5682 Preamplifier

User's Manual

10-001219-01EN — Rev. 4
September 2022

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed.

Keep this instruction manual in a safe, accessible location.

EVIDENT CANADA, 3415, Rue Pierre-Ardouin, Québec (QC) G1P 0B3 Canada

This document was prepared with particular attention to usage to ensure the accuracy of the information contained therein, and corresponds to the version of the product manufactured prior to the date appearing on the title page. There could, however, be some differences between the manual and the product if the product was modified thereafter.

The information contained in this document is subject to change without notice.

Part number: 10-001219-01EN
Rev. 4
September 2022

Printed in Canada

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List of Abbreviations

DC	direct current
EFUP	environment-friendly use period
GND	ground
LED	light-emitting diode
TOFD	time-of-flight diffraction

Important Information — Please Read Before Use

Intended Use

The 5682 preamplifier is designed to perform nondestructive inspections on industrial and commercial materials.

WARNING

Do not use the 5682 preamplifier for any purpose other than its intended use. It must never be used to inspect or examine human or animal body parts.

Instruction Manual

This instruction manual contains essential information on how to use this product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed. Keep this instruction manual in a safe, accessible location.

IMPORTANT

Some of the details of components illustrated in this manual may differ from the components installed on your device. However, the operating principles remain the same.

Device Compatibility

Only use this device with the approved ancillary equipment provided by Evident. Equipment provided by Evident and approved for use with this device is described later in this manual.

CAUTION

Always use equipment and accessories that meet Evident specifications. Using incompatible equipment could cause equipment malfunction and/or damage, or human injury.

Repair and Modification

This device does not contain any user-serviceable parts. Opening the device might void the warranty.

CAUTION

In order to prevent human injury and/or equipment damage, do not disassemble, modify, or attempt to repair the device.

Safety Symbols

The following safety symbols might appear on the device and in the instruction manual:

General warning symbol

This symbol is used to alert the user to potential hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm or material damage.

 High voltage warning symbol

This symbol is used to alert the user to potential electric shock hazards greater than 1000 volts. All safety messages that follow this symbol shall be obeyed to avoid possible harm.

Safety Signal Words

The following safety symbols might appear in the documentation of the device:

 **DANGER**

The DANGER signal word indicates an imminently hazardous situation. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, will result in death or serious personal injury. Do not proceed beyond a DANGER signal word until the indicated conditions are fully understood and met.

 **WARNING**

The WARNING signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in death or serious personal injury. Do not proceed beyond a WARNING signal word until the indicated conditions are fully understood and met.

 **CAUTION**

The CAUTION signal word indicates a potentially hazardous situation. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, may result in minor or moderate personal injury, material damage, particularly to the product, destruction of part or all of the product, or loss of data. Do not proceed beyond a CAUTION signal word until the indicated conditions are fully understood and met.

Note Signal Words

The following note signal words could appear in the documentation of the device:

IMPORTANT

The IMPORTANT signal word calls attention to a note that provides important information, or information essential to the completion of a task.

NOTE

The NOTE signal word calls attention to an operating procedure, practice, or the like, which requires special attention. A note also denotes related parenthetical information that is useful, but not imperative.

TIP

The TIP signal word calls attention to a type of note that helps you apply the techniques and procedures described in the manual to your specific needs, or provides hints on how to effectively use the capabilities of the product.

Safety

Before turning on the device, verify that the correct safety precautions have been taken (see the following warnings). In addition, note the external markings on the device, which are described under “Safety Symbols.”

Warnings

WARNING

General Warnings

- Carefully read the instructions contained in this instruction manual prior to turning on the device.
- Keep this instruction manual in a safe place for further reference.

- Follow the installation and operation procedures.
- It is imperative to respect the safety warnings on the device and in this instruction manual.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment could be impaired.
- Do not install substitute parts or perform any unauthorized modification to the device.
- Service instructions, when applicable, are for trained service personnel. To avoid the risk of electric shock, do not perform any work on the device unless qualified to do so. For any problem or question regarding this device, contact Evident or an authorized Evident representative.
- Do not touch the connectors directly by hand. Otherwise, a malfunction or electric shock may result.
- Do not allow metallic or foreign objects to enter the device through connectors or any other openings. Otherwise, a malfunction or electric shock may result.

