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1

Useful information



This chapter contains basic information about measuring magnetic fields and about using the G81 gaussmeter.

[1.1 Measuring magnetic fields](#)

[1.2 About this instrument](#)

[1.3 About this operating manual](#)

1.1 Measuring magnetic fields

A Gaussmeter is a measuring instrument used to measure the strength or direction of magnetic fields. The unit of measure for magnetic field strength is the tesla. As this is a very large unit for most practical uses, scientists commonly use the nanotesla (nT) as their working unit of measure. Engineers often measure magnetic fields in Gauss (1 Gauss = 100,000 nT, 1 T = 10000 gauss).

1.2 About this instrument

G81 Gaussmeter adopts Bypass Zero Technology (patented technology) and high-stability GaN hall sensor, without zero calibration, which greatly improves the accuracy of the data and the convenience of use. G81 also has extremely low measurement noise that is unique in a handheld gaussmeter. The peak-to-peak noise within 60 seconds is less than 0.05G. It can easily measure the metal materials' remanence and even measure the earth's magnetic field (about 0.4G).

The DC accuracy of Gaussmeter G81 is better than 0.8%, the measurement range is up to 100kG (10T), and the frequency response range is DC-10kHz. Gaussmeter G81 uses Fourier analysis method to measure AC magnetic field (RMS value and spectrum analysis), which is very suitable for measuring AC magnetic field of various waveforms (sine wave, square wave, triangle wave, trapezoidal wave, sawtooth wave, etc.).

The Gaussmeter G81 uses a 3.2-inch color industrial resistive touch screen and a menu and display that conform to the smart phone habit. It is easy to operate, and users can use it without reading the manual. The Gaussmeter G81 is powerful, with maximum/minimum functions and magnetic field polarity display function, storage function, real-time spectrum analysis function and 0.2ms pulse magnetic field capture function.

More details in <http://www.coliy.com>


1.3 About this operating manual

Characters and symbols used

Various elements are used in this operating manual to indicate special meanings or particularly important passages in the text.


Symbols and terms used in warnings

According to the American National Standard ANSI Z535.6-2006, the following warnings, symbols, and terms are used in this document:

	The general danger symbol warns of risk of serious injury when used with the signal words CAUTION , WARNING , and DANGER . Follow all the instructions in order to avoid injuries or death.
NOTICE	Indicates a danger that results in damage to or destruction of the instrument.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Structure of warnings

All warnings are structured as follows:

 SIGNAL WORD
Type and source of danger Consequences of failure to observe warning ® Instructions for preventing danger

Symbols and marks used in this document

!	<p>Important instruction Indicates an instruction that must be followed to avoid danger.</p>
✓	<p>Requirement Indicates a requirement that must be met before the next instruction can be carried out, e.g. ✓ The instrument is switched off.</p>
	<p>Instruction Indicates a single instruction, e.g. ⇒ Switch the instrument on.</p>
	<p>Sequence of instructions Indicates a sequence of instructions that must be carried out in the order given.</p>
	<p>Result Indicates the result of carrying out an instruction, e.g. The instrument starts a self-test.</p>

2

Safety instructions



This chapter contains important instructions on how to use the G81 gaussmeter safely. Please therefore read this chapter carefully and follow the instructions closely.

[2.1 Using this operating manual](#)

[2.2 Proper use](#)

[2.3 Improper use](#)

[2.4 Dangers when handling rechargeable Batteries](#)

[2.5 Dangers from AC adapter/charger](#)

2.1 Using this operating manual

! Carefully read this entire operating manual before you start using the instrument.

! Keep this operating manual so that it is available to everyone who uses the instrument, and ensure that this operating manual is with the instrument if you pass it on to a third party.

2.2 Proper use

The G81 gaussmeter is designed to measure and evaluate magnetic fields.

! Only use the instrument for the purpose and under the conditions for which it has been designed.

! In particular, observe the technical data given in the **“Specification”**.

