

IP AxisLink® router

Installation information

Introduction

The IP AxisLink platform can leverage your existing EnergyAxis® AMI network to reach your devices previously stranded by your AMI or SCADA network. Communication to devices (such as capacitor bank controllers, recloser controllers, and LTC voltage controllers) is handled within a secure tunnel over the EnergyAxis wide area network (WAN). The IP AxisLink platform creates a secure, DA communication virtual private network (VPN) for remote access to previously stranded intelligent electronic devices on the distribution feeder.

With the optional gatekeeper functionality enabled, utilities can expand their EnergyAxis System architecture by combining the router, DA gateway, and AMI LAN gatekeeper functions into one integrated device.

This document provides information for installing the IP AxisLink router.

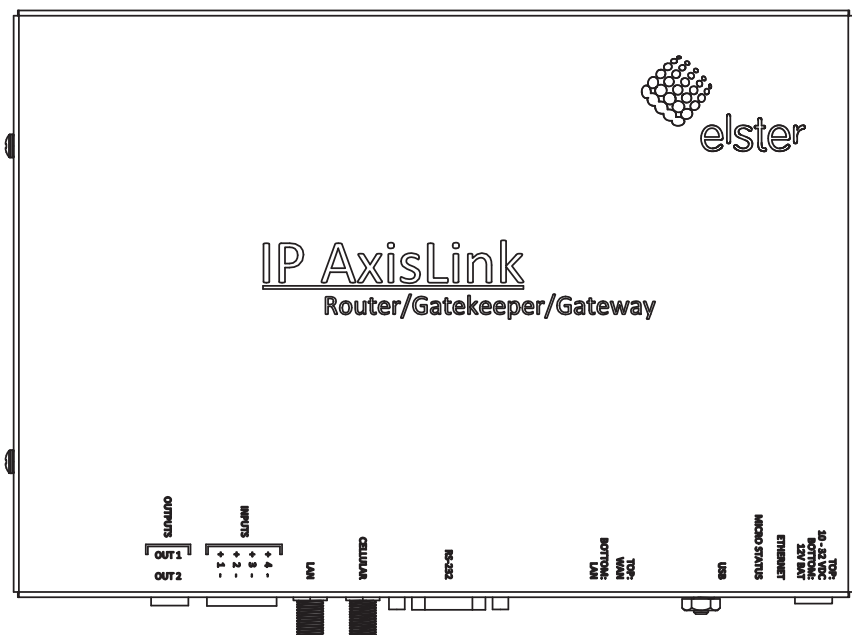


Figure 1. IP AxisLink router, front view

The IP AxisLink router includes the following components:

- The IP AxisLink router
- panel mounting bracket
- 2 × two-position terminal blocks for discrete outputs
- 2 × four-position terminal blocks for discrete inputs
- 1 × two-position terminal block for DC power
- 1 × two-position terminal block for battery power

The IP AxisLink router provides the following communications and input/output connections:

Communications interface	Quantity	Type
Ethernet 10Base-T	2	RJ-45
Serial RS-232	1	DB9
EA_Gatekeeper module	1	Wireless
USB serial configuration port	1	Mini-B USB
RF antenna (Cellular/EA_LAN) ¹	2	SMA

1. When equipped with a corresponding communication option board

Discrete input/output	Quantity	Type
Discrete binary inputs	4	Screw terminal
Discrete binary outputs	2	Screw terminal
External ground connection	1	#6 threaded stud

A panel mount bracket is also included with the IP AxisLink router. This provides a secure physical mounting point to flat surfaces.¹ The mounting holes support fasteners up to 0.200 inches in diameter.

¹ An external ground must be provided when mounting the IP AxisLink router to a non-metallic or electrically floating location. A #6 grounding post is provided on the connection panel for this mounting scenario.

