



STAND ALONE MERGING UNIT (AMU)

DATASHEET



(Panel mount configuration shown here)

MGU010000

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PRODUCT OVERVIEW

The VIZIMAX AMU is a **Stand-Alone Merging Unit (SAMU)** dedicated to merge analog AC current and voltage measurements into high accuracy digital messages published over the substation process bus in compliance with the IEC 61850-9-2LE or IEC61869-9 standard.

Data is published in the form of sampled values (SV) that comply with the light edition (LE) of the IEC 61850-9-2. The unit provides the capability of sampling and transmitting data according to the Protection portion of the standard or based on the Measurement portion of the standard.

The unit is also compatible with the new IEC 61869-9 standard and can publish two IEC data streams simultaneously, no matter the format.

Data can be directly used by bay controllers and/or protection relays that support these protocols.

The VIZIMAX AMU offers high accuracy time synchronization via PPS or IRIG-B000/B004 C37.118, IRIG-B000/B004 IEEE1344, NTP, PTP1588, local clock or via its internal built-in GPS receiver. In some configurations, VIZIMAX's AMU can act as synchronization source to adjacent equipment.

The AMU provides several communication ports, including Modbus (slave) protocol and specific control commands, offering remote access and a configurable parallel redundancy protocol (PRP).

In complement to the standard AMU product, VIZIMAX offers the **AMU-RTS** model (Stand-Alone Merging Unit for Real-Time Simulation) specially designed for hardware-in-the-loop **Real-Time Simulation** environment such as OPAL-RT's RT-LAB™ or Hypersim™, or RTDS Technologies' RTDS®. Please refer to the dedicated section for more details about AMU-RTS.

With its outstanding performances in measuring, computing and reporting time stamped data, VIZIMAX Stand Alone Merging Unit is a perfect solution for new digitalized substation or retrofit of legacy equipment.

BENEFITS

- **Well suited for new or refit of legacy installations** into an IEC 61850 compliant architecture, providing a second life to the switchyard equipment.
- **Easy integration** as the Vizimax AMU is a manufacturer-agnostic solution, compatible with any type of CT and PT configuration. Can be installed in a substation control room or integrated in an outdoor equipment junction box.
- **Reduced investment** due to the elimination of expensive copper cables replaced by economical Fiber optic or RJ45 copper Ethernet links.
- **Performs very well in stressed and disturbed power systems:** provides accurate and reliable measurements, allowing faster operation for control and protection systems.
- **Exceptional reporting rate** allows implementation of fast intelligent protection and control schemes.
- **Complies with:** IEC 61850-9-2LE, and IEC 61850 GOOSE messaging (publisher). Also complies with the new IEC 61869-9 standard (published 2016-04).
- **Ready to provide Time synchronization source** like PTP1588 Grandmaster clock, PPS signal or NTP server, to substation equipment.

FEATURES

- High precision, 20-bit accuracy on current inputs and 16-bit accuracy on voltage inputs.
- CT inputs support extended dynamic range (DR) up to 160 A (for 5A range).
- High precision internal clock base <100 ns supporting several synchronization techniques (PPS or IRIG-B, PTP1588, NTP, local clock).
- Time synchronization with an optional built-in GPS receiver also available.
- Can supply PPS output signal (acts as a local master clock) to other devices (depending of time synchronization configuration).
- Supports GOOSE messaging (publisher) for digital Inputs and signalization relay Outputs.
- Performs event detection and recording.
- 4 dry contacts relay outputs for alarm signalization.
- 10 opto-isolated digital inputs to monitor status, event or alarm conditions of equipment in the vicinity of the PTs and CTs.
- Rugged platform resistant to extreme temperatures from -40 °C to +85 °C.
- Local HMI and remote secured web-based configuration tool and operating interface.
- **AMU-RTS** model (Stand Alone Merging Unit for Real-Time Simulation) specially designed for hardware-in-the-loop **Real-Time Simulation** environment.

OPERATING ENVIRONMENT

The VIZIMAX AMU combines the acquisition of AC current and voltage measurements from conventional transformers (CTs and PTs) and converts these signals into digital time-synchronized sampled values.

Thanks to its rugged platform resistant to extreme temperatures (from -40 °C to +85 °C), the VIZIMAX AMU can be installed in a substation control room or integrated in an outdoor equipment junction box.

In its operating environment, the AMU device is connected to several components or systems:

- The DC power supply
- The AC measurement input connections (from CTs and PTs)
- The time synchronization inputs
- The communication links (Ethernet links, Ethernet service port and serial port).
- The status and alarm signals (signalization outputs and programmable digital inputs).

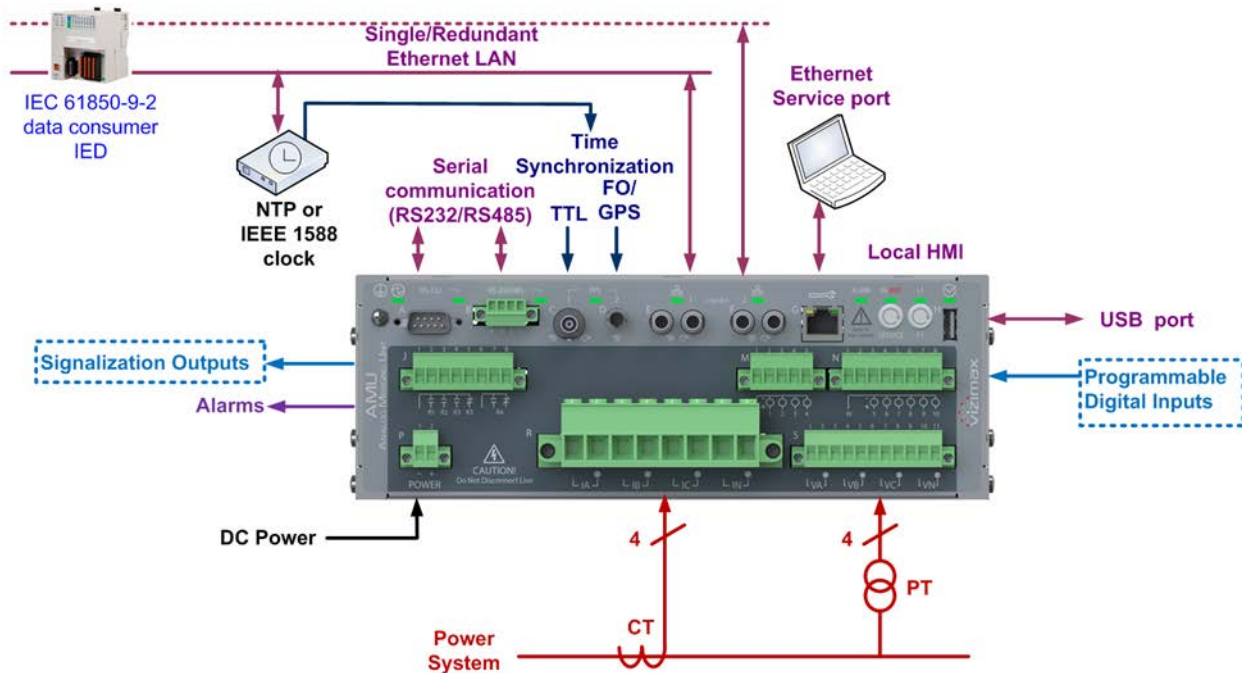


FIGURE 1 AMU IN ITS OPERATING ENVIRONMENT

The VIZIMAX AMU has a capability of publishing the signalization output states and the digital input states using 61850-GOOSE publisher protocol. This functionality allows fast data exchange with protection systems and automation platforms.