! Ensure that only qualified personnel with appropriate training can use the instrument.

2.3 Improper use

The G81 gaussmeter is not a warning device that gives active notice of the existence of dangerous fields by means of a visible or audible warning signal.

! Remember that this instrument is a measuring device, not a warning device.

2.4 Dangers when handling rechargeable Batteries

When handled improperly, rechargeable batteries can overheat, explode, or ignite.

⇒ Only use the G81 gaussmeter with its rechargeable batteries.

Do not use dry batteries.

2.5 Dangers from AC adapter/charger

You could experience electric shock from the AC adapter/charger.

⇒ Do not use the instrument when the casing is damaged because parts carrying dangerous voltages could be exposed.

⇒ Do not use an AC adapter/charger that has been moved from a cold to a warm room.

⇒ Only use the AC adapter/charger indoors and at temperature between 0 °C and +40 °C.

⇒ Only use the AC adapter/charger if the voltage specification on the AC adapter/charger matches the AC line voltage.

3

Preparing G81 gaussmeter for use

This chapter describes all you need to do before starting to use the G81 gaussmeter.

[3.1 Unpacking](#)

[3.2 Instrument overview](#)

[3.3 Power supply](#)

[3.4 Connecting the probe](#)

[3.5 Transverse and axial Probes](#)

[3.6 Accessories](#)

3.1 Unpacking

Packaging

The packaging is designed to be re-used as long as it has not been damaged.

Keep the original packaging and use it whenever the instrument needs to be shipped or transported.

Transport damage

<i>NOTICE</i>
<p>Instrument/accessories damaged during transportation using damaged instrument/accessories can lead to subsequent damage.</p> <p>⇒Check the instrument and all accessories for damage when you have unpacked them.</p> <p>⇒If the instrument is damaged, contact your Coliy Service Center.</p>

The addresses of your Coliy Service Center are listed at the end of this operating manual and on the Internet at

<http://www.Coliy.com>

Equipping the case

You can use the case provided to store a wide range of optional accessories in addition to the items supplied. The figures below show the compartments in the case lid and case base.

Note: The instrument is not ready for use until it has reached a temperature within the operating range of -10 to +50 °C.

3.2 Instrument overview



3.3 Power supply

The power supply is normally taken from the batteries provided. You can use the AC Adapter / Charger supplied as an alternative power source.

Operation from rechargeable batteries

The rechargeable batteries for this device are packaged separately. The charging cycle takes about 6 hours.

Charging the batteries

If the device is probably not going to be used for several weeks, it should be recharged before being stored to avoid the possibility of deep discharge of the batteries.

WARNING

Charging the batteries with wrong AC Adapter/Charger: Overheating, explosion, or ignition of chargeable batteries/batteries or their surroundings
⇒ You must use only the AC Adapter / Charger supplied to charge the batteries.

Note: A complete charge cycle takes about 6 hours (With the instrument switched off).

Starting the charge cycle

✓ The AC line voltage must match the operating voltage of the AC Adapter / Charger.

1. Connect the AC Adapter / Charger to the USB charging socket of the G81 gaussmeter.
2. Connect the AC Adapter / Charger to the AC line.

The charge cycle starts.

The **Charge** LED glows red during the entire charge cycle.

As soon as the batteries are fully charged, the AC Adapter / Charger switches to trickle charge mode and the **Charge** LED glow green.

Proper handling of rechargeable batteries

⇒ Observe the following precautions when handling rechargeable batteries:

- Always handle the batteries with care.
- Do not drop or damage the batteries or expose them to excessively high temperatures.

3.4 Connecting the probe

There are many different probes available for different applications for the G81 gaussmeter. You can find more information about the order numbers and specifications of the probes under “**Ordering information**”, as well as in the data sheets of the G81 gaussmeter and probes. These documents can also be downloaded from the Coliy web site on the Internet at <http://www.Coliy.com>.

