



User Manual

PCE-TTC 30 Process Calibrator



User manuals in various languages (français, italiano, español, português, nederlands, türk, polski, русский, 中文) can be found by using our product search on: www.pce-instruments.com

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1 Safety notes

Please read this manual carefully and completely before you use the device for the first time. The device may only be used by qualified personnel and repaired by PCE Instruments personnel. Damage or injuries caused by non-observance of the manual are excluded from our liability and not covered by our warranty.

- The device must only be used as described in this instruction manual. If used otherwise, this can cause dangerous situations for the user and damage to the meter.
- The instrument may only be used if the environmental conditions (temperature, relative humidity, ...) are within the ranges stated in the technical specifications. Do not expose the device to extreme temperatures, direct sunlight, extreme humidity or moisture.
- Do not expose the device to shocks or strong vibrations.
- The case should only be opened by qualified PCE Instruments personnel.
- Never use the instrument when your hands are wet.
- You must not make any technical changes to the device.
- The appliance should only be cleaned with a damp cloth. Use only pH-neutral cleaner, no abrasives or solvents.
- The device must only be used with accessories from PCE Instruments or equivalent.
- Before each use, inspect the case for visible damage. If any damage is visible, do not use the device.
- Do not use the instrument in explosive atmospheres.
- The measurement range as stated in the specifications must not be exceeded under any circumstances.
- To prevent electrical shocks or damage to the instrument, do not connect more than 30 V between the terminals, or between the terminals and the ground.
- This instrument uses a Lithium-Ion battery pack. To prevent an explosion or fire, do not short circuit, do not disassemble and keep it safe from damage.
- To prevent battery leakage or heat generation, only use the battery charger in the temperature range 0 ... 45 °C (32 ... 113 °F).
- To make sure the display shows the correct data, disconnect the test leads before you set the power to on or change to another measure or source function.
- To prevent damage to the display, do not use sharp objects on the screen.
- Only sufficiently skilled persons may use the meter. Qualifications from an approved training establishment may be necessary.
- Follow good engineering practice at all times.
- Non-observance of the safety notes can cause damage to the device and injuries to the user.

We do not assume liability for printing errors or any other mistakes in this manual.

We expressly point to our general guarantee terms which can be found in our general terms of business.

If you have any questions please contact PCE Instruments. The contact details can be found at the end of this manual.



2 PCE-TTC 30 Hardware Parts and Accessories

2.1 Unpacking and Inspection

At the factory each new PCE-TTC 30 passes a careful inspection. It should be free of scrapes and scratches and in proper operation order upon receipt. The receiver should, however, inspect the unit for any damage that may have occurred during transit. If there are signs of obvious mechanical damage, package contents are incomplete, or the instrument does not operate according to specifications, contact the purchasing sales office as soon as possible.

Delivery contents:

- 1 x Temperature sensor PCE-TTC 30
- 2 x Laboratory cables with 2 mm plug
- 1 x Thermocouple adapter to 2 mm plug
- 2 x Adapter 2 mm on 4 mm laboratory cable
- 2 x Alligator clips
- 1 x Mini USB cable
- 1 x Power supply 5 V / 1 A
- 1 x Carrying bag
- 1 x User manual

The software can be downloaded here: https://www.pce-instruments.com/english/download-win_4.htm

If you have to return the instrument to the factory for any reason, use the original packing whenever possible. Include a detailed description of the reason for the return.

2.2 Operational Sections and Connections

All sections and connections are presented in detail on the next pages.

Note: Keep in mind that the next picture (as well as all pictures of the PCE-TTC 30 in this manual) has an example configuration of modules. The configuration of your PCE-TTC 30 may vary significantly from the one in the picture.



1 Terminal Connection for TC Measure and Source

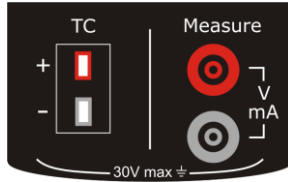
2 Keypad Section

3 Color Display

4 USB Connection Slot for PC Communication and Charging



2.2.1 Terminal Connections



EM Measure Terminals

Input Terminal for measuring voltage, current and supplying loop power.

EM Measure Terminals	
mA	Range: 0.000 ... 24.000 mA Resolution: 0.001 mA
mA(24V)	Range: 0.000 ... 24.000 mA Resolution: 0.001 mA
V	Range: 0.000 ... 30.000 V Resolution: 0.001 V

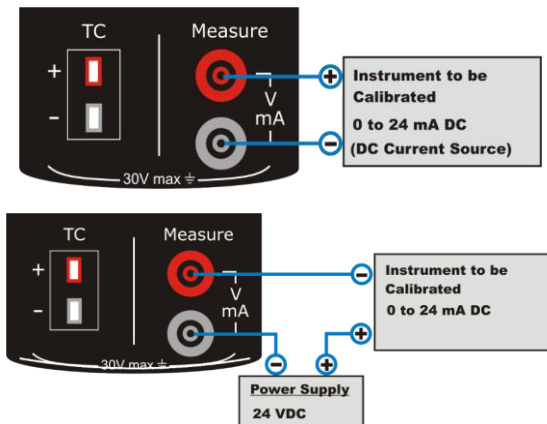
Current Measurement

The PCE-TTC 30 supports current measurement using either PCE-TTC 30 as the loop power supply while at the same time measuring the current or simply measuring the current while an external power supply is used.

The following picture displays the connection for Current Measurement for different mode. And also different ways of providing the supply power to the loop.

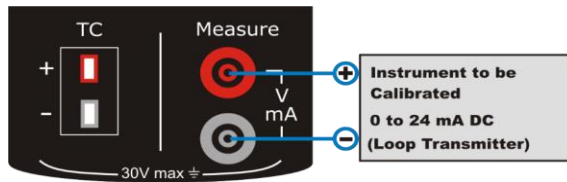
mA Current Measurement

In this mode, the PCE-TTC 30 does not provide any supply voltage. For proper measurement the external device should be capable of providing the voltage supply. If the external device should not be capable, an external Power Supply should be connected in series.



mA Read Power Current Measurement

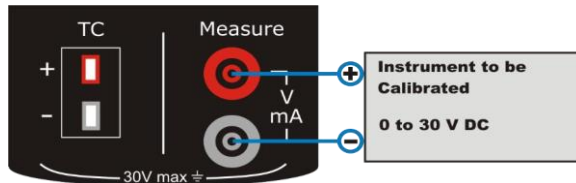
In this mode, the PCE-TTC 30 works as Loop Power Supply while at the same time measuring the current.



Voltage Measurement

The PCE-TTC 30 is capable of voltage Measurement with two voltage measurement ranges.

The following picture displays the connection for Voltage Measurement for different mode.

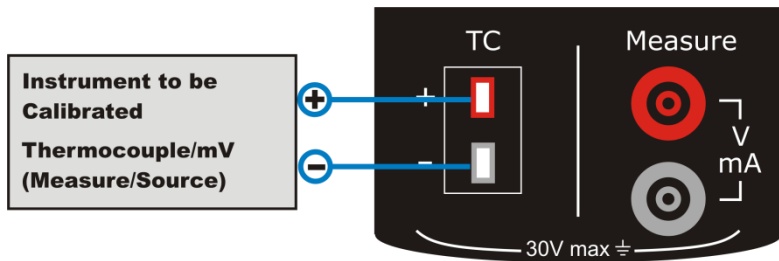


TC Terminals

Terminal for measuring and simulating thermocouples and mV. This terminal accepts a miniature polarized thermocouple plug with flat, inline blades spaced 7.9 mm (0.312 in) center to center.

TC Terminal (Measure and Source)			
TC Type	Range	Display Resolution	Accuracy
E	-200.0 ... 1000.0 °C	0.1 °C	± 0.3 °C
J	-200.0 ... 1200.0 °C	0.1 °C	± 0.3 °C
K	-200.0 ... 1372.0 °C	0.1 °C	± 0.3 °C
T	-200.0 ... 400.0 °C	0.1 °C	± 0.3 °C
B	450.0 ... 1800.0 °C	0.1 °C	± 0.5 °C
R	0.0 ... 1750.0 °C	0.1 °C	± 0.5 °C
S	0 ... 1750.0 °C	0.1 °C	± 0.5 °C
N	-200.0 ... 1300.0 °C	0.1 °C	± 0.3 °C
mV	-10 ... 80 mV	0.001 mV	±0.02 % of reading ± 2µV
	-10 ... 250 mV	0.01mV	±0.02 % of reading ± 0.02mV







The PCE-TTC 30 supports measurement and simulation of Thermocouple and mV.



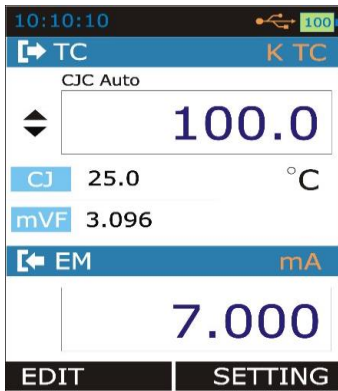
2.2.2 Keypad



The PCE-TTC 30 has six different keys. The key description is given below.