TIME SYNCHRONIZATION

The AMU's time synchronization can be achieved with:

- IEC 61588 (IEEE 1588) PTP compliant master clock: Ethernet port 1 and 2 include specific hardware for a full PTP1588 compatibility (multiple profiles incl. IEC61850-9-3).
- NTP Client & Server service enhanced with BNC-TTL or IR fiber PPS inputs
- IRIG-B un-modulated signal:
 - IRIG-B000/B004 C37.118
 - IRIG-B000/B004 IEEE1344
- IRIG-B signal received through either:
 - fiber optic – ST connector
 - copper – BNC²-TTL
- Optional internal GPS receiver available.

Any one of these approaches renders the required accuracy to transmit SVs (sampled Value) using the IEC 61869-9 or IEC 61850-9-2 LE protocol.

²The BNC connector can be programmed to act as an electrical output to provide a high quality PPS clock pulse to other IEDs or devices, if not used as an input.

Vizimax AMU can provide Time synchronization source like PTP1588 Grandmaster clock, PPS signal or NTP server, to substation equipment.

COMMUNICATION LINKS

The AMU provides 3 Ethernet ports:

- Port 1 and 2 can be configured for 61850-9-2 / 61869-9 communications, GOOSE publishing as well as time synchronization and secured access to a web interface and configuration tools:
 - Standard: copper Ethernet connections (100BASE-T) with RJ-45 connectors
 - Option: fiber-optic connections 100BASE-FX with ST type connectors
 - Option: fiber-optic connections 100BASE-LX with LC long range connectors
- Port 3 located on the AMU's back panel (or front panel in the 19" rack configuration) is used as a local service port or for remote maintenance (RJ-45 connector).

The AMU provides 2 serial ports:

- The RS232 port A.
- The RS485-RS232 configurable port B.

The AMU offers a user-friendly graphical web operating interface. Furthermore, the VIZIMAX Tool Suite for Microsoft Windows provides a rich environment for the remote configuration of the unit and data analysis.

DATA ACQUISITION RATES

The AMU publishes sampled values according to the multicast sampled values control block (MSVCB01 for protection portion of the standard) or (MSVCB02 for the measurement portion of the standard) as defined in the 9-2LE guide.

When targeting protection relays and bay controllers, sampling occurs 80 times per cycle (thus 4000 or 4800 times per second depending on nominal network frequency, i.e. 50 Hz or 60 Hz). When the measurement sampling is selected, the unit samples at a rate of 256 samples per cycle (12800 sample/s to 15360 sample/s) and transmits this information in blocks of 8 per the standard to minimize bandwidth usage.

The AMU also supports (MSVCB03 for protection portion of the standard) or (MSVCB04 for the measurement portion of the standard) as defined in the IEC 61869-9 standard. The advantage of this standard is to have a fixed number of sampled values per second whatever the network frequency.

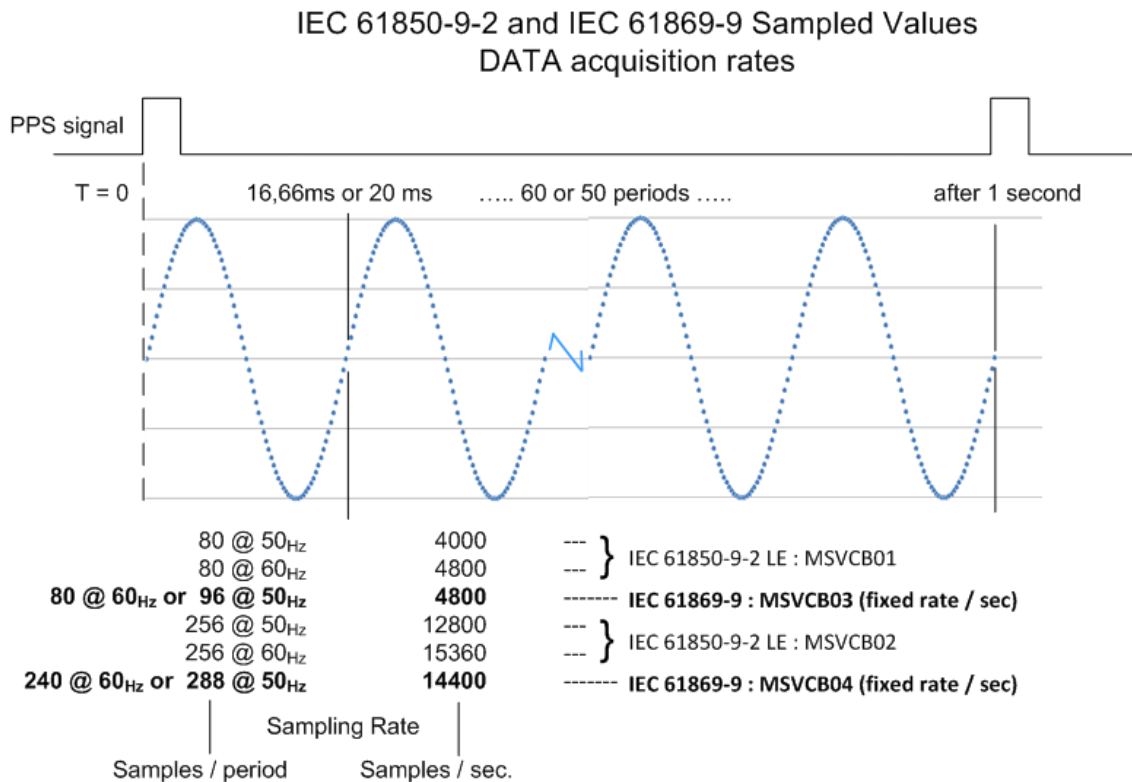


FIGURE 2 AMU DATA ACQUISITION RATES

Vizimax Stand Alone Merging Unit supports ALL these sampling rates and can publish two data streams simultaneously, no matter the format.

DATA REPORTING

Data published through IEC 61869-9 or IEC 61850-9-2 LE and 61850-GOOSE formats are time stamped with accuracy better than 1ms and can be used for real time applications as well as for offline analysis.

Digital signal states can be reported over the Modbus protocol.

The secured Web interface displays an extensive set of information as described in Figure 3 below.

