

Acuvim-L

Multifunction Power & Energy
Meter Datasheet

ACCUENERGY



DESCRIPTION

Designed for a wide range of standard metering projects, the Acuvim-L is a cost effective, multifunction power meter that combines value and high-performance with easy integration into panel or device monitoring applications. With multiple communication options including Modbus-RTU, PROFIBUS, Modbus-TCP/IP, and BACnet-IP through optional expansion modules and revenue grade accuracy, the Acuvim-L can be configured as either a panel-mount device, as a DIN rail mount transducer, or installed in a pre-configured, pre-wired AcuPanel for extreme protection in even the toughest application environments.



FEATURES

- + Revenue grade: ANSI C12.20 class 0.2 & IEC62053-22 class 0.2s
- + 4th CT input – measure neutral current
- + Dual Ethernet ports with both RSTP bridge daisy-chain mode and separately configurable network
- + Remote channel mapping and four channel multi-circuit metering
- + Dual source meter to monitor energy usage from separate energy sources
- + Data Logging available in 8MB onboard and 8GB with WEB2 module
- + Designed with industry leading cybersecurity
- + Available compatibility with multiple CT output options including 5A, RCT (Rogowski), or 333mV
- + Modbus-RTU & BACnet MS/TP ready. Optional modules add support for multiple industrial protocols & interfaces such as Modbus-TCP/IP, BACnet-IP, IEC61850, EtherNet/IP and WiFi

KEY FEATURES

Communication

- + Modbus RTU Protocol and BACnet MS/TP via RS485
- + Wi-Fi and Ethernet Communication Channels (Modbus TCP, BACnet IP, HTTP, SMTP, SNTP, HTTPs, Post, FTP)
- + PROFIBUS DP
- + Dual RJ45 ports with RSTP daisy-chain and two individually configurable Ethernet ports

Data Logging

- + Acuvim-L meters offer three, assignable historical logs and a real time clock to record metering parameters with accurate timestamping. Add the AXM-WEB2 module to expand the memory to 8GB with an adjustable log size.

Individual Channel Configuration

- + Acuvim-L meter can operate as a four channel multi-circuit meter and allow CT wiring configuration through remote channel mapping.

Time of Use

- + Users can assign up to four tariffs (sharp, peak, valley, & normal) to different time periods within a day. The Acuvim-L meter will calculate and accumulate energy to different tariffs according to the meter's internal clock and TOU settings.

Display

- + Clear, large character LCD with white backlight
- + Wide environmental temperature endurance
- + View load percentage, 4 quadrant powers, & load nature

Optional I/O Module

- + Expand Acuvim-L I/O functionality by connecting an optional I/O module. A maximum of three modules can be used per meter. Digital input, digital output, pulse output, relay output, analogue input, and analogue output I/O modules are available.

Alarms

- + Limits can be set for up to 16 indicated parameters with a specified time interval. Parameters that are over or under setting limit and persist longer than the specified time interval will be recorded and trigger the Alarm DO. Choose from 80 available parameters.

Flexible Current Transformer Options

- + The Acuvim-L is directly compatible with Rogowski coils plus a variety of other current transformer outputs including 5A, 1A, 333mV, and Rogowski coils. All CTs are available from Accuenergy.



APPLICATIONS

- + Power distribution automation
- + Medium and low voltage systems
- + Industrial automation
- + Energy management systems
- + Power quality analysis
- + Electric switch gear and control panels
- + Building automation
- + Marine applications

SPECIFICATIONS

Metering

| PARAMETERS | | ACCURACY | RESOLUTION | RANGE |
|-----------------------|-----------|--------------------------|------------|--------------------|
| Voltage | | 0.10% | 0.1V | 10V~1000kV |
| Current | | 0.10% | 0.1mA | 5mA~50000A |
| Power | | 0.20% (EL) or 0.50% (CL) | 1W | -9999MW~9999MW |
| Reactive Power | | 0.20% (EL) or 0.50% (CL) | 1var | -9999Mvar~9999Mvar |
| Apparent Power | | 0.20% (EL) or 0.50% (CL) | 1VA | 0~9999MVA |
| Power Demand | | 0.20% (EL) or 0.50% (CL) | 1W | -9999MW~9999MW |
| Reactive Power Demand | | 0.20% (EL) or 0.50% (CL) | 1var | -9999Mvar~9999Mvar |
| Apparent Power Demand | | 0.20% (EL) or 0.50% (CL) | 1VA | 0~9999MVA |
| Power Factor | | 0.10% | 0.001 | -1.000~1.000 |
| Frequency | | 0.00% | 0.001Hz | 45.00~65.00Hz |
| Energy | Primary | 0.20% (EL) or 0.50% (CL) | 0.1kWh | 0-99999999.9kWh |
| | Secondary | 0.20% (EL) or 0.50% (CL) | 0.001kWh | 0-999999.999kWh |
| Reactive Energy | Primary | 0.20% (EL) or 0.50% (CL) | 0.1kvarh | 0-99999999.9kvarh |
| | Secondary | 0.20% (EL) or 0.50% (CL) | 0.001kvarh | 0-999999.999kvarh |
| Apparent Energy | Primary | 0.20% (EL) or 0.50% (CL) | 0.1kVAh | 0-99999999.9kVAh |
| | Secondary | 0.20% (EL) or 0.50% (CL) | 0.001kVAh | 0-999999.999kVAh |
| Harmonics | | 1.00% | 0.1% | |
| Phase Angle | | 2.00% | 0.1° | 0.0°~359.9° |
| Unbalance Factor | | 2.00% | 0.1% | 0.0%~100.0% |
| Running Time | | 0.01h | 0.01h | 0~9999999.99h |

