

### Unit Type Substation Transformers

#### GENERAL

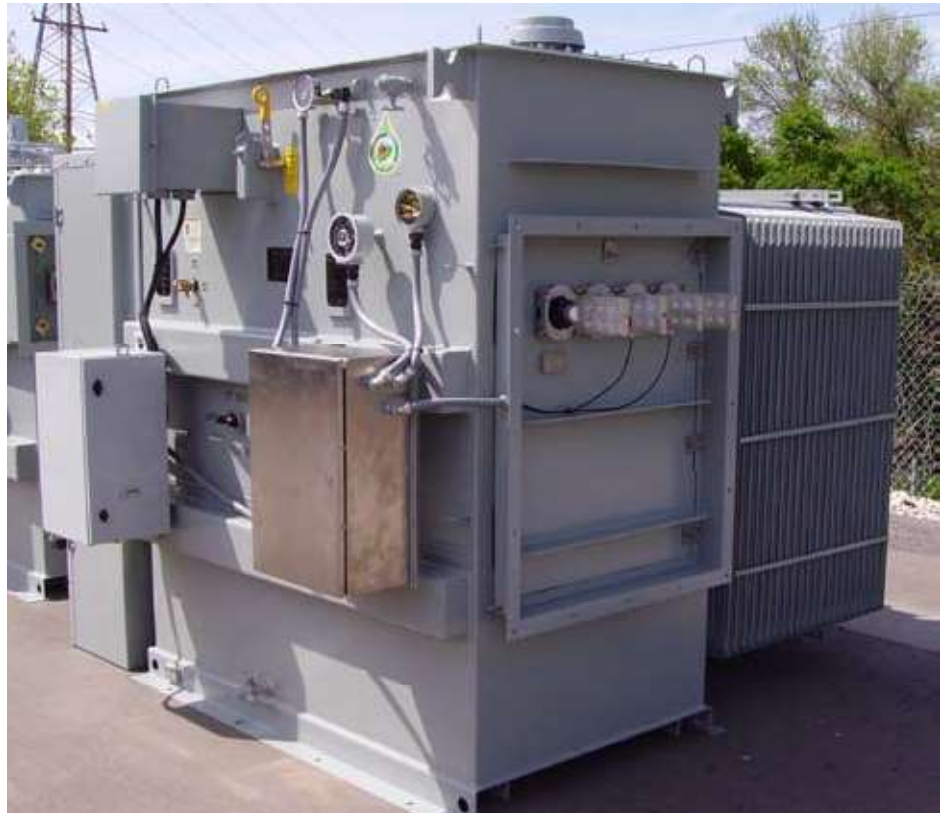
Cooper Power Systems Unit Type Substation Transformers are designed to meet customer specifications.

Flexibility in design, combined with the highest quality manufacturing processes, equipment, and testing procedures enable Cooper Power Systems to provide a product optimized to the customer's requirements. All units meet applicable American National Standards Institute (ANSI®), Institute of Electrical and Electronics Engineers, Inc. (IEEE®) and National Electrical Manufacturers Association (NEMA) standards, as well as National Electric Code® (NEC®), Department of Energy (DOE) and Canadian Electricity Association (CEA) specifications.

Unit type substation transformers are available with enclosed sidewall-mounted bushings for connections to primary and/or secondary switchgear.

Substation transformers are made with a wide range of core steels and winding conductors to optimize efficiency versus cost. Flexible core/coil and tank construction enable your dimensional requirements to be met.

