



## Instruction Manual

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## SECTION 1

### *Introduction*

#### **Description**

The RE357(Tx) pH meter is a precision meter that includes automatic temperature compensation, automatic calibration with standard buffers, and with a resolution of 0.1mV. The instrument can be used with ion selective electrodes.

#### **Unpacking**

Verify that you have received all equipment. If you have any questions about the shipment, please call EDT Direct ION Ltd. or your agent.

When you receive the shipment, inspect the container for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the agent.

#### **Note**

The carrier will not honour any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material in the event that re-shipment be necessary.

The following items are packed in the box:

- RE357(Tx) pH Meter
- E805I Temperature Probe
- E806I Electrode Stand
- pH Buffers 4,7,10
- A/C Adaptor
- 9V Battery

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## Setting Up

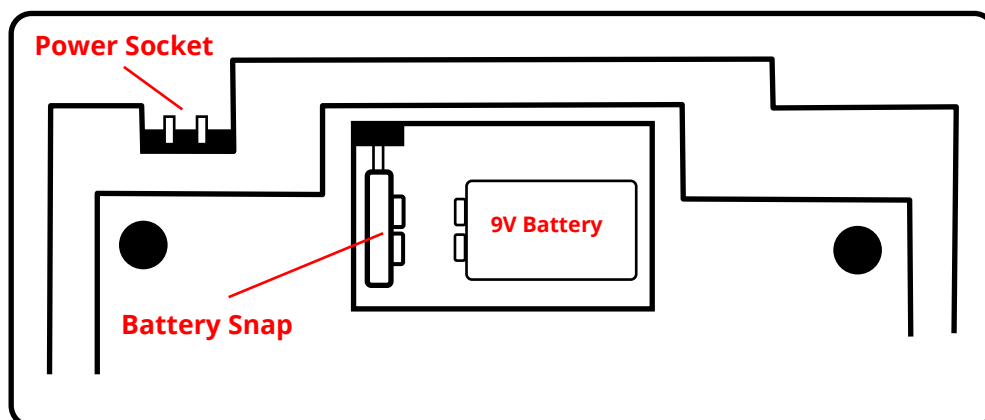
The instrument can be used on battery or AC power. It is not necessary to remove the battery before transferring to AC power.

### AC Operation

- Only use the approved power adaptor supplied
- Check that the adaptor is the correct voltage for your power supply
- Plug the adaptor into the power socket at the back of the meter, then connect to the AC supply.

### Battery Installation

- Approximately 24 hours of continuous use is afforded by the 9V battery.
- The BAT flag appears on the display to indicate a low battery
- To install or replace the battery, slide off the back cover
- Remove the old battery and insert a new one ensuring that the polarity is correct
- Replace back cover.



***Figure 1. Bottom view of instrument showing power connections***

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## Instrument Test Procedure

- Ensure that the shorting plug is connected to the BNC pH in-put at the back of the meter. Switch on using the switch on the back panel.
- Press the Mode key to select pH mode and clear any calibration data by pressing the Clear key for 5 seconds.
- The displayed reading should read  $7.00 \pm 0.02\text{pH}$
- Switch to mV mode by pressing the mode key. Display should read  $0.0 \pm 0.2\text{mV}$
- Switch to °C key by pressing the mode key. Ensure that the display has a value in the range  $0.0$  to  $19.0^\circ\text{C}$  and is adjustable. i.e. responds to the use of the up and down arrow keys. Adjust to  $20.0^\circ\text{C}$
- The meter is ready for calibration



**Figure 2. Rear view of RE357Tx**

### A Note on Electrodes:

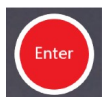
pH, Ion Selective and Redox electrodes may all be used with the RE357. These may be combination or half-cell types. Combination or sensing half-cells should have a BNC terminal and be connected to the socket marked pH/ION input at the back of the meter. Reference half-cells should have a 4mm bunched terminal and be connected to the socket marked REF. Always refer to electrode instructions before use. See also, Appendix 1.



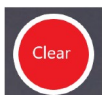
**Figure 3. Front Panel**



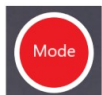
Calibration Keys—Alter displayed reading



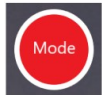
Enters displayed value as calibration data



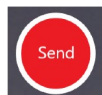
Clears Calibration data when pressed for 5 s



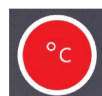
Selects mV Mode



Selects pH Mode



Transmits data to printer (Tx Version). On RE357 labelled Hold and freezes the reading.



Selects °C Mode

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## Section 2

### pH Calibration and Measurement

For accurate results, stir all buffers and samples. Always rinse electrodes and blot dry before transferring from one solution to another to prevent contamination. Ensure that any electrode filling holes are left uncovered during use.