Input

CURRENT INPUTS (EACH CHANNEL)

| | |
|-------------------------|---|
| Nominal Current Options | ① 5A, ② 1A, ③ 1A (333mV) ④ 1A (100mV Rope CT) |
| Metering Range | ① 0-10A, ② 0-2A, ③ 0-1.2A, ④ 0-1.2A |
| Pickup Current | ① 5mA, ② 1mA, ③ 5mA, ④ 5mA |
| Withstand | 20Arms Continuous, 0.1% of Nominal 100Arms for 1 second, Non-Recurring |
| Burden | 0.05VA (Typical) @ 5A RMS |
| Accuracy | 0.1% at Reading |

VOLTAGE INPUTS (EACH CHANNEL)

| | |
|--------------------|---|
| Nominal Full Scale | 400Vac L-N, 690Vac L-L (+20%) |
| Withstand | 1500Vac Continuous 2500Vac, 50/60Hz for 1 Minute |
| Input Impedance | 2MΩ per Phase |
| Metering Frequency | 45Hz~65Hz, 300Hz~500Hz |
| Pickup Voltage | 10Vac |
| Accuracy | 0.1% at Reading |

ENERGY ACCURACY

| | |
|----------|--|
| Active | Class 0.2s for Acuvim-EL and Class 0.5s for Acuvim-CL (IEC 62053-22) Class 0.2 for Acuvim-EL and Class 0.5s for Acuvim-CL (ANSI C12.20) |
| Reactive | Class 0.5 (IEC62053-24) |

HARMONIC RESOLUTION

| | |
|---------------|--|
| Metered Value | 2 nd to 63 rd Harmonic (50Hz or 60Hz type) for Acuvim-EL 2 nd to 31 st Harmonic (50Hz or 60Hz type) for Acuvim-CL |
|---------------|--|

Communications

| | |
|---|---|
| Modbus-RTU or BACnet MS/TP | Modbus-RTU 2-Wire Shielded Twisted Pair Cable Connection 1200~115200 bps |
| SECOND RS-485 PORT (OPTIONAL MODULE) | Same as the primary RS485 port Baud Rate: 4800~38400 bps |
| ETHERNET (OPTIONAL MODULE) | Ethernet 10M/100M BaseT MODBUS-TCP/IP DNP 3.0 Over IP IEC 61850 2nd Edition SNMP V3 BACnet-IP HTTP/HTTPs Webserver HTTP/HTTPs, FTP data post SMTP MQTT NTP |
| PROFIBUS (OPTIONAL MODULE) | PROFIBUS-DP/V0 Protocol Work as PROFIBUS Slave, Baud Rate Adap- tive, up to 12M Model 1: Input Bytes: 32, Output Bytes: 32 Model 2: Input Bytes: 64, Output Bytes: 2 PROFIBUS Standard According to EN 50170 Vol. 2 |

SPECIFICATIONS

I/O Options

DIGITAL INPUT

| | |
|-----------------------|---|
| Input Type | Dry |
| Input Resistance | 100k Ω |
| Input Voltage Range | 20~160 Vac/dc |
| Input Current (Max) | 2mA |
| Start Voltage | 15V |
| Stop Voltage | 5V |
| Pulse Frequency (Max) | 100Hz, 50% Duty Ratio (5ms ON and 5ms OFF) |
| SOE Resolution | 2ms |

DIGITAL OUTPUT (DO) (PHOTO-MOS)

| | |
|-------------------|---|
| Voltage Range | 0~250Vac/dc |
| Load Current | 100mA (Max) |
| Output Frequency | 25Hz, 50% Duty Ratio (20ms ON, 20ms OFF) |
| Isolation Voltage | 2500Vac |

