



EPOCH 6LT

Ultrasonic Flaw Detector

User's Manual

DMTA-10083-01EN — Rev. 6
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 SCIENTIFIC INC., 48 Woerd Avenue, Waltham, MA 02453, USA

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List of Abbreviations

| | |
|--------|--|
| EFUP | environment-friendly use period |
| IP | International Protection (or ingress protection) |
| Li-ion | lithium-ion |
| UI | user interface |

Important Information — Please Read Before Use

Intended Use

The EPOCH 6LT is designed to perform nondestructive inspections on industrial and commercial materials.



WARNING

Do not use the EPOCH 6LT 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 EPOCH 6LT 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 EPOCH 6LT, 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 EPOCH 6LT 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.



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。

电器电子产品有
害物质限制使用
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.

The MSIP code for the device is the following: MSIP-REM-OYN-EP6LT.

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 EPOCH 6LT 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: EPOCH 6LT

Model: EPOCH 6LT-MR/EPOCH 6LT-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 SCIENTIFIC INC.

Address:

48 Woerd Avenue, Waltham, MA 02453, USA

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

The EPOCH 6LT is a portable ultrasonic nondestructive testing (NDT) instrument designed primarily for inspections requiring high portability, such as rope access, and detection of flaw conditions in welds, pipes, turbine blades, and other structural and industrial materials. The instrument can be used both indoors and outdoors.

The EPOCH 6LT offers advanced conventional ultrasonic performance featuring a large dynamic range and superior measurement resolution. The full color liquid-crystal display provides a resolution of 640×480 pixels with transfective technology for superior visibility. The software user interface (UI) provides an intuitive way to access the full functionality of the instrument.

Before you operate the EPOCH 6LT, Evident recommends that you have a thorough understanding of the principles and limitations of ultrasonic nondestructive testing and that you seek adequate training. Evident assumes no responsibility for incorrect operational procedure or misinterpretation of test results.

Although the EPOCH 6LT continuously self-calibrates, you must be aware of the regulatory requirements. Evident offers calibration and documentation services. Contact Evident or your local representative with any special requests.

1. Package Content

A complete EPOCH 6LT package consists of a handheld ultrasonic flaw detector and several key accessories.

1.1 Unpacking the Instrument

The EPOCH 6LT ultrasonic flaw detector and accessories are shipped in an industrial transport case.

To unpack the instrument

1. Open the transport case, then locate the shipping papers, documentation, and USB drive, and then remove them from the case.
2. Remove the EPOCH 6LT and all of the accessories.
3. Inspect the EPOCH 6LT and all accessories for damage, and report any problems to Evident immediately.

1.2 Case Contents

The EPOCH 6LT comes standard with several key accessories:

- AC charger/adaptor with power cord (varies by outlet configuration)
- *EPOCH 6LT Ultrasonic Flaw Detector Getting Started Guide*
- USB drive containing the *EPOCH 6LT Ultrasonic Flaw Detector User's Manual*
- USB cable
- Wrist strap

For a complete parts list, see “EPOCH 6LT basic kit” on page 55.

1.3 EPOCH 6LT Flaw Detector Components

The following table lists the EPOCH 6LT ultrasonic flaw detector components (see Table 1 on page 26).

Table 1 EPOCH 6LT ultrasonic flaw detector components

| Component key | | EPOCH 6LT – All models |
|---------------------------|-------------------------------|------------------------|
| EPOCH 6LT (front) | | |
| 1 | Adjustment knob | |
| 2 | User interface display | |
| 3 | Tab button | |
| 4 | Enter button | |
| 5 | Escape button | |
| 6 | Shift (2nd function) button | |
| 7 | Power indicator | |
| 8 | Power button | |
| EPOCH 6LT (top) | | |
| 9 | Data Port access cover | |
| 10 | Transducer connectors | |
| 11 | AC adaptor connector (12 VDC) | |
| EPOCH 6LT (bottom) | | |
| 12 | Battery compartment cover | |
| 13 | Accessory mount | |

1.4 Standard Accessories

The EPOCH 6LT comes with the following standard accessories:

- Lithium-ion (Li-ion) battery
- AC power adaptor
- USB data cable
- USB drive containing the user documentation.

1.4.1 Battery

The EPOCH 6LT comes standard with one removable lithium-ion (Li-ion) battery (see Figure 1-1 on page 27).



Figure 1-1 EPOCH 6LT Li-ion battery

1.4.2 AC Charger/Adaptor

The AC charger/adaptor (see Figure 1-2 on page 28) can be used to power the EPOCH 6LT when an AC mains outlet is available. The AC charger/adaptor is for indoor use only. If a Li-ion battery is installed in the instrument, and the AC charger/adaptor is connected, the battery charges until full.



