FLUKE ®

Temperature calibration and measurement products

For industrial applications

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HART SCIENTIFIC
A Fluke Company

For industrial applications

Fluke provides a variety of temperature calibration products from Hart scientific – a Fluke Company. The range covers everything from dry–well temperature calibrators and micro–baths, to Infrared calibrators and high accuracy temperature readouts. These products cover the needs from instrumentation engineers in industrial applications who must calibrate temperature devices like thermocouples and RTDs.

Selection table

Thermometer Readouts	Model	Probe Types	Accuracy	Page
	1502A	PRTs	±0.006ºC	4–5
	1521	PRTs, Thermistors	±0.025ºC	8
	1522	PRTs, Thermistors	±0.025ºC	8
	1529	PRTs, Thermistors, Thermocouples	±0.006ºC (PRT)	6–7

Micro-Baths	Model	Range	Accuracy	Page
	6102	35ºC to 200ºC	±0.25ºC	10–11
	7102	–5ºC to 125ºC	±0.25ºC	10–11
	7103	–30ºC to 125ºC	±0.25ºC	10–11

Field Dry-Wells	Model	Range	Accuracy	Page
	9103	–25ºC to 140ºC	±0.25ºC	12–13
	9140	35ºC to 350ºC	±0.5ºC	12–13
	9141	50ºC to 650ºC	±0.5ºC at 400ºC ±1ºC at 650ºC	12–13

Handheld Dry-Wells	Model	Range	Accuracy	Page
	9100S	35ºC to 375ºC	±0.25ºC at 100ºC ±0.5ºC at 375ºC	14–15
	9102S	–10ºC to 122ºC	±0.5ºC	14–15

Dual-Block Calibrator	Model	Range	Accuracy	Page
	9009	–15ºC to 350ºC	Cold block: ±0.2ºC Hot block: ±0.6ºC	16

Thermocouple Furnace	Model	Range		Stability	Page
	9150	150ºC to 1200ºC		±0.5%	17

Infrared Calibrators	Model	Range		Accuracy	Page
	9132	50ºC to 500ºC		±0.5ºC at 100ºC ±0.8ºC at 500ºC	18–19
	9133	–30ºC to 150ºC		±0.4ºC	18–19
	9135	50ºC, 100ºC, 150ºC		±1ºC	18–19

Thermo-Hygrometer	Model	Range	Temp. Accuracy	RH Accuracy	Page
	5020A-H	0ºC to 50ºC	16–24ºC ±0.125ºC	20% to 70%: ±1.5%	20–21
	5020A-S	0ºC to 50ºC	15–35ºC ±0.25ºC	20% to 70%: ±2%	20–21

Probes	Model				Page
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Software	Model				Page
MET/TEMP II	9938				22
Logware	9934				23
Logware II	9935				23

1502A "Tweener" Thermometer

Best performance thermometer in its price range

- PRT readout with accuracy to ± 0.006 °C
- Reads both 100 ohm and 25 ohm probes
- 0.0001 °C resolution across its entire range
- Optional battery pack available for portable operation
- Smallest unit in its class

The Tweener thermometer is one of Hart's best selling products. No other company has a thermometer that comes close to the performance and features of the Tweener for anywhere near its price.

Each 1502A thermometer is easily programmable through front-panel keystrokes, to match a probe's constants for maximum linearity and accuracy.

For convenience, the 1502A reads the IEC-751 or "385" ALPHA RTD without any programming. Temperature is displayed in °C, °F, K or resistance in ohms.

Each thermometer comes complete with an RS-232 interface for automating temperature data collection, calibrations, or process control functions. An optional IEEE-488 interface is also available.

9934 LogWare software lets you use the 1502A for real-time data acquisition. MET/TEMP II software lets you use the 1502A as an automated reference thermometer.

Ordering Information

Models
1502A-256 "Tweener" PRT Thermometer (220 V)

Options & Accessories
2502 DC Power Option
2505 Spare Connector
2506 IEEE Option
2507 Mini-Printer
2508 Serial Cable Kit
9313-256 Battery Pack
9301 Carrying Case, fits Tweener and 30 cm probe
9308 Carrying Case, fits Tweener and 15 cm probe

Software
9934-S LogWare, Single Channel, Single User
9934-M LogWare, Single Channel, Multi-User
9938-25 MET/TEMP II (includes CD-ROM, RS-232 multiplexer, adapter, and PC cable), (220 V)

Probes
See page 9 for optional probes.

FLUKE®

Summary specifications 1502A

Function	Range
Temperature Range*	−200 °C to 962 °C
Resistance Range	0 Ω to 400 Ω, auto-ranging
Probe	Nominal RTPW: 25 Ω to 100 Ω RTD, PRT, or SPRT
Characterizations	ITS-90 subranges 4, 6, 7, 8, 9, 10, and 11 IPTS-68: R0, a, d, a4, and c4 Callendar-Van Dusen: R0, a, d, and b
Resistance Accuracy (ppm of reading)	0 Ω to 20 Ω: 0.0005 Ω 20 Ω to 400 Ω: 25 ppm
Temperature Accuracy*, typical (meter only)	± 0.004 °C at −100 °C ± 0.006 °C at 0 °C ± 0.009 °C at 100 °C ± 0.012 °C at 200 °C ± 0.018 °C at 400 °C ± 0.024 °C at 600 °C
Operating Temperature Range	16 °C to 30 °C
Resistance Resolution	0 Ω to 20 Ω: 0.0001 Ω 20 Ω to 400 Ω: 0.001 Ω
Temperature Resolution	0.001 °C
Excitation Current	0.5 and 1 mA, user selectable, 2 Hz
Measurement Period	1 second
Digital Filter	Exponential, 0 to 60 seconds time constant (user selectable)
Probe Connection	4-wire with shield, 5-pin DIN connector
Communications	RS-232 serial standard IEEE-488 (GPIB) optional
Display	8-digit, 7-segment, yellow-green LED; 12.7 mm high characters
Power	230 VAC (± 10 %), 50/60 Hz, 1 A, nominal
Size H x W x D	61 x 143 x 181 mm
Weight	1.0 kg
Calibration	Accredited NIST-traceable calibration provided
Probes from Hart	See page 9

*Temperature ranges and accuracy may be limited by the sensor you use.

