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°≥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.

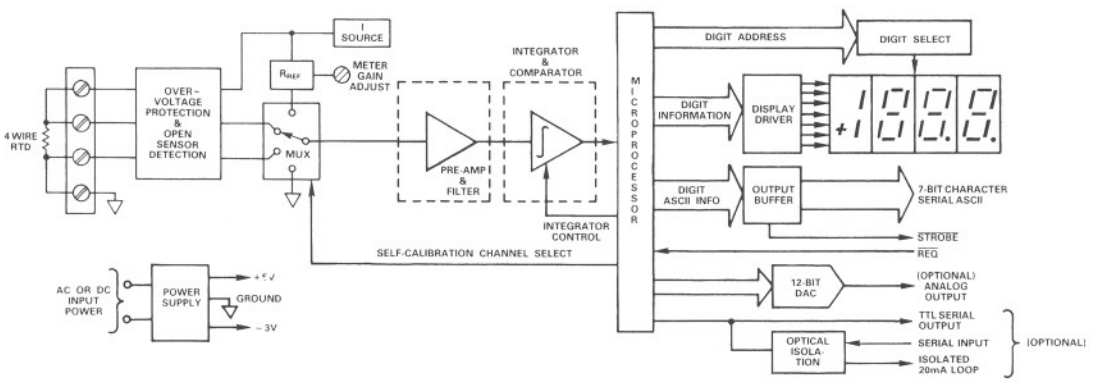

Figure 1. AD2060 & AD2061 Functional Block Diagram

Route 1 Industrial Park; P.O. Box 280; Norwood, Mass. 02062
Tel: 617/329-4700 **TWX: 710/394-6577**
West Coast 714/641-9391 **Mid-West 312/653-5000** **Texas 214/231-5094**

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
  $\overline{\text{Strobe}}$: 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
- $\overline{\text{REQ}}$: Low-Level Triggered: Must go low at any time other than during data transmission to be recognized. $\overline{\text{REQ}}$ 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 $\overline{\text{REQ}}$.
- $\overline{\text{SERIAL INPUT}}$ (Optional): Edge Triggered, Current On to Current Off: Must be triggered at any time other than during data transmission to be recognized. $\overline{\text{Serial Input}}$ 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 $\overline{\text{Serial Input}}$.

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: >55,000 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

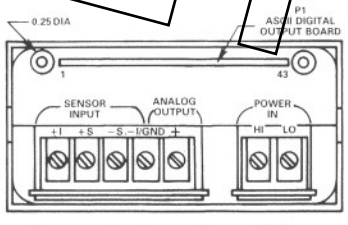

Figure 2. Rear Panel View

ORDERING GUIDE

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

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

} ENTER

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

} ENTER

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

} ENTER

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

} ENTER

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.

C832–15–4/84
PRINTED IN U.S.A.