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## MT-BBT-277V-230V-3P-37.47A

# 3-Phase Delta Buck/Boost Step-Down Transformer - 277V Primary - 230V Secondary - 37.47 Amps - 50/60Hz

**Product ID: 239225**

**Please see last page for supporting documentation for this product(certificates, CAD files & drawings, IES files, wiring diagrams, etc).**

**Larson Electronics LLC manufactures a wide variety of products, including custom built to spec designs. The pictures displayed for this unit are a general representation of form factor for the product line and may not accurately represent this exact configuration in every detail due to custom builds and changes between similar products in our standard catalog. The specifics for this configuration are listed in the specification table and supporting documentation (CAD files, Dimensional Drawing, Name Plate Diagram, Wiring Diagram, etc.). This means that specific details (receptacles, plugs, wires, connections, mounting brackets, external finishes, etc.) may not be accurately represented in images vs specifications. Please review specifications and do not order based solely on images.**

**MT-BBT-277V-230V-3P-37.47A Buck and Boost Step-Down Transformer**

**Transformer Type:** Buck/Boost Step-Down Autotransformer
**Phase:** Three Phase
**Frequency:** 50/60 Hz
**Input Voltage:** 277 V
**Primary Amps:** 31.25 A @ 277 V
**Primary Configuration:** Delta
**kVA:** 14.99
**Output Voltage:** 230 V
**Secondary Amps:** 37.47 A @ 230 V
**Voltage Difference:** 83%
**Winding Material:** Aluminum
**Knockouts:** Side and Rear
**Primary Termination:** Front Access Copper Tabs or Lead Wires
**Secondary Termination:** Front Access Copper Tabs or Lead Wires
**Cooling:** Air / Dry Type
**Insulation:** 180°C
**Temperature Rise:** 135°C
**Sound Level:** 36 dB
**Enclosure Rating:** NEMA 3R
**Encapsulation:** Silica Sand & Resin Compounds
**Enclosure Material:** Steel
**Finish:** ANSI 61 Grey / UL50
**Mounting:** Wall Mount Via Mounting Tabs

**Ratings**

UL Listed for United States
CSA Certified for Canada
NEMA 3R Indoor/Outdoor Enclosure
Meets or Exceeds NEMA ST-20 Standards
Buck and Boost Step-Down Transformer

**Special Orders - Special Requirements**

Contact us for special requirements
**Toll Free:** 1-800-369-6671

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**Dimensions:** 11.75"H x 14.12"W x 6.25"D
**Weight:** 37 lb

**Intl:** 1-903-270-1187
**E-mail:** sales@larsonelectronics.com

**The MT-BBT-277V-230V-3P-37.47A Three Phase Step-Down Buck and Boost Transformer from Larson Electronics is powerful, reliable, and designed with the environment in mind. Suitable for both indoor and outdoor applications, the MT-BBT-277V-230V-3P-37.47A provides increased reliability, higher efficiency, protection against critical equipment failures and an extra level of protection by isolating the power source from the connected device. The lower operating costs, lower heat emissions and lower cost of ownership make this transformer ideal for a wide range of applications and businesses.**

***PLEASE NOTE: ANY FREE SHIPPING OFFERS DO NOT APPLY TO POWER DISTRIBUTION PANELS, TRANSFORMERS, OR SUBSTATIONS***

**Transformer Features:** The MT-BBT-277V-230V-3P-37.47A buck and boost transformer is a three phase unit with a 14.99 kVA rating and a primary voltage of 277 V using a maximum of 31.25 amps on the primary side. This step-down transformer has a secondary voltage of 230 V and provides up to 37.47 amps available on the secondary side. Featuring robust construction, this unit`s cores are manufactured with non-aging, cold-rolled silicon steel laminations using state of the art technology.

This unit boasts a low cost of ownership and is highly energy efficient. Lower heat emissions mean less cooling is needed as well. The NEMA 3R painted steel enclosure makes the unit suitable for both indoor and outdoor applications, and this step-down transformer can be either floor or wall mounted. The MT-BBT-277V-230V-3P-37.47A features a 180°C insulation with a 135°C temperature rise.