1529 "Chub-E4" Thermometer

Lab-quality accuracy on four channels for PRTs, thermistors and thermocouples

- Four channels for PRTs, thermistors and thermocouples
- Displays eight user-selected data fields from any channel
- Logs up to 8,000 readings with date and time stamps
- Battery provides eight hours of continues operation

If you need multiple channels, battery power, outstanding accuracy, and the ability to read many different sensor types—but you don't need all the power of a 1 ppm Super-Thermometer readout, the Chub-E4 Thermometer is the solution for you. PRTs and thermistors connect easily to the 1529 using Hart's patented mini DWF connectors. Thermocouples connect using standard or miniature terminations. Measurements are taken each second, either simultaneously or sequentially.

The versatile front panel displays measurements in °C, °F, K, ohms, or millivolts and lets you choose temperature resolution from 0.01 to 0.0001. Select and display any eight items from a long list of displayable data fields, including statistical functions, probe information, utility functions, and more. Pushing a single front-panel button brings up a simple menu to guide you through all the internal setup and memory options.

Hart's 9935 *LogWare* II software lets you unload data quickly from the Chub-E4 to your PC for graphical and statistical analysis. With MET/TEMP II software, the Chub-E4 may be integrated into a completely automated calibration system. An RS-232 port is standard on every unit. An optional IEEE-488 port is also available.

Ordering Information

Models
1529-256 Chub-E4 Thermometer, 2 TC and 2 PRT/Thermistor Inputs (220 V)
1529-R-256 Chub-E4 Thermometer, 4 PRT/Thermistor Inputs (220 V)
1529-T-256 Chub-E4 Thermometer, 4 TC Inputs (220 V)

Options & Accessories
2506-1529 IEEE Option
9322 Rugged Carrying Case, holds 1529 and four probes up to 30 cm long
9323 Soft Carrying Case
2513-1529 Rack-Mount Kit
2374 IR Dongle
2375 Thermal Serial Printer, with paper, AC adapter, cable, battery pack
2362-256 Spare AC Adapter, 15 V

Software
9935-S LogWare II, Multi-Channel, Single User
9935-M LogWare II, Multi-Channel, Multi-User
9938-25 MET/TEMP II (includes CD-ROM, RS-232 multiplexer, adapter, and PC cable), (220 V)

Probes
See page 9 for optional probes.

Summary specifications 1529

Specifications	PRT / RTD	Thermistor	Thermocouple
Inputs	2 channels PRT/thermistor and 2 channels TC, or 4 channels PRT/thermistor, or 4 channels TC, specify when ordering; PRT/thermistor channels accept 2, 3, or 4 wires; TC inputs accept B, E, J, K, N, R, S, T, and Au-Pt TC types		
Temperature Range	−189 °C to 960 °C	−50 °C to 150 °C	−270 °C to 1800 °C
Measurement Range	0 to 400 Ω	0 to 500 KΩ	−10 to 100 mV
Characterizations	ITS-90, IEC-751 (DIN "385"), Callendar-Van Dusen	Steinhart-Hart, YSI-400	NIST Monograph 175, 3-point deviation function applied to NIST 175, 6th-order polynomial
Temperature Accuracy (meter only)	± 0.004 °C at −100 °C ± 0.006 °C at 0 °C ± 0.009 °C at 100 °C ± 0.012 °C at 200 °C ± 0.018 °C at 400 °C ± 0.024 °C at 600 °C	± 0.0025 °C at 0 °C ± 0.0025 °C at 25 °C ± 0.004 °C at 50 °C ± 0.010 °C at 75 °C ± 0.025 °C at 100 °C	Ext. RJC: Int. RJC B at 1000°C ± 0.6 °C: ± 0.6°C E at 600 °C ± 0.07 °C: ± 0.25 °C J at 600 °C ± 0.1 °C: ± 0.35 °C K at 600 °C ± 0.15 °C: ± 0.4 °C N at 600 °C ± 0.15 °C: ± 0.3 °C R at 1000 °C ± 0.4 °C: ± 0.5 °C S at 1000 °C ± 0.5 °C: ± 0.6 °C T at 200 °C ± 0.1 °C: ± 0.3 °C
Temperature Resolution	0.001°	0.0001°	0.01 to 0.001°
Resistance/Voltage Accuracy	0 Ω to 20 Ω: ± 0.0005 Ω 20 Ω to 400 Ω: ± 25 ppm of rdg.	0 Ω to 5 K Ω: ± 0.5 Ω 5 KΩ to 200 KΩ: ± 100 ppm of rdg. 200 KΩ to 500 KΩ ± 300 ppm of rdg.	−10 to 50 mV: ± 0.005 mV 50 to 100 mV: ± 100 ppm of rdg. (Internal RJC: ± 0.25 °C)
Operating Range	16 °C to 30 °C		
Measurement Interval	0.1 second to 1 hour; inputs may be read sequentially or simultaneously at 1 second or greater interval		
Excitation Current	1 mA, reversing	2 and 10 mA, automatically selected	n/a
Display	33 mm x 127 mm backlit LCD graphical display		
Display Units	°C, °F, K, Ω, KΩ, mV		
Data Logging	Up to 8,000 time- and date-stamped measurements can be logged		
Logging Intervals	0.1, 0.2, 0.5, 1, 2, 5, 10, 30, or 60 seconds; 2, 5, 10, 30, or 60 minutes		
Averaging	Moving average of most recent 2 to 10 readings, user selectable		
Probe Connection	Patented DWF Connectors accept mini spade lug, bare-wire, or mini banana plug terminations		Universal receptacle accepts miniature and standard TC connectors
Communications	RS-232 and IR ports included, IEEE-488 (GPIB) optional		
AC Power	100–240 VAC, 50-60 Hz, 0.4 A		
DC Power	12–16 VDC, 0.5 A (battery charges during operation from 14.5 to 16V DC, 1.0A)		
Battery	NiMH, 8 hours of operation typical without backlight, 3 hours to charge, 500 cycles		
Size H x W x D	102 x 191 x 208 mm		
Weight	2 kg		
Probes from Hart	5618A, 5614, 5613, 5611, 5627, 5610, 5622, 5626		
Calibration	Accredited NIST-traceable resistance calibration and NIST-traceable voltage calibration provided		

1521 and 1522 Handheld Thermometers

Highest precision available in a battery-powered, handheld thermometer

These handheld thermometers feature measurement accuracy to ± 0.005 °C and 0.001 °C resolution.

