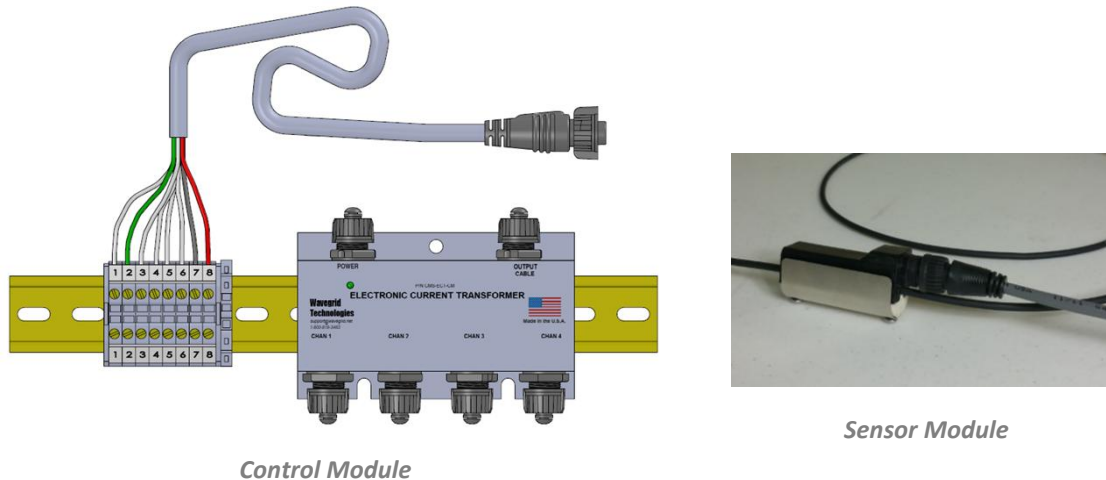


Electronic Current Transformer (ECT)

Installation, Operations and Maintenance Guide



Revision 6.0 – June 24th, 2016

I – Description

The Electronic Current Transformer (ECT) system provides lightweight, non-intrusive sensors with factory adjustable turns ratios used to measure AC currents from instrument transformers. The system uses an array of “intelligent electronic sensors” that deploy on live wires without having to take extensive system outages. Unlike solid and split core CTs, the ECTs do not magnetize or breakdown due to burden and high magnitude fault currents. The ECTs also do not offset due to presence of DC components.

The ECT system is comprised of four sensors connected to a control module. The control module powers the sensors and provides an output signal cable designed for connection to Disturbance Monitoring Equipment (DME) such as Numerical Relays, Digital Fault Recorders, and Sequence of Events Recorders. The control module has an indicating LED that monitors the module’s power supply.

The ECT system power supply, weatherability, and withstand capabilities are:

- 125 VDC power supply (110 – 370 VDC, 3 Watts).
- The power supply is surge protected and uses a half amp slow blow fuse.
- The control module and all of the connectors and sensors are watertight.
- The surge withstand capability is compliant with C37.90-1-2.

- The operating temperature range is -20 to 65°C.
- The operating humidity range is 0 to 95% non-condensing.

II – Basic Operation

The ECT sensors use Hall Effect sensing technology to measure current flow through secondary conductors. The sensors provide a current output proportional to the current flowing through the conductor being monitored. The ECT default turns-ratio is 1000:1 which is ideal for fault current monitoring applications in transmission and distribution systems. The maximum current output capability per sensor is 200 milliamps providing a maximum sensing range of secondary currents up to 200 amps instantaneous.

Other turns-ratios are available. For example, for metering applications a turns-ratio of 240:1 would be more appropriate than the default turns-ratio because it provides more sensitivity at load current levels. Please contact the manufacturer for further details.

III – Range and Accuracy

- *Turns Ratio:* 1000:1.
- *Frequency Response:* DC to 100 kHz.
- *Minimum Sensitivity:* 1 A (secondary AC or DC).
- *Maximum Sensitivity:* 200 A (secondary AC or DC).
- *Magnitude Accuracy:* 1% of actual current.
- *Phase Accuracy:* 1° of actual phase.
- *Output stability:* Linear from -20 to 60 °c.