WARNING

Electrical Warning

The device must only be connected to a power source corresponding to the type indicated on the rating label.

CAUTION

If a non-approved power supply cord not dedicated to Evident products is used, Evident will not be able to ensure the electrical safety of the equipment.

Battery Precautions

CAUTION

- Before disposing of a battery, check your local laws, rules, and regulations, and follow them accordingly.

- Transportation of lithium-ion batteries is regulated by the United Nations under the United Nations Recommendations on the Transport of Dangerous Goods. It is expected that governments, intergovernmental organizations, and other international organizations shall conform to the principles laid down in these regulations, thus contributing to worldwide harmonization in this field. These international organizations include the International Civil Aviation organization (ICAO), the International Air Transport Association (IATA), the International Maritime Organization (IMO), the US Department of Transportation (USDOT), Transport Canada (TC), and others. Please contact the transporter and confirm current regulations before transportation of lithium-ion batteries.
- For California (USA) only:

  The device may contain a CR battery. The CR battery contains perchlorate material, and special handling may be required. Refer to http://www.dtsc.ca.gov/hazardouswaste/perchlorate.
- Do not open, crush, or perforate batteries; doing so could cause injury.
- Do not incinerate batteries. Keep batteries away from fire and other sources of extreme heat. Exposing batteries to extreme heat (over 80 °C) could result in an explosion or personal injury.
- Do not drop, hit, or otherwise abuse a battery, as doing so could expose the cell contents, which are corrosive and explosive.
- Do not short-circuit the battery terminals. A short circuit could cause injury and severe damage to a battery making it unusable.
- Do not expose a battery to moisture or rain; doing so could cause an electric shock.
- Only use an external charger approved by Evident to charge the batteries.
- Only use batteries supplied by Evident.
- Do not store batteries that have less than 40 % remaining charge. Recharge batteries to between 40 % and 80 % capacity before storing them.
- During storage, keep the battery charge between 40 % and 80 %.
- Do not leave batteries in the 5682 preamplifier unit during device storage.

Regulations for Shipping Products with Lithium-Ion Batteries

IMPORTANT

When shipping a Li-ion battery or batteries, be sure to follow all local transportation regulations.

WARNING

Damaged batteries cannot be shipped through normal routes — DO NOT ship damaged batteries to Evident. Contact your local Evident representative or material disposal professionals.

Equipment Disposal

Before disposing of the 5682 preamplifier, check your local laws, rules, and regulations, and follow them accordingly.

BC (Battery Charger - California, USA Community)

The BC marking indicates that this product has been tested and complies with the Appliance Efficiency Regulations as stated in the California Code of Regulations Title 20, Sections 1601 through 1608 for Battery Charger Systems. The internal battery charger within this device has been tested and certified pursuant to the California Energy Commission's (CEC) requirements; this device is listed on the online CEC's (T20) database.

CE (European Community)

This device complies with the requirements of directive 2014/30/EU concerning electromagnetic compatibility, directive 2014/35/EU concerning low voltage, and directive 2015/863 which amends 2011/65/EU concerning restriction of hazardous substances (RoHS). The CE marking is a declaration that this product conforms to all the applicable directives of the European Community.

UKCA (United Kingdom)

This device complies with the requirements of the Electromagnetic Compatibility Regulations 2016, the Electrical Equipment (Safety) Regulations 2016, and the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012. The UKCA marking indicates compliance with the above regulations.

RCM (Australia)

The regulatory compliance mark (RCM) label indicates that the product complies with all applicable standards, and has been registered with the Australian Communications and Media Authority (ACMA) for placement on the Australian market.

WEEE Directive

In accordance with European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately. Refer to your local Evident distributor for return and/or collection systems available in your country.

China RoHS

China RoHS is the term used by industry generally to describe legislation implemented by the Ministry of Information Industry (MII) in the People's Republic of China for the control of pollution by electronic information products (EIP).

The China RoHS mark indicates the product's Environment-Friendly Use Period (EFUP). The EFUP is defined as the number of years for which listed controlled substances will not leak or chemically deteriorate while in the product. The EFUP for the 5682 preamplifier has been determined to be 15 years.

Note: The Environment-Friendly Use Period (EFUP) is not meant to be interpreted as the period assuring functionality and product performance.