They accept inputs from RTDs or thermistors and with Hart's INFO–CON connector, there's no need to program probe coefficients into the meter. All data is stored in the INFO–CON and conveniently downloaded when connected to the 1521 and 1522. The 1522 is also a data logger. Log up to 10,000 readings. Download logged data via RS–232 with Hart's 9934 Log*Ware* software.

Ordering Information

Models
1521-256 Thermometer, Handheld, 1 Channel, 220 V
1522-256 Thermometer, Handheld, 1 Channel Data Logger, 220 V

Options & Accessories
2370 Spare RS-232 cable
2371 Spare INFO-CON adapter
2374 IR Dongle
2601 Probe carrying case
2521 Battery pack 1521/1522
2361-256 Spare AC adapter, 12V
9321 Soft carrying case
9318, Hard carrying case, fits 1521/1522 and probe

Software
9934-S, Log*Ware* 1-channel, Single-User Software
9934-M Log*Ware*, Single Channel, Multi-User

Probes

Summary specifications 1521 and 1522

Sensor type	Pt 25 to Pt 100	Thermistor
Temperature range	-200 °C to 962 °C	-50 °C to 150 °C
Resistance range	0 Ω to 400 Ω	0 Ω to 500 KΩ
Temperature accuracy (meter only)	-200 °C to 100 °C: ± 0.025 °C 100 °C to 400 °C: ± 0.05 °C 400 °C to 800 °C: ± 0.1 °C 800 °C to 962 °C ± 0.15 °C	0 °C to 50 °C: ± 0.005 °C 50 °C to 75 °C: ± 0.01 °C 75 °C to 100 °C: ± 0.02 °C
Excitation current	0.5 mA	5 µA
Operating range	0 °C to 40 °C	
Memory	1521 – Stores 6 readings in "Hold" mode 1522 – Logs 10,000 readings in "Auto Logging" mode, 100 readings in "Demand Logging" mode	
Power	Rechargeable nickel-metal-hydride batteries (ac adapter included)	
Size H x W x D	197 x 107 x 38 mm	
Weight	0.4 kg	
Calibration	10-point, NIST-traceable, NVLAP-accredited resistance calibration provided	

Optional Probes

Each probe includes:

- Individual report of calibration*
- Probe linearization coefficients
- Programmed INFO–CON connector (for 1521, 1522)
- Resistance vs. temperature table
- Termination to match your thermometer readout (see spec chart)

Summary specifications

Model	Readout	Type	Range	Size	Cal Uncertainty and Short-Term Stability	Typical Drift (1 Year)
5626-12-I 5626-12-D 5626-12-L	1521 or 1522 1502A 1529	High-Temp PRT, 100 ohm	−200 to 661 °C	1/4 in x 12 in (6.35 x 305 mm)	± 0.007°C at 0 °C	< ± 0.03 °C
5614-12-I 5614-12-D 5614-12-L	1521 or 1522 1502A 1529	Secondary PRT, 100 ohm	−200 to 420 °C	1/4 in x 12 in (6.35 x 305 mm)	± 0.018 °C at 0 °C	± 0.01 °C
5613-6-I 5613-6-D 5613-6-L	1521 or 1522 1502A 1529	Secondary PRT, 100 ohm	−200 to 300 °C	3/16 in x 6 in (4.76 x 152 mm)	± 0.018 °C at 0 °C	± 0.01 °C
5612-9-I 5612-9-D 5612-9-L	1521 or 1522 1502A 1529	Secondary PRT, 100 ohm	−200 to 420 °C	3/16 in x 9 in (4.76 x 229 mm)	± 0.018 °C at 0 °C	± 0.01 °C
5627-6-I 5627-6-D 5627-6-L	1521 or 1522 1502A 1529	RTD, 100 ohm	−200 to 300 °C	3/16 in x 6 in (4.76 x 152 mm)	± 0.050 °C at 0 °C	± 0.13 °C
5627-9-I 5627-9-D 5627-9-L	1521 or 1522 1502A 1529	RTD, 100 ohm	−200 to 420 °C	3/16 in x 9 in (4.76 x 229 mm)	± 0.050 °C at 0 °C	± 0.13 °C
5627-12-I 5627-12-D 5627-12-L	1521 or 1522 1502A 1529	RTD, 100 ohm	−200 to 420 °C	1/4 in x 12 in (6.35 x 305 mm)	± 0.050 °C at 0 °C	± 0.13 °C
5618A-9-I 5618A-9-D 5618A-9-L	1521 or 1522 1502A 1529	PRT, 100 ohm	−200 to 500 °C	1/8 in x 9 in (3.2 x 229 mm)	± 0.050 °C at 0 °C	± 0.01 °C
5622-05-I 5622-05-D 5622-05-L	1521 or 1522 1502A 1529	Fast-response RTD	−200 to 350 °C	0.02 in x 4 in (0.5 x 100 mm)	± 0.15 °C at 0 °C, uncalibrated; ± 0.04 °C, calibrated*	± 0.15 °C
5610-9-I 5610-9-L	1521 or 1522 1529	Thermistor, Stainless	0 to 100 °C	1/8 in x 9 in (3.2 x 229 mm)	± 0.015 °C at 0 °C	± 0.01 °C
5611-I 5611-L	1521 or 1522 1529	Thermistor, Bare Silcone Bead	0 to 100 °C	0.07 in x 0.55 in (1.8 x 14 mm)	± 0.015 °C at 0 °C	± 0.01 °C

*The 5622 probes come standard as uncalibrated conforming to DIN/IEC class A with ±0.15ºC at 0ºC.
To receive an individual report of calibration for the 5622 probe order calibration 1923-4-N separately (7 points from −197°C to 300 °C).

6102, 7102 and 7103 Micro-Baths

Portability and extreme stability

- Stability to ± 0.015 °C
- Ranges from –30 °C to 200 °C
- Exceptional bath portability

Micro-Baths can be used anywhere for any type of sensor. The Model 6102 weighs 4.5 kg with the fluid. It's lighter and smaller than most dry-wells and has a spill-proof lid. Micro-Baths can even be transported with fluid in them.

Display accuracy to ±0.25 °C for quick calibrations without a reference thermometer.

With a 4.8 cm diameter, 14 cm deep tank, a Micro-Bath can calibrate any type of sensor including short, square, or odd-shaped sensors. The problems of fit and immersion are virtually eliminated by using a fluid medium rather than a dry-block calibrator. Micro-Baths are perfect for liquid-in-glass and bimetal thermometers.