RELAY OUTPUT (RO) (NO, Form A)

| | |
|-------------------------|---------------------|
| Switching Voltage (Max) | 250Vac, 30Vdc |
| Load Current | 5A(R), 2A(L) |
| Set Time | 10ms (Max) |
| Contact Resistance | 30m Ω (Max) |
| Isolation Voltage | 2500Vac |
| Mechanical Life | 1.5x10 ⁷ |

ANALOGUE OUTPUT (AO)

| | |
|----------------------|--|
| Output Range | 0~5V, 0~20mA 1~5V, 4~20mA Optional |
| Accuracy | 0.50% |
| Temperature Drift | 50ppm/ $^{\circ}$ C Typical |
| Isolation Voltage | 500Vdc |
| Open Circuit Voltage | 15V |

ANALOGUE INPUT (AI)

| | |
|-------------------|--|
| Input Range | 0~5V, 0~20mA 1~5V, 4~20mA Optional |
| Accuracy | 0.20% |
| Temperature Drift | 50ppm/ $^{\circ}$ C Typical |
| Isolation Voltage | 500Vdc |

POWER SUPPLY FOR DI (24 VDC)

| | |
|----------------|-------|
| Output Voltage | 24Vdc |
| Output Current | 42mA |
| Load (Max) | 21DIs |

Control Power

| | |
|-----------|----------|
| Universal | AC or DC |
|-----------|----------|

AC/DC CONTROL POWER

| | |
|-----------------|--|
| Operating Range | 100~415Vac, 50/60Hz; 100~300Vdc |
| Burden | 5W |
| Frequency | 50/60Hz |
| Withstand | 3250Vac, 50/60Hz for 1 minute |
| | Installation Category III (Distribution) |

LOW VOLTAGE DC CONTROL POWER (OPTIONAL)

| | |
|-----------------|----------|
| Operating Range | 20~60Vdc |
| Burden | 5W |

Operating Environment

| | |
|-----------------------|---|
| Operating Temperature | -25 $^{\circ}$ C to 70 $^{\circ}$ C -13 $^{\circ}$ F to 158 $^{\circ}$ F |
| Storage Temperature | -40 $^{\circ}$ C to 85 $^{\circ}$ C -40 $^{\circ}$ F to 176 $^{\circ}$ F |
| Relative Humidity | 5% to 95% Non-Condensing |

Standard Compliance & Certifications





| | |
|------------------------|--|
| Measurement Standard | IEC 62053-22; ANSI C12.20; IEC61557-12 |
| Environmental Standard | IEC 60068-2, CE, RoHS |
| Safety Standard | IEC 61010-1, UL 61010-1 |
| EMC Standard | IEC 61000-4/-2-3-4-5-6-8-11, CISPR 22, IEC 61000-3-2, IEC 61000-6-2/4 |
| Outlines Standard | DIN 43700, ANSI C39.1 |
| Protocol Conformance | IEC 61850 2nd Edition |

