高频电流探头

High Frequency Current Probe

- **PT-227**
- **PT-320**
- **PT-325**
- **PT-350**

INSTRUCTION MANUAL

使 用 说 明 书

目录

English version,move to page 9

保修概要

PINTECH品致 保证，本产品从广州德肯电子股份有限公司最初购买之日起三年期间，保修仅适于原购买者且不得转让第三方。如果产品在保修期内确有缺陷，则 PINTECH品致 将按照保修声明所述，提供维修服务。

维护：保养此产品时请使用原厂指定的工具，原厂对其他不被认可的维修人员所做的维修将不负任何责任。本产品如超过 60 天不使用，请将本产品至于防潮箱存放。

清洁：此产品不需要任何特定的清洁。如有需要，请用轻软干净的布沾上微量的清洁液轻轻的在产品外观擦拭。

保修：除了在人为上的特意损坏，本产品主机保修三年。保修是仅在正常操作下而造成的损坏，并不包含任何刻意的损坏，操作上的错误，机械上的操作不当，保养不当，负载或过压。原厂的保修包含有限的单纯更换损坏的零件。如有任意的非原厂的维修或更换零件，原厂保修将自动取消。

有任何的维修，请联系我司销售人员，寄回原厂维修。自行拆机不保修。

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一、一般安全

请仔细阅读以下的安全防范措施以避免损伤并防止损坏这个产品或任何连接到它的产品。为了避免潜在的危险，请依所指示的方法使用这个产品。只有合格的人员可以执行服务程序。

避免火灾或人身伤害。

◆**正确的连接及断开。**在把探头连接到要测试的电路前，请先把探头输出端连接到测量仪器上。把探测钳从测量仪器上拔除前先把探头输入端和地线从电路上拔除。

*注意：请尽量避免测试裸露线，如需测裸露线的话请勿与测试端相接触。观察所有的终端测定。为了避免火灾或人身伤害，请观察所有在产品上的数据及标记。在连接产品前请先阅读手册。

◆**没有盖子时请勿操作。**盖子被去除时请勿操作这个产品。

◆**避免接触电路。**通电时，不要触摸曝露的连接及零件。

◆**如有故障的疑虑，请勿操作。**如果你怀疑产品有损坏，请合格的服务人员检查。

◆**请勿在潮湿的情况下操作。**

◆**请勿在易燃的环境下操作。**

◆**保持产品表面乾淨、乾燥。**

本手册中的术语

这些术语可能出现在本手册中:

警告。警告声明确定可能导致损伤或丧失生命的情况或做法。

谨慎。注意事项声明确定可能导致本产品或其他财产损害的情况或做法。

二、主要特点

PT-227/320/325/350 电流探头可以精确测量直流到 DC-2/20/25/50MHz。该探头运用了成熟的霍尔效应技术并与 PINTECH 品致探头示波器接口相结合。主要特点包括:

- ◆ 分芯结构，简便地连接电路
- ◆ AC / DC 测量能力
- ◆ 精度 1%±5mV
- ◆ 连接的仪器上直接显示读数

三、连接示波器

1.探头直接连接示波器使用，如图一。

2.探头连接标配配件转接头 PL-36 并与 BP-250 连接,通过 BP-250 连接示波器使用，如图二。

图一

图二

断开探头:

1. 逆时针旋转 BNC 头。
2. 将 BNC 头从示波器上拔出。

要断开适配器:

1.滑动航空插口拔出。

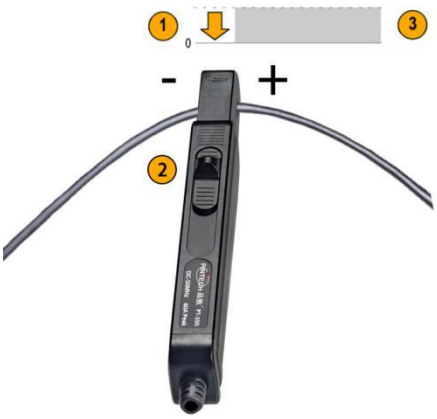
2.将适配器从探头上拔出。

四、探头控制

滑块开关和钳口

1. 当滑块处于锁定位置时，可以对探头进行测量。
2. 将滑块移动到未锁定的位置，以便插入和移除进出钳口的导线。
3. 钳口最大可以钳住直径 5 毫米(0.2 英寸)的导体

