 120-600 V

Protected transformers are available with a variety of protection options including a MagneX® Interrupter, a secondary breaker with weak link for secondary fault and overload protection, a primary weak link fuse, current-limiting fusing for high interrupting ratings and limiting fault currents, and internal or external lightning arresters.

Single-Phase Step-Down and Autotransformer

TYPE: Single-Phase, 50 or 60 Hz

LIQUID TYPE: R-Temp Fluid, Mineral Oil or Envirotemp FR3 Fluid

kVA: 25-500 (autotransformers available 167-5000 kVA)

PRIMARY VOLTAGE: 4160-46,000 V (60-250 kV BIL)

SECONDARY VOLTAGE: 2400-14,400 V (60-125 kV BIL)

Step-down transformers reduce single-phase distribution voltages to lower distribution voltages. They are available in two winding and autotransformer designs. Autotransformers with primary voltages of 200 or 250 kV BIL are not available.

*EPRI—Electrical Power Research Institute
Single-Phase Lightning Protected Transformer (LPT™)

- **TYPE:** Single-Phase, 50 or 60 Hz
- **LIQUID TYPE:** R-Temp Fluid, Mineral Oil or Envirotemp FR3 Fluid
- **kVA:** 5-500
- **PRIMARY VOLTAGE:** 2400-19,920 V
- **SECONDARY VOLTAGE:** 120-600 V

The Lightning Protected Transformer virtually eliminates transformer failure due to lightning. An internally-gapped, direct connected VariGAP® arrester, designed by Cooper, provides overvoltage protection. Cooper's STORM TRAPPER® high-energy arrester, a low-voltage distribution arrester, is mounted directly to the transformer secondary windings, protecting the transformer from failures caused by secondary induced surges. A properly coordinated D-Link fuse by Cooper provides superior overcurrent protection.

Three-Phase Transformer

- **TYPE:** Three-Phase, 50 or 60 Hz
- **LIQUID TYPE:** R-Temp Fluid, Mineral Oil or Envirotemp FR3 Fluid
- **kVA:** 30-300 Triplex or T-T connected
- **PRIMARY VOLTAGE:** 4160-34,500 V
- **SECONDARY VOLTAGE:** 120-480 V
- **BIL RATINGS:** 45 to 150 kV BIL

Three-phase overhead transformers are available in T-T connected or triplex designs. The use of a three-phase unit instead of single-phase transformers that are banked reduces the installation cost of the total bank.
Unobtrusive Pad-Mounted Transformers

Single-phase pad-mounted transformers are designed for underground residential and commercial distribution systems where safety, reliability and aesthetics are especially important.

Standard Features
- Meet or exceed ANSI C57.12.28 and C57.12.29 and CSA/CEA Standards
- Full compliance with ANSI C57.12.28 enclosure integrity requirements
- Laser-scribed anodized aluminum nameplate
- Recessed stainless steel lifting provisions
- Tank grounding provisions
- Automatic pressure relief device
- Electrical grade mineral oil
- Hinged door with stainless steel hinge pins and barrels
- Floating lock pocket for easy alignment
- Captive corrosion resistant pentahead door locking bolt
- Oil fill and drain provisions
- Removable sill
- Welded domed tank cover
- High-voltage bushings wells - 200 A
- Ground strap from X2 to tank ground
- Tamper strips of noncorrosive material
- Decal bushing designations

Optional Features
Choose from this large selection of options to customize your pad-mounted transformer to its application.
- Various multiple voltages or taps
- Externally-operable multiple voltage or tap changer switches for safe operation
- Stainless steel tank, tank bottom, sill, door, and/or hardware
- Service entrance in sill
- Various spades and terminals available for secondary designations
- Various other designations available, e.g., kVA, voltages, fuse number
- High-voltage bushing inserts
- Ground connectors
- Captive stainless steel hexhead door locking bolt
- Rural Utilities Service (RUS) design
- One piece high-voltage bushings
- High-voltage bushing wells with removable studs
- CSA/CEA designs
- Special designs to meet international specifications also available
- Loadbreak switches
- Drain/sampling valve
- Pressure vacuum gauge
- Liquid level gauge
- Temperature gauge
- Combination shipping and installation poly-pad
- FM Approved and Code Listed transformer
- R-Temp fluid, a fire-resistant dielectric coolant
- Envirotemp FR3 fluid, a fire-resistant seed oil-based dielectric coolant with desirable environmental characteristics
Poly-Pad