All Micro-Baths have RS-232 ports and come with Interface-*it* software. Also included are contacts to Calibrate a thermal switch, eight set-point memory storage, ramp-rate adjust and over-temperaturesafety cutout.

Ordering Information

Models
7103-256 Micro-Bath, 30 °C to 125 °C
(includes a transport seal lid and a 2085 test lid),
(220 V)
7102-256 Micro-Bath, –5 °C to 125 °C
(includes a transport seal lid and a 2082-P test lid),
(220 V)
6102-256 Micro-Bath, 35 °C to 200 °C
(includes a transport seal lid and a 2082-M test lid)
(220 V)

Options & Accessories
2082-P Spare test lid, plastic (7102)
2082-M Spare test lid, metal (6102)
2085 Spare test lid, plastic (7103)
2083 7.6 cm tank expansion adapter for 6102 and 7102
(affects stability, uniformity and range at
extreme temperatures)
5010-L Silicone oil, type 200.05, 1 liter
(usable range: –40 °C to 130 °C)
5013-L Silicone oil, type 200.20, 1 liter
(usable range: 10 °C to 230 °C)
9317 Carrying case for 7103
9310 Carrying case for 6102
9311 Carrying case for 7102

Summary specifications 6102, 7102 and 7103

Specifications	6102	7102	7103
Range	35 °C to 200 °C	−5 °C to 125 °C	−30 °C to 125 °C
Accuracy	± 0.25 °C		
Stability	± 0.02 °C at 100 °C (oil 5013) ± 0.03 °C at 200 °C (oil 5013)	± 0.015 °C at −5 °C (oil 5010) ± 0.03 °C at 121 °C (oil 5010)	± 0.03 °C at −25 °C (oil 5010) ± 0.05 °C at 125 °C (oil 5010)
Uniformity	± 0.02 °C		
Resolution	0.01 °C		
Operating Temperature	5 °C to 45 °C		
Heating Time	25 °C to 200 °C: 40 minutes	25 °C to 100 °C: 30 minutes	25 °C to 100 °C: 35 minutes
Cooling Time	200 °C to 100 °C: 35 minutes	25 °C to 0 °C: 30 minutes	25 °C to −20 °C: 45 minutes
Well Size	2.5 in dia. x 5.5 in deep (64 x 139 mm)(access opening is 1.9 in [48 mm] in diameter)		
Size H x W x D	26 x 14 x 20 cm	31 x 18 x 24 cm	34 x 23 x 26 cm
Weight	4.5 kg with fluid	6.8 kg with fluid	9.8 kg with fluid
Volume	0.75 L	0.75 L	1.0 L
Power	230 VAC (± 10 %), 1.1 A, switchable, 50/60 Hz, 270 W	230 VAC (± 10 %), 0.9 A, switchable, 50/60 Hz, 200 W	94–234 VAC (± 10 %), 50/60 Hz, 400 W
Computer Interface	RS-232 included with free Interface-*it* software		
NIST-Traceable Calibration	Data at 50 °C, 100 °C, 150 °C, and 200 °C	Data at −5 °C, 25 °C, 55°C, 90 °C, and 121 °C	Data at −25 °C, 0 °C, 25 °C, 50 °C, 75 °C, 100 °C, and 125 °C

Fluke and Hart Scientific have teamed up to solve one of the most common yet neglected problems when calibrating process loops: the calibration of the temperature sensor itself. Thanks to a new firmware release, the Fluke 744 calibrator now supports Hart Scientific's Dry-Wells and Micro-Baths for complete temperature transmitter calibrations.

9103, 9140 and 9141 Field Dry-Wells

Easy and productive to use

- Lightweight and very portable
- Accuracy to 0.25 °C
- RS–232 and Interface-*it* software included

The 9103 covers below–ambient temperatures as low as −25 °C. The 9140, weighing only 2,7 kg, has a temperature range of 35 °C to 350 °C and reaches its maximum temperature in 12 minutes. The 9141 upright dry-well unit calibrates up to 650 °C, weighs only eight pounds and heats up to 650 °C in 12 minutes. You can control all functions from the front panel or connect it to your PC with its built–in RS–232 port. Each dry-well has four removable well inserts available, an optional carrying case, a NIST–traceable calibration, and the best price in the industry.

Ordering Information

Models
9103-X-256 Dry-Well, 220 V 50/60 Hz
(specify X, X = A, B, C, or D included insert), (220 V)
9140-X-256 Dry-Well, 220 V 50/60 Hz
(specify X, X = A, B, C, or D included insert), (220 V)
9141-X-256 Dry-Well, 220 V 50/60 Hz,
(specify X, X = A, B, C, or D included insert), (220 V)

Options & Accessories
3103-1 Insert, blank (9103)
3103-2 Insert, A (9103)
3103-3 Insert, B (9103)
3103-4 Insert, C (9103)
3103-6 Insert, D (9103)
3140-1 Insert, blank (9140)
3140-2 Insert, A (9140)
3140-3 Insert, B (9140)
3140-4 Insert, C (9140)
3140-6 Insert, D (9140)
3141-1 Insert, blank (9141)
3141-2 Insert, A (9141)
3141-3 Insert, B (9141)
3141-4 Insert, C (9141)
3141-6 Insert, D (9141)
**9316** Rugged Carrying Case (9103)
9308 Rugged Carrying Case (9140)
9309 Rugged Carrying Case (9141)

Interchangeable insert options

Insert "A"
(1.6 mm) 1/16 in
1/4 in (6.4 mm)
(1.8 mm) 1/2 in
3/8 in (9.5 mm)
3/16 in (4.8 mm)
(3.2 mm) 1/8 in

Insert "B"
(4.8 mm) 3/16 in
1/4 in (6.4 mm)
(9.5 mm) 3/8 in
3/8 in (9.5 mm)
(6.4 mm) 1/4 in
3/16 in (4.8 mm)

Insert "C"
(6.4 mm) 1/4 in

Insert "D"
3 mm
4 mm
6 mm
6 mm
4 mm
3 mm
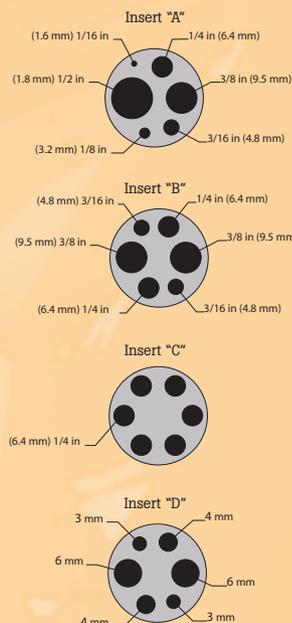
Summary specifications 9103, 9140 and 9141

