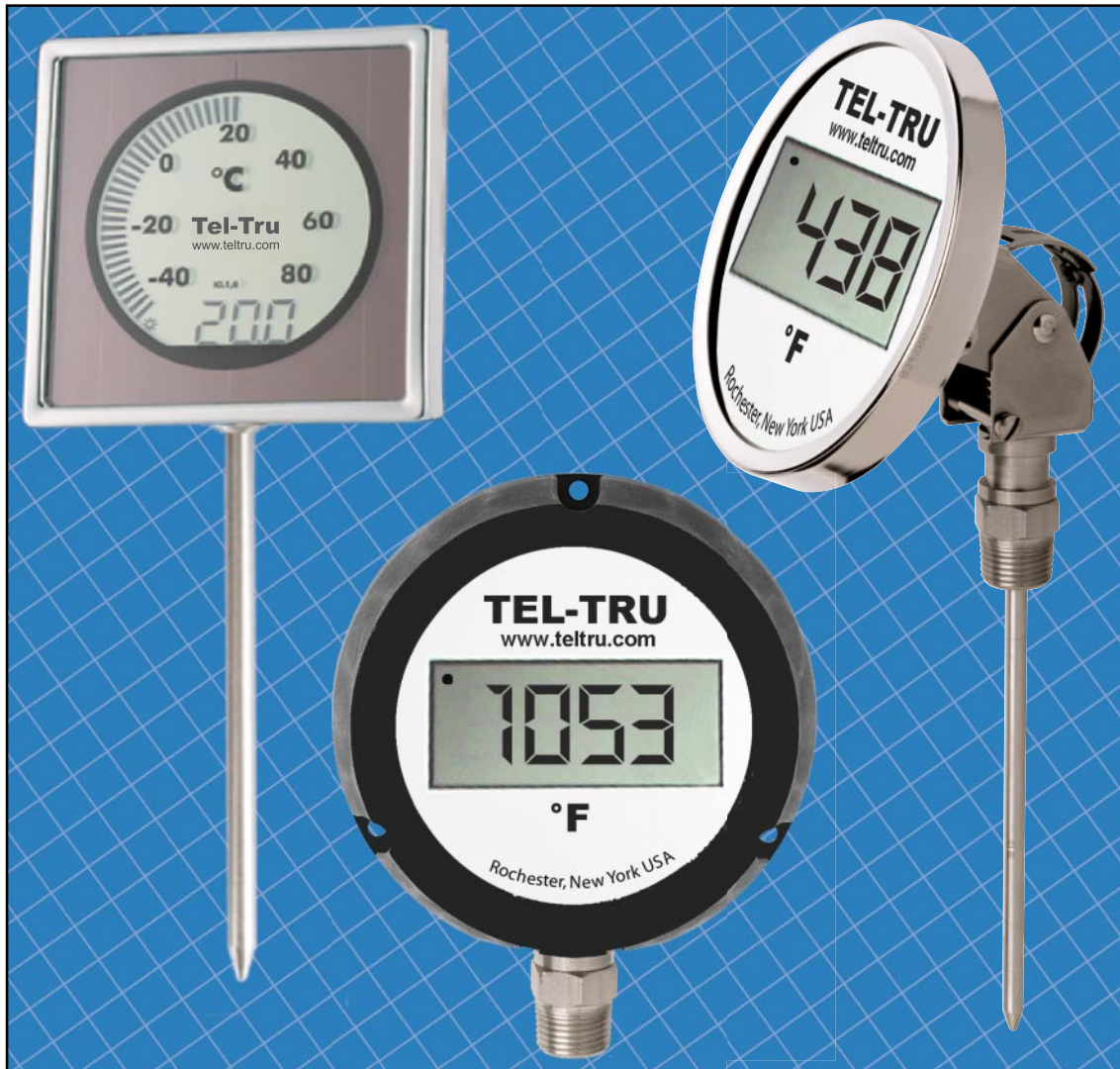




TEL-TRU MANUFACTURING COMPANY

DIGITAL THERMOMETERS



World-Class Thermometers Since 1916

www.Sandelius.com

ELECTRONIC DIGITAL THERMOMETERS

Tel-Tru's DIGI-TEL Thermometers combine the easy, quick visual reference feature of a local indicator and the precision readout of a digital thermometer with a unique interchangeable probe concept.