This polymer pad enables transformers to be shipped and installed on the same pad. Use of the poly-pad can eliminate the purchasing, inventory and administrative costs associated with conventional concrete, polymer or fiberglass pads. Installation costs can also be significantly reduced since the transformer is pre-mounted to its pad. These forkliftable units can be transported damage-free during shipping and handling. Our poly-pad is usable with most transformers conforming to ANSI C57.12.25 Type-1 or Type-2.

Overcurrent Protection

- Bay-O-Net expulsion fuse with Flapper™ valve and isolation link
- Bay-O-Net and partial range current-limiting fuses
- Weak link fuse
- Weak link and partial range current-limiting fuses
- Secondary breaker with weak link
- MagneX® Interrupter with isolation link
- MagneX Interrupter with partial range current-limiting fuse
- Kyle Vacuum Fault Interrupter (VFI) for electronic breaker trip control

Overvoltage Protection

- Under-oil high-voltage MOV arrester
- Low-voltage distribution class MOV arrester, internally or externally mounted
Aesthetics, Safety and Reliability

Single-Phase Shrubline Transformer

**TYPE:** Single-Phase, 50 or 60 Hz, Dead-front, ANSI Type-2, Loop or Radial Feed*

**LIQUID TYPE:** R-Temp Fluid, Mineral Oil or Envirotemp FR3 Fluid

**kVA:** 10-167

**PRIMARY VOLTAGE:** 2400-19,920 V

**SECONDARY VOLTAGE:** 120-600 V

The Shrubline, Cooper's ANSI Type-2 single-phase, dead-front, pad-mounted transformer combines safety and aesthetics, making this low profile unit ideal for high profile areas. Because it blends with surrounding shrubs, hedges and home air conditioners, the Shrubline transformer is very popular for residential applications.

Single-Phase MaxiShrub Transformer

**TYPE:** Single-Phase, 50 or 60 Hz, Dead-front, ANSI Type-1, Loop or Radial Feed*

**LIQUID TYPE:** R-Temp Fluid, Mineral Oil or Envirotemp FR3 Fluid

**kVA:** 10-167

**PRIMARY VOLTAGE:** 2400-19,920 V

**SECONDARY VOLTAGE:** 120-600 V

MaxiShrub is Cooper's ANSI Type-1 dead-front pad-mounted transformer. The ANSI Type-1 frontplate allows vertical feed to the primary and secondary bushings. The MaxiShrub is ideal for single-phase industrial and residential applications where a wide range of kVA's or heavy cabling is required.

* When specified, radial feed transformers can be connected line-to-line on 3-wire systems.
**Single-Phase Ranch Runner Transformer**

**TYPE:** Single-Phase, 50 or 60 Hz, Dead-front, Loop or Radial Feed

**LIQUID TYPE:** R-Temp Fluid, Mineral Oil or Envirotemp FR3 Fluid

**kVA:** 10-50

**PRIMARY VOLTAGE:** 2400-14,400 V

**SECONDARY VOLTAGE:** 120-600 V

Ranch Runner is Cooper's compact pad-mounted transformer. Ideal for irrigation, oil field or residential applications, Ranch Runner's economical design provides standard transformer capabilities in very little space. Ranch Runner is Rural Utilities Services (RUS) approved and meets all ANSI and CSA/CEA requirements except frontplate arrangements. Its combination poly-pad acts both as a shipping pallet and a mounting pad.