Preparing the installation

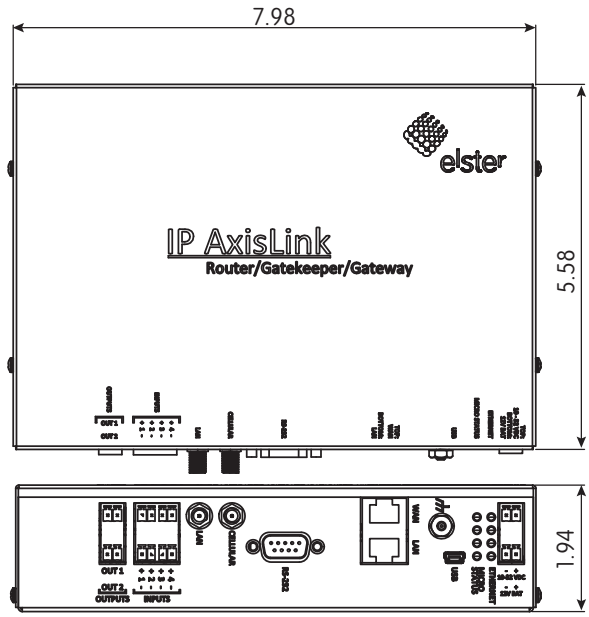
⚠ WARNING

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.

The IP AxisLink is provided in an indoor rated metallic enclosure. The device must be mounted such that it will not be exposed to condensing humidity, water, excessive airborne dust, subjected to extended periods of UV exposure or locations that exceed the IP AxisLink router temperature ratings.

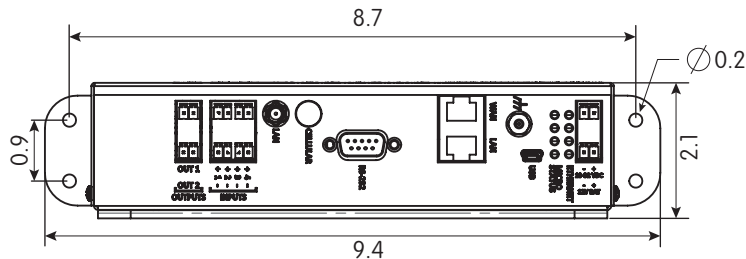
The customer must select a suitable rated enclosure for the environment if mounting the IP AxisLink in an outdoor location. A minimum environmental protection rating of NEMA 4X/IP65 is required. Contact your Elster representative for assistance.

Cabling for all communications and I/O interfaces should be routed in such a way as to not introduce a water ingress point leading back to the IP AxisLink router. Cables must be strain relieved near the connection with the router to prevent product damage.



Approximate dimensions in inches

Figure 2. IP AxisLink router dimensions



Approximate dimensions in inches

Figure 3. Mounting bracket dimensions

Weight of IP AxisLink router: approximately 2 pounds (varies depending on configuration)

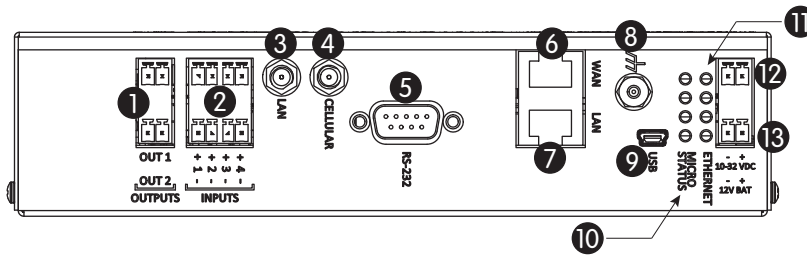
Placing the router into service

⚠ WARNING

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General product specifications:

Primary operating DC voltage	10 VDC to 32 VDC	
Secondary DC backup voltage	12 VDC (nominal)	Max = 14 V Min = 10 V
Maximum power	17 Watts	
Average power	6.5 Watts	
Operating temperature	-40 °C to +85 °C ANSI C12. test	
Product enclosure	Metal, indoor rated	



- ① Discrete output pairs (4 pin)
- ② Discrete input pairs (8 pin)
- ③ RF LAN port
- ④ RF cellular port
- ⑤ RS-232 port
- ⑥ Ethernet WAN port
- ⑦ Ethernet LAN port
- ⑧ Ground lug
- ⑨ USB port
- ⑩ Micro status LEDs
- ⑪ Ethernet status LEDs
- ⑫ 10 VDC to 32 VDC input
- ⑬ 12 VDC input

Figure 4. IP AxisLink connections

Discrete outputs

This port consists of 2 sets of dry contacts from separate solid state relays. The dielectric isolation from output to ground is rated at 2800 VDC for 1 minute. These contact pairs are labeled 1 and 2 from top to bottom. The contacts are rated for 1 A maximum continuous load current, 120 VAC/170 VDC maximum. These values hold over the rated temperature range of -40 °C to +85 °C. The default state of these outputs is open.