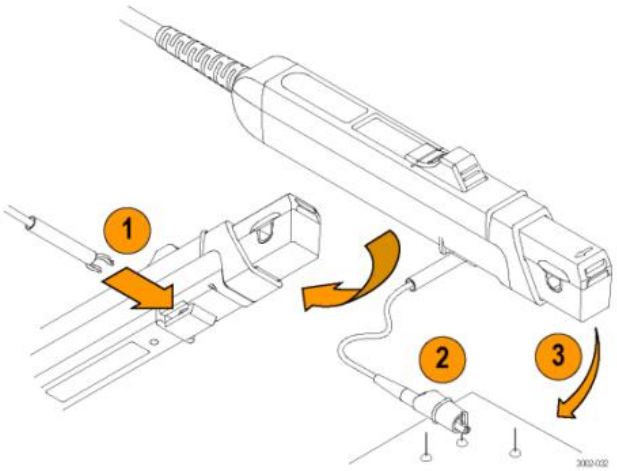
警告。为防止探头损坏，请勿将直径大于 5 毫米(0.2



英寸)的导线强行插入钳口。

探头接地线

1. 将小夹子固定在探头本体上的接地短节上。
2. 把鳄鱼夹夹到你的电路里。
3. 将探头连接到电路上。



注：保证设备及示波器接地良好，否则会导致探头烧毁。

五、功能检验

下面的过程检查您的探针是否正常工作。

自动归零功能：在测试直流前使用该功能，测试交流无需操作。

自动归零操作：探头通电后，按按键，红灯亮后松开按键，探头自动归零。

要检查探头的功能是否正确，请执行以下操作:

1. 探头连接示波器
2. 设置好探头相对应连接的通道
3. 探头夹在电路上
4. 自动设置或者手动设置好示波器以便得到稳定的波形，表示探头工作正常。

六、基本操作

1. 在将探头与导线连接之前，检查示波器的显示。

(如果发生过载、发现空载直流偏移或探头暴露在强磁场时，则对探头进行消磁调零。)

2. 关闭并锁住导线上的探头钳口。

要正确读取极性，请连接探头，使电流从正流向负。

3. 读取示波器显示上的测量值。

消磁操作： 1. 先按着按键 Degauss

2. 再通电，等绿灯不亮松开按键 Degauss 再迅速按下按键 Degauss 保持不动(一秒完成动作)

3. 并推动主机钳口开关三次，每滑动一次，红灯都会闪一下。

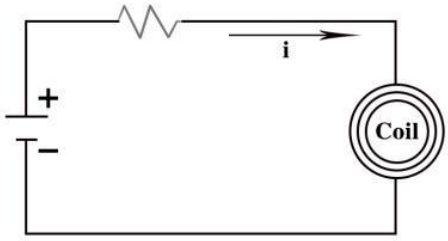
注：主机钳口开关推上去要推到顶

4. 三次过后松开按键

5. 再按着按键 Degauss 不动绿灯闪，长按十秒松开按键 Degauss

6. 关电即可。

七、测量电感线圈匝数



要获得电感器的近似匝数，请执行以下步骤:

1. 电感连接限定电流，如图所示。

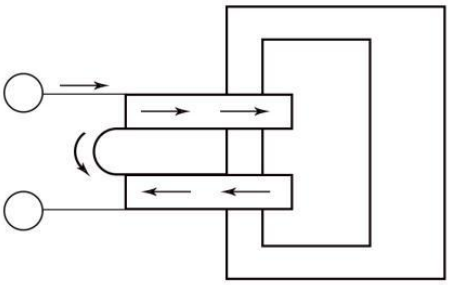
2. 测量其中一根电感引线上的输入电流。

3. 将电流探头夹在电感器周围，注意电流值。

匝数等于线圈电流与输入电流之比。

该方法的测量精度受电流测量精度的限制。

线圈的匝数已知，可用作参考。执行以下操作:



1. 重复上述第 1 步和第 2 步，并作出以下更改:

