# OPAL SOL™ Series

## HIGH PERFORMANCE TRANSFORMERS OPTIMIZED FOR SOLAR PV TO DELIVER 25-35% LESS LOSSES THAN TYPICAL DOE 2016 COMPLIANT TRANSFORMERS

### APPLICATION

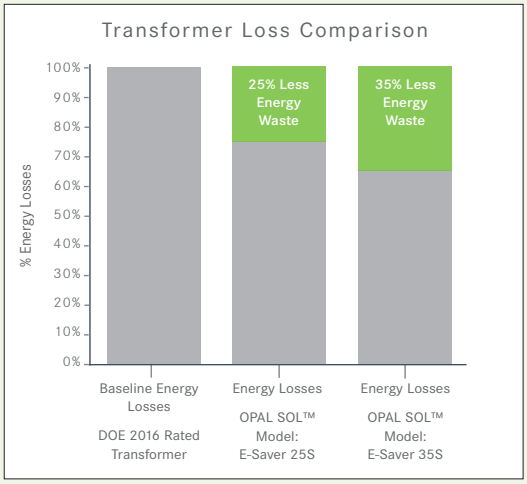
The E-Saver-SOL - OPAL Series (OPAL SOL) is an ultra-efficient low-voltage dry-type isolation transformer optimized specifically for solar PV applications. The OPAL SOL operates to maximize utilization of energy generated by solar PV. This is achieved by reducing typical energy waste that occurs when solar energy flows from the inverter to the building's electrical system – an even more compelling benefit for Net Zero, LEED® & High Performing Buildings.

### KEY PERFORMANCE CHARACTERISTICS

The OPAL SOL models are designed to deliver top performance for solar applications: lowest idling losses during off hours and highest efficiency at 100% load, as well as the rapidly fluctuating loads in between. The two models are designed to maximize the price/performance which will vary by region, system design, and site conditions. The OPAL SOL is available in step-up or step-down voltages, and a variety of winding configurations as required by the application. Delta-Wye and Wye-Wye windings are the most common, but other configurations are available. The OPAL SOL Wye-Wye configuration is built on a 5-leg core, which conforms with IEEE Std 241 para. 4.5 for fault conditions. and also ensures correct inverter sensing of a lost phase, overcoming the weaknesses associated with wye-wye configurations on a 3-leg core. Additionally, impedances are managed by design to mitigate arc flash, inrush current and fault current levels (typically 4% or higher, per application requirement). Quiet operation is assured by delivering 3dB lower than NEMA Standard Noise levels. Performance characteristics of every unit are guaranteed.

### SIZE OPAL SOL™ WITH SAME kW AS THE INVERTER

OPAL SOL designs are designed to handle the daily cyclical full load mode of operation without requiring derating or oversizing. This means that the OPAL SOL model is sized to match the inverter's power rating – it's that simple. This saves capital cost by enabling a right-sized electrical infrastructure including breakers, conductors, conduits, space, installation, and minimizes end-to-end carbon footprint. This also improves breaker trip coordination and reduces arc flash energy.




Savings estimate calculated in spring and autumn equinox in the L.A. California area compared with a basic DOE compliant transformer

OPAL SOL™ Transformer with 360° Rotatable IR Port™ and Hinged Door Options

### NET ZERO & LEED® CONTRIBUTIONS

The OPAL SOL contributes to Net Zero and LEED® buildings through substantial reduction in energy losses, which means that more of the solar energy produced by the PV system is delivered to the building – losses which are typically not accounted for in the solar energy production models. Additional sustainable benefits include our ISO 14001 certified manufacturing, reduced waste packaging, integrated metering and ability to integrate with the Powersmiths WOW™ Sustainability Management Platform. The WOW platform is a natural fit with the OPAL SOL combining live building resource data with an education and outreach component. Show animations and other customized visuals with real-time data, highlighting solar energy contribution to organizational sustainability objectives.

