2180A, 2189A & 2190A

GPIB IEEE-488

RS-232

2189A Thermometry System

2180A, 2189A & 2190A TemPak Series

- 0.01° resolution for the 2180A and 2189A and 0.1° resolution for the 2190A
- Capable of running off of 12V dc or ac line power
- Designed to be integrated with a wide variety of instruments and accessories
- °C of °F is selectable via a front panel switch
- A full five digit LED display
- Analog and digital (RS-232-C or GPIB/IEEE-488) output options are available
- The limits option allows peak and valley memory, alarms and delta
- The 2189A consists of a 2180A and plantinum RTD probe for greater accuracy
- 6 different RTD types are switch selectable. 4 platinum, 1 nickel, 1 copper (2180A)
- 15 different thermocouple linearizations including 2 DIN and 3 JIS standards (2190A)

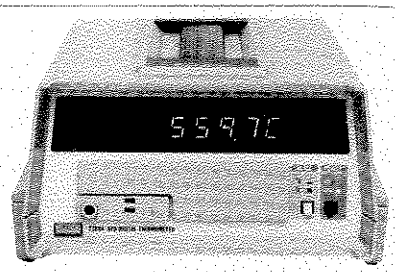
Fluke's most accurate and versatile general purpose digital thermometers are the 2180A and 2189A for RTDs and the 2190A for thermocouples. State-of-the-art accuracy teams with a large family of options and accessories to let you make precision temperature measurements in the lab or out in the field.

The 2180A RTD Digital Thermometer lets you switch-select one of six different types of RTDs, four platinum, one nickel, and one copper. Resolution is 0.01 degrees.

The 2189A Thermometry System consists of a 2180A that is factory-matched to a precision Y2039 Platinum RTD Probe.

The 2190A Thermocouple Digital Thermometer supports ten different thermocouple types, including two that comply to European DIN standards and three to Japanese standards. Resolution is 0.1 degrees. Take your choice from three different standard combinations of thermocouple types.

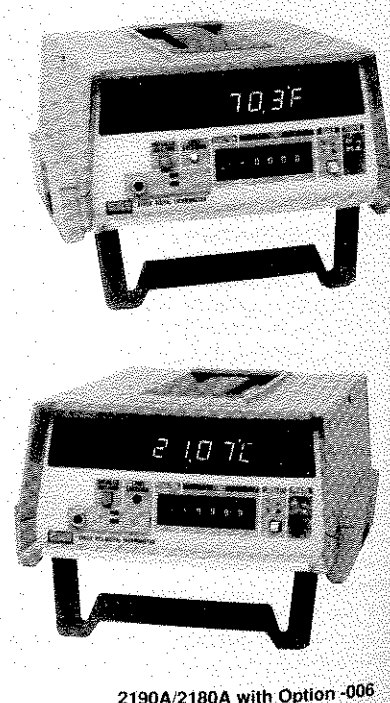
Each thermometer features a bright, high resolution LED display with pushbutton selection of Fahrenheit or Celsius readings. Each is capable of being run from either ac line power or external 12V dc, for field portability.



2180A without Option -006

Output Option -002, -004 and Limits Option -006 are usable with any of the three thermometers. Other accessory items electronically connect and stack and latch to the 2180A or 2190A. These include manual multipoints, multiple alarms, a battery pack, and a thermocouple thermometer calibrator. Some are also practical to use with the 2189A.

For automatic scanning, see the section on the 2300A Scanner. A 2020A or 2030A Printer allows you to permanently store data when used with a 2180A or 2190A configured with an output option. Portable temperature logging is available with the factory-tested Temperature Logging Systems — 2383A or 2393A.



2190A/2180A with Option -006

Limits Option (-006)

This option adds three powerful functions to the 2180A and 2190A Thermometers: Alarms, Peak Memory, and Delta. The Alarms function lights an indicator and closes a relay to activate external devices whenever a single preset maximum or minimum set-point is exceeded. Peak Memory stores the highest and lowest temperature reading for later recall. And Delta automatically subtracts a thumbwheel setting from the actual measurement and displays the difference.

