# SECTION 7

# ENERGY EFFICIENT GENERAL PURPOSE LOW VOLTAGE DISTRIBUTION TRANSFORMERS

## 600V Class, Single Phase & Three Phase


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# Low Voltage Distribution Transformer Energy Efficiency Guidelines

In the past several years, there has been an accelerated rate of change to introduce energy efficiency standards for transformers in North America. Many products have preceded the initiatives for transformers in an overall effort to optimize manufactured goods for environmental concerns. Governments are encouraging users to consider energy efficient products like dry-type transformers in an effort to help reduce carbon dioxide emissions.

In addition to the benefits to the environment, energy efficient transformers realize substantial savings in operating costs, thereby having a direct impact on the initial investment evaluated over a period of time.

## United States - Energy Efficiency (DOE 10 CFR Part 431)

*The laws in the U.S. state that all low voltage dry-type distribution transformers (as defined below) manufactured after January 1st, 2007, must meet the minimum energy efficiency standards outlined in DOE 10 CFR Part 431. The range of product covered by these standards are:*

| | | |
|---|---|---|
| Voltage Rating | Primary Voltage | 600 volt and below |
| | Secondary Voltage | 600 volt and below |
| Dry-Type Rating | Single Phase | 15-333 kVA |
| | Three Phase | 15-1000 kVA |
| Frequency | | 60 Hz only |

For transformers exempted from the DOE efficiency regulations please refer to the following DOE link:
http://www.access.gpo.gov/nara/cfr/waisidx_09/10cfr431_09.html

The HPS lines of 600 volt class energy efficient distribution transformers illustrated in this section, meet or exceed the minimum efficiencies required. These efficiencies are at their maximum at 35% of the nameplate rated load.

The standards covering 600 volt class energy efficiency in dry-type transformers in North America are outlined in DOE 10 CFR Part 431, “Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule”. These specifications have carefully considered the total owning cost unique for industrial or commercial installations where the load factor is an integral part of the efficiency rating.

| US Department of Energy<br>DOE 10 CFR Part 431 Efficiency Levels<br>Dry-Type Distribution Transformers - Low Voltage | | | |
|---|---|---|---|
| Single Phase | | Three Phase | |
| kVA | Efficiency | kVA | Efficiency |
| 15 | 97.70 | 15 | 97.00 |
| 25 | 98.00 | 30 | 97.50 |
| 37.5 | 98.20 | 45 | 97.70 |
| 50 | 98.30 | 75 | 98.00 |
| 75 | 98.50 | 112.5 | 98.20 |
| 100 | 98.60 | 150 | 98.30 |
| 167 | 98.70 | 225 | 98.50 |
| 250 | 98.80 | 300 | 98.60 |
| 333 | 98.90 | 500 | 98.70 |
| | | 750 | 98.80 |
| | | 1000 | 98.90 |

All efficiency values are at 35% of nameplate rated load



For termination details see page 268.
For accessories see pages 264 to 267.



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# Low Voltage Distribution Transformer Energy Efficiency Guidelines Continued...

## Canada - Energy Efficiency (CSA C802.2)

*The laws in Canada state that all low voltage dry-type distribution transformers (as defined below) manufactured after January 1st, 2005, must meet the minimum energy efficiency guidelines outlined by CSA C802.2 and referenced in the Canadian Energy Efficiency Act - Energy Efficiency Regulations (SOR/94-651). The range of product covered by these standards are:*

| | | |
|---|---|---|
| **Primary (high) Voltage** | | Up to 1.2 kV |
| **Secondary (low) Voltage Line Current** | | Less than 480 amps |
| **Dry-Type Rating** | **Single Phase** | 15-333 kVA |
| | **Three Phase** | 15-1000 kVA |
| **Frequency** | | 60 Hz only |

For transformers exempted from the Canadian Efficiency Regulations please refer to the following link: http://laws.justice.gc.ca/eng/sor-94-651/page-1.html or: http://www.hammondpowersolutions.com/products/locate_by_product/energy_efficient_distribution_transformers/index.php

The HPS lines of 1.2 kV volt class energy efficient distribution transformers illustrated in this section, meet or exceed the minimum efficiencies required. These efficiencies are at their maximum at 35% of the nameplate kVA transformer capacity.

The specifications covering 1.2 kV volt class energy efficiency in transformers in Canada are outlined in the CSA Efficiency Standard Document C802, “Maximum Losses for Distribution, Power and Dry-Type Transformers” as referenced in the Canadian Energy Efficiency Act - Energy Efficiency Regulations (SOR/94-651). These specifications have carefully considered the total owning cost unique for industrial or commercial installations where the load factor is an integral part of the efficiency rating.

| CSA Efficiency Standard Document<br>C802.2 Efficiency Levels<br>Dry-Type Distribution Transformers - Low Voltage | | | |
|---|---|---|---|
| **Single Phase** | | **Three Phase** | |
| **kVA** | **Efficiency** | **kVA** | **Efficiency** |
| 15 | 97.70 | 15 | 97.00 |
| 25 | 98.00 | 30 | 97.50 |
| 37.5 | 98.20 | 45 | 97.70 |
| 50 | 98.30 | 75 | 98.00 |
| 75 | 98.50 | 112.5 | 98.20 |
| 100 | 98.60 | 150 | 98.30 |
| 167 | 98.70 | 225 | 98.50 |
| 250 | 98.80 | 300 | 98.60 |
| 333 | 98.90 | 500 | 98.70 |
| | | 750 | 98.80 |
| | | 1000 | 98.90 |

All efficiency values are at 35% of nameplate rated load



For termination details see page 268.

