

# AcuRev 2000

## Multi-Circuits Networked Multifunction Power and Energy Meter



ISO9001 Certified



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## Multi-Circuits Networked Multifunction Power and Energy Meter

- IEC and ANSI Revenue Grade Accuracy Measurement Standard
- Comply to IEC 62053-22 Measurement Standard
- Support up to 18 Individual Channels for Energy Measurement
- Advanced Power Quality Analysis for each Circuits
- Onboard Datalogging Enables Historical Trending Analysis
- Multiple communication ports and protocols for local and remote monitoring
- External and Built-in CT options provides perfect solution to Retrofit and New projects
- Extended Power Supply (100 - 415 Vac)
- Data (Pulse) Collection from Water and Gas Meter
- Relay Output to Remotely Control Switches



### DESCRIPTION

The AcuRev 2000 Series provides a compact and robust metering solution to multi-tenant submetering/billing and high density metering points applications. The unit performs real-time metering, measures energy consumption, multi-tariff time-of-use (TOU) and monitors power quality for 18 single phase circuits or 6 three phase circuits. The versatility of The AcuRev 2000 series meters are ideal for multi-tenants submetering such as office buildings, apartments, condominiums, shopping malls, data centers and other multiuser environments. Advanced communications options including Modbus via RS485, Modbus via ethernet, I/O, and infrared communications provide for extensive reliable data exchange.

The AcuRev 2000 series meters monitors up to 18 circuits/channels/tenants in a single unit. Multiple units can be connected together to meter unlimited number of circuits.

### BENEFITS

The AcuRev 2000 series meters provide complete tenant sub-metering/billing and energy management solutions that benefit users by providing:

- Accurate energy reading for billing for multiple tenants
- Identify cost-saving opportunities by viewing the complete picture of energy usage, with detailed consumption historical trending data down to each circuits
- Identify high demand window and locate saving opportunities
- Verify utility bills to avoid overcharge by using revenue grade and accurate meters.

### APPLICATIONS

- **Submetering in:**
  - Commercial Complex/Mall
  - Apartment/Condominiums
  - Hospitals/Public Services
  - Hotels/Office Buildings
  - Tenant Submetering/Billing
  - Data Centers
  - LEED Projects
- **Branch Circuits Monitoring**
- **Energy Management Systems**
- **Industrial and Utilities Applications**
- **Railway and Subway Systems**



### Variety of Flexible Installations and configurations for new and retrofit projects:

- 9 or 18 circuits input options so no circuits will be left empty
- Multiple current input and CT options:
  - AcuRev 2000 provides a built-in CT option where all CTs are built inside the meter, no external CT will be needed which is ideal for new projects
  - High accuracy, low cost split core 333mV CTs are supplied for simple clamp-on installation- no shoring block and power shutdown is needed during installation, which is ideal for retrofit projects
- Display can be either built-in or remote depending on the installation environment
- Direct voltage measurement of up to 690Vac L-L/400Vac L-N for electrical distribution systems
- Wide range in power supply thus no control transformer is required
- Built-in communication including ethernet enables simple connections with existing networks.

## AcuRev 2000 Series Meter

Functions and measuring parameters for the two AcuRev 2000 series meters (AcuRev 2010 - kWh meter only; AcuRev 2020 - multifunction energy meter) are listed below:

|                    | Function  | Parameter                        | AcuRev2010 | AcuRev2020 |
|--------------------|---|----------------------------------|------------|------------|
| ENERGY             | Energy  | Ep                               | ●          | ●          |
|                    | Reactive Energy   | Eq                               |            | ●          |
|                    | Apparent Energy   | Es                               |            | ●          |
| TIME OF USE        | 4 Tariffs, 14 Schedules                                   | TOU                              | ●          | ●          |
| POWER DEMAND       | Power Demand  | Demand_P                         | ●          | ●          |
|                    | Peak Power Demand   | Demand_P_max                     | ●          | ●          |
| CURRENT DEMAND     | Current Demand  | Total and each circuit           |            | ●          |
|                    | Peak Current Demand                                       | Total and each circuit           |            | ●          |
| REAL TIME METERING | Phase Voltage   | V1,V2,V3                         |            | ●          |
|                    | Line Voltage  | V12,V23,V31                      |            | ●          |
|                    | Current   | Total and each circuit           |            | ●          |
|                    | Power   | Total and each circuit           | ●          | ●          |
|                    | Reactive Power  | Total and each circuit           |            | ●          |
|                    | Apparent Power  | Total and each circuit           |            | ●          |
|                    | Power Factor  | Total and each circuit           |            | ●          |
|                    | Frequency   | F                                |            | ●          |
| POWER QUALITY      | Total Harmonic Distortion                                 | THD                              |            | ●          |
|                    | Individual Harmonics                                      | 2nd ~ 31st (Voltage and Current) |            | ●          |
|                    | Current K Factor  | KF                               |            | ●          |
|                    | Voltage Crest Factor                                      | CF                               |            | ●          |
|                    | Voltage Unbalance   | U_unbl                           |            | ●          |
|                    | Current Unbalance   | I_unbl                           |            | ●          |
| TIME               | Real Time Clock (Year, Month, Date, Hour, Minute, Second) |                                  | ●          | ●          |
| ALARMING           | Over/Under Limit Alarming                                 |                                  | ●          | ●          |
| DATA LOGGING       | 8MB Memory  |                                  | ●          | ●          |
| COMMUNICATION PORT | Infrared  |                                  | ●          | ●          |
|                    | RS485 Modbus(R)-RTU                                       |                                  | ●          | ●          |
|                    | Ethernet Modbus(R)-TCP, HTTP, SMTP, SNMP, SNTP            |                                  | Option     | Option     |
| I/O OPTION         | 2 Channel Pulse Output, Second Pulse, Demand Cycle        |                                  | ●          | ●          |
|                    | 8 Channel Digital Input with 15Vdc Power Supply           |                                  | ●          | ●          |
|                    | 4 Channel Relay Output for Alarming Purpose               |                                  | ●          | ●          |
| DISPLAY            | Screen Display  |                                  | ●          | ●          |

## FEATURES

### Metering

- Energy: Active (kWh), reactive (kVAR) and apparent (kVA).
- Compliance with ANSI C 12.20 class 0.5; IEC62053-22 Class 0.5s
- Real-time RMS Metering: line and phase voltage, current for each circuit
- Power and Power Factor: Active (P), Reactive (Q), Apparent (S), Power Factor
- Demand and peak demand: Power and current demand for total and each circuits, 0-30 minutes window configurable.

### Multi-tariff Time of Use (TOU)

TOU can be used according to different regional billing requirements. AcuRev 2000 series meters support up to 4 tariffs (sharp, peak, valley, normal), 14 schedules, 14 segments, weekends and 10-year holiday settings.

### Data Logging

Energy, real-time metering, power quality and I/O data can be stored in the onboard, non-volatile memory.

E.g. capacity of onboard datalogging energy data is every 15 minutes for 3 phase system is 3.2 years.

Logged information can be retrieved via serial connection or remotely by ethernet as Excel, CSV or text format for historical trending and system analysis.

### Over/Under Limit Alarms

Ten limit alarms can be assigned to various conditions. The alarming function effectively alarms and protects by sending out alarms such as light or buzzer and automatically shutting down equipments. For example, the alarm can be configured as peak demand, current or power quality.

### Input/ Output (I/O)

AcuRev 2000 series meters are built with 8 digital inputs (DI), 4 relay outputs (RO) and 2 digital outputs (DO) to easily integrate other metering data and control in a single unit.

**8 digital inputs:** 8 dry contact inputs are designed to count pulses from water meter, gas meters and other devices with pulse output. This integration provides complete energy data to energy management and information reporting system. Digital inputs can also be configured to monitor switch status.

**4 Relay Outputs:** The crucial step to reduce demand peak is shutting down equipments when the demand reach pre-set threshold. The threshold value can be assigned as alarms condition to trigger relay to close. The relay can be triggered by alarm conditions such as demand peak automatically. Manually triggered relay remotely can also be configured.

**2 Digital Outputs:** Two DOs can be used to send out pulses on energy data if energy management system requires pulse counting for data collection.

### Power Quality Analysis

Power quality is essential to industrial and commercial electrical distribution system where monitoring and analyzing will help protecting the investment on sensitive equipments.

AcuRev 2000 series meters provides power quality parameters such as voltage and current THD, individual voltage and current harmonics up to 31st order, voltage crest factor, current K factor, voltage and current unbalance. These parameters are monitored real-time and logged in AcuRev 2000 series meters.