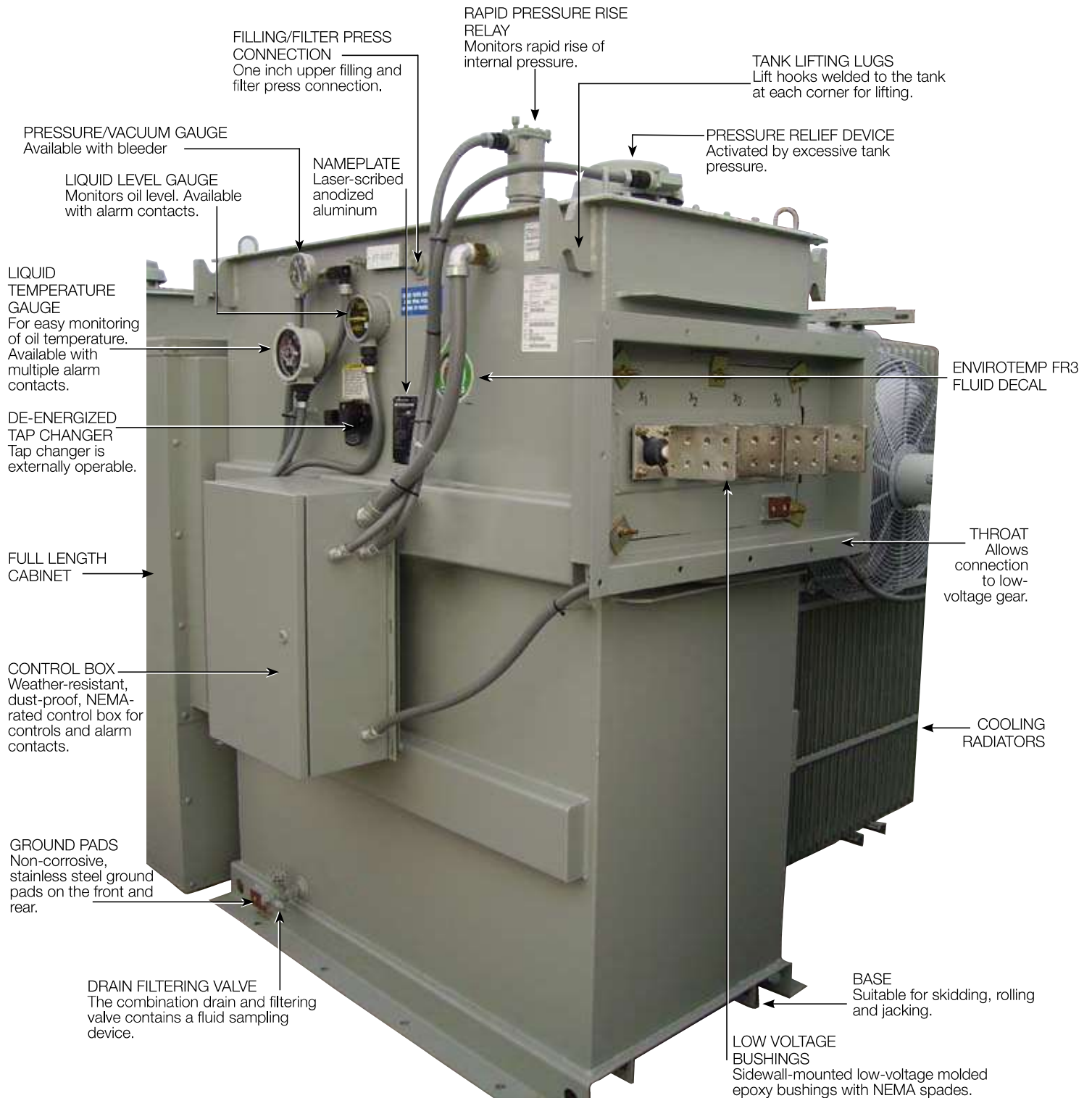
Cooper Power Systems transformers are available with our patented Envirotemp FR3 fluid, a less-flammable and bio-degradable fluid or electrical grade mineral insulating oil. Unit type substation transformers intended for indoor use are solely filled with Envirotemp FR3 fluid. Electrical codes recognize the advantages of using Envirotemp FR3 fluid both indoors and outdoors for fire sensitive applications. Envirotemp FR3 fluid-filled units meet Occupational Safety and Health Administration (OSHA) and Section 450.23, 2008 NEC requirements.



**Figure 1.**  
Unit type substation transformer equipped with low-voltage transition flange and high-voltage full height air terminal chamber.

#### PRODUCT SCOPE

Type	Three-Phase or Single-Phase, 50 or 60 Hz, 65 °C (55 °C/65 °C, 75 °C Optional)
Fluid Type	Envirotemp FR3 fluid or Mineral Oil (upon special request)
Size	Three-Phase: 300 – 12,000 kVA Single-Phase: 500 – 6667 kVA
Primary Voltage	2400 – 46,000 V
Secondary Voltage	208Y/120 V to 24,940 V Wye
Specialty Designs	Inverter/Rectifier Bridge Zig Zag K-Factor ( up to K-19) Hazardous Location (Class 1 Div 2) Internal Circuit Breaker (VFI) UL Listed & Labeled/ Classified Factory Mutual (FM) Approved Solar/Wind Designs Differential Protection Automation Solutions



**Figure 2.**  
Unit type substation transformer with standard features and optional accessories.

**TABLE 1**  
Three-Phase, Single Temperature kVA Ratings

Three-Phase kVA Self-Cooled and Forced-Air Cooled with 65 °C Temperature Rise		
65 °C Rise KNAN		65 °C Rise KNAN/ KNAF
500	<b>+15%</b>	575
750		863
1000		1150
1500		1725
2000		2300
2500	<b>+25%</b>	3125
3750		4688
5000		6250
7500		9375
10000		12500
12000	<b>+33%</b>	16000

**TABLE 4**  
Three-Phase, Dual or Triple Temperature kVA Ratings

Three-Phase kVA Self-Cooled and Forced-Air Cooled with Triple Rated 55 °C/65 °C/75 °C Temperature Rise							
55 °C Rise KNAN		65 °C Rise KNAN		75 °C Rise KNAN	55 °C Rise KNAN/ KNAF	65 °C Rise KNAN/ KNAF	75 °C Rise KNAN/ KNAF
500	<b>+12%</b>	560	<b>+9%</b>	610	575	644	702
750		840		916	863	966	1053
1000		1120		1221	1150	1288	1404
1500		1680		1831	1725	1932	2106
2000		2240		2442	2300	2576	2808
2500		2800		3052	3125	3500	3815
3750		4200		4578	4688	5250	5723
5000		5600		6104	6250	7000	7630
7500		8400		9156	9375	10500	11445
10000		11200		12208	12500	14000	15260
12000		13440		14650	16000	17920	19533

**TABLE 2**  
Percentage Impedance Voltage<sup>1</sup>

kV BIL Class	Low Voltage	
	< 2400V	≥ 2400V
45-150	5.75 <sup>2</sup>	6.5 <sup>3</sup>
200	7.25	7
250	7.75	7.5

<sup>1</sup> The standard tolerance is ± 7.5%.