	This key has different functionalities in different menus. These are shown in the bottom left part of the display.
	This key has different functionalities in different menus. These are shown in the bottom left part of the display.
	<ul style="list-style-type: none"> - Scroll down to next parameter - Decrease value of digit in Editbox
	<ul style="list-style-type: none"> - Scroll down to previous parameter - Increase value of digit in Editbox
	<ul style="list-style-type: none"> - Enter menu when in Run mode - Save edited parameter to memory
	<ul style="list-style-type: none"> - Log current reading in memory if device is in Run mode and log mode is manual - When not in Run mode, this key is used to enter Run mode - Press and hold (approx. 2 s) to turn meter on/off

2.2.3 Display



- LCD with a 2.4" color display
- Resolution of 240x320 pixels
- Supporting 262K colors

2.2.4 USB Connection

- The USB connection is located at the top of the PCE-TTC 30. It is a USB mini B-Type female connector.
- It can be used for PC communication and for charging the device.
- The USB cable supplied with the device is USB A-type male to USB B-type male. It is used for connecting charger and PC.

2.2.5 Stand for Table Top Use

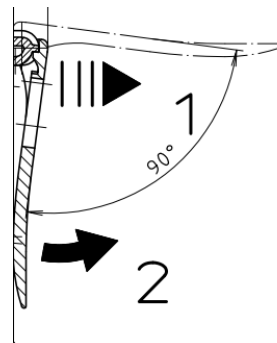
- This stand offers the best support for table top use which gives good viewing angle when the PCE-LOC 20 is placed on a table.
- Procedure to open stand:



is being engraved on the top of the stand. You should pull a bit first.



is being engraved on the bottom of the stand. Now during first pull of above you release this lower part easily so that you can maneuver the stand as you like.





2.3 Power Options

There are three power options:

- Lithium-Ion battery: All the instrument functions are available with a charged battery.
- 5 V DC charging adaptor: It supplies power to the instrument and charges the battery at the same time. It charges the battery when the instrument is on or off.
- USB mini Type B connection: This charges the battery when the instrument is off and increases the battery life when the instrument is on.

2.4 Battery

The Device uses 2300mAh Lithium-Ion Battery. When you set the power on, the battery symbol at the top of the display shows the charge status. To get more information on Battery go to Battery Info Page in Setting Menu.

2.4.1 Charging time

Charging method	Charging time (to full capacity)
External Charging Adaptor	≈ 5 hours

Note:

USB mini Type B connector charges the battery when the instrument is off and increases the battery life when the instrument is on.

2.4.2 Operating Time

Operation	Battery Duration
Continuous operation (measure or source)	>18 hours
Continuous operation (12mA (24V) measure)	> 8 hours

These are typical operating times for a new, fully charged Li-Ion battery pack with these settings:

- *Backlight Intensity* set to 5% (Default: 100%)
- *Backlight Timeout* set to 0 (0=Infinite) (Default: 0)

Power save options: To get the best battery duration, set a low value for the *Backlight Intensity* (40%) and a short *Timeout*.

The maximum operating time without recharging varies depending on the usage and brightness setting of the display light. Also the generated output and the usage of the 24 V transmitter supply affect the maximum operating time.

Notes:

- The PCE-TTC 30's memory and the internal clock/calendar use a small amount of power although the calibrator is switched off. Remember to check the capacity of the batteries from time to time although the PCE-TTC 30 is not in use.
- Do not leave the PCE-TTC 30 without a Battery Pack or an Empty Battery for a long time. The PCE-TTC 30 may lose its settings if it is left without a support voltage for an extended period.

3 Start Up and Basic Operations

3.1 Power On or Off

To set the instrument power ON, press and release this button down until the display comes on. During the power on sequence, the instrument shows a Startup Message and then shows the applicable data.

To set the instrument power off, press and hold (≈ 2 seconds) this button again. When the power is off, the last set of configuration options stays in memory.

3.2 User Interface

Every time the PCE-TTC 30 is switched on, the startup message ends in RUN Page. 3 display modes are available in RUN Page.

1. TC Measure/Source Mode
2. EM Measure Mode
3. TC Measure/Source + EM Measure Mode







This Display Mode can be selected from MENU \rightarrow DISPLAY Page.

In case of Dual Mode Display Screen is divided into two parts. Due to that only few additional info will appear on RUN Page. The information to be shown can be selectable in Display Mode Menu.

3.2.1 The Status Bar



The status bar at the top of the display is visible only in RUN Page. It is divided into five main sections.

1	<p>Time in HH:MM:SS format</p> <p>Available in two formats</p> <ol style="list-style-type: none"> 1. 24 hour (default) 2. 12 hour <p>This setting is available in Date/Time in Settings Men</p>																		
2	<p>Error Code Indicator</p> <p>This icon is visible if any on-board peripherals like RTC, ADC, DAC, etc. are not working properly, see chapter 5 Maintenance and Troubleshooting.</p> <p>The List of error codes available in this device is given below.</p> <table border="1" data-bbox="191 507 889 746"> <thead> <tr> <th>Error code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Memory corrupted or device unable to read/write it</td> </tr> <tr> <td>1</td> <td>RTC not working properly</td> </tr> <tr> <td>2</td> <td>Device unable to read battery information</td> </tr> <tr> <td>3</td> <td>Measure mode not working</td> </tr> <tr> <td>4</td> <td>Device unable to get source feedback reading</td> </tr> <tr> <td>5</td> <td>Data log memory corrupt</td> </tr> <tr> <td>6</td> <td>Source mode not working</td> </tr> <tr> <td>9</td> <td>More than one error from above list is occurring</td> </tr> </tbody> </table>	Error code	Description	0	Memory corrupted or device unable to read/write it	1	RTC not working properly	2	Device unable to read battery information	3	Measure mode not working	4	Device unable to get source feedback reading	5	Data log memory corrupt	6	Source mode not working	9	More than one error from above list is occurring
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6	Source mode not working																		
9	More than one error from above list is occurring																		
3	<p>USB Connection Status Icon</p> <p>Icon is visible if USB charging adaptor or USB data cable is connected to the device. Icon is different for both indications, see below.</p> <table border="1" data-bbox="171 927 889 1059"> <tbody> <tr> <td data-bbox="171 927 311 983"></td> <td data-bbox="316 927 889 983">USB data cable is connected and communication with PC is available</td> </tr> <tr> <td data-bbox="171 986 311 1059"></td> <td data-bbox="316 986 889 1059">USB charging adaptor is connected. Battery starts charging.</td> </tr> </tbody> </table>		USB data cable is connected and communication with PC is available		USB charging adaptor is connected. Battery starts charging.														
	USB data cable is connected and communication with PC is available																		
	USB charging adaptor is connected. Battery starts charging.																		
4	<p>Battery Charge Percentage Indicator</p> <p>Always visible in Run page; battery % is shown in the centre of the icon and the icon background is filled with green, yellow or red color if battery % is $\geq 50\%$, ≥ 20 and <20 respectively.</p>																		
5	<p>Data Logging Enable Status Indicator</p> <p>Icon is visible if data logging is enabled and will flash when a data log is stored to the memory</p>																		

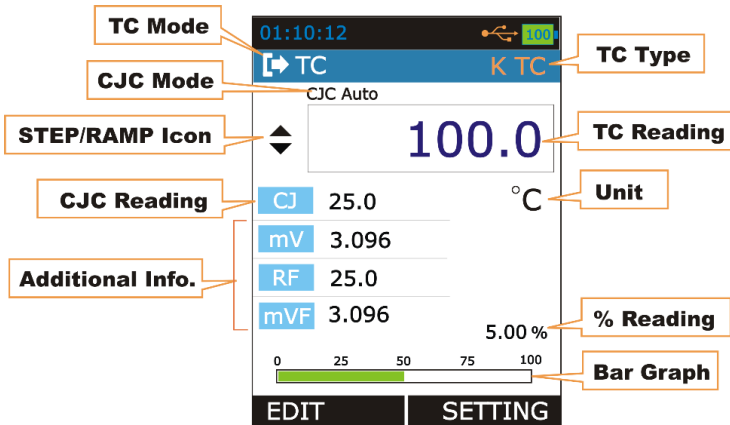
3.2.2 Function Key Bar






























The function key bar at the bottom of the display is visible all the time. 2 function keys are available. The meaning of the function keys varies depending on the situation. A blank function key text means that the function is disabled at the moment.