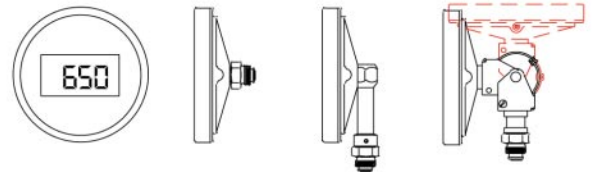
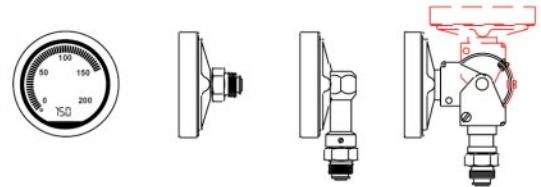
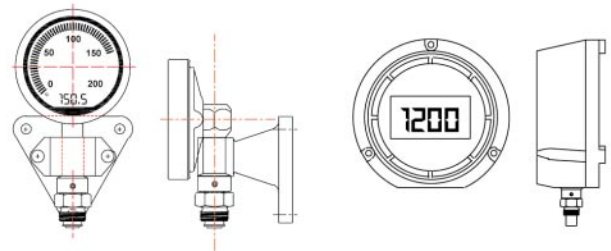
► The DIGI-TEL Advantage

- ★ Easily read display with either analog or digital indication.
- ★ Analog/digital readout with LCD graduations allow instant recognition of reading from a distance.
- ★ Innovative sensor and microprocessor technology.
- ★ Quick response time with lasting accuracy.
- ★ Temperature ranges available are traditional bimetal thermometer equivalents or maximum span allowable by instrument.
- ★ Sturdy mechanical design and stainless steel construction makes it suitable for heavy-duty industrial process applications.
- ★ No mechanical wear.
- ★ Fewer number of configurations for industrial plants to order and hold in stores.
- ★ Eliminates the use of measuring liquids, like mercury, which may be a risk to health and the environment during manufacture, use, and disposal.
- ★ Microprocessor design offers opportunities for future additions of advanced features to the electronic module.
- ★ Intrinsically safe approval pending.

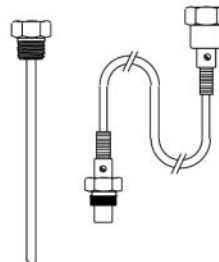
► Battery Powered DIGI-TEL

- ★ Battery powered models have interchangeable probe assemblies and display modules for easy field changes and replacements.
- ★ Battery powered units have a five year battery life.
- ★ Interchangeability of components is ideal for test applications.
- ★ Innovative concept and flexible configuration possibilities for OEM's.
- ★ Factory certification of accuracy and battery replacement available.

BATTERY POWERED DIGI-TEL DIGITAL DISPLAY MODULE (For more product information see pages 3-6)



Select a Probe and/or Cable

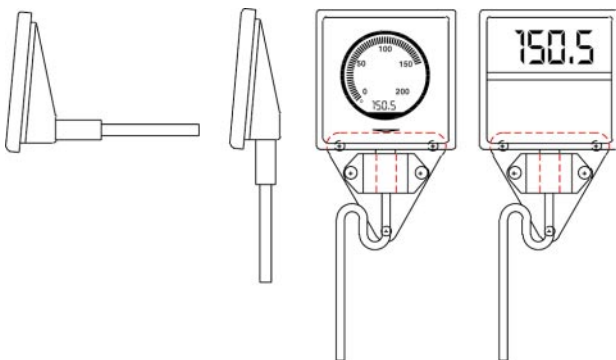


Connect and Install



SOLAR POWERED DIGI-TEL DIGITAL THERMOMETERS

Solar models have integrated cable and/or probe
(For more product information see pages 9-10)





► The Industrial Thermometer of the Future...

DIGI-TEL battery powered models combine the easy, quick visual reference feature of a local indicator and the precision readout capability of a digital thermometer with a unique interchangeable probe concept...**SELECT, CONNECT, and INSTALL!** **DIGI-TEL solar powered** models are available with an integrated cable and/or probe. All **DIGI-TEL** models have a one year warranty.