<sup>2</sup> Option for 6.75% is available.

<sup>3</sup> Option for 5.50% is available.

**TABLE 3**  
Audible Sound Levels

Self-Cooled, Two Winding kVA Rating	NEMA Average	
	dB, KNAN	dB, KNAF
500	56	67
501-700	57	67
701-1000	58	67
1001-1500	60	67
1501-2000	61	67
2001-2500	62	67
2501-3000	63	67
3001-4000	64	67
4001-5000	65	67
5001-6000	66	68
6001-7500	67	70
7501-10000	68	71
12500	69	71

**TABLE 5**  
Insulation Test Levels

kV Class	Induced Test 180 or 400 Hz- 7200 Cycle	kV BIL		Applied Test 60Hz (kV)
		Distribution	Power	
1.2	TWICE RATED VOLTAGE	30	45	10
2.5		45	60	15
5		60	75	19
8.7		75	95	26
15		95	110	34
25 (Grd Y Only)		125	150	40
25		150	150	50
34.5 (Grd Y Only)		125	150	50
34.5		150	200	70
46		200	250	95

**TABLE 6**  
Temperature Rise Ratings 0 - 3300 feet (0-1000 meters)

	Standard	Optional
Unit Rating	65 °C	55/65 °C, 75 °C
Ambient Temperature Rise	40 °C	40 °C
Ambient Temperature 24 Hour Av.	30 °C	30 °C
Temperature Rise Winding <sup>1</sup>	65 °C	55 °C
Temperature Rise Hotspot	80 °C	65 °C

<sup>1</sup> Average Rise by resistance. Refer to ANSI/IEEE Std C57.12.00™ standard.

**NOTE:** Derate kVA by 0.4% for each 100 M (330 ft.) that the altitude is above 1000 M (3300 ft.)

TABLE 7  
Fluid-Filled - Aluminum Windings 55/65 °C Rise<sup>1</sup>

kVA	Drawing Dimensions (in.)									Gallons Of Fluid	Approx. Total Weight (lbs.) (With Fluid)
	A	B	C	D	E	F	G	H	J		
500	66	51	26	52	45	45	30	60	35	300	5600
750	75	59	26	52	55	55	34	68	35	360	7000
1000	75	67	26	52	55	55	38	76	35	420	8400
1500	75	59	59	80	55	55	34	68	35	400	9500
2000	85	67	67	90	55	55	38	76	39	520	12000
2500	85	75	68	92	55	55	42	84	41	570	14600
3750	85	75	70	120	65	65	42	84	45	790	20500
5000	99	87	72	144	65	65	48	96	49	1050	26000
7500	99	95	74	148	75	75	52	104	53	1320	35000
10,000	99	103	76	152	75	75	56	112	57	1740	43000
12,000	99	103	82	164	75	75	56	112	61	1850	49000

<sup>1</sup> Weights, gallons of fluid and dimensions are for reference only, and not for construction. Please contact Cooper Power Systems for exact dimensions

TABLE 8  
Fluid-Filled - Copper Windings 55/65 °C Rise<sup>1</sup>

kVA	Drawing Dimensions (in.)									Gallons Of Fluid	Approx. Total Weight (lbs.) (With Fluid)
	A	B	C	D	E	F	G	H	J		
500	66	51	26	52	45	45	30	60	35	310	5900
750	75	59	26	52	55	55	34	68	35	370	7400
1000	75	67	26	52	55	55	38	76	35	430	8800
1500	75	59	59	80	55	55	34	68	35	420	10000
2000	85	63	67	90	55	55	36	72	39	500	12800
2500	85	67	68	92	55	55	38	76	41	590	14900
3750	85	75	70	120	65	65	42	84	45	830	21500
5000	99	87	72	144	65	65	48	96	49	1090	28000
7500	99	95	74	148	75	75	52	104	53	1360	37000
10,000	99	103	76	152	75	75	56	112	57	1780	45000
12,000	99	103	82	164	75	75	56	112	61	1880	50000

<sup>1</sup> Weights, gallons of fluid and dimensions are for reference only, and not for construction. Please contact Cooper Power Systems for exact dimensions

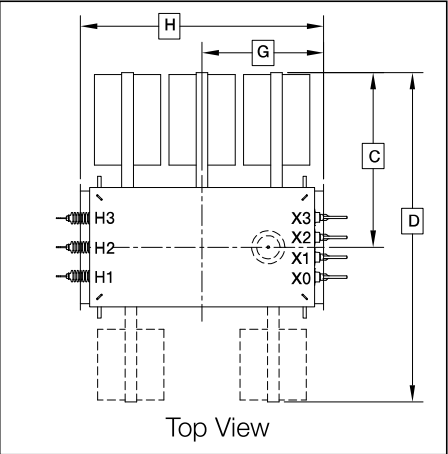


Figure 3.  
High-Voltage left (Segment 2) shown. High-Voltage right (Segment 4) also available.