3.2.3 Display Mode

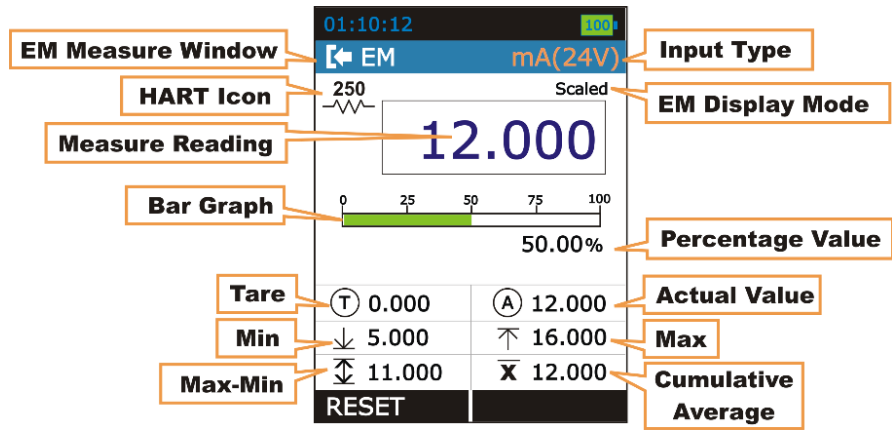
1. TC Mode



TC Display Mode																					
TC Mode	Shows the Current Thermocouple Mode																				
	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;"></td> <td>TC Measure Mode</td> </tr> <tr> <td style="text-align: center;"></td> <td>TC Source Mode</td> </tr> </table>		TC Measure Mode		TC Source Mode																
		TC Measure Mode																			
	TC Source Mode																				
TCType	Shows the current Thermocouple/mV Type.																				
CJC Mode	Shows the CJC Mode																				
	<table border="1" style="width: 100%;"> <tr> <td>CJC Auto</td> <td>CJC Auto Mode</td> </tr> <tr> <td>CJC Manual</td> <td>CJC Manual Mode</td> </tr> </table>	CJC Auto	CJC Auto Mode	CJC Manual	CJC Manual Mode																
	CJC Auto	CJC Auto Mode																			
CJC Manual	CJC Manual Mode																				
TC Reading	Shows the Thermocouple/mV Measure/Source reading according to display mode and TC Type																				
Unit	Shows the Unit of the TC Reading, CJC																				
	°C	Shows If TC Display mode is <i>Actual</i> and TC Unit is <i>Celsius</i> .																			
	°F	Shows If TC Display mode is <i>Actual</i> and TC Unit is <i>Fahrenheit</i> .																			
	K	Shows If TC Display mode is <i>Actual</i> and TC Unit is <i>Kelvin</i> .																			
	mV	Shows If TC Display mode is <i>Actual</i> . And TC Type is <i>-10 ... 80 or -10 ... 250mV</i> .																			
%	Shows If TC Display mode is <i>Percentage</i> .																				
STEP/RAMP P Icon	Shows the Icon indicating STEP/RAMP mode. Only applicable if TC mode is SOURCE.																				
	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;"></td> <td>Manual Step</td> <td style="width: 50px;"></td> <td style="text-align: center;"></td> <td>Rising Ramp</td> </tr> <tr> <td style="text-align: center;"></td> <td>Step UP</td> <td></td> <td style="text-align: center;"></td> <td>Falling Ramp</td> </tr> <tr> <td style="text-align: center;"></td> <td>Step DOWN</td> <td></td> <td style="text-align: center;"></td> <td>Ramp Hold @ 0%</td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;"></td> <td>Ramp Hold @ 100%</td> </tr> </table>		Manual Step			Rising Ramp		Step UP			Falling Ramp		Step DOWN			Ramp Hold @ 0%					Ramp Hold @ 100%
		Manual Step			Rising Ramp																
		Step UP			Falling Ramp																
		Step DOWN			Ramp Hold @ 0%																
				Ramp Hold @ 100%																	
CJC Reading	Shows the Temperature of the Cold Junction if CJC mode is selected as <i>AUTO</i> and shows the user entered CJC Temperature value if CJC mode is <i>MANUAL</i> . The Reading unit is same as TC Unit.																				
Additional Info	Shows the Addition Information according to TC Mode and Additional Info selected in <i>MENU → DISPLAY → TC terminal</i> .																				

Bar Graph	Horizontal Bar graph according to TC Percentage Value (0.00% - 100.00%). The value scales according to TC reading and Input 0% and 100% value as set in <i>MENU → DISPLAY → TC terminal</i> Menu.
Percentage Value	The Percentage Value in according to TC Reading.

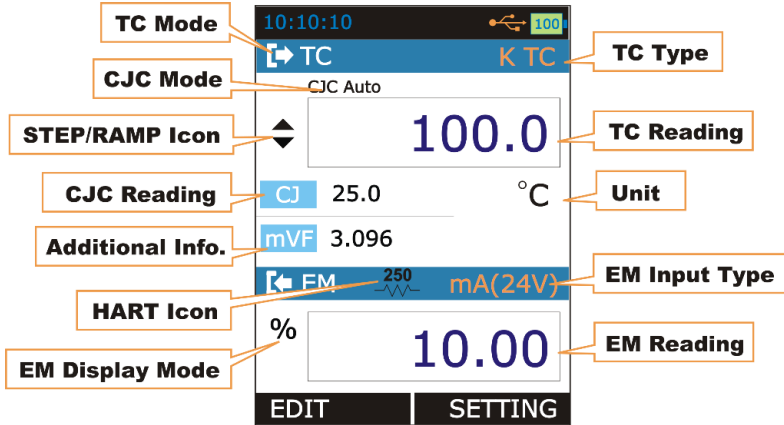
2. EM Measure Mode



Measure Window		
Input Type	The Input Type.	
	mA	mA Current Input
	mA(24V)	mA Current (Read Power-24V) Input
	V	V Voltage Input
EM Display Mode	The Measure Reading Display Mode	
	Actual	Displays the Raw Input Value without any scaling
	Percentage	Displays the Percentage Value
	Scaled	Displays the Scaled Value

Measure Reading	The Reading as per the Measure Display Mode
HART Icon	<p>HART Enable Status Icon</p> <p>This icon will appear if HART is enabled from <i>MENU</i> → <i>SETTING</i> → <i>HART</i> page. (This icon is visible for mA (24V) Input Type only. For other Input Types this will invisible regardless of HART settings)</p>
Bar Graph	Horizontal Bar graph according to Input Percentage Value (0.00% ... 100.00%).
Percentage Value	The Percentage Value in Percentage according to Input Value.
Tare	The Tare Value Set from <i>MENU</i> → <i>DISPLAY</i> → <i>EM Terminal-Tare</i> page
Actual Value	<p>The Raw Input Value without any scaling</p> <p>This will appear only if Main Display in <i>MENU</i> → <i>DISPLAY</i> → <i>EM Terminal</i> is set to PERCENTAGE/SCALED.</p>
Min	Displays the minimum value found after a measurement was started or minimum was reset.
Max	Displays the maximum value found after a measurement was started or maximum was reset.
Max-Min	Displays the Maximum-Minimum value found after a measurement was started or Maximum-Minimum was reset.
Cumulative Average	Displays the Cumulative Average value found after a measurement was started or Cumulative Average was reset.

3. TC + EM Mode



TC + EM Mode							
TC Mode TC Type CJC Mode TC Reading STEP/RAMP Icon CJC Reading Additional Info. Unit	Refer to TC Display Mode on previous pages.						
EM Input Type EM Reading HART Icon	Refer to EM Display Mode on previous pages.						
EM Display Mode	The Measure Reading Display Mode <table border="1" data-bbox="526 1109 1069 1252"> <tbody> <tr> <td>“ “ (Blank)</td> <td>Displays the Raw Input Value without any scaling</td> </tr> <tr> <td>%</td> <td>Displays the Percentage Value</td> </tr> <tr> <td>S</td> <td>Displays the Scaled Value</td> </tr> </tbody> </table>	“ “ (Blank)	Displays the Raw Input Value without any scaling	%	Displays the Percentage Value	S	Displays the Scaled Value
“ “ (Blank)	Displays the Raw Input Value without any scaling						
%	Displays the Percentage Value						
S	Displays the Scaled Value						

3.2.4 Display Operations

Mainly, four types of widgets are available in the Device Menu.

- i. ListBox
- ii. EditBox
- iii. CheckBox
- iv. RadioButtonBox

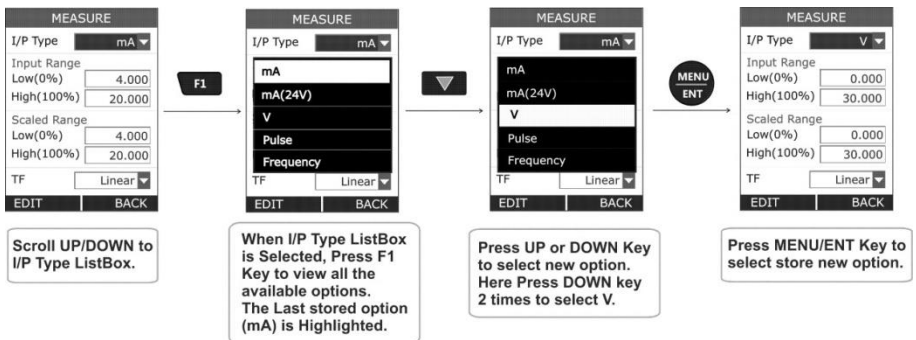
The below section will show how to change the value of different widgets.

i. ListBox

ListBox are used when there is a limited amount of preset values. You have to select one of the available options. The list of available options is displayed in the centre part.

A ListBox opens when you press the **F1** key. Use the **UP/DOWN** key to scroll through the available options. Select one of the options with the **ENTER** key.