Two 2-position terminal blocks are provided for insertion into the discrete output port. These contain screw-fastened contacts that can accommodate 16 gauge to 24 gauge wire.

Discrete inputs

This port consists of 4 optically isolated discrete input pairs. The dielectric isolation input to ground is rated at 500 Vrms for 1 minute. These input pairs are labeled 1 to 4 from left to right. The top terminal is positive and the bottom is negative and are labeled as such. To make any input active, apply a wetting voltage across the inputs within the range of 10 V to 32 V. Each input will draw up to 18 mA at 32 V and down to 4 mA at 10 V. As shown in Figure 5 and Figure 6, the wetting voltage can be sourced by the local AC/DC supply output for the IP AxisLink router or by an external isolated or non-isolated supply.

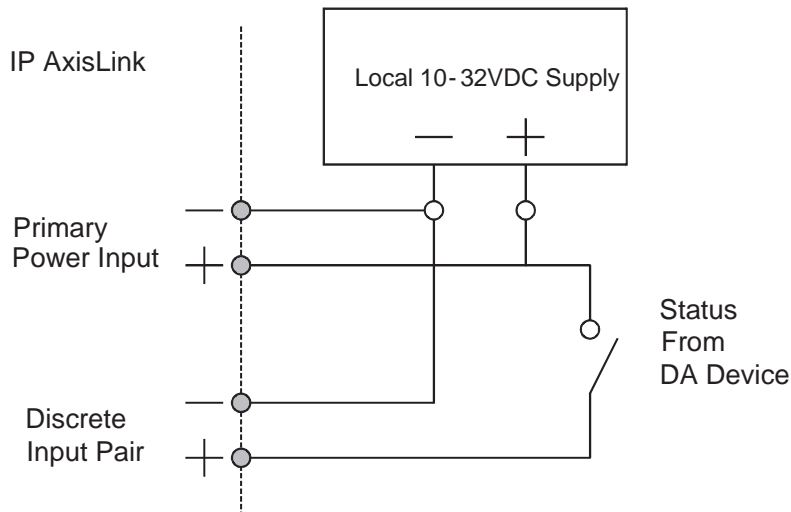


Figure 5. Local wetting voltage

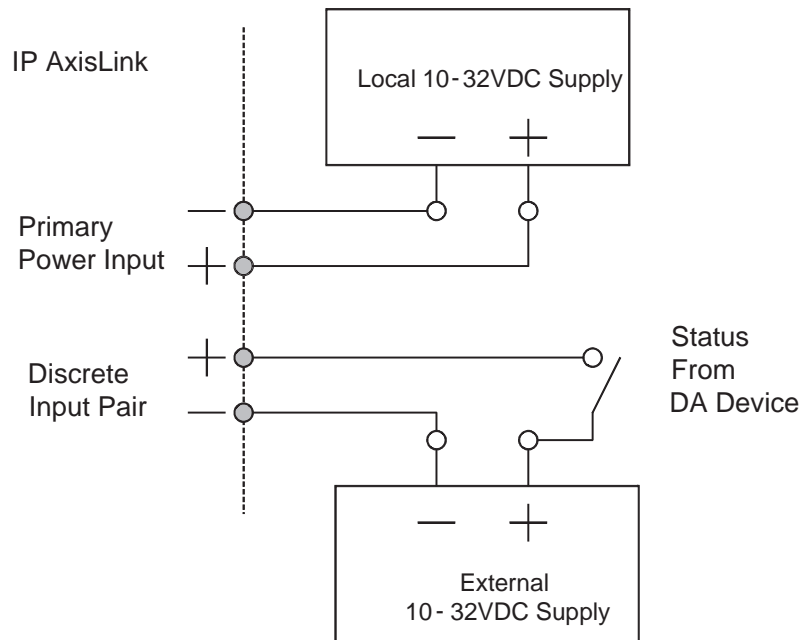


Figure 6. External wetting voltage

For the case of an external isolated supply, its ground would not be tied to the ground of the IP AxisLink router.