Specifications	9103	9140	9141
Range	−25 °C to 140 °C at 23 °C ambient	35 °C to 350 °C	50 °C to 650 °C
Accuracy	± 0.25 °C	± 0.5 °C (holes greater than 6.35 mm: ± 1°C)	± 0.5 °C to 400 °C; ± 1.0 °C to 650 °C (holes greater than 6.35 mm: ± 2 °C)
Stability	± 0.02 °C at −25 °C ± 0.04 °C at 140 °C	± 0.03 °C at 50 °C ± 0.05 °C at 350 °C	± 0.05 °C at 100 °C ± 0.12 °C at 500 °C ± 0.12 °C at 650 °C
Well-to-Well Uniformity	± 0.1 °C between similarly sized wells	± 0.1 °C with similarly sized wells	± 0.1 °C below 400 °C, ± 0.5 °C above 400 °C with similarly sized wells
Heating Times	18 minutes from ambient to 140 °C	12 minutes from ambient to 350 °C	12 minutes from ambient to 650 °C
Cooling Times	20 minutes from ambient to −25 °C	15 minutes from 350 °C to 100 °C	25 minutes from 650 °C to 100 °C
Stabilization Time	7 minutes		
Immersion Depth	124 mm		
Power	230 VAC (± 10 %), 0.7 A, switchable, 50/60 Hz, 150 W	230 VAC (± 10 %), 2.2 A, switchable, 50/60 Hz, 500 W	230 VAC (± 10 %), 4.4 A, switchable, 50/60 Hz, 1000 W
Size H x W x D	261 x 143 x 245 mm	86 x 152 x 197 mm	236 x 109 x 185 mm
Weight	5.7 kg	2.7 kg	3.6 kg
Computer Interface	RS-232 included with free Interface-*it* software		
NIST-Traceable Certificate	Data at −25 °C, 0 °C, 25 °C, 50 °C, 75 °C, 100 °C, and 140 °C	Data at 50 °C, 100 °C, 150 °C, 200 °C, 250 °C, 300 °C, and 350 °C	Data at 100 °C, 200 °C, 300 °C, 400 °C, 500 °C, and 600 °C

9100S and 9102S Handheld Dry-Well Calibrators

The smallest, lightest and most portable dry-wells in the world

- Temperature ranges from -10 °C to 375 °C
- Stability during calibrations to ± 0.05 °C
- Fast and easy calibrations of RTDs and thermocouples
- Includes RS-232 interface, Interface-*it* software

Despite its small size (6 cm high and 13 cm wide) and light weight, the 9100S outperforms every dry-well in its class. It's simple and convenient, too. It has a range to 375 °C and is perfect for checking RTDs, thermocouples, and small bimetal thermometers in the field. For work in the temperature range of −10 °C to 122 °C, Hart's Model 9102S dry-well is another first in the industry, featuring stability to ± 0.05 °C. This dry-well is only 10 cm high and 15 cm wide, achieves temperatures as low as −10 °C, includes a NIST-traceable calibration, and is stable to ± 0.05 °C.

Ordering Information

Models
9100S-A-256 Dry-Well, Block A
9100S-B-256 Dry-Well, Block B
9100S-D-256 Dry-Well, Block D
9102S-256 Dry-Well, -10°C to 122°C (2 Wells)*

Options & Accessories
9300 Rugged Carrying Case, 9100S
9308 Hard Carrying Case, 9102
9320-256 Battery Pack, 9102S*
3102-1 Insert, Al 1.6 mm (9102)
3102-2 Insert, Al 3.2 mm (9102)
3102-3 Insert, Al 4.8 mm (9102)
3102-4 Insert, Al 6.4 mm (Standard, 9102)
3102-6 Insert, Al 9.5 mm (Standard, 9102)

*256 Blocks are 220 V 50/60 Hz

Summary specifications 9100S and 9102S

|	9100S	9102S
Range	35 °C to 375 °C	–10 °C to 122 °C at 23 °C ambient
Accuracy	± 0.25 °C at 50 °C ± 0.25 °C at 100°C ± 0.5 °C at 375 °C	± 0.25 °C
Stability	± 0.07 °C at 50 °C ± 0.1 °C at 100 °C ± 0.3 °C at 375 °C	± 0.05 °C
Well-to-well uniformity	± 0.2 °C with sensors of similar size at equal depths within wells	
Stabilization	5 minutes	7 minutes
Well depth	4 in (102 mm); 1/16 in (1.6 mm) hole is 3.5 in (89 mm) deep	4 in (102 mm)
Removable inserts	N/A	**Standard:** 1/4 in (6.4 mm), 3/16 in (4.8 mm) **Optional:** Available in sizes from 1/16 in to 7/16 in
Power	230 VAC (± 10 %) 0.8 A, specify, 50/60 Hz, 175 W	94–234 V ac (± 10 %), 50/60 Hz, 60 W; or 12 V dc
Size H x W x D	57 x 125 x 150 mm	99 x 140 x 175 mm
Weight	1 kg	1.8 kg
NIST-traceable calibration	Data at 50 °C, 100 °C, 150 °C, 200 °C, 250 °C, 300 °C and 375 °C	Data at –10 °C, 0 °C, 25 °C, 50 °C, 75 °C, 100 °C and 122 °C

9100S Fixed-Block Options

Block "A"

1/4 in (6.4 mm)
1/8 in (3.2 mm)
5/32 in (4 mm)
3/16 in (4.8 mm)
3/16 in (4.8 mm)
1/16 in (1.6 mm)

Block "B"

3/8 in (9.5 mm)
3/16 in (4.8 mm)
1/4 in (6.4 mm)
1/8 in (3.2 mm)

Block "D"

