

# F150

## Precision Thermometer



AUTOMATIC SYSTEMS  
LABORATORIES

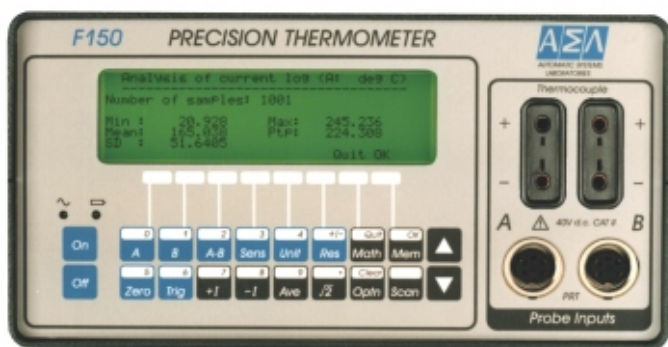


### TYPICAL APPLICATIONS

- Site Thermometer Calibration
- Environmental chambers
- Research
- Multi-channel logging

# F150 PRECISION THERMOMETER

If you are looking for a high accuracy digital thermometers for both resistance thermometers and thermocouples, then F150 is the instrument you need. Two channels on the front panel with the option of expanding by a further eight channels on the rear panel let you measure or calibrate a mixture of thermometers (PRTs) or thermocouples. Switch to battery power and on-board measurement storage, and you can use F150 almost anywhere. With accuracy and resolution up to  $\pm 0.01^{\circ}\text{C}$  and  $0.001^{\circ}\text{C}$  respectively, plus probe data storage, F150 is a powerful solution to your measurement problems. We'll supply your F150 complete with calibration traceable to international standards.



## THERMOMETER DATA ENTRY

F150 operates with a range of temperature probes, so for the best performance, you can select a linearisation to match the probe. You can store and edit calibration data for up to 20 PRTs for the best accuracy, or select one of three industry standard conversions for uncalibrated PRTs. With thermocouples, you can choose one of ten built-in industry standard linearisations.

Like to know more about storing and using probe calibration data?

Have a look at our fact sheet "Storing probe calibration data."

## DATA LOGGING

You can store up to 4000 single channel, or 2000 dual channel measurements against date and time to internal memory. F150 will re-call stored data to the display, or download it to a PC, or directly to your printer and will also analyse it to provide max/min values, peak to peak, mean and standard deviation.

Log#	Ch#	Temp(degC)	Date	Time
0000000001	0000000000	120.4465	09/09/09	15:59:08
0000000002	0000000000	120.4465	09/09/09	15:59:11
0000000003	0000000000	120.4465	09/09/09	15:59:14
0000000004	0000000000	120.4465	09/09/09	15:59:17
0000000005	0000000000	120.4465	09/09/09	15:59:22

## INPUTS

The front panel offers you the choice of industrial standard 5 pin DIN connectors for PRT, while for thermocouples, the unique dual connection socket offers the choice of either industry standard miniature plugs or 4mm instrument plugs.



On the rear panel, the optional 4 channel "plug-in" modules offer the choice of 5 pin DIN connectors for PRT or either miniature plug or bare wire connection for thermocouples.

No other product offers you this range of connection flexibility.

## MAIN FEATURES

- High accuracy (up to  $\pm 0.01^{\circ}\text{C}$ ) and resolution (up to  $0.001^{\circ}\text{C}$ ) for high quality data.
- Dual channel with four inputs, 2 off PRT and 2 off thermocouples for real versatility.
- Optional expansion modules for a further 8 channels.
- Wide temperature range:  $-210^{\circ}\text{C}$  to  $2315^{\circ}\text{C}$  for thermocouples,  $-210^{\circ}\text{C}$  to  $1100^{\circ}\text{C}$  for PRTs.
- LCD display: channels A, B or A-B in  $^{\circ}\text{C}$ ,  $^{\circ}\text{F}$  or K, plus  $\Omega$  or mV.
- Four linearisation for PRTs and ten linearisations for thermocouples with calibration data review for peace of mind.
- Three reference junction methods to meet all your needs for now and in the future.
- Battery operation plus built-in data logging.