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**Single-Phase Shrubline VFI Transformer**

**TYPE:** Single-Phase, 60 Hz, Dead-front, with VFI Switch for Loop Protection

**LIQUID TYPE:** Mineral Oil

**kVA:** 25-100

**PRIMARY VOLTAGE:** 2400-19,920 V

**SECONDARY VOLTAGE:** 240/120 V

The Shrubline VFI Transformer combines a single-phase dead-front, pad-mounted transformer with a vacuum fault interrupter in one low profile enclosure for resettable fault protection through 25 kV. Ideal for residential areas, the Shrubline is only 36 inches high and is designed to blend with its surroundings. Properly coordinated and strategically located, it can effectively minimize both outage area and outage duration due to a fault.
Compact Commercial Power in a Pad-Mounted Transformer

Three-Phase Pad-Mounted Compartmental Transformer

Three-Phase Pad-Mounted VFI Transformer

Three-phase pad-mounted transformers are compact power centers for commercial or industrial applications. With proper design selection, they can be located near or inside buildings for greater flexibility and savings.

Standard Features

- Meets or exceeds IEEE, ANSI, CSA/CEA and NEMA Standards
- Bolted cover for tank access (45-2500 kVA)
- Welded cover with handhole (3000-7500 kVA)
- Three-point latching door with pentadhead captive door bolt for security
- Lightning arrester mounting provisions (live-front)
- Laser-scribed anodized aluminum nameplate
- One-inch drain valve with sampling device in low-voltage compartment (45-7500 kVA)
- One-inch upper fill plug
- Automatic pressure relief device
- 20” deep cabinet (45-1000 kVA)
- 24” deep cabinet (1500-7500 kVA)
- 30” deep cabinet (34.5/19.92 kV)
- Removable sill for easy installation
- Steel divider between high-voltage and low-voltage compartments
- RTE (15/25 kV) 200 A HTN bushing wells (dead-front)
- Cooper electrical-grade wet-process porcelain bushings (live-front)
- Lifting lugs (4)
- Stainless steel single-hole ground pads (45-500 kVA)
- Stainless steel 2-hole ground pads (750-7500 kVA)
- Stainless steel cabinet hinges and weld studs

Optional Features

- Dial type thermometer
- One, two, or three On/Off loadbreak switches
- 4-position loadbreak switch (V-blade or T-blade switch)
- Low-voltage 6-, 8-, 10-hole spade
- Low-voltage 12-, 16-, 20-hole spade (750-2500 kVA)
- Low-voltage bushing supports
- RTE (15, 25 kV) high-voltage 200 A bushing inserts
- RTE (15, 25 kV) high-voltage 200 A feedthru inserts
- RTE (15/25 kV) high-voltage 200 A (HTN) bushing wells with removable studs
- RTE (15, 25, 35 kV) high-voltage 600 A deadbreak one-piece bushings
- Hexhead captive door bolt
- Ground connectors
- Drain/sampling valve in high-voltage compartment
- Breaker mounting provisions
- Stainless steel nameplate
- Stainless steel tank base and cabinet
- Stainless steel tank base, cabinet sides and sill
- Service entrance (2 inch) in sill or cabinet side
- Nitrogen blanket with bleeder and purge valve
- Delta-wye switch
- Auxiliary contacts for liquid level gauge
- Auxiliary contacts for dial type thermometer
- All copper windings
- Globe type upper fill valve
- K-Factor rated transformer
- FM Approved and Code Listed transformer
- R-Temp fluid, a fire-resistant dielectric coolant
- Envirotemp FR3 fluid, a fire-resistant seed oil-based dielectric coolant with desirable environmental characteristics
- CSA/CEA designs
- Per UL Classification
### Overcurrent Protection
- Bay-O-Net expulsion fuse with isolation link
- Bay-O-Net expulsion fuse in series with partial range current-limiting fuses
- Expulsion cartridge fuse
- Kyle Vacuum Fault Interrupter (VFI) for electronic breaker trip control

### Overvoltage Protection
- Heavy-duty M.O.V.E dead-front primary distribution class elbow arrester
- Heavy-duty MOV primary distribution class under-oil arrester
- Heavy-duty MOV distribution class secondary arrester

