

DET-783 Quick Installation Instructions

AMP1 Power and Energy Meter



Safety

FCC PART 15 INFORMATION NOTE: This equipment has been tested by the manufacturer 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 when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. This device complies with part 15 of the FCC Rules.

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.

Modifications to this product without the express authorization of the manufacturer nullify this statement.

A qualified person is one who has skills and knowledge related to the construction and operation of this electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved.

NEC2011 Article 100: No responsibility is assumed by manufacturer for any consequences arising out of the use of this material.

Provide a disconnect device to disconnect the meter from the supply source. Place this device in close proximity to the equipment and within easy reach of the operator, and mark it as the disconnecting device. The disconnecting device shall meet the relevant requirements of IEC 60947-1 and IEC 60947-3 and shall be suitable for the application. In the US and Canada, disconnecting fuse holders can be used. Provide overcurrent protection and disconnecting device for supply conductors with approved current limiting devices suitable for protecting the wiring. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

For Use in a Pollution Degree 2 or Better Environment only. A Pollution Degree 2 environment must control conductive pollution and the possibility of condensation or high humidity. Consideration must be given to the enclosure, the correct use of ventilation, thermal properties of the equipment and the relationship with the environment. Installation category: CAT II or CAT III.

	This symbol indicates an electrical shock hazard exists.
	Documentation must be consulted where this symbol is used on the product.

DANGER: Hazard of Electric Shock, Explosion or Arc Flash
Failure to follow these instructions will result in death or serious injury.

- Follow safe electrical work practices. See NFPA 70E in the USA, or applicable local codes.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Read, understand and follow the instructions before installing this product.
- Turn off all power supplying equipment before working on or inside the equipment.
- Use a properly rated voltage sensing device to confirm power is off. **DO NOT DEPEND ON THIS PRODUCT FOR VOLTAGE INDICATION**
- Only install this product on insulated conductors.

NOTICE:

- This product is not intended for life or safety applications.
- Do not install this product in hazardous or classified locations.
- The installer is responsible for conformance to all applicable codes
- Mount this product inside a suitable fire and electrical enclosure.

Specifications

Measurement Accuracy	
Real Power/Energy	IEC 62053-22 Class 0.5S, ANSI C12.20 0.5%
Input Voltage	
Measured AC	Minimum 90V L-N (156V L-L) for stated accuracy UL maximum = 600V L-L (347V L-N) CE maximum = 300V L-N (520V L-L)
Impedance	2.5 MΩ L-N / 5 MΩ L-L
Frequency	45 to 65 Hz
Input Current	
Measured Input Range	0 to 0.333VAC or 0 to 1.0VAC (+20% over-range)
Impedance	10.6 kΩ (1/3V mode) or 32.1 kΩ (1V mode)
Control Power	
AC	Maximum 5V; Minimum 90V UL maximum = 600V L-L (347V L-N) CE maximum = 300V L-N (520V L-L)
DC ¹	3W maximum; UL and CE = 125 to 300 VDC
Ride Through	100 msec @ 120VAC
Mechanical	
IP Degree of Protection (IEC 60529)	IP40 front displate; IP20 meter
Terminal Block Screw Torque	0.37 ft./lb. (0.5 N-m) nominal; 0.44 ft./lb. (0.6 N-m) maximum
Terminal Block Wire Size	24 to 14 AWG (0.2 to 2.1 mm ²)
Rail	T35 (35 mm) DIN Rail per EN50022
Environmental	
Operating Temp Range	-30° to 70°C (-22° to 158°F)
Storage Temp Range	-40° to 85°C (-40° to 185°F)
Humidity Range	<95% RH (non-condensing)
Altitude of Operation	3000m
Metering	
North America	CAT III; for distribution systems up to 347V L-N/600VAC
CE	CAT III; for distribution systems up to 300V L-N
Dielectric Withstand	Per UL 508; EN61010
Conducted and Radiated Emissions	FCC part 15 Class B; EN55011/EN61000 Class B (residential and light industrial)
Conducted and Radiated Immunity	EN61000 Class A (heavy industrial)
Compliance	
Agency Approvals	
US and Canada (cULus)	UL508 open type device / CSA 22.2 No. 14-05
Europe (CE)	EN61010-1:2001

¹ External DC current limiting is required, see fuse recommendations.

For troubleshooting or service related questions, contact GE at 1-800-GE-1-STOP (1-800-431-7867).

