Additel
Metrology Made Simple

Additel 878
Reference Dry Well Calibrators



- Three models ranging from -40°C to 700°C
- Reference level performance in accuracy, stability and uniformity
- Quick to temperature
- Two-channel readout measures RTDs and TCs, and provides task documentation
- Full HART communicator
- Optional external temperature control
- Wi-Fi and Bluetooth capable
- Color touch screen display
- Quick-Push connectors (PC Option)
- Set point control by reference
- Self-calibration feature
- Optional TPW kit for built-in automatic realization (ADT878-160 only)
- Built-in automatic PRT annealing feature (ADT878-700 only)

OVERVIEW

We are taking temperature calibration to the next level with the Additel 878 Reference Dry Well Calibrators. If you are looking for the best dry well on the market, then look no further! Additel's commitment to continuous improvement, quality and time saving features are on full display in the ADT878 series. With three models to choose from, ranging from -40 to 700°C, you will find the perfect fit for your calibration needs. The Process Calibrator option adds an external reference input, a two-channel readout for UUT's and a full complement of capabilities to help with everything from measuring temperature sensors, to calibrating thermocouples, self-calibrating the Reference Well and configuring HART transmitters. Each unit comes standard with a large touchscreen display, dual-zone control and Additel's commitment to the best customer service in the industry. We are certain that you will be blown away by the outstanding performance of these game-changing Reference Dry Wells!

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Rev # 20210422

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Process Calibrator Option

Each model can be purchased with our Process Calibrator (PC) option. This option combines the many features found in a fully functional HART documenting process calibrator with the reference grade dry well. This option includes the ability to measure a reference PRT, with virtually any connection type, and two device under test channels which can measure, mA, voltage, switch, RTD or thermocouple. In addition to these measurement functions, this calibrator has full documenting capability of creating tasks, saving as found and as left results, as well as communication with HART-smart transmitters. The process calibrator option also has an on board full HART communicator which allows users to read, configure and calibrate HART transmitters. The snap shot feature allows you to capture all information displayed on the screen with the push of a button. This optional add-on allows for data logging of all channels on an auto step function. By utilizing the reference PRT, you can select to control to the dry well set point using the internal sensor or the external reference PRT.

Self-Calibration

We believe using an external reference probe as your standard is the best way to perform your temperature calibration. But we also recognize this method is not always necessary or convenient and depending on the application, using the internal control sensor would be preferred. Traditionally, the internal control sensor has a wide accuracy which can largely be contributed to its long-term drift. We've built-in a self-calibration feature allowing you to run an automated calibration of the internal control sensor using your external reference. With literally a few selections the calibration will run automatically giving you a fresh, traceable calibration of the control sensor which will improve its accuracy as you will not have to account for its long term drift when used as the reference.

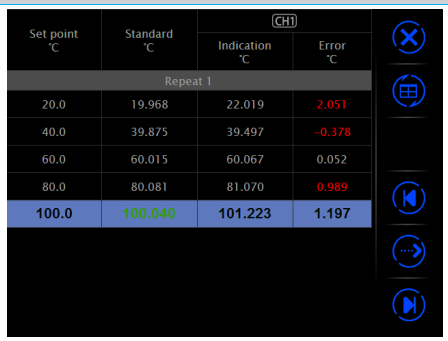
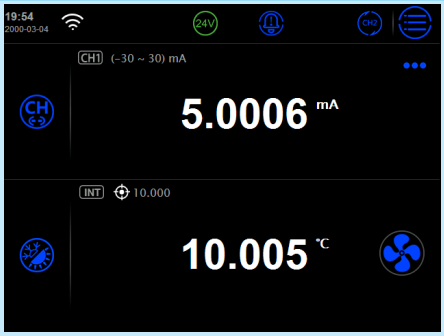
Automation Features

Traditionally, dry wells were simply a stable heat source. To enhance the usability of our Reference Dry Wells, we've added automation features enabling you to utilize these amazing devices as a highly stable heat source, triple point of water maintenance apparatus, and annealing furnace.