2. 将基准线圈插入电流探头。

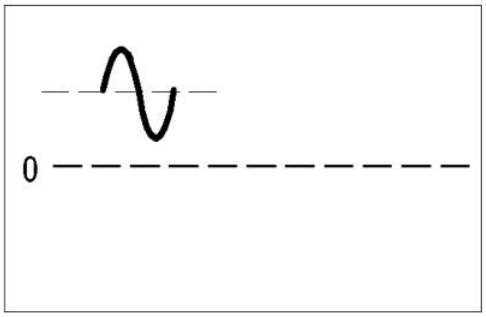
3. 如图所示，将测试线圈插入电流探头，使电流彼此相对。您必须观察线圈电流的极性，以确定测试线圈的匝数是否小于或大于参考线圈。匝数按公式计算:

$$N_2 = N_1 \times (I_m \div I_1)$$

注释:

N2 为测试线圈匝数，N1 为基准线圈匝数，Im 为被测线圈电流，I1 为输入电流。

警告。为降低触电或着火的风险，请不要超过 ADP-250N 适配器的额定值。



八、测量电流

为了测量数据准确，在没有信号输出的状态下，把探头归零。

1. 确定被测导体的方向，使极性(+和-)相互对立。

2. 将电流探头夹住一根导体。注意不要在探头钳口夹住导线。

3.测量电流。

常规电流从正流向负。基线以上的波形表明，与传统电流流向探针箭头方向的导体携带的电流更大。

4. 若要调整电流为零，切断输出信号，直到显示的测量值为零为止。

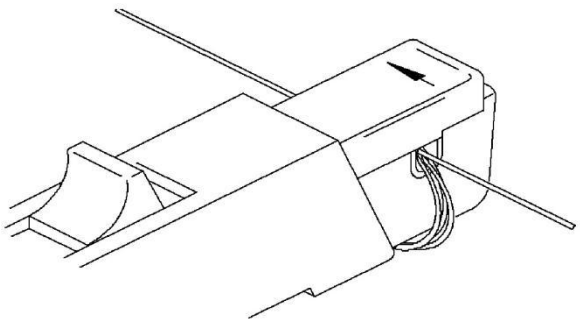
九、提高灵敏度

如果你正在测量非常小振幅的直流或低频交流信号，你可以通过以下步骤提高电流探头的测量灵敏度:

1. 如图所示，绕探头绕被测导体绕几圈。信号被乘以探头的匝数。

2. 要获得实际电流值，将显示的振幅除以匝数。

例如，如果导线绕探头三次，示波器显示读数为 60mA DC，那么实际的电流流量就是 60mA 除以 3，或 20mA DC。



请注意。绕探头旋转越多，插入阻抗越大，探头的带宽上限越小。

十、最大电流限制

电流探头有三个最大电流额定值:脉冲电流、连续电流。超过这些额定值中的任何一个都会使探头铁芯饱和，从而使铁芯磁化并导致测量误差。

最大脉冲电流(ImaxP)是探测器能够精确测量脉冲电流的最大峰值，无论脉冲持续时间有多短(在带宽限制内)。

最大连续电流(ImaxC)是在直流或特定交流频率下可以连续测量的最大电流。最大连续电流值随频率减小;随着频率的增加，最大连续电流额定值减小。

安培-秒积是脉冲电流的最大宽度，当脉冲振幅在最大连续和最大脉冲电

流规格之间时测量。最大连续规格随频率而变化。

要确定测量值是否超过安培秒，必须首先确定最大允许脉冲宽度或最大允许脉冲振幅。

注意。在测量超过探头的最大连续电流、最大脉冲电流或安培-秒积额定值的电流后，始终对探头进行消磁。超过这些额定值会使探头磁化并导致测量误差。

该探头已在 23℃±5℃的室内环境温度下进行校准。

探头必须有至少 20 分钟的预热时间，并且处于不超过所述限制的环境中。

十一、参数

型号	PT-227	PT-320	PT-325	PT-350
带宽	DC-2MHz	DC-20MHz	DC-25MHz	DC-50MHz
交流电流	70Ap-p	60Ap-p	100Ap-p	60Ap-p
最大电流	24A rms	20A rms	40A rms	20A rms
直流电流	35A	30A	40A	30A
最小电流	20mA	20mA	20mA	20mA
精度	1%（±5mV）	1%（±5mV）	1%（±5mV）	1%（±5mV）
噪声	≤6mA RMS	≤6mA RMS	≤6mA RMS	≤6mA RMS
上升时间	175 ns	17.5 ns	14 ns	7 ns
耦合方式	AC/DC	AC/DC	AC/DC	AC/DC
长度	1.48m	1.48m	1.48m	1.48m
径口直径	5mm	5mm	5mm	5mm
变比	0.1V/A	0.1V/A	0.1V/A	0.1V/A

