

ATE-2 Handheld Calibrator

STANDARD BASE UNIT FEATURES

- **Data logging**
- **IP65 / NEMA 4X enclosure**
- **Onboard 24Vdc loop power supply (non-intrinsically safe version)**
- **Optional intrinsically safe approvals (FM, ATEX, CSA)**
- **SD memory card slot**
- **USB interface**
- **13 Engineering units of measure**
- **Large back lit display**
- **180 Degree flip display**
- **Programmable damping**
- **Switch test function**
- **Percent error function**
- **Min/max recall**
- **Push-button zero adjust**
- **Tare function**
- **Hot swap capability**

The Ashcroft ATE-2 calibrator is designed to measure pressure, temperature, voltage or current. It includes the capability to display up to two modules and one electrical measurement simultaneously, along with logging data to internal memory or communicating directly to a PC via USB connection.

The ATE-2 has a wide selection of pressure modules, covering ranges from 0.25 inches H₂O through 10,000 psi. The base unit design allows the user to operate one or two modules. Modules are interchangeable, and can be changed without the need of tools, minimizing downtime.

The ATE-2 provides a large LCD display for ease of reading measurements and configuring the calibrator.

The unique product platform also includes data logging; with internal storage capacity for up to 16,000 records on up to 64 data log files that can be transferred to an SD card.

A wide range of approvals including UL, FM, ATEX and CSA make the ATE-2 a popular choice worldwide.



“larger, brighter display for ease of use”



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ATE-2 STANDARD FUNCTIONS

- **Data logging** allows the user to save pressure, temperature and or electronic values displayed on the LCD to internal memory. Internal memory can hold up to 64 data log files and a total of up to 16,000 individual records. Manual logging is initiated with a single key press. Automatic data logging can be programmed to collect data at timed intervals between 0.1 second and 24 hours.
- **SD Memory Card Slot** gives the ATE-2 additional data storage capability limited only by the capacity of the SD card installed. Data logs stored on the SD card are saved in .csv format which can be read by most spreadsheet programs. Data can easily be transferred from the ATE-2 to a PC.
- **Loop Power Supply** is a standard feature on non-I.S. units, and allows the user to conveniently power the device under test with 24Vdc up to 35mA.
- **Percent Error Function** can be used when calibrating pressure transducers. Calculations are performed by the ATE-2 eliminating potential for human errors. This function enables the user to program the full scale range and electrical output of the transducer under test and will display the actual pressure and electrical output readings as well as a percentage value comparing the actual output to the theoretical output.
- **Switch Test Function** allows the operator to calibrate and document the pressure switch function. The on-board display will show pressure switch trip point, reset point and will calculate switch deadband. All calculations are performed by the ATE-2 eliminating potential for human errors.
- **Dual Mode Function** allows the operator to add or subtract the measured pressure values from two installed Quick-Select™ pressure modules. This allows for measurement of “high-line” or elevated static differential pressures. This feature also offers the ability to add barometric pressure from an absolute pressure module to the measured pressure from a gauge pressure module, giving the user the ability to measure a variety of absolute pressures without using designated modules.

BASE UNIT SPECIFICATIONS

Ashcroft Model:

ATE-2

Dimensions:

8.7 in. (L) x 5.1 in. (W) x 3.8 in. (H)

Unit Weight (no modules):

2.4 lbs

Case Material:

High-impact PC-ABS

Enclosure:

IP65 / NEMA 4X

Sensor Module Capacity:

Two bays for Ashcroft AM2 sensor modules

LCD Display:

2.5" (W) x 1.5" (H); displays three (3) simultaneous measurements, bar graph, back light and flip-screen capability

Electrical Connection:

4mm banana jacks – 1 set of test leads included with each ATE-2

Loop Power Supply:

24Vdc-35mA maximum (non I.S. only)

Available Engineering Units:

psi, in.H₂O, in.Hg, ftSW, bar, mbar, kPa, MPa, mmHg, cmH₂O, mmH₂O, kg/cm², User Programmable