3 mm
4 mm
6 mm
6 mm
4 mm
3 mm

9102S Calibration Wells

Removable insert sleeves 1/2 in O.D. x 4 in deep (13 mm x 102 mm)
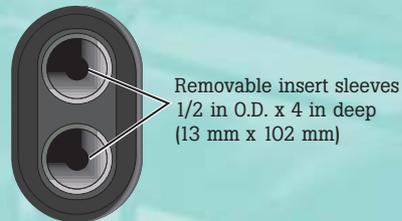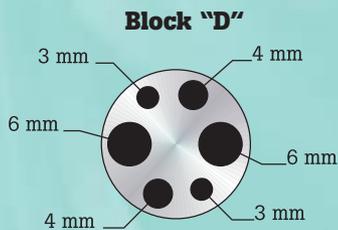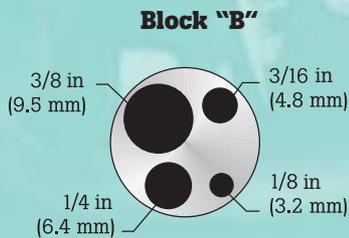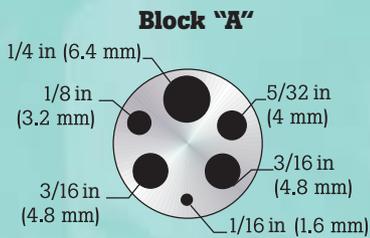
9009 Industrial Dual-Block Calibrator

Double your productivity or cut your calibration time in half

- Temperatures from –15 °C to 350 °C in one unit
- Two wells in each block for simultaneous comparison calibrations
- Rugged, lightweight, water-resistant enclosure
- Controlled by precision Hart Scientific temperature controller

Hart's new 9009 Industrial Dual-Block Calibrator lets you calibrate temperature probes from –15 °C to 350 °C. Each temperature well is independently controlled, so while you're checking your transmitter sensor at one temperature, the other block can be heating or cooling to your next set-point. Everything you need to calibrate thermometers is self-contained in a rugged, watertight case including four removable inserts, power cord, and removal tool. It's portable, covers a wide range, and – best of all – it's made by Hart Scientific, the world leader in temperature calibration.

Ordering Information

Models
9009-Y-256 Dry-Well, 220 V, Yellow Case
9009-B-256 Dry-Well, 220 V, Black Case

Options & Accessories
3102-1 Insert, Al 1.6 mm (1/16 in)
3102-2 Insert, Al 3.2 mm (1/8 in)
3102-3 Insert, Al 4.8 mm (3/16 in)
3102-4 Insert, Al 6.4 mm (1/4 in)
3102-6 Insert, Al 9.5 mm (3/8 in)

Summary specifications 9009

| Function	Range
Range	
Hot block	50 °C to 350 °C
Cold block	–15 °C to 110 °C in 23 °C ambient (–8 °C with hot block at 350 °C)
Accuracy	
Hot block	± 0.6 °C
Cold block	± 0.2 °C
Stability	± 0.05 °C
Well-to-well uniformity	± 0.1 °C
Stabilization time	8 minutes
Well depth	101.6 mm
Removable inserts	Two 1/4 in (6.4 mm) and two 3/16 in (4.8 mm) inserts included; see ordering information for other available inserts
Power	230 V ac (± 051 %), 60/60 Hz; specify
Size H x W x D	178 x 267 x 248 mm
Weight	4.5 kg
7-point NIST Traceable Calibration	
Hot block:	50 °C, 100 °C, 150 °C, 200 °C, 250 °C, 300 °C and 350 °C
Cold block:	–8 °C, 0 °C, 25 °C, 50 °C, 75 °C, 100 °C and 110 °C

9150
Thermocouple Furnace

Low-cost Thermocouple Furnace

- Stability of ± 0.5 °C
- Temperature range to 1200 °C
- Display accuracy of ± 5 °C across entire range
- NIST-traceable calibration included
- RS–232 port standard

The 9150 Thermocouple Furnace uses Hart's own microprocessor–based controller for great stability and set-point accuracy. It has a removable well insert for versatility. It has rapid cool–down and heat-up times. And it comes with an RS-232 port for connection to a PC. Each unit is factory–calibrated and comes with test data and a calibration traceable to NIST.

Ordering Information

Models
9150-X-256 Thermocouple Furnace (specify X, X = A, B, C, or D included insert), (220 V)

Options & Accessories
3150-2 Insert A
3150-3 Insert B
3150-4 Insert C
3150-6 Insert D
9315 Rugged Carrying Case

Summary specifications 9150

Function	Range
Temperature Range	150 °C to 1200 °C
Display Resolution	0.1° to 999.9° 1° above 1000°
Stability	± 0.5 °C
Display Accuracy	± 5 °C
Well Diameter	32 mm
Well Depth	140 mm; 101 mm in removable insert plus 38 mm in insulator
Heating Time	35 minutes to 1200 °C
Cooling Time	140 minutes with block
Well-to-Well Uniformity	± 0.5 °C to ± 1.0 °C (Insert "C" at 1200 °C)
Stabilization	20 minutes
Power	230 VAC (± 10 %), 5.2 A, switchable, 50/60 Hz, 1200 W
Size H x W x D	315 x 208 x 315 mm
Weight	13 kg
NIST-Traceable Calibration	Data at 150 °C, 300 °C, 450 °C, 600 °C, 800 °C, 1000 °C, and 1200 °C

Interchangeable insert options

Insert "A"
(1.6 mm) 1/16 in
1/4 in (6.4 mm)
(1.8 mm) 1/2 in
3/8 in (9.5 mm)
(3.2 mm) 1/8 in
3/16 in (4.8 mm)

Insert "B"
(4.8 mm) 3/16 in
1/4 in (6.4 mm)
(9.5 mm) 3/8 in
3/8 in (9.5 mm)
(6.4 mm) 1/4 in
3/16 in (4.8 mm)

Insert "C"
(6.4 mm) 1/4 in

Insert "D"
3 mm
4 mm
6 mm
6 mm
4 mm
3 mm
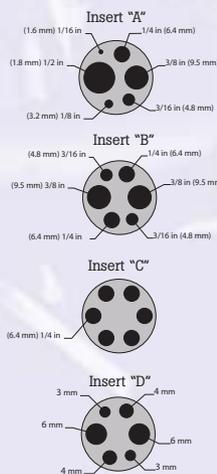
9132, 9133 and 9135 Infrared Calibrators

Precision when you need it for infrared temperature calibration

- Easily certify IR pyrometers to 500 °C
- Large 57 mm blackbody target
- RTD reference well for high precision
- Small, compact design

Hart's blackbody targets offer precision when you need it for infrared temperature calibration. Whether you're using in-line or handheld pyrometers, the 9132 Portable IR Calibrator can handle your workload to 500 °C. For calibrating IR guns at cold temperatures, the 9133 Portable IR Calibrator reaches −30 °C in normal ambient conditions.