电器电子产品有害物质限制使用标志

本标志是根据“电器电子产品有害物质限制使用管理办法”以及“电子电气产品有害物质限制使用标识要求”的规定，适用于在中国销售的电器电子产品上的电器电子产品有害物质使用限制标志。

（注意）电器电子产品有害物质限制使用标志内的数字为在正常的使用条件下有害物质等不泄漏的期限，不是保证产品功能性能的期间。

产品中有害物质的名称及含量

部件名称		有害物质					
		铅及其化合物 (Pb)	汞及其化合物 (Hg)	镉及其化合物 (Cd)	六价铬及其化合物 (Cr(Ⅵ))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
主体	机构部件	×	○	○	○	○	○
	光学部件	×	○	○	○	○	○
	电气部件	×	○	○	○	○	○

产品中有害物质的名称及含量

部件名称	有害物质					
	铅及其化合物 (Pb)	汞及其化合物 (Hg)	镉及其化合物 (Cd)	六价铬及其化合物 (Cr(Ⅵ))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
附件	×	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。

○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T26572 规定的限量要求以下。

×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T26572 规定的限量要求。

Korea Communications Commission (KCC)

Seller and user shall be noticed that this equipment is suitable for electromagnetic equipment for office work (class A) and it can be used outside the home. This device complies with the EMC requirements of Korea.

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다 .

EMC Directive Compliance

This equipment generates and uses radio-frequency energy and, if not installed and used properly (that is, in strict accordance with the manufacturer's instructions), may cause interference. The 5682 preamplifier has been tested and found to comply with the limits for an industrial device in accordance with the specifications of the EMC directive.

FCC (USA) Compliance

NOTE

This product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the product is operated in a commercial environment. This product generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this product in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

IMPORTANT

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the product.

FCC Supplier's Declaration of Conformity

Hereby declares that the product,

Product name: 5682 preamplifier
Model: 5682 preamplifier-MR/5682 preamplifier-CW

Conforms to the following specifications:

FCC Part 15, Subpart B, Section 15.107 and Section 15.109.

Supplementary information:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

Responsible party name:

EVIDENT CANADA

Address:

3415, Rue Pierre-Ardouin Québec (QC) G1P 0B3 Canada

Phone number:

+1 781-419-3900

ICES-001 (Canada) Compliance

This Class A digital apparatus complies with Canadian ICES-001.

Cet appareil numérique de la classe A est conforme à la norme NMB-001 du Canada.

Warranty Information

Evident guarantees your Evident product to be free from defects in materials and workmanship for a specific period, and in accordance with conditions specified in the Terms and Conditions available at https://www.olympus-ims.com/en/terms/.

The Evident warranty only covers equipment that has been used in a proper manner, as described in this instruction manual, and that has not been subjected to excessive abuse, attempted unauthorized repair, or modification.

Inspect materials thoroughly on receipt for evidence of external or internal damage that might have occurred during shipment. Immediately notify the carrier making the delivery of any damage, because the carrier is normally liable for damage during shipment. Retain packing materials, waybills, and other shipping documentation needed in order to file a damage claim. After notifying the carrier, contact Evident for assistance with the damage claim and equipment replacement, if necessary.

This instruction manual explains the proper operation of your Evident product. The information contained herein is intended solely as a teaching aid, and shall not be used in any particular application without independent testing and/or verification by the operator or the supervisor. Such independent verification of procedures becomes increasingly important as the criticality of the application increases. For this reason, Evident makes no warranty, expressed or implied, that the techniques, examples, or procedures described herein are consistent with industry standards, nor that they meet the requirements of any particular application.

Evident reserves the right to modify any product without incurring the responsibility for modifying previously manufactured products.

Technical Support

Evident is firmly committed to providing the highest level of customer service and product support. If you experience any difficulties when using our product, or if it fails to operate as described in the documentation, first consult the user's manual, and then, if you are still in need of assistance, contact our After-Sales Service. To locate the nearest service center, visit the Service Centers page on the Evident Scientific Web site.

Introduction

This manual describes the routine tasks for operating the 5682 preamplifier, including peripheral device connection and battery maintenance.