Local temperature indicators available without external power, until now, have all been analog dial types, either filled with mercury or gas, or of bimetal design. The new DIGI-TEL thermometer has been designed utilizing state-of-the-art microprocessor technology, resulting in a more reliable, flexible, and accurate alternative in temperature measurement.

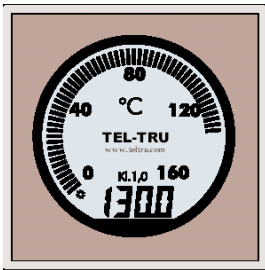
The Tel-Tru **solar powered DIGI-TEL** has as its energy source a solar cell as an integral part of the display module. The instrument functions reliably in artificial light at levels above 50 lux. The 100-lux minimum for many industrial plants means the installation of the Tel-Tru **solar powered DIGI-TEL** can be used practically anywhere. The Tel-Tru **battery powered DIGI-TEL** uses a lithium battery, which has a working life of five years.

Interchangeable probe assemblies offer maximum flexibility for use in industrial, test, and OEM applications. *Direct* and *Remote* thermometer styles are available. **DIGI-TEL** thermometers are *easy to install* because sensor assembly and display indicator can be selected according to the application and *easily connected on-site* for installation into standard thermowells.

The Display Module

Dual Analog and Digital Display

The circular arrangement of LCD "graduations" are designed to give the appearance of a traditional dial instrument, while the exact temperature can be read from a 4 digit display. **DIGI-TEL** models with a digital only display and with large high-resolution digits are also available. Modules are all stainless steel. The heavy-duty industrial assemblies are available as back, bottom, adjustable angle, or remote configurations. The unit complies with the vibration



requirements of German Lloyd for marine applications (modules D1A and D5A excluded). Dust and moisture protection level is to IP 65 and electromagnetic interference complies with the requirements of the EC standards.

► New Concept, Traditional Design!

The Probe Assembly--Sensor

The temperature sensor is a thin film Platinum RTD, Pt 1000 2-wire type. Grounding is not necessary due to minimal resistance change over length. Maximum length recommended is 163 feet/50 meters. Very low power consumption of the sensor allows use of solar powered modules, or up to a 5 year life on battery powered units. Signal conditioning is performed by the microprocessor. The small size of the sensor chip allows pinpoint positioning in the medium for faster response characteristics

Interchangeable Probe Construction

Probe assemblies for the **battery powered** models are interchangeable with all display modules through the use of a standard watertight connector assembly. Cable assemblies for Remote Mounted thermometers use the same interchangeable connectors. The threaded union connection is a standard 1/2" NPT and 6mm diameter stems fit into standard bimetal thermowells.

The Measuring Process

The Tel-Tru **solar** and **battery powered DIGI-TEL** thermometers rely on a periodic measurement process with a 3 second cycle time allowing the viewer, even in passing, to take a real-time reading. An activity display (a sun symbol at the start of display) indicates the measurement cycle.

Performance

The microprocessor conditions the signal resistance of Pt 1000 with a resolution of 12 bits. The numerical error of measurement is less than 1 Kelvin. This meets the accuracy requirements for measuring equipment to EN 13190 class 1, which is within $\pm 1\%$ of the reading plus 1 degree.

Sensor Monitoring

The microprocessor continually checks the integrity of the sensor signal.

Service Considerations

A significant advantage of the Tel-Tru **DIGI-TEL** thermometers lies in the long-term stability of the electronics to provide the measurement. Integrated diagnostic routines continually check the validity of the sensor output. An error message will occur when there is a short circuit of the sensor connection, the measured value is out of range, and when the probe is not connected to the module or in the event of a sensor failure. Please see www.teltru.com for error message details.

4-1/2" and 5" BATTERY POWERED DIGITAL MODULES

Tel-Tru's DIGI-TEL Thermometers combine easy, quick visual reference feature of a local indicator and the precision readout of a digital thermometer with a unique interchangeable probe concept.

