

Smart Sensors

1. **How long does it take for the OutageAdvisor sensor to send out a transmission to report status at initial installation? Is there any indication at the device other than it goes to reset?**

The device's FISHEYE display is shipped in the orange or tripped position. Upon installation, the sensor will provide indication of adequate minimum load current by initially flipping the FISHEYE display 3-4 times. If there is adequate load current, connection to the wireless network will be established. Once the device receives an acknowledgement message back from the server confirming network connection, it will reset. This should take no more than 3-4 minutes. The data displayed on the web page will be updated. If the utility has a notification list set up prior to installation, e-mail and SMS will also be sent during initial installation.

2. **Can we also get the OutageAdvisor unit in an 800 A minimum trip setting?**

This is a Variable-Trip device, meaning there is no set trip level. There is a 350 A minimum trip level that is actually the minimum pickup level (load + fault current). The device then looks for a rise in current of 350 A within 6-cycles followed by a loss of current in order for it to be considered a qualifying event.

3. **How low does the current have to go to be detected as a loss of current after a fault condition?**

After the qualifying di/dt is detected, the current must dip to below the minimum reset current, 10-Amps. The current must have dipped below the minimum for eleven (11) cycles in order to indicate a loss of current.

4. **How do I know if/when the device battery has expired?**

The OutageAdvisor sensor sends out a supervisory message once per day. One of the data values reported is the battery voltage. When that voltage gets down to a questionable level, the customer will be notified. Once the battery voltage has been reduced to a level where it is no longer useful, the device will no longer send that supervisory message.

5. **What is the expected life of the battery in the OutageAdvisor sensor?**

The battery used in the OutageAdvisor unit has a shelf-life of 20 years. However, given normal operation, the device useful life should exceed 10-12 years minimum.

6. **How are these units powered?**

The OutageAdvisor unit uses a proprietary technology that allows us to harvest energy off the conductor to maintain a charge on a lithium ion battery. The battery then powers the communications module that is internal to the sensor. No external power source is needed.

7. **How is the average current reported by the OutageAdvisor sensor being calculated?**

The device takes a current sample once every three hours. The last eight (8) samples are kept in an internal memory. During the supervisory message, an average of these eight (8) samples are reported along with the other supervisory data.

8. **How do I verify that the VARAdvisor sensor has communicated to the server?**

The VARAdvisor sensor is equipped with an internal reed switch which allows the user to swipe the device with a manual reset tool (part number SMRT) and force a communication. The device is also equipped with an LED that will indicate it has communicated with the server and received an acknowledgement message back. (Detailed installation instructions can be found in service section S1150-10-3.)

9. **How will the VARAdvisor unit signal that there is a problem with the capacitor bank?**

The VARAdvisor unit will take a current sample once every hour. If that current sample exceeds the threshold value (configurable, factory preset at 30-A) the device will send out a notification packet.

10. **If there isn't a problem with the capacitor bank, will the device report in on a regular basis? If so, how often will it report and what will it report?**

The VARAdvisor sensor will report a daily minimum and maximum every 14-days.

11. **For the VARAdvisor sensor, what is the minimum current required for the unit to operate properly?**

The VARAdvisor sensor does not use the power-harvesting technology that the OutageAdvisor unit uses due to unsustainable load current levels. It uses a fixed-cell battery and therefore, does not have a minimum load current requirement.

12. Will the VARAdvisor device work on both switched and fixed capacitor banks?

The VARAdvisor device can be used on either switched or fixed capacitor banks—especially, if the utility has a switch bank but no communications or neutral current monitoring.

13. What benefit will I gain from installing the VARAdvisor unit on my capacitor banks?

The primary benefit is that it allows the utility to get the most out of their investment in capacitors by ensuring they remain in service. If a failure occurs, the device will notify the customer within an hour. This also allows the customer to move from a time-based maintenance program to a condition-based maintenance program.

14. Where do I install the VARAdvisor device?

The VARAdvisor unit should be mounted to the common neutral of a grounded capacitor bank. (Detailed installation instructions can be found in service section S1150-10-3.)

15. Are there any special tools needed to install the VARAdvisor device?

As with all the smart sensors, the VARAdvisor unit does not require any special tools to install.

16. Is a separate, powered-RTU required to implement this solution?

No, radio communications are integrated directly in each sensor eliminating the need for a separate, powered-RTU.

17. What communications protocols do you support?

The initial product will support DNP 3.0 with other protocols to follow. Basically, if Cybectec supports a protocol with their Substation Modernization Platform (SMP), we can support it with the Yukon GridServer software.

18. Are the Fault Circuit Indicators (FCI) strictly one-way communications devices, from the FCI to the web host or DMS software? If not can information be requested or downloaded to the FCIs?