IV – Components and Installation

1) Control Module and Cables: The control module has mounting holes and brackets on the rear plate and is pre-mounted on a din rail as shown in Figure 1. The module is equipped with 6 connectors to simplify installation and maintenance. The connectors connect 4 sensors, 1 power cable, and 1 output cable. The power cable is un-terminated at the customer end. The output cable is pre-terminated on the terminal block (pig tail cable).

The system connections are shown in Figure 2 and the system components are listed in Table 1. The wire designations for the output and power cables are listed in Table 2.

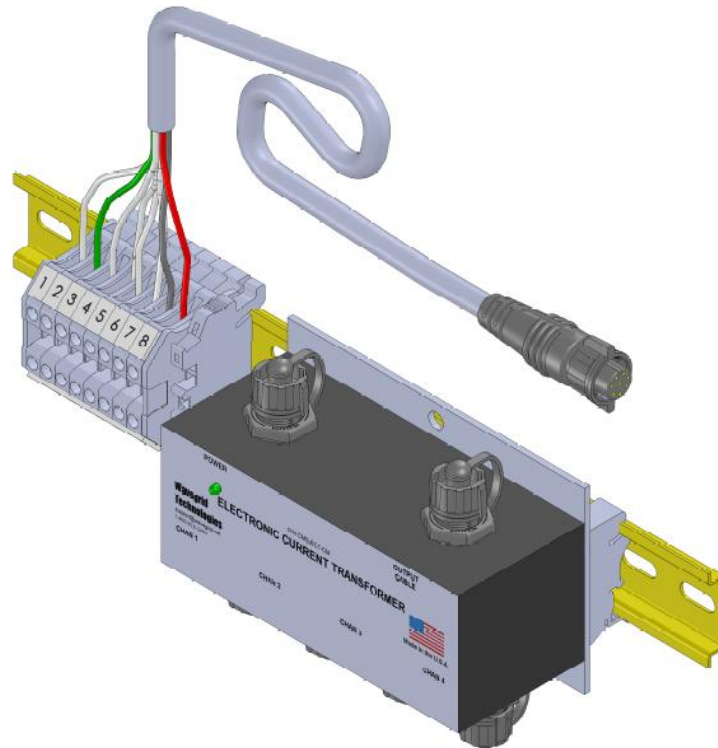


Figure 1: Isometric View of Control Module and Output Cable

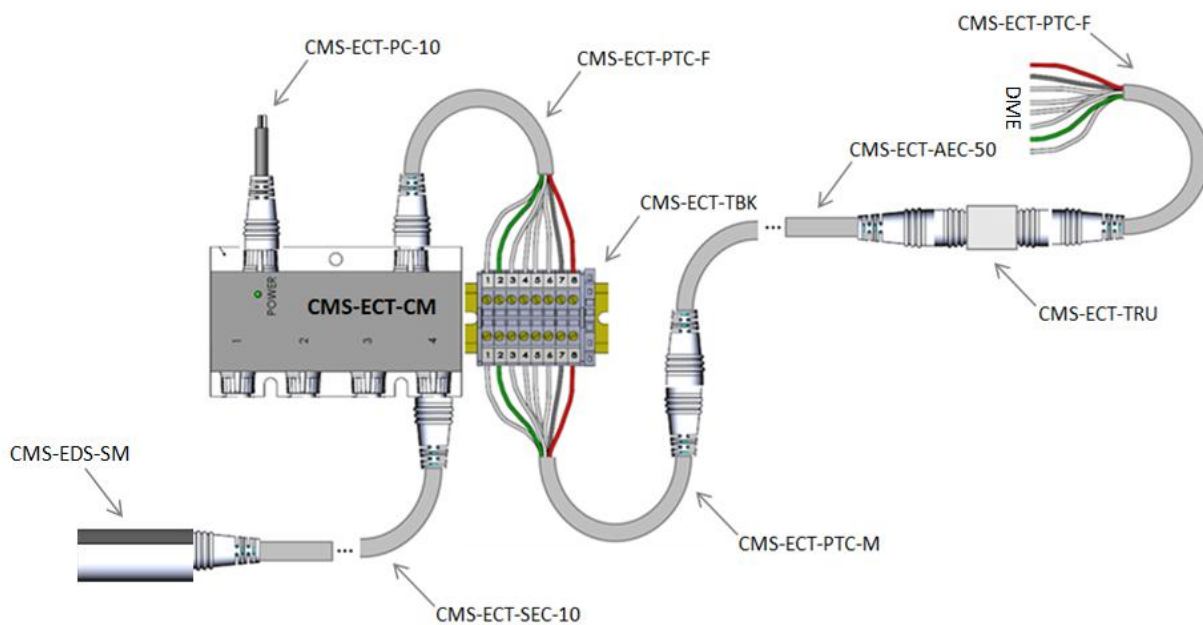


Figure 2: Overall Depiction of System Assembly

Component	Definition
<i>CMS-ECT-CM</i>	<i>Control Module with Brackets and 1' Din Rail</i>
<i>CMS-ECT-ATA</i>	<i>Output Terminal Block – 8 I/O Terminals</i>
<i>CMS-ECT-SM</i>	<i>Sensor Module with 10' Cable (connectors on both ends)</i>
<i>CMS-ECT-SEC-x</i>	<i>Sensor Extension Cable (x=length, 10' Standard – 50' Max)</i>
<i>CMS-ECT-PC-x</i>	<i>Power Cable (x=length, 10' Standard – 50' Max)</i>