Simply "point and shoot" to check your IR guns. For higher precision, a well is located directly behind the blackbody surface for contact calibration of the black-body using a calibrated PRT and readout. The 57 mm target offers a large field of view area for optical variations in infrared thermometers. Emissivity of the target is 0.95 (± 0.02) and its temperature may be controlled in increments of 0.1 °C.

No other IR calibrators offer this performance in a compact package!

Ordering Information

Models
9132-256 IR Calibrator, 220 V 50/60 Hz IR, 50 – to 500 °C
9133-256 IR Calibrator, 220 V 50/60 Hz IR, −30 – to 150 °C
9135-256 3-point IR Calibrator, 220V 50/60Hz, 50, 100, 150 °C

Options & Accessories
9308 Hard Carrying Case (9132)
9302 Hard Carrying Case (9133)
9308 Rugged Carrying Case (9135)

Summary specifications 9132, 9133 and 9135

	9132	9133	9135
Temperature Range	50 °C to 500 °C	−30 °C to 150 °C at 23 °C ambient	50 °C, 100 °C, 150 °C Fixed points
Accuracy	± 0.5 °C at 100 °C ± 0.8 °C at 500 °C	± 0.4 °C	± 1 °C
Stability	± 0.1 °C at 100 °C ± 0.3 °C at 500 °C	± 0.1 °C	± 0.1 °C
Target Size	57 mm	57 mm	38 mm
Target Emissivity	± 0.02 from 8 to 14 mm		
Heating Time	30 minutes (50 °C to 500 °C)	15 minutes (25 °C to 150 °C)	3 minutes (25 °C to 150 °C)
Cooling Time	30 minutes (500 °C to 100 °C)	15 minutes (25 °C to −20 °C)	25 minutes (150 °C to 50 °C)
Power	230 VAC (± 10 %), 1.5 A, switchable, 50/60 Hz, 340 W	230 VAC (± 10 %), 1.0 A, switchable, 50/60 Hz, 200 W	230 VAC (± 10%, 0.5 A, specify 50/60 Hz, 125 W
Size H x W x D	102 x 152 x 178 mm	152 x 286 x 267 mm	46 x 112 x 198 mm
Weight	1.8 kg	4.6 kg	0.7 kg
Computer Interface	RS-232 included with free Interface-it software		
NIST-Traceable Contact Calibration	Data at 50 °C, 100 °C, 200 °C, 250 °C, 300 °C, 400 °C	Data at −30 °C, 0 °C, 25 °C, 75 °C, 100 °C, 125 °C and 150 °C	Data at 50 °C, 100 °C and 150 °C

Fluke 5020A Thermo-Hygrometer

Comprehensive and precise environmental monitoring of temperature and humidity

- Best in the world accuracy – temperature to ± 0.125 °C and relative humidity to ± 1.5 %
- Large LCD for clear display of trend charts, statistics, real time and historical data.
- On–board memory holds up to 400,000 time/date-stamped readings; PC card holds millions more
- Visual and audio alarms for numerous alarm fault conditions
- Detachable probes contain their own calibration data for easy recalibrations
- Optional software logs in real time or shows graphical/statistical data from PC card

The Fluke 5020A Thermo–Hygrometer is a dual–sensor, graphical data logger/analyzer offering precise real-time and historical display and analysis of temperature and humidity data. It's an ideal solution for environments where accurate ambient temperature and humidity must be monitored and recorded, including calibration, research and medical testing laboratories, or pharmaceutical and food storage applications. The 5020A also replaces paper–based humidity chart recorders, eliminating the associated problems with paper, ink, records storage, and accuracy.

Ordering Information

Models
5020A-H Fluke High Accuracy Thermo-Hygrometer (includes high-accuracy probe, wall mount bracket, and RS-232 cable)
5020A-S Fluke Thermo-Hygrometer, Standard Accuracy (includes probe, wall mount bracket, and RS-232 cable)
5020A-HKIT Fluke Thermo-Hygrometer, High Accuracy (includes high-accuracy 5020A-H probe, wall mount bracket, and RS-232 cable. High accuracy spare probe kit (5027A-H and 5020A-LW3) software, single-PC license.

Options & Accessories
2526A-H Spare Probe, 5020A–H
2626A-S Spare Probe, 5020A–S
5027A-S Spare Probe Kit, 5020A-S (includes standard-accuracy probe, probe case, wall mount bracket, and 7.6 m extension cable)
5027A-H: Spare Probe Kit, 5020A–H (includes high-accuracy probe, probe case, wall mount bracket, and 7.6 m extension cable)
Y5028 Cable, 7.6 m extension cable
Y5029 Cable, 15.2 m extension cable
5032A-64MB PC Card (PCMCIA), 64 MB
5026A-CASE Protective Case, Spare Probe
5020A-CASE Protective Case, 5020A–H (includes space for the 5020A, two probes, an extra PC Card, RS-232 cable, and power cord)
5020A-PS Spare Power Supply, 100/240 VAC

Software
5020A-LW3 5020A software, single-PC License
5020A-LW3LIC 5020A-LW3 license

FLUKE ®

Summary specifications 5020A

Function	Description
Temperature range	0 °C to 50 °C
Temperature accuracy	15 °C to 35 °C: ± 0.25 °C (calibrated) 0 °C to 15 °C, 35 °C to 50 °C: ± 0.5 °C (uncalibrated typical)
Delta temperature accuracy	± 0.025 °C for ± 1 °C changes within 15 °C to 35 °C
Temperature resolution	User selectable up to 0.001 °C
RH range	0 % to 100 % RH
RH accuracy	20 % to 70 % RH: +2 % RH (calibrated) 0 % to 20 % RH, 70 % to 100 % RH: ± 3 % RH (uncalibrated, typical)
Delta humidity accuracy	± 1.0 % for ± 5 % changes within 20 % to 70 % RH
RH resolution	User selectable up to 0.01 %
Inputs	Two sensors, each measuring temperature and relative humidity; each is detachable, cable-extendable, and interchangeable, with self-contained calibration; each may be assigned a unique 16-character identification
Display	240 x 128 graphics monochrome LCD, displays temperature and humidity data graphically, numerically, and statistically; 16 pre-defined, user-changeable screen setups are included
Memory	400,000 typical individual time-stamped readings (excluding PC card storage)
Alarms	Visual and audio alarms for temperature, temperature rate, RH, RH rate, and fault conditions
Communications	RS-232 and IrDA
PC card interface	64 MB flash memory for downloading data to a PC; data can likewise be uploaded from a PC card into the 5020A for graphical and statistical display
Enclosure	The 5020A may be wall-mounted (hardware included) or set on a benchtop
Power	12 V dc from external 100-240 VAC power supply
Operating range	0 °C to 50 °C
Size H x W x D	125 x 211 x 51 mm
Size (Probes)	79 mm length x 19 mm dia
Weight	0.7 kg
Calibration	Certificate of NIST-traceable temperature and humidity calibration included; supplied data includes three each temperature and humidity points

