WHITEPAPER

Measuring Motor Load Current with a Current Transformer

Accurately measuring the load current of a motor (to determine if the motor is operating at a light load, full load, or overload) is a common requirement for the end-user and can be done quickly using a current transformer designed for metering applications.

Determining which current transformer to use requires the installer to know the full load current of the motor. To find the full load current, locate the nameplate label on the motor and note the full load current (FLC or FLA). If the motor's nameplate is no longer legible or missing altogether, reference the motor load data chart from the NEC Handbook based on horsepower rating, rated system voltage and whether it is a single-phase or three-phase motor.

For example, according to the tables in Article 430 of the NEC Handbook, the rating of a three-phase 460V 75HP induction type Squirrel Cage Motor is 96A. Then, we would select a current transformer with a full load rating between 1.33% – 1.60% of the motor FLA, 150:5A ratio.

IMPORTANT – remember to verify the outside diameter of your conductor is less than the inside diameter of the current transformer.

Using the model 180RL-151 (for the above example) with a 5A rated output (150:5A) and a 2.5" inside diameter window opening, we will:

1. Assume the outside diameter of the conductor is less than the 2.5" inside diameter of the 180RL current transformer.
2. Verify that the meter scale matches the current transformer ratio. In this case, the meter scale should be 0-150A.
3. Select an analog panel meter to display the load current. If the load current of the three-phases is to be monitored and read concurrently, use three separate 180RL-151 current transformers, each with an analog panel meter. As an alternate option, one can use three current transformers (180RL-151), one analog panel meter (HST905A150A) and a selector switch (N25-61328-37S or N25-61325-37S) to get the current reading of each phase.

In instances where cables cannot be removed (often the case with medium voltage installations) a split-core current transformer like the model FCL should be used to monitor the motor load current.

Note that window type current transformers are rated at 600V but can be used on higher voltages with fully insulated cables. Caution should be exercised in the proper installation of window type 600V rated current on higher voltages. Where a low voltage window type CT is intended for use in a higher voltage application, it is the purchaser's responsibility to ensure that the operating conditions are met, and the necessary precautions are taken. This is usually verified by performing insulation tests at an appropriate level of system voltage with the low voltage current transformers installed.

For some applications, such as motor load testing that requires high metering accuracy, it is recommended to use a higher accuracy (and more robust construction) current transformer like the JAK-0C or the JAK-0S models. These models have 0.3% and 0.15% revenue grade metering accuracy.

For applications where the metering device is housed at a separate location from the current transformer, the standard 2RL current transformer, which has a low burden, is not suitable and a higher burden rated CT will be required to compensate for the additional impedance of the long lead wires. In many cases we recommend using the 60RBT metering class current transformer.

If the distance between the current sensor and the metering device is further than 100ft, a suitable option is to use a current transducer with a 4-20mA output signal and a metering device that has 4-20mA signal input. Please consult with a Flex-Core application engineer if you find yourself in this situation.

Introducing the New JAB-0S “High Accuracy” Revenue Grade Current Transformer

The JAB-0S is a revenue grade current transformer which maintains IEEE 0.15 accuracy from 1% rated current up through its rating factor.

Designed for industrial and commercial customers that require a high accuracy class current transformer for their service metering.

Advantages

1. Maximize your revenue metering assembly with a very high accuracy class of 0.15%, extended beyond IEEE requirements.
2. Simplify current transformer selection and billing multipliers.
3. Improve productivity and minimize the risk of error.
4. Reduce inventory and part number requirements.
5. Reduce asset and operational costs.

Features

The JAB-0S is a revenue metering high accuracy current transformer that maintains an IEEE 0.15% accuracy class from 1% of rated current up through its rating factor. This is accomplished using specialized amorphous core material which minimizes electrical core losses. The result is an extremely accurate current transformer that can maintain high accuracy over an extended range of current. This model is designed for indoor service — specifically, for installation over the secondary bushings of pad mounted transformers. For revenue metering applications and window opening ID of 4.5” x 3.5”.

Construction

- The coil assembly is encapsulated in resin within a molded case using the GE Valox™ thermoplastic polyester resin. This sturdy material has excellent electrical and mechanical properties over a wide temperature range, and it has low water absorption and is resistant to oil and a variety of chemicals.
- A polyurethane resin completely encapsulates the core and windings and makes this unit waterproof.
- The core is made from high-efficiency material that reduces energy loss, allowing for higher accuracy over a broader range.
- The secondary winding is made from heavy enameled copper wire that is evenly distributed around the core for maximum accuracy and resistance to stray magnetic fields.

Mounting

The JAB-0S can be mounted in any position but is usually installed on a pad mount transformer terminal blade using the Valox™ “grabbers.” The grabbers are removable, and the transformer also has two mounting holes allowing it to be attached to a mounting bracket.

Window opening size – All JAB-0S units have the same window opening size of 4.5” x 3.5”.

Specifications

JAB-0S has a voltage insulation level of 0.6kV, 10kV BIL, frequency 50-60Hz. The available ratings are 600:5A, 1000:5A and 2000:5A and have a rating factor of 2.0 @30° C ambient and 1.5 @55° C ambient. High-temperature models rated at 85° C ambient with a rating factor of 2.0 for 1000:5A and 1.5 for 2000:5A are available.

Flex-Core has the following ratios in stock and ready to be shipped: 600:5A, 1000:5A and 2000:5A. Ratios not inventoried are subject to a 4-5 week lead time.

View product details >>

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