Microprocessor Based Autoranging RTD/Thermistor Meter
AD2060/AD2061

FEATURES
Temperature Ranges: $-328°F$ to $+1562°F$
$-200°C$ to $+850°C$
Autoranging: $0.1°$ from $-199.9°$ to $+199.9°$; $1° \geq 200°$
Sensor Selection (AD2060): RTD 100Ω Platinum
$\alpha = 0.00385, 0.00390, 0.00392$ or 2252Ω Thermistor
Universal Meter (AD2061) Sensor User Programmable
Switch Selectable Sensor Configuration: 2, 3 or 4-wire
7-Bit ASCII Character Serial Data Output
Automatic Self-Calibration for Gain, Offset, Excitation and Sensor Linearization
Optional Linearized Analog Voltage Output: 1mV/degree
Optional Isolated 20mA ASCII Loop/TTL Serial Outputs

APPLICATIONS
Temperature Monitoring in Laboratory, Manufacturing and Quality Control Environments
Process Control Temperature Measurements
Remote Data Logging

GENERAL DESCRIPTION
The AD2060/AD2061 are high performance single channel 3½ digit RTD/Thermistor meters that can measure temperature accurately between $-328°F$ and $+1562°F$ ($-200°C$ and $+850°C$). Both meters offer autoranging from $0.1°C/F$ to $1°C/F$. The AD2060 is supplied factory programmed for one of four sensor types: 100Ω Platinum RTDs: $\alpha = 0.00385, 0.00390, 0.00392$ or a 2252Ω Thermistor. The AD2061 is a universal meter in which the user selects one of the four sensor types via switch programming. The microprocessor based AD2060/AD2061 provides gain, offset and excitation error correction, linearization and $°C/°F$ scaling in firmware. The AD2060/AD2061 display temperature information on large $0.56"(14.3mm)$ high LEDs. Digital information is provided in 7-bit standard ASCII character serial

format with baud rate selection for easy interface to printers, terminals and other peripherals. For remote data acquisition applications, an optional isolated 2-wire 20mA ASCII serial loop/TTL compatible interface is available. For driving recorders or other analog instruments, an optional linearized analog voltage output of 1mV/degree is available. Selection of $°C$ or $°F$ scaling is accessed by removing the front panel lens and setting the selector switch to its proper position.

The AD2060/AD2061 can be ordered in one of the following power versions: 120V ac, 240V ac or $+7.5V$ dc to $+28.0V$ dc. Input voltage protection of 180V peak (RTD short to ac line), common-mode voltage to 1400V peak (ac version) with overrange and open sensor detection is provided. These meters are rated for operation over the 0 to $+40°C$ temperature range. Each AD2060/AD2061 is burned-in for 168 hours @ $50°C$ with on/off power cycles for increased reliability. The AD2060/AD2061 are supplied in rugged molded plastic cases that meet UL94V-0 and DIN/NEMA standard dimensions.

Figure 1. AD2060 & AD2061 Functional Block Diagram

SPECIFICATIONS (typical @ +25°C and rated supply voltages unless otherwise specified)

RTD INPUTS
- RTD Types: 100Ω Platinum
  α = 0.00385 (Per DIN 43760)
  α = 0.00390
  α = 0.00392
- Configuration: 2, 3 or 4 Wire
- Excitation Current: 0.25mA nominal
- External Lead
  Resistance Effect: Automatically Compensated for 3 & 4 wire configurations
- Lead Resistance: 50Ω/Lead max; RTD + Lead Resistance must be less than 400Ω
- 3 Wire Error: 2.8°C/Ω of impedance imbalance
- Open Sensor: DISPLAY + EEE
- RTD Short to ac Line: Internal protection provided to 180V peak (130V rms)
- Maximum Common-Mode Voltage: 1400V peak (ac or dc) between input and power line ground (ac version)
- Common-Mode Rejection Ratio: 100dB ac power to RTD input
- Normal Mode Rejection: 60dB @ 50/60Hz

THERMISTOR INPUTS
- Thermistor Type: Series 400 R = 2252Ω
- Configuration: 2 Wire
- Open Sensor: DISPLAY -EEE

ACCURACY
- Temperature Resolution: Autoranging 0.1° from −199.9° to +199.9°, 1° ±200°)
- All Ranges Guaranteed Monotonic
- Range Temperature Coefficient: 20ppm/°C typ, 30ppm/°C max
- Readout Accuracy @ +25°C

Sensor	Range	Accuracy
100Ω RTD α = 0.00385	−200°C to +850°C	±0.3°C ±1/2LSD
	−328°F to +1562°F	±0.6°F ±1/2LSD
100Ω RTD α = 0.00392	−200°C to +640°C	±0.3°C ±1/2LSD
	−328°F to +1184°F	±0.6°F ±1/2LSD
100Ω RTD α = 0.00390	−200°C to +640°C	±0.3°C ±1/2LSD
	−328°F to +1184°F	±0.6°F ±1/2LSD
Thermistor R = 2252Ω	−30°C to +100°C	±0.4°C ±1/2LSD
	−22°F to +212°F	±0.8°F ±1/2LSD

*Readout Accuracy: Includes Gain and Offset Errors. Recommended Recalibration Interval 15-MONTHS.