Two 4-position terminal blocks are provided for insertion into the discrete input port. These contain screw-fastened contacts that can accommodate 16- to 24-gauge wire.

RF LAN port

An RF LAN antenna must be selected and mounted for IP AxisLink devices with gatekeeper modules. The LAN remote antenna should be mounted in the clear, as free from conductive or metallic obstructions as possible. The connectors should be sealed for waterproofing. Elster Solutions supports the following antenna options:

- Local external antennas: Laird/Antenex TRA9023P (3.1 dBi) for use only with metal enclosure types; Laird/Antenex TRA9023NP (3.1 dBi) for use only with non-metal enclosure types¹
- Remote external antennas: PCTEL/MAXRAD P/N MFB9150² (2.15 dBi); PCTEL/MAXRAD P/N MFB 9153 (5.15 dBi)

Local external antenna

If the IP AxisLink router is used in a metal utility cabinet, using a local external antenna is necessary. To obtain better coverage, the local external antenna can be mounted on the top of the metal service cabinet. Elster recommends the Laird/Antenex 902 MHz to 928 MHz permanent mount antenna (TRA9023P). To mount the antenna on the service cabinet enclosure, drill a 5/8-inch hole into the cabinet wall with a step drill. Insert the antenna through the hole. Be sure to remove all metal shavings from the enclosure after drilling. After the antenna is mounted, the antenna can be connected to the AxisLink by using the proper length of RG316 cable (Type N male to SMA male jumper).

For installations where the mounting of the local antenna does not provide a conductive metallic ground plane, the Antenex TRA9023NP (no ground plane required) may be employed. The gain and pattern are virtually identical with the TRA9023P version. The TRA9023NP antenna may also be employed on metallic ground planes with good results.

¹ These part numbers specify antennas with a white body. For antennas with a black body, use part numbers TRAB9023P and TRAB9023NP, respectively. The version with an "N" does not require mounting on a conductive ground plane and should only be used in non-metal cabinets. The version without an "N" requires a conductive ground plane underneath the antenna and should only be used in metal enclosures.

² This part number specifies an antenna with a black body. For antenna with a white body, use part number MFA9150.

Remote external antenna

If the IP AxisLink router is used in a metal building, or if the IP AxisLink router is installed in a location where the site requires an antenna at a greater height, a remote antenna may be used. If a remote external antenna is used, a lightning/surge arrester should be installed at the bottom of the utility enclosure. Elster recommends a PolyPhaser DSXL IN-LINE EMP surge filter (Tessco P/N 491574).

The most economical connection to the remote external antenna is the RG-8/U "foam" or "LMR-400" type cable. This type of cable is suitable for distances of up to 100 feet. The foam dielectric cable will incur a loss of approximately 3.9 dB in 100 feet (or approximately 2 dB in 50 feet). The coaxial cable should be mounted at the bottom of the utility enclosure in "drip loop" fashion. A "drip loop" is formed by bringing the coaxial cable to a point below the enclosure and then bending it back up to the connector. This forms a U-shape, which allows water to run down the cable exterior. Antenna cables should be ordered with N-type male connectors on each end. Once inside the utility cabinet or building, connect the lightning/surge arrester to the IP AxisLink router using the appropriate length of RG316 cable with N-Type male connection on one end and SMA male on the other.

The IP AxisLink router with gatekeeper option has been certified for operation with the following remote external antennas. Both antennas are rated to withstand 100 mph winds and are fitted with Type N female connectors:

- PCTEL/MAXRAD MFB9150 Series (Tessco P/N 39493) for unity gain (2.15 dBi)
- PCTEL/MAXRAD MFB9153 Series (Tessco P/N 74330) for 3 dB gain (5.15 dBi)

Regardless of the antenna selected, the antenna should be mounted with at least two MMK1 pipe clamps (Tessco SKU 68869). The antenna should be mounted in the clear, as free from conductive or metallic obstructions as possible. The connectors should be sealed for waterproofing.

Contact your Elster Solutions representative if further assistance is needed.

