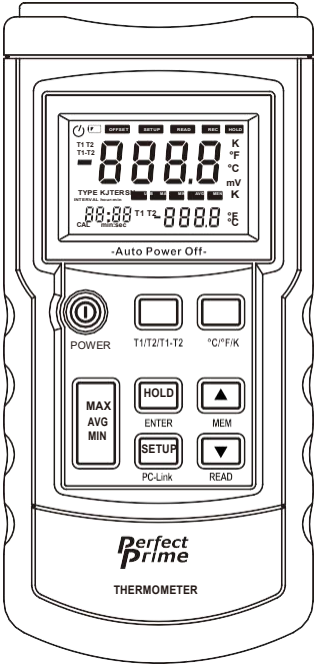
Perfect Prime

TC2100

Digital Thermometer

User's Manual



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CONTENTS

Perfect Prime

CONTENTS

1.Safety Information

In order to use the thermometer safely and correctly, please read this manual carefully first, especially the "*Safety Information*" part. It is recommended to keep the manual at hand so that one can refer to it at any time.

⚠ Warning

Warning indicates a situation/action which may cause danger to users. To avoid any possible accidents or injury, please strictly follow the procedures below:

1. Before using, check if there is any missing part or damages on the case. Do not use if it is damaged.
2. Disconnect thermometer and thermocouple before opening the meter case.
3. When the battery indicator appears, the battery should be replaced.
4. If the product works abnormally, stop using it. Protective equipment may be damaged. Send the meter to a designated repair site.
5. Do not use the product in explosive gas, vapor or dusty environment.
6. Do not apply voltage exceeding the rated voltage marked on the product (30V).

7. Insulated thermocouple should be used.
8. Thermometer should be repaired only using manufacturers replacement parts.
9. Do not use if the case is opened.

⚠ Caution

Situations/actions which may cause damage to the meter are listed below. To prevent damage, use the meter carefully.

1. Select appropriate thermocouple probes, function grade and measuring range before using.
2. Ensure there is no difference between two lines when using dual-line measurement.
3. Do not charge the batteries.
4. Note the "+" & "-" polarities when installing batteries.

Electrical Symbols

⚠	Note-important safety information, refer to the instruction manual.
ETL Intertek	Conforms to UL STD. 61010-1, Certified to CSA STD C22.2 NO. 61010-1
CE	Complies with European (EU) safety standards

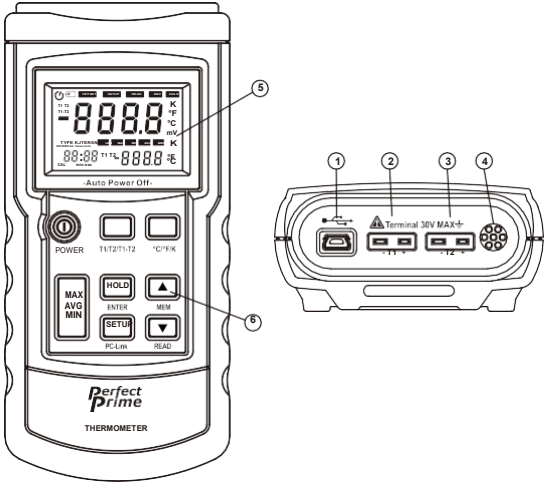
2. Product Overview

This product includes thermocouple probes with microprocessor as the temperature sensor. It has the following features:

- Suitable for various thermocouples probes: K, J, T, E, R, S, N.
- Different temperature units: °C, °F and K (Kelvin)
- Maximum, minimum and average value measurement
- Data hold
- Thermocouple deviation compensation
- Relative time display
- Auto power-off (can be set by users)
- Self-calibration (please refer to “User Self-calibration” section carefully)
- Automatically and manually save data
- USB port
- Dual-line input (T1, T2)