► DIGI-TEL DIGITAL DISPLAY MODULES (USE WITH INTERCHANGEABLE PROBE)

MODEL	DIAL SIZE	CASE TYPE	MOUNTING STYLE
D5A	5" Round	Direct Mount	Adjustable Angle
D5B	5" Round	Direct Mount	Back Connect
D5C	5" Round	Direct Mount	Bottom Connect
D4R	4-1/2" Round	Remote Mount	Wall Mount, Bottom Connect

D5A Direct Mount
Adjustable Angle



D4R Remote Mount
Bottom Connect



► SPECIFICATIONS:

Case Material:	D4 polypropylene turret style D5 304 stainless steel
Power Supply:	Lithium battery
Service Life:	5 years
Reading Cycle:	3 second intervals
Display:	Digital 4 digits with 7 segment display 1.06" (27mm) high
Protection Level:	IP 65
Ambient Temperature:	-4 to 140°F (-20 to 60°C)
Accuracy:	Within ±1% of reading plus 1 degree In accordance with DIN EN 13190 Class 1
Resolution:	Up to 500°F (250°C) = .5°, over 500°F = 1°

► HOW TO ORDER:

TO BUILD A PART NUMBER: Select one code from each column in the table below to build your Digital Thermometer.

Example: 4.5" round polypropylene case, digital, remote mount, -75/1200°F, no options

Ordering Format:	MODEL	CASE STYLE	TEMP RANGE	OPTIONS
	D4	R	10	100

**** Important Note ****

Order interchangeable probes and cables separately (see page 7 and 8)

MODEL CODE	CASE TYPE CODE	TEMP. RANGE CODE	OPTION CODE
D5 (digital)	A = Direct Mount, Adjustable Angle B = Direct Mount, Back Connect C = Direct Mount, Bottom Connect	* 09 = -75/750°F * 58 = -60/400°C	100 = NONE
D4 (digital)	R = Remote Mount, Wall Mount, Bottom Connect	* 09 = -75/750°F * 58 = -60/400°C ** 10 = -75/1200°F ** 59 = -60/650°C	

** Must use HIGH temp. probe P3 with cable

* Must use HIGH temp. probe P2

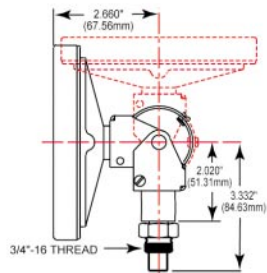


► DIGI-TEL D5 DIRECT MOUNT DIMENSIONAL DRAWINGS

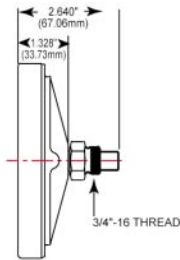
Front View



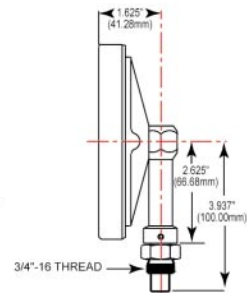
Adjustable Angle
D5A



Back Connect
D5B

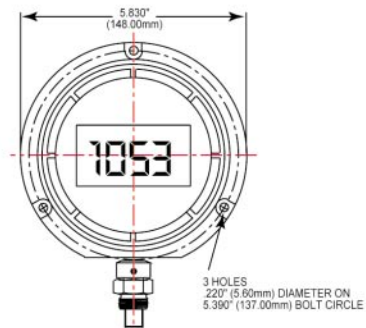


Bottom Connect
D5C

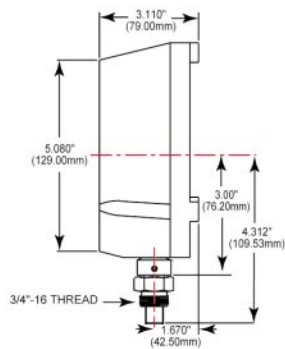


► DIGI-TEL D4 REMOTE MOUNT DIMENSIONAL DRAWINGS

Wall Mount
Bottom Connect
D4R



Side View
Wall Mount



3" BATTERY POWERED DIGITAL MODULES

Tel-Tru's DIGI-TEL Thermometers combine the easy, quick visual reference feature of a local indicator and the precision readout of a digital thermometer with a unique interchangeable probe concept.