FUNCTION LIST




| | REAL TIME METERING | Parameters | Acuvim-CL | Acuvim-EL |
|----------------------------|---|---|-------------|-------------|
| Metering | Phase Voltage | V1, V2, V3, Vlnavg | ● | ● |
| | Line Voltage | V12, V23, V31, Vllavg | ● | ● |
| | Current | I1, I2, I3, I4, In, Iavg | ● | ● |
| | Power | P1, P2, P3, Psum | ● | ● |
| | Reactive Power | Q1, Q2, Q3, Qsum | ● | ● |
| | Apparent Power | S1, S2, S3, Ssum | ● | ● |
| | Power Factor | PF1, PF2, PF3, PF | ● | ● |
| | Frequency | F | ● | ● |
| | Load Features | Load Features | ● | ● |
| | Four Quadrant Powers | Four Quadrant Powers | ● | ● |
| ENERGY & DEMAND | | | | |
| | Energy | Ep_imp, Ep_exp, Ep_total, Ep_net, Epa_imp, Epa_exp, Epb_imp, Epb_exp, Epc_imp, Epc_exp | ● | ● |
| | Reactive Energy | Eq_imp, Eq_exp, Eq_total, Eq_net, Eq_a_imp, Eq_a_exp, Eqb_imp, Eqb_exp, Eqc_imp, Eqc_exp | ● | ● |
| | Apparent Energy | Es, Esa, Esb, Esc | ● | ● |
| | Demand | Dmd_P, Dmd_Q, Dmd_S, Dmd_I1, Dmd_I2, Dmd_I3 | ● | ● |
| TIME OF USE | | | | |
| TOU | Energy/max demand | TOU, 4 Tariffs, 12 Seasons, 14 Schedules | ● | ● |
| | DAYLIGHT SAVINGTIME | | | |
| | Two Adjustable Formats | Month/Day/Hour/Minute, Month/Week/First few Weeks/Hour/Minute | ● | ● |
| POWER QUALITY | | | | |
| Monitoring | Voltage Unbalance Factor | U_unbl | ● | ● |
| | Current Unbalance Factor | I_unbl | ● | ● |
| | Voltage THD | THD_V1, THD_V2, THD_V3, THD_Vavg | ● | ● |
| | Current THD | THD_I1, THD_I2, THD_I, THD_Iavg | ● | ● |
| | Individual Harmonics | Harmonics | 2nd to 31st | 2nd to 63rd |
| | Voltage Crest Factor | TIF THFF | ● | ● |
| | Current K factor | K Factor | ● | ● |
| STATISTICS | | | | |
| | MAX with Time Stamp | Each phase of V & I; Total of P, Q, S, PF & F; Demand of I1, I2, I3, P, Q&S; | ● | ● |
| | MIN with Time Stamp | Each phase THD of V & I; Unbalance factor of V & I | | |
| ALARM | | | | |
| | Over/Under Limit Alarm | V, I, P, Q, S, PF, V_THD & I_THD Each Phase and Total or Average; Unbalance Factor of V & I; Load Type; Analogue Input of Each Channel; Demand of I1, I2, I3, P, Q&S; Reverse phase sequence; DI1~DI28 | ● | ● |
| DATA LOGGING | | | | |
| Others | Data Logging 1 | F, V1/2/3/lnavg, V12/23/13/lavg, I1/2/3/n/avg, P1/2/3/sum, Q1/2/3/sum, S1/2/3/sum, PF1/2/3, PF, U_unbl, I_unbl, Load Type, Ep_imp, Ep_exp, Ep_total, Ep_net, Eq_imp, Eq_exp, Eq_total, Eq_net, Es, Epa_imp, Epa_exp, Epb_imp, Epb_exp, Epc_imp, Epc_exp, Eq_a_imp, Eq_a_exp, Eqb_imp, Eqb_exp, Eqc_imp, Eqc_exp, Esa, Esb, Esc, THD_V1/2/3/avg, THD_I1/2/3/avg, Harmonics 2nd to 63rd, Crest Factor, THFF, K Factor, Sequence and Phase Angles, DI Counter, AI, AO, Dmd P/Q/S, Dmd I1/2/3 | ● | ● |
| | Data Logging 2 | | | |
| | Data Logging 3 | | | |
| | | | | |
| ONBOARD MEMORY SIZE | | | | |
| | Memory | Standard Meter | 8MB | 8MB |
| | | AXM-WEB2 | 8GB | 8GB |
| COMMUNICATION | | | | |
| | RS485 Port, Half Duplex, Optical Isolated | Modbus-RTU and BACnet-MS/TP | ● | ● |
| TIME | | | | |
| | Real Time Clock | Year, Month, Date, Hour, Minute, Second | ● | ● |

COMMUNICATION MODULE COMPARISON

● Function; Blank NA

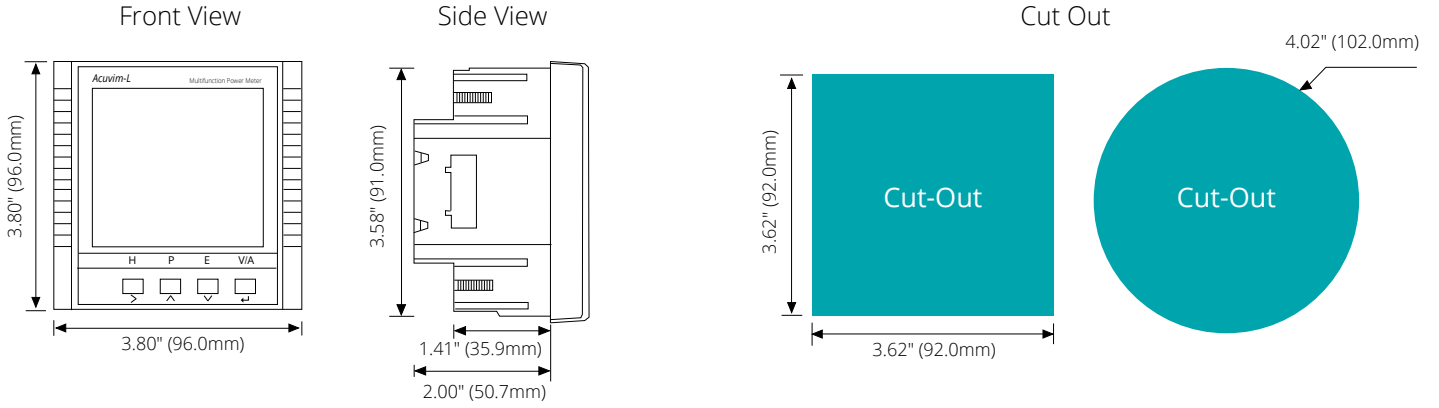
| | Standard | AXM WEB2 FOLC | AXM WEB2 | AXM PROFI | AXM RS485 |
|-----------------------|----------|---|---|---|---|
| | |  |  |  |  |
| Modbus-RTU | ● | | | | ● |
| BACnet-MS/TP | ● | | | | |
| DNP 3.0 Over IP | | ● | ● | | |
| IEC 61850 | | ● | ● | | |
| Modbus-TCP/IP | | ● | ● | | |
| HTTP/HTTPS Webservice | | ● | ● | | |
| SMTP Email | | ● | ● | | |
| SNMP V3 | | ● | ● | | |
| EtherNet/IP | | ● | ● | | |
| MQTT | | ● | ● | | |
| RSTP | | ● | ● | | |
| IPv6 | | ● | ● | | |
| HTTP/HTTPS Push | | ● | ● | | |
| FTP Post | | ● | ● | | |
| sFTP Server | | ● | ● | | |
| Datalogging | 8MB | 8GB | 8GB | | |
| BACnet-IP | | ● | ● | | |
| PROFIBUS | | | | ● | |
| WiFi | | ● | ● | | |
| RJ45 Ports | | 1 | 2 | | |
| Fiber Optics LC | | ● | | | |