### Three-Phase Compartmental Type Transformer

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Three-Phase, 50 or 60 Hz, 65°C (55°C/65°C Optional)</td>
</tr>
<tr>
<td><strong>Liquid Type</strong></td>
<td>R-Temp Fluid, Mineral Oil or Envirotemp FR3 Fluid</td>
</tr>
<tr>
<td><strong>kVA</strong></td>
<td>45-7500</td>
</tr>
<tr>
<td><strong>Primary Voltage</strong></td>
<td>2400-43,800 V (250kV BIL) Wth or Without Taps, Delta or Wye Connected, Dual Voltages Available</td>
</tr>
<tr>
<td><strong>Secondary Voltage</strong></td>
<td>208Y/120 V to 24,940 V</td>
</tr>
</tbody>
</table>

Three-phase pad-mounted compartmental type distribution transformers are designed for indoor or outdoor locations. Unobtrusive construction allows them to be installed in locations exposed to public view like schools, shopping centers and industrial sites. A wide array of configurations and accessories are available to meet a broad range of application demands.

### Three-Phase VFI Transformer

<table>
<thead>
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<tr>
<td><strong>Type</strong></td>
<td>Three-Phase, 50 or 60 Hz, 65°C (55°C/65°C Optional) with VFI Switch for Transformer or Loop Protection</td>
</tr>
<tr>
<td><strong>Liquid Type</strong></td>
<td>R-Temp Fluid, Mineral Oil or Envirotemp FR3 Fluid</td>
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The three-phase VFI Transformer is designed for commercial or industrial applications where conventional transformer or loop protection packages are inadequate, or where space limitations prove to be restrictive. The compact design simplifies installation and requires less real estate than conventional transformer/switchgear packages.
Substation Transformers for Your Exact Specifications

Primary or Secondary Unit Substation Transformers

Primary or Secondary Open Substation Transformers

Substation VFI Transformer

Substation transformers can be designed and configured to meet any application requirements. Substation transformers are available in primary or secondary open substation with cover-mounted bushings fed from overhead lines; or primary or secondary unit substation with enclosed sidewall-mounted bushings for connections to primary or secondary switchgear.

Standard Features

- Meets or exceeds IEEE, ANSI, CSA/CEA and NEMA Standards
- De-energized tap changer, externally operable
- Extra-heavy, welded-in-place lifting lugs and jacking provisions
- Cover-mounted high-voltage and low-voltage porcelain bushings (Open Sub)
- Sidewall mounted high-voltage porcelain bushings (Unit Sub)
- Sidewall mounted low-voltage molded epoxy bushings with NEMA six-hole spades (Unit Sub)
- Tank bases designed to allow skidding or rolling in any direction
- One-inch upper filling plug with filter press connection
- One-inch combination drain/filtering valve with sampling device
- Available in ANSI #61 Light Gray or ANSI #70 Sky Gray
- Tank interior is painted light gray, improving visibility for field inspection and servicing
- Pressure test connection
- Dial-type thermometer
- Dial-type liquid level gauge
- Pressure vacuum gauge
- Stainless steel grounding pads
- Laser-scribed anodized aluminum nameplate
- Cooling radiators welded directly to tank
- Electrical grade mineral oil
- Pressure relief device

Optional Features

- Pressure vacuum bleeder valve
- Cover-mounted pressure relief device (standard with R-Temp or Envirotemp FR3 fluid-filled units)
- Detachable, bolt-on radiators with valves
- Monitoring devices:
  - Dial-type thermometer with alarm contacts (standard with FA Fan Package)
  - Liquid level gauge with alarm contacts
  - Pressure/vacuum gauge with alarm contacts
  - Cover-mounted pressure relief device with alarm contacts
  - Rapid pressure rise relay
    • Optional seal-in panel
- Winding temperature indicator with alarm contacts
- Forced air fan control package (includes fans, NEMA 4 control box, fan controls, dial-type thermometer with alarm contacts)
- Nitrogen blanket with purge valves (3 psi)
- Nitrogen preservation system
- Control box
- Primary and secondary termination enclosure options (Unit Sub)
  - Throat
  - Flange
  - Top- or bottom-entry air terminal chamber
  - Top- or bottom-entry full length cabinet
- FM Approved and Code Listed transformer
- R-Temp fluid, a fire-resistant dielectric coolant
- Envirotemp FR3 fluid, a fire-resistant seed oil-based dielectric coolant with desirable environmental characteristics
- CSA/CEA designs
- Per UL Classification
- K-Factor rated transformer
Overcurrent Protection