Operating Temperature Range:

–4 to 120°F (–20 to 49°C)

Storage Temperature:

–4 to 158°F (–20 to 70°C)

Update Rate:

100ms – 1 module installed

200ms – 2 modules installed

300ms – 2 modules installed and external input

Resolution:

±0.001% span; 99,999 counts

Warm-Up Time:

5 minutes for rated accuracy

Electrical Measurements:

0-20mA or 0-30Vdc

Input	Volts	Accuracy
	0/10 Vdc	±0.025% fs
	10/30 Vdc	±0.10% fs
	0-20mA	±0.03% fs

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Programmable Filtering (Damping):

Levels 1 through 16

Temperature Effect Electrical Measurement:

±0.001% of span per F over compensated range from reference temperature of 70°F (±3°F)

Serial Interface:

USB (Micro-B connector type)

Field Calibration: Base Unit and pressure modules may be field-calibrated via keypad commands

Data Logging:

- Internal storage for up to 64 data logs and up to 16,000 records; transferrable to SD card
- Manual / automatic data logging capability
- Programmable data intervals (0.1 sec. to 24 hrs.)

Agency Approvals:

CE Mark, FCC (CFR47), UL 61010-1

OPTIONAL FEATURES

Hazardous Location Version

(Battery Powered Only):

FM Intrinsic Safety CL 1,

Div 1, Gr A, B, C, D

CSA Intrinsic Safety CL 1,

Div 1, Gr A, B, C, D

ATEX Ex ia ii c T4 Ga -20°C<Ta<+50°C

Note: Loop power supply is not included with Intrinsically Safe Units

Power Requirements:

(4) AA Batteries or via USB power supply

USB universal AC adapter 100-240Vac, 50/60 Hz

Battery Life:

Up to 40 hours battery with 2 modules installed

Certification:

N.I.S.T. traceable certification document provided for base unit and Quick-Select sensor modules.

HOW TO ORDER ATE-2 BASE UNIT

P/N	Description	Version
ATE2ST	Ashcroft Base Unit	(ST) Standard
ATE2IS	Ashcroft Base Unit	(IS) Intrinsically Safe



“a large variety of pressure and temperature modules are available”

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OPTIONAL PRESSURE MODULE FEATURES

- **AM2-1 Low Pressure Module**
- **AM2-2 Medium/High Pressure Module**
- **Hot Swap**
- **Accuracies from 0.025% to 0.1%**
- **Low Pressure Ranges from ± 0.25 InH₂O to 200 InH₂O**
- **Medium/High Pressure Ranges from 5 psi up to 10,000 psi**
- **Gauge, Absolute, Differential, Vacuum and Compound Ranges**

Quick-Select™ Pressure Modules

Available in full-scale ranges from 0.25 inches H₂O through 10,000 psi. Gauge, vacuum, absolute, differential or compound pressure ranges are available.

Select from multiple modules that can be quickly interchanged (“hot-swapped”) without the use of tools, and are automatically recognized once installed in the base unit.

Ashcroft Low Pressure Module AM2-1

The AM2-1 Quick-Select low pressure module is based on a proprietary, variable-capacitance sensor. This sensor is available in ranges from 0.25 to 0/200 inches H₂O with accuracies from $\pm 0.1\%$ to $\pm 0.06\%$ of span, and are available for gauge, differential and compound pressures. They are suitable for use with dry, non-corrosive gases

The variable-capacitance sensing element incorporates a micro-machined silicon diaphragm. Silicon provides optimum repeatability with minimal hysteresis. The sensor is extremely stable, due to the sputtered metal capacitance plates being molecularly bonded to the silicon. This design eliminates adhesives from the sensor assembly.

The AM2-1 sensor is also extremely rugged. It can withstand extreme overpressure, shock and vibration without significant error or calibration offset.