DIGITAL/ANALOGUE I/O

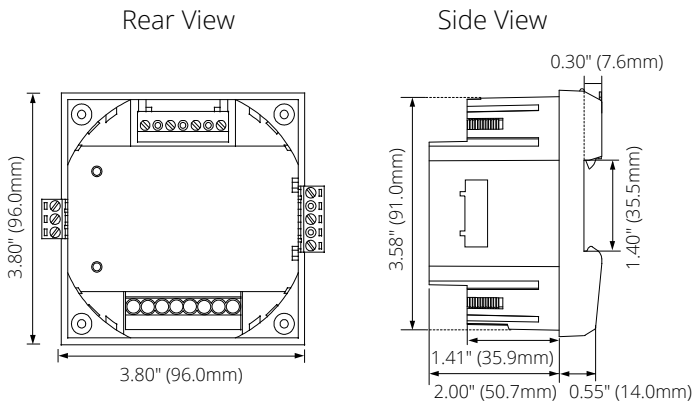
| | AXM-IO1 | AXM-IO2 | AXM-IO3 |
|------------------------------|---|--|---|
| |  |  |  |
| Digital Input (<i>Dry</i>) | 6 | 4 | 4 |
| Digital Output | - | 2 | - |
| Relay Output | 2 | - | 2 |
| Analogue Inputs | - | - | 2 |
| Analogue Outputs | - | 2 | - |
| Power Supply | 24Vdc | - | - |

DIMENSIONS

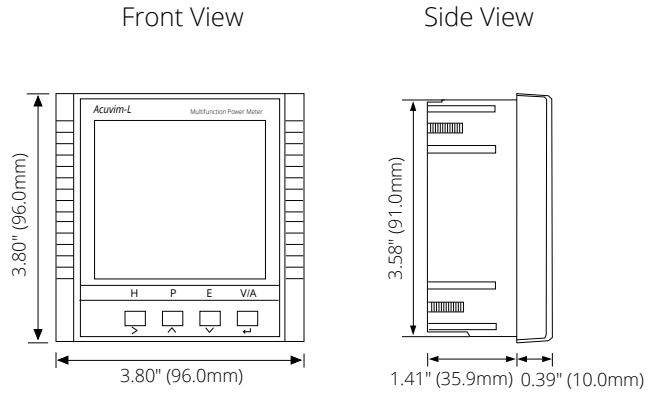
Acuvim-L Dimensions



DIN Mount Meter Dimensions

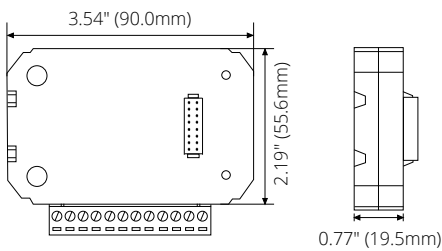


External Display Module Dimensions

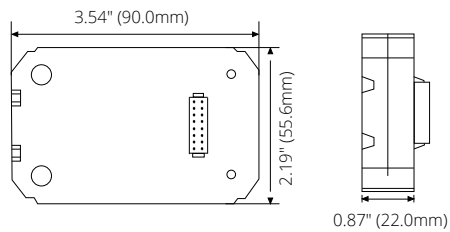


- Note:**
1. Display module is connected with a six foot 10 pin RJ45 cable, if you need a longer cable please specify that in the ordering statement.
 2. Display module opening size and Acuvim-L body openings are exactly the same size.