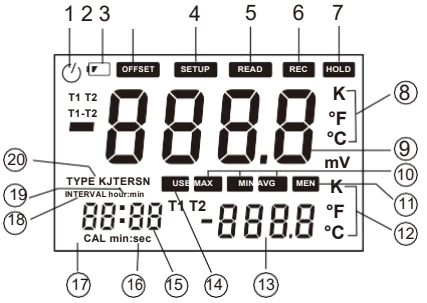
3. Meter Description

3.1 Components



①	USB port
②	Thermocouple probe T1 input
③	Thermocouple probe T2 input
④	Measure under normal temperature
⑤	Display
⑥	Key

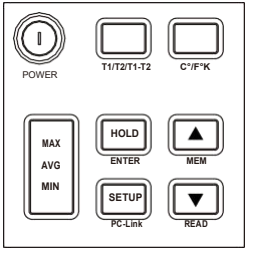
3.2 Display



①	Automatic power-off indicator
②	Low battery indicator: Battery should be replaced.
③	Thermocouple measurements include deviation value
④	Status setup indicator with flashing display
⑤	Indicator to display saved data
⑥	Indicator to save data automatically with flashing display
⑦	Data hold state
⑧	Main display unit
⑨	Main display
⑩	MAX, MIN, AVG
⑪	Indicator to save data
⑫	Auxiliary display unit

⑬	Auxiliary display
⑭	USB port
⑮	Time display
⑯	Indicate time display min: sec
⑰	Indicate calibrating state
⑱	Indicate auto-save time setting
⑲	Indicate time display hour: min
⑳	Indicate thermocouple probe type

3.3 Keys Description



POWER	Power on/off thermometer
T1/T2/ T1-T2	Select to display T1, T2 and T1-T2 (temperature difference measurement) on main/auxiliary screen
˚C/˚F/K	Unit selection: Celsius (°C), Fahrenheit (°F), Kelvin (K)

MAX/MIN /AVG	View maximum, minimum and average value. Press and hold to close
HOLD	Data hold
ENTER	To confirm, see user setting for details
SETUP	To set, see user setting for details
PC-Link	Press and hold to open USB, press and hold again to turn off
▲	To change setting options/add functions, see specific operation for details
▼	To change setting options/reduce functions, see specific operation for details
READ	Read saved data
MEM	Save current data

4. Setting Meter

4.1 SETUP Option

1. Press the SETUP key to enter setup mode.
   -->“ SETUP ” symbol will flash on the screen.
2. Press again to switch setting states.
3. Save all previous settings before exiting.
   -->If the meter is turned off in the process of saving settings, changes will not be saved.
4. Changed settings will function immediately after exiting setup mode.

4.2 SETUP Option Setting

A. Data storage interval setting (INTERVAL):

1. Press the SETUP key to enter the data storage interval setting mode.
   -->" SETUP " will flash on the screen.
2. Use▼▲to change automatic data storage time interval.
3. Maximum interval time is 59:59.
4. Minimum interval time is 00:00.
   -->00:00 enables auto data storage function.
   -->It can only be stored manually.

B. Thermocouple probe type setting (TYPE):

1. Enter thermocouple probe type setting mode.
2. Use▼▲to set thermocouple probe types: K, J, T, E, R, S, N.

C. OFFSET (T1) setting:

Users can adjust the thermometer displayed value to compensate for the thermocouple probe error.
See "*Adjust the temperature sensor error with deviation value*" section.

Allowable adjustment range is ±6°C. After entering OFFSET (T1) setting state, the offset value setting can be changed with ▼▲.

Note: When the offset value is not required, please restore the value to 0.0.

Note: Changing thermocouple probe type will automatically restore offset value to 0.0.

D. OFFSET(T2) setting:

Users can adjust the thermometer to show value that compensated for the thermocouple probe error.
See "*Adjust the temperature sensor error with deviation value*" section.

Adjustment range is ±6°C. After entering OFFSET (T2) setting state, offset value can be changed with ▼▲.

Note: When this offset value is no longer required, please restore this offset value to 0.0.

Note: Changing the thermocouple probe type will automatically restore offset value to 0.0.