For accessories see pages 264 to 267.
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# NEMA Premium® Efficiency Transformer Program

*The 1992 Energy Act was a significant evolution in regulating low voltage dry-type transformers for the reduction of national energy use. Market pressures, however, indicated that customers were interested in even higher efficiencies. However with no guidelines in place, many manufacturers started to offer a multitude of higher efficiency transformer products, most of these without a well defined consistent specification.*

*On June 9th, 2010 the National Electrical Manufacturers Association (NEMA) announced the initiation of the NEMA Premium® Efficiency Transformer Program, which will help utilities, commercial buildings, and industrial plants incorporate super high-efficiency electrical transformers into their operations.*

*NEMA originally set the standard for the efficiency of various types of distribution transformers with the publication of NEMA TP 1-2002 Guide for Determining Energy Efficiency for Distribution Transformers, which was later adopted by the U.S. Department of Energy (DOE) as the national energy-efficiency rule for low-voltage dry-type distribution transformers. The new NEMA Premium® Efficiency Transformer designation requires 30 percent fewer losses than existing DOE regulations (10 CFR 431) for low-voltage dry-type distribution transformers.*

*The transformers covered under the new program are typically used in commercial and industrial applications. However, some electric utilities are considering the NEMA program for their commercial and industrial energy-efficiency rebate programs. The adoption of this program will not only reduce energy consumption, but will also significantly reduce carbon dioxide emissions.*

*Hammond Power Solutions Inc (HPS) has already been offering super high efficiency transformer lines in the market for many years (the HPS SuperSentinel®, HPS SuperSynergy® and HPS SuperCenturion®). HPS has now updated these lines to meet the efficiency levels in the new NEMA Premium® Efficiency Transformer Program.*

*For more information about the NEMA Premium® Efficiency Transformer Program, visit;*
*http://www.nema.org/gov/energy/efficiency/premium/transformersProgram.cfm*

*Please Note; not all premium efficiency low voltage dry-type are the same and the user should closely look at the other design parameters that could affect their system performance.*

**As a Partner in the NEMA Premium® Efficiency Transformer Program, HPS has determined that the products indicated in this section with the NEMA Premium® logo meet the NEMA Premium® Efficiency guidelines for super high-efficiency.** (NEMA Premium® is a trademark of National Electrical Manufacturers Association.)




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## Product Features and Applications:

HPS offers three lines of energy efficient distribution transformers:

***Linear Load General Purpose Transformers (pages 159 to 188)***
General purpose distribution transformers are rated for 600 volts and below. They are generally used for supplying appliance, lighting, heating, motorized machine and power loads from electrical distribution systems. They are either ventilated, totally enclosed, or encapsulated (potted). For non-linear loads, all standard DOE 10 CFR Part 431 distribution transformers have to be derated to allow for additional heat due to harmonic losses.

***Non-Linear Load K-Factor Transformers (pages 189 to 201)***
The use of k-factor distribution transformers has become a popular means of addressing harmonic related overheating problems where electronic ballasts, drives, personal computers, telecommunications equipment, broadcasting equipment and other similar power electronics are found in high concentrations. These non-linear loads generate harmonic currents which can substantially increase transformer losses. The k-rated transformer has a more rugged design intended to prevent failure due to overheating.

K-factor is defined as a ratio between the additional losses due to harmonics and the eddy current losses at 60Hz. It is used to specify transformers for non-linear loads. Transformers with a rated k-factor of 4, 13, 20 and other are available.

***Harmonic Mitigating Transformers (pages 202 to 222)***
Harmonic Mitigating transformers are superior to k-rated and general purpose transformers in that they reduce voltage distortion (flat-topping) and power losses due to current harmonics created by single-phase, non-linear loads such as computer equipment. Secondary windings are arranged to **cancel** zero sequence fluxes and eliminate primary winding circulating currents. They treat zero sequence harmonics (3rd, 9th and 15th) within the secondary windings and 5th and 7th harmonics upstream with appropriate phase shifting.

Dual output, phase shifting Harmonic Mitigating Transformers provide extremely low output voltage distortion and input current distortion even under severe non-linear load conditions (Data Centers, Internet Service Providers, Telecom Sites, Call Centers, Broadcasting Studios, etc.). Combining zero sequence flux cancellation with phase shifting treats 3rd, 5th, 7th, 9th, 15th, 17th and 19th harmonics within its secondary windings.

