



## FEATURES

- Scales and displays the true-rms output of 5A current transformers
- Accurately measure complex ac current waveforms
- Perfect for measuring current in IT applications
- Available in three input ranges: 0-100A, 0 to 200A, or 0 to 500A
- Functionally complete:  
 On-board, low-burden toroid sensor  
 Scaling/interface circuitry  
 Precision A/D converter
- Reliable single-board construction
- Easy-to-read, red LED display with 0.37"/9.4mm digits
- Two AC power options: 85-140Vac & 170-264Vac (50/60Hz)
- 2000V isolation between ac supply and external CT
- Digital replacement for analog meters

Murata Power Solutions' ACA5-20RM Series accept the output of external 5A current transformers (CTs) and accurately display the true-rms value of complex, non-sinusoidal ac currents up to 500A. Operation and setup is straightforward: simply pass the external 5A CT's secondary 0-5A output leads through the ACA5-20RM's on-board toroid sensor, apply ac power, and the ammeter is fully operational. All models are totally self-contained—other than the external 5A CT, no other user-supplied components are required.

Three input ranges measure 0-100.0 amps (with 0.1A resolution), 0-200 amps (0.1A resolution), and 0-500 amps (1A resolution). Two power supply options are available: 85-140V (47-63Hz), and 170-264V (47-63Hz). Power consumption from a nominal 120V or 220V ac supply is less than 50mA. And, precision auto-zeroing circuitry, super-stable components, and an rms-to-dc converter circuit combine to achieve excellent performance when measuring the complex, non-sinusoidal, ac currents found in today's computer/telecom equipment.

ACA5-20RM Series rms ammeters feature full-size, 0.37" (9.4mm) high, 3½ digit, bright red LED-displays and a built-in bezel/filter assembly that features metal fasteners. They are also panel-cutout compatible with Murata Power Solutions' DMS-20RM Series of rms-reading ac voltage monitors, making ACA5-20RM ammeters perfect replacements for older, less reliable, analog voltmeters and ammeters in today's sophisticated instrumentation.

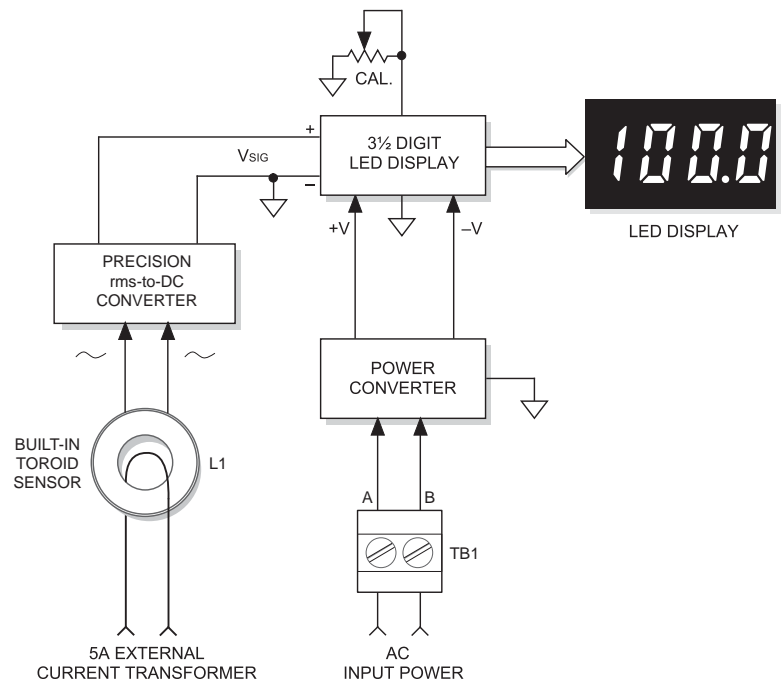


Figure 1. ACA5-20RM Series simplified schematic



### Performance/Functional Specifications

Typical at T<sub>A</sub> = +25°C, unless otherwise noted.