- Kyle Vacuum Fault Interrupter (VFI)
- Primary air disconnect switch (Unit Sub)
  - Non-disconnect power fuse
  - Disconnect power fuse
- Bay-O-Net expulsion fuse in series with partial range current-limiting fuse

Overvoltage Protection

- Heavy-duty MOV distribution class arrester
- MOV intermediate class arrester
- MOV station class arrester

Unit Substation Transformer

**TYPE:** Three-Phase, 50 or 60 Hz, 65°C (55°C/65°C Optional)

**LIQUID TYPE:** R-Temp Fluid, Mineral Oil or Envirotens FR3 Fluid

**kVA:** 500-10,000

**PRIMARY VOLTAGE:** Delta or Wye Connected 2400-43,800 V

Δ Delta 2400 V; 1000 kVA & Below

**SECONDARY VOLTAGE:** 208Y/120 V to 14,400 V

The Unit Substation Transformer is designed for commercial and industrial applications to convert distribution voltages to utilization voltages. They are constructed to interconnect easily with both primary and secondary switchgear. They can be used in outdoor or indoor (when filled with R-Temp or Envirotens FR3 fluid) load center substations.

Open Substation Transformer

**TYPE:** Three-Phase and Single-Phase, 50 or 60 Hz, 65°C (55°C/65°C Optional)

**LIQUID TYPE:** R-Temp Fluid, Mineral Oil or Envirotens FR3 Fluid

**kVA:**

- Three-Phase 500-10,000
- Single-Phase 500-2500

**PRIMARY VOLTAGE:** Delta or Wye Connected 2400-43,800 V

Δ Delta 2400 V; 1000 kVA & Below

**SECONDARY VOLTAGE:** 208Y/120 V to 14,000 V

The Open Substation Transformer is designed to be utilized in utility applications to convert from an overhead distribution system to a substation loadcenter. Intended for outdoor applications they can fulfill a wide array of applications.

Substation VFI Transformer

**TYPE:** Three-Phase, 50 or 60 Hz, 65°C (55°C/65°C Optional) with VFI Switch for Transformer Protection

**LIQUID TYPE:** R-Temp Fluid, Mineral Oil or Envirotens FR3 Fluid

**kVA:** 500-10,000

**PRIMARY VOLTAGE:** Delta or Wye Connected 2400-34,500 V

**SECONDARY VOLTAGE:** 208Y/120 V to 14,400 V

The Substation VFI Transformer is designed for commercial or industrial applications where conventional transformer protection is inadequate or where space limitations are restrictive. The compact design reduces real estate requirements and makes installation simpler and more economical.
Projects On-Line Faster

Cooper offers a family of standardized transformer designs (SST Transformers) that can provide you with faster delivery at very competitive prices. By standardizing on the designs and accessories most often requested by customers, Cooper Power Systems is able to offer transformers from stock or with very short lead times, so your project can get on-line faster.

Available in overhead, pad and substation configurations, single- and three-phase, mineral oil or R-Temp fluid-filled, SST transformers are suitable for the vast majority of applications, without the long lead-times associated with special designs. SST transformers are available in the following configurations:

### Single-Phase Overhead

- **kVA:** 10-167
- **PRIMARY VOLTAGE:** 7200, 7620, 14,400 and 7200 x 14,400 V
- **SECONDARY VOLTAGE:** 120/240 V

### Single-Phase Pad-mounted

- **kVA:** 25-100
- **PRIMARY VOLTAGE:** 7200, 7620, 14,400 and 7200 x 14,400 V
  - Loopfeed, Dead-front, ANSI Type-2
- **SECONDARY VOLTAGE:** 240/120

### Three-Phase Pad-mounted

- **kVA:** 75-2500
- **PRIMARY VOLTAGE:** 4160-24,940 V
  - (Grounded Wye and Delta connected)
  - Loopfeed, Dead-front
  - Radial Feed, Dead-front
  - Radial Feed, Live-front
- **SECONDARY VOLTAGE:** 480Y/277 V
  - 208Y/120 V through 1000 kVA