Figure 1-2 AC charger/adaptor

Region specific power cords are available for use with the AC charger/adaptor (see Figure 1-2 on page 28). Make sure that the power cord included with your EPOCH 6LT is appropriate for your region. See Table 2 on page 28 for more information.

Table 2 Region specific power cord options

| Region | Plug | U8 Number |
|--|----------|-----------|
| Australia | Type I | U8840005 |
| Brazil | Type J | U8769007 |
| China | Type I | U8769008 |
| Denmark | Type K | U8840011 |
| European | Type F | U8840003 |
| Italy | Type L | U8840009 |
| Japan | Type B | U8767383 |
| South Africa, Hong Kong, India, Pakistan | Type D/M | U8840013 |
| South Korea | Type F | U8769009 |

Table 2 Region specific power cord options (continued)

| Region | Plug | U8 Number |
|--------|--------|-----------|
| UK | Type G | U8840007 |
| USA | Type B | U8840015 |

1.4.3 USB Data Cable

The EPOCH 6LT flaw detector comes standard with one USB data cable. This cable provides you the ability to connect the EPOCH 6LT to a PC and transfer information into or out of the instrument (see Figure 1-3 on page 29). The USB data cable must have one L20 ferrite bead on each end of the cable to be CE compliant.



Figure 1-3 USB data cable

1.4.4 USB Drive

The EPOCH 6LT comes standard with a USB drive that is loaded with the *EPOCH 6LT Ultrasonic Flaw Detector User's Manual*. The USB drive can also be used to store test data.

1.5 Optional Accessories

The optional accessories for the EPOCH 6LT are the following:

- External charging base
- Display protectors (10 pack)
- Rope access accessory kit
- Chest harness
- Desktop stand

For a complete list of the optional accessories, see “EPOCH 6LT optional accessories” on page 55.

1.5.1 Charging Base

The external charging base charges a Li-ion battery that has been removed from the EPOCH 6LT. The charging base is useful if you usually operate the EPOCH 6LT without connecting the AC charger/adaptor. See Table 3 on page 30 for a list of the charging base’s components.

Table 3 EPOCH 6LT charging base


| Component key | | EPOCH 6LT – All models |
|-----------------------------|-----------------------------|--|
| Charging base (back) | |  |
| 1 | Input power socket (12 VDC) | |
| | | |

Table 3 EPOCH 6LT charging base (continued)

| Component key | | EPOCH 6LT – All models |
|----------------------------|---|------------------------|
| Charging base (top) | | |
| 2 | Charging base receptacle | |
| 3 | Battery charging indicator | |
| 4 | Battery conditioning button and discharge indicator | |

To operate the charging base

1. Plug the AC charger/adaptor into the charging base's input power socket.
2. Align the Li-ion battery contacts with the contacts at the bottom of the charging base receptacle.
3. Firmly insert the Li-ion battery into the charging base receptacle.

IMPORTANT

Do not force the Li-ion battery into the charging base receptacle. Make sure that the battery contacts and receptacle contacts are properly aligned.

4. Leave the Li-ion battery in the charging base until the charging indicator changes from flashing green to steady green.

1.5.2 Battery Conditioning

You can condition the Li-ion battery to restore it to peak efficiency. Battery conditioning completely discharges the battery, then recharges it.

To condition the battery

1. Firmly insert the battery into the charging base receptacle.
2. Press and hold the battery conditioning button for three seconds (see Table 3 on page 30).
After you release the button, the blue discharge indicator begins flashing.
3. Leave the battery in the charging base during the entire discharge/charge cycle:
 - a) The discharge indicator flashes blue until the battery is fully discharged.
 - b) The charging indicator flashes green until the battery is fully charged.
 - c) The charging indicator glows steady green when the discharge/charge cycle is complete.

2. Overview

The EPOCH 6LT ultrasonic flaw detector has a complement of connections intended to maximize the usability of the instrument.

2.1 External Connectors

The external connectors are located at the top of the instrument (see Figure 2-1 on page 33).

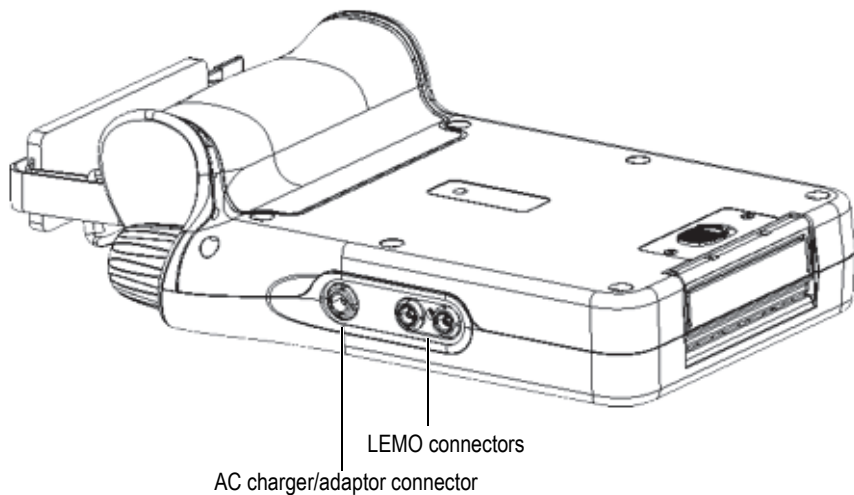


Figure 2-1 External connectors

2.1.1 AC Adaptor Connector

The AC charger/adaptor connects to the AC adaptor connector of the EPOCH 6LT to power the instrument and charge the battery.