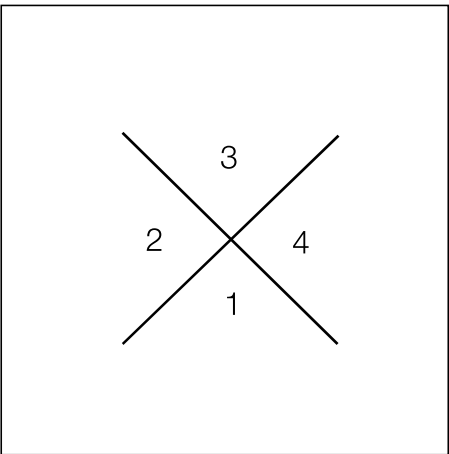
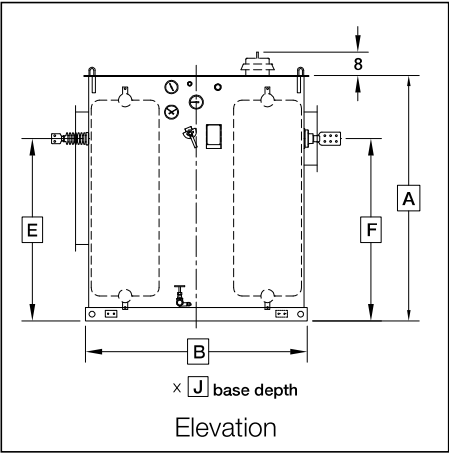
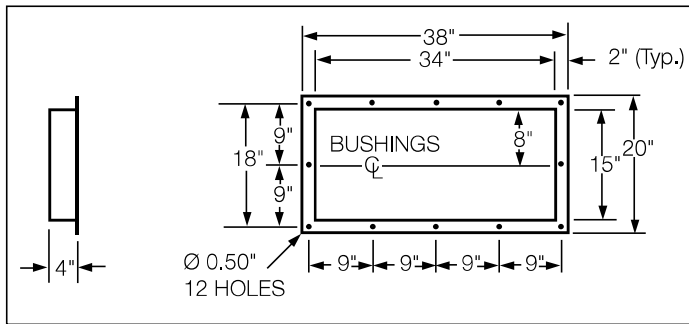
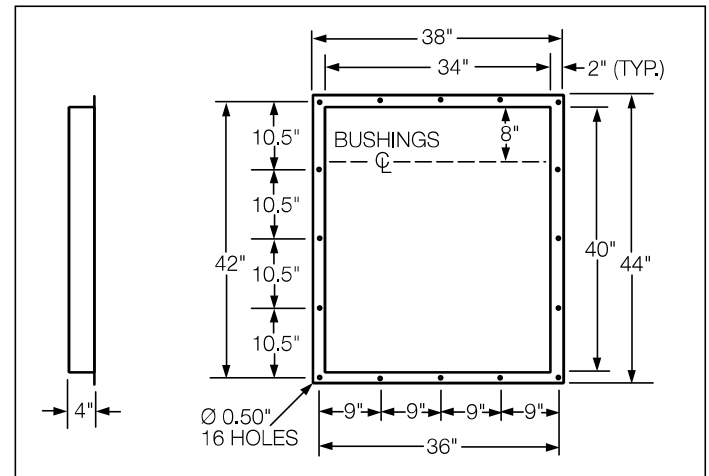


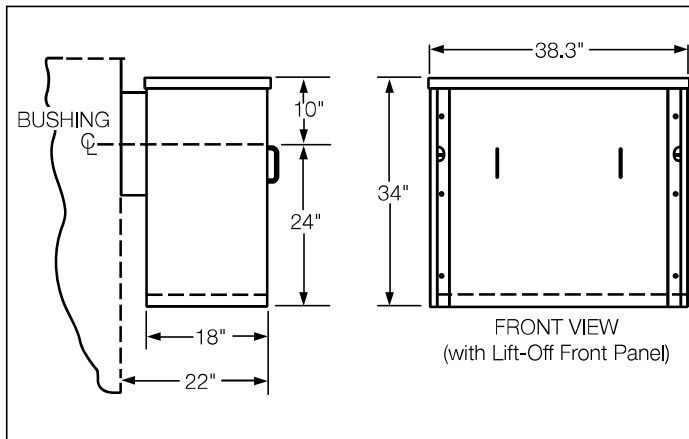
Figure 4.  
ANSI segment designation.