## Communication Protocols

- Built-in Standard Modbus-RTU via RS485
- Modbus-TCP, HTTP, SMTP, SNMP, SNTP
- Infrared data port

Build-in Webserver provides webpage, tablet and smartphone access:



## DIMENSIONS



Meter Base (with built-in display)

EM Module

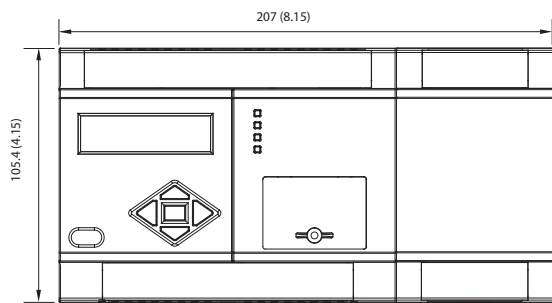
DM Module

Remote Display

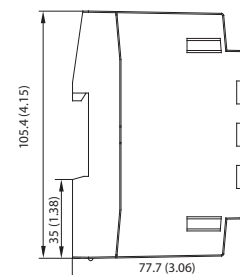
| Type                          | Products                                |
|-------------------------------|---|
| 9 Circuits External CT Meter  | Meter base (with built-in display)+ 1EM |
| 18 Circuits External CT Meter | Meter base (with built-in display)+ 2EM |
| 9 Circuits built-in CT Meter  | Meter base (with built-in display)+ 1DM |
| 18 Circuits built-in CT Meter | Meter base (with built-in display)+ 2DM |
| Remote Display                |   |

### Meter base(with built-in display)+ 1EM

Unit: mm (inch)



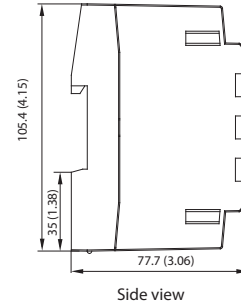
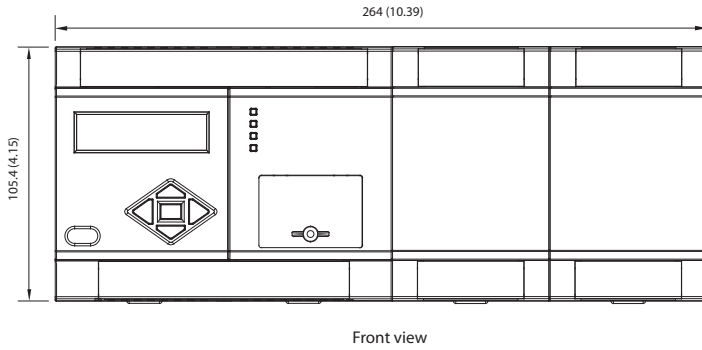
Front view



Side view

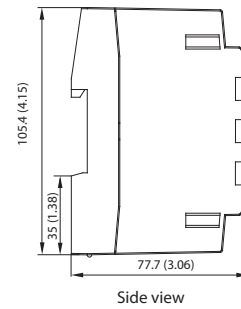
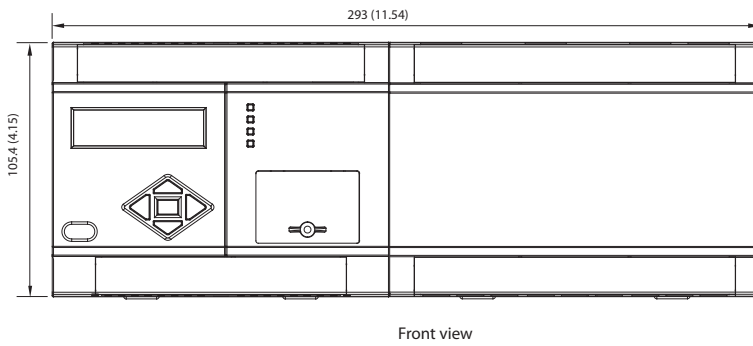
### Meter base(with built-in display)+ 2EM

Unit: mm (inch)