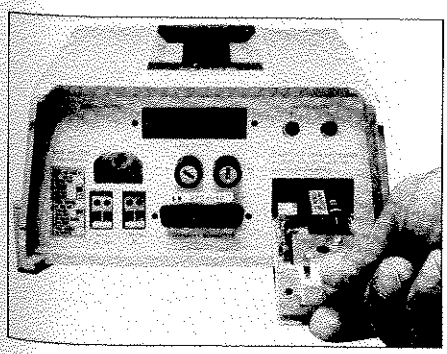
IEEE-488 Option (-004)

The 21X0-004 is an GPIB/IEEE-488* output option for the 2180A, 2189A and 2190A thermometers. This option mounts within the thermometer in the same location as the 21X0A-002. Readings are taken in response to an SRQ from the option by an IEEE-488 controller. This interface option does not include analog output capability. For applications requiring analog output and IEEE-488, use Option -002, 2XXXA-522, 1120A and Y7203. Not for use in a 2300A Scanner System.

Output Option (-002)

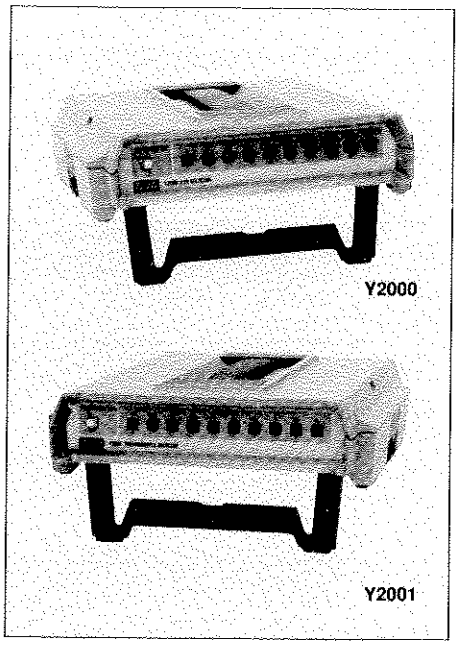
For recording temperature measurements with a 2180A, 2189A, or 2190A, you can use Output Option -002. It provides both an analog output for chart recorders and a digital output for printers or computers, and may be installed in the field. The digital output is available in four forms, depending on connector pins and cabling used: Parallel ASCII, RS-232-C, TTY current loop, and IEEE-488 (using the Fluke 1120A Translator). The Y2026B RS-232-C Cable Adapter is available to convert the 36-pin PTI connector on the option to a standard 25-pin RS-232-C connector, or the user can wire his own cable to the connector provided.

Option -002 is required when the thermometer is being used with a Fluke 2020A-004 or 2030A Printer unless a 2300A Scanner is used.



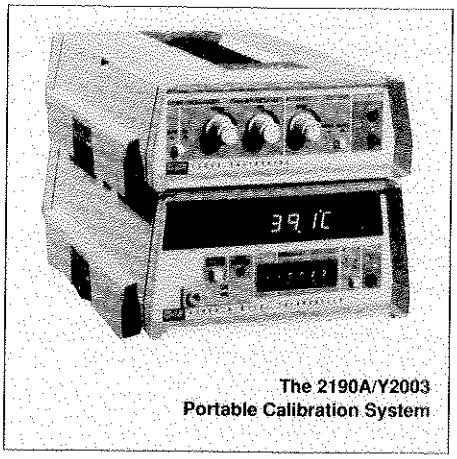
Rear view of 2190A showing the (A) Output Option -002 Connector, (B) Y2030 Thermocouple Input Module, and (C) Limits Option -006 Relay Output.

** The terms GPIB and IEEE-488 may be used interchangeably throughout this catalog.*



Multipoint Selector (Y2000 & Y2001)

The Y2000 RTD Multipoint Selector (for the 2180A) and the Y2001 Thermocouple Multipoint Selector (for the 2190A) increase the number of points your thermometer can monitor. Connect up to ten sensors to each multipoint selector. Cascade up to ten multipoint selectors for up to 100 measuring points—all using a single 2180A or 2190A Thermometer. Both units have ten pushbuttons to easily access a specific measurement point. To measure or monitor more than one type of RTD or thermocouple, take advantage of internal switching. This allows you to monitor five sensors of one type, five of another. With Output Option -002 or -004 installed, the channel number is sent to your printer or computer, too. For automatic scanning applications see the 2300A, 2383A and 2393A.

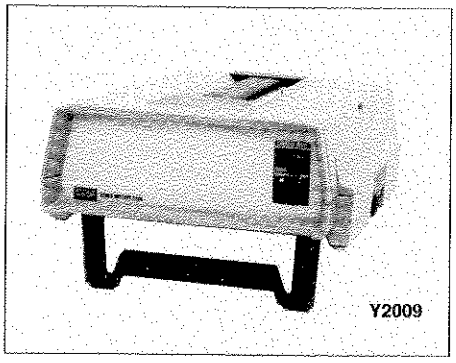


The 2190A/Y2003 Portable Calibration System

Thermometer Calibration (Y2003)

The Y2003 Thermometer Calibrator and 2190A Digital Thermocouple Thermometer can be used together to check the accuracy of a thermocouple or millivolt-measuring or recording instrument.