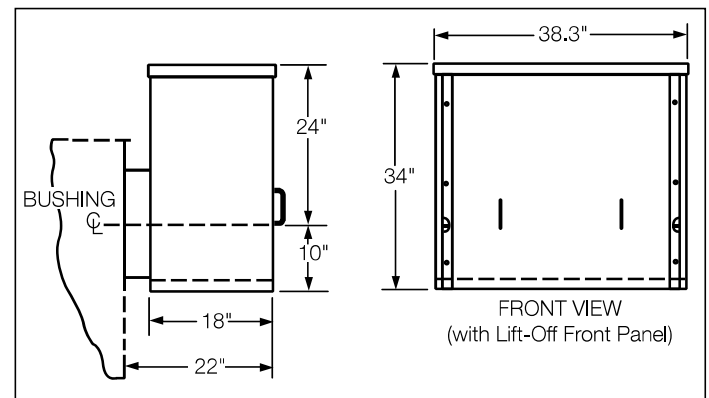
**Figure 5.**  
**Throat.**



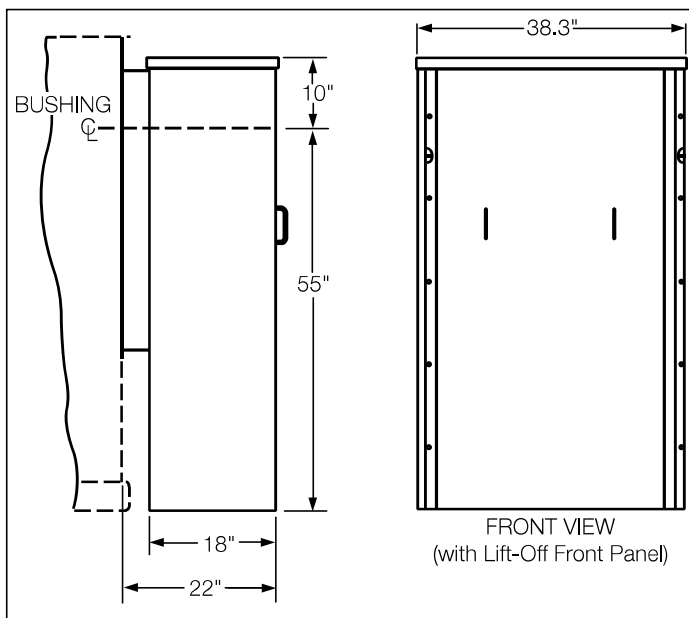
**Figure 8.**  
**Flange.**



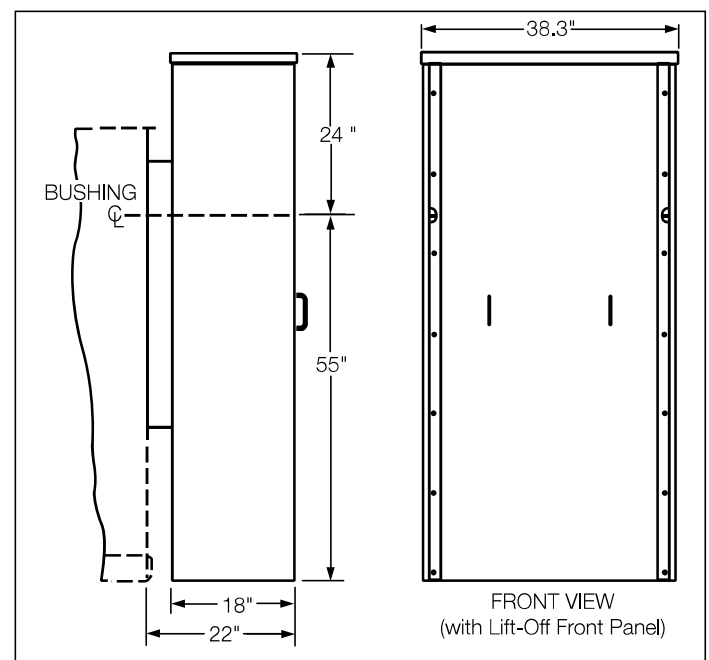
**Figure 6.**  
**Air terminal chamber-bottom entry.**



**Figure 9.**  
**Air terminal chamber-top entry.**



**Figure 7.**  
**Full length cabinet-bottom entry.**



**Figure 10.**  
**Full length cabinet-top entry.**

## STANDARD FEATURES

### FLUID

- Envirotemp FR3 fluid
- Electrical grade mineral insulating oil (upon special request))

### MECHANICAL FEATURES

- De-energized tap changer, externally operable

### HIGH- AND LOW-VOLTAGE BUSHINGS

- Sidewall-mounted high-voltage porcelain bushings.
- Sidewall-mounted low-voltage molded epoxy bushings with NEMA spades

### TANK

- Tank bases designed for skidding or rolling in any direction
- Extra-heavy, welded-in-place lifting lugs and jack pads (4)
- Stainless steel grounding pads (4)
- Cooling radiators are welded directly to the tank

### GAUGES AND DEVICES

- Dial-type thermometer
- Dial-type liquid level gauge
- Pressure vacuum gauge
- Cover mounted automatic pressure relief device
- Pressure test connection

### VALVES/PLUGS

- 1" upper fill plug with filter press connection
- 1" drain valve with sampler combination (2500 kVA and below)
- 2" drain valve with sampler (over 2500 kVA)
- 1" upper filter valve (over 2500 kVA)

### COATINGS (PAINT)

- ANSI #61 Light Gray
- ANSI #70 Sky Gray
- Special paint available per request

### NAMEPLATE

- Laser-scribed anodized aluminum nameplate



Figure 11.  
Automation solutions for remote monitoring.



Figure 12.  
12-pulse application with bushing supports.



Figure 13.  
Motor-operator for open/close of Vacuum Fault Interrupter (VFI).