十二、清洁

保护探头不受恶劣天气条件的影响。本产品不防水。

谨慎。为防止探头损坏，请勿将其暴露于喷雾剂、液体或溶剂中。在外部清洗时，避免探头内部受潮。

切勿使用化学清洁剂;它们可能会损坏探头。避免使用含有汽油、苯、甲苯、二甲苯、丙酮或类似溶剂的化学品。

用干燥的无绒布或软毛刷清洁探头的外部表面。如果污垢残留，用软布沾上75%异丙醇溶液，用去离子水冲洗。只使用足够的溶液来湿润布。不要在探头的任何部位使用研磨性化合物。

TABLE OF CONTENTS

Warranty

PinTech warrants that PT-227/PT-320/PT-325/PT-350 will be free for a period of THREE (3) years warranty from the date of shipment.Any repair except replacing components is free.

Please pay attention that,you must DO NOT unseal the product or do any change on it. Or we won't offer any warranty.Do contact PinTech or distributors if you need any repair.

1、General safety summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

To avoid fire or personal injury.

Connect and Disconnect Properly.Connect the probe output to the measurement instrument before connecting the probe to the circuit under test. Disconnect the probe input and the probe ground from the circuit under test before disconnecting the probe from the measurement instrument.

Observe all terminal ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not connect a current probe to any wire that carries voltages above the current probe voltage rating.

Do not operate without covers. Do not operate this product with covers or panels removed.

Do not operate with suspected failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Do not operate in wet/damp conditions.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry.

Terms in this manual

These terms may appear in this manual:

⚠ **WARNING.** Warning statements identify conditions or practices that could result in injury or loss of life.

⚠ **CAUTION**. Caution statements identify conditions or practices that could result in damage to this product or other property.

Symbols and terms on the product: These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

2.Specification

Model	PT-227	PT-320	PT-325	PT-350
Bandwidth	DC-2MHz	DC-20MHz	DC-25MHz	DC-50MHz
Max. current	70A	60A	100A	60A
DC Current	35A	30A	40A	30A
Max.RMS current	24A RMS	20A RMS	40A RMS	20A RMS
Min.current	20mA	20mA	20mA	20mA
Accuracy	1%（±5mV）	1%（±5mV）	1%（±5mV）	1%（±5mV）
Noise	≤6mA RMS	≤6mA RMS	≤6mA RMS	≤6mA RMS
Rise time	≤175ns	≤17.5 ns	≤14 ns	≤7 ns
Coupling	AC/DC	AC/DC	AC/DC	AC/DC
Length	1.48m	1.48m	1.48m	1.48m
Clamp dia.	5mm	5mm	5mm	5mm
Conversion ratio	0.1V/A	0.1V/A	0.1V/A	0.1V/A

3.Connecting the probe to oscilloscope

Method 1:Connect the oscilloscope directly.(pic 1)

Method 2:Connect the probe's BNC connector with PL-36, BP-250,connect the BP-250 BNC cable with oscilloscope.(pic 2)

Pic 1

Pic 2

Disconnecting the Probe

Remove the probe away from the oscilloscope accordingly.

To disconnect the adapter:

1. Press down the latch button.

2. Pull the adapter away from the probe by pulling the aviation connector.

4.Probe Head Controls

Slider and Conductor Jaw

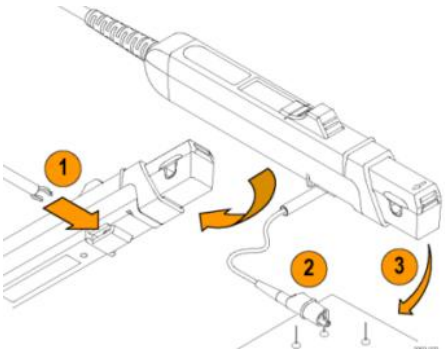
1.When the slider is in the locked position,you can take measurements.