► DIGI-TEL ANALOG DIGITAL DISPLAY MODULES (USE WITH INTERCHANGEABLE PROBE)

MODEL	DIAL SIZE	CASE TYPE	MOUNTING STYLE
D1A	3" Round	Direct Mount	Adjustable Angle
D1B	3" Round	Direct Mount	Back Connect
D1C	3" Round	Direct Mount	Bottom Connect
D1R	3" Round	Remote Mount	Wall Mount, Bottom Connect

D1A Direct Mount Adjustable Angle



D1B Direct Mount Back Connect



D1C Direct Mount Bottom Connect



D1R Remote Mount Bottom Connect



► SPECIFICATIONS:

Case Material:	304 stainless steel
Power Supply:	Lithium battery
Service Life:	5 years
Reading Cycle:	3 second intervals
Dual Display:	Analog bar graph 61 divisions, Digital 4 digits with 7 segment display .43" (11mm) high
Protection Level:	IP 65
Ambient Temperature:	-4 to 140°F (-20 to 60°C)
Accuracy:	Within ±1% of reading plus 1 degree In accordance with DIN EN 13190 Class 1
Resolution:	Up to 500°F (250°C) = .5°, over 500°F = 1°

► HOW TO ORDER:

TO BUILD A PART NUMBER: Select one code from each column in the table below to build your Digital Thermometer.

Example: 3" Adjustable Angle SS case, analog and digital, direct mount, 0/400°F, no options

MODEL	CASE STYLE	TEMP RANGE	OPTIONS
Ordering Format: D1	A	05	100

** Important Note **

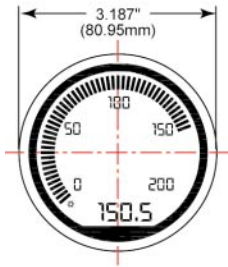
Order interchangeable probes and cables separately (see page 7 and 8)

MODEL CODE	CASE TYPE CODE	TEMP. RANGE CODE	OPTION CODE
D1 (analog/digital)	A = Direct Mount, Adjustable Angle	01 = -80/120°F	100 = NONE
	B = Direct Mount, Back Connect	02 = -40/160°F	
	C = Direct Mount, Bottom Connect	03 = 25/125°F	
	R = Remote Mount, Wall Mount, Bottom Connect	04 = 0/250°F	
		* 05 = 0/400°F	
		* 06 = 50/550°F	
		* 07 = 150/750°F	
		50 = -60/40°C	
		51 = -40/80°C	
		52 = 0/120°C	
		53 = 0/160°C	
		* 54 = 0/250°C	
		* 55 = 0/300°C	