E. Automatic power-off time setting (P):

1. Enter the automatic power-off time setting mode.
   -->"P-" will show on the screen.
2. Set automatic power-off time (5 to 60 minutes) with▼▲
3. Set the sleep time <5 minutes to show "OFF".
   --> This will turn off auto power-off function.
4. If the function is active, "⏻" will show on screen.
   -->Auto power-off time counts from last key operation.
   -->In auto data recording & PC communication state, it will not enter automatic power-off state.

F. System time setting (S-T):

System time is the time from powering on. It will automatically be cleared after power failure.

1. Enter the system time setting.
   -->"S-T" will show on screen.
2. The system time can be set with▲▼.

3. Press ENTER to select time format (hr:min/min:sec)
4. The system time is the current running time if not changed.

G. Power frequency setting (LinE):

To get the best result, please set the meter's power frequency to local frequency.

1. Enter the power frequency setting.
   --> “LinE” will show on the screen.
2. Select & set interference frequency to 50/60Hz with ▼▲

H. Normal temperature compensation (NTC):

1. Enter normal temperature compensation (NTC) switch setting mode.
   -->“NTC” will show on the screen.
2. ON/OFF can be set for normal temperature compensation with ▼▲.
3. Meter automatically restores to ON state after reboot.

I. Auto-calibration switch setting (CAL):

1. Enter the ON/OFF setting of auto-calibration (CAL).
   -->“CAL” will show on the screen.
2. ON/OFF can be set for calibration function with ▲▼.

By setting this item to ON, users can enter the calibration mode. See “*User Self-Calibration*” for details.

Note: Use this function with caution!

J. Data clearing (CLr):

1. Enter the data clearing (CLr) mode.
   -->“CLr” will show on the screen.
2. Press “ENTER” to clear all recorded data.
   -->“CLr” will flash on the screen.
   -->Flashing will stop after data is cleared.

5. Using The Meter

5.1 Connecting Thermocouple probe

1. Insert the thermocouple probe to input jack.
2. Press the power key to turn on the meter.
3. Set the thermocouple probe type to be consistent with the inserted thermocouple probe type.

Note: If the thermocouple probe is not connected to the selected input end/the thermocouple probe is “open”/ exceeds measuring range, “OL” will show on the thermometer.

5.2 Displaying Temperature

1. Press °C/°F/K key to select temperature unit.
2. Put the thermocouple probe into the testing position.
3. Measurement results will display on screen.

5.3 Data Hold

1. Press HOLD to keep reading on screen.
   -->“ **HOLD** ” will show on the screen.
2. Press again to close “HOLD” function and restore measurement state.

5.4 Viewing MAX, MIN and AVG Readings

1. Press MAX/MIN/AVG key to view MAX, MIN and AVG readings.
2. Hold MAX/MIN/AVG key to exit MAX/MIN/AVG view

5.5 Use offset Value To Adjust Temperature Probe Error

Use OFFSET (T1) & (T2) in the Setup to adjust the meter readings to compensate for thermocouple probe error.

1. Put the thermocouple probe in a known and stable temperature environment (such as in ice bath or dry well calibrator).
2. Stabilize the temp. reading.
3. In SETUP option, adjust OFFSET value until the temp. reading on the auxiliary display is consistent with calibrated temp. (see "*SETUP Option Setting*").

5.6 User Self-Calibration

The meter can be calibrated in calibration mode. Calibration points & methods are shown below:

1. Calibration point:
   a) Normal Temp. 25°C
   b) T1 input channel, 0μV and 40.000mV
   c) T2 input channel, 0μV and 40.000mV

2. Calibration methods:
   a) Put the meter into a thermotank with the temp. of 25°C for 3~5 min.

   b) Power on to stabilize the thermometer.

   c) Set self-calibration(CAL) to ON in "SETUP" then exit. It will return to calibration state.

   d) Adjust the screen temp. with keys until the temp. is consistent with the thermotank.

e) Press "ENTER" to save current calibration value.

f) Press "T1/T2/T1-T2" / "TC TYPE" key to switch to T1 measurement channel.

g) Input 0μV in T1 measurement channel.

h) After stabilizing, press "ENTER" to save current calibration value.

i) Input 40.000mV in T1 measurement channel.

j) After stabilizing, press "ENTER" to save current calibration value.

k) Press "T1/T2/T1-T2" to switch to T2 measurement channel.

l) Input 0μV in T2 measurement channel.

m) After stabilizing, press "ENTER" to save current calibration value.

n) Input 40.000mV in T2 measurement channel.

o) After stabilizing, press "ENTER" to save current calibration value.

p) Power off and restart to complete calibration.