The OutageAdvisor sensor reports by exception. It only reports when there is a qualifying event. They are strictly one-way communicating devices at this time.

19. What is meant that the FCI is designed to count momentary outages that do not meet the criteria for transmitting a fault event?

The device has the ability to differentiate between a permanent fault and a momentary fault. After the device detects a qualifying event (dramatic rise in current followed by a loss of current) it waits 60 seconds. This gives any system reclosing devices a chance to remove temporary faults. If the sensor detects adequate load current at any point during this delay time, it considers that a momentary event

and sends out the appropriate notification. If the 60-seconds time expires and adequate load current is still not detected, it considers the event to be sustained and sends out the appropriate notification. (The momentary count is reset 24-hours after the momentary occurred.)

20. How accurate is the load current data reported by the OutageAdvisor device?

± 5 Amps.

21. Is it possible to communicate from your sensors directly into our OMS or SCADA system?

We use a proprietary protocol for device communication in order to maximize battery life and minimize the device cost. We have the ability to convert the protocol using the GridAdvisor Exchange software to DNP3.0, ICCC or others. This allows the data from the device to integrate to your OMS or SCADA system.

22. How do I know if the device communicates with the radio tower when I install it?

The device's FISHEYE display is shipped in the orange or tripped position. Upon installation, the sensor will provide indication of adequate minimum load current by initially flipping the FISHEYE display 3-4 times. If there is adequate load current, connection to the wireless network will be established. Once the device receives an acknowledgement message back from the server confirming network connection, it will reset. This should take no more than 3-4 minutes. The data displayed on the web page will be updated. If the utility has a notification list set up prior to installation, e-mail and SMS will also be sent during initial installation.

23. Are any special tools required for installation?

No, these devices can be clamped on using a single hotstick just like the other S.T.A.R. faulted circuit indicators.

24. What cellular networks will these devices work on?

The first technology we developed was a GSM radio on the AT&T® network. However, we've got plans to develop a CDMA radio for use on the Verizon® Wireless and Sprint® networks later in 2010.

25. What type of battery is being used? Is it rechargeable or replaceable?

The OutageAdvisor unit uses a rechargeable lithium cell. It is a sealed design and therefore not replaceable.

26. Is there an upgrade or maintenance fee for the Yukon GridServer sensor?

There is an annual maintenance fee that is included in the purchase price for the first year, required for years 2-3 and option for year 4 going forward. This annual fee provides the utility with on-line customer technical support and a minimum of one software revision per year.

27. What operating system is required for the Yukon GridAdvisor Exchange?

Microsoft® Windows® XP or newer, Windows Server® 2003. It is a .NET 2.0™ application.

28. Are other similar devices available?

We also have a capacitor neutral sensing device that will record and communicate current seen on the common neutral of a grounded capacitor bank. This will provide a utility with an indication of fuse operation. This is called the VARAdvisor sensor.

29. Will the OutageAdvisor device report fault current levels?

The cellular version of the OutageAdvisor device has the ability to report fault current levels. However, in the present design, the CT being used saturates at about 1000 A so any readings above that are inaccurate.

The destination of the data is based on an IP address that is programmed into the device. When manufactured, the devices are programmed with the IP address of our hosted server. However, the IP address is configurable with an over-the-air message. This means the device data can be re-routed without removing them from their field installation.

30. Where does the Yukon GridServer software reside?

The software would reside on a customer-owned server. That way, the utility has complete control over the setup, configuration and maintenance of the sensor database.

31. Is 10 amps the current necessary for reset or is it the current necessary to maintain a battery charge or both?

Both. We've established the 10-Amp minimum for the device to maintain charge on the battery and keep the 10-15 year useful life. If the current dips below 10-A, the device will report a loss-of-current and go into hibernation mode.

32. Does "indication of power" and "return of 60Hz power" refer to the circuit current exceeding 10 amps and is it totally independent of whether voltage has returned?

Yes, this is strictly a current-sensing device.

33. What is the inrush restraint feature?

It prevents false trips on adjacent phases of a single-phase fault when a three-phase overcurrent protection device trips and recloses. If the unit sees a loss of current initially followed by a qualifying di/dt current, the device will ignore that inrush current.

34. How long does the current need to be absent to activate the inrush restraint feature?

The current must be below the 10-Amp minimum for 11-cycles minimum to activate the inrush restraint.

35. The literature says this device has a low-pass filter, what is that feature doing?

The low-pass filter prevents a common miss-operation of older fault indicators known as "tripping beyond the fault". When a three-phase overcurrent protection device operates, the high-frequency transient currents from long runs of cable can be enough to trip devices downstream from the fault. With the low-pass filter, these high frequency "faults" are ignored.

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