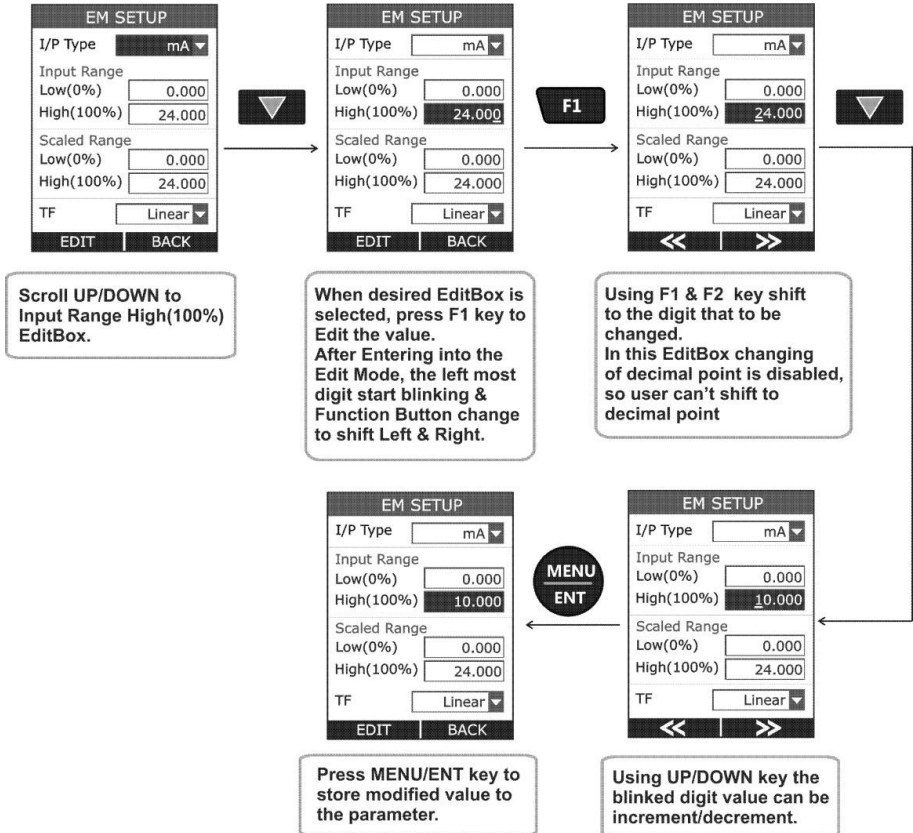
Example: How to change of Input Type (I/P Type) from mA to V. This option is available in *MENU* → *EM SETUP* Page.



ii. EditBox

EditBox is used where a large range of values is possible for a parameter.

To edit the value of an EditBox, press **F1** key. After that EditBox enters Edit mode where **F1** and **F2** keys work as shifter. User can shift to desired digit and using **UP** or **DOWN** key digit value can be incremented or decremented. The modified value can be saved using **MENU/ENT** key.



The above figure shows the example how to change Input High (100%) Range from 24.000 to 10.000 mA.

There are mainly 2 types of EditBox in this device. In most of the EditBox changing of decimal point & changing of sign is not allowed. But there are few EditBox, where these are allowed. Examples Scaled Low (0%) & High (100%) etc.

The below figure shown the example how to change decimal point of the Input Scaled High (100%) Range.

EM SETUP	
I/P Type	mA
Input Range	
Low(0%)	0.000
High(100%)	24.000
Scaled Range	
Low(0%)	0.000
High(100%)	24.000
TF	Linear
EDIT	BACK

Scroll UP/DOWN to Input Scaled Range High(100%) EditBox.

F1

EM SETUP	
I/P Type	mA
Input Range	
Low(0%)	0.000
High(100%)	24.000
Scaled Range	
Low(0%)	0.000
High(100%)	+24.000
TF	Linear
<<	>>

When desired EditBox is selected, press F1 key to Edit the value. After Entering into the Edit Mode, the left most digit start blinking & Function Button change to Shift Left & Right.

F1

EM SETUP	
I/P Type	mA
Input Range	
Low(0%)	0.000
High(100%)	24.000
Scaled Range	
Low(0%)	0.000
High(100%)	+24.000
TF	Linear
<<	>>

Using F1 key shift to the decimal point. In this EditBox changing of decimal point is allowed, so user can shift to the decimal point.

▼

EM SETUP	
I/P Type	mA
Input Range	
Low(0%)	0.000
High(100%)	
Scaled Range	
Low(0%)	0.000
High(100%)	240.00
TF	Linear
EDIT	BACK

Press MENU/ENT key to store modified value to the parameter.

MENU
ENT

EM SETUP	
I/P Type	mA
Input Range	
Low(0%)	0.000
High(100%)	24.000
Scaled Range	
Low(0%)	0.000
High(100%)	+240.00
TF	Linear
<<	>>

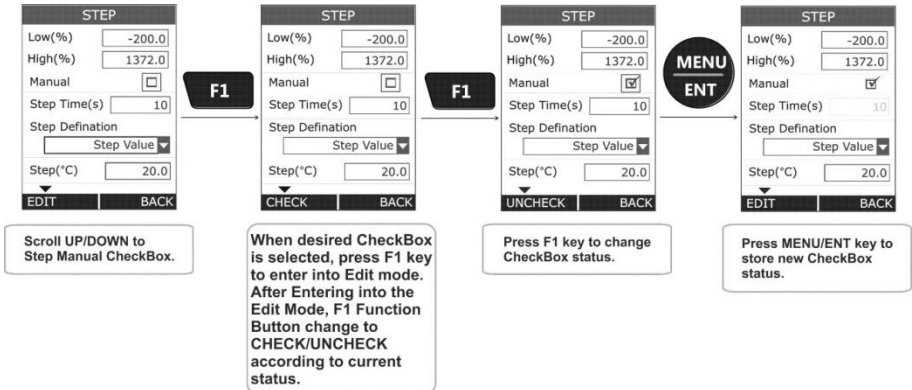
Using UP or DOWN key the decimal point can be increment or decrement.

To change the sign of the value, shift to the sign digit and pressing UP or DOWN key will toggle the sign.

iii. CheckBox

CheckBox is used where Binary Value (1/0, True/False) is available for any parameter.

To change the CheckBox status, press **F1** key. This will enter edit mode. In this mode, status can be toggled by pressing **F1** key. Press **MENU/ENT** key to store new status.

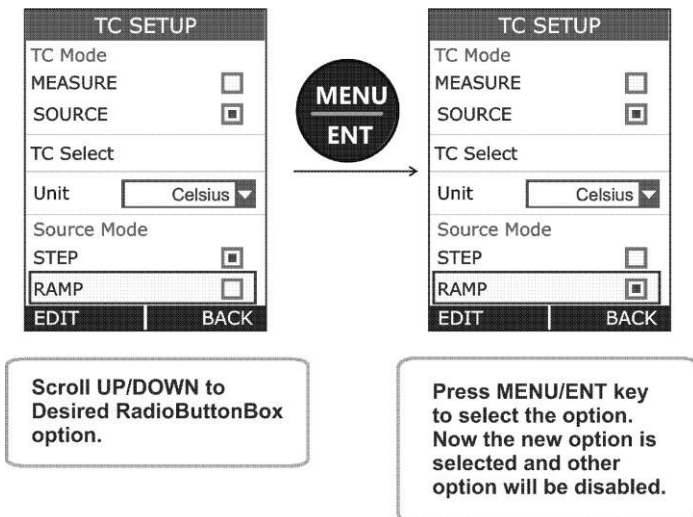


iv. RadioButtonBox

Radio Button Box is used where very few values can be possible and all the available values need to be visible.

In this device, two types of Radio Button Box are available. One with 1 value can be selectable & the other where 1 or 2 values can be selectable at a time.

In Radio Button Box the other option can be selected by pressing **MENU/ENT** key on that option. When pressing this key the new option will be selected and the other option will be disabled. Below an example is given, How to change TC Source Mode from STEP to RAMP.

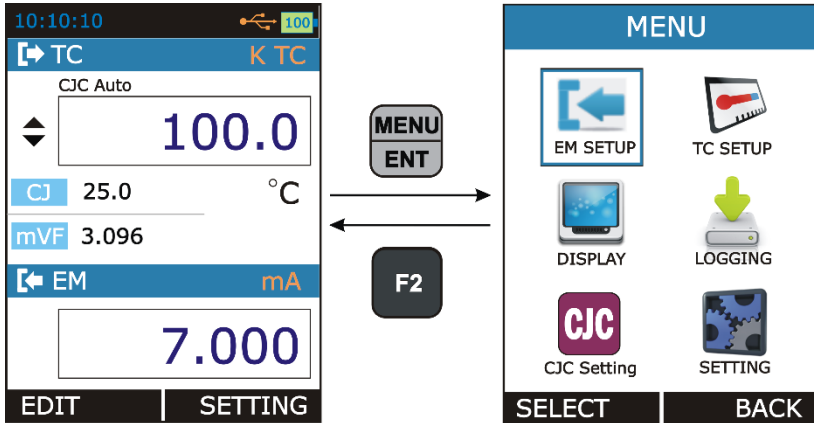


4 Menu Layout

4.1 MENU page

There are mainly six Menus in this device.

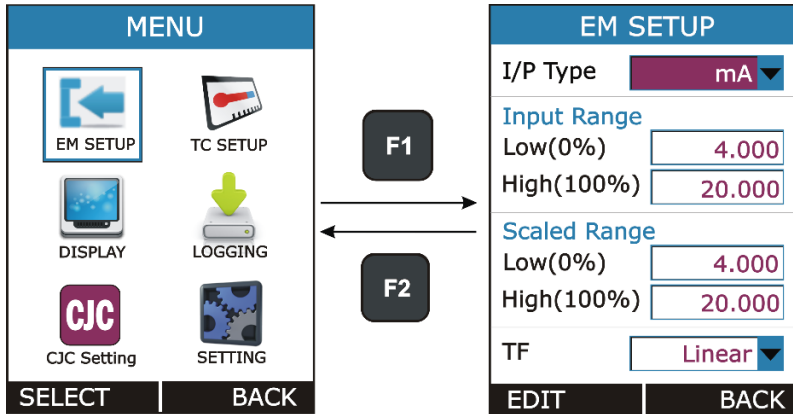
To enter into the MENU page press **MENU/ENT** key and press **F2** key to come out from Menu page.



EM SETUP	Contains Parameters related to EM Measure Mode like Input Type, Range etc.
TC SETUP	Contains Parameters related to Thermocouple like TC Mode, TC Type etc.
DISPLAY	Contains Parameters related to different display mode for RUN page
LOGGING	Contains Parameters related to Data Logging.
CJC Setting	Contains Parameters related to Alarm & Alarm Set-Points.
SETTINGS	Contains Parameters related to General Settings of the device like display, Date/Time, Calibration, Reset, etc.