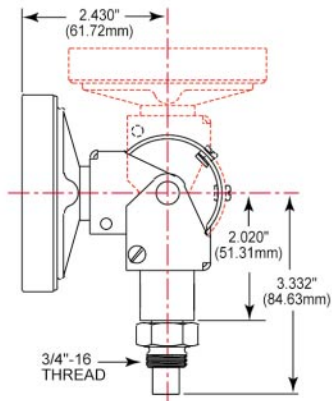
* Must use HIGH temp. probe P2

► DIGI-TEL D1 DIRECT MOUNT DIMENSIONAL DRAWINGS

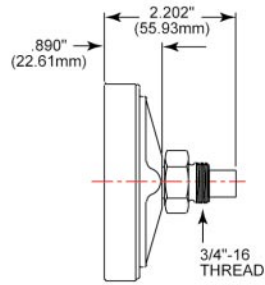
Front View



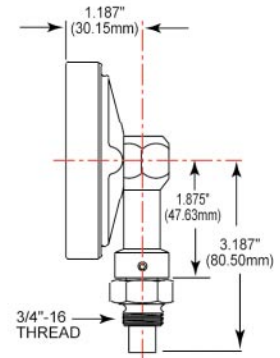
Adjustable Angle
D1A



Back Connect
D1B

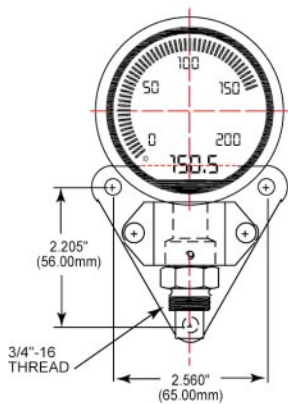


Bottom Connect
D1C

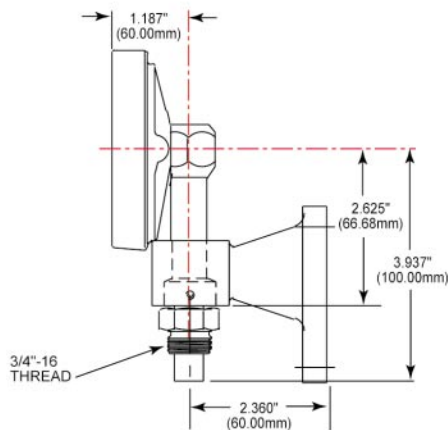


► DIGI-TEL D1 REMOTE MOUNT DIMENSIONAL DRAWINGS

Wall Mount
Bottom Connect
D1R



Side View of
Wall Mount



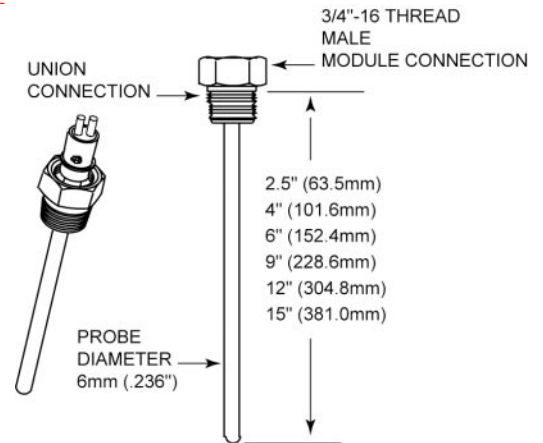
Interchangeable Probes and Cables

DIGI-TEL Thermometers combine easy, quick visual reference feature of a local indicator and the precision readout of a digital thermometer with a unique interchangeable probe concept.

► INTERCHANGEABLE PROBES

► SPECIFICATIONS:

Connection:	316SS union connection
Temp. Probe Materials:	316SS up to 750°F/300°C Inconel up to 1200°F/650°C
Probe Diameter:	6mm (.236") diameter
Probe Length:	Other probe lengths available, consult factory
Sensor:	Pt 1000 thin film platinum RTD
Accuracy:	In accordance with IEC 751, A2 (DIN EN60751)



► HOW TO ORDER:

TO BUILD A PART NUMBER: Select one code from each column in the table below to build your Probe.

Example: High temperature probe, 6mm diameter 316SS, 2.50" length, plain bushing

Ordering Format:	PROBE	DIAMETER	PROBE LENGTH	CONNECTION	OPTION
	P2	4	02	1	0

RANGE	D1	D4	D5	PROBE CODE	DIA. CODE	PROBE LENGTH CODE	CONNECTION CODE	OPTION CODE
-80/120°F -40/160°F 25/125°F 0/250°F -60/40°C -40/80°C 0/120°C 0/160°C	X X X X X X X X			P1 Low temp. probe, 316SS (Max. Operating Temp. 300°F/160°C)	4 = 6mm	02 = 2.50" 04 = 4.00" 06 = 6.00" 09 = 9.00" 12 = 12.00" 15 = 15.00"	1 = No Thread 2 = 1/2" NPT Union 3 = 1/2" BSPT Union	0 = NONE 1 = 316SS Cap and Chain
-75/750°F 0/400°F 50/550°F 150/750°F -60/400°C 0/250°C 0/300°C	X X X X X X X	X	X	P2 High temp. probe 316SS (Max. Operating Temp. 750°F/400°C)				
-75/1200°F -60/650°C		X	X	P3 High temp. Inconel probe (Max. Operating Temp. 1200°F/650°C)				

NOTE: Thermowells are recommended for pressure, corrosive fluid or high velocity applications. Probes can be used with standard .260" ID thermowells.