Save These Instructions

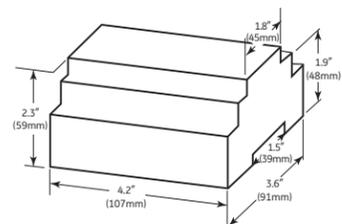
Product Identification

Description

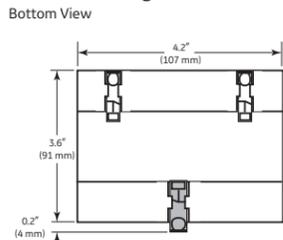
AMP1

- B1 = Pulse and alarm outputs only
- C2 = Modbus full data set, pulse and alarm outputs
- C3 = Modbus full data set, data logging, pulse and alarm outputs
- H5 = BACnet full data set, data logging, and two pulse inputs

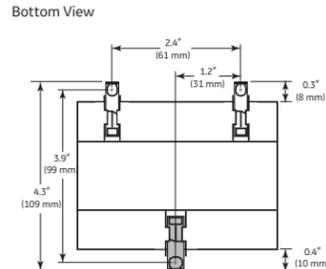
Dimensions



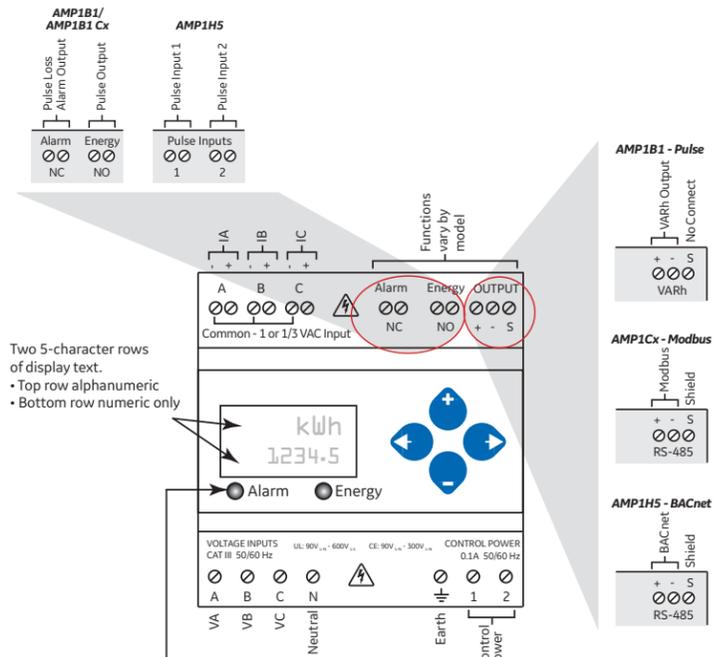
DIN Mount Configuration



Screw Mount Configuration



Product Diagram



Wiring Diagram Symbols

Symbol	Description
	Voltage Disconnect Switch
	Fuse (Installer is responsible for ensuring compliance with local requirements. No fuses are included with the meter.)
	Earth Ground
	Current Transducer
	Potential Transformer
	Protection containing a voltage disconnect switch with a fuse or disconnect circuit breaker. The protection device must be rated for the available short-circuit current at the connection point.

Wiring

WARNING: RISK OF ELECTRIC SHOCK OR PERMANENT EQUIPMENT DAMAGE
Failure to follow these instructions will result in death or serious injury.
 CT negative terminals are referenced to the meter's neutral and may be at elevated voltages.
 • Do not contact meter terminals while unit is connected.
 • Do not connect or short other circuits to the CT terminals.

CTs are NOT polarity sensitive. No need to observe orientation.

Figure 1. 1-phase, Line to Neutral, 2-wire system, 1 CT
 USE SYSTEM TYPE 10 (1L + 1n)

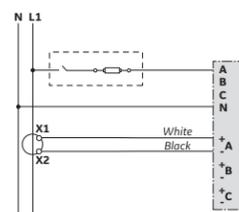


Figure 2. 1-phase, Line to Line, 2-wire system, 1 CT
 USE SYSTEM TYPE 11 (2L)

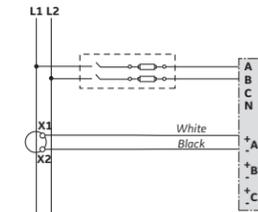


Figure 3. 1-phase, direct voltage, 2-wire system connection, 2 CT
 USE SYSTEM TYPE 12 (2L + 1n)

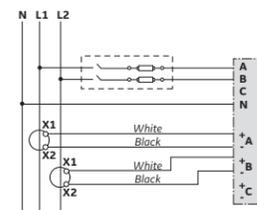


Figure 5. 3-phase, 4-wire, wye direct voltage input connection, 3 CT
 USE SYSTEM TYPE 40 (3L + 1n)