## HPS Energy Efficient Distribution Transformer Product Offering:

### Energy Efficient General Purpose Transformers:

*Energy efficient general purpose transformers are designed for linear loads and are most frequently used for applications such as commercial buildings, which will supply a variety of general loads.*

**HPS SENTINEL® (PART NUMBER PREFIX NMK OR NMF)**
- Meets **DOE 10 CFR Part 431** and **C802.2** efficiencies; at **35%** of rated load.
- Efficiencies are calculated under a **linear load profile**.
- Copper and Aluminum Available.

**HPS SUPERSENTINEL® (PART NUMBER PREFIX SMK OR SMF)**
- **Exceeds DOE 10 CFR Part 431** and (if applicable) **CSA C802.2** efficiencies at **35%** of rated load.
- Efficiency performance will meet the **NEMA Premium®** guidelines; **30% lower losses** than DOE 10 CFR Part 431 and (if applicable) CSA C802.2 standards; when measured under a linear load profile.
- Copper and Aluminum Available.

NEMA Premium

SECTION 7

FOR TERMINATION DETAILS SEE PAGE 268.

FOR ACCESSORIES SEE PAGES 264 TO 267.
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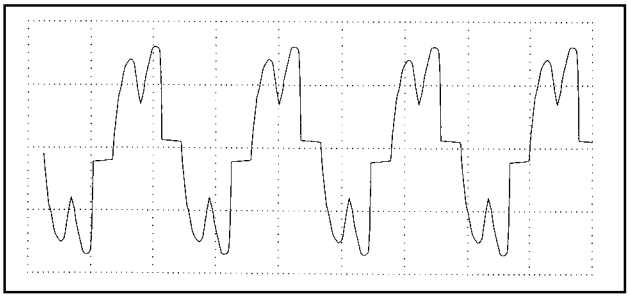
# HPS SYNERGY® Series

## 600V CLASS ENERGY EFFICIENT K-FACTOR TRANSFORMER

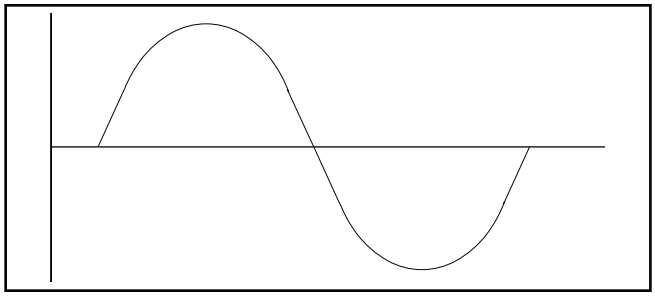
The use of electronic equipment has continued to proliferate in both offices and industrial plants. These electronic devices are powered by either switching power supplies or a rectifier circuit. Examples of these devices include computers, fax machines, copiers, printers, cash registers, UPS's and solid-state ballasts. They all contribute to the distortion of the current waveform and the generation of harmonics.

## HARMONICS AND NON-LINEAR LOADS

Harmonics, in an electrical system, are currents created by non-linear loads that generate non-sinusoidal (non-linear) current waveforms. These current and voltage waveforms operate on frequencies that are in multiples of the fundamental 60 hertz frequency. That is, the fundamental frequency is at 60 hertz, the 2nd harmonic is at 120 hertz frequency (60 x 2), the 3rd at 180 hertz, and so forth.



An example of harmonics



An example of a perfect waveform

Harmonics are principally the by-product of switch-mode power supply technology where AC is rectified to DC, and back again. In the process, a capacitor is charged in the first half-cycle and then discharged in the next half-cycle in supplying current to the load. This cycle is repeated. This action of recharging causes AC current to flow only during a portion of the AC voltage wave in abrupt pulses. These abrupt pulses distort the fundamental wave shape causing distortion to the various harmonic frequencies.

### Non-Linear Loads

Today, non-linear loads make up the majority of all electrical demand. Rectified input, switching power supplies and electronic lighting ballasts are the most common single phase non-linear loads. Harmonic currents and voltages produced by single phase, non-linear loads which are connected phase-to-neutral in a three phase four wire system, are third order, zero sequence harmonics (the third harmonic and its odd multiples - 3rd, 9th, 15th, 21st, etc., phasors displaced by zero degrees). These third order, zero sequence harmonic currents do not cancel, but add up arithmetically on the neutral bus, creating a primary source of excessive neutral current.



FOR TERMINATION DETAILS SEE PAGE 268.



FOR ACCESSORIES SEE PAGES 264 TO 267.

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# HPS SYNERGY® Series

## 600V CLASS ENERGY EFFICIENT K-FACTOR TRANSFORMER continued...

Energy efficient general purpose distribution transformers, most frequently used for applications such as commercial or institutional buildings, will supply widely varied single phase loads. Energy Efficient K-Factor transformers are energy efficient general purpose transformers, but are designed to tolerate the harmonic distortion associated with these loads.