➤ CABLES FOR REMOTE MOUNT APPLICATIONS

Cables have complete male and female 316SS connectors for assembly to display modules and probes.

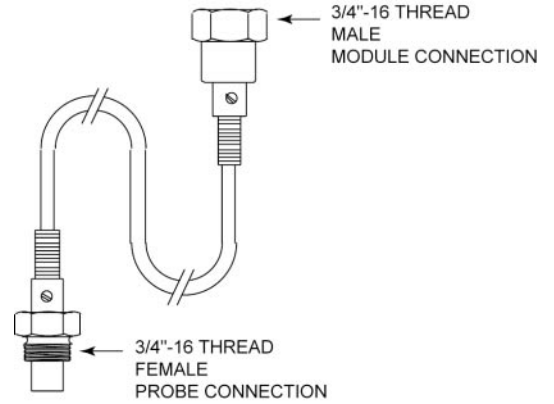
➤ HOW TO ORDER:

TO BUILD A PART NUMBER: Select one code from each column in the table below to build your cable.

Example: Teflon, 30 FT.

	CABLE	LENGTH
Ordering Format:	C1	030

CABLE CODE	CABLE LENGTH CODE
C1 Teflon EMI shielded (max. temp. exposure 400°F/200°C)	005 = 5 FT. 010 = 10 FT. 015 = 15 FT. 020 = 20 FT. 030 = 30 FT. 040 = 40 FT. 050 = 50 FT.
C2 Braided Galvanized EMI shielded (max. temp. exposure 500°F/300°C)	



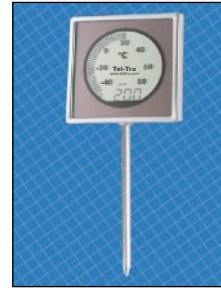
4" SOLAR POWERED DIGITAL THERMOMETERS

Tel-Tru's DIGI-TEL Thermometers combine the easy, quick visual reference feature of a local indicator and the precision readout of a digital thermometer with very low light requirements.

► DIGI-TEL ANALOG DIGITAL AND DIGITAL THERMOMETERS (WITH INTEGRATED PROBE)

MODEL	DIAL SIZE	CASE TYPE	MOUNTING STYLE
D2B and D3B	4" Square	Direct Mount	Back Connect
D2C and D3C	4" Square	Direct Mount	Bottom Connect
D2R and D3R	4" Square	Remote Mount	Wall Mount, Bottom Connect

D2C Direct Mount
Bottom Connect



D2R Remote Mount
Bottom Connect



► SPECIFICATIONS:

Case Material:	Stainless Steel case with chrome plated bezel
Connection:	None (compression fitting sold separately)
Probe:	6mm (.236") diameter 316SS
Power Supply:	Solar cell, 50 Lux min. light density
Reading Cycle:	3 second intervals
D2 Display:	Analog bar graph 61 divisions and Digital 4 digits with 7 segment display .43" (11mm) high
D3 Display:	Digital 4 digits with 7 segment display 1.06" (27mm) high
Protection Level:	IP 65
Ambient Temperature:	-4 to 140°F (-20 to 60°C)
Accuracy:	Within ±1% of reading in accordance with DIN EN 13190 Class 1

D3B Direct Mount
Back Connect



D3R Remote Mount
Bottom Connect



► HOW TO ORDER DIRECT MOUNT:

TO BUILD A PART NUMBER: Select one code from each column in the table below to build your Solar Digital Thermometer.

Example: 4" square SS case, digital, direct mount, back connect, -75/750°F, none, 15" probe.

Ordering Format:	MODEL	CASE STYLE	TEMP RANGE	OPTION	PROBE LGTH.	* 14
	D3	B	09	100	15	14

* Represents part number place holder--must always appear in this placement when building a Solar Powered Digital Thermometer part number.