### SUSTAINABILITY, CERTIFICATIONS & TESTING

Sustainable design is evident in the substantial reduction in energy losses compared to legislation[1], backed by our manufacturing facility's ISO 14001 certified environmental management system, as well as lower emission superior epoxy co-polymer impregnant used during manufacturing and our innovative recyclable product packaging. With the continued "pursuit of excellence", our high-quality ISO 9001 manufacturing certification, and ISO 17025 Efficiency Test Lab certification, we deliver a product with a longer life and significant sustained benefits to our customers.

### 32-YEAR PERFORMANCE GUARANTEE & PRODUCT WARRANTY

The OPAL SOL has an industry leading 32-year pro-rated warranty.

EFFICIENCY & LOSSES: Powersmiths guarantees that ALL units meet or exceed the performance levels set out in their technical data sheets, for the full duration of the 32-year warranty period.

SEISMIC: Powersmiths warrants the unit will remain functional after a seismic event up to rated severity.

### INTEGRATED OPTIONS

Powersmiths offers many integrated options, all with Arc Flash safety in mind, such as lockable hinged doors, integrated metering and meter ports to provide information about capacity utilization, load profiles, power and energy use, and a patented Rotatable IR Port™ to enable safe, quick, cost-effective and non-invasive thermal imaging of the live transformer. The integrated breaker option (input/output) is valuable where space is constrained, and may eliminate the need for outdoor-rated switchgear.

### KEY FEATURES

- Maximize utilization of solar energy production
- Optimized for demanding solar applications: from no load to 100% load
- Match inverter kW; no oversizing required
- Fast payback and low lifecycle cost
- Performance guarantee – 32 Years

[1] U.S. Department of Energy, 10 CFR Part 431, [Docket No. EERE-2010-BT-STD-0048] Energy Conservation Program: Energy Conservation Standards for Distribution Transformers; Final Rule, April 18, 2013

## TECHNICAL SPECIFICATIONS

OPAL SOL is an ultra-efficient low-voltage dry-type isolation transformer with a common-core, 10kV BIL, 200% rated neutral, built to NEMA ST-20, UL1561 and other applicable ANSI and IEEE standards, and is cULus Listed and CSA Efficiency Verified. All OPAL SOL models come standard in a TYPE 2 ventilated drip-proof indoor enclosure made of heavy gauge steel finished with epoxy powder coating for durability and low environmental impact. Outdoor TYPE 3 enclosures are also available. Both primary and secondary terminals and voltage taps (typically six 2.5%) are readily accessible by removing the front enclosure panel. The OPAL SOL is UL Listed for 2" clearance for ventilated openings - a significant improvement over the typical industry 6" limit. The 220°C class insulation system is NOMEX-based with an Epoxy Co-polymer impregnant with technical performance characteristics that embed lower environmental impact, long term reliability and long-life expectancy.

## OPAL SOL MODELS

| Model* | Winding Material | Temperature Rise | Estimated Savings vs. DOE2016 |
|---|---|---|---|
| 25S | Aluminum | 115°C | 25% |
| 35S | Copper | 80°C | 35% |

*The number designation represents the average savings compared to a DOE 2016 transformer. The 'S' designates solar optimization. The savings estimate is based on Southern California latitude and 10-15% solar array oversizing for extended peak power delivery.

## WINDING CONFIGURATIONS

E-Saver-SOL is available in a variety of winding configurations: building side delta to inverter-side 4-wire grounded wye (Dy), building-side 3-wire wye to inverter-side 4-wire grounded wye (Yy) in configurations.