Ultrasonic testing of certain materials may require the use of a 5682 preamplifier along with an instrument such as a flaw detector or pulser-receiver to amplify low amplitude signals to usable levels (improved receiver signal-to-noise ratios). The 5682 preamplifier is typically used in the following types of applications:

- Flaw detection
- Thickness gaging
- Sound velocity or attenuation measurements on thick sections of materials exhibiting high levels of attenuation or scattering. These materials include: nodular cast iron, bronze, austenitic steel, rubber, reinforced composites, and low density plastics.

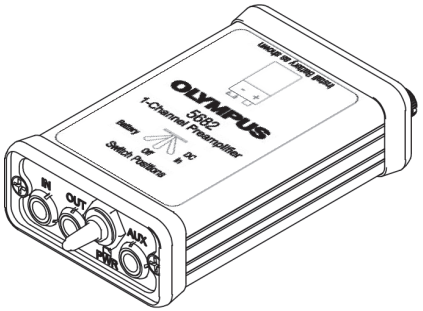

Figure i-1 The 5682 preamplifier

1. Equipment Overview

The 5682 preamplifier provides low-noise amplification of ultrasonic signals ranging from 525 kHz to 34 MHz. The 5682 preamplifier, housed in a splash-proof enclosure, is a small unit designed to increase the signal level of a receiving probe during conventional ultrasound or TOFD inspections. It is particularly suited for remote applications involving long cables and/or inspection of thick materials.

The preamplifier can be powered by either a single 9 V battery for up to 50 hours of continuous operation or a local 9–13 volt DC supply from an appropriate Evident instrument connected to the AUX connector with a dedicated cable. When battery operated, a multicolored LED provides feedback on the battery charge status (see Figure 1-1 on page 24).

CAUTION

To avoid equipment damage and the risk of injuries, only connect the 5682 preamplifier's AUX connector to a DC supply from an appropriate Evident instrument with dedicated cable. For details about compatible instruments and cables, contact Evident.

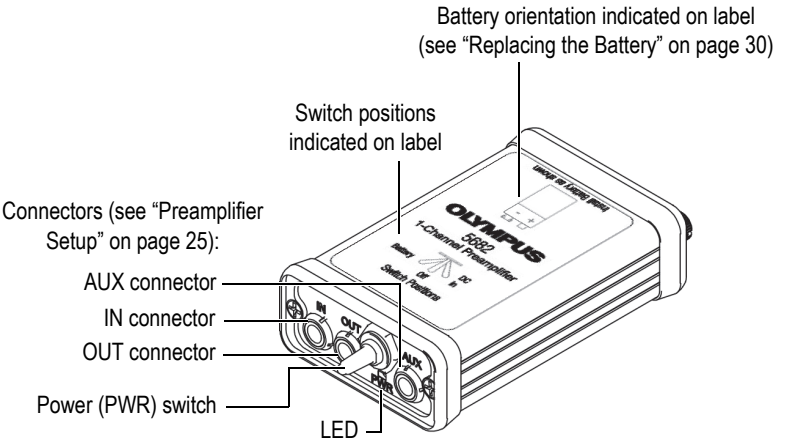

Figure 1-1 The 5682 preamplifier’s front panel and top

The power switch on the front panel of the 5682 preamplifier has the following three positions:

- Battery
- Off
- DC In (AUX connector)

When the switch is in the Battery or DC In position, the “power” LED is turned on.

Turn the power switch to the Off position when you are not using the preamplifier.

2. Preamplifier Setup

The 5682 preamplifier is used to amplify low-level ultrasonic signals of a probe that is connected to an ultrasonic test instrument such as an ultrasonic flaw detector or thickness gage. The preamplifier provides a 26 dB gain to a receiving conventional ultrasonic probe signal.

There are two ways of connecting the 5682 preamplifier to a test system:

1. Pitch-catch system connection, using two probes
2. Pulse-echo system connection, using a single-element probe

IMPORTANT

When a preamplifier is added to an ultrasonic inspection setup, it is important to reduce the gain level of the ultrasonic instrument to avoid signal saturation and excessive noise.

2.1 Connecting the Preamplifier for a Pitch-Catch Application

In a pulser-receiver (pitch-catch) system connection, the preamplifier is placed between the receiving probe and the receiving channel of the ultrasonic instrument. The pulser probe is connected directly to the instrument's pulser channel.

