



EPOCH 600

Basic Operation Manual

DMTA-10007-01EN [U8778365] — Revision C
September 2022

EVIDENT SCIENTIFIC INC., 48 Woerd Avenue, Waltham, MA 02453, USA

This manual and the product and the programs it describes are protected by the *Copyright Act* (R. S., 1985, chapter C-42), by laws of other countries, and by international treaties, and therefore may not be reproduced in whole or in part, whether for sale or not, without the prior written consent from Evident. Under copyright law, copying includes translation into another language or format.

© 2022 by Evident. All rights reserved.

This document was prepared with particular attention to usage to ensure the accuracy of the information contained therein. It 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 has been modified thereafter.

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

Part number: DMTA-10007-01EN [U8778365]

Revision C

September 2022

Printed in United States of America

All brands are trademarks or registered trademarks of their respective owners and third party entities.

Table of Contents

List of Abbreviations	5
Important Information – Please Read Before Use	7
Intended Use	7
Instruction Manual	7
Device Compatibility	8
Repair and Modification	8
Safety Symbols	8
Safety Signal Words	9
Note Signal Words	10
Safety	10
Warnings	10
Battery Precautions	11
Regulations for Shipping Products with Lithium-Ion Batteries	13
Equipment Disposal	13
BC (Battery Charger - California, USA Community)	13
CE (European Community)	14
UKCA (United Kingdom)	14
RCM (Australia)	14
WEEE Directive	14
China RoHS	15
Korea Communications Commission (KCC)	16
EMC Directive Compliance	16
FCC (USA) Compliance	17
ICES-001 (Canada) Compliance	18
Warranty Information	18
Technical Support	19
1. Instrument Overview	21
1.1 What's In the Box	21

1.2	EPOCH 600 Instrument Configurations	22
1.3	Connectors	23
1.4	Power Requirements	26
1.4.1	Lithium-Ion Battery	26
1.4.2	AC Charger/Adaptor	27
1.4.3	Alkaline Batteries	30
1.5	Installing the MicroSD Card	32
2.	Basic Operation	35
2.1	User Interface	35
2.1.1	Menus and Parameters	36
2.1.2	Parameter Adjustment – Knob Configuration	37
2.1.3	Parameter Adjustment – Navigation Pad Configuration	38
2.1.4	Direct-Access Keys	38
2.1.5	Special Functions	40
2.1.6	Submenus	41
2.2	Pulser and Receiver Settings	41
2.2.1	Sensitivity	41
2.2.2	Reference Gain	42
2.2.3	Pulser	42
2.2.4	Receiver	43
2.3	Gates	44
2.3.1	Quickly Adjusting Basic Gate Parameters	44
2.3.2	Gate 1 and Gate 2	44
2.3.3	Gate Setup	45
2.3.4	Alarm Indications	46
2.4	Calibration	47
2.4.1	Measurement calibration	47
2.4.2	Angle Beam Calibration	51
2.5	Data Logger	51
2.5.1	Calibration Files	52
2.5.2	Other Create Functions	54
	Appendix: Parts List	55
	List of Figures	59
	List of Tables	61

List of Abbreviations

AC alternating current
AC alternative current
BIP beam index point

DC direct current
EFUP environment-friendly use period

Important Information — Please Read Before Use

Intended Use

The EPOCH 600 is designed to perform nondestructive inspections on industrial and commercial materials.



WARNING

Do not use the EPOCH 600 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 600 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 600, 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 600 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 EPOCH 600 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 600

Model: EPOCH 600-MR/EPOCH 600-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.

1. Instrument Overview

This chapter provides a brief overview of all common operational requirements of the EPOCH 600 instrument. This chapter is organized in the following manner:

- “What’s In the Box” on page 21
- “EPOCH 600 Instrument Configurations” on page 22
- “Connectors” on page 23
- “Power Requirements” on page 26

1.1 What’s In the Box

The EPOCH 600 instrument comes standard with several key accessories (see Figure 1-1 on page 22):

- 2-GB MicroSD removable memory card and adaptors (P/N: MICROSD-ADP-2GB [U8779307])
- AC charger/adaptor (P/N: EP-MCA-X). Varies by configuration; must select power cord.
- Power cord
- Alkaline battery holder (P/N: 600-BAT-AA [U8780295])
- Instrument transport case (P/N: 600-TC [U8780294])
- *Getting Started* leaflet (P/N: DMTA-10008-01EN [U8778373])
- *EPOCH 600 Basic Operation Manual* (P/N: DMTA-10007-01EN [U8778365]) on hard copy
- *EPOCH 600 User’s Manual* (P/N: DMTA-10006-01EN) on CD-ROM (P/N: EP600-MANUAL-CD [U8778381])