Combined with the ADT878-TPW-KIT, the ADT878-160 Reference Dry Well can be used to automatically realize and maintain a triple point of water cell. Traditional methods take time and practice to realize the triple point of water. Additel has now simplified this process with an automatic TPW realization feature. Simply insert the cell and PRT into the Reference Dry Well and run the procedure. The automation in the firmware will alert when the cell is super cooled. Remove the cell and give it a shake and now you can maintain the triple point in the reference well. This is very useful to check the drift of your PRT. For more information, please see our ADT878-TPW-KIT data sheet.

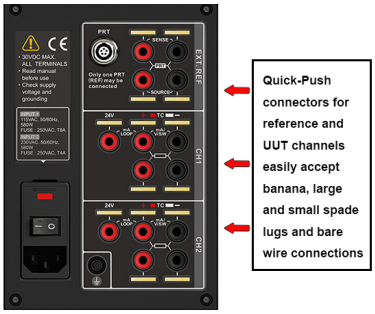
When you purchase our 700°C Reference Dry Well, you will find our automatic annealing feature used to anneal PRTs. We have preconfigured annealing procedures that set the temperature annealing time and cool down rate. This feature, also lets you create your own annealing procedures.

FEATURES

Specification	*Display*
Task	
mA Measurement	



Non-PC version PC version



Process Calibrator Optional Electronics

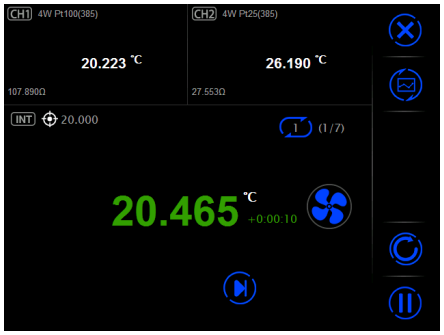
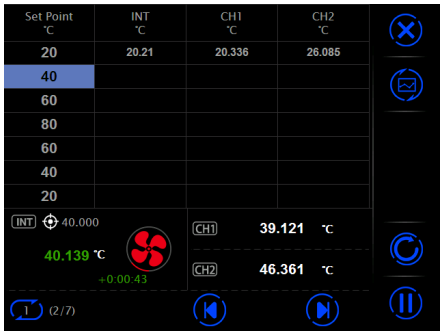
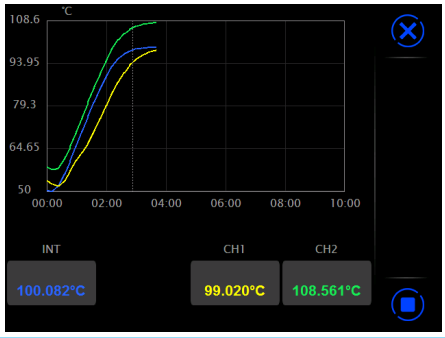
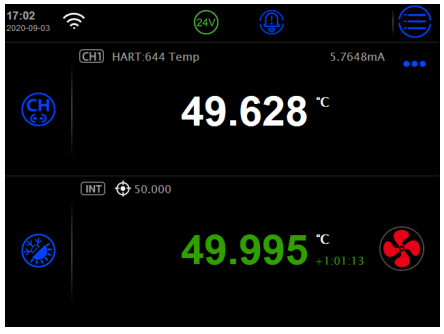
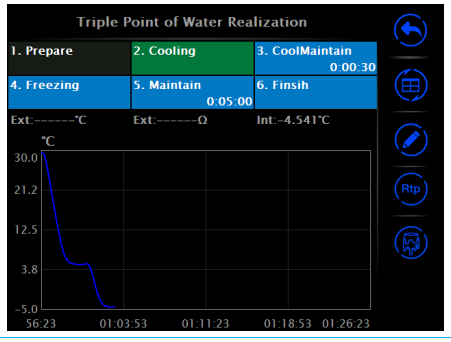
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FEATURES