2.Move the slider to the unlocked position to insert and remove conductors from the jaw.

3.The jaw can accept a 5 mm (0.2 in) diameter maximum conductor size.

WARNING. To prevent probe from damage, do not force conductors larger than 5 mm (0.2 in) diameter into the jaw. And do not adjust the probe by yourself with the hole on the probe,the hole is for manufacturer use only.

Grounding the Probe



Use the ground lead to improve EMI rejection at high frequencies only.

1.Fasten the small clip to the ground stub on the probe body.

2. Clip the alligator clip to your circuit.

3. Attach the probe to your circuit.

4.Make sure oscilloscope is grounded,and no any voltage signal between channels and the probe's ground,or it will damage the probe.

5. Function Testing

The following information is provided to help you use the current probe properly.

Auto Zero DC Offset： Power the probe,press this button with red LED lighting then remove your hand immediately.

(Use this function before testing DC, and no need for teSting AC.)

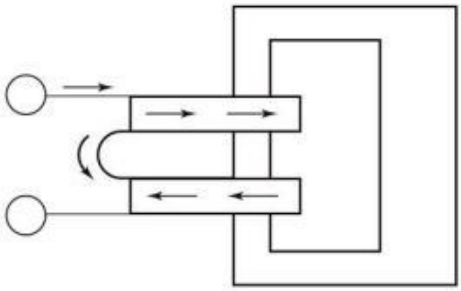
Functional Check:

1. Connect the probe to any channel of the oscilloscope.
2. Set the oscilloscope to display the probe channel.
3. Clamp the probe to your circuit.
4. Adjust the oscilloscope or use the Autoset function to display a stable waveform.When you see a stable waveform, your probe is functioning correctly.

6.Basic Operation

1. Before connecting the probe to the lead(circuit), check the display of the oscilloscope.

(Degauss and zeros the probe if an overl oad occurs, a no-load DC offset is found, or the probe is exposed to a strong mag netic field.)



2. Close and lock the probe jaw over the conductor.For correct polarity reading, connect the probe so that the current flow, from positive to negative, is aligned with the arrow on the probe jaw.

3.Readout the measurement on the oscilloscope. inductor leads.

Degaussing：1.To degauss the probe, first verify that the probe jaw is fully closed.

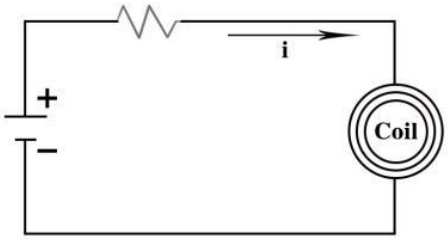
2.Press this button then power it. Remove your hand after the green LED is off,then press the button again quickly in 1 second.

3.Push the clamp to the end by locking and opening it for 3 times.(the red LED will lighting each time.)

4.After that, remove your hand again.
5.Press the button for about 10 seconds with green LED lighting.
6.Turn off the power.

7.Measuring Inductor Turns Count

To obtain an approximate turns count of an inductor, do the following:



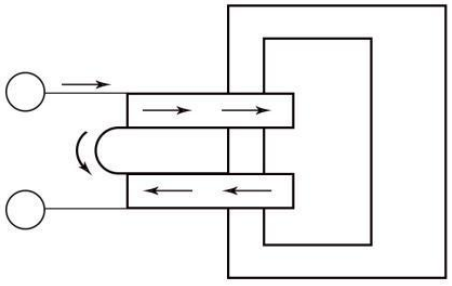
1. Connect the inductor to a current limited source, as shown.
2. Measure the input current on one of the inductor leads.
3. Clamp the current probe around the inductor and note the current value.

The number of turns is equal to the ratio of coil current to input current.

The accuracy of this method is limited by the current measurement accuracy.