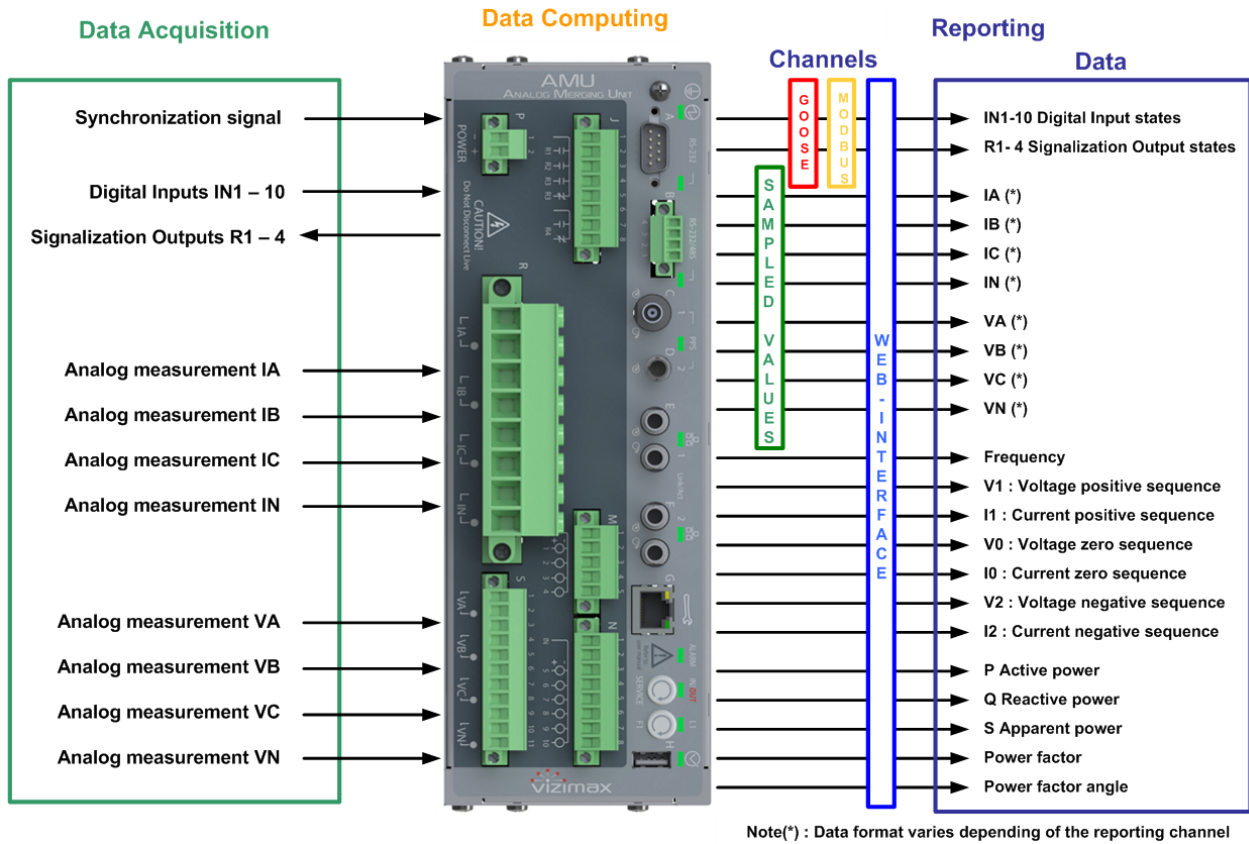


FIGURE 3 DATA ACQUISITION AND REPORTING-DISPLAY

TECHNICAL SPECIFICATIONS

COMPLIANCE AND CERTIFICATIONS



TYPE TESTS

| Type Tests | | Standard | Value |
|---------------------------------------|--------------------------|----------------------------|----------------------------|
| Temperature range | Operating temperature | IEC-68-2-1 IEC-68-2-2 | -40°C to +85°C (*see note) |
| | Storage temperature | | -50°C to +85°C |
| Maximum Relative humidity (R.H.) | | | 95% without condensation |
| IP rating | | | IP30 |
| Maximum altitude | | | 2000 m |
| Pollution degree | | | Level 2 |
| Mechanical resistance to vibrations | Performance | IEC 60255-21-1, 21-2, 21-3 | Class 2 |
| | Endurance | IEC 60255-21-1, 21-2, 21-3 | Class 1 |
| Dielectric withstand | AC inputs and I/Os | IEC 60255-5 | 2200 V ac, 1 s |
| | Communication | IEC 60255-5 | 1650 V ac, 1 s |
| Impulse voltage withstand | | IEC 60255-5 | 5 kV |
| Electrostatic discharge (ESD) | Air discharge | IEC 61000-4-2 | 15 kV |
| | Direct contact discharge | IEC 61000-4-2 | 8 kV |
| Surge Immunity test | | IEC 61000-4-5 | Level 4 |
| Damped oscillatory wave (1 MHz burst) | Common mode | IEC 60255-22-1 | 2.5 kV |
| | Differential mode | | 1.0 kV |
| Fast transients (bursts) | | IEC 60255-22-4 | Level 4 |

| Type Tests | Standard | Value |
|--------------------------------|---|--|
| RF immunity | IEC 61000-4-3 | 20 V/m, from 80 MHz to 1 GHz |
| | IEC 60255-26 | Spot frequency: 80 MHz to 2150 MHz |
| | ANSI/IEEE 1613 | 10 V/m, from 1.4 GHz to 2.7 GHz |
| | SN62. 1008-1 | 3 V/m, from 5.15 GHz to 5.75 GHz |
| Conducted disturbance immunity | IEC 61000-4-6 | 150 kHz to 80 MHz |
| RF emissions | CISPR 11, CISPR 22, FCC | Class A |
| Safety | IEC 61010-1, 3 rd edition ISO 14971: 2012 | Equipment for measurement, control, and laboratory use |

*See Temperature Test Performances below

TEMPERATURE TEST PERFORMANCES

| Type Tests | | Standard | Value |
|-------------------|---|-------------|--------------------------------|
| Temperature range | Operating temperature (UL applications) | IEC 61010-1 | -40 °C to +75 °C |
| | Temperature testing | Cold | IEC 68-2-1 |
| Dry heat | | IEC 68-2-2 | +85 °C (16 hours) |
| Damp heat cyclic | | IEC 68-2-30 | +55 °C at 95% R.H. (144 hours) |

POWER SUPPLY

POWER SUPPLY FOR STANDARD AMU MODEL

The power supply is set in factory according to the ordering option.

| Parameter | Value |
|-----------------------------|--|
| Power supply rating (48 V) | 36 V dc - 72 V dc |
| Power supply rating (125 V) | 90 V dc - 140 V dc |
| Power supply rating (220 V) | 180 V dc - 280 V dc |
| Rated power | 29 W max. (typical 18 W, 0.14 A @ 125 V dc) |
| Connector | Phoenix MSTB 5.08 mm |
| Isolation | 3000 V during 1 s |
| Fuse | Time delay, 2 x 2 A (not user serviceable) |
| Maximum Voltage interrupt | 100 ms @ 100% |

NOTE:This table is applicable to AMU standard model only.