<i>CMS-ECT-PTC-g</i>	<i>Output Cable, Pig tail, 8 wires (g=Gender M or F)</i>
<i>CMS-ECT-AEC-x</i>	<i>Output Extension Cable (x=length, 50' Standard – 150' Max)</i>
<i>CMS-ECT-TRU</i>	<i>Termination Resistors Adapter Unit</i>

Table 1: List of ECT Components and their Definitions

Wires	Colors	Designations
Output cable	Yellow	Sensor 1 Output Signal
	Brown	Sensor 1 Return (Polarity)
	Blue	Sensor 2 Output Signal
	Orange	Sensor 2 Return (Polarity)
	Green	Sensor 3 Output Signal
	White	Sensor 3 Return (Polarity)
	Red	Sensor 4 Output Signal
	Black	Sensor 4 Return (Polarity)
Power cable	Red	Positive 125 VDC Source
	Black	Negative 125 VDC Source

Table 2: Wire Designations for the Output and Power Cables

2) Sensor Module: Each module is comprised of a molded sensor enclosure, a conductor stabilizer, and a curved metallic shield as shown in Figures 3 and 4. The conductor stabilizer is used to wedge the monitored conductor against the surface of the sensing chip. The curved metallic shield is used to amplify internal magnetic fields and protect against external magnetic fields, and also to hold the conductor stabilizer in place. Each sensor is marked with a yellow dot for polarity indication.