4.2 MEASURE Page

This page appears when you select *RUN* → *MENU* → *EM SETUP*.



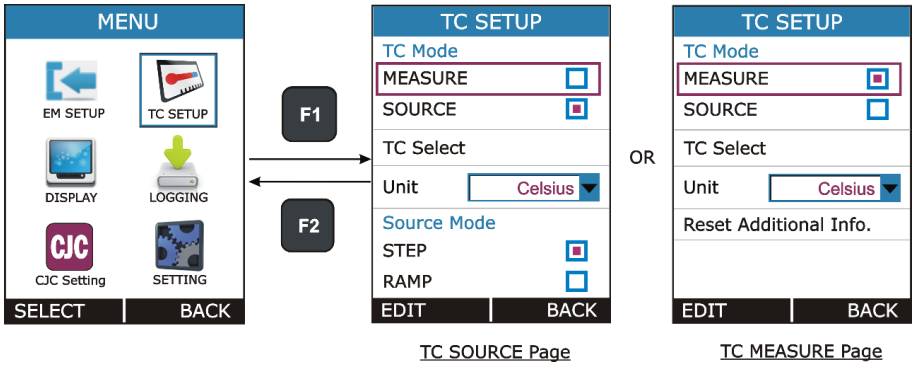
This page contains parameters related to EM Measure like Input Type, Input Range, Scaling and Transfer Function. The Description of the Parameters appear on this page is given below.

Parameter Name	Description / Options
I/P Type (Input Type)	Measure Input Type <u>Available Options:</u> mA: 0.000 ... 24.000 mA DC mA (24 V): 0.000 ... 24.000 mA DC V: 0.000 ... 30.000 V DC
Input Range Low (0%)	Low Range for Measure Input <u>Range:</u> Default Input Low to Input Range High (100%) This parameter is enabled, if Main Display in <i>MENU</i> → <i>DISPLAY</i> → <i>EM SETUP</i> is set to Percentage or Scaled .
Input Range High (100%)	High Range for Measure Input <u>Range:</u> Input Range Low (0%) to Default Input High This parameter is enabled, if Main Display in <i>MENU</i> → <i>DISPLAY</i> → <i>EM SETUP</i> is set to Percentage or Scaled

<p>Scaled Input Range Low (0%)</p>	<p>Scaling Low Range for Measure Input</p> <p><u>Range:</u> -99999 to Scaled Input Range High (100%)</p> <p>Decimal Point for this Edit Box is changeable</p> <p>This parameter is enabled, if Main Display in <i>MENU</i> → <i>DISPLAY</i> → <i>EM SETUP</i> is set to Scaled</p>
<p>Scaled Input Range High (100%)</p>	<p>Scaling High Range for Measure Input</p> <p><u>Range:</u> Scaled Input Range Low (0%) to 99999</p> <p>Decimal Point for this EditBox is changeable.</p> <p>This parameter is enabled, if Main Display in <i>MENU</i> → <i>DISPLAY</i> → <i>EM SETUP</i> is set to Scaled.</p>
<p>TF (Transfer Function)</p>	<p>Transfer Function for Scaling</p> <p><u>Available Options:</u> Linear x^2 (x^2) $x^{1/2}$ (\sqrt{x})</p> <p>This parameter is enabled, if Main Display in <i>MENU</i> → <i>DISPLAY</i> → <i>EM SETUP</i> is set to Scaled.</p>

4.3 SOURCE Page

This page appears when you select *RUN* → *MENU* → *TC SETUP*.



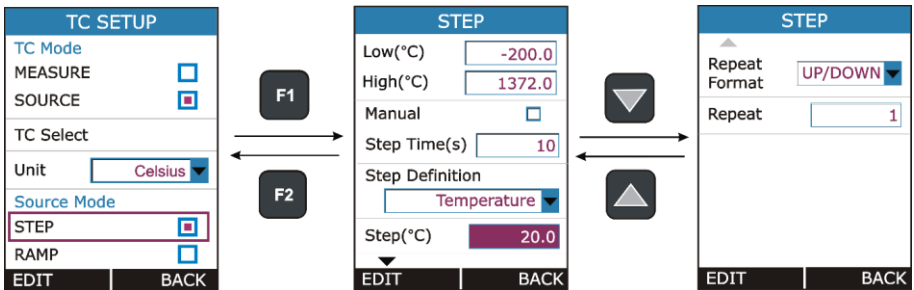
This page contains parameters related to Thermocouple like TC Mode Type, TC Type, Unit, TC Source Mode etc. The Description of the Parameters appear on this page is given below.



Parameter Name	Description / Options																						
TC Mode	Thermocouple Mode <u>Available Options:</u> MEASURE SOURCE																						
TC Select	Select the Thermocouple/mV Type for Measurement / Simulation <u>Available Options:</u> <table border="1" data-bbox="463 528 1016 970"> <thead> <tr> <th>TC Type</th> <th>Range</th> </tr> </thead> <tbody> <tr> <td>E TC</td> <td>-200.0 ... 1000.0 °C</td> </tr> <tr> <td>J TC</td> <td>-200.0 ... 1200.0 °C</td> </tr> <tr> <td>K TC</td> <td>-200.0 ... 1372.0 °C</td> </tr> <tr> <td>T TC</td> <td>-200.0 ... 400.0 °C</td> </tr> <tr> <td>B TC</td> <td>450.0 ... 1800.0 °C</td> </tr> <tr> <td>R TC</td> <td>0.0 ,... 1750.0 °C</td> </tr> <tr> <td>S TC</td> <td>0.0 ... 1750.0 °C</td> </tr> <tr> <td>N TC</td> <td>-200.0 ... 1300.0 °C</td> </tr> <tr> <td>-10 to 80 mV</td> <td>-10.000 ... 80.000 mV</td> </tr> <tr> <td>-10 to 250 mV</td> <td>-10.00 ... 250.00 mV</td> </tr> </tbody> </table>	TC Type	Range	E TC	-200.0 ... 1000.0 °C	J TC	-200.0 ... 1200.0 °C	K TC	-200.0 ... 1372.0 °C	T TC	-200.0 ... 400.0 °C	B TC	450.0 ... 1800.0 °C	R TC	0.0 ,... 1750.0 °C	S TC	0.0 ... 1750.0 °C	N TC	-200.0 ... 1300.0 °C	-10 to 80 mV	-10.000 ... 80.000 mV	-10 to 250 mV	-10.00 ... 250.00 mV
TC Type	Range																						
E TC	-200.0 ... 1000.0 °C																						
J TC	-200.0 ... 1200.0 °C																						
K TC	-200.0 ... 1372.0 °C																						
T TC	-200.0 ... 400.0 °C																						
B TC	450.0 ... 1800.0 °C																						
R TC	0.0 ,... 1750.0 °C																						
S TC	0.0 ... 1750.0 °C																						
N TC	-200.0 ... 1300.0 °C																						
-10 to 80 mV	-10.000 ... 80.000 mV																						
-10 to 250 mV	-10.00 ... 250.00 mV																						
TC Unit Unit	Measure/Source Reading Unit <u>Available Options:</u> Celsius Fahrenheit Kelvin																						

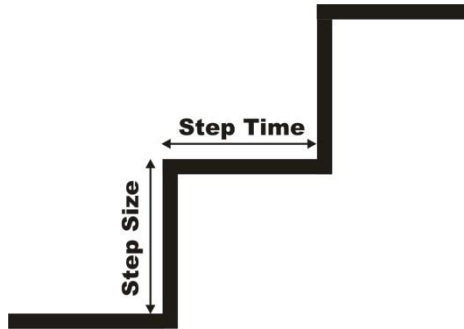
<p>Source Mode</p>	<p>TC Source Output Format This option appears only if TC Mode is <i>SOURCE</i></p> <p><u>Available Options:</u> STEP RAMP</p> <p>At a time one can be selected. Press F1 key on one of the options for more settings.</p>
<p>Reset Additional Info</p>	<p>Reset the Additional Information of Measure mode like Minimum and Maximum This option appear only if TC Mode is <i>MEASURE</i>.</p>

4.3.1 STEP Page





Parameter Name	Description / Options
<p>Low</p>	<p>Starting Value of Step Enter value according to TC Display Mode. If display mode is actual, enter value in temperature/mV and if display mode is %, enter value in %.</p>
<p>High</p>	<p>Ending Value of Step Enter value according to TC Display Mode. If display mode is actual, enter value in temperature/mV and if display mode is %, enter value in %.</p>
<p>Manual (Output Type)</p>	<p>Step Manual Mode Selection CheckBox</p> <p>Ticking this checkbox will enable Step Manual Mode and Un-ticking will enable Auto Step Mode.</p>

Step Time (s)	<p>Enter the time for a single step in seconds</p> <p><u>Range:</u> 1 ... 9999</p> <p>This parameter is enabled only for Auto Step Mode (Manual CheckBox is Un-Checked)</p>
Step Definition	<p>Step Definition for the Step function</p> <p><u>Available Options:</u> Temperature (Appear only if TC Display mode is Actual) Percentage (Appear only if TC Display mode is Percentage) User Defined</p>
Step	<p>Step Value in Temperature/mV/% according to TC Display Mode and TC unit Only appears if Step Definition is Temperature or Percentage.</p>
Define Steps	<p>User Defined Step value for Manual and Auto Step Mode. This option appears only if Step Definition is User Defined. Maximum 10 step value can be configured. First enter the no. of step and then define step value in serial order.</p>
Repeat Format	<p>How the stepping should be done.</p> <p><u>Available Options:</u> UP DOWN UP/DOWN DOWN/UP</p> <p>This parameter is enabled only for Auto Step Mode (Manual CheckBox is Un-Checked)</p>
Repeat Repeat Counts	<p>Defines how many times the steps are repeated</p> <p><u>Range:</u> 1 ... 9999</p> <p>This parameter is enabled only for Auto Step Mode (Manual CheckBox is Un-Checked)</p>



Manual Stepping

To Enable Manual Stepping, select Source Type as STEP and Check the Manual CheckBox.