Harmonics indicate their presence in a number of ways:

- Overheating
- Device malfunctions
- Telephone interference
- Equipment vibration
- Breakers tripping

### Harmonics For A 60Hz System

In a 60 Hz power system, the fundamental and harmonic frequencies are outlined in the table below.

| | |
|---|---|
| Fundamental | 60 Hz |
| 2nd Harmonic | 120 Hz |
| 3rd Harmonic | 180 Hz |
| 4th Harmonic | 240 Hz |
| 5th Harmonic | 300 Hz |
| 6th Harmonic | 360 Hz |
| 7th Harmonic | 420 Hz |
| 8th Harmonic | 480 Hz |
| 9th Harmonic | 540 Hz |
| 10th Harmonic | 600 Hz |
| 11th Harmonic | 660 Hz |
| 12th Harmonic | 720 Hz |
| 13th Harmonic | 780 Hz |

| | |
|---|---|
| 14th Harmonic | 840 Hz |
| 15th Harmonic | 900 Hz |
| 16th Harmonic | 9600 Hz |
| 17th Harmonic | 1020 Hz |
| 18th Harmonic | 1080 Hz |
| 19th Harmonic | 1140 Hz |
| 20th Harmonic | 1200 Hz |
| 21st Harmonic | 1260 Hz |
| 22nd Harmonic | 1320 Hz |
| 23rd Harmonic | 1380 Hz |
| 24th Harmonic | 1440 Hz |
| 25th Harmonic | 1500 Hz |

### K-Factor

K-factor is defined as a ratio between the additional losses due to harmonics and the eddy current losses at 60Hz. It is used to specify transformers for non-linear loads. Transformers with a rated K-factor of 4, 7, 13, 20 and 30 are available. For balanced loading, a transformer with a K-factor of 4 should be specified when no more than 50% of the total load is non-linear. A transformer with K-factor 13 should be specified when 100% of the load is non-linear.



For termination details see page 268.



For accessories see pages 264 to 267.

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# HPS SYNERGY®

## 600 VOLT CLASS ENERGY EFFICIENT K-FACTOR TRANSFORMERS

### K-Factor Transformer Efficiencies:

**HPS SYNERGY (PART NUMBER PREFIX NMT)**

Energy efficient k-factor transformers are designed to tolerate heating due to harmonics associated with non-linear loads. Harmonics can indicate their presence in a number of ways: overheating, device malfunctions; telephone interference; equipment vibration; and breakers tripping.

- Meets **DOE 10 CFR Part 431** and **C802.2** efficiencies at **35%** of rated load.
- Efficiencies are calculated under a **linear load profile**.
- Copper and Aluminum Available.



FOR TERMINATION DETAILS SEE PAGE 268.



FOR ACCESSORIES SEE PAGES 264 TO 267.

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# HPS SYNERGY®
## 600V CLASS ENERGY EFFICIENT K-FACTOR TRANSFORMERS

### ALUMINUM & COPPER, THREE PHASE STANDARD SPECIFICATIONS

15 to 45 kVA

75 to 750 kVA

| | 15 to 45 kVA | 75 to 750 kVA |
|---|---|---|
| **Efficiency** | Meets DOE 10 CFR Part 431 & C802.2 efficiencies at 35% of rated load. Efficiencies are calculated under a linear load profile. | |
| **UL Listed** | File: E112313 | File: E112313 |
| **CSA Certified** | File: LR3902 | File: LR3902 |
| **Frequency** | 60 Hz | 60 Hz |
| **Insulation System** | 220°C (150°C rise)<br>200°C (130°C rise) on 15 & 30kVA copper<br>(optional 115°C and 80°C rise available) | 220°C (150°C rise)<br>(optional 115°C and 80°C rise available) |
| **Electrostatic Shield** | 60dB Common Mode - typical | 60dB Common Mode - typical |
| **Enclosure Type** | Heavy Duty Ventilated NEMA Type 3R<br>Optional NEMA 4, 4X (stainless steel) and 12. | Heavy Duty Ventilated NEMA Type 3R<br>Optional NEMA 4, 4X (stainless steel) and 12. |
| **Enclosure Finish** | ANSI 61 Grey, UL50 | ANSI 61 Grey, UL50 |
| **Neutral** | Neutral terminal for field connection (on applicable units). | Neutral terminal for field connection (on applicable units). |
| **Standard Primary Taps** | Refer to wiring diagrams for details. | Refer to wiring diagrams for details. |
| **Termination** | Front accessible separate high and low voltage terminals; connectors suitable for aluminum and copper are provided for easy cable installation. | Front accessible separate high and low voltage terminals; connectors suitable for aluminum and copper are provided for easy cable installation. |
| **Conduit Knock-Outs** | Standard on all units. | Standard on 75 kVA & 225 kVA units. |
| **Impedance** | Typically 2.5% to 6.5% | Typically 2.5% to 6.5% |
| **Mounting** | Floor or wall/ceiling mounting available.<br>Refer to selection tables for details. | Floor or wall/ceiling mounting available.<br>Refer to selection tables for details. |
| **Seismic** | Meets Occupancy Category III Ip=1.25 for Ss=1.0g per IBC 2006; section 1613, earthquake loads and NBCC 2005 for ground level installations only for all locations in North America. | Meets Occupancy Category III Ip=1.25 for Ss=1.0g per IBC 2006; section 1613, earthquake loads and NBCC 2005 for ground level installations only for all locations in North America. |
| **Sound level** | Meets NEMA ST-20 standards.<br>**(Optional low noise units available)** | Meets NEMA ST-20 standards.<br>**(Optional low noise units available)** |

***Other voltages and kVA sizes not listed in this section are available upon request for both aluminum and copper wound units. Features as listed above may differ. Features as listed above may differ. Please contact customer service for details, price and availability.***



For termination details see page 268.