2.1.2 LEMO Transducer Connectors

The EPOCH 6LT is supplied with sealed LEMO 00 transducer connectors. A center pin automatically identifies the connected transducer with certain Evident corrosion dual element transducers.

The transducer connectors are color coded red and blue. When used with dual element transducers and in through-transmission modes, the red LEMO 00 connector acts as the transmit connector and the blue LEMO 00 connector acts as the receive connector.

| |
|-------------|
| NOTE |
|-------------|

For single crystal pulse-echo inspections, you must connect the transducer to the red LEMO 00 (transmit) connector to send and receive a signal.

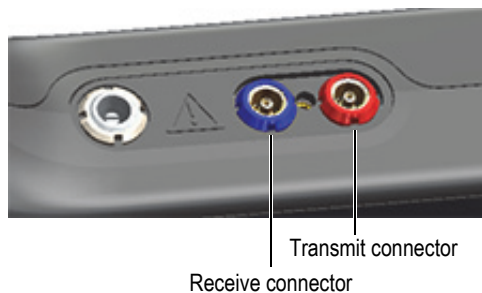


Figure 2-2 Color-coded LEMO connectors

2.2 Battery Compartment

The battery compartment cover is located at the bottom of the instrument (see Figure 2-3 on page 35).

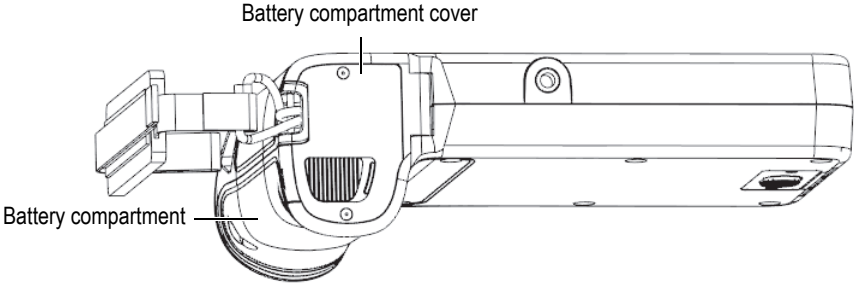


Figure 2-3 Battery compartment—cover closed

A sliding latch button opens the battery compartment cover and ensures the door is sealed when closed.

2.3 Data Port

The data port contains the EPOCH 6LT digital I/O connections and reset switch.

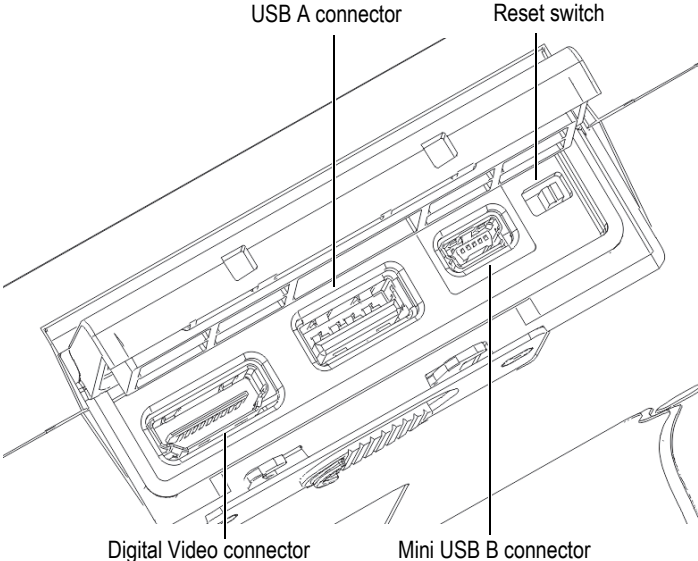


Figure 2-4 Data port connectors and reset switch

2.3.1 Digital Video Connector

The Digital Video connector is used to connect the EPOCH 6LT to an external digital display via a compatible cable (optional). The Digital Video cable must have one L20 ferrite bead on each end of the cable to be CE compliant.

2.3.2 USB A Connector

The USB A connector is used to connect the EPOCH 6LT to a USB storage device. The USB A connector must be used with the Evident USB drive or equivalent to be CE compliant.