To connect the preamplifier for a pitch-catch application

- Complete the connections between the preamplifier, instrument, and probes as illustrated in Figure 2-1 on page 26.

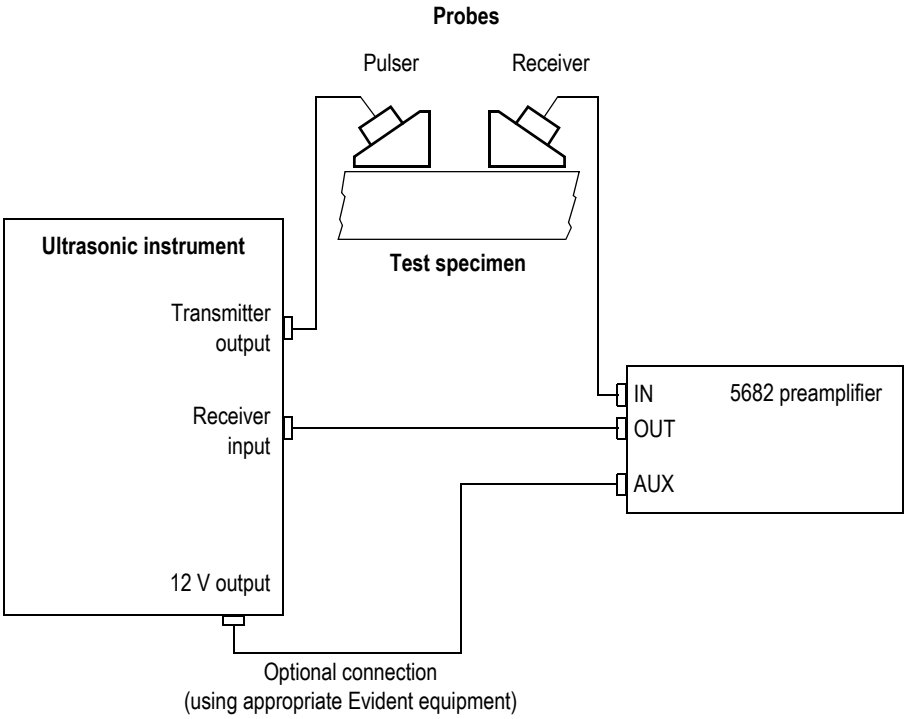

Figure 2-1 The preamplifier connections for a pulser-receiver system

2.2 Connecting the Preamplifier for a Pulse-Echo Application

When the 5682 preamplifier is used with a single-element probe in a pulse-echo system, the probe cable should be connected using a "T" connector. One branch of the T is connected to the transmitter probe connector of the ultrasonic instrument. The other branch of the T goes to the preamplifier input. The preamplifier output should be connected to the receiver probe connector of the ultrasonic instrument. If the ultrasonic instrument has a mode selection switch (single element/dual element or pulse-echo/thru-transmission), it should be set to the dual element or thru-transmission position, even though a single-element probe is being used.

To connect the preamplifier for a pulse-echo application

- Complete the connections between the preamplifier, instrument, and probe as illustrated in Figure 2-2 on page 27.

  If there is a mode selection switch on the instrument, make sure that it is set to the dual-element or thru-transmission position.