For a more precise turns count, you need a coil with a known number of turns to use as a reference. Do the following:

1. Repeat steps 1 and 2 above and make the following changes:
2. Insert the reference coil into the current probe.
3. Insert the test coil into the current probe so that the currents oppose each other as shown. You must observe the polarity of coil current to determine whether the test coil has less or more turns than the reference coil. The turns are calculated by using the formula:

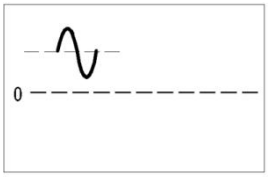


$$N_2 = N_1 \times (I_m \div I_1)$$

where:
N2 is the number of turns in the test coil,
N1 is the number of turns in the reference coil,Im is the measured coil current, and I1 is the input current.

Warning:To reduce the risk of electric shock or fire, do not exceed the ratings of the ADP-250N adapter.

8.Measuring Current

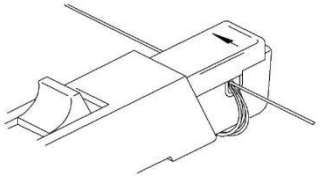


To make the measurements accurate, do the DC zero setting.

WARNING. Do not force the slide closed. Or it may damage to the probe. If you cannot close the slide around the conductor(s),either reduce the number of conductors you are measuring, or, if possible, take your measurement on a smaller conductor.

1. Be certain the polarities (+ and –) oppose each other.
2. Clamp the tested conductor(electric cable). Be careful not to pinch a conductor in the probe jaws.
3. Measure the current.Conventional current flows from positive to negative. A waveform above the baseline indicates that the conductor with the conventional current flow in the direction of the probe arrow is carrying the greater current.
4. To adjust for a current null, adjust the current in one of the conductors until the displayed measurement is zero.

9.Increasing Sensitivity



If you are measuring very small DC or low-frequency AC signals of very small amplitudes, you can increase measurement sensitivity of your current probe by doing the following:

1. Wind several turns of the conductor under test around the probe as shown. The signal is multiplied by the number of turns around the probe.
2. To obtain the actual current value, divide the displayed amplitude by the number of turns.

For example, if a conductor is wrapped around the probe three times and the oscilloscope shows a reading of 60 mA DC, the actual current flow is 60mA divided by 3, or 20mA DC.

NOTE. Winding more turns around the probe increases the

insertion impedance and reduces the upper bandwidth limit of the probe.

10.Maximum Current Limits

Current probes have three maximum current ratings: pulsed, continuous, and Ampere-second product. Exceeding any of these ratings can saturate the probe core, which magnetizes the core and causes measurement errors. Refer to the specifications for the maximum current ratings of the probe.

Maximum Pulsed Current (ImaxP) is the maximum peak value of pulsed current the probe can accurately measure, regardless of how short (within bandwidth limitations)the pulse duration is.

Maximum Continuous Current (ImaxC) is the maximum current that can be continuously measured at DC or at a specified AC frequency. The maximum continuous current value is derated with frequency; as the frequency increases, the maximum continuous current rating decreases.

Ampere-Second Product is the maximum width of pulsed current that you can measure when the pulse amplitude is between the maximum continuous and maximum pulsed current specifications. The maximum continuous specification varies by frequency.

To determine if your measurement exceeds the Ampere-second product, you must first determine the maximum allowable pulse width or maximum allowable pulse amplitude.

NOTE. Always degauss the probe after measuring a current that exceeds the maximum continuous current, maximum pulsed current, or Ampere-second product rating of the probe. Exceeding these ratings can magnetize the probe and cause measurement errors.

The probe has been calibrated at an indoor ambient temperature of 23℃±5℃.

The probe must have a warm-up time of at least 20 minutes and be in an environment that does not exceed the limit.

11.Cleaning

Protect the probe from adverse weather conditions. The probe is not waterproof.

CAUTION. To prevent damage to the probe, do not expose it to sprays, liquids, or solvents. Avoid getting moisture inside the probe during exterior cleaning.

Do not use chemical cleaning agents; they may damage the probe. Avoid using chemicals that contain benzine, benzene, toluene, xylene, acetone, or similar solvents.

Clean the exterior surfaces of the probe with a dry, lint-free cloth or a soft-bristle brush. Do not use abrasive compounds on any part of the probe.