For accessories see pages 264 to 267.



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## ALUMINUM WOUND, SHIELDED, THREE PHASE

### K-FACTOR 4

480 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 480Y/277 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT04K015KBS** | NH5 | 19.40 | 20.20 | 21.50 | 190 | F or W * | SCD 7 |
| 30 | **NMT04K030KBS** | NH6 | 23.90 | 25.00 | 28.75 | 330 | F or W * | SCD 19 |
| 45 | **NMT04K045KBS** | NH6 | 23.90 | 25.00 | 28.75 | 430 | F or W * | SCD 19 |
| 75 | **NMT04K075KBS** | NH3 | 26.00 | 25.00 | 38.00 | 640 | F or W * | SCD 19 |
| 112.5 | **NMT04K112KBS** | NH3 | 26.00 | 25.00 | 38.00 | 920 | F | SCD 19 |
| 150 | **NMT04K150KBS** | NH4 | 32.00 | 29.50 | 41.00 | 1050 | F | SCD 19 |
| 225 | **NMT04K225KBS** | NH4 | 32.00 | 29.50 | 41.00 | 1575 | F | SCD 19 |
| 300 | **NMT04K300KBS** | NJ1 | 39.50 | 34.00 | 51.50 | 1830 | F | SCD 19 |
| 500 | **NMT04K500KBS** | NJ2 | 48.50 | 38.40 | 59.00 | 3000 | F | SCD 20 |
| 750 | **NMT04K750KBS** | NJ3 | 51.50 | 43.40 | 66.00 | 3375 | F | SCD 20 |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

600 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 600Y/347 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT04K015PBS** | NH5 | 19.40 | 20.20 | 21.50 | 190 | F or W * | SCD 9 |
| 30 | **NMT04K030PBS** | NH6 | 23.90 | 25.00 | 28.75 | 330 | F or W * | SCD 9 |
| 45 | **NMT04K045PBS** | NH6 | 23.90 | 25.00 | 28.75 | 430 | F or W * | SCD 9 |
| 75 | **NMT04K075PBS** | NH3 | 26.00 | 25.00 | 38.00 | 640 | F or W * | SCD 9 |
| 112.5 | **NMT04K112PBS** | NH3 | 26.00 | 25.00 | 38.00 | 920 | F | SCD 9 |
| 150 | **NMT04K150PBS** | NH4 | 32.00 | 29.50 | 41.00 | 1050 | F | SCD 9 |
| 225 | **NMT04K225PBS** | NH4 | 32.00 | 29.50 | 41.00 | 1575 | F | SCD 9 |
| 300 | **NMT04K300PBS** | NJ1 | 39.50 | 34.00 | 51.50 | 1830 | F | SCD 9 |
| 500 | **NMT04K500PBS** | NJ2 | 48.50 | 38.40 | 59.00 | 3000 | F | SCD 10 |
| 750 | **NMT04K750PBS** | NJ3 | 51.50 | 43.40 | 66.00 | 3375 | F | SCD 10 |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

## COPPER WOUND, SHIELDED, THREE PHASE

### K-FACTOR 4

480 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 480Y/277 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT04K015KBKF** | NH5 | 19.40 | 20.20 | 21.50 | 210 | F or W * | SCD 7 |
| 30 | **NMT04K030KBKN** | NH6 | 23.90 | 25.00 | 28.75 | 350 | F or W * | SCD 19 |
| 45 | **NMT04K045KBK** | NH6 | 23.90 | 25.00 | 28.75 | 460 | F or W * | SCD 19 |
| 75 | **NMT04K075KBK** | NH3 | 26.00 | 25.00 | 38.00 | 665 | F or W * | SCD 19 |
| 112.5 | **NMT04K112KBK** | NH3 | 26.00 | 25.00 | 38.00 | 945 | F | SCD 19 |
| 150 | **NMT04K150KBK** | NH4 | 32.00 | 29.50 | 41.00 | 1070 | F | SCD 19 |
| 225 | **NMT04K225KBK** | NH4 | 32.00 | 29.50 | 41.00 | 1725 | F | SCD 19 |
| 300 | **NMT04K300KBK** | NJ1 | 39.50 | 34.00 | 51.50 | 1925 | F | SCD 19 |
| 500 | **NMT04K500KBK** | NJ2 | 48.50 | 38.40 | 59.00 | 2925 | F | SCD 20 |
| 750 | **NMT04K750KBK** | NJ3 | 51.50 | 43.40 | 66.00 | 3375 | F | SCD 20 |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