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Specification	*Display 1*	*Display 2*
Auto Step		
Remote Control		
Data Logging		
HART Communicator		
TPW Cell Realization		

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SPECIFICATIONS

Reference Dry Well Specifications

Specification	*878-160*	*878-425*	*878-700*
Temperature Range at 23°C	-40°C to 160°C	33°C to 425°C	33°C to 700°C
Display Accuracy	±0.1°C at Full Range	±0.2°C at Full Range	±0.20°C at 33°C
			±0.20°C at 425°C
			±0.25°C at 660°C
Stability (30 min)	±0.005°C at Full Range	±0.005°C at 100°C	±0.005°C at 100°C
		±0.010°C at 225°C	±0.015°C at 425°C
		±0.015°C at 425°C	±0.030°C at 700°C
Axial Uniformity at 60 mm (2.4 in)	±0.025°C at -40°C	±0.10°C at 100°C	±0.10°C at 100°C
	±0.020°C at 0°C	±0.15°C at 225°C	±0.25°C at 425°C
	±0.050°C at 160°C	±0.25°C at 425°C	±0.40°C at 700°C
Axial Uniformity at 80 mm (3.15 in)	±0.050°C at -40°C	±0.15°C at 100°C	±0.15°C at 100°C
	±0.040°C at 0°C	±0.20°C at 225°C	±0.30°C at 425°C
	±0.050°C at 160°C	±0.30°C at 425°C	±0.60°C at 700°C
Radial Uniformity	±0.01°C at Full Range	±0.025°C at 100°C	±0.025°C at 100°C
		±0.030°C at 225°C	±0.040°C at 425°C
		±0.040°C at 425°C	±0.060°C at 700°C
Loading Effect	±0.08°C (Display Sensor)	±0.05°C (Display Sensor)	±0.02°C at 100°C
			±0.05°C at 425°C
			±0.15°C at 700°C
	±0.010°C (External Sensor)	±0.01°C (External Sensor)	±0.01°C at 100°C
			±0.02°C at 425°C
			±0.03°C at 700°C
Hysteresis (Display Sensor)	0.025°C	0.04°C	0.07°C
Environmental Conditions	8°C to 38°C guaranteed accuracy		
	0°C to 50°C, 0% to 90% RH non-condensing		
Storage Conditions	-20°C to 60°C		
IP Rating	IP20		
Immersion Depth	160 mm (6.30 in)	193 mm (7.60 in)	
Insert OD	31.9 mm (1.26 in)	30.8 mm (1.21 in)	
Heating Time	4 min: -40°C to 23°C	15 min: 23°C to 425°C	25 min: 23°C to 700°C
	10 min: 23°C to 160°C		
Cooling Time	8 min: 160°C to 23°C	24 min: 425°C to 100°C	30 min: 700°C to 100°C
	15 min: 23°C to -40°C	15 min: 100°C to 50°C	15 min: 100°C to 50°C
Typical Time to Stability	10 min		
Resolution	0.001°C		
Units	°C, °F, and K		
Display	6.5 in (165 mm) color touch screen		
Size (H x W x D)	170 x 345 x 330 mm (6.69 x 13.58 x 13.0 in)		
Weight	11.2 kg (24.7 lbs)	9.7 kg (21.4 lbs)	
Power Requirements	90-254 VAC, 45-65 Hz, 580 W	90-254 VAC, 45-65 Hz, 1400 W	
Communication	USB A, USB B, RJ45, WiFi, Bluetooth		
Localization	English, Chinese, Japanese, Russian, German, French, Italian, and Spanish		
Warranty	1 year		

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Input Specifications (Process Calibrator [PC] Option)