Accurate and completely portable, the Y2003-2190A combination provides a variable voltage output from -10mV to +90mV. The output voltage simulates a thermocouple output, so that the reading on the 2190A Thermometer can be compared with a corresponding reading on any other thermocouple thermometer, either analog or digital. In addition, the Y2003 and 2190A can be used to calibrate millivolt chart recorders and digital or analog indicators measuring to 90 mV. Besides being used as a portable calibration system, the Y2003 can be used as a battery pack for the 2190A. See Y2009 below for battery usage details. For more information ask for Bulletin B0059.



Battery Pack (Y2009)

The Y2009 Battery Pack is a rechargeable, self-contained 12V dc nickel-cadmium supply for up to five hours of continuous operation. An indicator light tells you when batteries are low, while an automatic cut-off prevents damage to the cells from excessive discharge.

Specifications

2180A & 2190A Specifications

2180A RTD Thermometer

RTD Types: 100Ω Pt, 385 (DIN), 390, 3916, or 392; 100Ω Ni (DIN); 10Ω Cu; 0 to 999Ω resistance — switch-selectable

Resolution: 100Ω Pt RTDs: 0.01°, autoranging to 0.1° above 204°C; 100Ω Ni RTDs: 0.01°, autoranging to 0.1° above 93°C; 10Ω Cu RTDs 0.1°.

Input Connection: 4-wire screw terminals. Terminals accept 3-wire and 2-wire RTDs at reduced accuracy

RTD Matching: User-performed potentiometer adjustment matches the 2180A to user's RTD to compensate for variations in lead length and resistance at 0°C

Lead Resistance: 4-wire: 200Ω max per lead for both 100Ω and 10Ω RTDs; 3-wire: 2Ω max per lead for 100Ω RTDs, 0.18Ω max per lead for 10Ω RTDs; 2-wire; 0.9Ω max per lead for 100Ω RTDs, 0.09Ω max per lead for 10Ω RTDs

Lead Resistance Error: 4-wire; no error, 3-wire 100Ω RTDs: 0.012° per degree per ohm; 3-wire 10Ω RTDs: 0.12° per degree per ohm; 2-wire 100Ω RTDs: 0.025° per degree per ohm; 2-wire 10Ω RTDs 0.25° per degree per ohm

2180A Linearizations (Type 2)*

RTD Type	Linearization Coefficients		
100Ω 385 Pt	DIN**43760 Table		
100Ω 390 Pt	ALPHA*	=	0.0038994
	DELTA*	=	1.494
	A4*	=	-0.265668×10^{-4}
	C4*	=	$-0.205984 \times 10^{-11}$
100Ω 3916 Pt	ALPHA*	=	0.003916
	DELTA*	=	1.505
	A4*	=	-0.099668×10^{-5}
	C4*	=	$-0.271142 \times 10^{-12}$
100Ω 392 Pt	ALPHA*	=	0.0039221
	DELTA*	=	1.493
	A4*	=	-0.38668×10^{-5}
	C4*	=	$+0.192912 \times 10^{-13}$
100Ω 617 Ni	DIN** 43760 Table		
10Ω*** Cu	RO	=	9.042 Ohms
	R25	=	10.005 Ohms
	ALPHA	=	0.004260

**See IPTS 68 equations in NBS Monograph 126. Type 1 no longer available.*
***European Standard.*
****Contact factory for information on the 2180A/AT for 10Ω, 3 wire applications.*

2180A Accuracy (Type 2)* (Celsius)

RTDs		Maximum Error* ±Degrees C		
Type	Applicable Portion of Temperature Range °C	At Cal	90 Days 20°C to 30°C	1 Year 15°C to 35°C
100Ω	-190 to 0	0.043	0.089	0.112
	0 to 204	0.043	0.132	0.173
385 Pt	-190 to 0	0.11	0.12	0.14
	0 to 750	0.11	0.26	0.37
100Ω	-200 to 0	0.009	0.055	0.078
	0 to 204	0.009	0.098	0.139
390 Pt	-200 to 0	0.08	0.10	0.11
	0 to 750	0.08	0.23	0.32
100Ω	-200 to 0	0.040	0.086	0.109
	0 to 204	0.040	0.13	0.171
3916 Pt	-200 to 0	0.11	0.12	0.14
	0 to 750	0.10	0.26	0.34
100Ω	-200 to 0	0.008	0.055	0.078
	0 to 204	0.009	0.098	0.139
392 Pt	-200 to 0	0.08	0.10	0.11
	0 to 750	0.08	0.23	0.32
100Ω	-60 to 0	0.129	0.157	0.172
	0 to 93	0.129	0.176	0.199
617 Ni	-60 to 0	0.19	0.20	0.21
	0 to 177	0.19	0.22	0.25
10Ω Cu	-75 to 0	0.16	0.18	0.19
	0 to 150	0.16	0.20	0.23
Ohms	0 to 196.99	0.005	0.042	0.059
	0 to 999.99	0.05	0.22	0.31