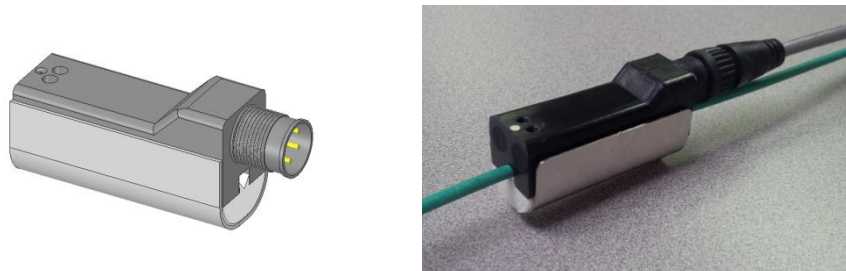


Figure 3: Sensor Module - 3D Views of the Sensor Module Assembly

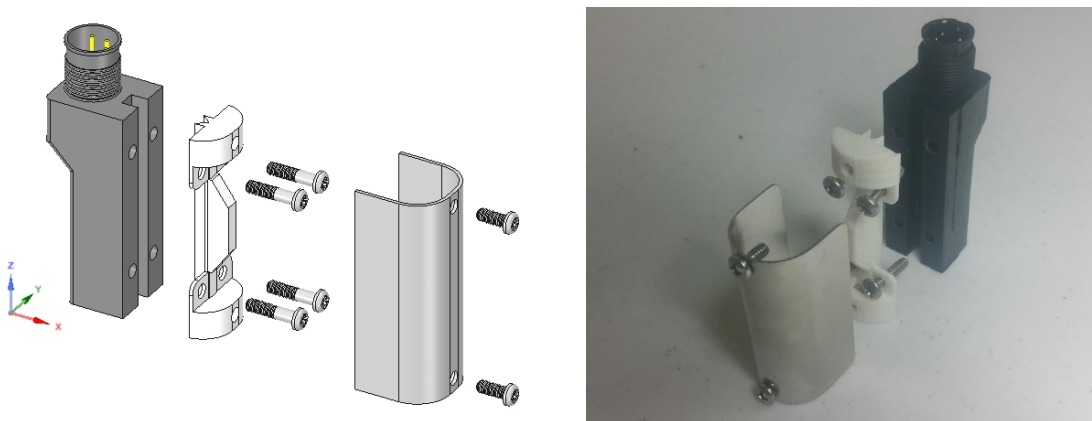


Figure 4: Sensor Module - 3D Views of the Sensor, Stabilizer and Shield

V – Installation Procedure

- Mount the ECT control module in the desired relay panel.
- Mount the sensors on the phase A, B, C, and neutral conductors to be monitored utilizing the conductor stabilizer and shield (**yellow dot indicates primary side polarity, sensor returns are secondary side polarities**).
- Connect the sensor modules to the control module.
- Connect the termination resistors adapter unit at the DME end (uses high accuracy resistors with sufficient power ratings).
- Connect the output wires to the desired DME analog channels (un-shunted channels) and set the desired trigger levels and scale factors.

- Connect the power cable to the 125VDC source. The connection is fused as noted in section I (half amp slow blow fuse).
- Plug the power cable to the control module.
- Observe that the power LED on the control module is illuminated (steady on).

VI – System Testing (Maintenance)

System testing is used to confirm that the system is providing the proper output to the DME. To test the system, use the following procedures:

Procedure 1 – DC Level Testing:

- Apply the desired direct current to a selected set of sensors.
- Observe that the DME is displaying the correct RMS current levels.

Procedure 2 – AC Transient Testing:

- Playback the desired fault current waveforms to the conductors being monitored (such as phase to phase and phase to ground faults, inrush, saturation, and offset signatures).
- Confirm that the DME triggered and recorded each waveform (observe that the RMS levels and phase angles are within the desired accuracy).

VII – Terms and Ordering Information

- ***Procurement:*** All materials will be procured upon receipt of PO.
- ***Deliveries:*** Within 12 weeks of receipt of PO.
- ***Production:*** Up to 100 complete EDSs per month.
- ***Discounts:*** Prices are discounted based on quoted volumes.
- ***Payments:*** Payments are for materials delivered.
- ***Warranty:*** 2 years from initial date of delivery.
- ***Training:*** Training services are available. Please contact us for further information.

Item	Part Number	Description
1	CMS-ECT-04	<u>Complete Package /w:</u> 1 CMS-ECT-CM (Control Module with Brackets and 1' Din Rail) 4 CMS-ECT-SM (Sensor Module with 10' Cable) 1 CMS-ECT-PC-10 (Power Cable – 10' – 2 Wire) 1 CMS-ECT-PTC-F (Output Cable – 1' Pig Tail – Female – 8 Wire) 1 CMS-ECT-TBK (Output Terminal Block – 8 I/O Terminals)
2	CMS-ECT-SEC-x	Accessory (Sensor Extension Cable – 10' Standard – Up to 50' Custom)
3	CMS-ECT-AEC-x	Accessory (Output Extension Cable – 50' Standard – Up to 150' Custom)
4	CMS-ECT-PTC-M	Accessory (Output Cable – 1' Pig Tail – Male)
5	CMS-ECT-PTC-F	Accessory (Output Cable – 1' Pig Tail – Female)
6	CMS-ECT-TRU	Accessory (Output Cable – Termination Resistors Adapter)

Table 3: ECT Parts List and Model Numbers

VIII – Contact Information

For further information, please contact our sales or support team at:

800.818.3463 (Sales)

sales@wavegrid.net

215.922.6880 (Support)

support@wavegrid.net

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