**Construction:** The aluminum winding in the MT-BBT-277V-230V-3P-37.47A are formed from high quality aluminum wire help to improve performance. The close tolerances used during manufacturing also eliminates burrs which hinder performance. Each core is specially coated to prevent the ingress of moisture and are electrically balanced to minimize axial forces during short circuit situations. Buck and boost transformers are designed to maximize the performance and life of electrical equipment. The MT-BBT-277V-230V-3P-37.47A is encapsulated in silica sand and resin, and cased in a NEMA 3R steel enclosure. NEMA 4, NEMA 4X, and NEMA 12 enclosures are available upon request.

Click Image to Enlarge

**Benefits:** The MT-BBT-277V-230V-3P-37.47A buck/boost step-down transformer offers many benefits to the consumer. Buck/boost transformers pass the majority of the load voltage directly through the transformer, only transforming a small percentage of the load. Due to this technology, a smaller and quieter step-down transformer is manufactured and uses less materials. This provides owners with significant energy savings as well as offering environmental benefits.

Higher efficiency not only extends the life of the transformer, but also turn into cost savings for owners in the form of lower energy bills and decreased cost of ownership. Installation and maintenance costs are reduced due to the smaller form factor, and less overall space requirements are decreased. In addition, these step-down transformers operate quieter than a standard autotransformer of the same capacity.

**Mounting:** Integrated wall mounting brackets make installation fast and easy. Because of the smaller overall footprint, heavy machinery is rarely needed for mounting and installation.
**Installation:** Installation is simple. Connect the primary leads and secondary leads to the step-down transformer per the provided wiring diagram. Knockout hubs on either side and the bottom of the transformer allow for easy line-in and line-out wiring. The front access cover provides convenient .
**Applications:** Air conditioners, lighting systems, heating elements, motor applications and other applications that that require the ability to power loads that differ from the available line voltage.
**Limitations:** While there are many benefits to a buck/boost transformer, there are some limitations to consider. This transformer will only transformer voltage, it will not convert phases, it will not create even legs between line 1 and line 2 (L1 and L2 WILL be UNEVEN), has no circuit isolation, and does not create a neutral for applications where a neutral is not already present. If any of these limitations apply to you, you will need a standard transformer. Please see below link for our standard line of industrial transformers or our line of phase converters.
**Note on Voltage Generation:** Buck/boost transformers, like this unit, do NOT generate even legs of voltage on the secondary side. The generate voltage legs will always be unbalanced. This is acceptable for some situations, but other situations call for even legs on the secondary side. This simply cannot be achieved with a buck/boost transformer.

If your specific situation requires even legs of voltage on the secondary side, you will have to consider either a split phase buck/boost transformer or a standard industrial transformer. Larson Electronics has a wide range of both available for purchase:

Split Phase Buck/Boost Transformers

Standard Industrial Transformers
**Note on Phases:** This buck/boost transformer is a three phase step-down transformer. For single phase transformers or for three phase Wye transformers, click on the following links:

Single Phase Delta Buck/Boost Transformers

Three Phase Wye Buck/Boost Transformers
Larson Electronics is a manufacturer and as such can build stationary and portable transformer systems to your specifications. Although we carry several models of power distribution transformer systems, we can deliver custom ordered units almost as quickly as our prebuilt units. If this model does not meet your needs, please contact us at 1-800-369-6671 or sales@larsonelectronics.com to discuss your specific requirements.

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# Frequently Asked Questions (FAQ)

**Q. What are BuckBoost Transformers and where are they used?**

A. Buck-boost transformers are potted transformers with low voltage secondary windings. By field connecting the primary and secondary windings in an autotransformer configuration (not isolated), they offer an economical solution to the adjustment of line voltages that are slightly above or below normal. These transformers should be used to adjust stable voltages only.

**Q. Can a Buck-Boost Transformer regulate the output voltage?**

A. No. A buck-boost transformer will not regulate the voltage. If the input voltage varies, then the output voltage will also vary by the same percentage. The output (or secondary voltage) of a buck-boost transformer is dependent on the primary voltage and the transformer turns ratio. Therefore, fluctuations in the secondary voltage are direct results of any fluctuations in the primary voltage. We do offer voltage regulators.