CONTROL AND COMMUNICATION

CONTROLLER

| Parameter | Value |
|----------------------|---|
| Main processor | 32-bit, 800 MHz 4 cores A9 high performance ARM processor |
| OS | Linux |
| Memory | 512 MB Flash memory /128 MB RAM |
| Real time clock | Autonomy is 36 hours without power (no battery required) |
| I/O board controller | 32 bits, 168 MHz ARM processor with RTOS. 16 bit ADC. |

INTERNAL TIME BASE AND TIME SYNCHRONIZATION

| Parameter | Value |
|--|--|
| Base precision | Better than 100 nanosecond, after 15 minutes warm-up |
| Time for a drift of 1.0 μ s on external time base lost | Typical: \approx 1200 s Guaranteed: 400 s @ 25°C no movement, after 15 minutes warm-up |
| Ethernet – NTP (Client & Server) | RJ45, Fiber ST or Fiber LC Base precision \leq 1 millisecond |
| Ethernet - IEEE PTP 1588 | RJ45, Fiber ST or Fiber LC Base precision \leq 25 nanoseconds |
| IRIG-B un-modulated or PPS-in over fiber optic | ST type frequency range: 820-850 nanometers Base precision \leq 75 nanoseconds |
| IRIG-B un-modulated or PPS-in over BNC | Zin: 500 Ω /50 Ω selectable by software Level: 3.3 V dc to 5.0 V dc Base precision \leq 85 nanoseconds |
| PPS-out over BNC | Zout: 10 Ω Vout: 5.0 V dc, Iout max = 100 mA |
| Built-in GPS option (*) | GPS option replaces PPS fiber optic input with a SMA antenna connector. Base precision \leq 45 nanoseconds |

NOTE: (*) GPS antenna and accessories are not included in the Built-in GPS option.

LOCAL USER INTERFACE

| Parameter | Value | |
|--|--|------------|
| Two push buttons (back side and front side) | <ul style="list-style-type: none"> - In/Out of service - Test Mode | |
| Ten LED (back side) | Service, alarm (2x), communication activity (4x), system status (2x) and power | |
| Five LED (front side) | Service, alarm, system status (2x) and power | |
| USB port | Interface compatibility | 2.0 |
| | Maximum speed | 480 Mbit/s |
| | Connector type | Type A |
| | Voltage isolation level | N/A |

COMMUNICATION PORTS

| Port | Characteristic | Value |
|---------------------------------|----------------|---|
| Ethernet – LAN-1 | Interface | 10/100 Mbps |
| | Connector | RJ-45, ST or LC (for fiber connection) |
| | Isolation | 1500 VRMS |
| | Connector name | Port 1 |
| | Function | User communication link |
| Ethernet – LAN-2 | Interface | 10/100 Mbps |
| | Connector | RJ-45, ST or LC (for fiber connection) |
| | Isolation | 1500 VRMS |
| | Connector name | Port 2 |
| | Function | User communication link |
| Ethernet – Service (back) | Interface | 10/100 Mbps |
| | Connector | RJ-45 |
| | Isolation | 1500 VRMS |
| | Connector name | Port service–initial unit configuration and setup |
| | Function | Service port |
| RS-232 serial | Connector | DB-9 |
| | Bit rate | 115 Kbps |
| | Function | Console port, service operations |
| RS232 or RS-485 isolated serial | Connector | Phoenix type, 3.81 mm secured by screws |
| | Bit rate | 38.4 Kbps |
| | Mode | Two wire interface (A-B) with jumper selectable 120 Ω terminations. Reference wire (0V) provided for high-common-mode voltage capability |
| | Isolation | 2000 VRMS |
| | Function | (Reserved for internal use) |

ANALOG MEASUREMENT

ANALOG CURRENT MEASUREMENT INPUTS (CT FOR STANDARD AMU MODEL)

| Parameter | Value | |
|---|--|--|
| Number of inputs | 4 | |
| Name | IA, IB, IC and IN | |
| Connector type | Phoenix PC-6, 10.16mm, pluggable screw type AWG 7-18 (10.5 mm ² – 0.75 mm ²) | |
| Current | Rated current | 1 A or 5 A, manufacturing selectable |
| | Saturation current | 160 A @ 5 A range / 40 A @ 1 A range |
| | Maximum current | 500 A @ 1.0 s, 160 A @ 10.0 s, 42 A @ 100.0 s 20 A continuous |
| Measurement category | MEAS CAT IV | |
| Maximum Burden @ rated current | 0.01 VA @ 1 A 0.1 VA @ 5 A 4 VA @ 42 A | |
| Isolation | 3000 VRMS | |
| Measurement accuracy with 100% asymmetrical current | Typical: 98% Guaranteed: 95% | |
| Nominal frequency range | 40 Hz to 70 Hz | |
| Measurement bandwidth (-3 dB) | DC to 3 kHz | |
| Sampling frequency | 19200/s | |
| Conversion resolution | 20 bits | |
| CT angle compensation parameter | ±1.00 degree | |
| CT magnitude compensation factor | x0.01 to x1000 | |
| Hardware Accuracy 5 A or 1A range | Typical: ±0.03% @ 25 °C + (±6PPM/°C) ≤14 A (5A) or ≤3.5 A (1A) Guaranteed: ±0.1% @ 25 °C + (± 20PPM/ °C) ≤14 A (5A) or ≤3.5 A (1A) ±0.5 to 0.8% @ 25 °C + (± 125PPM/ °C) >14 A (5A) or >3.5 A (1A) after 15 minutes warm-up | |

NOTE: This table is applicable to AMU standard model only.

ANALOG VOLTAGE MEASUREMENT INPUTS (PT FOR STANDARD AMU MODEL)

| Parameter | Value |
|----------------------------------|---|
| Number of inputs | 4 |
| Name | VA, VB, VC and VN |
| Connector type | Phoenix MSTB 5.08 mm, pluggable screw type AWG 13-24 (2.5 mm ² – 0.2 mm ²) |
| Rated voltage | 57.7 V ac to 138.6 V ac (L-N) |
| Saturation Voltage | 220 V ac |
| Thermal capacity | 220 V ac @ continuous |
| Measurement category | MEAS CAT IV (0 – 150 V ac) MEAS CAT III (150 – 300 V ac) |
| Maximum Burden | 0.05 VA |
| Isolation | 3000 VRMS |
| Nominal frequency range | 40 Hz to 70 Hz |
| Measurement bandwidth (-3 dB) | DC to 3 kHz |
| Sampling frequency | 19200/s |
| Conversion resolution | 16 bits |
| PT angle compensation parameter | ±1.00 degree |
| PT magnitude compensation factor | x0.01 to x1000 |
| Hardware Accuracy | Typical: ±0.05% @ 25°C + (±10 PPM/°C) Guaranteed: ±0.1% @ 25 °C + (±15 PPM/°C) after 15 minutes warm-up and above 20 V ac |

NOTE: This table is applicable to AMU standard model only.

DIGITAL INPUTS / SIGNALIZATION OUTPUTS

DIGITAL INPUTS

The AMU offers 10 digital inputs split in 2 groups, one of 6 inputs with one common and a group of 4 with their own common.

| Parameter | Value |
|---|---|
| Name | IN 1 to 10 |
| Number of inputs | 10 (6+4) |
| Maximum input voltage (48V power supply) | 72 V dc, (detection threshold 28 V dc) |
| Maximum input voltage (125V power supply) | 140 V dc, (detection threshold 80 V dc) |
| Maximum input voltage (220V power supply) | 280 V dc, (detection threshold 150 V dc) |
| Isolation | Opto-coupler, 2000 VRMS |
| Measuring Category | MEAS CAT IV |
| Burden | 2 mA to 5 mA |
| Maximum Hardware Response Time | 0.10 ms at nominal voltage 1.00 ms at 80% of nominal voltage |
| Software Filter | Programmable, 1 ms increments up to 250ms. Advanced chatter filter |
| Connector | Phoenix MSTB 5.08mm, pluggable screw type. |

NOTE:This table is applicable to AMU standard model only.