NOTICE

**Wrong handling of the probe
Damage of the probe head**

Probe with “Push-Pull” connector

Connecting the probe

✓ The red mark on the probe plug is pointing towards the back of the instrument.

⇒ Push the probe plug straight down into the probe socket until it clicks into place.

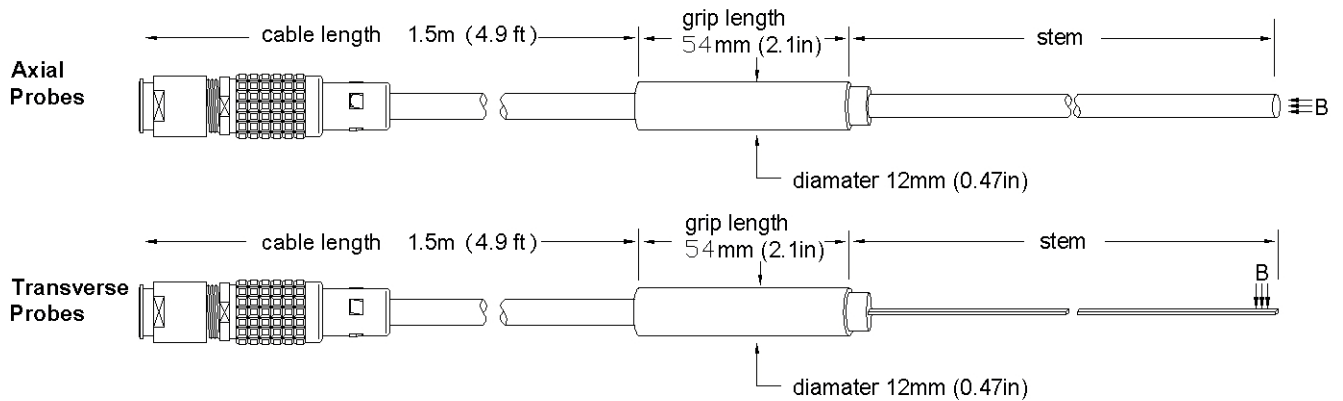
The G81 gaussmeter detects the probe model automatically. The probe model is displayed top left when you switch on the instrument.

Disconnecting the probe

⇒ Slide the sleeve on the probe plug upwards and pull the probe upwards to remove it.

3.5 Transverse and axial Probes

COLIY G81 gaussmeter probes are designed to meet the electrical and mechanical requirements of virtually any application. Models are available for transverse, axial, and very low field measurements. The probe style is dependent upon the measurement environment. The probe's length, outside diameter (axial probes) or thickness and width (transverse probes) are important if there are physical constraints where the probe will be used. In 'transverse' probes the Hall generator is mounted in a thin, flat stem whereas in 'axial' probes the Hall generator is mounted in a cylindrical stem. The primary difference is the axis of measurement, as shown by '+B' in following picture. Generally transverse probes are used to make measurements between two magnetic poles such as those in audio speakers, electric motors and imaging machines. Axial probes are often used to measure the magnetic field along the axis of a coil or solenoid. Either probe can be used where there are few physical space limitations, such as in geomagnetic or electromagnetic interference surveys.



All Probe Configurations

3.6 Accessories

The instrument (host with selected probes) is shipped with:

- Power adaptor (input: 100- 230VAC, output: 5VDC);
- Low impedance USB cable (for communication and power connection);
- U disk (manual and PC software).

Optional Components including:

- Dedicated analog output BNC conversion cable;
- Zero flux chamber, used for shielding the probe from unwanted fields during zeroing;
- A sturdy carrying case, provided for the zero flux chamber, probes, host, and this manual;
- Calibration data report;
- 3-Direction precision non-magnetic movement platform.

4

Measuring with G81 gaussmeter

This chapter describes how to make measurements using the G81 gaussmeter.