600 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 600Y/347 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT04K015PBKF** | NH5 | 19.40 | 20.20 | 21.50 | 210 | F or W * | SCD 9 |
| 30 | **NMT04K030PBKN** | NH6 | 23.90 | 25.00 | 28.75 | 350 | F or W * | SCD 9 |
| 45 | **NMT04K045PBK** | NH6 | 23.90 | 25.00 | 28.75 | 460 | F or W * | SCD 19 |
| 75 | **NMT04K075PBK** | NH3 | 26.00 | 25.00 | 38.00 | 665 | F or W * | SCD 9 |
| 112.5 | **NMT04K112PBK** | NH3 | 26.00 | 25.00 | 38.00 | 945 | F | SCD 9 |
| 150 | **NMT04K150PBK** | NH4 | 32.00 | 29.50 | 41.00 | 1070 | F | SCD 9 |
| 225 | **NMT04K225PBK** | NJ1 | 39.50 | 34.00 | 51.50 | 1725 | F | SCD 9 |
| 300 | **NMT04K300PBK** | NJ1 | 39.50 | 34.00 | 51.50 | 1925 | F | SCD 9 |
| 500 | **NMT04K500PBK** | NJ2 | 48.50 | 38.40 | 59.00 | 2925 | F | SCD 10 |
| 750 | **NMT04K750PBK** | NJ3 | 51.50 | 43.40 | 66.00 | 3375 | F | SCD 10 |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

***Products listed on this page are available as 'CE Mark' products. Please consult our sales office.***



For termination details see page 268.

For accessories see pages 264 to 267.



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## ALUMINUM WOUND, SHIELDED, THREE PHASE

### K-FACTOR 13

480 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 480Y/277 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT13K015KBS** | NH5 | 19.40 | 20.20 | 21.50 | 190 | F or W * | SCD 19 |
| 30 | **NMT13K030KBS** | NH6 | 23.90 | 25.00 | 28.75 | 340 | F or W * | SCD 19 |
| 45 | **NMT13K045KBS** | NH6 | 23.90 | 25.00 | 28.75 | 410 | F or W * | SCD 19 |
| 75 | **NMT13K075KBS** | NH3 | 26.00 | 25.00 | 38.00 | 675 | F or W * | SCD 19 |
| 112.5 | **NMT13K112KBS** | NH4 | 32.00 | 29.50 | 41.00 | 920 | F | SCD 19 |
| 150 | **NMT13K150KBS** | NH4 | 32.00 | 29.50 | 41.00 | 1050 | F | SCD 19 |
| 225 | **NMT13K225KBS** | NJ1 | 39.50 | 34.00 | 51.50 | 1600 | F | SCD 19 |
| 300 | **NMT13K300KBS** | NJ1 | 39.50 | 34.00 | 51.50 | 1830 | F | SCD 20 |
| 500 | **NMT13K500KBS** | NJ3 | 51.50 | 43.40 | 66.00 | 3000 | F | SCD 20 |
| 750 | **NMT13K750KBS** | NJ3 | 51.50 | 43.40 | 66.00 | 4300 | F | SCD 10 |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

600 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 600Y/347 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT13K015PBS** | NH5 | 19.40 | 20.20 | 21.50 | 190 | F or W * | SCD 9 |
| 30 | **NMT13K030PBS** | NH6 | 23.90 | 25.00 | 28.75 | 340 | F or W * | SCD 9 |
| 45 | **NMT13K045PBS** | NH6 | 23.90 | 25.00 | 28.75 | 410 | F or W * | SCD 9 |
| 75 | **NMT13K075PBS** | NH3 | 26.00 | 25.00 | 38.00 | 675 | F or W * | SCD 9 |
| 112.5 | **NMT13K112PBS** | NH4 | 32.00 | 29.50 | 41.00 | 920 | F | SCD 9 |
| 150 | **NMT13K150PBS** | NH4 | 32.00 | 29.50 | 41.00 | 1050 | F | SCD 9 |
| 225 | **NMT13K225PBS** | NJ1 | 39.50 | 34.00 | 51.50 | 1600 | F | SCD 9 |
| 300 | **NMT13K300PBS** | NJ1 | 39.50 | 34.00 | 51.50 | 1900 | F | SCD 9 |
| 500 | **NMT13K500PBS** | NJ3 | 51.50 | 43.40 | 66.00 | 3000 | F | SCD 10 |
| 750 | **NMT13K750PBS** | NJ3 | 51.50 | 43.40 | 66.00 | 4300 | F | SCD 10 |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