**Q. Will a Buck-Boost Transformer create a neutral on the output? My application requires a neutral.**

A. No. A buck-boost transformer will not derive a neutral. If your application requires a neutral and you do not already have a neutral, you will require an isolation transformer. Neither single phase or three phase buck-boost transformers will create a neutral.

**Q. Will a Buck-Boost Transformer output even voltage on both output legs?**

A. No. Our standard buck-boost transformers do not generate even legs. For single phase applications, we do offer a line of buck-boost transformers that will output even legs. Three phase units will not output even legs. If you require even legs on the output voltage, we recommend purchasing an isolation transformer and not a buck-boost transformer.

**Q. Why do BuckBoost transformers have 4 windings?**

A. A four winding buck-boost transformer with 2 primary and 2 secondary windings can be connected eight different ways to provide a multitude of voltages and kVA's. This provides the flexibility necessary for the broad variety of applications. A two-winding transformer can only be connected in two different ways.

**Q. How does a buckboost transformer differ from an isolating transformer?**

A. A Buck-Boost transformer is manufactured as an isolating transformer, with separate primary and secondary windings and is shipped from the factory in that configuration. When field connected for a buck-boost application, the primary and secondary windings are wired together which changes the transformer's electrical characteristics to those of an autotransformer. The primary and secondary windings are no longer isolated as they are connected together.

**Q. What is the difference between a buckboost transformer and an autotransformer?**

A. A Buck-Boost transformer is typically a small single-phase low voltage lighting transformer that can be wired as an autotransformer to provide small voltage corrections for single and three phase applications. An autotransformer is a transformer with a direct connection between the primary and secondary and does not act as an isolation transformer. Autotransformers can also include wider classes of products including buck-boost, dedicated three coil distribution style units, motor starting autotransformers and solar grid tie transformers.

**Q. As an autotransformer, how can a BuckBoost transformer supply the same electrical load rating as a low voltage lighting isolation transformer that is much larger?**

A. With an autotransformer, only a portion of the current acts as a load on the transformer. This portion is roughly

proportional to the voltage change. If you increase the voltage from 100VAC to 120VAC, you are roughly adding 20% (20/100). As a result, only about 20% of the current acts as a load on the transformer. This is a function of changing the voltage by a small amount. For example, if the transformer is connected in such a way that 22 volts is added to a 208 volt primary, a 230-volt output will result. Only a portion of the current goes through a buck-boost autotransformer roughly equivalent to the voltage change. As a result, if a buck boost transformer changes the voltage by 10%, only 10% of the current (kVA) go through the unit. This allows the buck-boost transformer to be smaller and cheaper to manufacturer over an isolation transformer.

**Q. Do BuckBoost transformers present a safety hazard compared to conventional autotransformers?**

A. No. A buck-boost transformer will only change the voltage by a small amount, such as 208 to 240 volts. This small increase or decrease does not represent a safety hazard. Conventional autotransformers, manufactured as single winding transformers, change much higher magnitudes of voltage, e.g. 480 to 240 volts. In a system where the line is grounded, it is possible to have 480 volts to ground when the expectations are that 240 volts is at the output. For this reason, qualified personnel only should maintain conventional autotransformers.

**Q. BuckBoost transformers are almost always installed as autotransformers. Does the National Electrical Code (NEC) permit the use of autotransformers?**

A. You can refer to N.E.C. Article 450-4, “Autotransformers 600 Volts, Nominal, or Less”, as a reference publication. Item (a) details over-current protection for an autotransformer, and Item (b) covers an isolation transformer being field connected as an autotransformer for a Buck-Boost application.