2180A Accuracy (Type 2)* (Fahrenheit)

RTDs		Maximum Error* ±Degrees F		
Type	Applicable Portion of Temperature Range °F	At Cal	90 Days 20°F to 30°F	1 Year 15°F to 35°F
100Ω	-309.9 to 32	0.076	0.161	0.203
	32 to 399.2	0.076	0.239	0.314
385 Pt	-309.9 to 32	0.18	0.21	0.24
	32 to 1382.0	0.18	0.46	0.62
100Ω	-327.9 to 32	0.015	0.100	0.142
	32 to 399.2	0.015	0.177	0.252
390 Pt	-327.9 to 32	0.13	0.16	0.19
	32 to 1382.2	0.13	0.41	0.57
100Ω	-327.9 to 32	0.071	0.156	0.198
	32 to399.2	0.071	0.234	0.309
3916 Pt	-327.9* to 32	0.17	0.21	0.24
	32 to 1382.2	0.17	0.46	0.62
100Ω	-327.9 to 32	0.014	0.099	0.141
	32 to 399.2	0.014	0.177	0.252
392 Pt	-327.9 to 32	0.12	0.16	0.19
	32 to 1382.2	0.12	0.41	0.57
100Ω	-76 to 32	0.230	0.282	0.308
	32 to 199.4	0.231	0.317	0.359
617 Ni	-76 to 32	0.33	0.39	0.35
	32 to 350.6	0.33	0.39	0.44
10Ω Cu	-103 to 32	0.27	0.31	0.34
	-103 to 302	0.27	0.35	0.41
Ohms	.005	All units In Ohms		
	.05			

Note: Shaded area is 0.01° resolution; unshaded area is 0.1° resolution.
**Total instrument accuracy. Does not include RTD probe errors. Valid for 4-wire RTDs only.*
Microcomputer Type 1 no longer available.

2189A Thermometry System

Includes Platinum RTD Probe Y2039 and a 2180A RTD Thermometer.

Maximum System error (±°C)

Temp. °C	At Calibration	90 Days 18°C-28°C Ambient	1 Year 18°C-28°C Ambient
Low Temperature Range...			
-183	(1)	(1)	(1)
-50	0.04	0.08	0.11
0	0.03	0.07	0.09
50	0.05	0.10	0.13
100	0.07	0.12	0.16
150	0.08	0.15	0.20
200	0.09	0.17	0.23
High Temperature Range...Periodic probe exposure*			
204	0.14	0.25	0.27
300	0.18	0.32	0.33
400	0.21	0.39	0.40
480	0.29	0.48	0.50

(1) The system operates down to -183°C but the probe calibration is not verified below -50°C. It is estimated that the accuracy below -50°C is the same as the accuracy at an equal temperature in the positive range. Low temperature calibrations are available as a special.
**Accuracy above 200°C is based on the user performing an Ice Point adjustment in accordance with the following schedule:*

Probe Exposure Temperature Range	Total Exposure Time Before Adjustment
200°C t0 350°C	500 hours
350°C to 480°C	250 hours

Exposure of the Y2039 at high temperatures for long periods of time may cause the probe to change its characteristics and require the accuracy specifications to be degraded. For example, there is a 20% probability that exposure at 480°C for 500 hours will require degrading. It is easy for the user to determine if degrading is necessary by measuring the Ice Point resistance of the probe. The 2189A Instruction Manual explains this degrading procedure.

2190A Specifications

Thermocouple Types: Five, switch-selectable. Which thermocouple types depends on your choice of microcomputer type. See Accuracy chart below.