NOTICE

Do not use a standard RG-8/U cable with solid polyethylene dielectric. The losses in solid dielectric RG-8/U cables in short distances make solid dielectric RG-8/U cables unacceptable.

NOTICE

For optimal performance of the LAN antenna, Elster recommends that the EA_Gatekeeper be installed so that the LAN antenna is at least 5 feet off the ground. Failure to meet the minimum ground clearance can result in degraded performance of the EA_Gatekeeper communications within the Energy Axis System.

RF cellular port

An external RF cellular antenna must be selected and mounted for IP AxisLink routers with W-WIC modules. The external cellular antenna should be mounted in the clear, as free from conductive or metallic obstructions as possible. The connectors should be sealed for waterproofing. Elster Solutions recommends choosing an antenna with the following constraints:

- 850 MHz band: The antenna system gain must not exceed 7.91 dBi gain.
- 1900 MHz PCS band: The antenna system gain must not exceed 7.01 dBi gain.

NOTICE

For optimal performance the cellular antenna should not be mounted adjacent to the LAN antenna. Failure to do so can result in degraded performance of the IP AxisLink communications within the Energy Axis System.

RS-232 port

 **CAUTION**

This device contains components that are sensitive to electrostatic discharge (ESD). When installing, servicing, or removing this device, connect to ground with a wrist strap and follow safe ESD procedures. Failure to properly ground both you and the electronic devices or to follow safe ESD procedures to avoid ESD can result in equipment damage.

This is an optically isolated RS-232 port. However, the RS-232 drivers/receivers are on the non-isolated side of the isolation barrier and connect directly to the connector. The dielectric isolation from input/output to ground is rated at 500 Vrms for 1 minute. Use a standard DB9 female connector to mate with this port. This port has signal assignments as follows:

Pin #	Signal
1	NC
2	Rx
3	Tx
4	NC
5	SGND
6	NC
7	RTS
8	CTS
9	NC

Ethernet WAN, Ethernet LAN

These ports are each isolated via a transformer for both receive and transmit signals. The dielectric isolation from input/output to ground is rated at 500 Vrms for 1 minute. These ports have signal assignments as follows:

Pin #	Signal
1	Tx+
2	Tx-
3	Rx+
4	NC
5	NC
6	Rx-
7	NC
8	NC

USB

This port is used for configuration and uses a standard USB Mini B connector.

Micro Status LEDs

LED 4 (top)	Unused
LED 3	Tunnel Connected
LED 2	PPP Connected
LED 1 (bottom)	Heartbeat

Ethernet Status LEDs

LED 4 (top)	WAN Activity
LED 3	WAN Link
LED 2	Edge Activity
LED 1 (bottom)	Edge Link

Power: 10 VDC to 32 VDC and 12 VDC

These 2 ports are the power supply inputs for the IP AxisLink router and are not isolated. The router will accept power from either of 2 sources:

- Primary power: 10 VDC to 32 VDC supply
This port does not provide dielectric isolation; therefore, the attending AC/DC power supply must provide ≥ 4000 VAC of isolation.
This port provides limited protection from surges or fast transients; therefore, a sufficient surge protection device (such as the DIN1P-20-250-1G-30-ELS made by Superior Electric) must be installed at the input of the AC/DC power or be integrated into the attending AC/DC power supply.
- Secondary Power: 10VDC to 14 VDC supply (intended to be a back-up battery)

The top 2 pins are for connecting to source 1, and the bottom 2 pins are for connecting source 2. Both supplies can be plugged in at the same time without damaging the router. When both supplies are present, the router will automatically switch to secondary power if primary power is lost.

Two 2-position terminal blocks are provided for insertion into the primary and secondary power ports. These contain screw-fastened contacts that can accommodate 16 gauge to 24 gauge wire.

Verifying proper operation

⚠ 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.

Following the application of power, the Micro Status LEDs will all come on for a few seconds then turn off with the exception of the heartbeat LED and PPP LEDs. The Heartbeat and PPP LEDs will remain on for several seconds. The PPP LED will then turn off, and the Heartbeat LED flashes at a once per second rate. This indicates the router has completed its initialization and is ready for use.

Removing the device from service

⚠ 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.

To remove the unit from service, simply turn off power to the IP AxisLink and remove the connected cables.

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.

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