If this mode is enabled,   icon will appear in Source Display Window in RUN Page.

Pressing UP or DOWN key in RUN Page will Increment or Decrement Source Value by Step specified in STEP Page.

In RUN Page, Source Value can directly change by Pressing F1 key (EDIT) and modifying value like in EditBox. And STEP Setting can be accessed directly by F2 key (SETTING).

Auto Stepping

To Enable Auto Stepping, select Source Type as STEP & UnCheck the Manual Check Box.

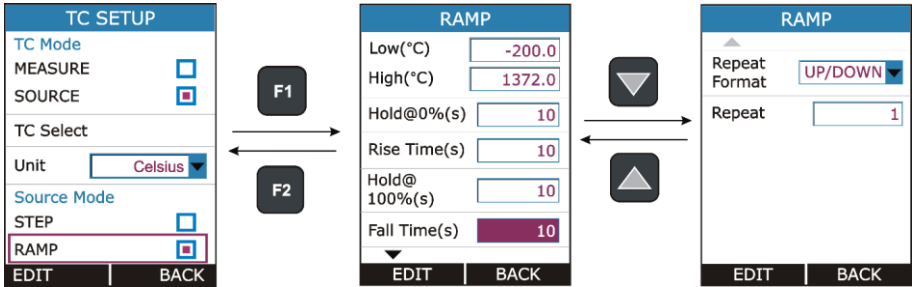
If this mode is enabled,  (Step UP) or  (Step Down) icon will appear in Source Display Window in RUN Page and F1 & F2 Button change to START and SETTING respectively.

Automated Step can be started by Pressing F1 key (START). After that F1 and F2 key will change to PAUSE&STOP respectively. So by pressing F1 & F2 key running STEP can be PAUSE or STOP at any time in RUN Page.

STEP Setting can be accessed directly by F2 key (SETTING).

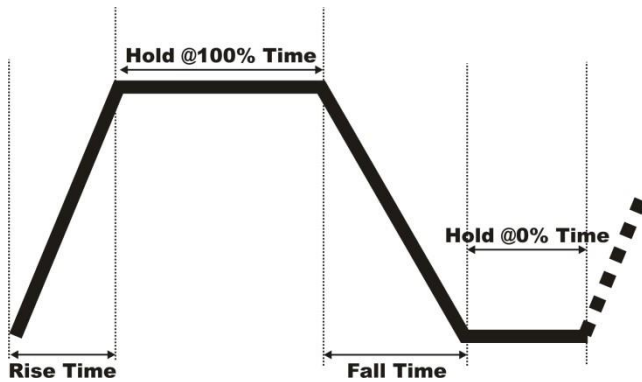
NOTE: While STEP is running STEP settings can't be accessible and Source Page Parameter settings can't be change. Stop STEP before changing any settings.

4.3.2 RAMP Page



Parameter Name	Description / Options
Low	Starting Value of Ramp Enter value according to TC Display Mode. If display mode is actual, enter value in temperature/mV and if display mode is %, enter value in %.
High	Ending Value of Ramp Enter value according to TC Display Mode. If display mode is actual, enter value in temperature/mV and if display mode is %, enter value in %.
Hold@0%(s)	Time to wait at Low (0%) level in second This parameter is used for Repeat Format UP/DOWN or DOWN/UP . <u>Range:</u> 0 ... 9999
Rise Time (s)	Time to Increase from Low to High Level. <u>Range:</u> 1 ... 9999
Hold@100%(s)	Time to wait at High (100%) level in second This parameter is used for Repeat Format UP/DOWN or DOWN/UP . <u>Range:</u> 0 ... 9999






Fall Time (s)	Time to decrease from High to Low Level <u>Range:</u> 1 ... 9999
Repeat Format	How the Ramp should be done <u>Available Options:</u> UP DOWN UP/DOWN DOWN/UP
Repeat Repeat Counts	Defines how many times the steps are repeated <u>Range:</u> 1 ... 9999





Starting the RAMP

To Enable Ramp, select Source Type as RAMP.

If this mode is enabled,  (Rising Ramp) or  (Falling Ramp) or  (Ramp Hold @ 100%) or  (Ramp Hold @ 0%) icon will appear in 

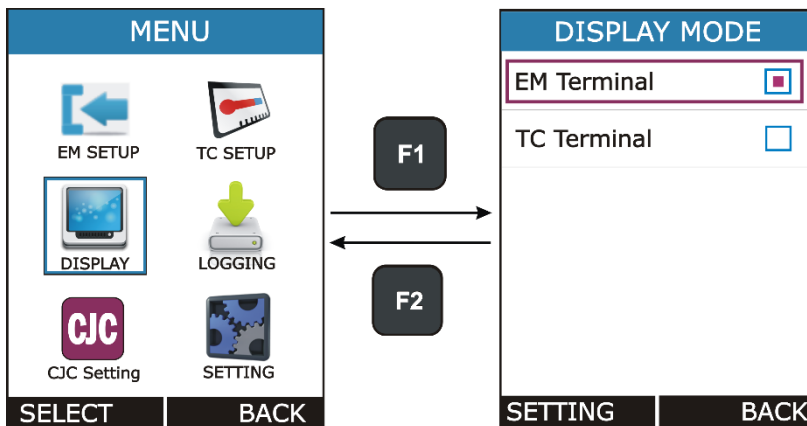
Source Display Window according to current RAMP mode in RUN Page and F1 & F2 Button change to **START** and **SETTING** respectively.

RAMP can be started by Pressing **F1** key (START). After that F1 & F2 key will change to **PAUSE** and **STOP** respectively. So by pressing F1 and F2 key running RAMP can be PAUSE or STOP at any time in RUN Page.

NOTE: While RAMP is running RAMP settings can't be accessible and Source Page Parameter settings can't be change. Stop RAMP before changing any settings.

4.4 DISPLAY Page

This page appears when you select *RUN* → *MENU* → *DISPLAY*.

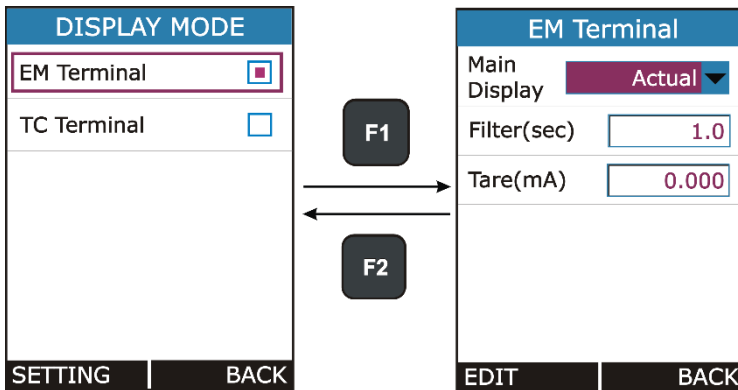


There are mainly Four RUN Display Modes possible in this device. And this mode can be selected from the above Page. What information to be shown in each RUN Display Mode can be defined by this page.

In this page there is one RadioButtonBox. At a time one or two option can be selected. The possible combinations are given below.

4.4.1 EM Display Settings

This page appears when you select *RUN* → *MENU* → *DISPLAY* → *EM Terminal*.

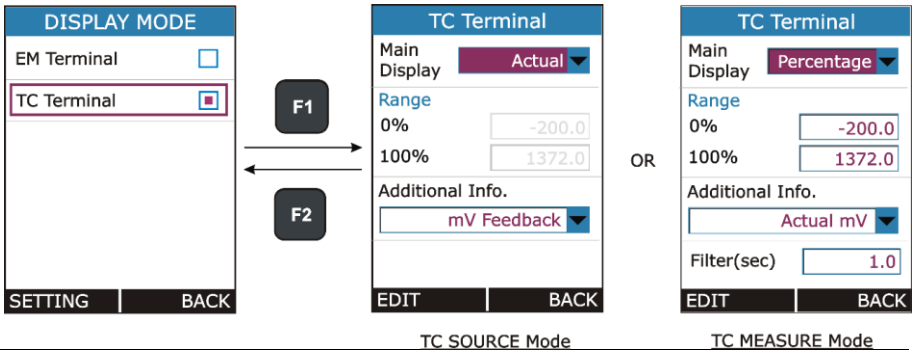


Parameter Name	Description / Options	
Main Display	Select which Reading to be displayed as a Main Reading (Reading Displays in Box in RUN Page).	
	<u>Available Options:</u>	
	Actual	Display the Actual Input Value
	Percentage	Display the Percentage Value of the Input The Value depends on Input Range. These settings are available from <i>MENU</i> → <i>EM SETUP</i> .
	Scaled	Display the Scaled Value of the Input The Scale Value depends on Input Range, Input Scaled Range and Transfer Function. These settings are available from <i>MENU</i> → <i>EM SETUP</i> .
Filter (sec)	1 st Order IIR Low Pass Filter for Input Reading Filter is useful when a measurement signal contains unwanted noise. <u>Range:</u> 0.0 ... 60.0 sec	

<p>Tare (unit)</p>	<p>The Tare value is subtracted from the reading of the measured value. Here unit is changed according to current Input Type and Measure Display Mode.</p> <p><u>Range:</u> In accordance with Input Range & Measure Display Mode.</p> <p>Note: Beware of the problems that may result in not seeing the true measurement value.</p>
---------------------------	---

4.4.2 TC Display Settings

This page appears when you select *RUN* → *MENU* → *DISPLAY* → *TC Terminal*.








