

LV AGInode monitor

Polyphase A3 ALPHA® option

Introduction

The Elster polyphase low voltage (LV) transformer AGInode monitor brings EnergyAxis® System metering and network communication to monitoring of low voltage polyphase distribution transformers. The LV AGInode monitor is designed for easy installation on pole top transformers without interrupting service to the loads. The polyphase LV AGInode monitor supports transformers as small as 50 kVA and loads to 1000 A/phase.

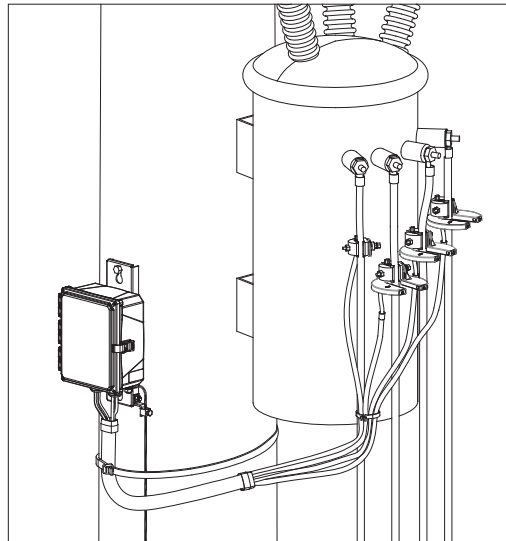


Figure 1.

The product consists of:

- Three current sensors mounted on the transformer phase A-B-C outputs (X1-X2-X3). The open-aperture current sensors are installed without interrupting service. A separate wire connects to neutral / X0.
- The line and neutral voltage connections are made by insulation-piercing voltage connectors. The voltage connectors also support the current sensors and are easily installed and removed without interrupting service.
- A meter enclosure contains the meter assembly and interface electronics for the current sensors. The meter enclosure is mounted to the utility pole near the transformer via an integral mounting bracket. The enclosure can be attached to the pole with bolts or straps. The lockable front door of the meter enclosure permits verification of meter operation during installation. After installation, all interaction with the meter is via the meter's integral RF connection. Access or visibility from the ground is not required. There are no indicator lights to attract nuisance attention.
- An integrated cable assembly connects the current sensors and voltage clamps to the meter enclosure. The cable assembly is approximately 84 inches (2.1 meters) long to accommodate integrated or multi-transformer polyphase installations.

Planning the installation

▲ WARNING

Use authorized utility procedures to install and service this metering equipment. Dangerous voltages are present. Equipment damage, personal injury, or death can result if safety precautions are not followed.

Since the A3 ALPHA LV AGInode monitor will communicate with a nearby EnergyAxis EA_LAN, pick a transformer monitoring site that will be within reach (ideally 600 feet or less) of another EnergyAxis-enabled meter, gatekeeper, or repeater.

Choose a transformer monitoring site with suitable line voltage and currents. The Polyphase LV AGInode monitor is rated for four-wire Wye services with nominal voltages 120/208 through 277/480 VAC. The recommended total polyphase transformer capacity is summarized below:

	120/208V	277/480V
Minimum	50 kVA	75 kVA
Maximum	225+ kVA ¹	225+ kVA ¹

1. The maximum transformer size is limited by secondary cable size. The "large" voltage clamp connector works with cables as large as 750 MCM.

The LV transformer AGInode device current sensors must be positioned so that all of each phase's load current passes through the aperture of the meter's related phase current sensor. This is most easily accomplished when there is a single cable connected to each transformer output bushing.

The voltage connection to the transformer output lines is accomplished with insulation-piercing connectors made by Groupe Sicame. The connectors also support and position the current sensors. The voltage connectors pierce the cable insulation and form a weather-tight seal when the clamp bolt is tightened. The clamp-bolt has a plastic "break-away" double head to guarantee proper installation torque. When the proper torque is reached, the outer nut head breaks off. The inner nut head remains and allows the connector to be removed later.

NOTICE

The LV AGInode monitor is ordered with "large" or "small" Sicame voltage clamp connectors. The large connectors work with cable sizes 3/0 to 750 MCM. The small connectors work with 2/0 to #4 AWG. Contact your Elster sales representative for information on ordering the proper connector size.

Performing the installation

WARNING

The Polyphase LV transformer AGInode device may be installed on energized transformers only by personnel trained and equipped for live-line service.

Use authorized utility procedures to install and service this equipment. Dangerous voltages are present. Equipment damage, personal injury, or death can result if safety precautions are not followed.

1. Choose the installation site following the guidelines in "Planning the installation" on page 2.
2. Prepare the site and inspect for safety issues following your utility's procedures. In particular, check for minimum clearances to nearby high voltages.
3. Mount the meter enclosure to the pole. Temporarily support the sensor assemblies and connecting cable so they do not interfere with mounting the enclosure.

The meter enclosure can be mounted to the pole at a convenient location that is less than seven feet from the current sensor mounting positions. The enclosure does not need to be visible from the ground. For best RF communication, the front of the enclosure should be unobstructed by metal parts. The meter enclosure should be mounted upright with the LCD horizontal.