### Open & Unit Substation

- **kVA:** 500-2500
- **PRIMARY VOLTAGE:** 2400-14,400 V
  - (Delta connected)
- **SECONDARY VOLTAGE:** 480Y/277 V
  - (Only sidewall mounted: flange, throat or air terminal chamber accessible high-voltage and low-voltage connections)
FM Approved Transformers are Code Listed and Labeled to Bring Power to the Load

The “FM Approved and Code Listed” R-Tran™ and Envirotran™ Transformers are the industry’s first listed and labeled liquid-filled transformers. Factory Mutual Research Corporation’s Class 3990 Transformer Approval Standard* makes it easy for specifiers of indoor and outdoor transformers to comply and verify compliance with the National Electrical Code® (NEC).

FM Approved and Code Listed transformers integrate state-of-the-art fire safety design and construction that in most cases eliminates the need for fire vaults, auto sprinklers or special clearances. NEC and FM listing requirements are simplified, FM Loss Prevention Data Sheet compliance is easier and installation flexibility is increased. In addition, with the FM Approved logo clearly visible on the transformer, third party certification of NEC compliance is now readily verifiable by the local inspector.

FM Approved and Code Listed transformers are available as substation, pad-mounted and overhead transformers, three-phase and single-phase, with ratings from 5-10,000 kVA and voltage ratings up to 46 kV. These transformers can be filled with either R-Temp or Envirotemp FR3 fire-resistant dielectric coolant.

For applications with severe harmonic levels, specify the K-Plus™ Transformer. This line of transformers is capable of withstanding constant and severe harmonic levels of varying degrees, based on the optimal K factor rating selected. For added fire safety, K-Plus Transformers can be specified “FM Approved and Code Listed”.

Envirotran™ Transformers, for Environmental and Fire Sensitive Applications

Envirotran™ Transformers incorporate the latest advancements in liquid-filled transformer design. This results in a transformer that sets the standard for customers concerned with evolving environmental regulations, fire safety and overall performance.

Envirotran Transformers use a unique dielectric coolant, Envirotemp FR3, whose base oils come from a renewable natural resource—seeds. Formulated with food grade performance enhancing additives, it is non-toxic, non-bioaccumulating and readily biodegradable. Envirotemp FR3 fluid also has an exceptionally high fire point that provides enhanced fire safety. It is Classified by Underwriters Laboratories® and is Approved by Factory Mutual for use in indoor and outdoor transformer installations. For added safety, Envirotran Transformers can also be specified “FM Approved and Code Listed” per Factory Mutual, making it easier to comply and verify compliance with the National Electrical Code®.

The Envirotran Transformer is ideal for environmentally sensitive areas, which today can be just about everywhere! It is also ideal for areas where fire safety is a concern such as in or near buildings, or in public areas such as parks and school grounds.

Envirotran Transformers are available as substation, pad-mounted and overhead transformers, three-phase and single-phase, with ratings from 5-10,000 kVA and voltage ratings up to 46 kV.

*On August 13, 1999 OSHA announced its official recognition of this standard.
Voltage Regulators Preserve Power Quality

**VR-32 32-Step Voltage Regulator**
**4-Step Auto-Booster® Regulator**

Single-phase, electronically controlled voltage regulators accurately keep voltage levels within preset parameters for improved power quality.

Cooper Power Systems offers distinct regulator types to suit the needs of particular applications.

### Standard Features
- Meets or exceeds ANSI, IEEE, IEC and NEMA Standards
- Tap changer with motor and internal power supply
- Laser-scribed anodized aluminum nameplates
- Lifting lugs
- Stainless steel mounting provisions for shunt arresters
- Porcelain bushings with threaded stud terminals
- Clamp-type connectors
- Platform mounting provisions
- Pole-type mounting brackets (250 kVA and below)
- External polymer series (bypass) arrester
- Automatic pressure relief device
- Inspection handhole
- Stainless steel ground bosses