2190A Accuracy* (Celsius)

RTDs		Maximum Error* ±Degrees C		
Type	Applicable Portion of Temperature Range °C	At Cal	90 Days 20°C to 30°C	1 Year 15 C to 35°C
Type 1				
J	-128 to 0	0.18	0.19	0.21
	0 to 900	0.18	0.31	0.36
K	-132 to 0	0.18	0.19	0.21
	0 to 1350	0.18	0.39	0.47
T	-243 to 0	0.18	0.20	0.22
	0 to 400	0.18	0.22	0.25
R	0 to 1708	0.31	0.59	0.70
C**	0 to 2471	0.18	0.60	0.75
Type 2				
J	-128 to 0	0.18	0.19	0.21
	0 to 900	0.18	0.31	0.36
K	-132 to 0	0.18	0.19	0.21
	0 to 1350	0.18	0.39	0.47
E	-252 to 0	0.18	0.20	0.22
	0 to1000	0.18	0.33	0.39
R	0 to 1708	0.31	0.59	0.70
S	0 to 1685	0.22	0.50	0.60
Type 3				
J DIN**	-100 to 0	0.18	0.19	0.20
	0 to 760	0.18	0.28	0.33
K	-50 to 0	0.18	0.18	0.20
	0 to 1372	0.18	0.39	0.48
T DIN**	-200 to 0	0.18	0.20	0.21
	0 to 400	0.18	0.22	0.25
B	420 to 1815	0.21	0.52	0.62
R	140 to 1700	0.18	0.46	0.46

2190A Accuracy* (Fahrenheit)

RTDs		Maximum Error* ±Degrees F		
Type	Applicable Portion of Temperature Range °F	At Cal	90 Days 20°F to 30°F	1 Year 15°F to 35°F
Type 1				
J	-198 to 32	0.20	0.23	0.26
	32 to 1652	0.20	0.47	0.58
K	-206 to 32	0.30	0.33	0.37
	32 to 2462	0.30	0.72	0.87
T	-405 to 32	0.30	0.35	0.39
	32 to 752	0.30	0.41	0.46
R	32 to 3106	0.47	1.01	1.20
C**	32 to 4480	0.30	1.11	1.37
Type 2				
J	-198 to 32	0.20	0.23	0.26
	32 to 1652	0.20	0.47	0.58
K	-206 to 32	0.30	0.33	0.37
	32 to 2462	0.30	0.72	0.87
E	-422 to 32	0.30	0.33	0.40
	32 to 1832	0.30	0.61	0.72
R	32 to 3106	0.47	1.01	1.20
S	32 to 3065	0.38	0.92	1.10
Type 3				
J DIN**	-148 to 32	0.30	0.32	0.36
	32 to 1400	0.30	0.52	0.61
K	-58 to 32	0.20	0.22	0.25
	32 to 2502	0.20	0.63	0.78
T DIN**	-328 to 32	0.30	0.34	0.38
	32 to 752	0.30	0.41	0.46
B	788 to 3299	0.37	0.95	1.15
R	284 to 3092	0.20	0.74	0.93

Total instrument accuracy. Does not include Thermocouple errors
**C designates Tungsten-5% Rhenium vs. Tungsten 26% Rhenium*
***DIN 43710, a European Standard until 1984*

Resolution: 0.1°C, °F
Input Connection: 2 wires on screw terminal isothermal block
Max Source Impedance: 2 kΩ
Overrange Detection: Flashing display
Open Circuit Detection: Source impedance of 3 kΩ or more causes of flashing "0C"
Repertoire: SH1, AH1, T6, LO, SR1, RLO, PPO, DC0, DT0, C0, E2
Service Request Usable: Yes
Power: Operates only when powered by AC line

14

2190A/AM Thermocouple Thermometer

The 2190A/AM is a modified 2190A thermometer with fifteen thermocouple linearizations instead of the standard five. The user can select any of the 15 thermocouple types by adjusting the configuration of a multiswitch. The Model 2190A/AM provides all of the benefits of the standard 2190A in accuracy and system capability. The 2190A/AMK is a kit for retrofitting existing 2190As. The 2190A/AM offers the Japanese (JIS) series and European (DIN) of linearizations as well as the U.S. N and D linearizations.

Specifications are equivalent to those of the standard 2190A. Thermocouple Types Supported: NBS types (J,K,T,C,R,E,S,B,N,D), DIN types (J,T), JIS Types (J,K,R)

Option Specifications

Output Option (-002)

Analog Output
Type: Linearized and isolated
Voltage: 1.0 mV/°C or °F to 5 mA max
Temperature Coefficient: 200 ppm/°C from 25°C
Noise: ≤100μV at 100 Hz bandwidth
Accuracy: ±0.1% of reading ±1mV
Drift: 200μV/°C from 25°C
Overload or Open Circuit: Zero volts via banana jacks