2.3.3 Mini USB connector

The mini USB connector is used to connect the EPOCH 6LT, via the supplied USB cable, to a PC for data transfer.

2.3.4 Reset Switch

The Reset switch is used to reset the system software in the event of a catastrophic software failure.

2.3.5 Accessory Mount

The accessory mount is a standard $\frac{1}{4}$ in.-20 thread insert, which is located on the bottom of the instrument (see Figure 2-5 on page 36). Multiple mechanical accessories can be used with this mount, including the Evident rope access accessory kit.

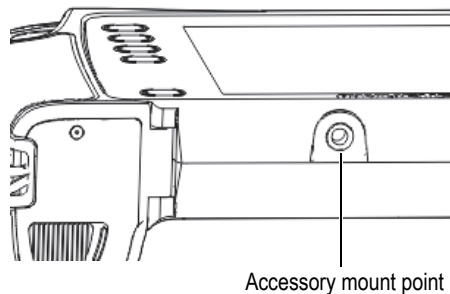


Figure 2-5 Accessory mount

2.3.6 Wrist Strap Mounts

The wrist strap mounts are located on the handle of the instrument (see Figure 2-6 on page 37). The EPOCH 6LT ships with the wrist strap mounted.

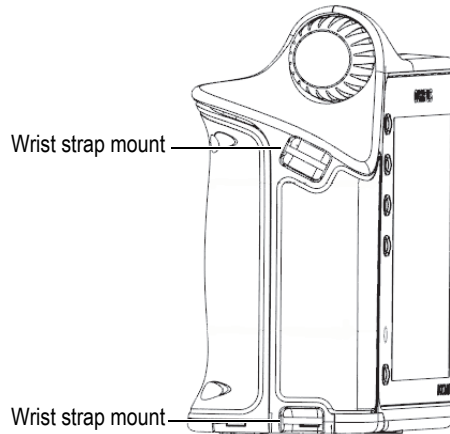


Figure 2-6 Wrist strap mounts


2.4 Keys, Knob, and Indicators

The keys and indicators are located on the front of the instrument. The adjustment knob is located on the left side of the instrument.




Figure 2-7 EPOCH 6LT front panel


2.4.1 Power Key

The Power key () is used to turn on or off the instrument.


2.4.2 Power Indicator

The power indicator () glows when power is applied to the instrument.


2.4.3 Shift Key

The Shift key () is used to activate the second function, changing the way the ESC, Enter, and Tab keys function.


2.4.4 Escape Key

The ESC key () is used to move the focus to the previous data field in the user interface (UI). The ESC > Shift key sequence changes the display mode of the UI.

2.4.5 Enter Key

The Enter key () is used to accept a highlighted parameter (selected with the adjustment knob). The Shift > Enter key sequence switches between coarse and fine adjustment of the highlighted parameter with the adjustment knob.

2.4.6 Tab Key

The Tab key () moves the focus to the next data field in the UI. The Shift > Tab key sequence enables you to navigate to the default Home screen in the UI.

2.4.7 Adjustment Knob

The adjustment knob increases or decreases the value of the highlighted adjustable parameter (see Figure 2-8 on page 39). The adjustment knob also allows scrolling/navigating through icons in the UI.

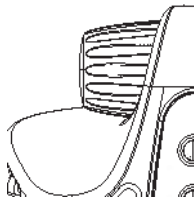


Figure 2-8 Adjustment knob

3. Operation

This chapter provides instructions for basic operational tasks. For information on the instrument software, refer to the user interface guide.

3.1 Turning On the Instrument

The EPOCH 6LT must have a battery inserted or be connected to AC power.

To turn on the instrument

- ◆ Press the Power key () to turn on the instrument.
The software user interface (UI) initializes and displays.

3.2 Turning Off the Instrument

To turn off the instrument

- ◆ Press the Power key () to turn off the instrument.

3.3 Connecting the AC Charger/Adaptor

Connect the AC charger/adaptor directly to the EPOCH 6LT to power the instrument. When a Li-ion battery is installed in the instrument, and the AC charger/adaptor is connected, the battery charges until full. For information on charging the battery in the external charging base, see “Charging Base” on page 30. Note that the AC charger/adaptor is intended for indoor use only.