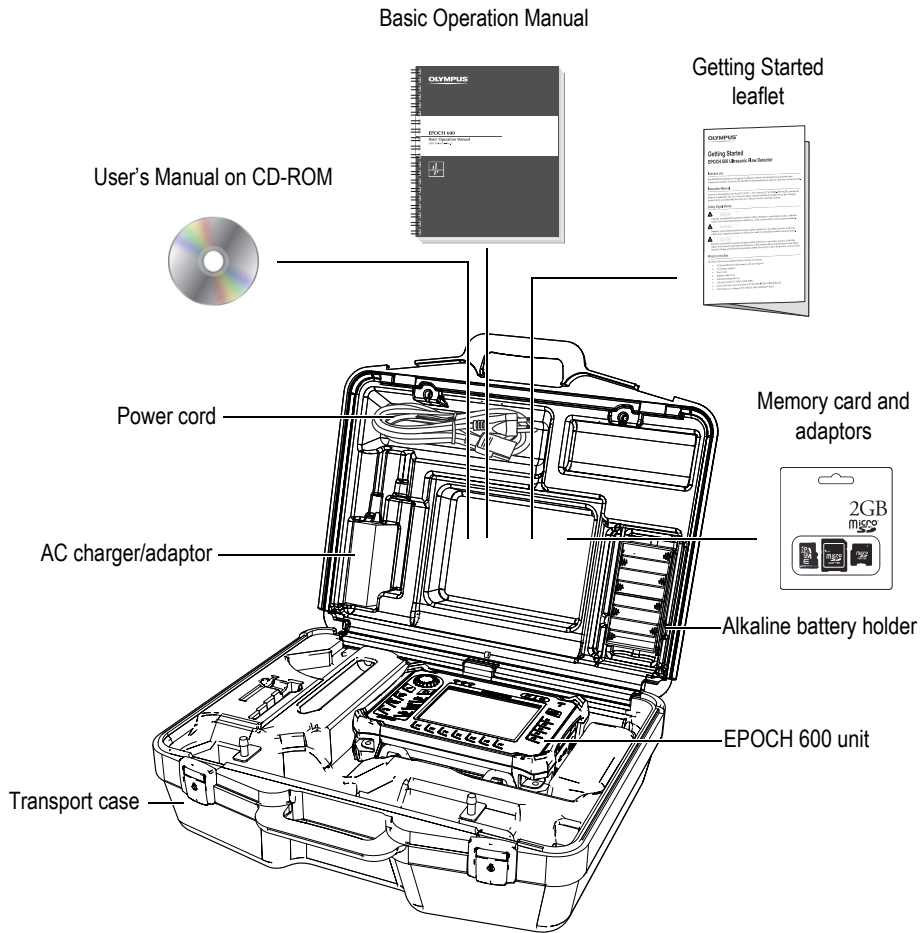


Figure 1-1 Transport case contents

For a list of optional accessories, please refer to the Parts List on page 47.

1.2 EPOCH 600 Instrument Configurations

The EPOCH 600 instrument is configured according to the customer's preferences in several ways. Available configurations include:

- Adjustment knob or navigation pad
- Keypad overlay (English, Japanese, Chinese, or Symbolic)
- BNC or LEMO 01 series transducer connectors
- Optional analog output port

Configuration selections must be made when ordering the instrument. The EPOCH 600 also comes standard with a rechargeable lithium-ion battery, an adjustable pipe stand, and a flexible display protector.

1.3 Connectors

Figure 1-2 on page 23 illustrates the connections of the EPOCH 600 with the AC charger/adaptor, the MicroSD card, and a PCL5 USB printer.