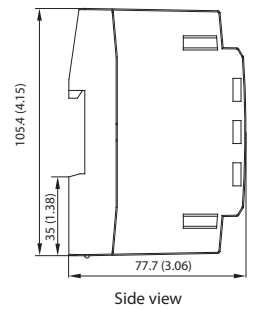
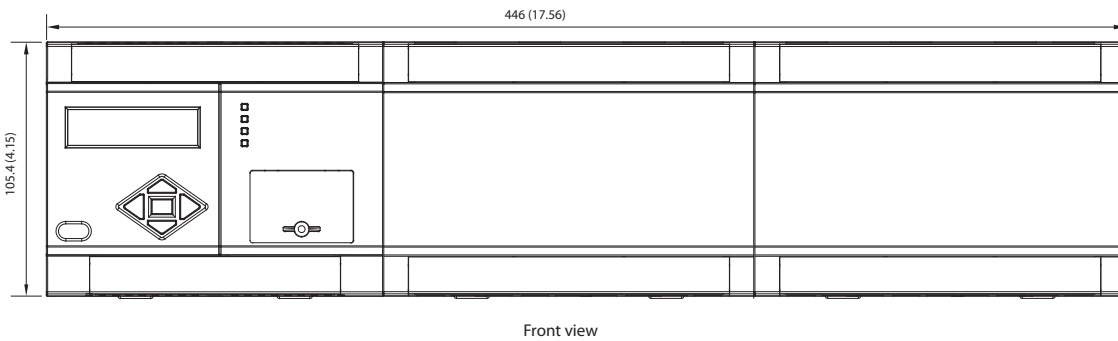
### Meter base(with built-in display)+ 1DM

Unit: mm (inch)



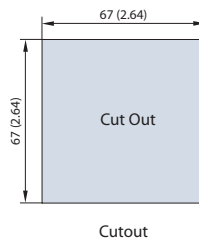
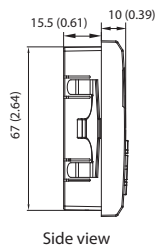
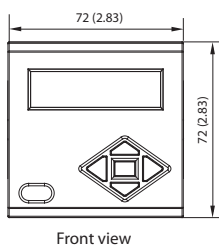
### Meter base(with built-in display)+ 2DM

Unit: mm (inch)