To connect the AC charger/adaptor

1. Plug the DC power plug into the AC charger/adaptor connector on the instrument (see Figure 3-1 on page 42).

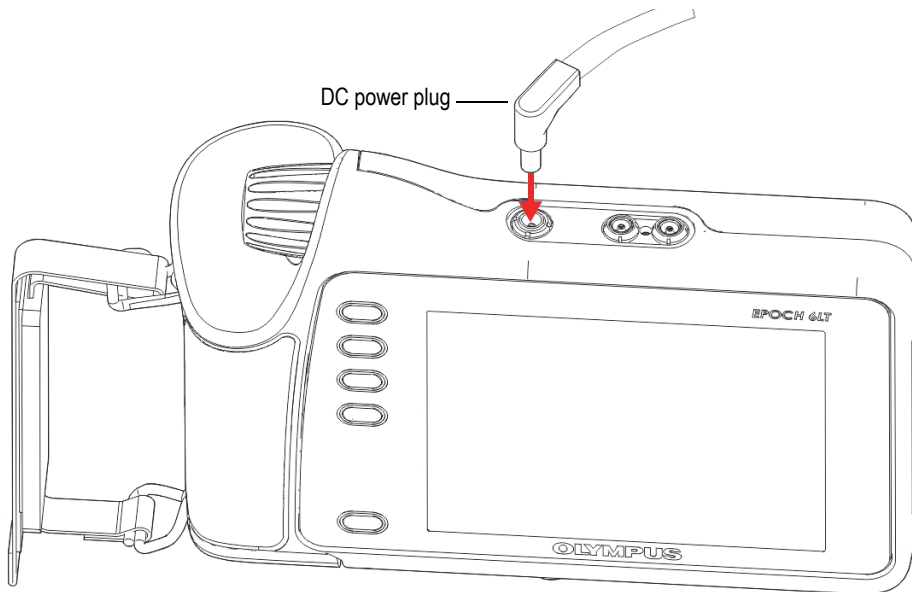


Figure 3-1 Connecting the DC power plug

2. Insert the other end of the AC power cord into the AC connector on the AC charger/adaptor (see Figure 3-2 on page 43).

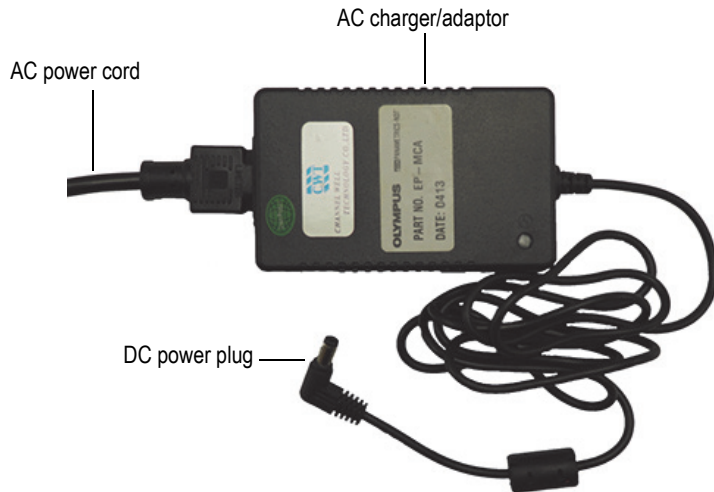


Figure 3-2 AC charger/adaptor

3. Insert the AC power cord plug into a suitable AC mains outlet.

3.4 Opening the Data Port Cover

The data port contains the EPOCH 6LT I/O connections.

To open the data port cover

1. Press the cover release button and slide it towards the bottom of the instrument to unlock the data port cover (see Figure 3-3 on page 44).

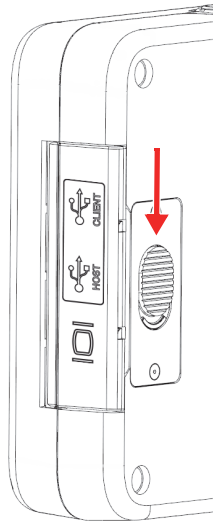


Figure 3-3 Data Port cover release button

2. Swing up the cover to its fully open position (see Figure 3-4 on page 44).

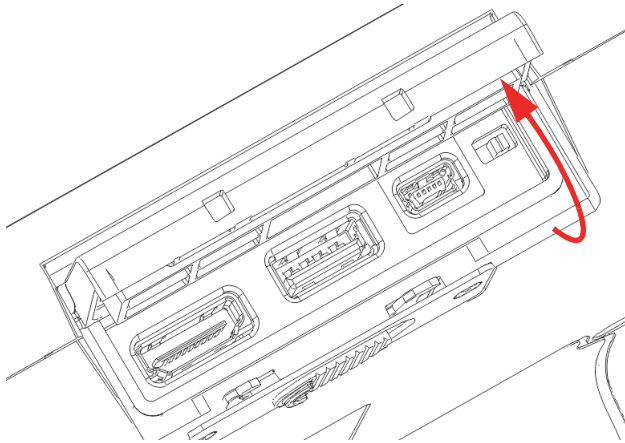


Figure 3-4 Data port—cover open

4. Maintenance and Troubleshooting

This chapter details the maintenance tasks to be performed on the EPOCH 6LT ultrasonic flaw detector and provides a troubleshooting guide.

4.1 Battery Replacement

Perform the following procedure to replace the battery.