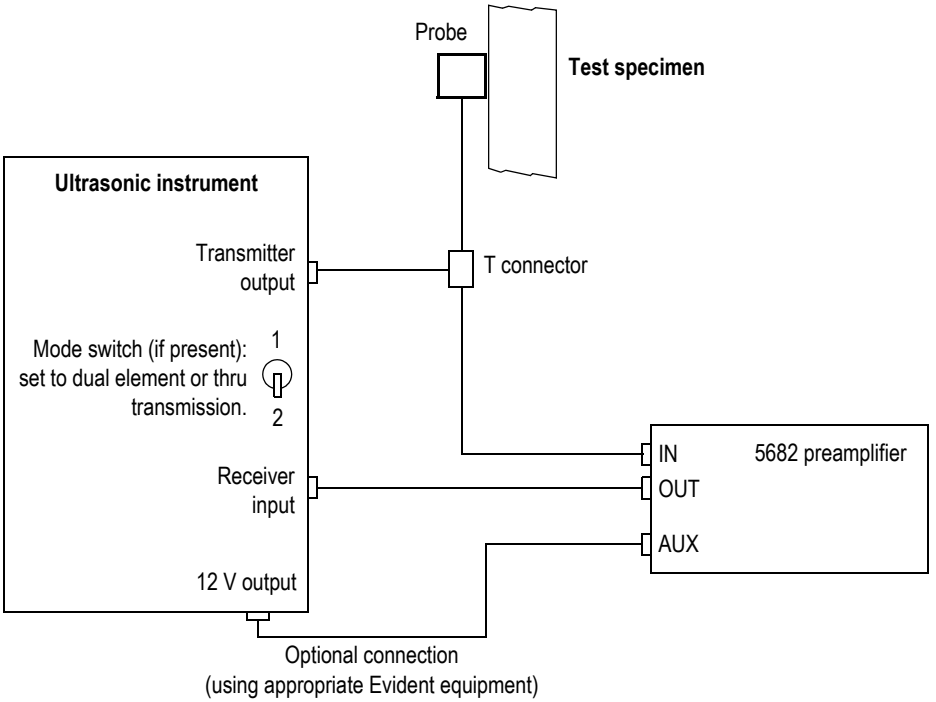

Figure 2-2 The preamplifier connections for a pulse-echo system

3. Maintenance

The maintenance requirements of the 5682 preamplifier are minimal:

- The unit can be cleaned using a soft cloth, mild soap, and water.
- If necessary, the rubber switch cover can be changed.
- After about 50 hours of battery operation, the battery needs to be changed.

CAUTION

To avoid the risk of electric shock and equipment damage, disconnect all cables on the 5682 preamplifier before performing any maintenance.

3.1 Changing the Waterproof Rubber Switch Cover

If necessary, the rubber cover on the switch can be replaced (see Figure 3-1 on page 30).

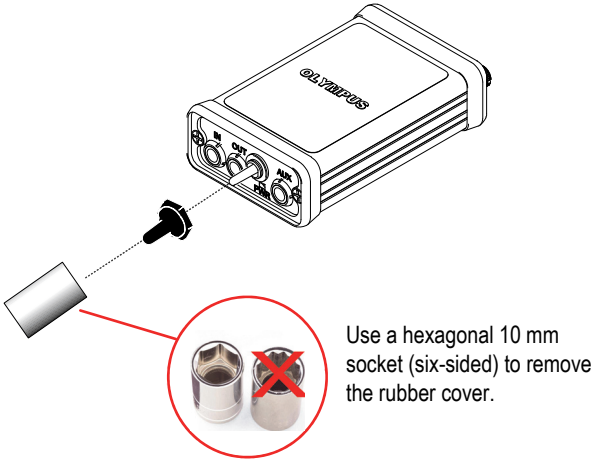

Figure 3-1 Replacing the switch's rubber cover

To change the waterproof rubber switch cover

1. Push a 10 mm socket against the hexagonal portion of the switch's rubber cover at its base.
2. Carefully unscrew the rubber cover off the threaded metal, and replace it with a new rubber cover.

CAUTION

To avoid damaging the rubber cover and losing watertightness, carefully handle the rubber and do not push hard, force, or over-tighten the socket on the rubber. The rubber can easily be damaged.

---

3. Fit the socket onto the new rubber cover and carefully screw it onto the switch.

3.2 Replacing the Battery

The 5682 preamplifier requires a standard 9 V battery and will run for approximately 50 hours continuously before battery replacement is needed. Either standard or rechargeable batteries may be used, but rechargeable batteries cannot be charged via

the DC input on the 5682 preamplifier; rechargeable batteries will need to be removed, charged with an external charger, and reinstalled. Below are detailed instructions on battery removal and installation.

NOTE

Make sure that the power toggle switch on the front panel is in the Off position when removing and replacing the battery. The battery indicator LED may not function properly after battery replacement if the switch is in the Battery or DC In position during the installation.