MET/TEMP II Software

Easy-to-use temperature calibration automation software
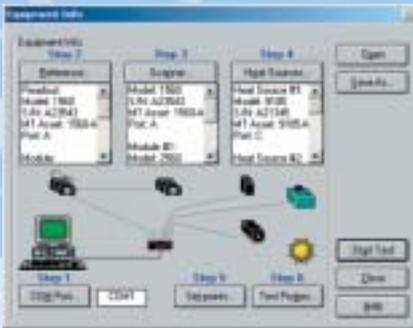
Instrument configuration screen

Set-point configuration screen

Test information screen

- Fully automated calibration of RTDs, thermocouples, thermistors, and many heat sources
- Calibrates up to 100 sensors at up to 40 points
- Performs coefficient calculations and generates tables and reports
- Includes optional integration with Fluke's MET/TRACK® database

Calibrating sensors manually is expensive because of labor costs. It takes roughly four hours to calibrate a sensor at three points, then another hour on top of that for paperwork to document the temperature data and to create the certificate. This is much too time–consuming. Now there's a better way.

With MET/TEMP II, you simply place your test sensors in a heat source, connect them to a readout, and enter your setup data into your PC. Sometime later, hit your print button, take the reports out of your printer, sign them, and ship the sensors back to your customer.

This software package tests thermocouples (all types), RTDs, SPRTs, thermistors, and even liquid–in–glass thermometers (LIGs). Virtually any sensor with a resistance or voltage output can be tested, up to 100 sensors at a time. You can select as few as 1 or as many as 40 temperatures at which to test your sensors. MET/TEMP II also lets you perform semi–automated fixed–point calibrations.

Calibration reports are automatically created from your setup data and test results. Each report conforms completely to the requirements of ANSI/NCSL Z540-1. MET/TEMP II will interface with MET/TRACK to record calibration and maintenance history, traceability information, and even the location of your thermometers and heat sources. Use it with MET/TRACK and watch your productivity take a big step up.

Log*Ware* Data:
Logging and Analysis Software

Turns any Hart Scientific thermometer readout into a real-time data logger
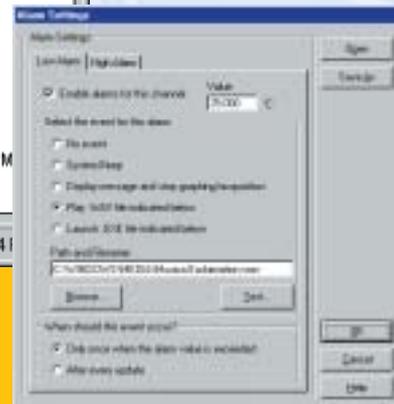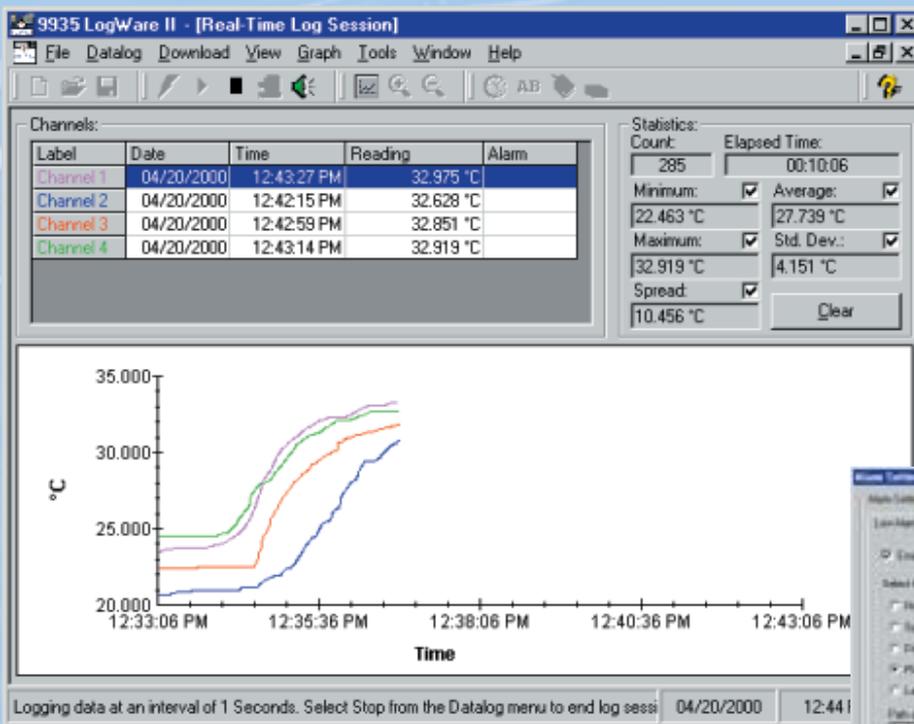
- Calculates statistics and displays customized graphs
- User-selectable alarms, delayed start times, and sample intervals
- Two versions for single-channel or multi-channel thermometer readouts

Log*Ware* was designed specifically for temperature data acquisition. Use 9934 Log*Ware* with a single-channel thermometer readout or 9935 Log*Ware* II with one of Hart's multi-channel readouts. Log*Ware* lets you acquire data to your PC graphically and store it to a text file. It also performs statistical functions automatically on each data set. Set high and low alarm conditions, program a delayed start time, store a data log for a fixed number of readings or length of time, program the acquisition interval from 1 second to 24 hours, and let the software record the data you need the way you need it. With Log*Ware* II you can collect and view data from up to 96 probes at a time.

Ordering Information

Software
9934-S Log*Ware*, Single Channel, Single User
9934-M Log*Ware*, Single Channel, Multi-User
9935-S Log*Ware* II, Multi-Channel, Single User
9935-M Log*Ware* II, Multi-Channel, Multi-User

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