## EASY TO USE

The multi-channel LCD shows your measurements in  $^{\circ}\text{C}$ ,  $^{\circ}\text{F}$  or K, plus other probe and status information, such as  $\Omega$  and channel. For ease of use, dedicated buttons select major instrument functions.

## BATTERY OPERATION

F150 operates on either AC power or its internal batteries that give you typically 8 hours operation (14 hours with display back lighting turned off). An integral charger eliminates the need to carry a separate unit and maintains the battery charge level with F150 switched on or off.

## REFERENCE JUNCTION (RJ)

For high versatility you can choose the thermocouple RJ compensation method. Automatic compensation is provided by an internal sensor, or an external 100Ω PRT. A third option allows you to switch off the RJ and refer all measurements to 0°C.

## DISPLAY ZERO (NULL)

If you have ever monitored temperature change, you will know that it's much easier when you can set the initial measurement to "zero", allowing you to see the changes as they occur. Display zero is available on F150 in all input modes, i.e. channels A, B or A-B.

## PRT PROBE CURRENT

For improved accuracy, F150 virtually eliminates the effect of voltages which are generated when a direct current passes through a PRT and its connecting wires. Uniquely at this instrument level, F150 offers continuous current reversal, guaranteeing higher accuracy than a conventional DC machine.

## CALIBRATION SYSTEMS

Complementing F150 we offer a wide range of metal block calibrators covering a temperature range of -25°C to 700°C. Contact our application engineers for more information on our complete calibration systems.



F150 and **B550** block bath calibrator.

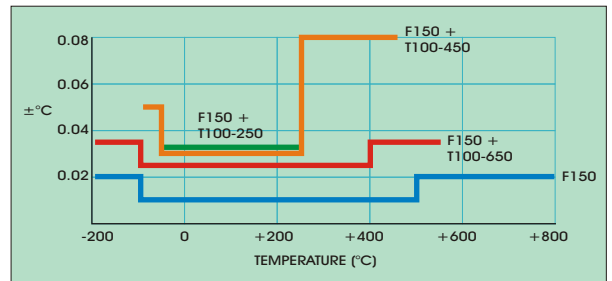
## ACCURACIES

Instrument accuracies for thermocouples.

TC type	F150 range (°C) (Min. to Max.)	Measurement uncertainties* (+20°C ±5°C ambient over 1 year) at 0°C + % reading	
		±0.09°C	±0.025%
B	+250 TO +1820	±0.09°C	±0.025%
C	0 to +2315	±0.57°C	±0.057%
D	0 to +2315	±0.60°C	±0.059%
E	-200 to +1000	±0.05°C	±0.031%
J	-210 to +1200	±0.07°C	±0.030%
K	-200 to +1372	±0.09°C	±0.035%
N	-200 to +1300	±0.08°C	±0.035%
R	-50 to +1768	±0.27°C	±0.020%
S	-50 to +1768	±0.27°C	±0.020%
T	-200 to +400	±0.09°C	±0.025%

Add % reading to the 0°C uncertainty to obtain instrument accuracy at the indicated temperature.

\* RJ mode off.



## EXPANSION MODULES

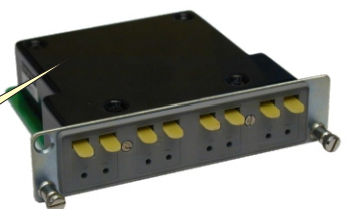
Expand F150 up to 10 channels without any compromise in performance when using the versatile 4 channel expansion modules. Both the miniature connector and bare wire thermocouple modules have internal RJ compensation, so the performance on the back panel is as good as the front panel.