| Full-Scale Primary Current ①  | Min.  | Typ. | Max. | Units       |
|---|---|------|------|-------------|
| All Models  | –   | –    | 5.0  | rms Amps    |
| Overcurrent Rating ②  | 1.5 x Rated full-scale rms current            |      |      |             |
| <b>Display Readings with 5A Flowing through the Ammeter's Current Transformer</b> |   |      |      |             |
| <b>Model Number</b>   | <b>Display Reading</b>                        |      |      |             |
| ACA5-20RM-3-ACX-RL  | 100.0   |      |      |             |
| ACA5-20RM-5-ACX-RL  | 199.9   |      |      |             |
| ACA5-20RM-9-ACX-RL  | 500   |      |      |             |
| <b>Performance</b>  |   |      |      |             |
| <b>Sampling Rate</b>  | 2.5 Samples per second                        |      |      |             |
| <b>Accuracy ③</b>   | ±0.4%FS ±3 Counts with 60Hz Sine-Wave Input   |      |      |             |
| <b>Input Frequency Range</b>  | 47–63   |      | Hz   |             |
| <b>Measurement Type</b>   | rms Responding, Crest Factors of 1-5          |      |      |             |
| <b>Temperature Drift (0 to 60 °C)</b>   | –   | ±0.2 | ±0.4 | Cnts/°C     |
| <b>Zero-Current Reading (within 30 sec.)</b>                                      | –001  | 000  | 001  | Cnts        |
| <b>Breakdown Voltage</b>  | 2000  | –    | –    | Vdc         |
| <b>Power Supply Voltage</b>   |   |      |      |             |
| ACA5-20RM-X-AC3-RL  | 85  | 120  | 140  | Vac/47-63Hz |
| ACA5-20RM-X-AC4-RL  | 170   | 220  | 264  | Vac/47-63Hz |
| <b>Power Supply Current ④</b>   |   |      |      |             |
| ACA5-20RM-X-AC3-RL  | —   | 30   | 50   | mA/47-63Hz  |
| ACA5-20RM-X-AC4-RL  | —   | 30   | 50   | mA/47-63Hz  |
| <b>Power Supply Terminal Block (all models)</b>                                   |   |      |      |             |
| <b>Wire Size</b>  | 16-22AWG, Solid or stranded                   |      |      |             |
| <b>Insulation Strip Length</b>  | 0.250 inches                                  |      |      |             |
| <b>Screw Tightening Torque</b>  | 2.2 lb-in (0.25 N-m) ±20%                     |      |      |             |
| <b>Rated Voltage</b>  | 310Vac  |      |      |             |
| <b>Display</b>  |   |      |      |             |
| <b>Display Type and Size</b>  | 3½ Digit Red LED, 0.37"/9.4mm High            |      |      |             |
| <b>Overrange Indication</b>   | "1 ___"                                       |      |      |             |
| <b>Display Reading/Decimal Point</b>  | Model dependent; see "Display Readings" above |      |      |             |
| <b>Physical/Environmental</b>   |   |      |      |             |
| <b>Operating Temperature</b>  | 0   | –    | +60  | °C          |
| <b>Storage Temperature</b>  | –40   | –    | +75  | °C          |
| <b>Humidity (non-condensing)</b>  | –   | –    | 85   | %           |
| <b>Dimensions</b>   | Model dependent, see page 4 & 5               |      |      |             |
| <b>Weight</b>   |   |      |      |             |
| All models  | 1.1 Ounces (31 grams) nominal                 |      |      |             |

- ① The specified full-scale current is the ac current circulating through the meter's built-in 5A current transformer's primary circuit L1 (i.e., the external current transformer's 0-5A output current).
- ② The overcurrent rating of 1.5 times the rated full-scale current is a continuous rms rating and applies to the current passing through the built in current transformer (CT). Accuracy is only guaranteed up to the rated full-scale CT current of 5Arms.
- ③ Specified accuracy applies to inputs with crest factors (CF) up to 2.0, where CF = V<sub>peak</sub>/V<sub>rms</sub>. Crest factors of 2 to 5 introduce an additional error of ±3% of full scale. Ammeters are calibrated with a 5.00Arms/60Hz current flowing through the ammeter's built-in 5A CT.
- ④ All specified maximum power supply currents are steady state; larger surge currents can occur at initial turn-on.

### Ordering Information

|                             |                                |
|-----------------------------|--------------------------------|
| <b>ACA5-20RM-3-AC3-RL-C</b> | 100.0A Range, 85-140Vac power  |
| <b>ACA5-20RM-3-AC4-RL-C</b> | 100.0A Range, 170-264Vac power |
| <b>ACA5-20RM-5-AC3-RL-C</b> | 199.9A Range, 85-140Vac power  |
| <b>ACA5-20RM-5-AC4-RL-C</b> | 199.9A Range 170-264Vac power  |
| <b>ACA5-20RM-9-AC3-RL-C</b> | 500A Range, 85-140Vac power    |
| <b>ACA5-20RM-9-AC4-RL-C</b> | 500A Range, 170-264Vac power   |