I/O Module Dimensions

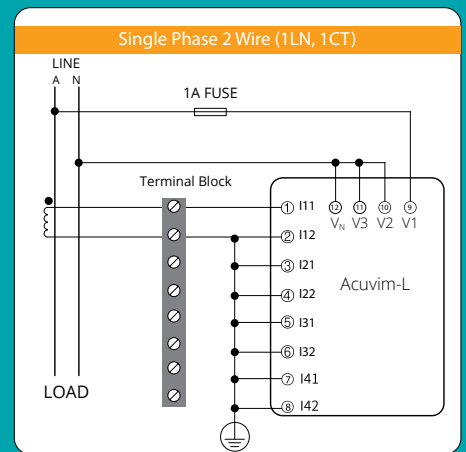
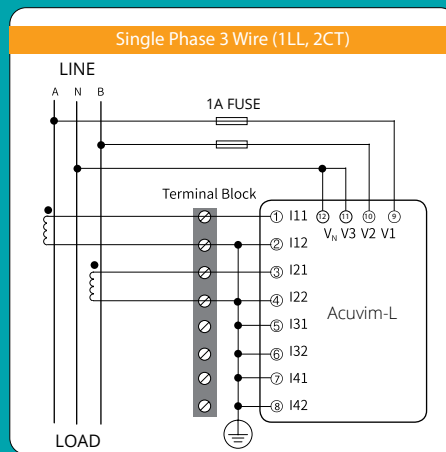
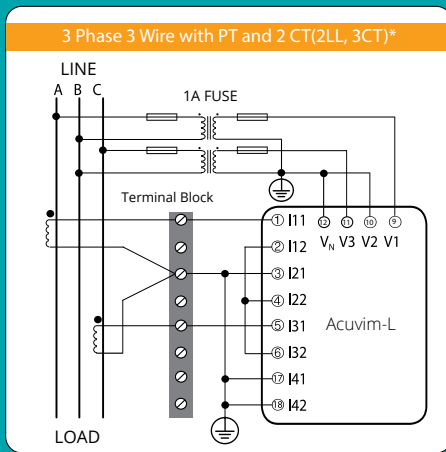
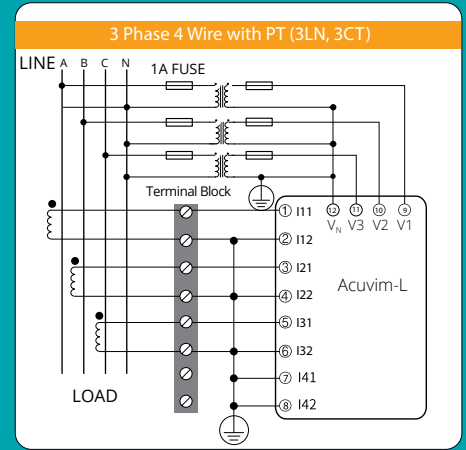
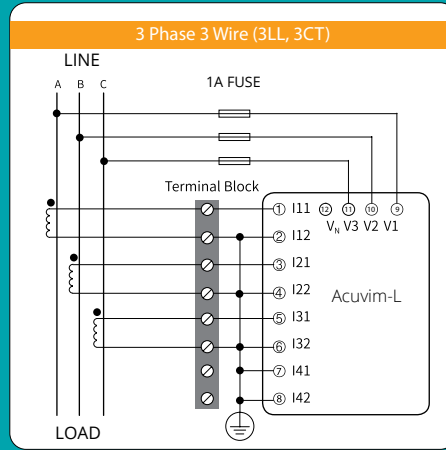
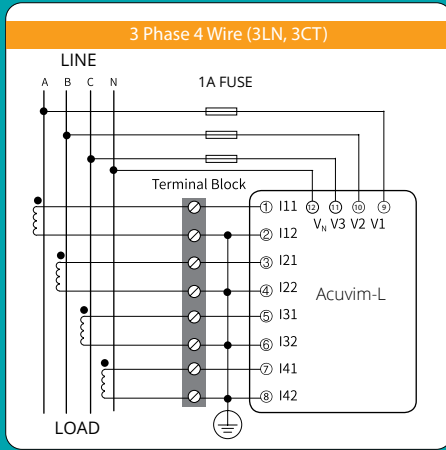