SIGNALIZATION DIGITAL OUTPUTS

The AMU has 4 signaling dry contact (relays) outputs. These outputs allow the unit to send alarm conditions to other IEDs such as RTUs and annunciators.

| Parameter | Value |
|---------------------------|---|
| Number of outputs | R1 to R4 2x form A and 2x form C dry contact outputs (1 form C reserved for system health status) |
| Function | System health, synchronization, In/Out of service, alarm. |
| Type | Electromechanical relays |
| Maximum steady AC current | 3 A at 250 V ac |
| Maximum steady DC current | 0.3 A at 250 V dc |
| Contact ratings | 250 V ac, 300 V dc |
| Contact breaking capacity | 10 A at 250 V ac 8 A @ 30 V, 0.5 A @ 125 V, 0.3 A at 250 V dc |
| Isolation | 5000 VRMS (coil to contacts) |
| Over voltage category | OVC CAT III |
| Connector | Phoenix MSTB 5.08 mm, pluggable screw type |

DATA REPORTING

SAMPLED VALUE REPORTING

| Specifications | Value |
|-------------------------------------|---|
| 2x Ethernet connections | Copper or Fiber Optic (PRP supported) |
| 2x clients IP transport | TCP/UDP or UDP spontaneous |
| Digital Interface Message format | IEC 61850-9-2LE (MSVCB01 and MSVCB02) IEC 61869-9 (MSVCB03 and MSVCB04) Two data streams can be published <u>simultaneously</u> no matter the format. |
| Data published in MSVCB | Voltage: VA, VB, VC and VN Current: IA, IB, IC and IN (Sample Timestamp and Time quality implicitly included in MSVCB.) |

NOTE: Additional measured and computed data such as active, reactive and apparent power or symmetrical components (zero, positive and negative sequences) are displayed on the web interface.

DIGITAL INPUTS / SIGNALIZATION OUTPUTS REPORTING (61850-GOOSE PUBLISHER)

| Parameter | Value |
|--------------------------------|--|
| Communication links | Ethernet1 - Ethernet2 - Redundant1 |
| Message format | IEC61850-GOOSE |
| Publishing rate : | Configurable by software |
| Data published in GOOSE stream | Digital inputs (IN1 to IN10) Digital relay outputs (R1 to R4) (Timestamp and Time quality are implicitly attached with all input/output state change in GOOSE data frame). |

NOTE: The AMU .icd file defining the complete device capability following the IEC 61850 standard is provided in the documentation folder of the Vizimax Tool Suite.

MODBUS PROTOCOL (SLAVE)

Vizimax AMU unit integrates the MODBUS slave protocol over either:

- A serial link RS232-RS485 (Modbus-RTU)
- A TCP/IP link (Modbus-TCP).

| Parameter | Value |
|-----------------------|--|
| Modbus functions | 02: Read Input status : Discrete Inputs/Outputs 04: Read Input Registers: Analog Input Registers |
| Modbus-TCP | TCP/IP over Ethernet port 1 or 2 User port configurable 1 to 65535 (default port number: 502 as reserved in Modbus-TCP protocol). Up to 5 simultaneous connections |
| Modbus-RTU | Over RS232 or RS485 serial port B 300 to 115200 Baud rate Data Bits: 8, No Parity, 1 Stop bit. Slave address: 1 to 247 |
| Modbus Data Format | Value format: Integer or float Configurable 32-bits words ordering |
| Data Register Mapping | Refer to the mapping tables below. |

MODBUS MAPPING TABLE : REGISTER 10001 TO 19999 : DISCRETE INPUTS/OUTPUTS

| Register number | Data Address (Hex) | Value |
|-----------------|--------------------|----------------------------|
| 10001 | 0000 | State of Digital Input #1 |
| 10002 | 0001 | State of Digital Input #2 |
| 10003 | 0002 | State of Digital Input #3 |
| 10004 | 0003 | State of Digital Input #4 |
| 10005 | 0004 | State of Digital Input #5 |
| 10006 | 0005 | State of Digital Input #6 |
| 10007 | 0006 | State of Digital Input #7 |
| 10008 | 0007 | State of Digital Input #8 |
| 10009 | 0008 | State of Digital Input #9 |
| 10010 | 0009 | State of Digital Input #10 |
| ... | | reserved |
| 10017 to 10022 | 0010 to 0015 | reserved |
| ... | | reserved |
| 10033 | 0020 | State of Output Relay #1 |
| 10034 | 0021 | State of Output Relay #2 |
| 10035 | 0022 | State of Output Relay #3 |
| 10036 | 0023 | State of Output Relay #4 |
| ... | | reserved |
| 10049 | 0030 | Alarm Status #1, Time sync |
| ... | | reserved |
| 10064 | 003F | reserved |

MODBUS MAPPING TABLE : REGISTER 30001 TO 39999 : ANALOG INPUT REGISTERS

Time Values

| Register number | Data Address (Hex) | Value | Unit | Type |
|-----------------|--------------------|---|------|--------|
| 30001 | 0000 | SOC (Unix Time) | s | uint32 |
| 30003 | 0002 | Second Fraction and Time Quality (as 61850 TimeStamp) | - | uint32 |

Binary Values (16-bits words mapping of binary inputs/Outputs)

| Register number | Data Address (Hex) | Value | Type |
|-----------------|--------------------|----------------------|--------|
| 31001 | 03E8 | Contact Input States | uint16 |
| 31002 | 03E9 | reserved | uint16 |
| 31003 | 03EA | Relay Output States | uint16 |
| 31004 | 03EB | Alarms Status | uint16 |

MOUNTING CONFIGURATIONS

The VIZIMAX Stand Alone Merging Unit is available in 3 mounting configurations: standard (stand-alone), panel mount (with a 12" front panel) or a 19" rack mount.

TABLE 1 PHYSICAL DIMENSIONS

| Specifications | Value |
|----------------|--|
| Width | 257 mm/10.125 in for standard mount 305 mm/12 in for panel mount 483 mm/19 in for Rack mount |
| Height | 92 mm/3.6 in for standard mount 105 mm/4.1 in for panel mount 3U: 132.56 mm/5.219 in for Rack mount installation |
| Depth | 134 mm/5.25in |
| Weight | Standard mount 3.0 kg (6.6 lbs) Panel mount 3.3 kg (7.3 lbs) Rack mount 3.6 kg (8 lbs) |

STANDARD MOUNT (STANDALONE)

The AMU standard mount is a breeze to install. It can be mounted directly inside an equipment control enclosure (Indoor or outdoor). It also includes movable mounting brackets for multiple mounting positions (horizontal or vertical).