### Automatic Calibration & Temperature Compensation

1. Connect the pH electrode(s) and temperature probe and switch on using the power ON/OFF switch on the back panel.
2. Select pH mode and clear any calibration data by pressing the Clear key for 5 seconds.
3. Place the pH electrode(s) and the temperature probe in the pH 7 buffer and wait for a stable reading. \*Press the Enter key. The first calibration point will now be entered automatically at the correct value for the temperature of measurement. The Cal flag will be displayed.
4. Rinse, blot and place the pH electrode(s) and temperature probe in the second buffer (4 or 10). Wait for a stable reading. \*Press the Enter key. The second calibration point will now be entered automatically at the correct value for the temperature of measurement.
5. Rinse, blot and place pH electrode(s) and temperature probe in the sample. Wait for a stable reading and record pH value
6. Temperature or mV measurements may be made at any time by pressing the appropriate key.

**Note:** The display may be frozen at any time by pressing the HOLD key if using the RE357 or the SEND key if using the RE357Tx with no computer or printer connected. To release the display press the key again.

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## Manual Calibration

If buffers other than 4,7 and 10 pH are to be used, then the calibration must be performed manually. That is the correct pH values must be entered using the up and down arrow keys.

Follow the procedure for Autocalibration above but before pressing the enter key(\* in points 3 and 4) carry out the following procedure:

1. Check the temperature of the buffer
2. Look up the value of the buffer for this temperature
3. Use the up and down arrow keys to adjust the displayed reading to the value displayed in point 2 (the CAL flag will flash). Press Enter (the CAL flag will stop flashing)

## Manual Temperature Compensation

If the use of a temperature probe is inappropriate, e.g. small sample size then manual temperature compensation can be used. With the temperature probe disconnected, follow the procedure for Automatic Temperature compensation on page 6. points 1 to 3.

4. Press the Mode key to select °C function. Note that the °C flag will flash when no temperature probe is connected. Use the up and down arrow keys to adjust the displayed reading to the temperature of the first buffer.
5. Press the Mode key to return to pH function.
6. The meter may now be calibrated automatically or manually following either of the procedures above.

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## Section 3

### m V Calibration and Measurement

The mV mode has two ranges. The meter will automatically select the most appropriate range as follows:

0 to  $\pm 400$  mV with resolution 0.1 mV

$\pm 400$  mV to  $\pm 2000$  mV with resolution 1 mV

#### Absolute mV

1. Connect the electrodes
2. Press the Mode key to select m V function
3. Clear any existing data. (Press Clear for 5 seconds)
4. Absolute mV readings may now be made by immersing the electrodes in the sample and recording the reading.

#### Relative mV

Follow the procedure for Absolute mV from points 1 to 3

5. Immerse electrode(s) in the standard or blank solution. Wait for a stable reading and press Enter. The display will automatically zero and the CAL flag will be displayed.
6. mV values relative to the standard solution may now be taken by immersing in the sample and recording the reading.

## Section 4

### Use of the recorder output

Connect the recorder via the red and black 4mm sockets on the back panel. (Red positive, Black negative)

Mode	Range	Display	Recorder
Ion	0-200		mV/10
pH	0-200	7.0 pH	70.0mV
mV	$\pm 200$	500mV	50.0mV
$^{\circ}\text{C}$	$\pm 200$	25.0 $^{\circ}\text{C}$	25.0mV

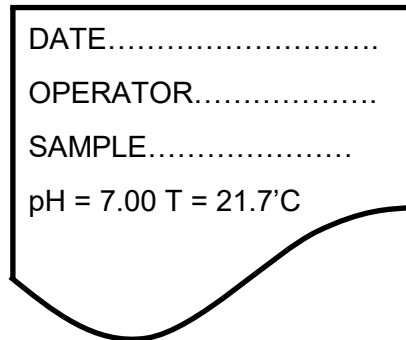


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## Section 5 (Tx Version Only)

### Operation With a Printer or Computer Printer

1. Connect a printer (set at 1200 Baud) to the meter via the RS232C port on the back panel.
2. Follow the calibration procedure given in Section 2 or 3
3. To print out a sample reading, press the Send key. The first time the key is pressed the following printout is obtained



```
DATE.....  
OPERATOR.....  
SAMPLE.....  
pH = 7.00 T = 21.7°C
```

4. Pressing and releasing the Send key subsequently will result in a printout of the displayed reading and temperature only.
5. To obtain a printout of other parameters for the same sample, press the Mode key and then the Send key
6. To print a new identifier, press and hold down the Send key.