CAUTION

Use only straps or 1/2-inch bolts to mount the meter enclosure. If lag bolts are used, do not hammer the bolts after the meter enclosure is hung on the bolts. Hammering the lag bolts after the meter enclosure is hung on the bolts will cause shock damage to the meter enclosure and components.

For mounting on wood poles:

- use 1/2-inch lag bolts that are at least 2.5 inches long.
- Drive the lag bolts into the pole leaving at least 1 inch of the bolt shanks exposed. The nominal bolt spacing is 13.25 inches.
- Hang the meter assembly onto the bolts and tighten the bolts so that the bracket is securely held on the pole.

For strap-mounting on poles:

- Note that both band slots are open to permit hooking onto pre-installed bands.
 - Loosely install two bands (band width less than 1 inch) on the pole.
 - Hook the bracket slots onto the bands.
 - Position the enclosure and complete tightening of the bands.
4. Mount the current sensors and make the neutral connection. The current sensors are positioned on the X1 (phase A), X2 (phase B) and X3 (phase C) transformer drop wires between the transformer output bushings and the point where loads are connected. The sensor cables are marked "A", "B" and "C" on the cable below each sensor body. The top of the current sensors (the side containing the insulating piercing connector and labeled "SOURCE") must face toward the transformer bushings. The neutral wire connects to transformer output X0.

NOTICE

For best measurement accuracy, orient the sensor aperture openings away from the transformer tank. The sensor apertures should be parallel with each other or turned away (outward) from each other. Figure 2 shows an example.

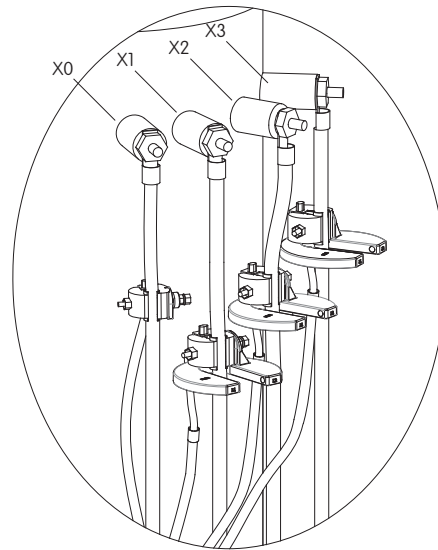


Figure 2.

5. For each sensor, loosen the mounting bolt until the voltage connector jaws fit over the cable. Finger-tighten the mounting bolt until the sensor is lightly held on the cable. Orient the sensor (see the Notice above), and tighten the bolt with a 1/2-inch socket driver until the bolt head breaks off.

NOTICE

The Sicame voltage connectors may ship with two bolt head designs (see Figure 3). The type A bolt head requires a 1/2-inch socket for both outer breakaway and inner heads. The type B bolt head requires a 1/2-inch socket for the outer breakaway head but requires a 5/8-inch socket on the inner head. Exercise care while tightening the type B bolt head to make sure that the socket driver is aligned and fully engaged with the connector bolt.

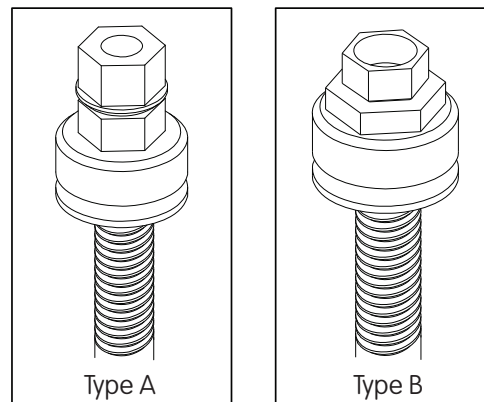


Figure 3.

Tips for making a good voltage connection include:

- Use a 6-point ½-inch socket to tighten the connector bolt.
 - Use a power drive "screwdriver" tool to tighten the bolt. This facilitates two-handed installation: One hand holds and aligns the sensor and connector while the other hand operates the driver.
 - While tightening the bolt, carefully align the power driver shaft with the bolt to achieve the best connection between the socket and bolt head.
 - The voltage connector bites into both the main transformer cable and a smaller black voltage "tap" wire which powers the LV AGI Node. Before final tightening of the connector bolt, make sure that the voltage "tap" cable extends into the sealing cap (on top of the connector), and both tap and transformer cables are aligned with their respective connector jaws.
 - The correct bolt torque is achieved by tightening the connector bolt until the outer bolt head breaks off. If it is necessary to loosen or remove a voltage connector, the bolt must be re-torqued to 80 inch-pounds using a torque wrench. Elster Solutions recommends replacing the voltage connector with a new unit if it is necessary to remove a connector.
6. Check that the meter is energized. The LCD display should show activity. The A-B-C voltage indicators should be continuously lit. The meter should not display an error code (ie, display beginning with "Er"). If there is sufficient load current, the right energy arrow will pulse. If the display still does not light or there is an Error indication, the meter should be returned to the shop for service.