FIGURE 4 STANDARD CONFIGURATION (STANDALONE)

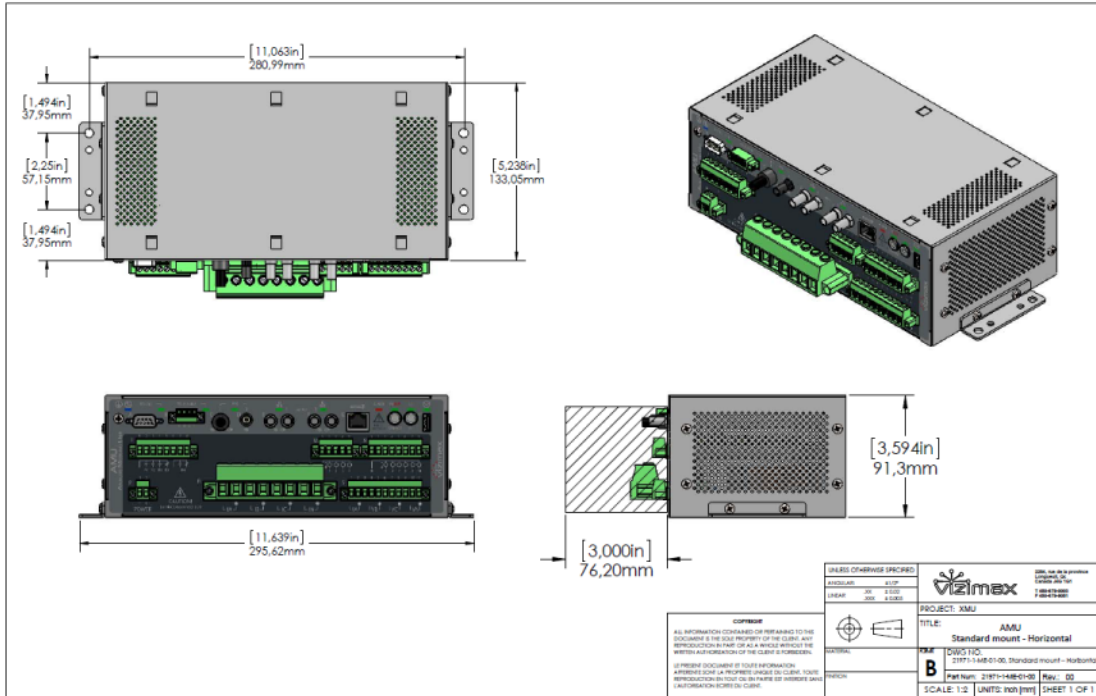


FIGURE 5 STANDARD CONFIGURATION — HORIZONTAL

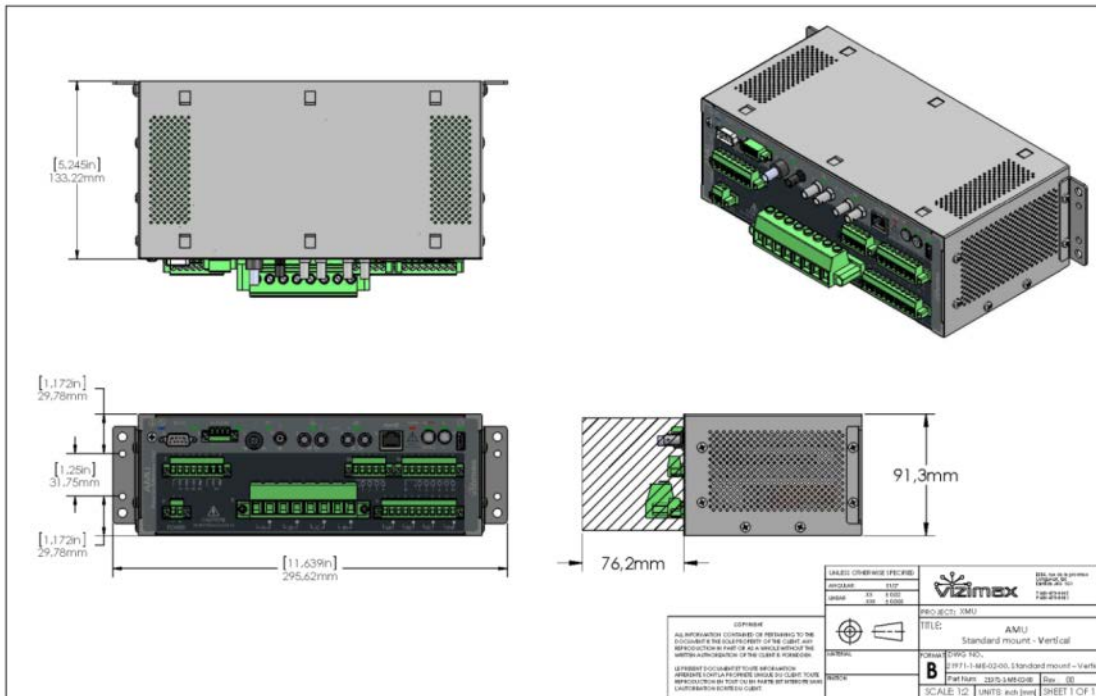


FIGURE 6 STANDARD CONFIGURATION — VERTICAL

PANEL MOUNT

The AMU panel mount is used for mounting the AMU on a metallic panel or swing door of an enclosure. It includes mounting specific brackets. The panel cut out is shown in Figure 9.