Parameter Name	Description / Options				
Main Display	<p>Select which Reading to be display as a Main Reading (Reading Displays in Box in RUN Page).</p> <p><u>Available Options:</u></p> <table border="1" style="width: 100%;"> <tr> <td>Actual</td> <td>Display the Actual Thermocouple/mV Value</td> </tr> <tr> <td>Percentage</td> <td>Display the Percentage Value of Thermocouple/mV according to value set in 0% and 100%.</td> </tr> </table>	Actual	Display the Actual Thermocouple/mV Value	Percentage	Display the Percentage Value of Thermocouple/mV according to value set in 0% and 100%.
Actual	Display the Actual Thermocouple/mV Value				
Percentage	Display the Percentage Value of Thermocouple/mV according to value set in 0% and 100%.				
0%	Low Value in Temperature/mV for (0 ... 100%) scaling.				
100%	High Value in Temperature/mV for (0 ... 100%) scaling.				



Additional Info.1

Choose which information to be shown as TC Mode Additional Information on RUN Page.

Available Options for TC Measure Mode:

Options	Icon	Description
None	-	No info is visible.
Actual Value		Shows the Actual Thermocouple Temperature/mV value without any scaling. This option is available only if TC Display Mode is Percentage.
mV		Shows the Thermovoltage which is measured through TC terminals.
mV w/o CJC		Shows the Thermovoltage according to TC Temperature with adding CJ Temperature mV.
Maximum		Shows the Maximum measured reading from the time when info last reset.
Minimum		Shows the Minimum measured reading from the time when info last reset.
Min & Max	-	Shows the Minimum (in place of mV ₀) and Maximum value both together. This option available only for only TC Display mode.

Available Options for TC Source Mode:

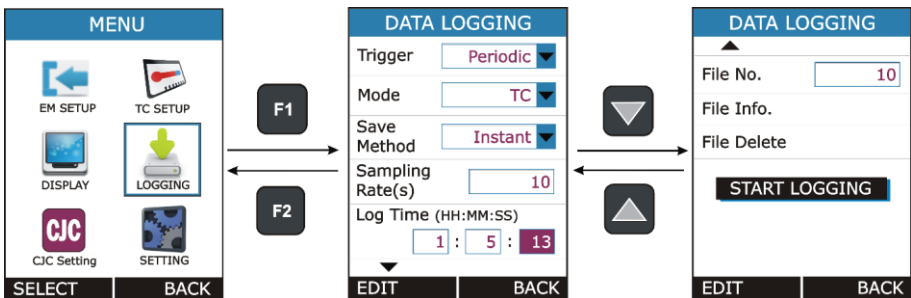
Options	Icon	Description
None	-	No info is visible.
Actual Value		Shows the Actual Thermocouple Temperature/mV value without any scaling. This option is available only if TC Display Mode is Percentage.
mV		Shows the Thermovoltage according to Temperature including CJ temperature mV. The mV which is sourced through TC Terminal.




	Reading Feedback	RF	Shows the Feedback Temperature/mV Reading. When TC-12 generate mV, it uses its own measurement function to control the generated value. This feedback measurement is shows if this option is selected.
	%Error	%E	Shows the error in % between the Desired Source Value and Feedback value.
	mV Feedback	mVF	Shows the Feedback mV Reading.
	mV w/o CJC	mV ₀	Shows the Thermovoltage according to Temperature (for CJ Temperature = 0 °C)
Filter(sec)	<p>1st Order IIR Low Pass Filter for TC Measure Reading. This option is available only for TC mode is Measure. Filter is useful when a measurement signal contains unwanted noise.</p> <p><u>Range:</u> 0.0 ... 60.0 sec</p>		

4.5 DATA LOGGING Page

This section gives examples of how to log Readings with time and date over a set time period or on a key press. Logged data is stored in a user defined file in internal memory.

This Page appears when you select *RUN* → *MENU* → *LOGGING*.



Parameter Name	Description / Options						
Trigger	<p>Data Logging Trigger Mode Selection.</p> <p><u>Available Options:</u></p> <table border="1"> <tr> <td>Key Press</td> <td>Log Data on pressing  from RUN key Page</td> </tr> <tr> <td>Periodic</td> <td>Log Data periodically at every Sampling Rate for total time specified by Logging Time.</td> </tr> </table>	Key Press	Log Data on pressing  from RUN key Page	Periodic	Log Data periodically at every Sampling Rate for total time specified by Logging Time.		
Key Press	Log Data on pressing  from RUN key Page						
Periodic	Log Data periodically at every Sampling Rate for total time specified by Logging Time.						
Mode	<p>Data Mode Selection for Logging</p> <p><u>Available Options:</u></p> <table border="1"> <tr> <td>EM</td> <td>Log only EM Measure Readings</td> </tr> <tr> <td>TC</td> <td>Log only TC Terminal Readings</td> </tr> <tr> <td>EM+TC</td> <td>Log EM Measure and TC Terminal both Readings</td> </tr> </table> <p>This parameter is enabled only for Periodic Trigger.</p>	EM	Log only EM Measure Readings	TC	Log only TC Terminal Readings	EM+TC	Log EM Measure and TC Terminal both Readings
EM	Log only EM Measure Readings						
TC	Log only TC Terminal Readings						
EM+TC	Log EM Measure and TC Terminal both Readings						
Save Method	<p>Reading Type selection for Logging</p> <p><u>Available Options:</u></p> <p>Instant Min Max Average All</p> <p>This parameter is enabled only for Periodic Trigger.</p>						
Sampling Rate(s)	<p>Sampling Rate for Periodic Data Logging in seconds</p> <p><u>Range:</u> 1 ... 9999</p> <p>This parameter is enabled only for Periodic Trigger.</p>						
Logging Time (HH:MM:SS)	<p>Total Logging Time in HH:MM:SS Format for Periodic Logging</p> <p>This parameter is enabled only for Periodic Trigger.</p>						

File No.	File Number. Range: 1 ... 25 This parameter is enabled only for Periodic Trigger.
File Info.	Shows the information of stored files. This information contains Logging Start Time & Date and No of Samples stored in the file.
File Delete	Delete stored file.
START LOGGING	Press F1 key while selecting this button to start the Logging.

Notes:

- Maximum No. of Readings that can be stored in

Logging Mode	Max. Reading
Periodic	150000
Key Press	484

- In Periodic mode, changing of any Measure or Source parameter is not allowed. So While Periodic Logging is Running, the user can't enter *MEASURE*, *SOURCE* and *DISPLAY* menu. But in Key Press Logging mode, there is no restriction.
- In Periodic Mode, if error message like "*Not Sufficient Memory*" comes while starting the Logging. Try to Reduce Logging Time or Increase Sampling Period or try deleting some existing files.
- In Key Press Mode, If No of Samples reach its maximum limit that is 484, the next sample will start from the first overwriting the memory.
- While Logging is running, entering into the *LOGGING* menu shows below page.

for Periodic Mode

DATA LOGGING	
Logging Running...	
No of Sample Taken	20 out of 100
Time Remaining	00:10:45
STOP LOGGING	
BACK	

for Key Press Mode

DATA LOGGING	
Logging Running...	
STOP LOGGING	
BACK	

- For Periodic Mode, this page contains information of Number of Samples Taken and Time Remaining for Logging in HH:MM:SS.
- Both Periodic and Key Press logging can be stop manually by pressing F1 key on STOP LOGGING Button. For Periodic Mode, Logging will automatically stopped when defined log time ends and a message "LOGGING DONE" pop ups.







Transferring the Results to a Personal Computer:

A 32-bit Windows® software called **mCAL+.exe** can be downloaded here: https://www.pce-instruments.com/english/download-win_4.htm. Start this software just as any other Windows® software.

All communication between the PC and PCE-TTC 30 is initiated from **mCAL+.exe**. More information on the software can be found in the separate software manual.

4.6 CJC Setting Page

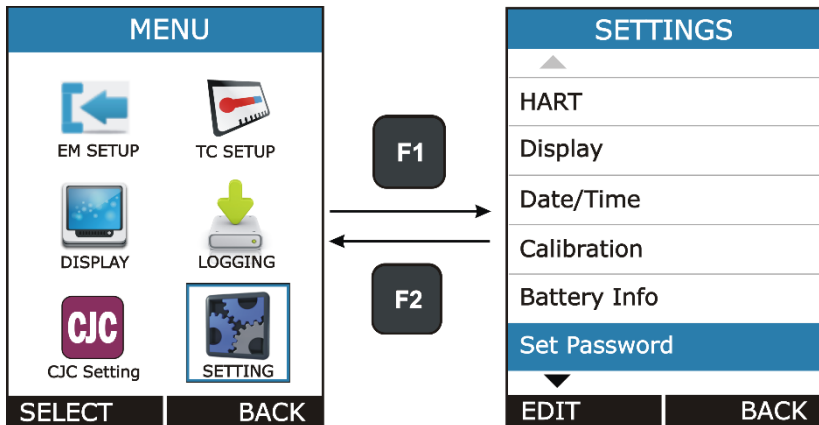
This page appears when you select *RUN* → *MENU* → *CJC Settings*.