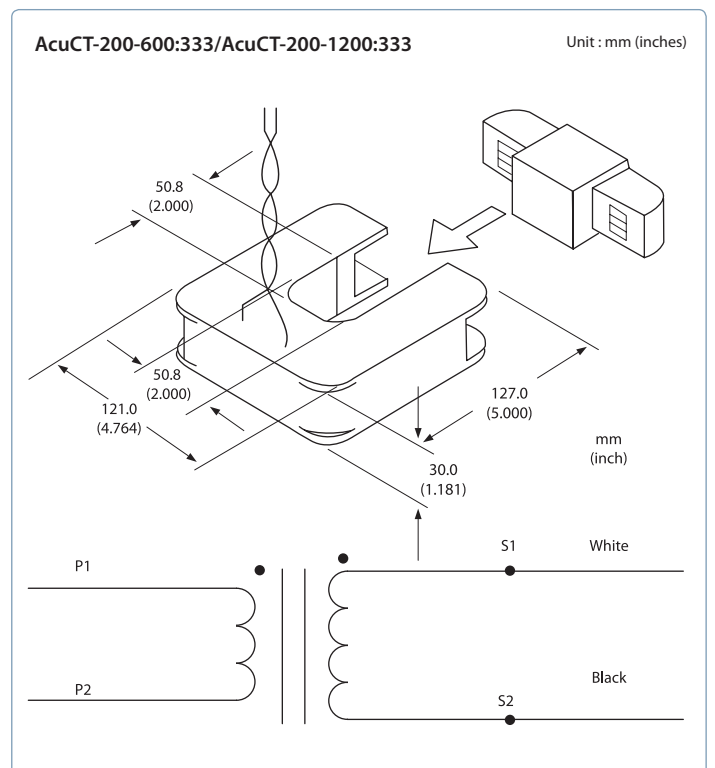
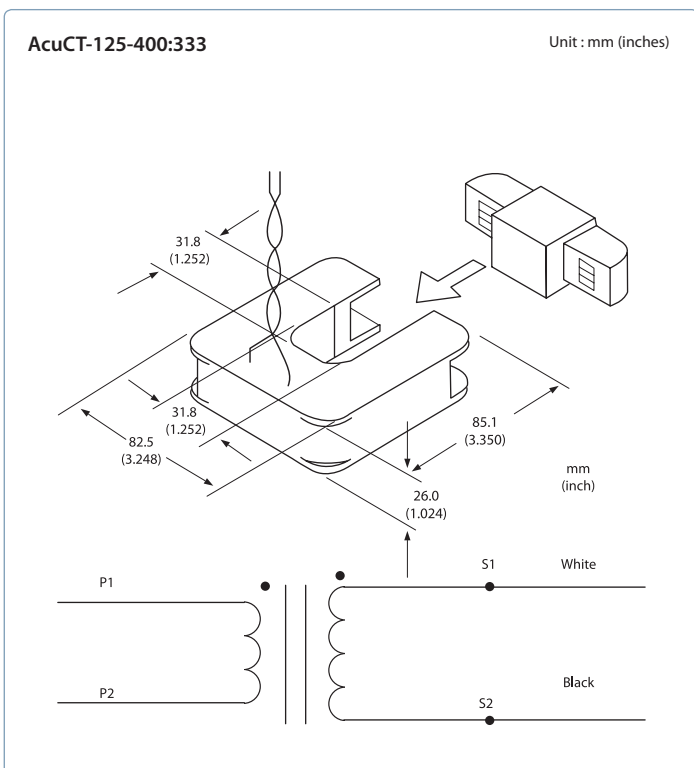
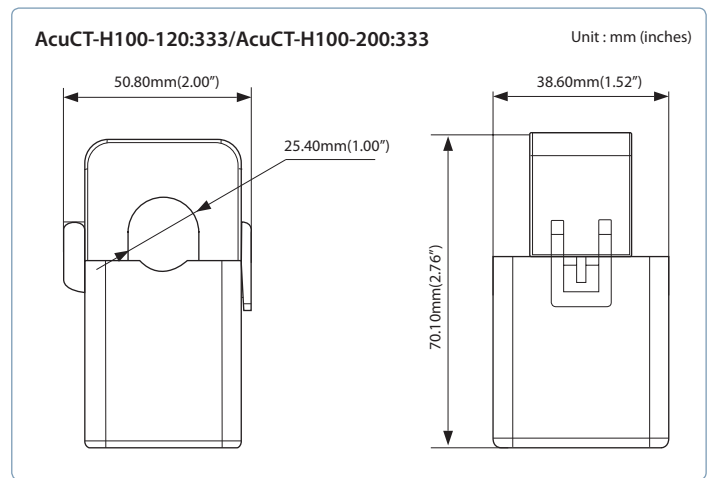
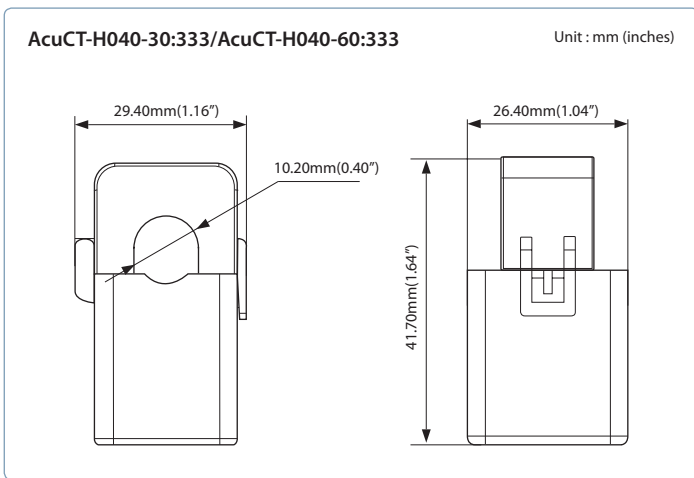
### Display Module

Unit: mm (inch)