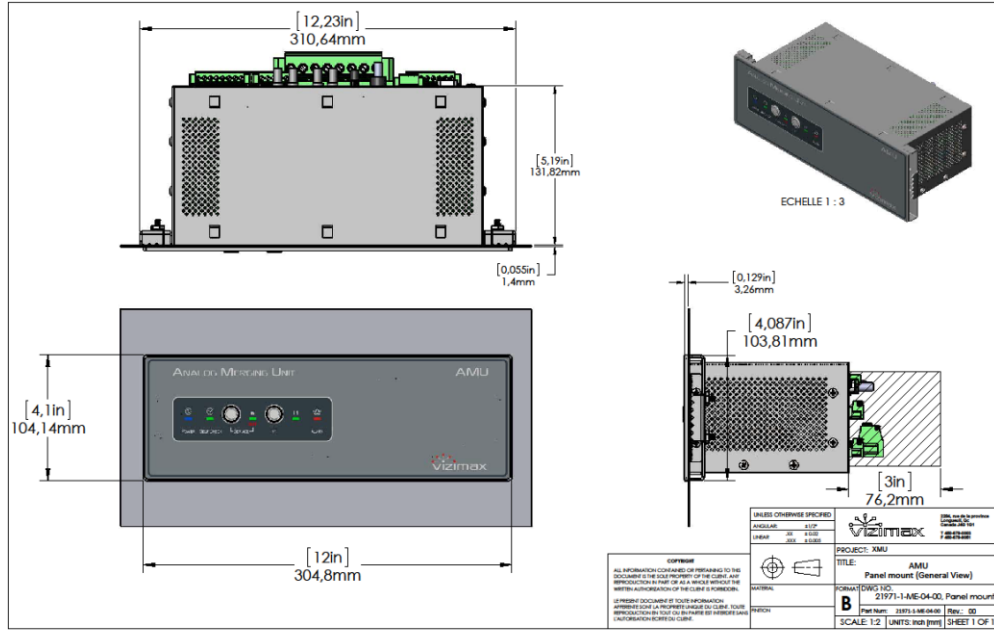


FIGURE 7 PANEL MOUNT CONFIGURATION



FIGURE 8 SPECIFIC BRACKETS FOR PANEL MOUNT

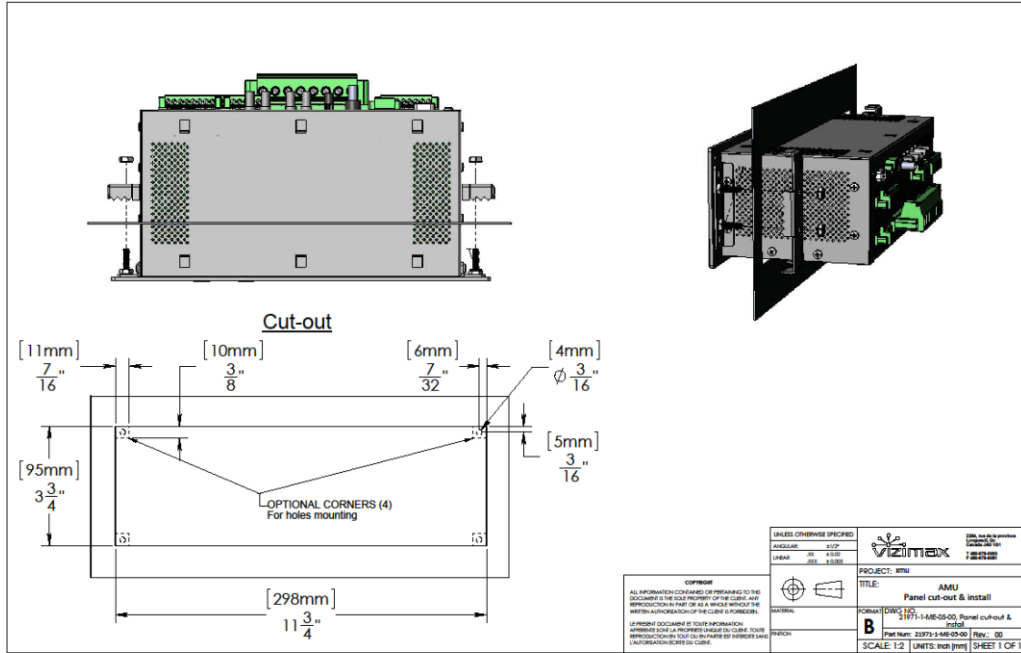


FIGURE 9 PANEL MOUNT CUT-OUT

RACK MOUNT

The AMU rack mount is installed on an EIA 19 in rack (482.6 mm) in the substation control building. Panel size: 3U standard panel (5.219 in x 19 in).

In the configuration the Ethernet service port is relocated on the front panel.

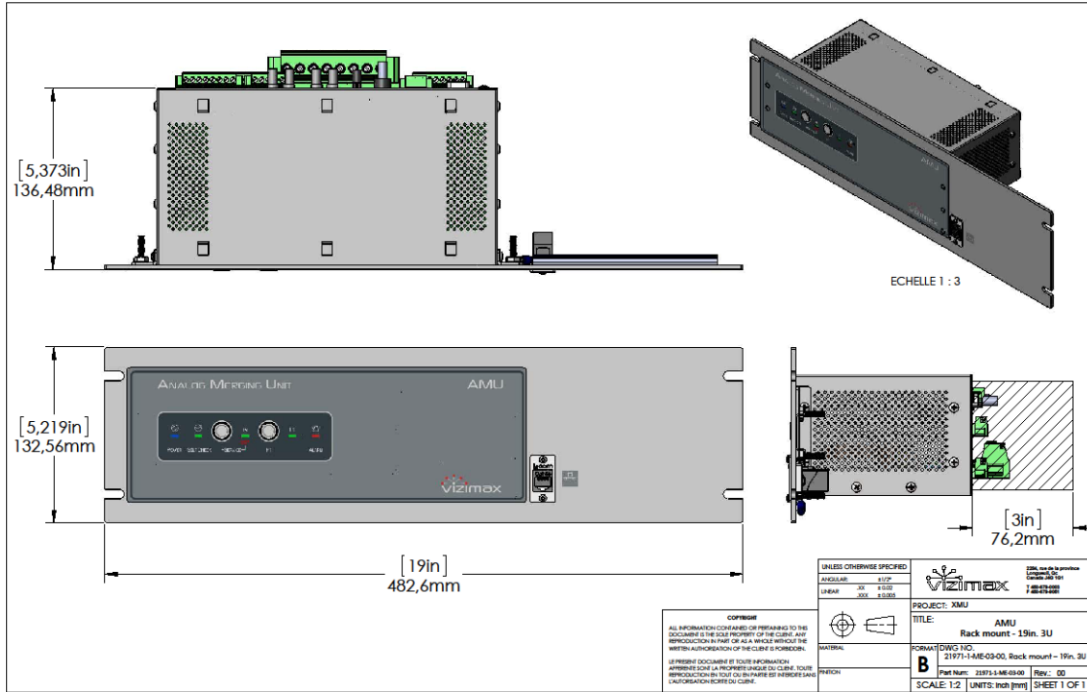


FIGURE 10 19" RACK MOUNT CONFIGURATION

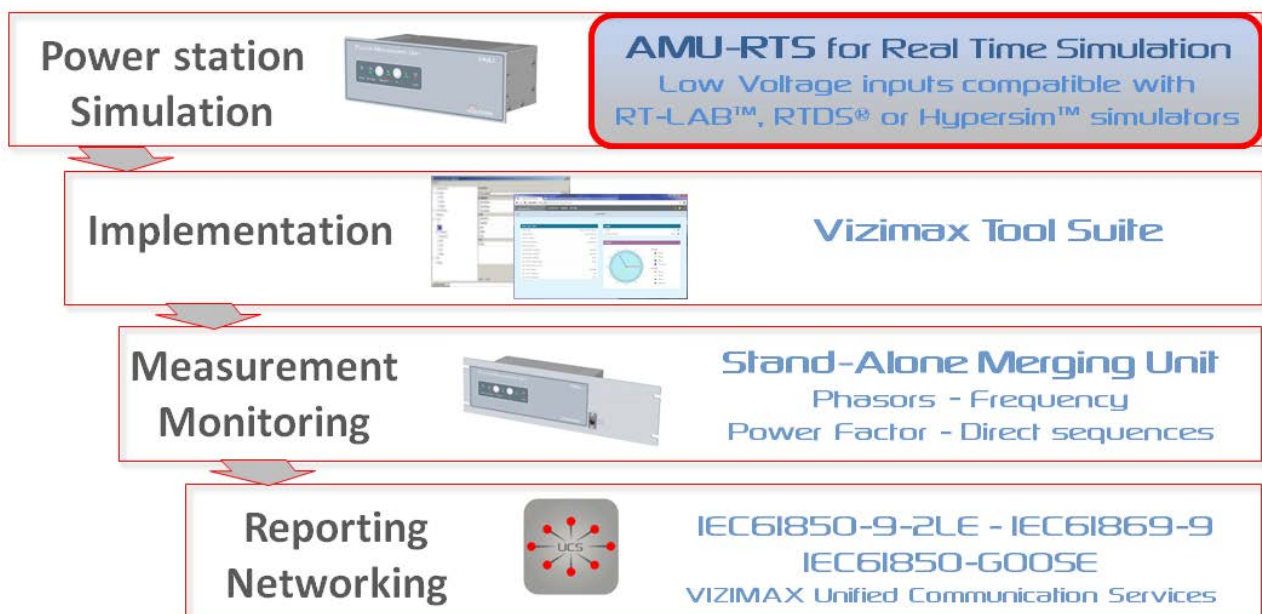
A DIN rail (120 mm - 4.8 in) - is provided on the rear panel to mount terminal blocks or IED accessories.