**Q. When a BuckBoost transformer is connected as an autotransformer, what is the procedure for determining the current rating of the overcurrent protective device, such as the fuse or circuit breaker?**

A. The NEC Article 450-4 outlines over-current protection for autotransformers. It is reproduced as follows: “NEC 450-4 – Autotransformers 600 Volts, Nominal, or Less (a) Over-current Protection. Each autotransformer 600 volts nominal, or less shall be protected by an individual over-current device installed in series with each ungrounded input conductor. Such overcurrent device shall be rated or set at not more than 125 percent of the rated full load input current of the autotransformer. An over-current device shall not be installed in series with the shunt winding. Exception: Where the rated input current of an auto transformer is 9 amperes or more and 125 percent of this current does not correspond to a standard rating of a fuse or non-adjustable circuit breaker; the next higher standard rating described in our section shall be permitted. When the rated input current is less than 9 amperes, an over-current device rated or set at not more than 167 percent of the input current shall be permitted. (b) Transformer Field-Connected as an Autotransformer. A transformer field-connected as autotransformers shall be identified for use at elevated voltage.”

**Q. What is a Transformer?**

A. It is a static electrical device, which, by electromagnetic induction transforms energy at one voltage and current to another voltage and current at the same frequency.

**Q. What is a StepUp Transformer? What is a StepDown Transformer?**

A. In a step-up transformer, the low voltage winding (secondary) is connected to the input or power source and the high voltage winding (primary) is connected to the output or load. In a step-down transformer, the high voltage winding (primary) is connected to the input or power source and the low voltage winding (secondary) to the output or load.

**Q. What does the abbreviation KVA stand for? What is VoltAmperes (VA)?**

A. “Kilovolt Ampere Rating” designates the output that a transformer can deliver for a specified time at rated secondary

voltage and rated frequency without exceeding the specified temperature rise. (1 kVA = 1000 VA, or 1000 volt amperes). The VA or volt-ampere output rating designates the output that a transformer can deliver for a specified time at its rated secondary voltage and rated frequency, without exceeding its specified temperature rise. It is the current flowing in a circuit multiplied by the voltage of the circuit.

**Q. What is Primary Voltage and Secondary Voltage Rating?**

A. Primary voltage rating designates the input circuit voltage for which the primary winding is designed. Secondary voltage rating designates the no-load circuit voltage for which the secondary winding (winding on the output side) is designed.

**Q. What does 50/60 Hertz mean?**

A. Transformers that are designed to specifically run at 60 Hz can't be run at 50 Hz or in some cases only with significant derating. Magnetic flux is proportional to frequency so a 50 Hz transformer has a core 20% larger to handle 20% more magnetic flux than a 60 Hz unit. A 50 Hz transformer will simply run cooler at 60 Hz given the proper voltage is applied. Transformers cannot change frequency, the primary frequency equals the secondary frequency.

**Q. Explain the term Phase?**

A. It is a type of AC electrical circuit; usually single phase 2-wire or 3-wire, or three-phase, 3 or 4 wire. a single phase 3 wire system may also be referred to as "split phase" or two-phase.

**Q. What is a Delta, Wye, and Center Tap connection?**

A. The delta connection is a standard three phase connection with the ends of each phase winding connected in series to form a closed loop with each phase 120 degrees from the other. The wye connection is a standard 3-wire transformer connection with similar ends of the single-phase coils connected. This common point forms the electrical neutral point and may be grounded. A center tap is a reduced capacity tap at the midpoint in a winding.

**Q. What are the differences between copper and aluminum windings? Copper has better conductivity but less life expectancy, correct?**

A. We design our copper and aluminum units to meet the same specifications. Aluminum coils need to use larger wires, but the user does not see any difference. The copper coils are physically smaller, but we put them in the same enclosure as the Aluminum, so the user will not see any difference. The terminals are the same, so the user will not see any difference. Most wiring lugs are tin-plated so there is no problem connecting the transformer to aluminum or copper wires. Conductivity is addressed in the design by using larger wire in aluminum units. There is no difference in life expectancy for copper. The only real difference is that Copper costs more.