### Accessory Current Transformers for above\*:

|                     |  |
|---------------------|--|
| <b>7020-01038-0</b> | 100A Current Transformer, RoHS compliant     |
| <b>7020-01040-0</b> | 200A Current Transformer, RoHS compliant     |
| <b>39-3681409</b>   | 500A Current Transformer, not RoHS compliant |

\* See data sheet titled "Current Transformers" at [www.murata-ps.com](http://www.murata-ps.com) for more information

### TECHNICAL NOTES

**IMPORTANT! To ensure safe and reliable operation, ACA5-20RM ammeters must be installed and serviced by qualified technical personnel. Contact Murata Power Solutions if there is any doubt regarding ammeter installation and/or operation.**

- 1. Measurement Type:** ACA5-20RM ac ammeters employ a true rms input circuit to measure the output of external 5A current transformers. Stated accuracy specifications are measured using a sine-wave current at, or close to, the full-scale input range, at nominal line frequency of 60Hz.
- 2. Calibration:** Periodic recalibration of ACA5-20RM ammeters is not required under normal, indoor operating environments. If user calibration is necessary, it should be performed by qualified technical personnel. Calibration is performed with potentially lethal voltages applied to the ACA5-20RM and its associated wiring, with 5.0 amps flowing through the ammeter's built-in toroid sensor. A plastic, fully-insulated adjusting tool must be used to access the calibration potentiometer located on the back of the meter (see Mechanical Specifications). Contact MPS if additional information is required regarding calibration, setup, or any other technical issue pertaining to ACA5-20RM ammeters.

**3. Wire Gauges and Fusing:** Wires specified in the Functional Specifications section must be used for making connections to ACA5-20RM series ammeters. All power-supply and load wiring must be rated for the supply voltages and currents they will conduct and must comply with any code or application-mandated requirements pertaining to the user's specific installation.

ACA5-20RM ammeters are not internally fused. Terminal block TB1 is to be used only for powering the ammeter's internal circuitry; it must not be used to supply power to external loads. The supply wires feeding these ammeters must be fused with a 0.25A/250V time delay/time lag fuse, in accordance with applicable regulatory codes.

Wire insulation must be stripped to within  $\pm 10\%$  of the stated dimensions, and wires should be inserted into TB1 such that their insulation is not pinched by the screw terminal.

**4. AC Supply Polarity and Grounding:** The two supply inputs, TB1-A and TB1-B, on ACA5-20RM ammeters are not in themselves polarity sensitive, that is, they have no internal "AC LO" or "AC HI" designations. ACA5-20RM ammeters do not include or require a connection to earth/chassis ground.

**5. Connector Torque Ratings:** It is important to tighten TB1's, screw-terminals to their rated torque specification of 3.6 pound-inches (0.4Nm). Proper tightening will minimize connector losses and ensure safe, reliable operation.

**6. Isolation:** The built-in toroid sensor (L1) provides a minimum of 2000Vdc isolation between the external CT's 5A secondary conductors and the ammeter supply voltage connected to TB1.

**7. CT Precautions:** In normal operation, a 5A CT's secondary circuit operates at a very low voltage due to its closed-loop operation and low burden resistance. However, a CT can still generate potentially lethal voltages if its output current is suddenly interrupted. For example, loose 5A CT secondary connections can cause a condition referred to as "inductive kick". Inductive kick can generate extremely high voltages across a CT's intermittent secondary connections.

Therefore, implementing connections to any 5A current transformer's output leads must only be performed with zero load-current flowing through the CT's primary load-circuit.

**8. CT Connections and Grounding:** Some applications require connecting one of the external 5A CT's output leads to earth/chassis ground. In the USA, consult the latest revision of the National Electrical Code (NEC) for more information regarding CT grounding.

After all mechanical assembly is completed, connect the two output leads of the external 5A CT to each other after they are run through L1's center hole. Pressure-style connectors (commonly referred to as "wire nuts") are acceptable as long as they are rated for the number of conductors and voltage involved.

**9. Replacing Analog Panel Meters:** ACA5-20RM ammeters can be used as direct replacements for most analog panel meters driven by external 5A CT's. All wiring operations must be performed with both the load and the supply power sources completely de-energized.