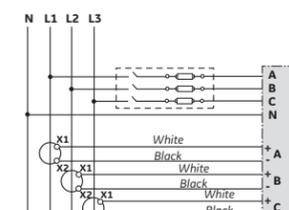


Figure 4. 3-phase, 3-wire system connection, CT no PT
 USE SYSTEM TYPE 31 (3L)

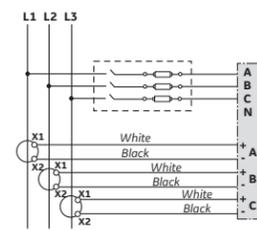
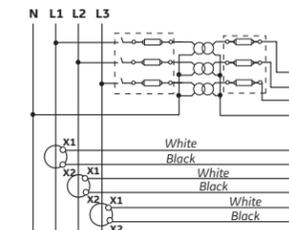
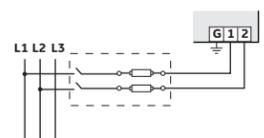


Figure 6. 3-phase, 4-wire, wye connection, 3 CT 3 PT
 USE SYSTEM TYPE 40 (3L + 1n)



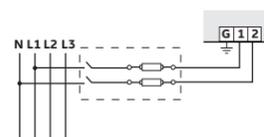
Control Power

Direct Connect Control Power, Line to Line



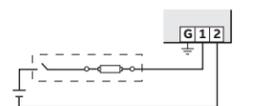
Line to Line from 90 VAC to 600 VAC (UL) (520 VAC for CE). In UL installations the lines may be floating (such as a delta). If any lines are tied to an earth (such as a corner grounded delta), see the Line to Neutral installation limits. In CE compliant installations, the lines must be neutral (earth) referenced at less than 300VAC-L-N.

Direct Connect Control Power, Line to Neutral



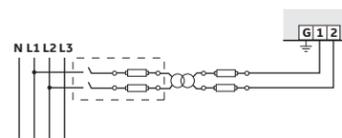
Line to Neutral from 90 VAC to 347 VAC (UL) or 300 VAC (CE).

Direct Connect Control Power (DC Control Power)



DC Control Power from 125 VDC to 300 VDC (UL and CE max.)

Control Power Transformer (CPT) Connection



The Control Power Transformer may be wired L-N or L-L. Output to meet meter input requirements.

Fuse Recommendations

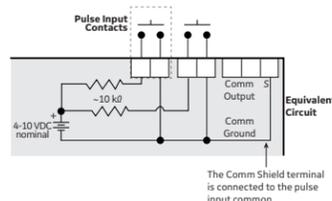
Keep the fuses close to the power source (obey local and national code requirements).

For selecting fuses and circuit breakers, use the following criteria:

- Select current interrupt capacity based on the installation category and fault current capability.
- Select over-current protection with a time delay.
- Use a voltage rating sufficient for the input voltage applied.
- Provide overcurrent protection and disconnecting means to protect the wiring. For DC installations, provide external circuit protection. Suggested: 0.5A, time delay fuses rated for DC operation at or above the supply voltage.
- Use the earth connection for electromagnetic compatibility (EMC), not a protective earth ground.

Pulse Contact Inputs (AMP1H5 Only)

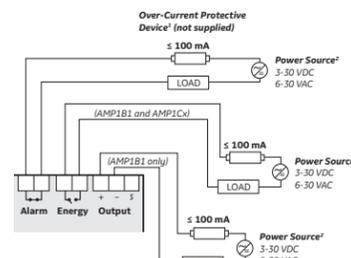
The AMP1H5 has two inputs with pulse accumulators for solid state or mechanical contacts in other sensors, such as water or gas flow meters. These inputs are isolated from the measured circuits and are referenced to the communication signal ground and the comm output shield terminal.



The Comm Shield terminal is connected to the pulse input common.

Solid State Pulse Outputs (AMP1B1, AMP1Cx Only)

The AMP1B1 and AMP1Cx have one normally open (N.O.) KY Form A output and one normally closed (N.C.) output. One is dedicated to energy (Wh), and the other to Alarm. The AMP1B1 also provides an additional N.O. KY reactive energy (VARh) contact. See the Setup section for configuration information.



¹ The over-current protective device must be rated for the short circuit current at the connection point.

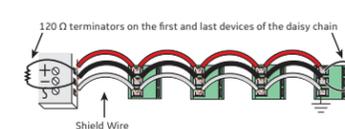
² All pulse outputs and communication circuits are only intended to be connected to non-hazardous voltage circuits (SELV or Class 2). Do not connect to hazardous voltages.