## OPTIONAL FEATURES

### BUSHING ENCLOSURE OPTIONS

- Throat
- Flange
- Top- or bottom-entry air terminal chamber
- Top- or bottom-entry full length cabinet

### GAUGES AND DEVICES

- With Alarm Contacts
  - Dial-type thermometer (Standard with Fan Package)
  - Liquid level gauge
  - Pressure/vacuum gauge
  - Cover-mounted pressure relief device
  - Winding temperature indicator
- Rapid pressure rise relay with optional seal-in panel
- Nitrogen gas preservation system

### VALVES/PLUGS

- Pressure vacuum bleeder valve
- Detachable, bolt-on radiators with valves

### CONTROL BOXES

- Control box (NEMA 4, NEMA 4X, NEMA 7)

### FORCED-AIR FAN CONTROL PACKAGE

- Forced-air fan control package includes fans, NEMA control box, fan controls, dial-type thermometer with alarm contacts.

### OVERCURRENT PROTECTION

- Vacuum Fault Interrupter (VFI)
  - Visible Break Switch
  - Tri-phase with Ground Trip technology (TPG)
    - SCADA
  - Relays
    - Feeder Protection Relay (iDP-210)
    - Transformer Protection Relay (iXP-420)
- Bay-O-Net Fuse w/Isolation Link
- Bay-O-Net Fuse w/Partial Range Current Limiting Fuse
- Primary air disconnect switch with fuses

### OVERVOLTAGE PROTECTION

- Distribution-, Intermediate-, or, Station-class surge arresters
- Elbow arresters (for dead-front connections)



## OVERCURRENT PROTECTION FEATURES

### Vacuum Fault Interrupter (VFI)



Figure 14.  
VFI - Inside Transformer Tank.



Figure 17.  
VFI - Operating Handle.



Figure 19.  
TPG Control with SCADA shown.

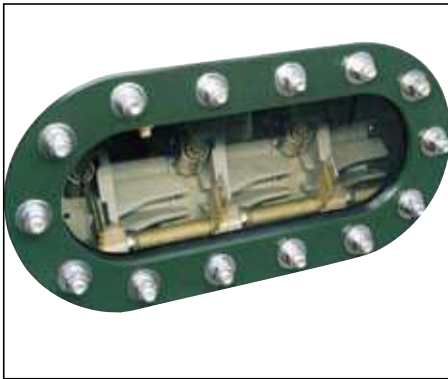


Figure 15.  
Visible Break Switch Moveable blades  
shown in the "Open" position.



Figure 18.  
iDP/iXP Relays - without and with Trip/  
Close pushbuttons.



Figure 20.  
LIS - Switch Position Viewing Window.



Figure 16.  
LIS - Interior view showing power fuses.

## CONSTRUCTION

### Core

The three-legged, step-lap mitered core construction is manufactured using a high-quality cutting machine. For maximum efficiency, cores are precisely stacked, virtually eliminating gaps in the corner joints.

Five-legged wound core or shell-type triplex designs are used for wye-wye connected transformers, and other special transformer designs.

Cores are manufactured with precision cut, burr-free, grain-oriented silicon steel. Many grades of core steel are available for optimizing core loss efficiency.

### Coils

Substation transformers feature a rectangular coil configuration with wire-wound, high-voltage primaries and sheet-wound secondaries. The design minimizes axial stress developed by short circuits and provides for magnetic balancing of tap connections.

Coils are wound using the highest quality winding machines providing exacting tension control and conductor placement for superior short-circuit strength and maximum efficiency.

Extra mechanical strength is provided by diamond pattern, epoxy coated paper insulation, used throughout the coil, with additional epoxy at heavy stress points. The diamond pattern distribution of the epoxy and carefully arranged ducts, provide a network of passages through which cooling fluid can freely circulate.

Coil assemblies are heat-cured under calculated hydraulic pressure to ensure performance against short-circuit forces.

### Core and Coil Assemblies

Substation transformer core and coil assemblies are braced with heavy steel ends to prevent the rectangular coil from distorting under fault conditions. Plates are clamped in place using presses, and welded or bolted to form a solid core and coil assembly. Core and coil assemblies exceed ANSI/IEEE requirements for short-circuit performance. Due to the rigidity of the design, impedance shift after short-circuit is comparable to that of circular wound assemblies.

### Tanks

Transformer tanks are designed for high strength and ease of handling, installation, and maintenance. Tanks are welded using precision-cut, hot

rolled, pickled and oiled steel. They are sealed to protect the insulating fluid and other internal components.

Transformer tanks are pressure-tested to withstand 7 psig without permanent distortion and 15 psig without rupture.

### Tank Finish

An advanced multi-stage finishing process exceeds ANSI/IEEE Std C57.12.28™ standards. The eight-stage pre-treatment process assures coating adhesion and retards corrosion. It converts tank surfaces to a nonmetallic, water insoluble iron phosphate coating.

The paint method consists of three distinct layers of paint. The first is an epoxy primer (E-coat) layer which provides a barrier against moisture, salt and corrosives. The two-component urethane final coat seals and adds ultraviolet protection.