To remove the battery

1. Hold the EPOCH 6LT so the battery compartment cover is facing up as shown in Figure 4-1 on page 45.
2. Press the battery compartment cover release button and slide it to the right.

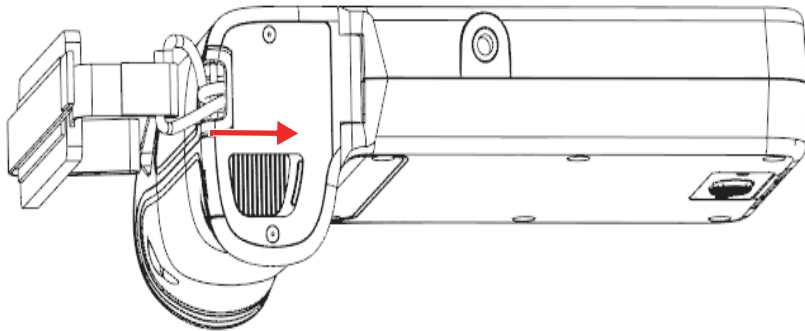


Figure 4-1 Battery compartment cover release button

3. Lift the cover to the fully open position (see Figure 4-2 on page 46).

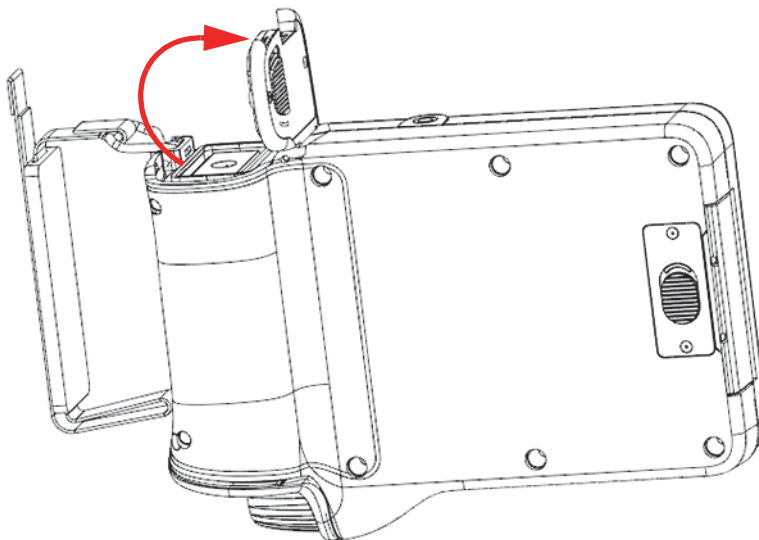


Figure 4-2 Battery compartment—cover open

4. Grasp the tab on the battery and pull it up to release and remove the battery (see Figure 4-3 on page 47).

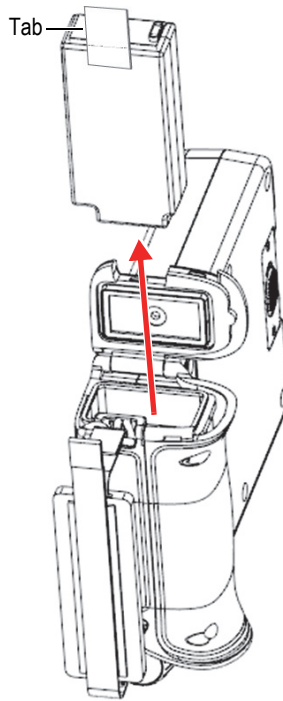


Figure 4-3 Battery removal

To replace the battery

1. Align the contacts of a fully charged battery with the contacts inside the EPOCH 6LT battery compartment, and then insert the battery into the battery compartment.
The battery compartment is keyed so that the battery can only be fully inserted if it is correctly inserted in the keyway.
2. Fold the battery tab away from the battery compartment cover seal before closing.
3. Close the battery compartment cover.
4. Press and slide the release button to the left to securely lock the cover.

4.2 Instrument Cleaning

When needed, use a cloth dampened with mild soap and water to carefully wash the instrument.

4.3 Seal Verification

The EPOCH 6LT contains seals that are used to protect the instrument's internal hardware from the environment. These include the following:

- Battery compartment cover seal
- Data port cover seal

Regularly clean and verify the state of the above seals to ensure the integrity of the hardware protection.

4.4 Display Protection

The EPOCH 6LT includes a clear-plastic sheet to protect the display window. Leave the clear-plastic sheet in place when using the instrument to continuously protect the display. Clear-plastic sheet replacements are available from Evident in packages of 10 (P/N: 600-DP [U8780297]).



CAUTION

The display window is permanently bonded to the front panel of the instrument case to fully seal the instrument. If the display window is damaged, the entire front panel, including the direct-access keypad, must be replaced.