The solid state pulse outputs are rated for 30 VAC/DC nom.

Maximum load current is 100 mA at 25°C. Derate 0.56 mA per °C above 25°C (e.g. 86 mA@50°C).

RS-485 Communications (AMP1Cx and AMP1H5 Only)

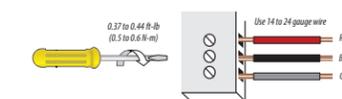
Daisy-chaining Devices to the Power Meter
The RS-485 slave port allows the power meter to be connected in a daisy chain with up to 63 2-wire devices. In this bulletin, communications link refers to a chain of devices that are connected by a communications cable.



NOTES:

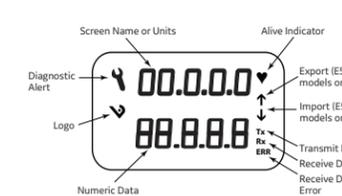
- The terminal's voltage and current ratings are compliant with the requirements of the EIA RS-485 communications standard.
- The RS-485 transceivers are ¼ unit load or less.
- RS-485+ has a 47 kΩ pull up to +5V, and RS-485- has a 47 kΩ pull down to Shield (RS-485 signal ground).
- Wire the RS-485 bus as a daisy chain from device to device, without any stubs. Use 120 Ω termination resistors at each end of the bus (not included).
- Shield is not internally connected to Earth Ground.
- Connect Shield to Earth Ground somewhere on the RS-485 bus (only at one point).

- For all terminals on AMP1 Series meters**
- When tightening terminals, apply the correct torque: 0.37-0.44 ft·lb (0.5-0.6 N·m).
 - Use 14-24 gauge (2.1-0.2 mm²) wire.

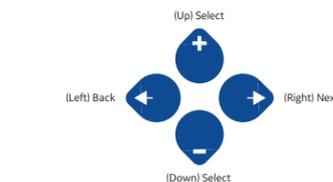


Display Screen Diagram

LCD Screen



Buttons



Initial Setup

Use this section to enter:

- Modbus or BACnet communication parameters
- CT (Current Transducer) output voltage and input current ranges
- The service type to be monitored

These instructions assume the meter is set to factory defaults. If it has been previously configured, all optional values should be checked. For more options (i.e., Potential Transformer ratios, etc.) and the full setup instructions, see the full installation guide for the specific model at www.geindustrial.com.

A. To navigate to the Setup screens

1. Press **+** or **-** repeatedly until **SETUP** screen appears.
2. Press **+** to get to the **PASWD** screen.
3. Press **+** to move through the digits. Use the **+** or **-** buttons to enter your password (the default is 00000).
4. Press **+** to move to the first Setup screen (**S CT** on AMP1B1, **S COM** on AMP1Cx, **S BAC** on AMP1H5)
5. Use **+** or **-** to select the parameter screen you want to set.
6. After you set the parameters you want, use **+** or **-** to select the next Setup screen or **+** to exit the Setup screens (return to **SETUP**).

B. To enter Modbus communication parameters (AMP1Cx models only)

1. Navigate to the **S COM** (set communications) Setup screen (see section A above).
2. Press **+** to go to the **ADDR** screen and through the address digits. Use **+** or **-** to select the Modbus address (default is 001).
3. Press **+** to accept the value and go to the **BAUD** screen. Use **+** or **-** to select the baud rate (default is 19200).
4. Press **+** to go to the **PAR** screen. Use **+** or **-** to select the parity (default is **NONE**).
5. Press **+** to go back to the **S COM** screen.

C. To enter BACnet communication parameters (AMP1H5 models only)

1. Navigate to the **S BAC** (set BACnet) Setup screen (see Section A on page 12).
2. Press **+** to go to the **MAC** screen and through the address digits. Use **+** or **-** to select the **BACnet MAC** address (default is 001).
3. Press **+** to accept the value and go to the **KBAUD** screen. Use **+** or **-** to select the baud rate (default is 76.8K).
4. Press **+** to go to the **ID1** screen and through the upper four digits of the Device Instance. Use **+** or **-** to select the ID digits (default is a pseudo-random number).
5. Press **+** to accept the value and go to the **ID2** screen and through the lower three digits of the Device Instance. Use **+** or **-** to select the ID digits (default is a pseudo-random number).
6. Press **+** to accept the value and go back to the **S BAC** screen.

