

LV AGInode™ monitor: Single phase A3 ALPHA® version

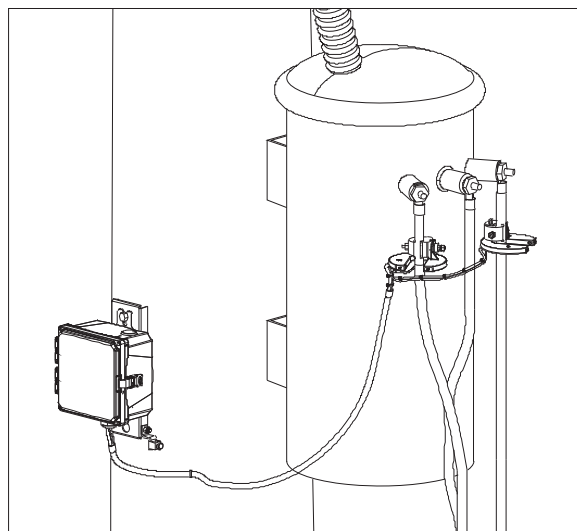
Installation instructions
IL42-5024C

Introduction

The Elster low voltage (LV) transformer AGInode monitor brings EnergyAxis® System metering and network communication to monitoring of low voltage single phase distribution transformers. The LV transformer AGInode monitor is designed for easy installation on pole top transformers without interrupting service to the loads. Transformers to 167 kVA and loads to 1000 A at 240 V are supported.

The single phase A3 ALPHA AGInode monitor can be ordered with either an EnergyAxis communication capability or a wired Ethernet connection supporting either ANSI C12.21 or C12.22 communication protocols. See "Ethernet installation and operation" on page 6 for more information.

Figure 1.



The product consists of the following components:

- Two current sensors mount on the transformer X1 and X3 line outputs. The open-aperture current sensors are installed without interrupting service. Since meter measurements are made line-to-line essentially as a Form 2S, there is no connection to neutral.
- The X1 and X3 line 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 two-piece 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 long to accommodate most 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.

If the A3 ALPHA LV transformer AGInode monitor will communicate with a nearby EnergyAxis network, pick a transformer monitoring site that will be within reach (ideally 600 feet or less) of another EnergyAxis-enabled meter or gatekeeper. If the AGInode monitor is equipped with the wired Ethernet communication option, see the "Ethernet installation and operation" on page 6 for more information.

Choose a transformer monitoring site with suitable line voltage and currents. The LV transformer AGInode monitor is rated for 240 VAC 3-wire distribution only and can be used at load currents to 1000 A, typically with transformer ratings between 37.5 kVA to 167 kVA.

To measure the transformer's total current output, the LV transformer AGInode monitor current sensors must be positioned so that all load current on each X1 and X3 output line passes through the aperture of a current sensor. This is most easily accomplished when there is a single drop-lead pigtail wire connected to each transformer output bushing. In this case, the two current sensors and voltage connectors are positioned on the drop leads, between the transformer X1 and X3 output bushings and the first load splice or tap-off point.

If multiple load cables are connected directly to the transformer bushings, the load cables must be bundled together with tape or cable ties so that all cables connected to the same transformer bushing fit within the 1.75-inch width of a current sensor. Since all wires connected to the same bushing are at equal voltage, the voltage clamp for each sensor connects to just one of the cables in the bundle.

The voltage connection to the transformer X1 and X3 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 double-head (1/2-inch hex nut) 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

Two Sicame connector sizes may be ordered with the pole top LV transformer AGInode monitor. The connector size is specified when the order is placed. The "large" connector is labeled for usage with 3/0 through 750 MCM cables which are used on most transformers. The "small" connector is labeled for usage with #4 AWG through 2/0 cables which are typically found on smaller transformers. Contact your Elster sales representative for help with ordering the desired connectors.

The meter enclosure is mounted on the utility pole at a convenient location less than seven feet from the planned locations of the current sensors. Visibility from the ground is not required. The enclosure may be mounted on poles with straps or ½-inch lag bolts.

Performing the installation

WARNING

The LV transformer AGInode monitor 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 the section "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

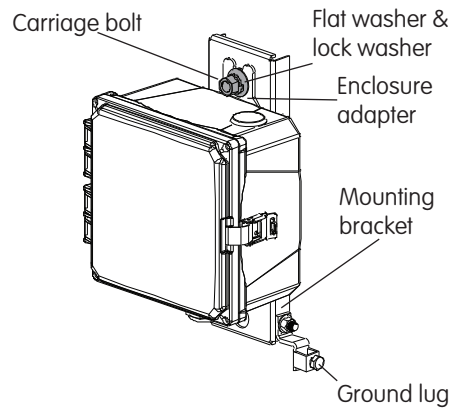
Use only straps or ½-inch bolts to mount the meter enclosure. If lag bolts are used, do not hammer the bolts after the meter enclosure is hung on the bolts. Hammering the lag bolts after the meter enclosure is hung on the bolts will cause shock damage to the meter enclosure and components.