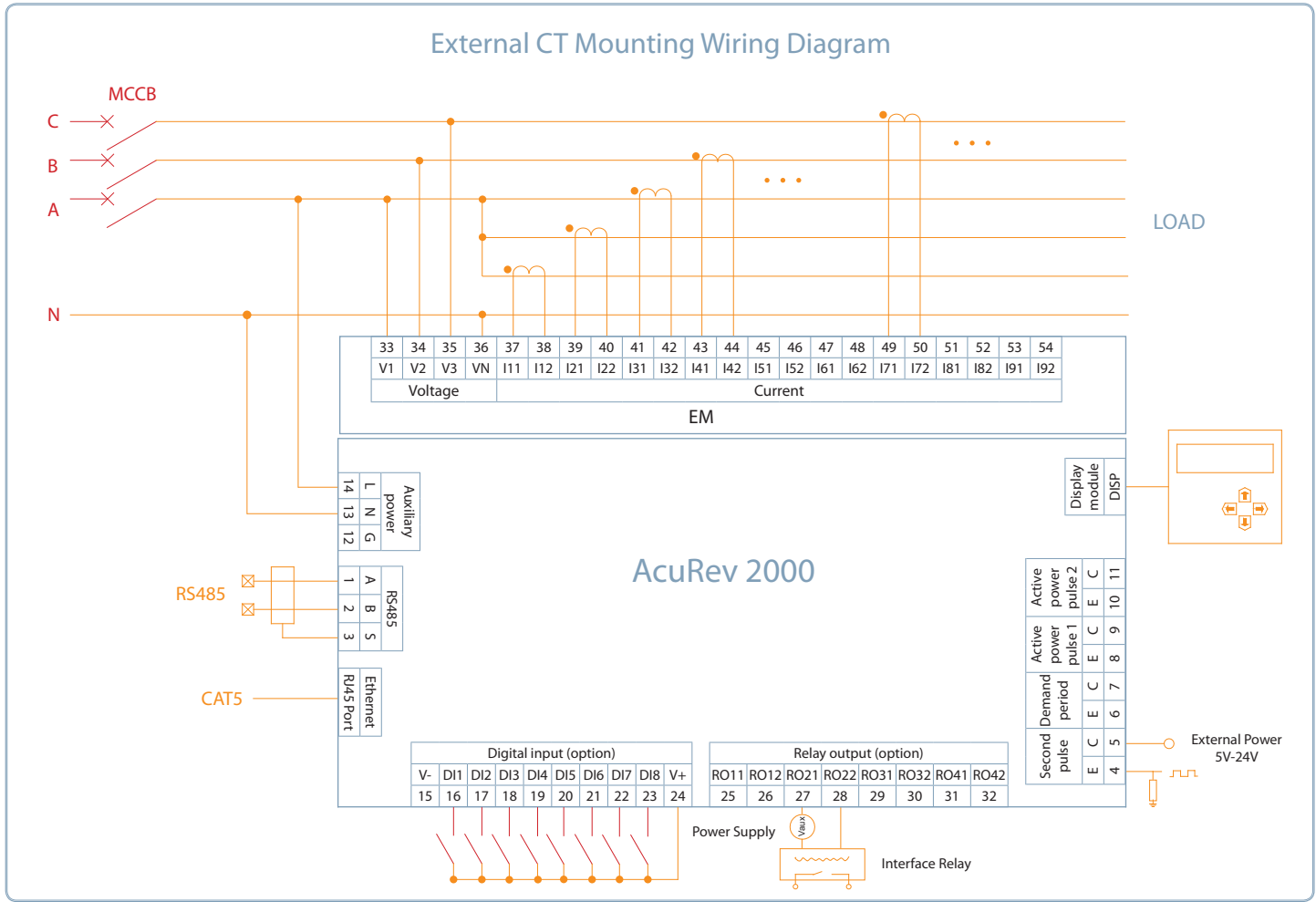
Display Module is designed with flexibility in mind, it can be installed together with the base unit or can be mounted on a panel.\*  
 \*(when ordered as a separate module. Please see ordering information for details).