4.5 Annual Calibration

Evident recommends that you send your EPOCH 6LT once a year to an Evident service center for annual calibration. Contact Evident for details.

4.6 Troubleshooting

Table 4 on page 49 lists some problems that may arise, possible causes, and suggested solutions.

Table 4 Troubleshooting guide

| Problem | Possible cause | Solution |
|--|--|--|
| After a software update, the instrument does not start when pressing the Power button. | Interrupted, incomplete, or corrupted software update. | Toggle the Reset switch located under the data port cover. Then turn the instrument on and use the PC upgrade software to reinstall the upgrade files. |
| Several software functions are unavailable. | The Cal Lock function is active, locking all front panel keys. | Turn the instrument off and on to unlock the keys. |
| The instrument freezes on the Evident splash screen during start up. | File or parameter value corruption. | Perform a hard reset by turning the instrument off, pressing and holding the Tab button, and turning the instrument back on. Note that all saved files will be lost during this process. |
| No signal is received when connected to one or more transducers. | Transducer(s) connected to the incorrect LEMO 00 connector(s). | For single crystal pulse-echo inspections, ensure the transducer is connected to the transmit (red) connector. For dual or through-transmission inspections, ensure the transmitting transducer or cable is connected to the transmit (red) connector and the receiving transducer or cable is connected to the receive (blue) connector. |

Appendix A: Specifications

This appendix outlines the specifications for the EPOCH 6LT and its accessories.

Table 5 General specifications

| Parameter | Specifications |
|-----------------------------------|---|
| User interface languages | English, Spanish, French, German, Japanese, Chinese, Portuguese, Russian, Italian |
| Transducer connections | LEMO 00 |
| Data storage | 100 000 IDs onboard |
| Battery type | Single lithium-ion rechargeable standard |
| Battery life | 6 h (lithium-ion) |
| Power requirements | AC Mains: 100 VAC to 120 VAC, 200 VAC to 240 VAC, 50 Hz to 60 Hz |
| Current consumption | 2.5 A |
| Power consumption | 60 W |
| Display type | Full VGA (640 × 480 pixels) transfective color LCD, 60 Hz update rate |
| Display dimensions (W × H, diag.) | 117 mm × 89 mm, 146 mm (4.62 in. × 3.49 in., 5.76 in.) |
| Overall dimensions (W × H × D) | 209 mm × 128 mm × 36 mm, 58 mm at hand grip (8.2 in. × 5 in. × 1.4 in., 2.3 in. at hand grip) |
| Weight | 890 g (1.95 lb), including lithium-ion battery |

Table 6 Pulser

| Parameter | Specifications |
|-----------------|--|
| Pulser | Tunable square wave |
| PRF | 10 Hz to 2000 Hz in 10 Hz increments |
| Energy settings | 100 V, 200 V, 300 V, or 400 V |
| Pulse width | Adjustable from 25 ns to 5000 ns (0.1 MHz) with PerfectSquare technology |
| Damping | 50 Ω , 400 Ω |

Table 7 Receiver

| Parameter | Specifications |
|--------------------------|--|
| Gain | 0 db to 110 db |
| Maximum input signal | 20 Vpk |
| Receiver input impedance | 400 Ω \pm 5 % |
| Receiver bandwidth | DC to 26.5 MHz at -3 dB (Standard version) 0.2 MHz to 26.5 MHz at -3 dB (ISO 22232-1.:2020 compliant version) |
| Digital filter settings | 8 digital filter sets (standard version) 7 digital filter sets (ISO 22232-1.:2020 compliant version) |
| Rectification | Full-wave, Positive Half-wave, Negative Half-wave, RF |
| System linearity | Horizontal: \pm 0.5 % FSW |
| Resolution | 0.25 % FSH, amplifier accuracy \pm 1 dB |
| Reject | 0 % to 85 % FSH in 1 % increment positions |
| Amplitude measurement | 1.25 % to 110 % full screen height |
| Measurement rate | Equivalent to PRF in all modes (single shot) |

Table 8 Calibration

| Parameter | Specifications |
|------------------------|---|
| Automated calibration) | Velocity, Zero Offset Straight Beam (first back wall or echo-to-echo) Angle Beam (Soundpath or Depth) |
| Test modes | Pulse Echo, Dual, or Through Transmission |

Table 8 Calibration (continued)

| Parameter | Specifications |
|-----------------|--|
| Units | Millimeters, inches, or microseconds |
| Range | 4.31 mm to 6700 mm at 5900 m/s (0.2320 in./ μ s) |
| Velocity | 635 m/s to 15 240 m/s (0.0250 in./ μ s to 0.6000 in./ μ s) |
| Zero offset | 0 μ s to 750 μ s |
| Display delay | -10 μ s to 2203 μ s |
| Refracted angle | 0° to 85° in 0.1° increments, then jumps to 90° |