## COPPER WOUND, SHIELDED, THREE PHASE

### K-FACTOR 13

480 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 480Y/277 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT13K015KBKF** | NH5 | 19.40 | 20.20 | 21.50 | 280 | F or W * | SCD 19 |
| 30 | **NMT13K030KBKN** | NH6 | 23.90 | 25.00 | 28.75 | 350 | F or W * | SCD 19 |
| 45 | **NMT13K045KBK** | NH6 | 23.90 | 25.00 | 28.75 | 470 | F or W * | SCD 19 |
| 75 | **NMT13K075KBK** | NH3 | 26.00 | 25.00 | 38.00 | 680 | F or W * | SCD 19 |
| 112.5 | **NMT13K112KBK** | NH4 | 32.00 | 29.50 | 41.00 | 970 | F | SCD 19 |
| 150 | **NMT13K150KBK** | NH4 | 32.00 | 29.50 | 41.00 | 1200 | F | SCD 19 |
| 225 | **NMT13K225KBK** | NJ1 | 39.50 | 34.00 | 51.50 | 1900 | F | SCD 19 |
| 300 | **NMT13K300KBK** | NJ1 | 39.50 | 34.00 | 51.50 | 2150 | F | SCD 19 |
| 500 | **NMT13K500KBK** | NJ3 | 51.50 | 43.40 | 66.00 | 3200 | F | SCD 20 |
| 750 | **NMT13K750KBK** | NJ3 | 51.50 | 43.40 | 66.00 | 4500 | F | SCD 20 |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

600 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 600Y/347 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT13K015PBKF** | NH5 | 19.40 | 20.20 | 21.50 | 295 | F or W * | SCD 9 |
| 30 | **NMT13K030PBKN** | NH6 | 23.90 | 25.00 | 28.75 | 350 | F or W * | SCD 9 |
| 45 | **NMT13K045PBK** | NH6 | 23.90 | 25.00 | 28.75 | 480 | F or W * | SCD 19 |
| 75 | **NMT13K075PBK** | NH3 | 26.00 | 25.00 | 38.00 | 700 | F or W * | SCD 9 |
| 112.5 | **NMT13K112PBK** | NH4 | 32.00 | 29.50 | 41.00 | 970 | F | SCD 9 |
| 150 | **NMT13K150PBK** | NH4 | 32.00 | 29.50 | 41.00 | 1200 | F | SCD 9 |
| 225 | **NMT13K225PBK** | NJ1 | 39.50 | 34.00 | 51.50 | 1900 | F | SCD 9 |
| 300 | **NMT13K300PBK** | NJ1 | 39.50 | 34.00 | 51.50 | 2400 | F | SCD 9 |
| 500 | **NMT13K500PBK** | NJ3 | 51.50 | 43.40 | 66.00 | 3200 | F | SCD 10 |
| 750 | **NMT13K750PBK** | NJ3 | 51.50 | 43.40 | 66.00 | 4500 | F | SCD 10 |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

***Products listed on this page are available as 'CE Mark' products. Please consult our sales office.***

For termination details see page 268.



For accessories see pages 264 to 267.

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## ALUMINUM WOUND, SHIELDED, THREE PHASE

### K-FACTOR 20

480 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 480Y/277 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT20K015KBS** | NH6 | 23.90 | 25.00 | 28.75 | 275 | F or W * | SCD 19 |
| 30 | **NMT20K030KBS** | NH6 | 23.90 | 25.00 | 28.75 | 365 | F or W * | SCD 19 |
| 45 | **NMT20K045KBS** | NH3 | 26.00 | 25.00 | 38.00 | 565 | F or W * | SCD 19 |
| 75 | **NMT20K075KBS** | NH3 | 26.00 | 25.00 | 38.00 | 730 | F or W * | SCD 19 |
| 112.5 | **NMT20K112KBS** | NH4 | 32.00 | 29.50 | 41.00 | 950 | F | SCD 19 |
| 150 | **NMT20K150KBS** | NH4 | 32.00 | 29.50 | 41.00 | 1400 | F | SCD 19 |
| 225 | **NMT20K225KBS** | NJ1 | 39.50 | 34.00 | 51.50 | 1900 | F | SCD 19 |
| 300 | **NMT20K300KBS** | NJ2 | 48.50 | 38.40 | 59.00 | 2400 | F | SCD 20 |
| 500 | **NMT20K500KBS** | NJ3 | 51.50 | 43.40 | 66.00 | 3600 | F | SCD 20 |
| 750 | **NMT20K750KBS** | | | **CONSULT FACTORY** | | | | |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

600 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 600Y/347 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT20K015PBS** | NH6 | 23.90 | 25.00 | 28.75 | 275 | F or W * | SCD 9 |
| 30 | **NMT20K030PBS** | NH6 | 23.90 | 25.00 | 28.75 | 365 | F or W * | SCD 9 |
| 45 | **NMT20K045PBS** | NH3 | 26.00 | 25.00 | 38.00 | 565 | F or W * | SCD 9 |
| 75 | **NMT20K075PBS** | NH3 | 26.00 | 25.00 | 38.00 | 730 | F or W * | SCD 9 |
| 112.5 | **NMT20K112PBS** | NH4 | 32.00 | 29.50 | 41.00 | 950 | F | SCD 9 |
| 150 | **NMT20K150PBS** | NH4 | 32.00 | 29.50 | 41.00 | 1400 | F | SCD 9 |
| 225 | **NMT20K225PBS** | NJ1 | 39.50 | 34.00 | 51.50 | 1900 | F | SCD 9 |
| 300 | **NMT20K300PBS** | NJ2 | 48.50 | 38.40 | 59.00 | 2400 | F | SCD 10 |
| 500 | **NMT20K500PBS** | NJ3 | 51.50 | 43.40 | 66.00 | 3600 | F | SCD 10 |
| 750 | **NMT20K750PBS** | | | **CONSULT FACTORY** | | | | |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