Split core CTs

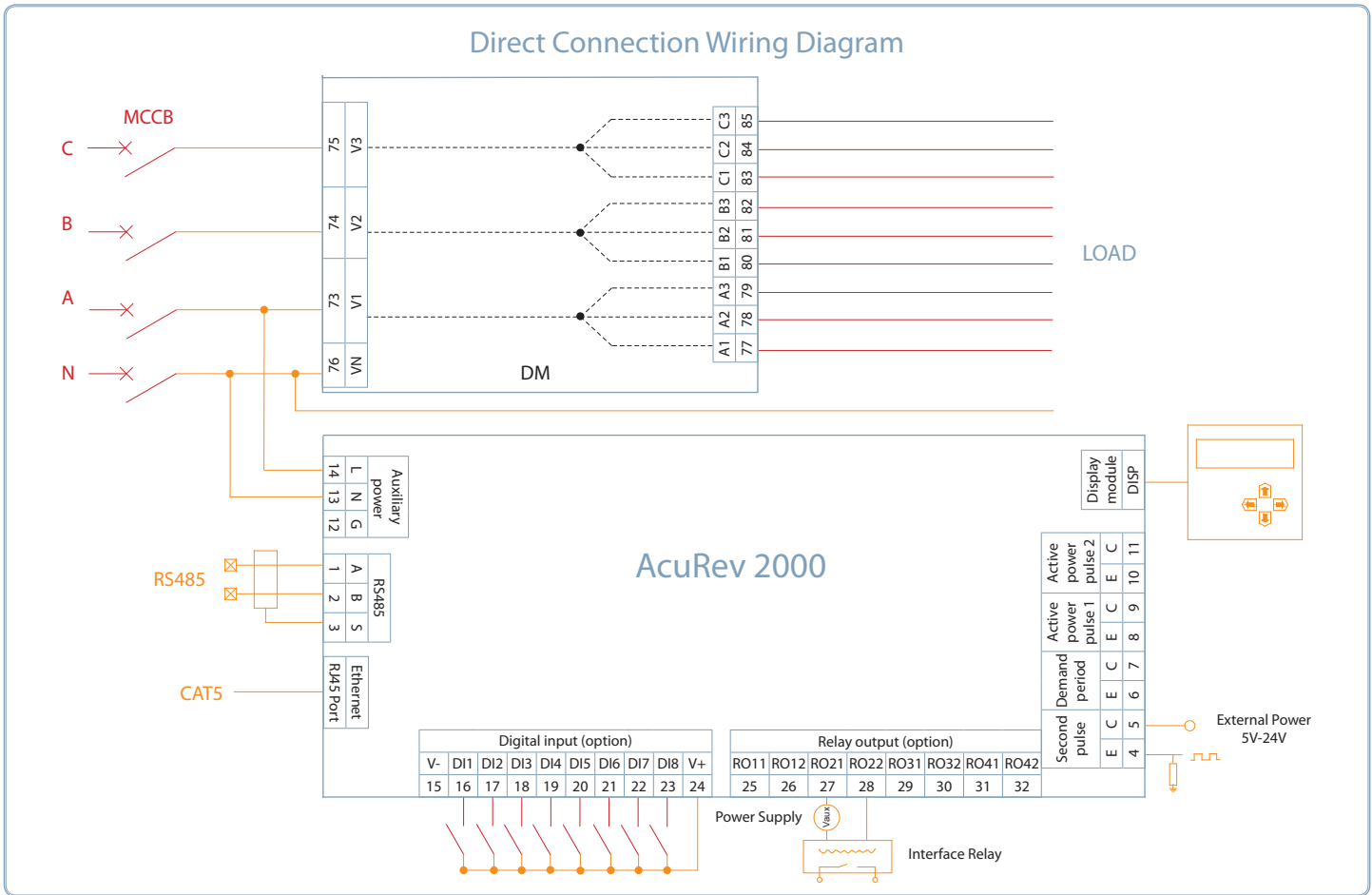


# TYPICAL WIRING

## External CT Mounting Wiring Diagram



## Direct Connection Wiring Diagram



## SPECIFICATIONS

| MEASURE            |                   |                  |
|--------------------|-------------------|------------------|
| Parameter          | Accuracy ± (%rdg) | Range            |
| kWh                | 0.5s              | 0~999999.9kwh    |
| V                  | 0.5%              | 10~400V          |
| I                  | 0.5%              | 5mA~10000A       |
| P                  | 0.5%              | 4000.0kW         |
| Q                  | 0.5%              | 4000.0kvar       |
| S                  | 0.5%              | 4000.0kVA        |
| PF                 | 0.5%              | -1.000~1.000     |
| Freq               | 0.2%              | 45~65Hz          |
| Activepower Demand | 0.5%              | 4000.0kW         |
| Current Demand     | 0.5%              | 5mA~10000A       |
| Harmonic           | 1%                | 0~100%           |
| Unbalance          | 1%                | 0~100%           |
| Meter Running Time |                   | 0~999999.9 hours |

| INPUT   |   |
|---|---|
| <b>Voltage Input</b>                                |   |
| Nominal Full Scale                                  | 400Vac L-N,690Vac L-L                             |
| Withstand   | 1500Vac continuous, 2500Vac, 50/60Hz for 1 minute |
| Input Impedance                                     | 2Mohm per phase                                   |
| Metering Frequency                                  | 45Hz~65Hz   |
| PT Burden   | <0.2VA  |
| <b>Current Input (wired directly or through CT)</b> |   |
| External CT:  | See ordering information.                         |
| Internal CT:  | Each loop current limit: 20A-80A                  |

| MEASUREMENT STANDARD |   |
|----------------------|---|
| Measurement Standard | IEC 62053-22 (Class 0.5s)<br>ANSI C12.20 (Class 0.2s) |
| Environment Standard | IEC 60068-2   |
| Safety Standard      | IEC 61010-1, UL 61010-1                               |