Ashcroft Medium / High Pressure Module AM2-2

The AM2-2 Quick-Select pressure module incorporates a piezoresistive, micro-machined silicon sensor. These sensors are available in ranges from 5 psi through 0-10,000 psi, and are also offered in absolute, vacuum and compound ranges with accuracies from 0.025% to 0.1% of span. 316 SS sensor isolation is provided on all ranges except for 10,000 psi which is 17-4 PH stainless steel, and is suitable for applications involving fluids or corrosive gases.

Optional enhanced accuracy eliminates temperature error over the entire compensated temperature range of high pressure modules.

OPTIONAL PRESSURE SENSOR MODULE SPECIFICATIONS

AM2-1 LOW PRESSURE MODULE

Pressure Types:

Gauge, differential and compound

Available Ranges:

Refer to Range Table

Available Accuracies:

± 0.06 (0/1-0/200” in.H₂O),
 ± 0.07 (0/0.25-0/0.5” in.H₂O), or 0.1% of Span

Compensated Temperature Range:

20 to 120°F (-7 to 49°C)

Temperature Effect:

$\pm 0.004\%$ of Span per °F over compensated range from reference temperature range of 70°F (± 3 degrees)

Repeatability:

$\pm 0.01\%$ of Span (range 0/1 in.H₂O or higher)
 $\pm 0.02\%$ of Span (range below 1.0 in.H₂O)

Sensitivity:

$\pm 0.002\%$ of Span (typical)

Media Compatibility:

Clean, dry, non-conductive, non-corrosive gas

Under / Overpressure Capability:

-15 to 50 psi

Maximum Static (line) Pressure:

100 psi

Process Connection:

Standard 1/8 NPT Female

Agency Approvals:

FCC (CFR47), UL-61010-1
 Not RoHS compliant

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AM2-2 MEDIUM / HIGH PRESSURE MODULE

Pressure Types:

Gauge, absolute, compound and vacuum

Available Ranges:

Refer to Range Table

Available Accuracies:

±0.025%, 0.05% or 0.1% of Span (10,000 psi only offered in psig and 0.1% accuracy)

Compensated Temperature Range:

20 to 120°F (-7 to 49°C)

Temperature Effect:

Standard:

±0.004% of Span per °F over compensated range from reference temperature range of 70°F (±3 degrees)

Optional:

Enhanced Accuracy Option.

No additional error due to ambient temperature from +20°F to +120°F

Sensitivity:

±0.002% of Span (typical), ±0.001 span (max)

Repeatability:

±0.01% of Span

Media Compatibility:

Any medium compatible with 316 SS isolation; 10,000 psi range only available with 17-4 PH / 316 SS

Optional:

Cleaned for Oxygen Service

Overpressure Compatibility:

200% for ranges to 1000 psi

150% for ranges > 1000 psi

Agency Approvals:

CE, FCC (CFR47), UL-61010-1

Process Connection:

Standard: 1/8 Female NPT

Optional: 1/8 Female NPT with Flush Port

Optional: Welded VCR Fitting with Standard Finish (up to 5000 psi)

HOW TO ORDER PRESSURE MODULES

Refer to Product Ordering Table on Pages 6 and 7



“hot-swap modules without the use of tools”

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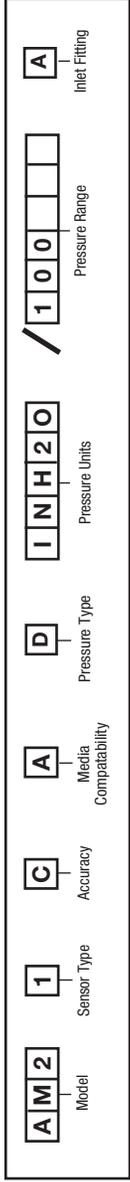
PRODUCT CODE – LOW PRESSURE MODULES