## COPPER WOUND, SHIELDED, THREE PHASE

### K-FACTOR 20

480 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 480Y/277 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT20K015KBKF** | NH6 | 23.90 | 25.00 | 28.75 | 275 | F or W * | SCD 19 |
| 30 | **NMT20K030KBK** | NH6 | 23.90 | 25.00 | 28.75 | 440 | F or W * | SCD 19 |
| 45 | **NMT20K045KBK** | NH3 | 26.00 | 25.00 | 38.00 | 700 | F or W * | SCD 19 |
| 75 | **NMT20K075KBK** | NH3 | 26.00 | 25.00 | 38.00 | 860 | F or W * | SCD 19 |
| 112.5 | **NMT20K112KBK** | NH4 | 32.00 | 29.50 | 41.00 | 1150 | F | SCD 19 |
| 150 | **NMT20K150KBK** | NH4 | 32.00 | 29.50 | 41.00 | 1600 | F | SCD 19 |
| 225 | **NMT20K225KBK** | NJ1 | 39.50 | 34.00 | 51.50 | 2100 | F | SCD 19 |
| 300 | **NMT20K300KBK** | NJ2 | 48.50 | 38.40 | 59.00 | 2600 | F | SCD 20 |
| 500 | **NMT20K500KBK** | NJ3 | 51.50 | 43.40 | 66.00 | 3800 | F | SCD 20 |
| 750 | **NMT20K750KBK** | | | **CONSULT FACTORY** | | | | |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

600 Delta Primary Volts 208Y/120 Secondary Volts 60 Hz

**May be used on a 4 wire 600Y/347 Volt Supply**

| kVA | Catalog Number | Case Style (Pages 256 - 263) | Approx. Dimensions (Inches) Width | Depth | Height | Approx. Weight (Lbs.) | Mtg Type W - Wall F - Floor | Wiring Diagram (Pages 269 - 281) |
|---|---|---|---|---|---|---|---|---|
| 15 | **NMT20K015PBKF** | NH6 | 23.90 | 25.00 | 28.75 | 275 | F or W * | SCD 9 |
| 30 | **NMT20K030PBKN** | NH6 | 23.90 | 25.00 | 28.75 | 440 | F or W * | SCD 9 |
| 45 | **NMT20K045PBK** | NH3 | 26.00 | 25.00 | 38.00 | 700 | F or W * | SCD 9 |
| 75 | **NMT20K075PBK** | NH3 | 26.00 | 25.00 | 38.00 | 860 | F or W * | SCD 9 |
| 112.5 | **NMT20K112PBK** | NH4 | 32.00 | 29.50 | 41.00 | 1150 | F | SCD 9 |
| 150 | **NMT20K150PBK** | NH4 | 32.00 | 29.50 | 41.00 | 1600 | F | SCD 9 |
| 225 | **NMT20K225PBK** | NJ1 | 39.50 | 34.00 | 51.50 | 2100 | F | SCD 9 |
| 300 | **NMT20K300PBK** | NJ2 | 48.50 | 38.40 | 59.00 | 2600 | F | SCD 10 |
| 500 | **NMT20K500PBK** | NJ3 | 51.50 | 43.40 | 66.00 | 3800 | F | SCD 10 |
| 750 | **NMT20K750PBK** | | | **CONSULT FACTORY** | | | | |

*Wall mounting kit and/or drip plate kit required. Refer to pages 264 to 266 for details.

***Products listed on this page are available as 'CE Mark' products. Please consult our sales office.***

For termination details see page 268.



For accessories see pages 264 to 267.

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# HPS SuperSynergy®

## 600 VOLT CLASS ENERGY EFFICIENT K-FACTOR TRANSFORMERS

### K-Factor Transformer Efficiencies:

**HPS SuperSynergy (part number prefix SMT)**

The HPS SuperSynergy energy efficient k-factor transformer exceeds DOE 10 CFR Part 431/C802.2 efficiencies over a range of linear loads. It will not only satisfy the necessity for running at k-factor modern building load types, but in addition, because of the increasing need for energy conservation, they are much more efficient than that of our standard energy efficient line.

- Efficiency performance will meet the **NEMA Premium®** guidelines; **30% lower losses** than DOE 10 CFR Part 431 and (if applicable) C802.2 efficiency standards; when measured under a linear load profile at **35%** of rated load.
- Efficiency will meet or exceed DOE 10 CFR Part 431 and (if applicable) C802.2 standards; for linear load even at **50%** of rated load when measured under a **non-linear** load up to **K13**.
- Copper and Aluminum Available.



For termination details see page 268.



For accessories see pages 264 to 267.

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