## ORDERING INFORMATION

OPAL PRODUCT FAMILY - Px - kVA - PV - SV - W - OPT

- OPAL PRODUCT FAMILY: E-SAVER
- Px: Performance Model (25S, 35S)* *other models available
- kVA: 10-1000 kVA
- PV: Primary Voltage/ Building Side Connection (up to 600V)
- SV: Secondary Voltage/ Inverter Side Connection (up to 347/600V)
- W: Winding Configuration (Yd, Dy, Yy, Dd)** **lower-case letter is inverter side
- OPT: Options if Applicable (See Available Options)

### TECHNICAL DATA

| kVA | Impedance (%Z) | CU Model Weight (lbs) | Standard Case Size (in) |
|---|---|---|---|
| 15 | 3.2-4.5 | 250-325 | A (18W x 17D x 27H) |
| 20 | 3.2-4.5 | 275-375 | B (26W x 18D x 30H) |
| 25 | 3.2-4.5 | 300-400 | B (26W x 18D x 30H) |
| 30 | 3.2-4.5 | 350-425 | B (26W x 18D x 30H) |
| 45 | 3.2-4.5 | 450-550 | B (26W x 18D x 30H) |
| 50 | 3.2-4.5 | 500-600 | C (32W x 22D x 40H) |
| 63 | 3.2-4.5 | 550-650 | C (32W x 22D x 40H) |
| 75 | 3.2-4.5 | 675-800 | C (32W x 22D x 40H) |
| 100 | 3.2-4.5 | 775-975 | C (32W x 22D x 40H) |
| 112.5 | 3.2-4.5 | 875-1100 | C (32W x 22D x 40H) |
| 125 | 3.2-4.5 | 1000-1250 | D (38W x 27D x 48H) |
| 150 | 3.2-4.5 | 1150-1400 | D (38W x 27D x 48H) |
| 175 | 3.2-4.5 | 1250-1500 | D (38W x 27D x 48H) |
| 200 | 3.2-4.5 | 1325-1600 | D (38W x 27D x 48H) |
| 225 | 3.2-4.5 | 1400-1750 | D+ (38W x 32D x 52H) |
| 250 | 3.2-4.5 | 1550-1850 | D+ (38W x 32D x 52H) |
| 300 | 3.2-4.5 | 1700-2150 | D+ (38W x 32D x 52H) |
| 400 | 3.2-4.5 | 2200-2650 | E+ (52W x 38D x 61H) |
| 450 | 3.2-4.5 | 2500-2900 | E+ (52W x 38D x 61H) |
| 500 | 3.2-4.5 | 2750-3350 | E+ (52W x 38D x 61H) |
| 600 | 3.2-4.5 | 3000-3800 | F (64W x 47D x 67H) |
| 750 | 3.2-4.5 | 3550-4350 | F (64W x 47D x 67H) |
| 850 | 3.2-4.5 | 4100-4800 | F+ (64W x 53D x 67H) |
| 1000 | 3.2-4.5 | 4700-5700 | F+ (64W x 53D x 67H) |

## AVAILABLE OPTIONS

**Metering:** Express Logger™, SMART™ or Cyberhawk TX™ (See product cut sheets for more info)
**N3R:** NEMA 3R, ventilated enclosure
**N2S:** Indoor sprinkler proof enclosure
**OSEC:** Enclosure for outdoor public areas
**OV:** Enclosure for outdoor secure areas
**IRP:** Rotatable IR Port™
**IRG:** Fixed IR Grill
**HD:** Hinged Door
**1S:** Single electrostatic shield
**2S:** Dual electrostatic shields
**3S:** Triple electrostatic shields
**SPD:** (120/208 V OR 277/480V)
- **PRO80:** 80kA, 7 mode, Filter
- **PRO120:** 120kA, 7 mode, Filter
- **PRO200:** 200kA, 7 mode, Filter
- **PRO240:** 240kA, 7 mode Filter
- **PROXX:** Where XX is custom ID

**LKS:** Lug kit, screw-type
**LKC:** Lug kit, compression type
**LI:** Low inrush
**COL:** Custom color
**TS:** Thermal sensors at 170°C and 200°C
**SE:** Sensitive environment, extra low noise
**SB:** Seismic bracing
(Contact Powersmiths for seismic certification details)

**IMP:** Custom Impedance
**RTR:** Routine Test Report
**2016TR:** DOE 2016 Test Report

NOTE: The above data applies to the standard configuration of each kVA. Selection of some options may change enclosure size and/or transformer weight. Consult factory for detailed product data sheet for these and other configurations.

Technical specifications subject to change without notice.



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