## ORDERING INFORMATION

| AcuRev 2000      | Model   | Current Input   | Communication option    | Display                    |
|------------------|---|---|-------------------------|----------------------------|
| Ordering Number  | -   | -   | -                       | -                          |
| Ordering Example | <b>2010</b>   | <b>-</b>  | <b>2EM</b>              | <b>-</b>                   |
|                  | 2010: Basic Energy& Demand datalogging meter                          | 1EM: 9 circuits with external CT-333mV secondary input  | Mod: RS485 only         | D: Built-in Display        |
|                  | 2020: Real-time Metering and advanced Power Quality datalogging meter | 2EM: 18 circuits with external CT-333mV secondary input | NET: Ethernet and RS485 | E: External remote display |
|                  |   | 1DM: 9 circuits with 20-80A direct input                |                         |                            |
|                  |   | 2DM: 18 circuits with 20-80A direct input               |                         |                            |

Note: 1. Accuenergy suggests using USB-RS485 converter for configuration, and 3 CTs per three phase circuits.  
2.All fields must be completed to create a part number.

### Additional Accessories:

**Communication converter: USB-RS485** (USB to RS485 converter)

**Certificate of Calibration: Part #-NIST** (Certificate of Calibration with NIST traceable test and calibration data)

### Split core CT ordering information:

| Part Number        | Window Size (Diameter in inches) | Rated Input |
|--------------------|----------------------------------|-------------|
| AcuCT-H040-30:333  | Hinged 0.4"                      | 30A         |
| AcuCT-H040-60:333  | Hinged 0.4"                      | 60A         |
| AcuCT-H100-120:333 | Hinged 1"                        | 120A        |
| AcuCT-H100-250:333 | Hinged 1"                        | 250A        |
| AcuCT-125-400:333  | Square 1.25"                     | 400A        |
| AcuCT-200-600:333  | Square 2"                        | 600A        |
| AcuCT-200-1200:333 | Square 2"                        | 1200A       |

Note: Please contact Accuenergy if CTs in other sizes and ratios are needed.

| IO                        |                       |
|---------------------------|-----------------------|
| <b>Digital Input (DI)</b> |                       |
| Input Style               | Dry node              |
| Input Current (MAX)       | 2mA                   |
| Input Voltage Range       | 15~30V                |
| Start Voltage             | 12V                   |
| Stop Voltage              | 10V                   |
| Pulse Frequency (MAX)     | 100Hz, 50% Duty cycle |
| SOE Resolution            | 2ms                   |

|                              |                     |
|------------------------------|---------------------|
| <b>Auxiliary Power of DI</b> |                     |
| Output Voltage               | 24VDC               |
| Rated Power                  | 1W                  |
| <b>Relay Output (RO)</b>     |                     |
| Switching Voltage(MAX)       | 250Vac, 30Vdc       |
| Load Current                 | 3A                  |
| Set Time                     | 10ms ( MAX)         |
| Contact Resistance           | 100mΩ ( MAX)        |
| Isolation Voltage            | 2500V               |
| Mechanical Life              | 1.5x10 <sup>7</sup> |

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

| OPERATING ENVIRONMENT |                       |
|-----------------------|-----------------------|
| Operation temperature | -25°C~ 70°C           |
| Storage temperature   | -40°C~ 85°C           |
| Humidity              | 5%~95% non-condensing |
| Altitude              | 3000m                 |

| POWER SUPPLY    |                                 |
|-----------------|---------------------------------|
| Operating Range | 100-415Vac, 50-60Hz; 100-300Vdc |
| Burden          | 10VA                            |

**ACCUEENERGY**

**Accuenergy Corporation**

Los Angeles-Toronto-Beijing

North America Toll Free: 1-877-721-8908

Web: [www.accuenergy.com](http://www.accuenergy.com)

Email: [marketing@accuenergy.com](mailto:marketing@accuenergy.com)



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