Communication Module Dimensions

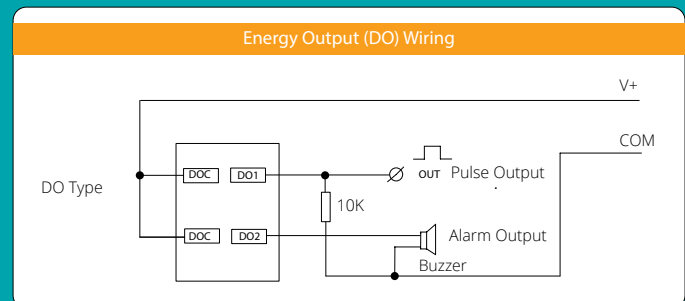
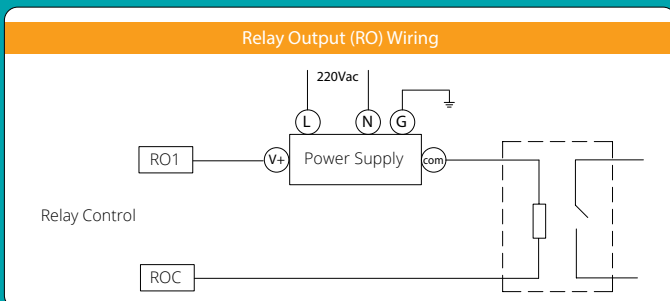
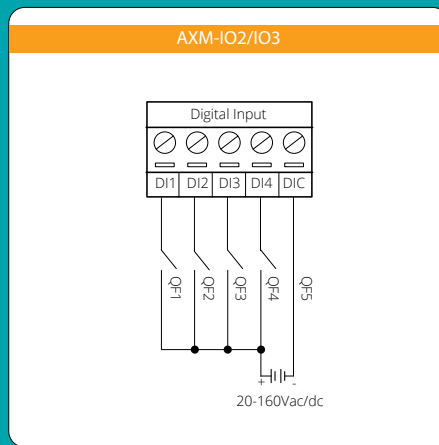
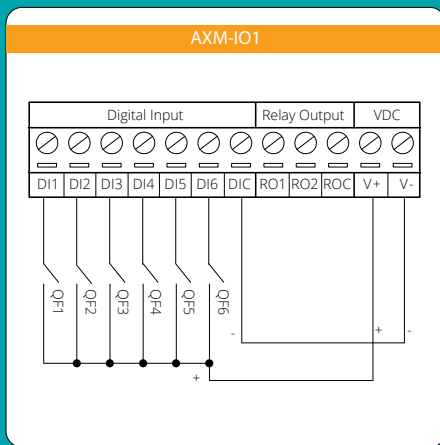


WIRING DIAGRAMS

Typical Wiring With 5A/1A CTs



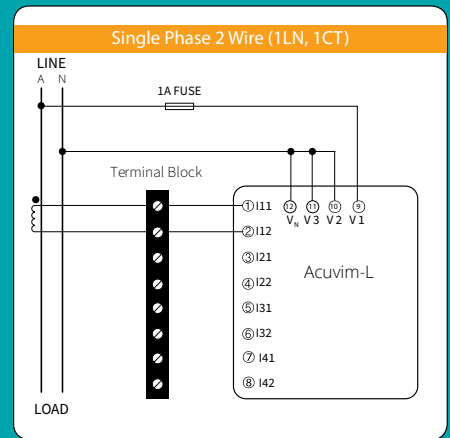
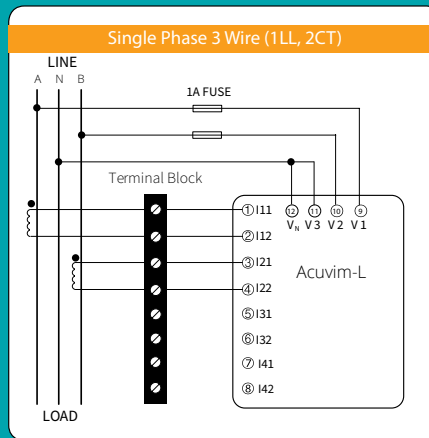
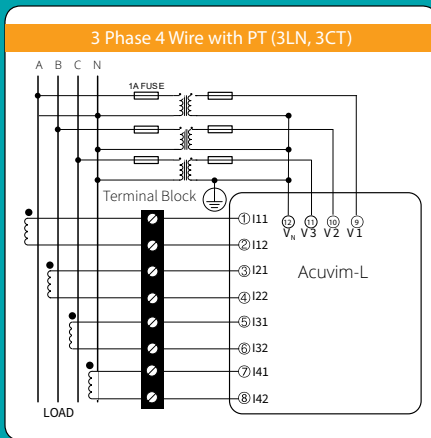
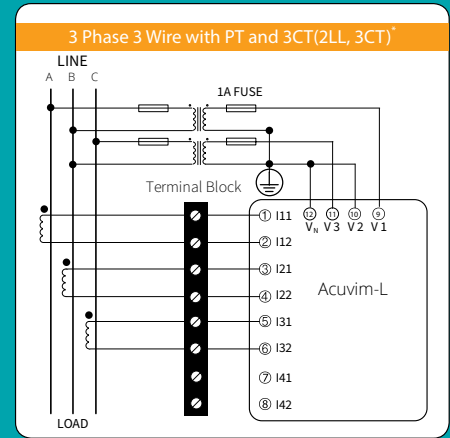
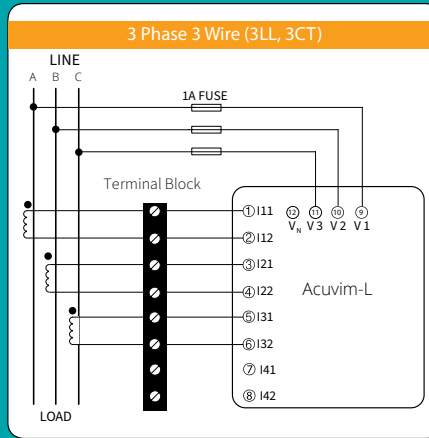
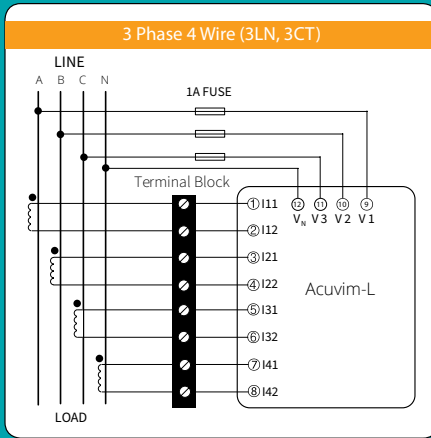
I/O Module Wiring