Note: Make sure the standard source is accurate, then make calibration.

Note: If the meter is inaccurate due to inaccurate calibration sources, users bears the liability.

6. Data Storage

6.1 Data Storage

Manual storage is in the normal measurement mode and data storage interval (INTERVAL) is set to 00:00.

1. Press the “MEM” key to store an item of data.
2. Storage location will be the smallest no. in the unused storage space.
3. If storage space is full of data, “FULL” will be displayed for 2s.

Automatic storage is in normal measurement mode and data storage interval is not set to 00:00.
Press the “MEM” key to start storing data.
Storage location will be the smallest no. in the unused storage space.

1. “ REC ” symbol will flash on screen.
2. Press the “MEM” again to stop storing data.
3. Each data storage time interval is the time set in the INTERVAL.
   -->The mini. time interval can be set is 1s.
   -->The maxi. is 59 minutes and 59s.
4. If storage space is full, “FULL” will be displayed for 2s and no data will be stored.

6.2 Data Reading

In normal measurement mode, press “READ” key to enter data reading mode.
-->“ READ ” symbol will flash on the screen.

1. Press to read the next/previous data.

-->“ MEM ” and number will shown on auxiliary display.

2. If there is no available storage space, “NULL” will be displayed for 2s.

6.3 Clearing Stored Data

Please refer to Data clearing (CLr) in 4.2 SETUP Option Setting.

Data Transmission
Connect the thermometer to PC with data line.
Hold “PCLink” key.
-->“ USB ” symbol will show on screen.
-->The USB port is opened.

See data transmission protocol for details.

Note: After connecting the USB, the meter will be powered by USB power supply and the meter's power key is invalid; After disconnecting, the USB key will become valid.

Meter Maintenance

7.1 Replace Battery

Turn off the power.
Unscrew the screw and remove the cover.
Replace with 9V battery.
Put battery cover back and tighten the screw.

7.2 Clean

Use a soft cloth/sponge to wipe the product surface gently with a little soap water or detergent.

To avoid damage, do not immerse the thermometer in water.

8.Technical Data

The indicator is accurate within the temp. range (18°C-28°C) and relative humidity is <80%. Warranty period is one year (thermocouple probe error not included).

Function	The meter	
Thermocouple probe type	K, J, T, E, R, S, N	
Measurement channel	T1/T2	
Measurement range	K: -200.0°C to +1372°C -328.0°F to +2501°F J: -210.0°C to +1200°C -346.0°F to +2192°F T: -250.0°C to +400°C -418.0°F to +752°F E: -150.0°C to +1000°C -238.0°F to +1832°F R: 0°C to +1767°C 32°F to +3212°F S: 0°C to +1767°C 32°F to +3212°F N: -200.0°C to +1300°C -328.0°F to +2372°F	
Display resolution	0.1°C/ °F / K<1000° (1°C/ °F / K for R-type and S-type) 1°C/ °F / K >1000°	
Precision T1/ T2/T1-T2	±[0.5% +0.5°C]	K,J,T,E:±(0.2%+0.5°C) R,S:±(0.2%+1°C) N:±(0.2%+0.5°C)

	<-10°C: within +0.5°C; <-200°C: within +1°C T-type < -200°C for reference only
Time	Relative time
Data record	0~999, 1000 groups in total
Temperature scale	ITS-90
Applicable standard	NIST-175
Setting functions	Recording interval setting*, thermocouple type setting, thermocouple probe offset setting, automatic power-off time setting, system time setting, power frequency setting, temperature compensation switch setting, self-calibration switch setting, data clearing*
Power supply	9V Battery

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