MODEL	SENSOR TYPE	ACCURACY	MEDIA COMPATIBILITY	PRESSURE TYPE	PRESSURE UNITS	InH ₂ O	mmHG	kPa	mbar	cmH ₂ O	mmH ₂ O	INLET FITTING
AM2	1	C	A	D	INH2O							A
AM2-ASHCROFT MODULE	1 - CAPACITIVE SENSOR	B - .1% STD. ACCURACY C - .06% STD. ACCURACY C - .07% STD. ACCURACY	A - NON-ISOLATED SENSOR	C - COMPOUND D - DIFFERENTIAL	InH ₂ O mmHG kPa mBar cmH ₂ O mmH ₂ O	0.25 0.5 1 2 3 5 10 20 30 50 100 200 300 500	0.5 1 2 3 5 10 20 30 40 60 100 200 300 500	0.2 0.5 1 2.5 4 6 10 25 40 60 100 200 250 400 500	0.6 1 2.5 4 6 10 25 40 60 100 200 250 400 500	0.6 1.5 3 5 6 15 30 60 150 300 600 1500 2000 5000	6 15 30 50 60 150 300 600 1500 2000 5000 3000	A - 1/8 NPT INTERNAL
DIFFERENTIAL PRESSURE RANGES												
COMPOUND PRESSURE RANGES (All prefixed by +/- sign)												
						0.125	0.2	0.1	0.25	0.3	3	
						0.25	0.5	0.25	0.6	0.6	6	
						0.5	1	0.4	1	1.5	15	
						1	2	0.6	2.5	3	30	
						1.5	3	1	4	5	50	
						2.5	5	1.6	6	6	60	
						5	10	2.5	10	15	150	
						7.5	15	6	16	20	200	
						12.5	20	10	25	30	300	
						25	50	25	60	60	600	
						50	75		100	150	1500	
						75	100		160	200	2000	
						100	150		250	300	3000	
						200	200					

Note: Pressure range codes which contain a decimal point will be designated with a letter 'P'. For example 0.5 code is P5

Note: "C" accuracy is 0.06% for ranges 1.0 inH₂O and higher.
"C" accuracy is 0.07% for ranges below 1.0 inH₂O (shaded val-

Product Code Example:



PRODUCT CODE – MEDIUM & HIGH PRESSURE MODULES

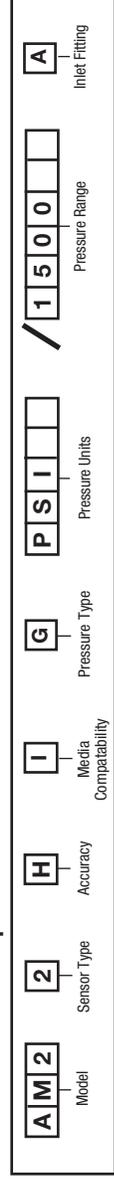
MODEL	SENSOR TYPE	ACCURACY	MEDIA COMPATIBILITY	PRESSURE TYPE	PRESSURE UNITS	psi	InH ₂ O	InHG	kPa	mbar	cmH ₂ O	mmHG	BAR kgcm ²	Mpa	mmH ₂ O	INLET FITTING
GAUGE / ABSOLUTE PRESSURE RANGES																
AM2	2 - PIEZO-RESISTIVE SENSOR	H	I	G	PSI	5	*100	10	*25	*250	*250	250	1	1	*3000	A
		B - .1% STD. ACCURACY	I - ISOLATED SENSOR	G - GAUGE	psi	10	150	20	40	*300	*300	500	1.6	1.6	5000	B - 1/8 NPT INTERNAL WITH FLUSH PORT
		C - .05% STD. ACCURACY	O - ISOLATED OXYGEN SERVICE	A - ABSOLUTE	InH ₂ O	15	250	30	60	400	400	750	2.5	2.5	10000	C - G 1/8 BRITISH STD THREAD
		D - .025% STD. ACCURACY		V - VACUUM	InHG	20	300	50	100	500	500	1000	4	4		D - G 1/8 BRITISH STD WITH FLUSH PORT
		F - .1% ENHANCED. ACCURACY		C - COMPOUND	kPa	30	400	100	160	600	600	1500	6	6		E - 0.3525-24 UNJF-3B INTERNAL THREAD MS3649-02
		G - .05% ENHANCED. ACCURACY			mBar	50	500	200	250	1000	1000	3000	10	10		
		H - .025% ENHANCED. ACCURACY			cmH ₂ O	60	800	300	400	1600	1600	5000	16	16		
					mmHg	100	1000	500	600	2000	2000		25	25		
					BAR	150			1000	2500	2500		40	40		
					Mpa	200				4000	4000		60	60		
					mmH ₂ O	250				5000	5000		100	100		
					kgcm ²	300				6000	6000		160	160		
						500				10000	10000		250	250		
						600							400	400		
						1000							500	500		
						1500										
						2000										
						2500										
						3000										
						5000										
						6000										
						7500										
						*10000										
VACUUM RANGES																
						10		20	60	600	600	500	0.6		5000	
						15		30	100	1000	1000	750	1			
COMPOUND PRESSURE RANGES (NOTE: All symmetric ranges prefixed with +/- sign)																
						5	100	10	25	300	300	300	0.25		3000	
						10	250	20	40	600	600	500	0.4		6000	
						V15	V400	V30	60	V1000	V1000	V750	0.6		V10000	
						V30		V60	V100	V2000	V2000	V1500	V1			
						V60		V100	V200	V4000	V4000	V3000	V2			
									V400				V4			