Specification	Description
Readout Accuracy for 100 ohm PRT (Probe Accuracy Not Included)	±0.005°C at -40°C
	±0.006°C at 0°C
	±0.008°C at 50°C
	±0.009°C at 100°C
	±0.011°C at 160°C
	±0.015°C at 300°C
	±0.019°C at 425°C
	±0.026°C at 660°C
	±0.028°C at 700°C
Readout Resolution	0.1 mΩ
Reference Resistance Temperature Measurement Range	-200°C to 962°C
Reference Resistance Accuracy	0Ω to 50Ω: ±1.25mΩ
	50Ω to 400Ω: ±0.0025% RD
Reference Characterizations	ITS-90, CVD, IEC-751
Reference Measurement Capability	4-wire PRT
Reference Probe Connection	6-pin lemo smart connector and Quick-Push connectors to accept banana, mini-banana, large & small spade lug and bare wire connections
RTD Channels	2 channels. Both accept 2, 3, or 4-wire RTDs
RTD Measurement Accuracy (excl sensor)	0Ω - 25Ω: ±0.002Ω
	25Ω - 400Ω: 0.004% RD
	400Ω - 4kΩ: 0.005% RD
RTD Measurement Resolution	0.1mΩ
RTD Measurement Resistance Range	0Ω to 4KΩ
RTD Characterizations	PT10, PT25, PT50, PT100, PT200, PT500, PT1000, CU10, CU50, CU100, NI100, NI120
RTD Connection	Quick-Push connectors accept banana, mini-banana, large & small spade lug and bare wire connections
TC Channel	2
TC Measurement Channels	Accepting S, R, K, B, N, E, J, T, C, D, G, L, and U
TC Range	–75 mV to 75 mV
TC Resolution	0.1 µV
TC Voltage Accuracy	0.01% RD + 5 µV
Internal CJC Accuracy	±0.2°C (ambient from 0°C to 50°C)
Current Range	–30 mA to 30 mA
Current Accuracy	0.01% RD + 2 µA
Current Resolution	0.1 µA, Input Impedance: < 10Ω

Specification	Description
Voltage Ranges	-12 V to 12 V and –30 V to 30 V
Voltage Accuracy	±0.01% RD + 0.6 mV
Voltage Resolution	0.1 mV; Input impedance: >1MΩ
Switch Test	Mechanical or Electrical
DC 24V Output	24 V ±0.5 V, MAX 60 mA
Hart Communicator	Read, configure and calibrate HART devices - DD files updated periodically Optional - (order ADT875PC)
Documentation	Up to 1,000 tasks which store up to 10 results each containing as found and as left data. Snap shot feature allows for screen captures. Records auto step and ramp functions.
Temperature Coefficient 0°C to 13°C and 33°C to 50°C	ADT878 (PC)-160: ±0.005°C/°C
	ADT878 (PC)-425/700: ±0.005°C/°C
	Ref Readout: ±1 ppm FS/°C
	RTD Readouts: ±1 ppm FS/°C
	TC Readouts: ±5 ppm FS/°C
	Current: ±5 ppm FS/°C
	Voltage: ±5 ppm FS/°C

TC Measurement Specification and Calculation (Process Calibrator [PC] Option)

TC Type	Temperature (°C)	Error (°C)[1]	TC Type	Temperature (°C)	Error (°C)[1]
B	250	±1.99	T	-200	±0.28
	300	±1.65		-40	±0.14
	425	±1.18		0	±0.13
	660	±0.81		160	±0.11
	700	±0.77		300	±0.11
	1768	±0.56		400	±0.11
K	-200	±0.29	N	-200	±0.46
	-40	±0.13		-40	±0.20
	0	±0.13		0	±0.19
	160	±0.14		160	±0.17
	300	±0.15		300	±0.17
	425	±0.16		425	±0.17
	660	±0.18		660	±0.19
	700	±0.19		700	±0.19
	1000	±0.31		1000	±0.27
E	-200	±0.16	S	-50	±1.25
	-40	±0.09		-40	±1.17
	0	±0.09		0	±0.93
	160	±0.08		160	±0.63
	300	±0.09		300	±0.57
	425	±0.10		425	±0.55
	660	±0.12		660	±0.54
	700	±0.13		700	±0.53
	1000	±0.17		1768	±0.66
J	-210	±0.22	R	-50	±1.33
	-40	±0.10		-40	±1.23
	0	±0.10		0	±0.95
	160	±0.11		160	±0.61
	300	±0.12		300	±0.54
	425	±0.13		425	±0.51
	660	±0.14		660	±0.48
	700	±0.14		700	±0.48
	1000	±0.21		1768	±0.58