MENU		CJC Settings	
 EM SETUP	 TC SETUP	F1 → ← F2	CJC Mode AUTO <input type="checkbox"/>
 DISPLAY	 LOGGING		MANUAL <input checked="" type="checkbox"/>
 CJC Setting	 SETTING		CJC Adjustment <input type="text" value="27.5"/> °C
SELECT BACK			EDIT BACK

Parameter Name	Description / Options			
CJC Mode	CJ (Cold Junction) Temperature Mode			
	<u>Available Options:</u>			
	<table border="1"> <tr> <td>AUTO</td> <td>CJ Temperature is TC Terminal's temperature.</td> </tr> <tr> <td>MANUAL</td> <td>CJ Temperature is user selectable irrespective of TC Terminal temperature.</td> </tr> </table>	AUTO	CJ Temperature is TC Terminal's temperature.	MANUAL
AUTO	CJ Temperature is TC Terminal's temperature.			
MANUAL	CJ Temperature is user selectable irrespective of TC Terminal temperature.			
CJC Adjustment	CJ Temperature adjustment for Manual CJC Temperature.			

4.7 SETTING Page

This page appears when you select *RUN* → *MENU* → *SETTING*.



All the available Settings Options are given below.

- i. HART
- ii. Display
- iii. Date/Time
- iv. Calibration
- v. Battery Info
- vi. Set Password
- vii. Factory Reset
- viii. About Us

Press F1 key to Enter into the settings of any option.
Description of all settings is given below.

4.7.1 HART Settings

HART

HART (250 ohms)

NO

YES

EDIT
BACK

Select YES to add a Series resistor (250Ω) into the mA circuit. You can then use this instrument together with a HART® communicator to set up and calibrate HART® devices. This option is applicable for mA(24V) Read Power Input Type Only.

4.7.2 Display Settings

DISPLAY

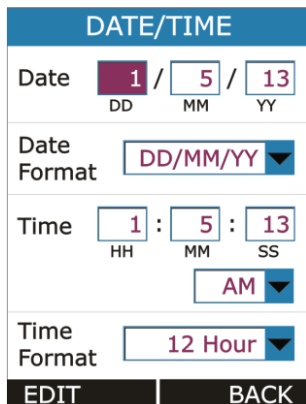
Display Intensity(%) 100

Display Off Time(s) (0=Infinite)

EDIT
BACK

Display Intensity	Display Brightness Settings. <u>Range:</u> 5 to 100
Display Off Time	Standby Time in second after which display will turn Off. To turn the display off press any key. <u>Range:</u> 0 to 9999 sec Setting 0 will disable this feature. That means display will never turn off automatically.

4.7.3 Date/Time Settings



To set the Time + Date of the device.

2 date formats are supported in this device: **DD/MM/YY** and **MM/DD/YY**. This is useful only in Data Logging, to decide in which format the Date is to be stored.

2 time formats are supported in this device: **24 Hour** and **12 Hour**. This is to select in which format the time should be displayed on Run page and time to be stored in Data Logging.

AM/PM selection is enabled only for 12 Hour Time Format.

4.7.4 Calibration

The instrument is factory calibrated for the specified range, but due to long term drift of components, re-calibration may be necessary in some cases. For calibrating the instrument, a reliable source is required. This source should be at least ten times accurate compared to the range of the instrument.

Note: PCE Instruments can provide a calibration service that is traceable to international standards.

We recommend that you return the instrument to the manufacturer or an approved service agent for calibration. If you use an alternative calibration facility, make sure that it uses these standards.

4.7.5 Battery Info

This page shows the basic battery Information.

- Battery Level (Percentage)
- Battery Voltage (in mV)
- Current (in mA)
- Battery Status
- Time to Full (in min)
- Time to Empty (in min)

4.7.6 About Calibrator

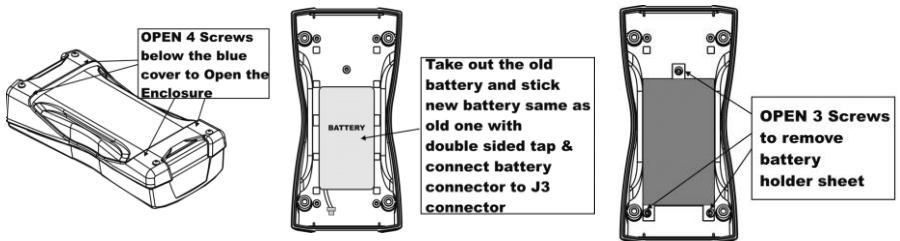
This Page illustrates the Connection diagrams for valid connections to this device.

5 Maintenance and Troubleshooting

5.1 Common Problems

Problem	Possible Causes
Device Not Starting Up	<ul style="list-style-type: none"> Battery Discharged Battery Connection Loose
Reading Fluctuation/ Reading OPEN	<ul style="list-style-type: none"> Wrong / Loose Connections
Error Code on status bar	<ul style="list-style-type: none"> One of the peripheral not working properly. (Solution: Restart the Device if still error code showing contact PCE Instruments)
Calibration Out	<ul style="list-style-type: none"> Distortion in due to external noise connection (Solution: Check connection. If still out, contact PCE Instruments or Recalibrate Device in authorized calibration laboratory.)
Battery Not Charging	<ul style="list-style-type: none"> Battery Connection Loose Battery Dead

5.2 Replacing the Battery



6 Technical Specifications

Voltage DC V			
Measuring range		Resolution	Accuracy
0 ... 30V		0.001V	± 0.02% v.Mw. + 2 Dgt
Current DC mA			
Measuring range		Resolution	Accuracy
0 ... 24-mA		0.001-mA	± 0.02% v.Mw. + 2 Dgt
Measurement / Simulation			
Thermocouples	Measuring range	Resolution	Accuracy
e	-200 ... 1200°C / -328 ... 2192°F	0.1°C / 0.18°F	± 0.3°C / 0.54°F
J	-200 ... 1200°C / -328 ... 2192°F	0.1°C / 0.18°F	± 0.3°C / 0.54°F
K	-200 ... 1372°C / -328 ... 2501°F	0.1°C / 0.18°F	± 0.3°C / 0.54°F
T	-200 ... 400°C / -328 ... 752°F	0.1°C / 0.18°F	± 0.3°C / 0.54°F
B	450 ... 1800°C / 842 ... 3272°F	0.1°C / 0.18°F	± 0.3°C / 0.54°F
R	0 ... 1750°C / 32 ... 3182°F	0.1°C / 0.18°F	± 0.3°C / 0.54°F
S	0 ... 1750°C / 32 ... 3182°F	0.1°C / 0.18°F	± 0.3°C / 0.54°F
N	-200 ... 1300°C / -328 ... 2372°F	0.1°C / 0.18°F	± 0.3°C / 0.54°F
mV	10 ... 80 mV -10 ... 250 mV	0.001 mV 0.01 mV	± 0.02% of the displayed value + 2µV ± 0.02% of reading + 0.02 mV
Note: The specifications refer to the temperature standard ITS-90			

General specifications	
Display modes	Measurement: mA / V / thermocouple / mV Simulation: thermocouple / mV
temperature units	°C / °F / K
Cold junction compensation error	$\leq \pm 0.5^{\circ}\text{C} / 0.9^{\circ}\text{F}$
Maximum input voltage	30V DC
Temperature coefficient	<30 ppm
Input impedance measurement	Thermocouple / mV / V:> 1 M Ω Current measurement: 10 Ω
Response time	<100 ms
Impedance	> 4,7 k Ω with thermocouple / mV
Refresh rate display	10 Hz
Isolation	500V DC
Data storage	Internal memory 150000 readings
Interface	USB 2.0
Display	2.4" TFT LCD 240 x 320 pixels LED illuminated
Output voltage current loop	24V DC / 24mA
HART mA loop resistance	250 $\Omega \pm 20\%$
Special features	Step and ramp function Automatic and manual mode \sqrt{x} , x^2 : For the measuring function
Continuity test	Adjustable threshold up to 100 Ω
Power supply	3.7V / 2300mAh Li-ion battery
Charging time	about 5 h
Power adapter	Input: 100 ... 240V AC / 50/60 Hz Output: 5V / 1 A DC
Battery life	Approx. 15 h: Simulation and measurement with low LCD illumination Approx. 8 h: Measurement with low LCD illumination
Dimensions	162 x 82 x 40 mm
Weight	About 300 g / < 1 lb
Degree of protection	IP20
Operating conditions	Battery operation: 0 ... 55°C / 32 ... 131°F, 30 ... 90% RH Main operation: 0 ... 45°C / 32 ... 113, 30 ... 90% RH
Storage conditions	-20 .. 60°C / -4 ... 140°F, 30 ... 90% rh non-condensing
Heating time	About 15 minutes



7 Warranty

You can read our warranty terms in our General Business Terms which you can find here: <https://www.pce-instruments.com/english/terms>.

8 Disposal

For the disposal of batteries in the EU, the 2006/66/EC directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose.

In order to comply with the EU directive 2012/19/EU we take our devices back. We either re-use them or give them to a recycling company which disposes of the devices in line with law.

For countries outside the EU, batteries and devices should be disposed of in accordance with your local waste regulations.

If you have any questions, please contact PCE Instruments.



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