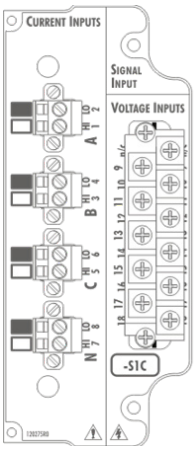
Split Core CT for M87x
Clamp-On Monitoring and Recording

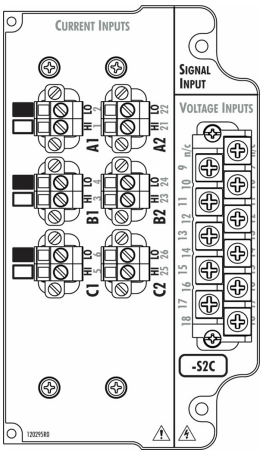
Split core or clamp-on CTs provide an alternative to directly wiring to measurement or relay CTs in substation upgrade/retrofit applications when it is desired to add monitoring and recording. This non-invasive approach provides for quicker installation with no disruption of service. Many split core or clamp-on options though come with the compromise of reduced accuracy, reliability and overall performance. Bitronics has solved most of the common problems seen when using this approach.

Bitronics Product Offering

The split core CT option is available on the Bitronics 87x Monitoring and Recording Intelligent Electronic Device (IED). We use a split core CT with 100A primary rating and 1000:1 turns ratio which is made in the USA. We calibrate the M87x with split core CTs as a matched set. That is, the meter or IED ships with the same CTs it was calibrated to operate with. Each CT is labeled with the phase it was calibrated on, so the CTs are not interchangeable. There are options for three or four (including neutral) split core CTs on the M871 and six on the M872.

Signal input module S1C used with Split Core CTs on M871





Signal input module S2C used with Split Core CTs on M872

It is possible to replace a damaged split core CT in the field by using the 70 Series Configurator program to input values from the label on the side of the new CT. Mounting brackets are available as an accessory. Brackets bolt to any flat surface, and the split core CT attaches to the bracket with two screws (see images on page 2).

Application

There are two different applications for the split core CT for the M87x:

Substation Medium and High Voltage (MV, HV) applications: The primary reason for supplying the M87x with a split core CT option is to support permanently installed remote monitoring and disturbance recording applications via SCADA and TCP/IP networks where it may be undesirable to cut into substation CT circuits to add instrumentation. In this application, the 100A range of the split core CT represents a 20X full-scale range for disturbance recording on the low side of substation CTs rated for a nominal full scale of 5A.

Commercial and Light-Industrial Low Voltage (LV) applications: In combination with the standard 600V range of the voltage connections on the M87x, the 100A range of the split core CT makes the M87x ideal for providing remote access to accurate load and power quality data from LV load-carrying conductors up to 100A service where CTs and VTs are not present. Loads exceeding 100A can be monitored with ordinary commercial split core CTs (5A full scale) connected to the conventional model M87x. In that case, the accuracy is dependent on the accuracy of the CTs selected. In all cases, the split core CT option is rated for indoor use on lines that are energized to no more than 600V. It is not appropriate for use on substation CTs that have a 1A nominal full scale.

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Advantages of the Bitronics Split Core Implementation

Concern: *Is there any danger if I disconnect the low-side leads of the split core CT from the meter?*

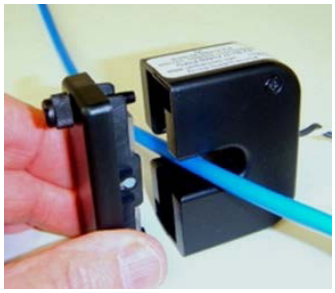
The Bitronics Difference: The CTs use Zener diodes to protect against changes in the magnetic characteristics of the core that could otherwise result from operating with the secondary leads open.

Concern: *Using Split Core CTs result in reduced accuracy.*

The Bitronics Difference: The M87x IED is calibrated to linearize the response of the transformer, resulting in a significant improvement relative to the accuracy claimed by the manufacturer. As a result, the accuracy is equal to that of the standard 100A M87x IED (which would operate directly in the primary CT circuit). That's the 0.5S class for the M87x, defined by the IEC standard that governs revenue meter accuracy (IEC 62053- 22 & 23, and generally described as 0.5% of reading). Heat-treated high-permeability ("superm") nickel core material produces superior low-end response, phase angle response, and repeatability characteristics compared to ferrite core material used by some competitors. It is these characteristics that make it possible to further linearize the output in the calibration of the M87x IED to the extent that the accuracy class when using external split core CTs is as good as the standard IED would be when operating in the primary CT circuit. Attempting to do the same kind of calibration with ferrite core CTs of comparable size would result in a de-rating of the accuracy class of the resulting IED.

Concern: *Many clamp-on CTs using clothes pin or hinge and snap type gates are flimsy, resulting in uncertain connection and variability in results.*

The Bitronics Difference: The spring-tensioned two bolt gate in the core is more durable than the hinge-and-snap type gates used by some competitors. That construction also produces less variation in the magnetic characteristics as a result of repeated opening and closing of the gate. The mating surfaces where the gate closes the core are lapped for a near-perfect mating surface in order to minimize the impact on the magnetic characteristics caused by the necessity of having a break in the core.

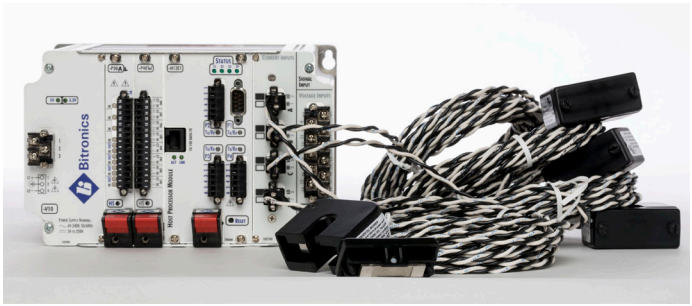


Concern: *Am I limited to the 25-ft. length of the leads provided with the split core CT?*

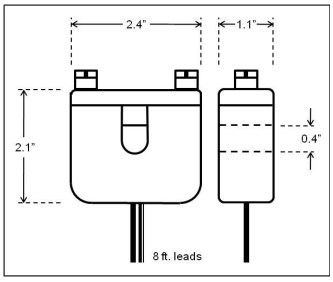
The Bitronics Difference: By specifying that the split core CT produces a current-rated output (as opposed to a voltage-rated output, which is more common) the impact of adding a reasonable extension in the wire length from the split core CT to the meter is minimal. Bitronics offers a 50-ft. length version for the M872.

Concern: *Aren't ferrite core transformers cheaper than nickel?*

The Bitronics Difference: In most retrofit applications, the cost savings that result from not having to cut into the primary CT circuit generally outweighs the incremental cost of using the split core CT option. (The advantage can approach a factor of ten.) Next to the offset cost, the small differential between using high-quality nickel core transformers compared to "cheap-and-dirty" ferrite core transformers is well justified. Nickel core material is not brittle, a major limitation of ferrite material used by other manufacturers. Even the tension exerted on a ferrite core CT by its secondary windings is often sufficient to chip or fracture the core, affecting its magnetic characteristics. Rough handling can easily fracture ferrite core CTs.



Available mounting bracket options



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