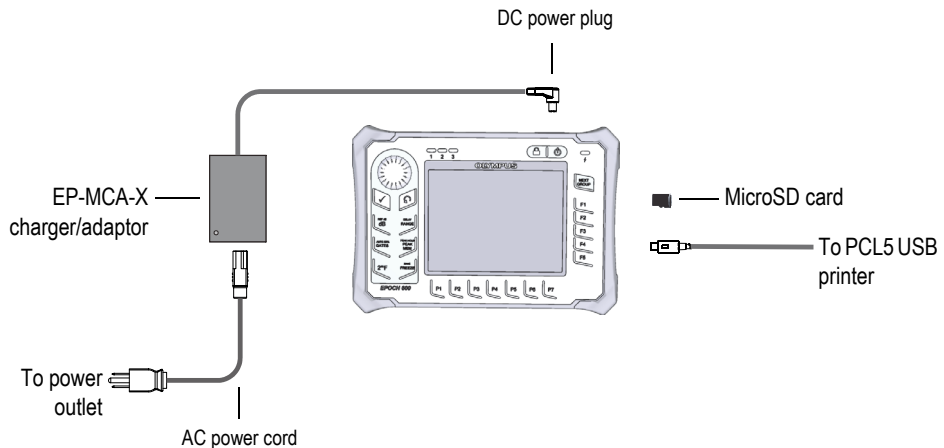


Figure 1-2 The EPOCH 600 connections



CAUTION

Use only the AC power cord supplied with the EPOCH 600. Do not use this AC power cord with other products.

The DC power, the Receive probe connector, and the Transmit/Receive probe connector are located on the top end of the EPOCH 600 (see Figure 1-3 on page 24).

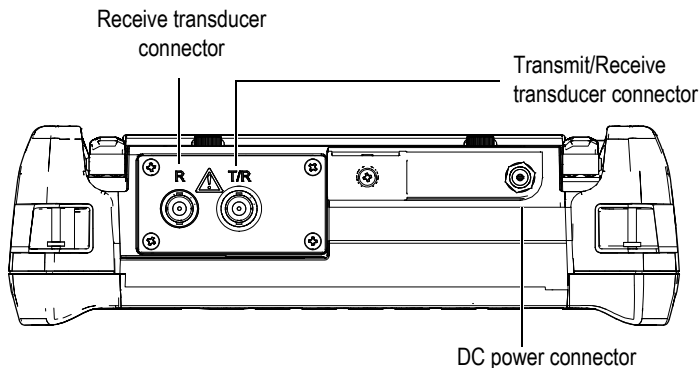


Figure 1-3 The top end connectors

The USB On-The-Go port and the external MicroSD memory card slot are located on the right side of the instrument, hidden behind the side door (see Figure 1-4 on page 25).

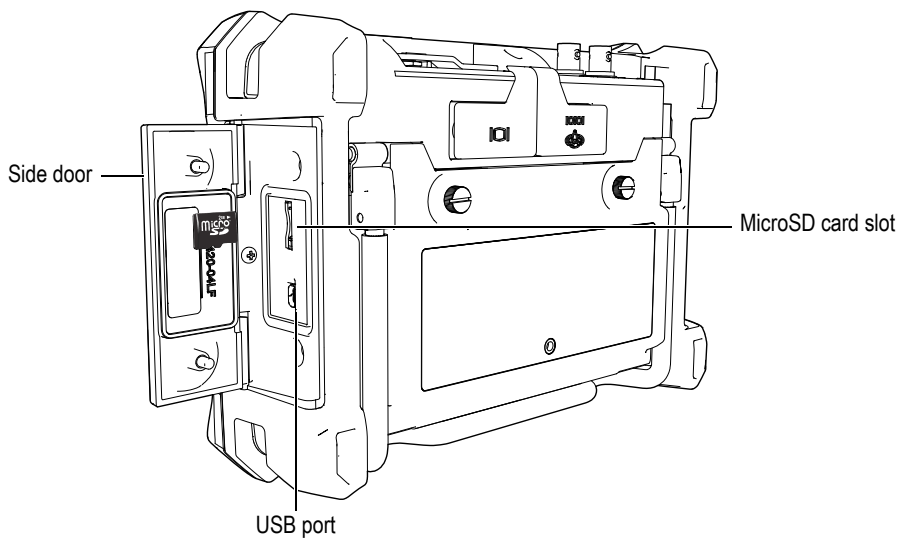


Figure 1-4 The connectors behind the side door

The RS232/Alarms and the VGA Out connectors are located at the back of the instrument, in the upper section (see Figure 1-5 on page 25). A rubber cover protects each connector.