-NOTE: 10,000 PSI = 0.1% ACCURACY AND GAUGE PRESSURE ONLY

* = Gauge pressure only (no absolute)

Note: Pressure range codes which contain a decimal point will be designated with a letter "P". For example 0.5 code is P5

Product Code Example:



ATE-2 Handheld Calibrator

OPTIONAL TEMPERATURE MODULE FEATURES

- Measures temperature with most RTD probes
- Supports 2, 3 & 4-wire RTDs
- Displays measurement for Fahrenheit, Celsius, Kelvin, Rankine and ohms
- Easy configurability to meet application requirements

The Ashcroft ATE-2 provides accurate temperature measurement when using the AM2-RT module with an RTD probe. This system supports the most common RTD's without requiring operator input of probe characterization data; each module comes factory-programmed with standard curves for Pt100 (385 & 392), Ni 120, Cu 10 and temperature probes.

The setup menu allows the operator to choose configurations for 2, 3 or 4 wire RTD probes and decimal resolution. The temperature measurement system includes the ability to automatically track minimum / maximum values.

RTD TEMPERATURE MODULE SPECIFICATIONS:

Following specification is based on use of 4 wire RTD probe; accuracy does not include contribution from RTD

Part Number:

AM2-RT1, AM2-RT2

AM2-RT1 MODULE

Used with RTD Probe Type	Measurement Range and Accuracy	Resolution*
Pt100 (385 & 392)	-200 to 550°C: $\pm 0.15^\circ\text{C}$ 550 to 850°C: $\pm 0.2^\circ\text{C}$	0.01°C or F
Ni 120	-80 to 260°C: $\pm 0.1^\circ\text{C}$	0.1°C or F
Cu 10	-70 to 150°C: $\pm 0.6^\circ\text{C}$	0.1°C or F
Ohms	$\pm 0.01\%$ reading ± 0.02 ohms	0.004 ohms

AM2-RT2 MODULE

Used with RTD Probe Type	Measurement Range and Accuracy	Resolution*
Pt1000	-200 to 550°C: $\pm 0.15^\circ\text{C}$	0.01°C or F
Ohms	$\pm 0.01\%$ reading ± 0.02 ohms	0.004 ohms

*Select from 1, 0.1, 0.01 and 0.001 degrees or ohms. Resolution for a given probe is dependent on the output of the probe. Maximum resolution is 1 part in 100,000 of full scale ohms. Select from 1, 0.1, 0.01 and 0.001 degrees or output for the probe.