D. To Enter the CT output voltage and input current ranges

1. Navigate to the **S CT** (Set Current Transducer) Setup screen (see Section A on page 12).
2. Press **+** to go to the **CT V** screen. Use **+** or **-** to select the voltage mode Current Transducer output voltage (default is 1.00).
3. Press **+** to go to the **CT SZ** screen and through the digits. Use **+** or **-** to select the CT size in amps (default is 100).
4. Press **+** to accept the value and go back to the **S CT** screen.

E. To Enter the service type to be monitored:

1. Navigate to the **S SYS** (Set System) Setup screen (see Section A on page 12).
2. Press **+** to go to the **SYSTM** screen. Use **+** or **-** to select the configuration (see wiring diagrams - default is 3L-1N).
3. Press **+** to go back to the **S SYS** screen.

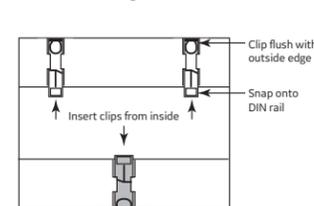
Installation

Disconnect power prior to installation.
Reinstall any covers that are displaced during the installation before powering the unit. Mount the meter in an appropriate electrical enclosure near equipment to be monitored. Do not install on the load side of a Variable Frequency Drive (VFD).

DIN Rail Mounting

1. Attach mounting clips to the underside of the housing by sliding them into the slots from the inside. The stopping pegs must face the housing, and the outside edge of the clip must be flush with the outside edge of the housing.
2. Snap the clips onto the DIN rail. See diagram of the underside of the meter. (Figure 7).
3. To prevent horizontal shifting across the DIN rail, use two end stop clips.

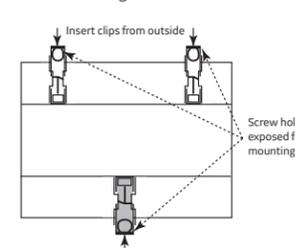
Figure 7.
DIN Rail Mounting



Screw Mounting

1. Attach the mounting clips to the underside of the housing by sliding them into the slots from the outside. The stopping pegs must face the housing, and the screw hole must be exposed on the outside of the housing.
2. Use three #8 screws (not supplied) to mount the meter to the back of the enclosure. See diagram of the underside of the meter. (Figure 8).

Figure 8.
Screw Mounting



Supported System Types

CAUTION: RISK OF EQUIPMENT DAMAGE

- This product is designed only for use with 1V or 0.33V current transducers (CTs).
- DO NOT USE CURRENT OUTPUT (e.g. 5A) CTs ON THIS PRODUCT.
- Failure to follow these instructions can result in overheating and permanent equipment damage.

The meter has a number of different possible system wiring configurations (see Wiring Diagrams, pages 7-8). To configure the meter, set the System Type via the User Interface, Modbus register 130 (AMP1Cx) or BACnet Analog Value Object AV2 (AMP1H5). The System Type tells the meter which of its current and voltage inputs are valid, which are to be ignored, and if neutral is connected. Setting the correct System Type prevents unwanted energy accumulation on unused inputs, selects the formula to calculate the Theoretical Maximum System Power, and determines which phase

loss algorithm is to be used. The phase loss algorithm is configured as a percent of the Line to Line system voltage (except when in System Type 10) and also calculates the expected Line to Neutral voltages for system types that have Neutral (12 & 40). Values that are not valid in a particular System Type will display as "----" on the User Interface or as QNAN in the Modbus registers or BACnet Analog Input objects.

To avoid distortion, use parallel wires for control power and voltag inputs.

Number of Wires	CTs		Voltage Connections		System Type	Phase Loss Measurements			Wiring Diagram Number		
	Qty	ID	Qty	ID		Type	Modbus Register 130 or BACnet Analog Value Object AV2	User Interface: SETUP>S SYS		VLL	VLN
Single-Phase Wiring											
2	1	A	2	A, N	L-N	10	1L + 1n		AN		1
2	1	A	2	A, B	L-L	11	2L	AB			2
3	2	A, B	3	A, B, N	L-L with N	12	2L + 1n	AB	AN, BN	AN-BN	3
Three-Phase Wiring											
3	3	A, B, C	3	A, B, C	Delta	31	3L	AB, BC, CA		AB-BC-CA	4
4	3	A, B, C	4	A, B, C, N	Grounded Wye	40	3L + 1n	AB, BC, CA	AN, BN, CN	AN-BN-CN & AB-BC-CA	5, 6

For troubleshooting or service related questions, contact GE at 1-800-GE-1-STOP (1-800-431-7867).

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Imagination at work

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