[1] Excluding cold junction compensation errors.

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Ordering Information

Model Number

ADT878 — 160 — A — 110 V

Model:
ADT878
ADT878PC

Temperature Range (at 23℃):
160: -40°C to 160°C
425: 33°C to 425°C
700: 33°C to 700°C

Insert Model:
A, B, C, D,
E, F

Power Option:
110 V
220 V

Accessories

Standard Accessories		
Model	*Quantity*	*Picture*
Reference Dry Well and selected insert	1 pc.	
Power cable	1 pc.	
USB Cable	1 pc.	
Insert removal tool	1 pc.	
Thermal Shield (ADT878/PC-425/700 only)	1 pc.	
Silica gel plugs (ADT878/PC-160 only)	1 set (3 pcs.)	
Insulation plug (ADT878/PC-160 only)	1 pc.	
Test leads (ADT878PC only)	2 sets (4 pcs.)	
ISO 17025 Accredited calibration	1 pc.	
CD Manual	1 pc.	

Insert Ordering Information

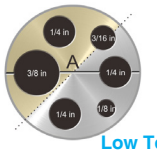
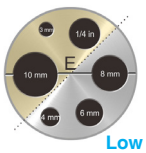
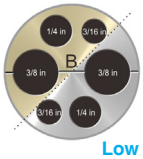
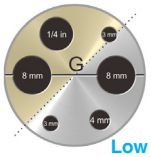
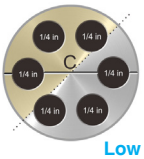
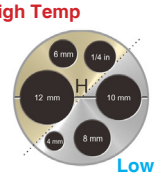
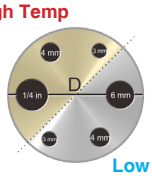
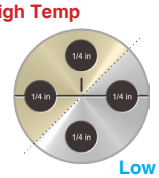
ADT110 — 878 — L — INSERT — A

Temperature Range:
L - Low Temp
H - High Temp

Insert Model:
A, B, C, D,
E, G, H, I

Optional Accessories		
Model	*Description*	*Picture*
9915-878	Carry Case for ADT878-160/425/700 with wheels	
ADT110-878-X-INSERT-X	Insert for ADT878, see insert ordering information on the next page	
AM17XX-12-ADT	Secondary PRT with dry well connector, see PRT information on the next page	
AM17XX-BEND-ADT	Bend Secondary PRT with dry well connector, see PRT information on the next page	
9070	Smart connector for reference PRT used with ADT878 Dry Well Calibrator	
9071	Connector Adapter from smart connector to 4-wire with gold-plated spades for ADT878 Dry Well Calibrator	
9072	Smart connector with clamps for reference PRT used with ADT878 Dry Well Calibrator	
9080	Cable Kit (includes TC plug, compensation cable, S,R,B,K,J,T,E,N)	
ADT878-TPW-KIT	Triple point of water cell kit (see ADT878-TPW-KIT for details)	

Insert Information

Insert Information			
Model	*Specification*	*Model*	*Specification*
A	High Temp  Low Temp	E	High Temp  Low Temp
B	High Temp  Low Temp	G	High Temp  Low Temp
C	High Temp  Low Temp	H	High Temp  Low Temp
D	High Temp  Low Temp	I	High Temp  Low Temp