### Vacuum Processing

Transformers are dried and filled with filtered insulating fluid under vacuum, while secondary windings are energized. Coils are heated to drive out moisture, ensuring maximum penetration of fluid into the coil insulation system.

### Cooling System

Less Flammable Liquid-Air (KNAN) cooling is provided with transformers rated 500 kVA. A choice of KNAN/Future KNAF (Future Forced-Air) or KNAN/KNAF (Forced-Air) cooling is provided with units rated 750 kVA and above.

### Insulating Fluid

Transformers from Cooper Power Systems are available with Envirotemp FR3 fluid or electrical grade mineral insulating oil. The highly refined fluids are 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 fluid is re-tested for dryness and dielectric strength, refiltered, heated, dried, and stored under vacuum before being added to the completed transformer.

Envirotemp FR3 fluid is a bio-based, sustainable, natural ester dielectric coolant for use in Envirotran transformers where its unique fire safety, environmental, electrical, and chemical properties are advantageous. It is formulated from seed oils and performance enhancing additives. FR3 fluid quickly and thoroughly biodegrades in the environment, and is non-toxic in acute aquatic and oral

toxicity tests. Building for Environmental and Economic Sustainability (BEES) total life cycle assessment software utilized by the US Dept. of Commerce reports that FR3 fluid's overall environmental performance impact score (results from adding the impacts of water intake, smog, ozone depletion, indoor air, human health, habitat alteration, global warming, fossil fuel depletion, eutrophication, ecological toxicity, critical air pollutants, and acidification) is 1/4th that reported for mineral oil (and that's without consideration for FR3 fluid's transformer insulation life extending properties). FR3 fluid has also earned the distinction of having received the first published EPA Environmental Technology Verification of transformer materials. The green tint reflects its favorable environmental profile and readily distinguishes it from petroleum based oils. FR3 fluid is FM Global Approved and Underwriters Laboratories Classified "Less-Flammable" per NEC Article 450-23, fitting the definition of a Listed Product per NEC.

### Substation VFI Transformer

The VFI transformer combines a conventional distribution transformer from Cooper Power Systems with the proven Vacuum Fault Interrupter (VFI). This combination provides both voltage transformation and transformer over current protection in one space saving and money saving package. The substation VFI transformer with transformer protection protects the transformer and provides proper coordination with upstream protective devices. When a transformer fault or overload condition occurs, the VFI breaker trips and isolates the transformer.

The three-phase VFI breaker has independent single-phase initiation, but is three-phase mechanically gang-tripped. A trip signal on any phase will open all three phases. This feature eliminates single-phasing of three phase loads. It also enables the VFI breaker to be used as a three-phase load break switch.

Due to the resettable characteristics of the VFI breaker, restoring three-phase service is faster and easier.

The sealed visible break window and switch is an option that can be installed to provide visible break contact. This feature provides enhanced safety and allows an operator to see if the contacts are in an open or closed position on the VFI before performing maintenance.



## Envirotran FM Approved Transformer

The Envirotran Transformer from Cooper Power Systems is FM Approved and suitable for indoor locations. Factory Mutual Research Corporation's (FMRC) approval of the Envirotran transformer line makes it easy to comply and verify compliance with Section 450.23, 2008 NEC, Less-Flammable Liquid-Filled Transformer Requirements for both indoor and outdoor locations.

FM Approved Envirotran transformers offer the user the benefit of a transformer that can be easily specified to comply with NEC, and makes FM Safety Data Sheet compliance simpler, while also providing maximum safety and flexibility for both indoor and outdoor installations.

Because the "FM Approved" logo is readily visible on the transformer and its nameplate, NEC compliance is now easily verifiable by the inspector.

Substation Envirotran FM Approved transformers from Cooper Power Systems are manufactured under strict compliance with FMRC Standard 3990, and are filled with FM Approved Envirotemp FR3 fire-resistant dielectric coolant.

## ABS Type Approved Substation Transformers

Cooper Power Systems offers liquid-filled substation and pad-mounted distribution-class transformers from 0.5 to 10 MVA with type-approved certification from the American Bureau of Shipping (ABS®) for marine and off-shore applications.

## SPECIALTY DESIGNS

### Inverter/Rectifier Bridge

Cooper Power Systems complements its range of applications for substation transformers by offering dual winding designs. These designs are intended for connection to 12-pulse rectifier bridges.

### Zig Zag

Cooper Power Systems is providing a cost-effective and an alternative solution for earthing ungrounded systems and applications where a transformation with 0 degree phase shift is required.

### Hazardous Locations (Class 1 Div 2)

Hazardous locations can be defined as areas where combustible materials are present. Cooper Power Systems is offering explosion proof designs that prevent gasses from coming in contact with switching arcs. These explosion proof control boxes are made of cast aluminum and are designed to contain an arc.

### Underwriters Laboratories® (UL®) Listed & Labeled/ Classified

The Envirotran Transformer from Cooper Power Systems can be specified as UL Listed & Labeled, and/or UL Classified.

Underwriters Laboratories (UL) listing is a verification of the design and construction of the transformer to the ANSI/IEEE standards. UL listing generally is the most efficient, cost-effective solution for complying with relevant state and local electrical codes.