[4.1 Avoiding measurement errors](#)

[4.2 Switching on](#)

[4.3 Overview of the display](#)

[4.4 Operating of single probe](#)

[4.5 The Menu screen](#)

[4.6 Switching off](#)

[4.7 Analog output](#)

4.1 Avoiding measurement errors

The measurement result can be falsified by external influences when measuring magnetic fields. Considerable measurement deviations can occur under certain circumstances, particularly when measuring low field strengths. The following tips may be of assistance in recognizing sources of interference so as to avoid measurement errors. The following factors can affect the measurement result:

- Distance
- Changes in temperature
- Angle

Distance

To a great extent, the reading magnetic field strengths is determined by distance between the hall sensor and magnet.

Make a test standard. Make a fixture for the probe. Ensure the distance between probe and magnetic material.

Recommendation: **Changes in temperature** (see probes with temperature compensation)

The temperature coefficient of hall sensor is 0.03%/°C, thus stable vicinity temperature will contribute to the test accuracy.

Recommendation: The calibration temperature of the probe is 25°C. Following are some tips to gain an optimal accuracy in different vicinity temperature:

1. To calculate an accurate data according to the actual temperature and temperature coefficient.
2. Utilize another type of Gaussmeter and choose a probe that has a temperature a sensor integrated.

HALL sensor and magnetic angle

For axial probe, the maximum magnetic strength is only measured when the HALL sensor perpendiculars to the magnetic direction. For any other cases, if the angle between HALL sensor and magnetic field is θ , in consequence, the measured maximum data is $\sin\theta$.

Others

1. Failure to zero the error signals from the instrument, probe, a nearby source of magnetic interference.
2. Subjecting the probe to physical abuse.

Recommendation:

In order to measure the maximum magnetic strength, the HALL sensor should be approximately perpendicular to the magnetic field. The factor of magnetic direction is out of consideration when a 3-axis probe is utilized.

Further useful information can be found at www.Coliy.com

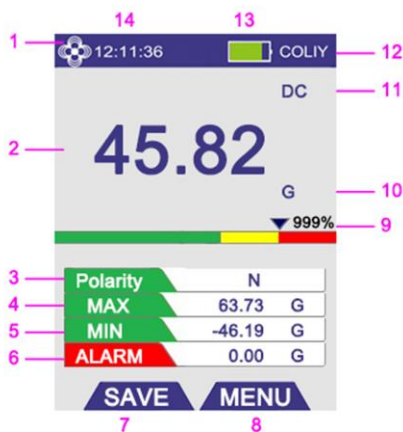
4.2 Switching on

You can switch the instrument on as soon as you have prepared it for use.

⇒ Press the ON/OFF button to switch the instrument on.

The instrument displays the instrument information and performs a self-test.

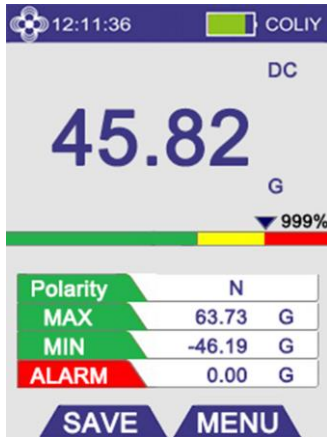
4.3 Overview of the display



The image below shows the items that can be displayed during a measurement.

1	Gaussmeter Logo
2	Measured Value
3	N/S Polarity
4	Max Value
5	Min Value
6	Alarm Threshold
7	Save Shortcut
8	Menu Shortcut
9	Ratio (= Measured Value / Alarm Threshold)
10	Magnetic Field Unit
11	DC Measurement Mode
12	Company Logo
13	Battery allowance
14	Current Time

4.4 Operating of single probe



Used to turn on/off the instrument



Used to switch screen brightness.



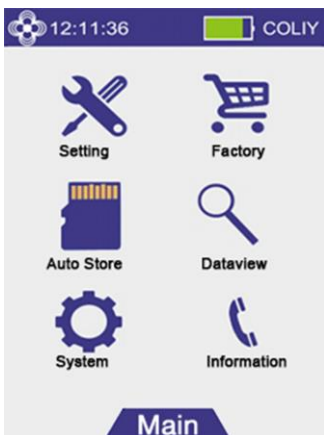
Gaussmeter logo



NOTICE

When pulling out the probe from the Gaussmeter, and inserting the probe again, 5 seconds interval is valid.