*Note: 2CT configuration is optional only in 3 Phase 3 Wire system

WIRING DIAGRAMS

Typical Wiring RCT/mV/ Current Input



*Note: 2CT configuration is optional only in 3 Phase 3 Wire system.

ACCESSORIES

DIN Rail Adapter

The AXM-DIN Rail Adapter is the easy way to mount the Acuvim-L Series energy meter on either horizontal or vertical DIN rail. The adapter quickly secures to the meter and is compatible with all AXM communication modules as well as I/O options.



Protective Display Cover

The Protective Display Cover is designed for Acuvim-L Series energy meters and other 96mm by 96mm display panel meters. Crucial in harsh environments, it increases the IP environmental rating of a meter's display to IP66 or NEMA 4X.



USB RS485 Converter

This plug-and-play USB to Serial RS485 Converter is designed to provide a convenient, reliable USB connection to the Acuvim-L Series power meters and other serial devices.



ORDERING INFORMATION

| Function Model | Mounting Option | Current Input | Power Supply |
|--|--------------------------------------|--|--|
| Acuvim-CL Energy class 0.5 Harmonics up to 31st | D: Panel Mounting with Display | 5A: Allow user to select 1A/5 | P1V4: 100~415Vac, 50/60Hz, 100~300Vdc |
| Acuvim-EL Energy class 0.2 Harmonics up to 63rd | M: DIN-Rail Mounting without Display | mV: Allow user to select 333mV/ RCT | P2V4: 20~60Vdc |
| Ordering Example: | Acuvim-CL-D-5A-P1V4 | | |

| Communication Module (Optional) | Protocols |
|---------------------------------|--|
| AXM | WEB2-FOLC: IEC 61850, Modbus-TCP, HTTP/HTTPS Webserver, SMTP Email, SNMP, HTTP/HTTPS Push, FTP Post, sFTP Server, BACnet-IP, Datalogging, WiFi, Fiber Optics LC WEB2: IEC 61850, Modbus-TCP, HTTP/HTTPS Webserver, SMTP Email, SNMP, HTTP/HTTPS Push, FTP Post, sFTP Server, BACnet-IP, Datalogging, WiFi PROFI: PROFIBUS RS485: Modbus-RTU |
| Ordering Example: | AXM-RS485 AXM-WEB2 |

| I/O Module (Optional) | Logic Module | Input/Output Type |
|-----------------------|--------------|-------------------|
| AXM-IO1 | 1 | |
| | 2 | |
| Ordering Example: | AXM-IO1-1 | |
| AXM-IO2 | 1 | A: 4~20mA |
| AXM-IO3 | 2 | B: 0~20mA |
| | | C: 1~5V |
| | | D: 0~5V |
| Ordering Example: | AXM-IO3-1B | |

| Accessories (Optional) | |
|--|---------|
| REM-DS1V4: Remote Display <i>(Only for Acuvim-L DIN-Rail Mount "M" option)</i> | |
| AXM-DIN: DIN Rail Adapter | |
| IP66/NEMA4X: Environmental Protection Cover | |
| USB-RS485: USB-to-RS485 Converter | |
| Ordering Example: | AXM-DIN |

- Note:
1. Refer to the Communication table and Digital/Analogue I/O table on page 6.
 2. A maximum of 3 modules may be attached to the meter. If a communication module is used (e.g. AXM-WEB2), it must be installed on the back FIRST before the other I/O modules are attached.
 3. No more than 2 of the same I/O modules may be attached to the meter (e.g. two AXM-IO2). The same two I/O modules must have a different logic number.



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