4 channel expansion module for miniature thermocouple connector



4 channel expansion module for PRT connector

4 channel expansion module for bare wire thermocouples



# F150

°C °F Ω K mV 0.01 °C

## SPECIFICATION

<b>Instrument accuracy</b>	±0.015°C for PRT measurement ( $R_0 = 100\Omega$ ) at 0°C over 1 year. Up to ±0.05°C at 0°C for TC*, see table for TC types B, C, D, E, J, K, N, R, S & T. (RJ** mode = Off).
<b>RJ Accuracy</b>	±0.1°C @ 20°C ambient, plus 0.01°C/°C deviation from 20°C.
<b>System Accuracy</b>	Up to ±0.025°C, see graph for typical system accuracies with PRTs.
<b>Resolution</b>	<b>PRT:</b> 0.01 or 0.001°C/°F/K, plus 0.001Ω. <b>TC*:</b> 0.1 or 0.01°C/°F/K, plus 0.001mV.
<b>Range</b>	<b>PRT:</b> 10 to 460Ω, -210°C to 1100°C. <b>TC*:</b> -210°C to 2315°C
<b>Probe linearisation</b>	<b>PRT:</b> $R_0 + A, B \& C$ coefficients for calibrated probes IEC751, US/JIS and EN60751 (ITS90) for un-calibrated probes. <b>TC*:</b> Types C & D to ASTM E988. All other types to NIST175 (ITS90).
<b>PRT probe current</b>	1mA with selectable current reversing mode and $\sqrt{2}$ divider for self-heating check.
<b>Front panel connectors</b>	<b>PRT:</b> 2 x 5-pin DIN socket. <b>TC*:</b> Dual standard connector for 2 x miniature plugs or 2 x pairs 4mm instrument connectors.
<b>Expansion module connectors</b>	<b>PRT:</b> 4 x 5-pin DIN socket <b>TC*:</b> Dual standard connector for 4 x miniature plugs or 4 x pairs bare wire connection (up to ø0.9mm)
<b>Display</b>	240 x 64 dot, backlit LCD graphics display with contrast adjustment.
<b>Interface options</b>	RS232 or IEEE-488 and analogue output (±2V, 1mV/°C with 1°C resolution).
<b>Working (storage) temperature</b>	0°C to +50°C (-20°C to +55°C), up to 80% RH non-condensing.
<b>Power requirements</b>	<b>AC:</b> 100, 120, 220, 240V ±10%. 50/60 Hz. <b>DC:</b> Internal sealed batteries with integral charger.
<b>Size/weight</b>	219 x 110 x 315mm (W x H x D). 5.5kg.

(TC\* = thermocouple, RJ\*\*Reference Junction)

## ORDER CODES

<b>F150-N</b>	F150.	<b>FA-ADP-X</b>	Adaptor for standard thermocouple connection, where X = thermocouple type.
<b>F150-D</b>	F150 + RS232 output.	<b>FA-SC-X</b>	Adaptor for thermocouple wire connection where X = thermocouple type.
<b>F150-L</b>	F150 + IEEE output.	<b>T100-250-1D</b>	100Ω PRT, -50°C to +250°C.
<b>F150-M</b>	F150 + analogue output.	<b>T100-450-1D</b>	100Ω PRT, -70°C to +450°C.
<b>F150-V</b>	F150 + RS232 + analogue output.	<b>T100-600-1D</b>	100Ω PRT, -50°C to +600°C.
<b>F150-X</b>	F150 + IEEE + analogue output.	<b>TC-N1-1300</b>	Type N reference thermocouple, temperature range up to 1300°C.
<b>EXP-F150-TC-C</b>	4 ch. thermocouple expansion module (miniature connectors).		
<b>EXP-F150-TC-W</b>	4 ch. thermocouple expansion module (bare wire).		
<b>EXP-F150-PRT</b>	4 ch. PRT expansion module.		

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