Digital Output
Types: Four, E.I.A. Standard RS-232-C, TTY current loop, parallel ASCII, and Fluke PTI
Connector: 36-pin AMP "Champ"
Serial Baud Rates: 110, 150, 300, 600, 1200, 2400, 4800, or 9600, switch-selectable
RS-232-C Signals: Transmitted Data, Request to Send, Clear to Send, Data Set Ready, Signal Common
Parallel ASCII Signals: Data: 8 lines; Instrument Address: 4 lines; Address Valid; Data Valid; Acknowledge: Ground; +5V
TTY Current Loop Signals: Source and controlled sink, 20 mA
Out-of Limit Signals: Exclamation point transmitted with Option -006 only

Limits Option (-006)

Limits Function: Lights LED and activates form A (SPST) reed relay when thumbwheel setpoint is exceeded. Reed relay rated 10 VA, 184V dc or 130V ac rms max, 0.5A max, resistive, Selectable either low (≤) or high (≥)
Min/Max Function: Continuously stores Min and Max temperature
Delta Function: Displays difference between thumbwheel setpoint and actual temperature
Thumbwheels: 6, for function, sign, and setpoint (±9999). Setpoint resolution is 1 degree.

Accessory Specifications

Y2000 RTD Multipoint Selector

Channels: Ten per Y2000, up to ten Y2000s per 2180A. Channel number sent to printer or computer when Output Option -002 or -004 are used
RTD Types: Same as 2180A. Two types per Y2000
Power: Supplied by 2180A
Interfacing: Attached 46-cm cable plugs into rear of 2180A or Y2002. Receptacle accepts cable chained from other Y2000s
Size and Weight: Style A PTI case, 1.4 kg (3.09 lb)

Y2001 Thermocouple Multipoint Selector

Channels: Ten per Y2001, up to ten Y2001s per 2190A. Channel number sent to printer or computer when OUtput Option -002 or -004 are used
Thermocouple Types: Same as 2190A. Two types per Y2001
Maximum Voltage Between Channels: 125V ac rms
Power: Supplied by 2190A
Interfacing: Attached 46-cm cable plugs into rear of 2190A or Y2002. Receptacle accepts cable chained from other Y2001s
Size and Weight: Style A PTI case, 1.6 kg (3.53 lb)

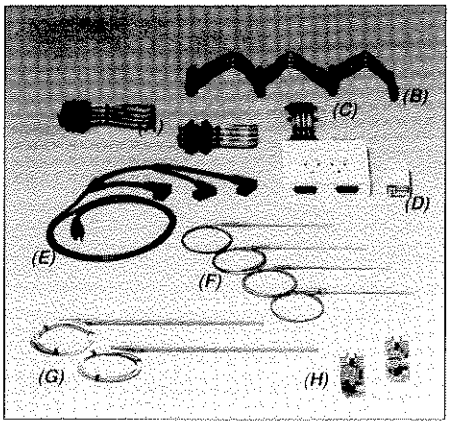
Y2003 Thermocouple Calibrator and Battery Pack

Thermocouple Types: Same as 2190A
Output Voltage: -10 mV to +90 mV, adjustable. Applied at input terminals of 2190A and thermocouple thermometer of less accuracy to be calibrated
Adjustments: Coarse, fine and offset
Battery Pack: Same specifications as Y2009
Interfacing: Attached 46-cm cable plugs into rear of 2190A
Size and Weight: Style B PTI case, 2.6 kg (5.74lb)

Y2009 Rechargeable Battery Pack

Output: 12V dc, 750 mA max
Battery: Ten 1/2-D size cells in drip-proof case
Operating Time: 5-6 hours typical at 25°C on full charge when connected to 2180A, 2190A
Recharge Time: 16 hours typical at 25°C
Charger: Built-in-on-off-switch, low-battery automatic discharge cut-off
Output Connectors: Rear panel screw terminal block
Operating and Storage Temperature: 0°C to 40°C
Power: 100, 120, 220, or 240V ac±10% selectable, 50 to 400 Hz; 10W, typical
Size and Weight: Style B PTI case, 2.5 kg (5.52 lb), typical

A Family of Accessories



Small accessories shown are: ***(A)*** *Y7203 and Y7204 PTI Polling Cables,* ***(B)*** *Y2036 3-Module PTI Polling Cable,* ***(C)*** *Y2026 Cable/Adapter,* ***(D)*** *Y2022 Calibration Divider,* ***(E)*** *Y2024 3-Module Power Cord,* ***(F)*** *P20-Series Thermocouple Probes,* ***(G)*** *Y2037 and Y2039 RTD Probes,* ***(H)*** *Y2030 and Y2031 Plug-In Modules.*