* Updated insert information at www.additel.com

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Secondary PRT Ordering Information

AM1710 — 12 — ADT

Secondary PRT Model:
AM1710
AM1730
AM1751
AM1760

PRT Exterior:
12 - 12 inch straight
BEND - 90° bend



AM17XX-12-ADT



AM17XX-BEND-ADT

Secondary PRT Information

Specification	*AM1710 Series*	*AM1730 Series*	*AM1751 Series*	*AM1760 Series*
Temperature Range [3]	-60°C to 160°C	-200°C to 420°C	-200°C to 670°C	-200°C to 670°C
Resistance at 0°C	Nominal 100Ω			
Temperature Coefficient	0.003925 Ω / Ω / °C			
Calibrated Accuracy (k=2)[2][3]	±0.025°C at -40°C ±0.015°C at 0.01°C ±0.025°C at 160°C	±0.025°C at -40°C ±0.015°C at 0.01°C ±0.035°C at 420°C	±0.025°C at -40°C ±0.015°C at 0.01°C ±0.035°C at 420°C ±0.05°C at 661°C	±0.010°C at -196°C ±0.006°C at 0.01°C ±0.015°C at 420°C ±0.025°C at 661°C
Drift	±0.01°C at TPW after 100 hours at 160°C	±0.01°C at TPW after 100 hours at 420°C	±0.01°C at TPW after 100 hours at 661°C	±0.004°C at TPW after 100 hours at 661°C
Short Term Stability	±0.007°C			±0.002°C
Thermal Shock	±0.005°C after (10) thermal cycles from minimum to maximum temperatures			±0.002°C after (10) thermal cycles from minimum to maximum temperatures
Hysteresis	<=0.005°C			<=0.001°C
Self-heating	50 mW/°C			0.0015°C at 0.5mA
Response Time	9 seconds for 63% response to step change in water moving at 3 feet per second			
Measurement Current	0.5 mA or 1 mA			
Sensor Length	32 mm			42 mm
Sensor Location	5 mm from tip			
Insulation Resistance	>1000 MΩ at room temperature			
Sheath Material	Stainless Steel	Inconel™		
Dimension	**AM1710-12-ADT** 0.25 in dia X 12 in (6.35 mm X 305 mm)	**AM1730-12-ADT** 0.25 in dia X 12 in (6.35 mm X 305 mm)	**AM1751-12-ADT** 0.25 in dia X 12 in (6.35 mm X 305 mm)	**AM1760-12-ADT** 0.25 in dia X 12 in (6.35 mm X 305 mm)
	AM1710-BEND-ADT 0.25 in dia X 12 in (6.35 mm X 305 mm), 90° bend at 7.4 inch (190 mm) from probe end	**AM1730-BEND-ADT** 0.25 in dia X 12 in (6.35 mm X 305 mm), 90° bend at 9.6 inch (245 mm) from probe end	**AM1751-BEND-ADT** 0.25 in dia X 12 in (6.35 mm X 305 mm), 90° bend at 9.6 inch (245 mm) from probe end	**AM1760-BEND-ADT** 0.25 in dia X 12 in (6.35 mm X 305 mm), 90° bend at 9.6 inch (245 mm) from probe end
External Leads	Teflon™ –insulated copper wire, 4 leads, 0.8 meters			
Handle Dimension	15 mm (OD) x 65 mm (L)			
Handle Temperature Range[1]	-50°C to 160°C	-50°C to 180°C		
Calibration	NIST traceable calibration with data included. Accredited calibration available per request.			

[1] Handle temperatures outside this range will cause damage to the probe.
[2] Includes calibration and 100 hour drift.
[3] Probe calibration ranges may differ from probe temperature ranges (see Calibrated Accuracy for calibration ranges).
* PRT Information from www.accumac.com

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