UL Combination Classification/Listing is another way in which to comply with Section 450.23, 2008 NEC requirements. This combines the UL listed transformer with a UL Classified Less-Flammable Liquid and complies with the use restrictions found within the liquid Classification.

### K-Factor

Cooper Power Systems is designing substations with appropriate K-factor correction to mitigate the effects of non-linear harmonic loading conditions.

### Solar/Wind Designs

Cooper Power Systems is offering custom designs for renewable energy power generation. Cooper Power Systems manufactures Generator Step-Up (GSU) transformers at the base of every wind turbine. Additionally, grounding transformers are available for wind power generation. For the solar photovoltaic industry, Cooper Power Systems is offering standard step-up transformers and dual secondary designs.

## SPECIAL PROTECTION FEATURES

### Kyle Vacuum Fault Interrupter (VFI)

- Provides resettable over current protection using reliable vacuum bottle interrupters.
- Utilizes Tri-Phase electronic controller which allows tripping of all three phases upon sensing a fault condition.
- Cooper Power Systems offers intelligent solutions for enhancing the capabilities of the Tri-phase controller.

### Tri-Phase with Ground Trip Technology (TPG):

Incorporates separate zero sequence circuit and settings for special applications where increased sensitivity and speed is required in detecting ground fault and phase loading imbalance conditions. Package includes standard Tri-Phase control features with an option for SCADA.

### Relays

- iDP-210 relay: Full featured, multi-function programmable relay includes Phase currents and Event Recorder data and trip signal to LV Circuit breaker (by others).
- iXP-420 relay: Provides all the protection features of iDP-210 relay with the addition of ANSI Device#87.

### Primary Air Disconnect Switch

- Provides economical, visible disconnect primary load break switching.
- Fully coordinated and packaged with the transformer by Cooper Power Systems.
- Meets ANSI/IEEE Std C37.20.3™ standard, NEMA SG-5 and related standards.
- Standard features
  - Switch
    - Three-pole, two-position, gang-operated air interrupter, unfused
- Standard ratings
  - 600 A continuous and load break; 40 kA fault close and momentary
  - 5 kV (60 kV BIL) or 15 kV (95 kV BIL)
-

- Enclosure
  - Standardized modular self supporting, bolted design
  - Mechanical safety interlock prevents access when switch is closed or closing of switch when door is open.
- Optional Features
  - 1200 A continuous and load break current rating; 61 kA fault close and momentary. Requires 1200 A copper bus option.
  - Key interlocks (single cylinder) for interlocking primary switch with secondary main circuit protective device.
  - Auxiliary switch for remote indication of primary switch position
  - Where high interrupting ratings and short-circuit protection are desired: current-limiting non-expulsion power fuses
  - Where lower interrupting ratings are adequate:
    - Non-disconnect power fuses
    - Disconnect power fuses

## TESTING

Cooper Power Systems performs routing testing on each transformer manufactured including the following tests:

- Insulation Power Factor: This test verifies that vacuum processing has thoroughly dried the insulation system to required limits.
- Ratio, Polarity, and Phase Relation: Assures correct winding ratios and tap voltages; check insulation of HV and LV circuits. Check entire insulation system to verify all live-to-ground clearances.
- Resistance: This test verifies the integrity of internal high-voltage and low-voltage connections; provides data for loss upgrade calculations.
- Applied Potential: Applied to both high-voltage and low-voltage windings, this test stresses the entire insulation system to verify all live-to-ground clearances.
- Induced Potential: 3.46 times normal plus 1000 volts for reduced neutral designs.
- Loss Test: These design verification tests are conducted to assure that guaranteed loss values are met and that test values are within

design tolerances. Tests include no-load loss and excitation current along with impedance voltage and load loss.

- Leak Test: Pressurizing the tank to 7 psig assures a complete seal, with no weld or gasket leaks, to eliminate the possibility of moisture infiltration or oil oxidation.

### Design performance tests include:

- Temperature Rise: Our automated heat run facility ensures that any design changes meet ANSI/IEEE temperature rise criteria.
- Audible Sound Level: Ensures compliance with NEMA requirements.
- Lightning Impulse: To assure superior dielectric performance, this test consists of one reduced wave, two chopped waves and one full wave in sequence, precisely simulating the harshest conditions.

## THOMAS A EDISON RESEARCH AND TEST FACILITY

We are constantly striving to introduce new innovations to the transformer industry, bringing you the highest quality transformer for the lowest cost. Cooper Power Systems Transformer Products is ISO 9001 compliant, emphasizing process improvement in all phases of design, manufacture, and testing. We have invested millions of dollars in the Thomas A. Edison Technical Center, our premier research facility in Franksville, Wisconsin affirming our dedication to introducing new innovations and technologies to the transformer industry. Headquarters for the Systems Engineering Group of Cooper Power Systems, this research facility is fully available for use by our customers to utilize our advanced electrical and chemical testing labs.



Figure 21.  
Substation transformer with visible break technology.



Figure 23.  
Triplex Indoor Power Center comprising of energy efficient and low noise single-phase substation transformers in a ganged setup.



Figure 22.  
Substation transformer with customer-specific coordination and accessories.



Figure 24.  
Class 1 Div 2 hazardous duty substation transformer.