Y2022 Thermometer Calibration Divider (D in Picture)

Function: Either precision resistor or voltage divider (÷10 or ÷100)
Input Voltage: 0-10V dc
Output Impedence: 100Ω
Precision Resistor: 100Ω±0.01Ω, temp coefficient 5 ppm

Y2024 3-Module Power Cord (E in Picture)

Connects three PTI-family instruments or accessories to single 120V ac power outlet

Y2026B RS-232-C Cable Adapter (C in Picture)

Function: Routes RS-232-C signals from 36-pin PTI connectors to 25-pin RS-232-C connectors
Connections: Two 36-pin PTI connectors (M and F), two 25-pin RS-232-C connectors (M and F). Y7203 cable supplied
RS-232-C Pin Selections: Slide switches. Select TD on pin 2 or 3; DTR, DSR and CTS, through or pulled up; Scanner busy, through or to CTS

Y2030 Plug-in Module (H in Picture)

Extra plug-in units for 2190A thermocouples. Leave attached to input wire-pair for easy interchange of thermocouple inputs.

Y2031 Plug-in-Module (H in Picture)

Extra plug-in unit for 2180A RTDs, leave attached to input wires for easy interchange of RTD inputs.

Y2036 PTI Polling Cable (B in Picture)

Connects up to three PTI-family measurement instruments to 2020A or 2030A Printer.

Y2037 Platinum RTD Probe (G in Picture)

Resistance: 100Ω ± 0.1Ω at 0°C
Temperature Range: -80°C to +480°C
Curve Conformity: ±0.1% of temperature using IPTS 68 with ALPHA = 0.0038994 and DELTA = 1.494
Stability: Periodic usage (20% of time) ±0.03°C if used from 0°C to 200°C and ±0.22°C if used from -80°C to +480°C
Hysteresis: Less than ± 0.08°C when using 0°C and 200°C as end points
Immersion Effects: ±0.005°C when going from 4 inches to 10 inches in an ice bath Transition End Temperature: 150°C maximum
Physical: 316 SS Sheath, 0.25 in diameter x 12 in L; four 6 ft leads #22 AWG stripped and tinned
Handling: Contains strain-free platinum coil. Must be handled with care.

Y2039 Platinum RTD Probe (G in Picture)

Probe resistance: 100Ω ± 0.1Ω at 0°C
Temperature Range: -183°C to +480°C
Performance Standard: R100° /RO° = 1.3922, nominal. Conforms to IPTS 68 within 0.03% of temperature from -50°C to 420°C using ALPHA = 0.0039221 and DELTA = 1.493
Resistance Stability: 12 mΩ/year when exposed at 200°C or 20 mΩ in 250 hours when exposed at 480°C measured with probe at 0°C. 4 mΩ = 0.01°C + 0.04% of temperature
Hysteresis: Less than 0.01°C at 200°C when using 0°C and 420°C as end points
Immersion Effects: The readings shall not vary more than 0.005°C when probe is varied from 4 to 10 inches in an ice bath
Transition End Temperature: 150°C maximum
Time Constant: 8 seconds maximum when tested in flowing water at 3 feet per second
Sheath Material: INCONEL
Size: Diameter 0.64cm (0.25 in), length 30.5 cm (12 in)
Leads: 4 wires, 6 ft, #22 AWG, ends stripped and tinned
Calibration: Each probe is calibrated at 0°C, 200°C and 420°C. The IPTS 68 constants R0, ALPHA, DELTA and A4 are provided
Handling: Contains strain-free platinum coil. Must be handled with care

PTI Case Dimensions

Style	Height	Width	Depth
A	5.7 cm (2.25 in)	20.5 cm (8.05 in)	32.6 cm (12.85 in)
B	8.2 cm (3.23 in)		
C	10.5 cm (4.13 in)		
D	12.8 cm (5.03 in)		