NOTICE

If the display does not light or one of the phase indicators is not lit, the most common cause is an unsuccessful voltage connection at one of the voltage connectors. Inspect the main cable and smaller tap cable (at the rear of the connector) to make sure both cables are aligned with the connector jaws. The voltage connectors may be loosened, realigned, and re-torqued to 80 inch-pounds to achieve a successful connection. However, Elster Solutions recommends carrying a small supply of extra new voltage connectors and changing the connector when the initial connection attempt is unsuccessful.

7. Restrain the sensor cable to prevent wind-driven movement. Excess cable should be taped or tie-wrapped in a loop and anchored to a stable object. The sensor cable is insulated and shielded and may be tie wrapped to a transformer output cable if the utility standards permit. Form a drip loop in the sensor cable under the meter enclosure to help the sensor cable shed rain.

Removing the LV AGInode monitor from service

▲ WARNING

Wear safety equipment and use authorized utility procedures to uninstall this equipment. Dangerous voltages are present. Equipment damage, personal injury, or death can result if safety procedures are not followed.

The LV transformer AGInode device may be uninstalled and re-used as desired by the utility. In general, to remove the LV transformer AGInode device from service, reverse the installation procedure. While removing the AGInode device from service, please note the following:

To remove a current sensor from the transformer cable, use a ½-inch (bolt type A) or 5/8-inch (bolt type B) socket to loosen the voltage connector. Then, with a safety-gloved hand, grasp the voltage connector and gently disengage the connector from the transformer output cable. It may be desirable to tape or insulate the small puncture holes where the voltage connector pierced the cable insulation.

If it is desired to move the pole top LV AGInode monitor to a new location, use this procedure to install new voltage connectors:

- Order two new voltage connectors from Elster or Sicame USA. The small connector for #4 - 2/0 cables is the Sicame TTD 0510F. The large connector for 3/0 - 750MCM cables is the Sicame TTD 0810F.
- Remove the old voltage connectors from the sensors by unscrewing the voltage connector bolt. Each voltage connector consists of two jaw parts plus the bolt.
- Note that the insulation on the #14 voltage wire has been deformed (crushed) by the clamping action of the voltage connector. To get a good weather seal with the new connector, gently warm the wire insulation with a heat gun to remove the crush marks.
- The new voltage connector comes with protective wire caps on both top and bottom. Compare the new connector with the old and remove the lower protective wire cap by sliding the cap sideways.
- Install the new voltage connector on the sensor assembly. If the new connector is the TTD 0510F, make sure to re-install the original plastic spacer between the connector body and the sensor flange. Make sure the voltage wire passes through the smaller tap wire side of the connector. The end of the voltage wire should push into the protective wire cap on the top of the connector. Tighten the clamp bolt finger-tight.

Operating the LV AGInode monitor

The A3 ALPHA Polyphase LV AGInode monitor includes the following enhancements and differences relative to the polyphase A3 ALPHA smeter:

- The meter is similar to ANSI Form 16 and is recommended for usage with three-phase 4-wire Wye services.
- The meter nominal operating voltage range is 120/208 VAC to 277/480 VAC.
- The Class current (I_{max}) is 1000 A
- The test amperage is 150 A
- The meter register constant (K_r) is 108.
- Meter accuracy class is 1 % per relevant parts of ANSI C12.1-2008.

FCC and Industry Canada Compliance

User Information (Part 15.105)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient or relocate the receiving antenna
- increase the separation between the equipment and the receiver
- connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- consult the dealer or an experienced radio/TV technician for help

If you experience trouble with this equipment, please use the Return Material Authorization (RMA) feature available at the Online Customer Services at www.elstersolutions.com. Do not attempt to repair this equipment yourself unless you are replacing the entire module.

Compliance Statement (Part 15.19)

This device complies with Part 15 of the FCC Rules and Class B digital apparatus requirements for ICES-003. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation of the device.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Énoncé de conformité

Cet appareil est conforme à la Partie 15 des règles de la FCC et aux exigences relatives aux appareils numériques de classe B conformément à l'avis sur la compatibilité électromagnétique ACEM-3. L'utilisation de cet appareil est soumise aux deux conditions suivantes : (1) Cet appareil ne doit pas provoquer d'interférences nocives et (2) cet appareil doit accepter toutes les interférences reçues notamment celles pouvant provoquer un fonctionnement intempestif de l'appareil.

Antenna Compliance

To reduce potential interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than permitted for successful communication. Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Warning (Part 15.21)

Changes or modifications not expressly approved by Elster could void the user's authority to operate the equipment.

RF Radiation Safety Guidelines

The device should be installed in a location where there will be a separation greater than 20 cm (8 inches) from locations occupied by humans.

Collocation Statement

Collocation of simultaneously-transmitting (co-transmitting) antennas located within 20 cm of each other within a final product is not allowed.

Trademark notices

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Notes:

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