### Computer

Connect a computer using 1200 Baud via the RS232C port at the back of the meter. A computer program is required to receive and send characters from the computer. The current readings can be sent to the computer by pressing the Send key. Each line is terminated with a Carriage Return (CR), Line Feed (LF). All characters are ASCII printable alpha-numeric

**Three commands, CA, PR and RD can be sent from the computer:**

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## CA—Send Calibration Data

Command—CA

1 CR LF

pH = 7.06 CR LF

T = 15.8° C CR LF

mV= -0.2mV CR LF

2 CR LF

Second Calibration Point

## PR—Send Probe Status Data

Command—PR

SI = 95.3% NERNST CRLF

E° = 5.2mV CR LF

## RD—Send Current Readings

Command—RD

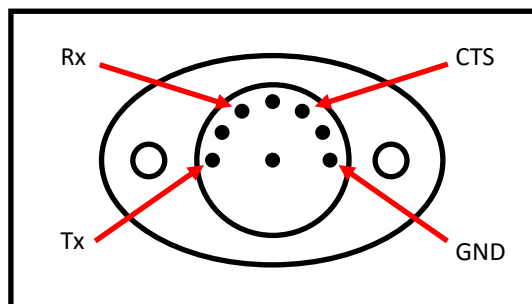
pH = 7.00pH CR LF

T = 21.5° C CR LF

mV = 0.2mV CR LF

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## RS232 Connection details



## Section 6

### *Troubleshooting*

Symptom	Probable Cause
No display	Battery is flat or not installed Power supply disconnected
'BAT' flag displayed	Battery low
Wildly erratic readings or display reads — on left hand side	Electrodes disconnected Electrodes not immersed in solutions Reference electrode not filled Reference junction dry
Drifting Readings	Inconsistent or lack of stirring Reference Filling solution contaminated Buffers contaminated
Erratic/drifting readings or display reads—on left hand side when shorting plug is attached	Return meter for servicing

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## Error Codes

<b>PRO</b>	Temperature probe malfunction
<b>Buf</b>	Wrong or contaminated buffer (pH)
<b>SL</b>	Poor electrode slope caused by faulty electrode or poor buffers/ standards
<b>E°</b>	Faulty or aged electrode
<b>E6,E7</b>	Calibration error. Recalibrate with fresh standards or buffers.

In the event of a malfunction, it is important to pinpoint the problem to either the meter or the cell. If a spare cell is available, substitute it for the one in use.

***There are no user serviceable parts in this instrument. Please ensure that the instrument, together with all accessories, is returned to EDT DirectIOn Ltd or the agent with a full description of the symptoms. No attempt should be made to repair the meter.***

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## Section 7

### *Specifications*

<b>pH Range/Resolution</b>	0.00-15.00
<b>pH Accuracy</b>	±0.02pH
<b>Temperature Compensation</b>	0-100°C
<b>Auto Calibration</b>	2 points, 4,7 or 10
<b>Manual Calibration</b>	2 points at any value
<b>mV Range/Resolution</b>	±400.0 & ±2000 mV
<b>mV Accuracy</b>	±2% ±1 digit
<b>Relative mV offset</b>	±2000mV
<b>Auto Range change at</b>	400mV
<b>°C Range/Resolution</b>	-30.0 to+ 130.0°C
<b>°C Accuracy</b>	±0.3°C
<b>Recorder Output</b>	±200mV
<b>Karl Fischer Output</b>	10µA
<b>Display</b>	12.7mm LC
<b>Power</b>	9V Battery or AC
<b>Instrument Size</b>	210 x 150 x 881mn
<b>Instrument Weight</b>	550g

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## **Appendix 1**

### ***pH electrodes***

#### **Before Use**

Remove the protective cap covering the glass sensing bulb and replace with the protective guard if applicable. Inspect the filling solution for air bubbles and remove by shaking in a downward direction. Soak the electrode in pH storage solution for 30 minutes.

#### **Cleaning**

Soak the electrode in 0.1M HCl for 15 minutes followed by soaking in pH storage solution for 30 minutes

#### **Storage.**

Put some pH storage solution in the protective cap and place over the glass bulb.

Never store the electrode in distilled or de-ionised water. Never allow the electrode to dry out.

pH electrode storage solution is made up by dissolving 1g KCl in 100mL of pH 7 buffer

### ***pH Buffers***

#### ***Buffer Capsules***

Buffer capsules are made up as follows For each buffer, empty the powder into a suitable container. Using deionised water, make up to 100mL ensuring that the powder is fully dissolved before use. The coloured outer skin may be added to colour code the resulting buffer. This may take up to 4 hours to dissolve but will not affect the pH of the buffer.

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## ***Buffer Solutions***

If using ready made solutions, use ones supplied with temperature coefficient information.

**Table of Temperature Coefficients For EDT Buffers**

<b>° C</b>	<b>pH 4</b>	<b>pH 7</b>	<b>pH 10</b>
<b>10</b>	3.99	7.07	10.18
<b>15</b>	4.00	7.04	10.14
<b>20</b>	4.00	7.02	10.06
<b>25</b>	4.00	7.00	10.00
<b>30</b>	4.00	6.99	9.95
<b>35</b>	4.01	6.98	9.91
<b>40</b>	4.02	6.97	9.85
<b>50</b>	4.05	6.96	9.78
<b>60</b>	4.07	6.96	9.75