4.5 The Menu screen



You can directly activate a function or make a selection by touch icon in the measurement screen.


All other settings have to be made using the menus described below.

Setting Tab	
Unit	Magnetic field unit setting: G (Gauss) or T (Tesla)
Frequency	<p>Magnetic field frequency setting: select according to actual measurement occasion</p> <ul style="list-style-type: none"> – DC: to measure DC (static) magnetic field – AC(>=0.5Hz): to measure AC magnetic field – Pulse (>=0.2ms): to capture pulsed magnetic field with pulse width $\geq 0.2\text{ms}$ – Spectrum: Using Fourier analysis of 20Hz-10kHz AC magnetic field, the screen will display the 2 largest magnetic field peaks and frequency values.
Zero	<p>Zero calibration setting, usually not needed.</p> <p>Gaussmeter G81 uses COLIY's Bypass Zero Technology and high-stability GaN Hall sensor. It has excellent zero point stability and is ready to use, usually without zero adjustment.</p> <p>If the application requires this, the operation is as follows:</p> <ol style="list-style-type: none"> 1) After the Gauss meter G81 is connected to the probe and turned on, unscrew the probe protective cover and extend it into the zero calibration cavity (zero chamber); 2) Click [MENU], select Setting >> Zero >> YES, after 15~20 seconds, zero calibration is completed, and the value displays 0.00G. <p>[Note: Please place the probe in the zero calibration cavity before zero calibration.]</p>
Alarm Setting	<p>Alarm threshold setting, the operation is as follows:</p> <p>Enter the threshold in the Threshold box and click OK; enter the Alarm option, select the appropriate condition (greater than or less than the threshold, the default is OFF) to complete the Alarm threshold setting.</p>
Factory Tab	
Users are not recommended to use this tab.	
Auto Store Tab	
Condition	<p>Save conditions setting</p> <p>Can be saved according to the threshold and conditions set by the user (greater than or less than the threshold), the default is OFF</p>
Duration	The duration of the save operation, in hours (h)
Interval	Data saving interval, in seconds (s), less than 1 second is counted as 1 second
Recording	Record (continuous saving at the default sampling speed)

	The operation is as follows: select "ON", enter the file name (MEMO), click "OK" to start recording data, later you can view it in the menu [Dataview]
Erase Data	Erase all saved data on the gaussmeter host
Dataview Tab	
<p>Detailed record list, operators can use MEMO to memorize any specification of every measurement.</p> <p>Click any record list, operators can review all the information recorded as screen shots and add note to every item.</p>	
System Tab	
Language	Language settings, currently only in English
Time	Time setting: After entering the corresponding time, click "OK" to complete the time setting of the gaussmeter host
Date (M/D/Y)	Date setting (month/day/year): After entering the corresponding date, click "OK" to complete the date setting of the gaussmeter host
Brightness	Screen brightness setting, this function can also be set directly on the host button shortcut
Information Tab	
Calibration Date	Calibration information: used to inform the user of the next calibration time of the host and probe
Max_Min Reset	<p>Maximum/minimum reset settings</p> <p>Operation: Click the maximum value area of the measurement interface to reset the corresponding maximum value. You can reset the corresponding minimum value by clicking on the minimum value area of the measurement interface.</p>
COLIY Technology	Inform the user that after the instrument leaves the factory, there is no need to adjust zero, and it is ready to use
Product	Introduce the main parameter difference (measurement range, accuracy, frequency, etc.) of G8x series Gaussmeter

4.6 Switching off

To switch the instrument off

⇒ Press and hold down the **POWER**  button for about three seconds.
the instrument switches off.