ABOUT THE AMU-RTS (REAL TIME SIMULATION) MODEL

The **AMU-RTS** (Stand Alone Merging Unit for Real-Time Simulation) is a component of the SAMU product family specially designed for hardware-in-the-loop **Real-Time Simulation** environment such as OPAL-RT's RT-LAB™ or Hypersim™, or RTDS Technologies' RTDS®

The AMU-RTS unit offers the same functionality as the standard AMU, but the AC measuring inputs (current and voltage inputs) are compatible with a low voltage signal (10Vrms) provided by real-time simulation hardware.

Therefore, real life AMU's applications can be fully simulated in a laboratory environment without needing expensive analog power amplifiers or high voltage discrete I/O interfaces.



The **AMU-RTS** unit is available with the following hardware configuration:

- Power Supply: 24Vdc
- AC input current measurement: 10Vrms input range.
- AC input voltage measurement: 10Vrms input range.
- Digital inputs: 10 inputs
- Signalization outputs: 4 electromechanical relay outputs

The mechanical mounting configuration, the time synchronization and the Ethernet communication ports are customer selectable at unit order. Please refer to the Smart coding document (MGU010000-SC) for more details on the available options.

SPECIFICITIES FOR THE AMU-RTS PRODUCT

POWER SUPPLY (FOR AMU-RTS MODEL)

| Parameter | Value |
|----------------------------|---|
| Power supply rating (24 V) | 12 V dc - 36 V dc (Universal 24V dc power supply adapter (100-240V ac/ 50-60Hz) included with AMU-RTS unit). |
| Rated power | 29 W max. (typical 18 W) |
| Connector | Phoenix MSTB 5.08 mm |
| Isolation | 3000 V during 1 s |
| Fuse | Time delay, 2 x 2 A (not user serviceable) |
| Maximum Voltage interrupt | 100 ms @ 100% |

NOTE:This table is applicable to AMU-RTS model only.

DIGITAL INPUTS (FOR AMU-RTS MODEL)

The AMU-RTS offers 10 digital inputs split in 2 groups, one of 6 inputs with one common and a group of 4 with their own common.

| Parameter | Value |
|--|---|
| Name | IN 1 to 10 |
| Number of inputs | 10 (6+4) |
| Maximum input voltage (24V power supply) | 36 V dc, (detection threshold 10 V dc) |
| Isolation | Opto-coupler, 2000 VRMS |
| Measuring Category | MEAS CAT IV |
| Burden | 2 mA to 5 mA |
| Maximum Hardware Response Time | 0.10 ms at nominal voltage 1.00 ms at 80% of nominal voltage |
| Software Filter | Programmable, 1 ms increments up to 250ms. Advanced chatter filter |
| Connector | Phoenix MSTB 5.08mm, pluggable screw type. |

NOTE:This table is applicable to AMU-RTS model only.

ANALOG CURRENT MEASUREMENT INPUTS (FOR AMU-RTS MODEL)

AMU-RTS model: To be compatible with the simulator's output signals, the AC current measurement inputs have been converted and scaled to receive a 10 VRMS signal.

| Parameter | Value | |
|---|--|--|
| Number of inputs | 4 | |
| Name | IA, IB, IC and IN | |
| Connector type | Phoenix PC-6, 10.16mm, pluggable screw type AWG 7-18 (10.5 mm ² – 0.75 mm ²) | |
| Voltage | Rated voltage | 10 V ac (whatever the rated current 1A or 5A selected in the application configuration file) |
| | Saturation voltage | 10.6 V ac |
| | Maximum voltage | 10.6 V ac |
| Measurement category | Not Isolated | |
| Maximum Burden | 0.01 VA @ 10V | |
| Isolation | NA. Negative side connected to P.E | |
| Measurement accuracy with 100% asymmetrical current | Typical: 100% Guaranteed: 100% | |
| Nominal frequency range | 40 Hz to 70 Hz | |
| Measurement bandwidth (-3 dB) | DC to 3 kHz | |
| Sampling frequency | 19200/s | |
| Conversion resolution | 16 bits | |
| CT angle compensation parameter | ±1.00 degree | |
| CT magnitude compensation factor | x0.01 to x1000 | |
| Hardware Accuracy | Typical: ±0.03% @ 25 °C + (±6PPM/°C) Guaranteed: ±0.1% @ 25 °C + (± 20PPM/ °C) after 15 minutes warm-up and above 1 V ac | |

NOTE: This table is applicable to AMU-RTS model only.

ANALOG VOLTAGE MEASUREMENT INPUTS (FOR AMU-RTS MODEL)

AMU-RTS model: To be compatible with the simulator's output signals, the AC voltage measurement inputs have been scaled down to 10 VRMS.

| Parameter | Value |
|----------------------------------|--|
| Number of inputs | 4 |
| Name | VA, VB, VC and VN |
| Connector type | Phoenix MSTB 5.08 mm, pluggable screw type AWG 13-24 (2.5 mm ² – 0.2 mm ²) |
| Rated voltage | 10 V ac (whatever the rated voltage L-N selected in the application configuration file) |
| Saturation Voltage | 10.6 V ac |
| Thermal capacity | 10.6 V ac |
| Measurement category | MEAS CAT IV (0 – 150 V ac) |
| Maximum Burden | 0.05 VA |
| Isolation | 1500 VRMS |
| Nominal frequency range | 40 Hz to 70 Hz |
| Measurement bandwidth (-3 dB) | DC to 3 kHz |
| Sampling frequency | 19200/s |
| Conversion resolution | 16 bits |
| PT angle compensation parameter | ±1.00 degree |
| PT magnitude compensation factor | x0.01 to x1000 |
| Hardware Accuracy | Typical: ±0.05% @ 25°C + (±10 PPM/ °C) Guaranteed: ±0.1% @ 25 °C + (±15 PPM/ °C) after 15 minutes warm-up and above 1 V ac |

NOTE: This table is applicable to AMU-RTS model only.

NOTE: All other AMU-RTS specifications are similar to the standard product specifications.

ORDERING INFORMATION

MGU010000: Stand Alone Merging Unit (smart coding to be confirmed at order)

To select ordering options such as, AMU-RTS model, mounting configuration, power supply voltage or built-in GPS receiver, please refer to the 'smart coding' document 'MGU010000-SC'.

To download the AMU smart coding document, please use the following link:

<https://www.vizimax.com/support/download?id=266>

VIZIMAX also offers commissioning and training services: for more details please contact us.

NOTE: These specifications are subject to change without prior notice.



Support contact:

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