**VR-32 only**
- CL5 Series electronic control
- ADD-AMP feature
- Substation base (167 kVA and above)
- Oil drain valve and sampling device
- Upper filter press connection
- Oil level sight gauge
- Control cabinet with stainless steel hardware
- Conformally coated circuit boards
- Quick disconnect control cable with automatic solid state CT short circuiting device

**Auto-Booster only**
- Simplified control with fixed bandwidth and time delay
- Oil sampling device

### Optional Features
- Polymer shunt surge arresters
- Control cables to remote locations
- Nameplates in alternate languages or metric units
- Adjustable elevating structure
- 4-hole NEMA H-spade connectors
- Wildlife protection
- Export packaging

**VR-32 only**
- CL-5 Series Control optional accessories
  - Fiber optic/RS232 interface board (for digital communication)
  - DNP 3.0 Protocol converter board
  - Control heater
  - SCADA relay assembly
  - 240 volt external source
- Internal differential potential transformer for ANSI class accuracy for reverse power flow applications
- Cooling fans – select ratings only
- Pressure/vacuum gauge
- Dial-type oil level gauge
- Dial-type thermometer
- CCI–Windows based interface program
- Data reader

**Auto-Booster only**
- Control cables to remote locations
VR-32 32-Step Voltage Regulator

**TYPE:** Single-Phase, 50 or 60 Hz

**VOLTAGE:** 2400-34,500 V

**LOAD CURRENT:** 50-1665 A

**kVA:** 38-1000

**BIL RATINGS:** 60-200 kV

The thirty-two step voltage regulator accurately regulates voltage in 5/8% steps from 10% raise to 10% lower on distribution circuits rated 2400 volts (60 kV BIL) through 34,500 volts (200 kV BIL) for either 50 or 60 hertz systems.

CL-5 Series Regulator Control features include built-in metering, voltage limiting, voltage reduction, reverse power flow operation, resident digital communications capability, time-tagged demand metering, 30-hour profile recorder, tap position tracking, and source voltage calculation.

Suitable for installation on 4-wire and 3-wire systems.

4-Step Auto-Booster Regulator

**TYPE:** Single-Phase, 50 or 60 Hz

**VOLTAGE:** 2400-22,000 V

**LOAD CURRENT:** 50 or 100 A

**kVA:** 7.5-150

**BIL RATINGS:** 60-150 kV

The Auto-Booster regulator is a single-phase autotransformer for voltage regulation without the high degree of sophistication of thirty-two step regulators. They provide four-step voltage boost or buck (depending on connection) with a 6% or 10% range. Each step represents 1-1/2% voltage change for 6% units and 2-1/2% change for 10% units. Auto-Boosters are equipped with a simplified control with fixed bandwidth and fixed time delay. These regulators are intended for use on laterals with a limited number of tap changes per day.

Suitable for installation on 4-wire and 3-wire systems.
**Voltage Regulation for Underground Systems**

**Pad-Mounted Voltage Regulator**

The single-phase pad-mounted voltage regulator has all the functionality of the traditional round tank regulators, with the convenience of pad mounting.

**Standard Features**

- Meets or exceeds ANSI, IEEE, IEC and NEMA standards
- Full metal barrier separating the two compartments
- Two parking stands
- Three 200A bushing wells and inserts or 600 A terminations
- Standard pad-mounted green paint (Munsell 7GY3.29/1.5)
- Stainless steel ground bosses
- Bolted tank cover
- Laser-scribed anodized aluminum nameplates
- Deep (31”) removable cabinet
- Automatic pressure relief device
- Lifting lugs
- Under-oil series (bypass) arrester
- Provisions for pressure/vacuum gauge and thermometer
- 1” filter press connection and fill plug
- Control box with CL-5 control
- Oil level sight gauge
- Junction box and position indicator
- 1” drain valve with sampler
- Control cable disconnect at junction box and control box
- Line-side lift-off door secured with two captive bolts
- Padlockable lift-off control-side door with three-point latching
- Door position retention rods