4.7 Analog output

The G81 gaussmeter is capable of providing a real-time analog voltage signal proportional to the present flux density level. This signal, available at the DC/AC connector, can be connected to a voltmeter, oscilloscope, recorder, data logger, or external analog to digital converter. (Use a tie line to make DC interface into BNC interface.)

The full-scale voltage of analog output is $\pm 5V$. The scaling (proportion) for output is default 1T/V, and could be customized before placing an order, such as 2T/V, 0.1T/V, etc.

The actual magnetic field (B_1) is approximately equal to the difference between the current voltage (V_1) and the zero field voltage (V_0) multiplied by the scaling (S) for output. Therefore, for example: $B_1 = (V_1 - V_0) * S$.

Since the analog output signal is raw without calibration and medium and high frequency signals will be filtered in DC mode. So if user wants to get the DC magnetic field's analog output, DC mode or AC mode is OK, and just directly use the BNC cable to connect the host and voltmeter (or other instruments, such as oscilloscope); If user wants to get the high frequency AC (or pulse) magnetic field's analog output, please select AC mode firstly in the **Menu >> Setting >> Frequency >> AC (>=0.5Hz)**, and then use the BNC cable to connect the host and voltmeter (or oscilloscope, etc.).

5

PC software

This chapter gives you some basic information about the COLIY SMART PC software. It explains the possible applications of the software, how to connect the G81 gaussmeter to the PC.

[5.1 Using the PC software](#)

[5.2 Connecting the G81 gaussmeter](#)

[5.3 Working with the PC software](#)

[5.4 PC software interface](#)

5.1 Using the PC software

The software provides the following functions:

- DISPLAY
- SAVE DATA

Minimum system requirements

The following minimum system requirements must be met:

- Wind 7, Win 8, or Win 10
- Software can be downloaded from www.coliy.com or U disk.

5.2 Connecting the G81 gaussmeter

You can connect the G81 gaussmeter to the PC using USB cable. Use the 1.5m long USB cable supplied with the G81 gaussmeter for this purpose. Longer cables are available as accessories.

5.3 Working with the PC software

The following conditions must be fulfilled before you can work with the PC software:

- ✓ The PC is ready to use and the PC software has been installed successfully.
- ✓ The G81 gaussmeter is ready to use.
- ✓ G81 gaussmeter and PC are connected together by USB cable.

There are 2 software in U disk in the case, one for Microsoft .NET Framework Client Profile Installer and the other for SMART PC Software of Gaussmeter G81.

Software installation order:

1, To install the **Net_Client.exe**;

(Note: if user's computer has been equipped with the latest version of Microsoft .NET Framework Client Profile, then ignore this step)

2, Then to install the SMART PC Software **COLIY Gaussmeter.msi**.

Software Installation Notes of **Net_Client.exe**:

Follow the default path to install the software until finish.