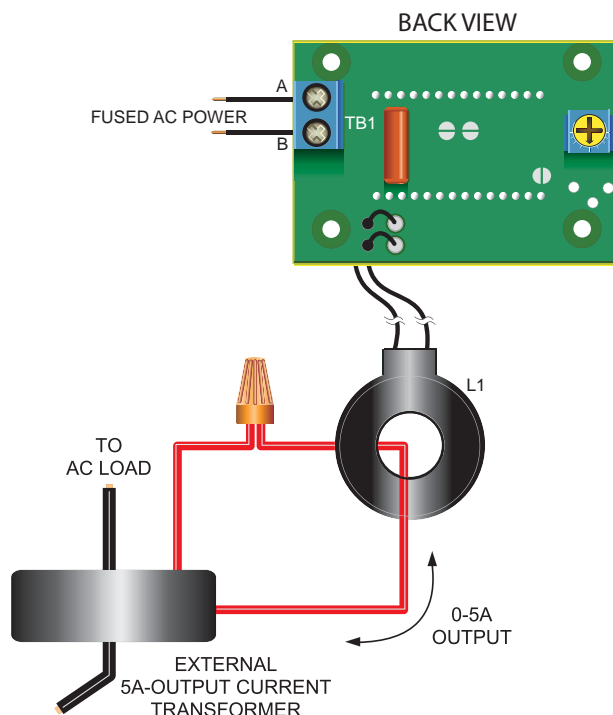


Figure 2. Typical wiring diagram

## PANEL INSTALLATION

All connections to ACA-20RM Series ammeters must be made after the ammeter is securely attached to the panel and with all associated load and supply voltages de-energized (off), using extreme caution and observing all safety measures applicable to the user's installation.

Care should be exercised when passing conductors through the ammeter's built-in toroid sensor L1. The installed wire-positions should be such that minimal mechanical forces are applied to L1, TB1, or to the ammeter itself. In high-vibration environments, it is strongly recommended that adequate strain reliefs be used for all wiring.

Using Figure 3 as a guide, carefully insert the bezel/color filter assembly into the panel opening. From the rear of the panel, install the four round

plastic standoffs over the bezel's threaded studs. Install the ACA5-20RM pc-board assembly as shown and then attach and securely tighten each of the four hex nuts to 15-20 ozf-in (0.106 to 0.140 N-m). Use only the factory-supplied hardware as the use of substitute hardware could result in an unsafe installation and/or adversely affect the reliability of the ammeter.

The recommended range of panel thickness that can be used with the supplied hardware is 0.040 inches (1.0mm) to 0.125 inches (3.2mm). Panel thickness outside of this range will require additional user-supplied hardware or modifications.