Strap mounting procedure (see Figure 2)

- Hook the enclosure adapter into the slot in the mounting bracket and position the mounting bracket as shown in Figure 2.
- From the back, insert the carriage bolt in the top bolt mounting keyhole. Install the flat washer, lock washer and nut as shown in Figure 2.
- Torque the nut to 25 foot-pounds (34 N-m).
- Follow your utility procedures for mounting the assembled unit using straps.

Note that a ground lug is provided. Follow your utility's procedures for properly grounding the unit's exposed metal hardware.

Figure 2.

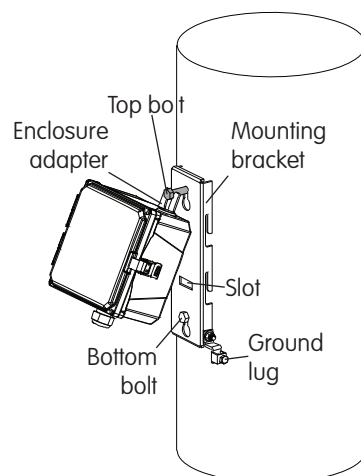


Bolt mounting procedure (see Figure 3)

- The mounting bracket is designed for 10-inch spacing between the upper and lower mounting bolts.
- Attach the mounting bracket to the desired location by first inserting the bottom bolt. The bottom bolt can be fully driven and lightly tightened.
- Insert and partially drive the top bolt, leaving approximately 1 ½ inches between the bolt head and mounting bracket.
- Position the enclosure adapter under the top bolt as shown in Figure 3.
- Pivot the enclosure adapter down and hook the mounting tab into the slot in the mounting bracket.
- Make sure the enclosure adapter tab is securely seated in the mounting bracket slot.
- Complete the mounting process by tightening the top bolt and checking tightness of the lower bolt. Do not overtighten the lower bolt to avoid deforming the mounting bracket.

Note that a ground lug is provided. Follow your utility's procedures for properly grounding the unit's exposed metal hardware.

Figure 3.



4 Mount the current sensors. The current sensors are positioned on the X1 and X3 transformer drop wires between the transformer output bushings and the point where loads are connected. Either

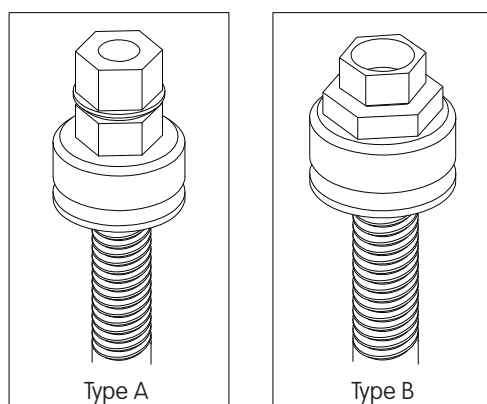
current sensor can be placed on either wire. The top of the current sensors (the side containing the insulating piercing connector and labeled "SOURCE") must face toward the transformer bushings.

For each sensor, loosen the mounting bolt until the voltage connector jaws fit over the cable. Fingertighten the mounting bolt until the sensor is lightly held on the cable. Orient the sensor (see the Notice below), 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 4). 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 4.



Tips for making a good voltage connection include:

- Use a 6-point 1/2-inch socket to tighten the connector bolt.
- Use a power driver (impact wrench or screwdriver) 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 AGInode. 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 large voltage connector can be ordered with a "Turbo Spacer" option which holds the connector jaws open and facilitates connector alignment. Consult your Elster Solutions Sales Representative for ordering details. The Turbo Spacer is a red plastic part which is visible from the rear of the voltage connector. Please note that the Turbo Spacer fractures with a popping sound during tightening of the connector bolt.
- 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.

NOTICE

For best measurement accuracy, orient the sensor aperture openings away from the transformer tank. The two sensor apertures should be parallel with each other or turned away (outward) from each other. Figure 1 shows an example with the sensor apertures non-parallel and the left sensor aperture turned outward.

5 Check that the meter is energized. The LCD display should show activity. The triangle error symbol should not be lit.

If there is sufficient load current, the right energy arrow will pulse. If the display is not lit, check the voltage connectors.

NOTICE

If the display does not light, 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.

If the display still does not light or there is an abnormal indication (for example, triangle error indicator lit), the meter should be returned to the shop for service.

6 Restrain the sensor cable to prevent wind-driven movement. Excess cable should be tie-wrapped in a loop and anchored to a stable object. Form a drip loop in the sensor cable under the meter enclosure to help the sensor cable shed rain. If hammer-driven staples are preferred, use an insulated staple sized for ½-inch electrical cable and be careful not to strike the cable or over-drive the staple.

Ethernet installation and operation

The single phase A3 ALPHA AGInode monitor can be optionally ordered with a wired 10BaseT Ethernet network connection in place of EnergyAxis RF communication capability. The Ethernet connection supports ANSI C12.21 or C12.22 communication protocols, selected at meter order time. The Ethernet output cable is weatherproof and shielded, and terminates in a TIA/EIA-568-B RJ-45 connection.