**Q. What is Temperature Rise?**

A. It is the increase over ambient temperature of the winding due to energizing and loading.

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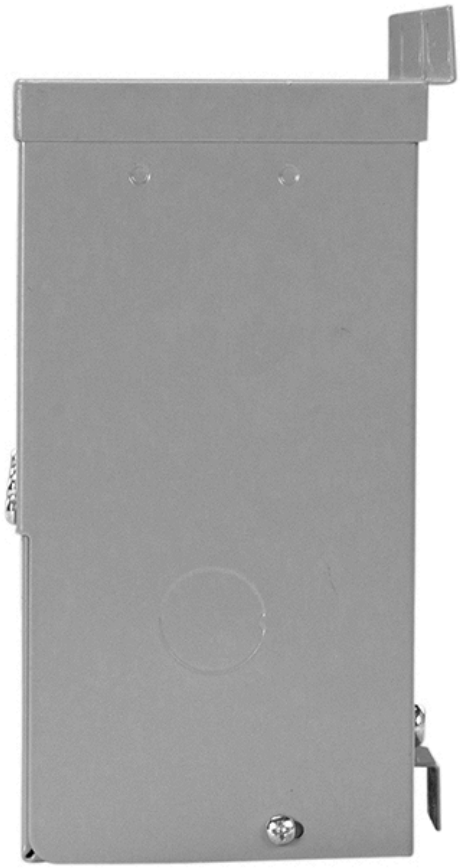

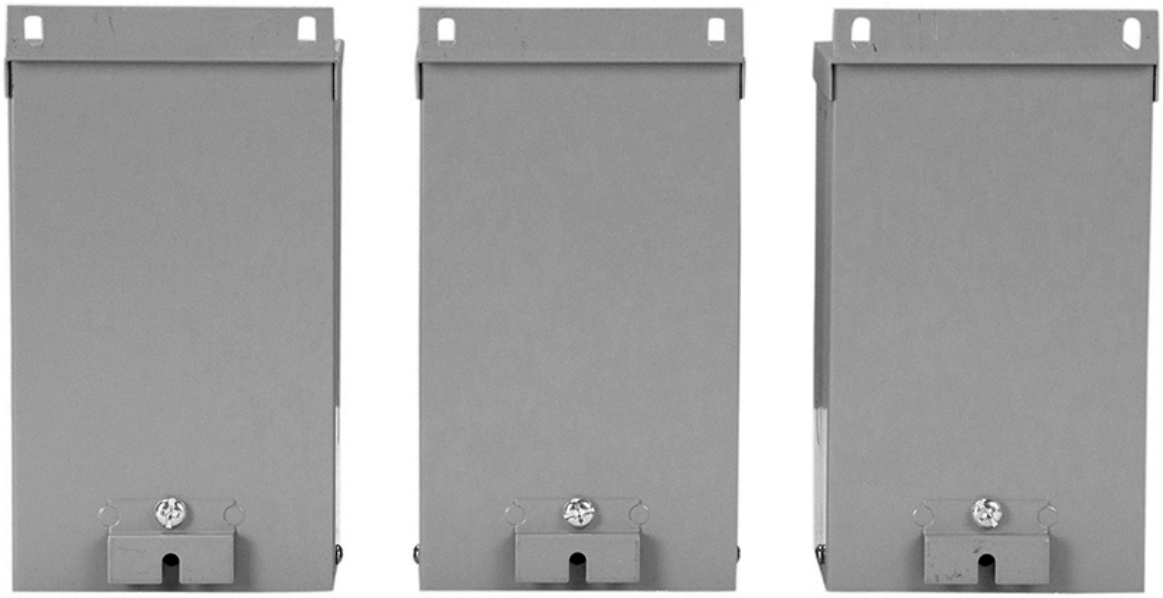

**MT-BBT-277V-230V-3P-37.47A**

**Product ID: 239225**

**Harmonized System (HS) Code:** 85043180

**Export Control Classification Number (ECCN):** EAR99

Links (Click on the below items to view):

- **Canadian CEC Certificate (Commonly referred to as CSA Certificate)**
- **CE Certificate**
- **Certificate 1, Misc**
- **MSDS (Material Safety Data Sheet**
- **Operations Manual**
- **RoHS Certificate (Restriction of Hazardous Substances)**
- **USA NEC Certificate (Commonly referred to as UL Certificate)**
- **Wiring Diagram (Oneline)**
- **HigResPic1**
- **HigResPic2**
- **HigResPic3**
- **HigResPic4**
- **HigResPic5**
- **HigResPic6**
- **HigResPic7**
- **HigResPic8**
- **ISO 9001 Certification**
- **Business Certificate**
- **Shipping Time Map**