General Specifications

Display: °F or °C, switch-selectable; 7 segment 1.1 cm LED
Measurement Method: Dual-slope integration, 100ms integration time, 3.33 readings/second
Linearization Technique: Segmented 4th order curve fit
Temperature Coefficient: ±15ppm/°C from 25°C
Stability: 175 ppm/90 days, 200 ppm/year
Common Mode Voltage: 350V dc, 250V rms ac, max
Common Mode Noise Rejection: ≥160dB at 50, 60, and 400 Hz ± 0.1% 100Ω unbalance
Normal Mode Noise Rejection: ≥90dB at 50, 60 and 400 Hz ± 0.1%
Drift: None, automatic zero correction
Input Impedence: 1000 MΩ at dc
Accessory Connector: 25-pin rear panel receptacle interfaces thermometer to Y2000, Y2001, Y2003, and 2300A
Shock and Vibration: Meets MIL-T-28800C, class 3 specifications
Ambient Temperature: 0°C to 50°C operating, -40°C to 75°C non-operating
Relative Humidity: ≤80% from 0°C to 50°C non-condensing
Power: 12V dc or 100, 120, 220, 240V ac ± 10% selectable, 50 to 400 Hz; 8W typical
Size: Style C PTI case, 10.5 cm H x 20.5 cm W x 32.6 cm D (4.13 in H x 8.05 in W x 12.85 in D)
Weight: 2.1 kg (4.63 lb)
Safety: (2180A and 2190A only) Factory Mutual 3820 approved, CSA 556B certified
Included: Instruction manual, power cord. Probes are not included except with 2189A

Ordering Information

Models

January 1989 prices

RTD Thermometers

2180* $1135
2189A System 1850
** Contact factory for 3-wire 10Ω copper applications*

Thermocouple Thermometers

2190A Type 1 — J,K,T,R,C 1085
2190A Type 2 — J,K,E,R,S 1085
2190A Type 3 — J(DIN), K,T (DIN),B,R 1085
2190A/AM (15 types) ..... on req
2190A/AMK (15 types) Upgrade Kit for 2190A ..... on req

Also see page 452, 2383A and 2393A Temperature Logging Systems

Options (for 2180A, 2189A, 2190A)

-002* Analog and Digital Output 395
-004** IEEE-488 Output 450
-006 Limits 265

Note: Above options are customer installable
**Required for compatibility with 2020A-004 or 2030 Printer or 1120A Translator. However, the option is not required when the thermometer is used with a 2300A Scanner, unless analog output is also needed.*
***Cannot be used with Option -002*

Accessories (Also see page 485)

Used for 2190A

P20J* Thermocouple Probe 63
P20K* Thermocouple Probe 63
P20T* Thermocouple Probe 63
P20E* Thermocouple Probe 63
Y2001 Multipoint Selector for Thermocouples 635
Y2003 Thermocouple Calibrator/ Battery Pack 685
Y2022 Thermometer Calibration Divider 130
Y2030 Thermocouple Input Module 95

Used for 2180A & 2189A

Y2000 Multipoint Selector for RTDs $635
Y2031 RTD Input Module 95
Y2037 RTD Probe 100Ω 390PT 260
Y2039 RTD Probe 100Ω 392PT 700

Joint Accessories

Y2009 Battery Pack, Rechargeable 440
Y2014** 5-1/4" Rack Mount Kit PTI, Single, Size C, Offset 95
Y2015** 5-1/4" Rack Mount Kit PTI, Double, Size C 95
Y2020** 4.80 DIN Panel Mount Kit PTI .. 95
Y2026B RS-232- Cable Adapter 180
Y2024 3-Module Power Cord 21
Y2036 PTI Polling Cable 83
Y7203 2-ft 36-pin PTI Cable 55
Y7204 5-ft 36-pin PTI Cable 70

**See page 442 for specifications*
***See page 485 for other size PTI rack mount kits and panel mount kits*

Also see 2030A Printer/Plotter, page 456; 2300A Scanner, page 450 and IEEE-488 Translator, page 361.

Service and Support

Warranty

One-year product warranty. See page 470 for further information on warranty terms and conditions.

Extended Warranty

SC1-2180A Repair (w/ calibration) 126
SC1-2180A Repair (cal w/ in or out data) 161
SC1-2180A Repair (cal w/in and out data) 196
SC2-2180A Cal (1/yr recommended) 63
SC2-2180A Cal (1/yr w/in or out data) ... 98
SC2-2180A Cal (1/yr w/in and out data) 133

SC1-2189A Repair (w/ calibration) 134
SC1-2189A Repair (cal w/ in or out data) 169
SC1-2189A Repair (cal w/in and out data) 204
SC2-2189A Cal (1/yr recommended) 72
SC2-2189A Cal (1/yr w/in or out data) ... 107
SC2-2189A Cal (1/yr w/in and out data) 142

SC1-2190A Repair (w/ calibration) 110
SC1-2190A Repair (cal w/ in or out data) 145
SC1-2190A Repair (cal w/in and out data) 180
SC2-2190A Cal (1/yr recommended) 63
SC2-2190A Cal (1/yr w/in or out data) ... 98
SC2-2190A Cal (1/yr w/in and out data) 133