To replace the battery

1. Loosen the thumb screws on the rear panel and remove the battery door (see Figure 3-2 on page 31).

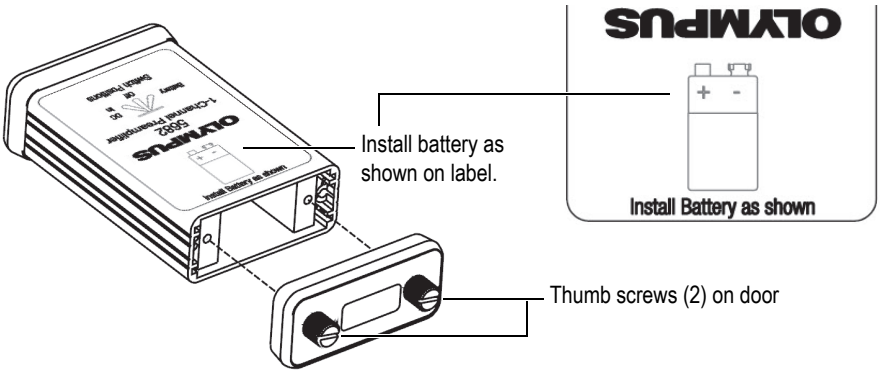

Figure 3-2 The battery door

2. Slide the existing battery out of the unit.
3. Slide the new battery into the 5682 preamplifier, ensuring the battery polarity is as shown on the label on the top panel—the positive battery terminal should be on your left when facing the rear of the unit.
4. Reinstall the rear cover and retighten thumb screws.

4. Specifications

Table 1 5682 preamplifier specifications

Parameter	Value
Voltage gain	26 dB at 10 MHz
Bandwidth (–3 dB)	525 kHz to 37.13 MHz
High-pass rollover	0.525 MHz ± 0.035 MHz
Low-pass rollover	37.13 MHz ±5.57 MHz
Equivalent input noise	Maximum 3.32 nV / $\sqrt{\text{Hz}}$
Input impedance	1.15 kΩ at 1 MHz
Output impedance	49.5 Ω at 300 kHz
Output voltage	Minimum 1.7 V p-p at 50 Ω
Protection	500 V peak
Current consumption	14.75 mA ±3.25 mA
Power	9 V alkaline battery or 9–13 V DC input (toggle switch)
Power monitor	Three-color LED for continuous power level indications: • Green to yellow: 9.0 V to 7.3 V • Yellow to red: 7.5 V to 6.5 V • Red to no light: 6.5 V to 5.0 V • No light < 5.0 V (low charge; replace battery)
Battery life	50 hours of continuous operation
Connectors	LEMO 00 type

Table 1 5682 preamplifier specifications *(continued)*

Parameter	Value
Dimensions	57.15 mm × 109.22 mm × 27.94 mm (2.25 in. × 4.3 in. × 1.1 in.)
Weight	181 g (6.4 oz.) with battery; 136 g (4.8 oz.) without battery
Operating temperature	0 °C to 50 °C (32 °F to 122 °F)
Environmental resistance	IP54

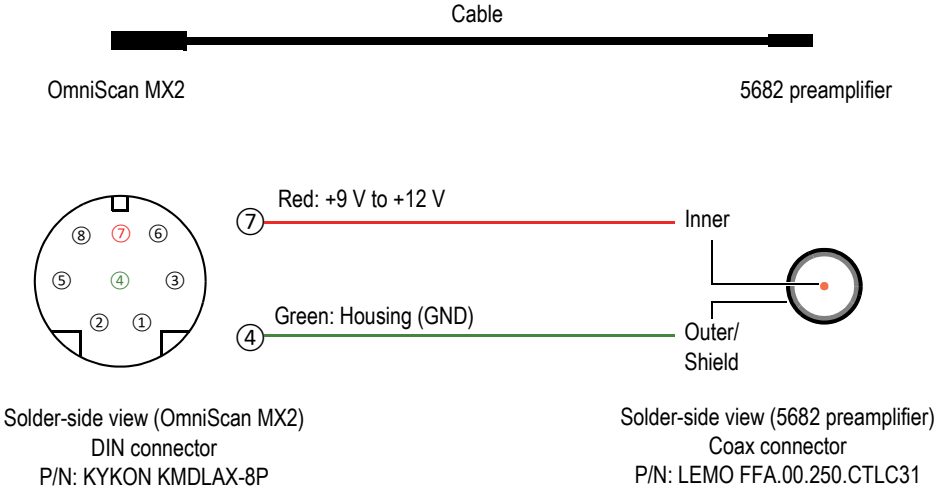

Figure 4-1 AUX connector pinout diagram

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