**Optional Features**

- Bypass switch module (200 and 400 Ampere) (Grounded Wye (Star) system only)
- Internal differential PT for source-side voltage sensing
- Alternate topcoat color
- Face-plate mounted off-load tap changer for PT taps
- No barrier
- Pressure/vacuum gauge
- Dial-type oil level gauge
- Dial-type thermometer
- Under-oil shunt surge arresters
- Control heater

**Pad-Mounted Step-Voltage Regulator**

**TYPE:** Single-Phase, 50 or 60 Hz

**VOLTAGE:** 7620/7200, 14,400, or 19,920 V (60 Hz) 11,000, 15,000, or 22,000 V (50 Hz)

**LOAD CURRENT:** 50-600 A

**BIL RATINGS:** 95-150 kV

The pad-mounted thirty-two step voltage regulator offers improved safety, reliability and power quality in existing and new underground construction. Pad-mounted voltage regulators are designed to be easier to site, easy to install and maintain, while also being safer, more reliable and aesthetically pleasing.
Dielectric Fluid Options for Every Application

**Standard Electrical Grade Mineral Insulating Oil**

**R-Temp Fire-Resistant Fluid**

**Envirotex 200 Fire-Resistant Fluid**

**Envirotex FR3 Fire-Resistant Fluid**

Cooper Power Systems transformers are available with standard electrical grade mineral oil or other dielectric coolants manufactured by Cooper Power Systems.

Standard electrical grade mineral insulating oil is tested and degassed to assure a chemically inert product with minimal acid ions. Special additives minimize oxygen absorption and inhibit oxidation. To ensure high dielectric strength, the oil is retested for dryness and dielectric strength, refiltered, heated, dried, and stored under vacuum before being added to the completed transformer.

R-Temp fluid, manufactured by Cooper Power Systems under strict quality control for optimum transformer cooling characteristics, has a higher fire point and higher dielectric strength than mineral oil. The special formulation is less-flammable as defined by the National Electric Code (NEC) and National Electric Safety Code (NESC). Since its introduction in 1975 over 100,000 R-Temp fluid-filled transformers have been installed, approaching one million unit years of service. The fire safety record is flawless. R-Temp fluid is Classified by Underwriters Laboratories® and Approved by Factory Mutual for use in indoor or outdoor installations.

Envirotex 200 fluid is a fire-resistant dielectric coolant developed for applications requiring high performance under extreme temperature conditions. Its unique formulation provides very low freezing and melting points. It is also a low viscosity fluid with excellent dielectric, thermal and mechanical properties. These properties make it particularly well suited for forced liquid cooling operations such as in traction transformers.

Envirotex FR3 fluid, manufactured by Cooper Power Systems, is a natural ester based fluid formulated from a renewable natural resource—seeds. The base oils from the seeds are blended with food grade performance enhancing additives to produce a fluid that has exceptional fire-resistant properties and favorable environmental attributes.

Envirotex FR3 fluid is Classified by Underwriters Laboratories and Approved by Factory Mutual for use in indoor or outdoor installations. It has an even higher fire point than R-Temp fluid, for an even greater margin of fire safety.

Plus, Envirotex FR3 fluid is readily biodegradable and is non-bioaccumulating. Because it is a seed oil-based fluid it can be differentiated from mineral oil regulation per the Edible Oil Regulatory Reform Act: Public Law 104-55. This makes it a much more favorable option when considering environmental risks and regulations.
Cooper Power Systems
Transformer Products Group

SINGLE- AND THREE-PHASE OVERHEAD TRANSFORMERS
SHRUBLINE, MAXISHRUB, RANCH RUNNER SINGLE-PHASE PAD-MOUNTED TRANSFORMERS
THREE-PHASE PAD-MOUNTED COMPARTMENTAL TRANSFORMERS
VFI PAD-MOUNTED TRANSFORMERS
OPEN AND UNIT SUBSTATION TRANSFORMERS
FM APPROVED AND NEC LISTED TRANSFORMERS
ENVIROTRAN TRANSFORMERS
OVERHEAD, PAD-MOUNTED AND SUBSTATION STEP-VOLTAGE REGULATORS
R-TEMP FIRE-RESISTANT DIELECTRIC FLUID
ENVIROTEMP FR3 FIRE-RESISTANT DIELECTRIC FLUID