Table 9 Gates

| Parameter | Specifications |
|-------------------|--|
| Measurement gates | 2 fully independent flaw gates |
| Gate start | Variable over entire displayed range |
| Gate width | Variable from 0.040 μ s to end of displayed range |
| Gate height | Variable from 2 % to 95 % full screen height in 1 % increments |
| Alarms | Positive and Negative Threshold/Curve, Minimum Depth (Gate 1 and Gate 2) |

Table 10 Measurements

| Parameter | Specifications |
|-------------------------------|---|
| Measurement display locations | 5 locations available (manual or auto selection) |
| Gate (1, 2) | Thickness, Soundpath, Projection, Depth, Amplitude, Time-Of-Flight, Min./Max. Depth, Min./Max. Amplitude |
| Echo-to-echo | Standard Gate 2 - Gate 1 |
| Other measurements | Overshoot (dB) value for DGS/AVG, ERS (equivalent reflector size) for DGS/AVG, AWS D1.1/D1.5 A, B, C, D values, Reject Value, Echo to Ref dB values |
| DAC/TCG | Standard |
| DAC points | Up to 50 points, 110 dB dynamic range |
| Special DAC modes | Custom DAC (up to 6 curves), 20–80 % View |
| Curved surface correction | Standard OD or Bar correction for Angle Beam measurements |

Table 10 Measurements (continued)

| Parameter | Specifications |
|----------------------|---|
| Corrosion (optional) | Zero-cross measurement algorithm, V-Path correction, Single or Echo-to-Echo |

Table 11 Environmental ratings

| Parameter | Specifications |
|-----------------------------------|--|
| IP rating | Ingress protection engineered to IP67 (dust tight and water submersion) and IP65 (dust tight and water jets) per IEC 60529-2004 (<i>Degrees of Protection Provided by Enclosures – IP Code</i>). |
| Explosive atmosphere | MIL-STD-810F, Method 511.4, Procedure 1 |
| Shock tested | MIL-STD-810F, Method 516.5, Procedure I, 6 cycles each axis, 15 g, 11 ms half sine |
| Vibration tested | MIL-STD-810F, Method 514.5, Procedure I, Annex C, Figure 6, general exposure: 1 hour each axis |
| Operating temperature | -10 °C to 50 °C (14 °F to 122 °F) |
| Battery storage temperature | 0 °C to 50 °C (32 °F to 122 °F) |
| Altitude | Designed to function safely up to 2000 m |
| Mains supply voltage fluctuations | Designed to function safely at ± 10 % of the nominal voltage |
| Transient overvoltages | Designed to function safely with transient overvoltages up to the levels of Overvoltage Category II |
| Temporary overvoltages | Designed to function safely with temporary overvoltages occurring on the mains supply |
| Pollution degree | Designed to function safely at a pollution degree of 2 |

Table 12 Instrument inputs and outputs

| Parameter | Specifications |
|--------------|---|
| USB ports | (1) USB 1.1 Full Speed Host (Type A) (1) USB 2.0 Full Speed Client (Type Mini B) |
| Video output | 1 digital video output |

Appendix B: Parts List

This appendix details the complete parts list, including optional accessories.

Table 13 EPOCH 6LT basic kit^a

| Part number | U8 or Q number | Description |
|-----------------------------------|----------------|---|
| EP6LT-UEE OR EP6LT-UEE-EN12 | N/A | EPOCH 6LT base unit EPOCH 6LT base unit with ISO 22232-1.:2020 Group 2 Certificate |
| BATT-10025 | Q7600001 | EPOCH 6LT lithium-ion rechargeable battery |
| HNDL-10018-0001 | Q7790068 | EPOCH 6LT wrist strap |
| EPLTC-C-USB-A-6 | U8840031 | USB Cable, mini A to mini B |
| PACK-10125-0000 | Q7640003 | EPOCH 6LT transport case |

a. Spares can be purchased.

Table 14 EPOCH 6LT optional accessories

| Part number | U8 or Q number | Description |
|----------------|----------------|---|
| 600-DP | U8780297 | EPOCH 6LT display protectors (10 Pack) |
| EP6LT-KIT-ROPE | Q7790069 | EPOCH 6LT rope access accessory kit |
| EP4/CH | U8140055 | EPOCH Series chest harness |
| EP6LT-STAND | Q7790070 | EPOCH 6LT desktop stand |
| EPXT-EC-x | N/A | EPOCH Series external charging base with power cord |

Table 15 Software options

| Part number | U8 or Q number | Specifications |
|--------------------|-----------------------|---|
| EP6LT-AWS | Q1400007 | AWS D1.1/D1.5 weld rating software option |
| EP6LT-CORRSN | Q1400008 | Corrosion module software option |
| EP6LT-BEA | Q1400009 | EPOCH 6LT back wall echo attenuator software option |

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