DIRECT MOUNT						
MODEL CODE	CASE TYPE CODE	TEMPERATURE RANGE CODE		OPTION CODE	PROBE LGTH. CODE	
D2 Analog/Digital	B = Direct Mount Back Connect	01 = -80/120°F	50 = -60/40°C	100 = NONE	02 = 2.50"	
		02 = -40/160°F	51 = -40/80°C		04 = 4.00"	
	C = Direct Mount Bottom Connect	03 = 25/125°F	52 = 0/120°C		06 = 6.00"	
		04 = 0/250°F	53 = 0/160°C		09 = 9.00"	
		05 = 0/400°F	54 = 0/250°C		12 = 12.00"	
		06 = 50/550°F	55 = 0/300°C		15 = 15.00"	
		07 = 150/750°F				
	D3 Digital		09 = -75/750°F		58 = -60/400°C	



➤ **HOW TO ORDER REMOTE MOUNT:**

TO BUILD A PART NUMBER: Select one code from each column in the table below to build your Solar Digital Thermometer.

Example: 4" square SS case, analog/digital, remote mount, wall mount, bottom connect, 150/750°F, none, 6" probe, Teflon cable, 20 FT. cable length.

Ordering Format:	MODEL	CASE STYLE	TEMP RANGE	OPTION	PROBE LGTH.	CABLE	CABLE LGTH. * 14	
	D2	R	07	100	06	C1	020	14

* Represents part number place holder--must always appear in this placement when building part number

REMOTE MOUNT							
MODEL CODE	CASE TYPE CODE	TEMPERATURE RANGE		OPTION CODE	PROBE LGTH. CODE	CABLE CODE	CABLE LGTH. CODE
D2 Analog/ Digital	R = Remote Mount	01 = -80/120°F	50 = -60/40°C	100 = NONE	02 = 2.50"	C1 = Teflon, C2 = Braided Galvanized EMI shielded	005 = 5 FT.
		02 = -40/160°F	51 = -40/80°C		04 = 4.00"		010 = 10 FT.
D3 Digital		03 = 25/125°F	52 = 0/120°C		06 = 6.00"		015 = 15 FT.
		04 = 0/250°F	53 = 0/160°C		09 = 9.00"		020 = 20 FT.
		05 = 0/400°F	54 = 0/250°C		12 = 12.00"		030 = 30 FT.
		06 = 50/550°F	55 = 0/300°C		15 = 15.00"		040 = 40 FT.
		07 = 150/750°F					050 = 50 FT.
		09 = -75/750°F					
		58 = -60/400°C					

➤ **REMOTE DIMENSIONAL DRAWINGS**

➤ **DIRECT DIMENSIONAL DRAWINGS**

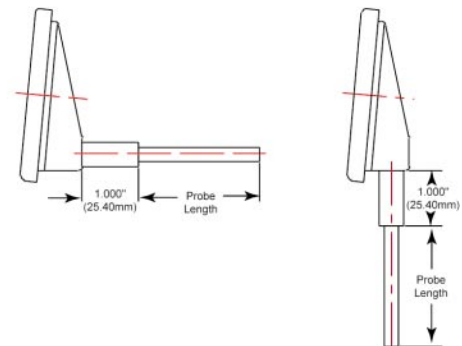
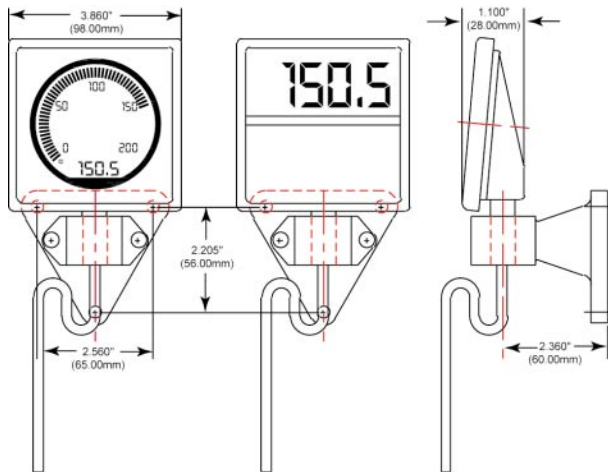
Wall Mount
Bottom Connect
D2R

Wall Mount
Bottom Connect
D3R

Wall Mount
Side View
D2R/D3R

Back
Connect
D2B/D3B

Bottom
Connect
D2C/D3C



Note: Order Compression Fitting Separately
For use with Solar Powered Direct & Remote Mount Models
Part number 96002105