Temperature Error: Better than $\pm 0.0005\%$ of reading per degree Fahrenheit from a reference temperature of $70^\circ \pm 3^\circ$ degrees F°

Input Receptacle: TA4F type RTD connector

HOW TO ORDER RTD PROBES FOR USE WITH AM2-RT1 MODULE

Probes are all 4 wire RTD's with 304 stainless steel sheath an a installed TA4F electrical connector for compatibility with AM2-RT1 interface modules. They are provided in DIN Class A accuracy.

HOW TO ORDER RTD PROBES

Part No.	Description
840X010-01	Pt100 (385), 0.125 diameter, 12 inch length, handle and 5 ft. coiled cable
840X010-02	Pt100 (385), 0.25 diameter, 12 inch length, handle and 5 ft. coiled cable
840X010-05	Pt100 (385), 0.125 diameter, 6 inch length, handle and 5 ft. coiled cable
840X010-06	Pt100 (385), 0.25 diameter, 6 inch length, handle and 5 ft. coiled cable
840X010-11	Pt100 (385), 0.125 diameter, 8 inch length, handle and 5 ft. coiled cable
840X010-03	Pt100 (385), 0.125 diameter, 12 inch length, 10 ft. straight extension lead with plug (no handle)
840X010-04	Pt100 (385), 0.25 diameter, 12 inch length, 10 ft. straight extension lead with plug (no handle)
840X010-07	Pt100 (385), 0.125 diameter, 6 inch length, 10 ft. straight extension lead with plug (no handle)
840X010-08	Pt100 (385), 0.25 diameter, 6 inch length, 10 ft. straight extension lead with plug (no handle)
828X136-01	TA4F mating connector for use with AM2-RT1 module and user supplied RTD probe



ATE-2 Handheld Calibrator

AM2-TC1 QUICK-SELECT OPTIONAL THERMOCOUPLE MODULE FEATURES

- Allows ATE-2 to measure temperature with a thermocouple
- Pre-programmed to accept 8 most common thermocouple types
- Selectable units of measure: Celsius, Fahrenheit, Kelvin, Rankine and millivolts
- Reference junctions: automatic internal or manual external



With the AM2-TC1 interface module installed, the ATE-2 contains programming to read types J, K, T, E, R, S, B and N thermocouples and display the measurement in units of temperature measure or millivolts. Other types of thermocouples may also be read by using the direct millivolt readout.

THERMOCOUPLE TEMPERATURE MODULE SPECIFICATIONS

Part Number:
AM2-TC1

Unit of Measure (selectable): °C, °F, °K, °R and millivolts

Reference Junction (selectable):

Automatic Mode: The AM2-TC1 module incorporates an internal resistor/thermistor based reference junction, which may be selected for use in the temperature readout mode.

Manual Mode: An external reference junction may be used in place of the internal junction. External reference junctions may be applied in the temperature or direct millivolt readout modes.

Resolution Reading in Temperature Units (selectable):

1, .1 or .01 degrees. "Auto" mode selection that allows the ATE-2 to automatically configure the readout to the highest significant resolution (resolution closest to the tolerance) for the thermocouple type selected.

Resolution Reading in Millivolts: .001 millivolts

Thermocouple Connection (to interface module):

Requires a "miniature thermocouple connector" (Omega type SMP), specifically matched to the thermocouple type to be used. These connectors may be purchased as an accessory under the following part numbers:

HOW TO ORDER THERMOCOUPLE CONNECTOR

Part No.	Description
828X161-01	Type J Connector
828X161-02	Type K Connector
828X161-03	Type T Connector
828X161-04	Type E Connector
828X161-05	Type R Connector
828X161-06	Type S Connector
828X161-07	Type B Connector
828X161-08	Type N Connector

SYSTEM ACCURACY (READING IN TEMPERATURE UNITS):

Includes the base unit and AM2-TC1 interface module. (Does not include inaccuracy of the thermocouple device. Consult thermocouple manufacturer or ANSI MC96.1 for thermocouple accuracy specifications. Typical inaccuracies range from ±1 to ±2.2°C.)