The Ethernet output cable is approximately 84 inches (2.1 m) long and is supplied with a M20 gland fitting at the far end to provide a weather tight interface with a separate user-provided NEMA enclosure. The user-provided enclosure houses the network interface device and its power supply.

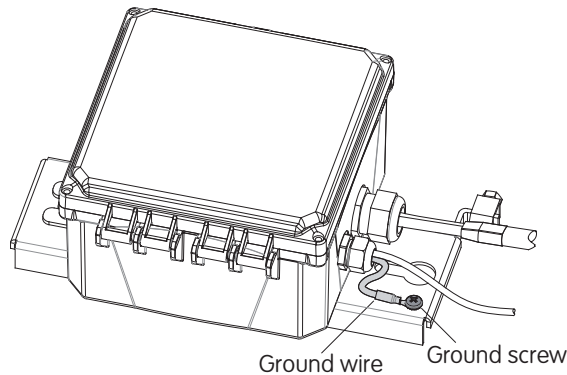
Meter siting and installation with Ethernet

The same considerations listed in “Planning the installation” on page 2 also apply to the Ethernet-equipped A3 ALPHA version of the AGInode monitor, except that extra space must be allowed nearby for the second user-provided enclosure that houses the network interface device (typically a radio modem) and its power supply. Since the Ethernet connection from the A3 ALPHA assembly in the AGInode monitor does not provide power, the network interface device must be powered separately.

The RJ-45 connector at the cable end must be protected from the weather to maintain the IP rating of the meter. To protect the cable end, mount the M20 gland near the cable end in a 0.80-inch (20.3 mm) diameter hole in the user-provided enclosure using the provided metal locknut. Tighten the locknut to 6.0 N-m (53.1 inch-pounds). The user-provided enclosure should be rated NEMA 4X/IP66 minimum to match the meter's rating. Also tighten the gland cap so that the gland securely grips the Ethernet cable.

The Ethernet cable is shielded to protect the connection from noise and surges. The Ethernet cable's shield is grounded to the metal mounting bracket after the meter is secured to the pole, typically after the mounting procedures (see "Performing the installation" on page 3"). The ground connection is made using a short wire and screw (see Figure 5).

Figure 5.



The A3 ALPHA AGInode monitor is shipped with the Ethernet ground wire disconnected to allow easier installation of the meter mounting bracket. After the meter is mounted, screw the Phillips-head mounting screw at the end of the ground wire into the captive nut at the lower-left corner of the mounting bracket and tighten securely. The mounting screw is held on the ring terminal during shipment by a small rubber O-ring. Leave the O-ring in place when making the ground screw connection.

To effectively ground the Ethernet cable shield, be sure to ground the meter's mounting bracket by connecting a ground wire to the provided lug at the lower-right corner of the mounting bracket. To avoid undesirable ground currents and electrical noise through the Ethernet cable, the user-provided network interface and power supply should be grounded to the AGInode monitor's mounting bracket with a minimum-length wire.

Operating the A3 ALPHA AGInode Ethernet Interface

The AGInode monitor Ethernet RJ-45 connector is wired per TIA/EIA-568-B and supports 10BaseT functionality. Supported communication protocols are ANSI C12.21 and C12.22, specified at the time of meter order. The A3 ALPHA meter and Ethernet option board must be programmed with several parameters including IP address, subnet mask, and default gateway using the latest Elster meter support software. For information on programming the A3 ALPHA meter and Ethernet option board, see the documentation or online Help for Elster's meter support software.

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

To remove a current sensor from the transformer cable, use a socket wrench to loosen the voltage connector. Because of the two bolt head designs on the Sicame voltage connector, 1/2-inch and 5/8-inch sockets may be required. 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 transformer monitor to a new location, use this procedure to install new voltage connectors:

- Order two new voltage connectors from Elster or Sicame USA. The large connector for 3/0 - 750MCM cables is the Sicame TTD 0810F (add "T" for Turbo Spacer). The connector for # 4 - 2/0 cables is the Sicame TTD 0510F.
- 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 version of the LV AGInode monitor includes the following enhancements and differences relative to the A3 ALPHA single phase meter:

- The meter is a 3-wire, single phase meter, similar to ANSI Form 2S, but can be operated as a 2-wire meter
- The meter nominal operating voltage is 120 VAC to 240 VAC
- The Class current is 1000 A
- The test amperage is 150 A
- The meter register constant (K_h) is 36.0.

Specification summary for the A3 ALPHA LV transformer AGInode monitor

Item	Performance level
Operating voltage	120 VAC to 240 VAC nominal 96 VAC to 288 VAC max range
Current	1000 A Class/maximum current 150 A test amps 500 mA max starting current
Frequency	50 Hz or 60 Hz \pm 5 %
Operating temperature	-40 °C to +65 °C continuous ambient -40 °C to +85 °C ANSI C12 test, 168 hours
Meter enclosure	Polycarbonate, rated NEMA 4X, IP66
Performance	Accuracy Class 1.0 % (0.5 % typical) Applicable parts of ANSI C12.1-2001 and C12.20-2002

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.

Notes:

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