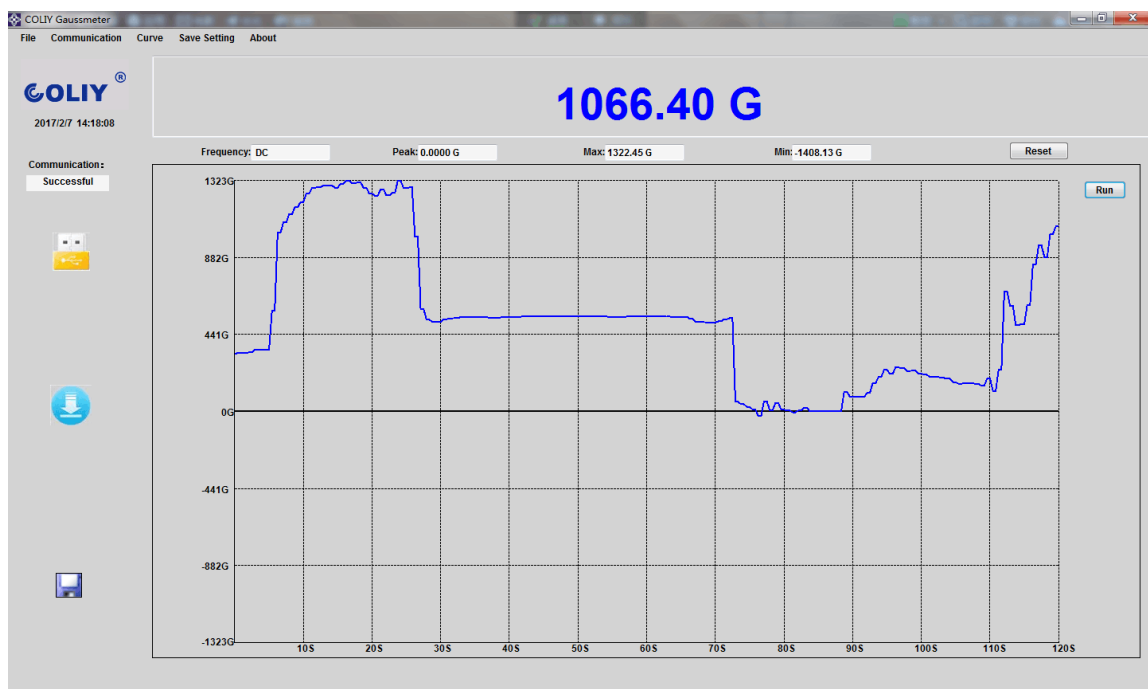
Software Installation Notes of **COLIY Gaussmeter.msi**:

1, The installation path should be located in the root directory, for example, C:\COLIY\Gaussmeter\;

Shouldn't be located in C:\Program Files (x86)\

2, Then follow the default path to install the software until finish.

5.4 PC software interface



6

Instrument maintenance

This chapter describes how to clean the instrument, replace the batteries, dispose the instrument and check the instrument for proper operation.

[6.1 Cleaning the instrument](#)

[6.2 Replacing / removing the batteries](#)

[6.3 Disposal](#)

6.1 Cleaning the instrument

Damage to the instrument from liquids

The instrument may be damaged or destroyed if liquids are allowed to get inside the casing.

⇒ Make sure that no liquid gets inside the instrument.

NOTICE

Solvents can corrode the surfaces of basic unit, probe and AC Adapter/ Charger.

⇒ You must not use solvents to clean the basic unit, probe, and AC Adapter / Charger.

Cleaning the instrument:

1. Use a soft cloth to clean the instrument. You can use lukewarm water to which a little detergent solution has been added as a cleansing agent.
2. To prevent streaks and spots, wipe off the instrument with a dry cloth while it is still damp.

6.2 Replacing/removing the batteries

The rechargeable batteries have a useful life of about 1000 charge cycles or 3 years (whichever occurs soonest).

Replace the batteries if the operating time is significantly reduced although the batteries are fully charged.

WARNING

Improper replacement of batteries

Overheating, explosion, or ignition of rechargeable batteries/batteries or their surroundings

⇒ Only use the G81 with rechargeable battery.

⇒ Do not use dry batteries.

⇒ you can buy lithium battery from Coliy.

Replacing the batteries

1. Switch off the instrument and disconnect it from all other devices (AC Adapter/ charger, optical cable).
2. Open the plastic case by screwdriver
3. Remove the old batteries and dispose of them according to the waste disposal ordinances applicable in your country.
4. Connect the new batteries.

Make sure you connect them the right way.

5. Close the plastic case by screwdriver
6. Connect the AC Adapter / Charger and charge the batteries (a complete charge cycle takes about 6 hours).

6.3 Disposal



Rechargeable batteries

Do not dispose of the batteries with the normal household waste. You should dispose of old batteries that are no longer required in accordance with the waste disposal ordinances in your country.

This product is subject to European Guideline 2002/96/EC governing the disposal of waste electrical and electronic equipment (WEEE).

Do not dispose of this instrument with the normal household waste. You should dispose of it in accordance with the waste disposal ordinances in your country.