Conversion Factors to convert °C specifications to other units of measure:

To convert from C to F; $F = (1.8 \times C) + 32$

To convert from C to K; $K = C + 273.15$

To convert from C to R; $R = (1.8 \times C) + 427.67$

Additional Thermocouple Information on the following page.

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THERMOCOUPLE SPECIFICATION TABLE

Thermocouple Type	Measurement Range (°C)	Accuracy @ 25°C (Not Including Internal Reference Junction) Expressed as ±°C	Accuracy @ 25°C (Including Internal Reference Junction) Expressed as ±°C	Max Additional Error Due to Ambient Temperature Deviation From 25°C. Expressed as Additional °C Deviation from 25°C
J	-210 to -151 -150 to 1200	0.7 0.3	1.1 0.4	0.02 0.01
K	-240 to -201 -200 to -101 -100 to 999	1.5 1.0 0.5	2.2 1.5 0.8	0.05 0.03 0.02
T	-250 to -201 -200 to -101 -100 to 400	1.5 0.8 0.5	2.2 1.2 0.8	0.05 0.03 0.02
E	-250 to -201 -200 to -101 -100 to 400	1.2 0.6 0.3	2.0 1.1 0.6	0.04 0.02 0.01
R & S	-50 to 299 300 to 1768	3.4 1.2	3.6 1.3	0.10 0.04
B	100 to 199 200 to 499 500 to 999 1000 to 1820	14.0 5.0 3.0 1.2	14.0 5.0 3.0 1.2	0.44 0.16 0.08 0.04
N	-250 to -226 -225 to -101 -100 to 1300	4.3 2.1 1.0	5.7 2.8 1.4	0.14 0.07 0.02

AMBIENT TEMPERATURE EFFECT:

To calculate, multiply degrees deviation from 25°C times the value listed in the far right column of the listed table. Only applied when using the internal reference junction, within the ambient window of 0-50°C.

TO CALCULATE TOTAL SYSTEM/MEASUREMENT ACCURACY:

Accuracy = System Accuracy @ 25°C + System Ambient Temperature Effect + Inaccuracy of Thermocouple Device

SYSTEM ACCURACY (BASED ON DIRECT MILLIVOLT READING FROM THERMOCOUPLE):

Includes the base unit and AM2-TC1 interface module. (Does not include inaccuracy due to the thermocouple device. Reference junction not applicable to direct millivolt readings.)

Input Range of Module	Accuracy @ 25°C	Max. Additional Error Due to Ambient Temperature Deviation From 25°C. Expressed As Additional Millivolt Error Per Each °C Deviation From 25°C
10 to 100mV	±0.01 to 100mV	.001

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OPTIONS

Carrying, Transport and Protective Cases:



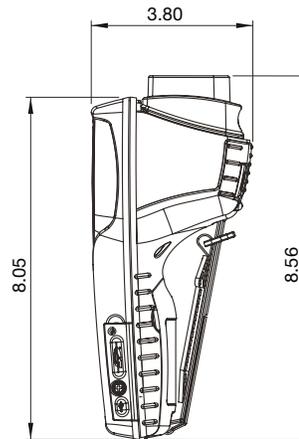
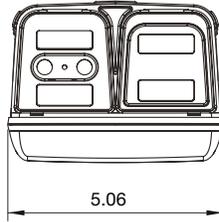
Contoured: Protective Instrument Case with Shoulder Strap. P/N 864D079-01



Heavy Duty, Watertight Instrument Carrying / Transport Case. P/N ATE2-CASE

DIMENSIONS

Base Unit



Carrying Case