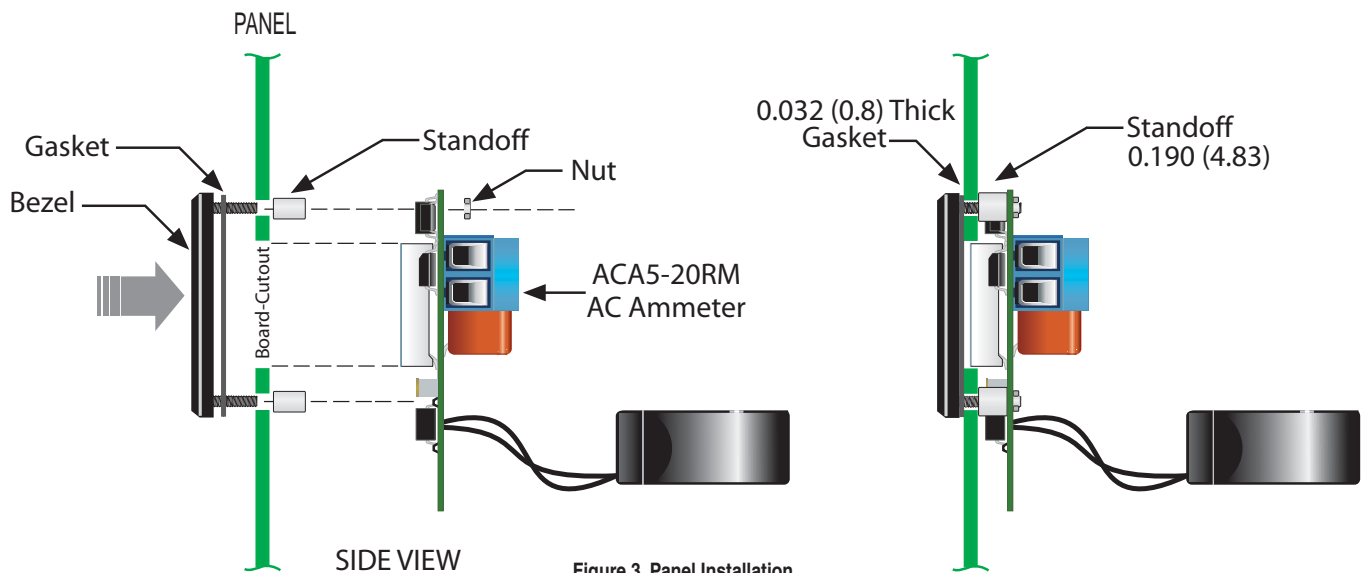
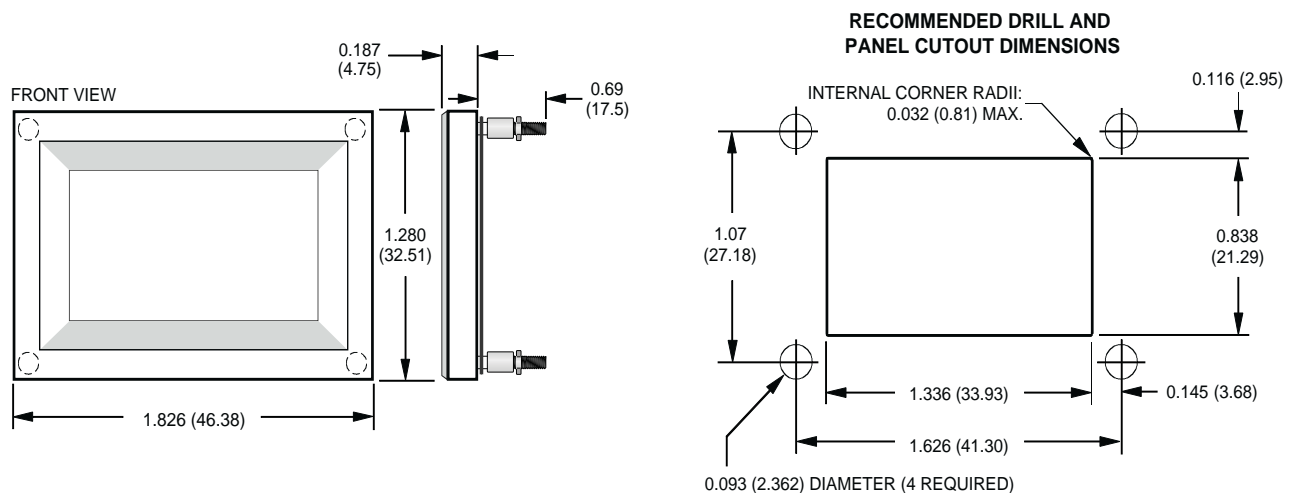
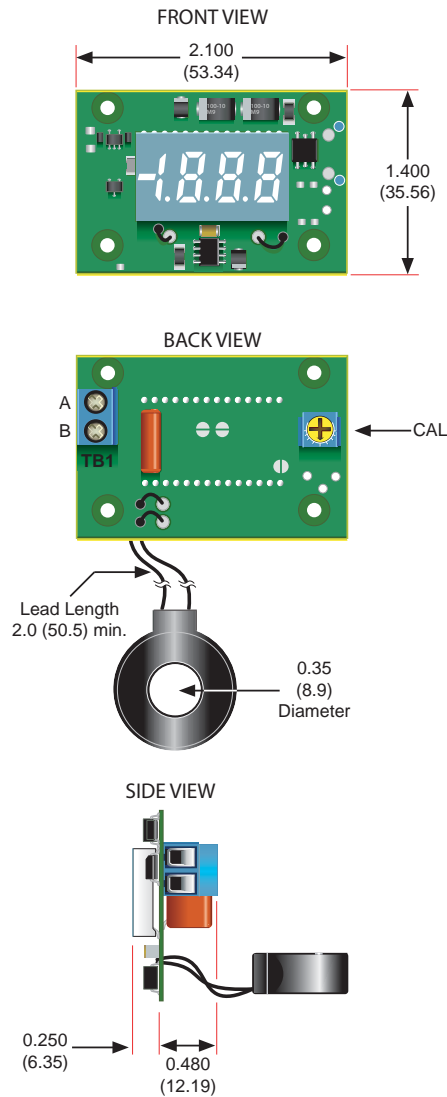


Figure 3. Panel Installation

## BEZEL AND PANEL CUTOUT



## MECHANICAL SPECIFICATIONS



MECHANICAL DIMENSIONS: Inches (mm)  
 TOLERANCES: 2 PL DEC  $\pm 0.02$  ( $\pm 0.51$ )  
 3 PL DEC  $\pm 0.010$  ( $\pm 0.254$ )