DIGITAL OUTPUTS
- Character Serial ASCII
  Data: Eleven transmitted characters, (each 7 bits plus strobe)
  Drive Capability: 2TTL loads, CMOS/TTL compatible
  Strobe: Negative transition determines when character serial data is valid. CMOS/TTL compatible.
  Character Rate: Selectable on P1 (Pin 32)
  Grounded: 25 characters/sec. (SLOW)
  Open: 100 characters/sec. (FAST)
- Isolated Serial Output (Optional)
  Data: Asynchronous ASCII 20mA current loop (Optically isolated to ±600V peak)
  Baud Rate: Selectable on P1 (Pin 32)
  Grounded: 300 baud (SLOW)
  Open: 1200 baud (FAST)
  Distance: 10,000 ft. max
- Nonisolated Serial Output (Optional)
  Data: Serial ASCII
  Drive Capability: 2TTL Loads, CMOS/TTL compatible
  Baud Rate: (same as Isolated Serial Output)
- Overrange: ±EEE.E
- Minimum Time Between New Data Update: 150ms

DIGITAL INPUTS
- REQ: Low-Level Triggered: Must go low at any time other than during data transmission to be recognized. REQ line taken low during data transmission will not be acknowledged and the ASCII digital output transmission will not occur. Display readings are not effected by REQ.
- SERIAL INPUT (Optional): Edge Triggered, Current On to Current Off: Must be triggered at any time other than during data transmission to be recognized. Serial Input triggered during data transmission will not be acknowledged and the 20mA isolated/TTL compatible serial output transmission will not occur. Display readings are not effected by Serial Input.

ANALOG OUTPUT (OPTIONAL)
- Voltage: 1mV/degree, linearized
- Current: ±2mA max drive
- CMV: 1400V peak (ac or dc) between Analog Output Ground & ac Power Line Ground
- Overrange: +2.048V, −0.512V
- Accuracy: ±2mV from Display Reading

Specifications subject to change without notice.

ANALOG TO DIGITAL CONVERSION
- Technique: Offset Dual Slope with Gain and Offset Error Correction
- Rate: 2.5 Conversions/Second Typical
- Input Integration Period: 100ms for 50/60Hz Noise Rejection

POWER REQUIREMENTS (Choice of Three Supply Ranges)
- ac: 90V ac to 132V ac @ 25mA (47Hz to 500Hz)
  198V ac to 264V ac @ 12.5mA (47Hz to 500Hz)
- dc: +7.5V to +28V dc @ 200mA (Protected Against Supply Reversals)

DISPLAY
- Type: Seven Segment Orange LED 0.56″ (14.3mm) high
- Polarity Indication: "+" or "−" displayed
- Overrange Indication: ±EEE
- Display Test: At Power Turn-On, 3 Second Display of "+188.8." Tests all Segments of Display

ENVIRONMENTAL
- Rated Temperature Range: 0 to +40°C
- Operating Temperature Range: −10°C to +50°C
- Storage Temperature Range: −40°C to +85°C
- Relative Humidity: Meets MIL-STD-202E, Method 103B (0 to 90%, Noncondensing)

DIMENSIONS
- Case: 3.78″ × 1.89″ × 5.13″ (96.8mm × 48.9mm × 131.3mm), rugged molded plastic case. Meets UL94V-0 and DIN/NEMA Standard dimensions
- Weight: 15.2 oz (431 grams) max, ac powered.
  12.0 oz (341 grams) max, dc powered.

RELIABILITY
- MTBF: >65,000 hours calculated
- Burn In: 168 Hours at +50°C with Power ON/OFF Cycles
- Calibration: NBS Traceable
- Recalibration: Recommended 15-Month Intervals
- Warranty: 12 months

CONNECTOR
One 44 pin 0.1″ (2.54mm) spacing card edge connector Viking 3VH22/1 JN5 or equivalent
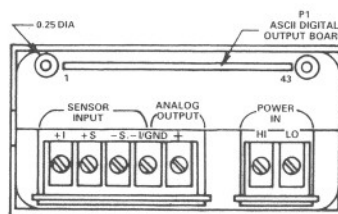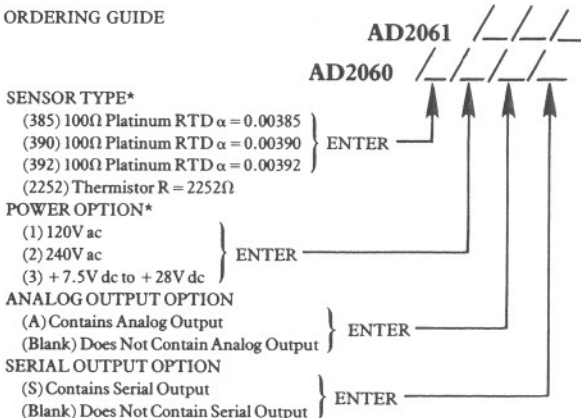Optional: Order AC2630

Figure 2. Rear Panel View

ORDERING GUIDE

AD2061 /__/__/__/
AD2060 /__/__/__/__/

SENSOR TYPE*
(385) 100Ω Platinum RTD α = 0.00385
(390) 100Ω Platinum RTD α = 0.00390 } ENTER
(392) 100Ω Platinum RTD α = 0.00392
(2252) Thermistor R = 2252Ω

POWER OPTION*
(1) 120V ac
(2) 240V ac } ENTER
(3) +7.5V dc to +28V dc

ANALOG OUTPUT OPTION
(A) Contains Analog Output } ENTER
(Blank) Does Not Contain Analog Output

SERIAL OUTPUT OPTION
(S) Contains Serial Output } ENTER
(Blank) Does Not Contain Serial Output

PRICING	(1–4)	(100s)
AD2060	$295.00	$206.50
AD2061	$355.00	$248.50
Analog Output	$ 55.00	$ 38.50
Isolated Serial Output	$ 76.00	$ 53.25
DC Version	$ 27.00	$ 19.00
AC2630	$ 9.50	$ 6.50

*Only one option can be ordered. The sensor type does not need to be specified when ordering the AD2061 since it is user programmable.

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