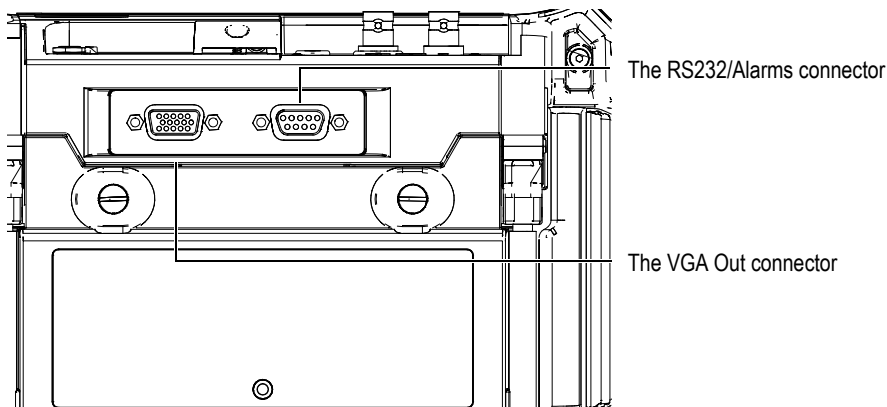


Figure 1-5 The RS232/Alarms and VGA Out connectors

1.4 Power Requirements

Press the [ON/OFF] key to turn on the EPOCH 600 (see Figure 1-6 on page 26). Pressing this key once causes an initial beep, followed by the instrument startup screen and a second beep approximately 5 seconds later.

The EPOCH 600 is designed to operate using three power supply methods:

- Internal lithium-ion battery
- Directly from the EPOCH charger/adaptor
- Internal alkaline batteries

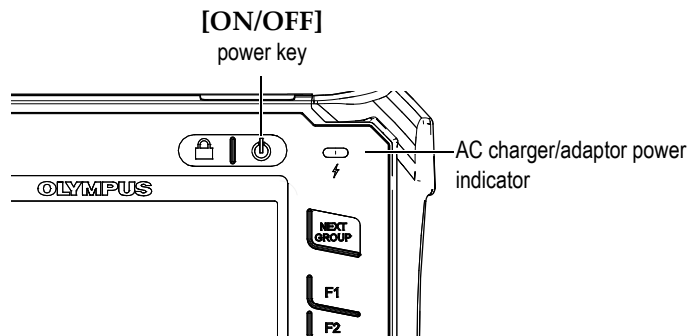


Figure 1-6 Location of the EPOCH 600 power key and indicator

1.4.1 Lithium-Ion Battery

The lithium-ion (Li-ion) battery is the primary method for powering the EPOCH 600. This battery comes installed in every instrument. When properly maintained, and when the instrument is operated under typical inspection conditions, the lithium-ion battery should provide between 12 and 13 hours of continuous operation.

To install or replace the lithium-ion battery

1. Unfold the instrument pipe stand.
2. At the back of the instrument, loosen the two thumb screws securing the battery compartment cover (see Figure 1-7 on page 27).
3. Remove the battery compartment cover (see Figure 1-7 on page 27).
4. Remove the battery and/or install the battery in the battery compartment.

5. Ensure that the gasket of the battery compartment cover is clean and in good condition.
6. Install the battery compartment cover at the back of the instrument, and then tighten the two thumb screws to complete the installation (see Figure 1-7 on page 27).

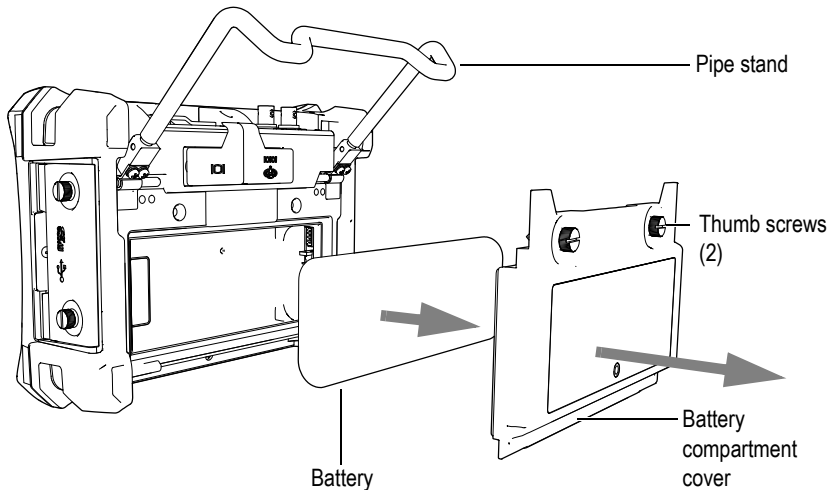


Figure 1-7 Removing the lithium-ion battery

1.4.2 AC Charger/Adaptor

The EPOCH 600 AC charger/adaptor is provided with every instrument. This charger/adaptor allows you to power the EPOCH 600 with or without a battery installed, as well as to charge the lithium-ion rechargeable battery when installed in the instrument. A power indicator on the front panel of the unit displays the current status of the AC charger/adaptor.

To connect the AC charger/adaptor

1. Connect the power cord to the charger/adaptor unit and to an appropriate power outlet.



CAUTION

Use only the AC power cord supplied with the EPOCH 600. Do not use this AC power cord with other products.

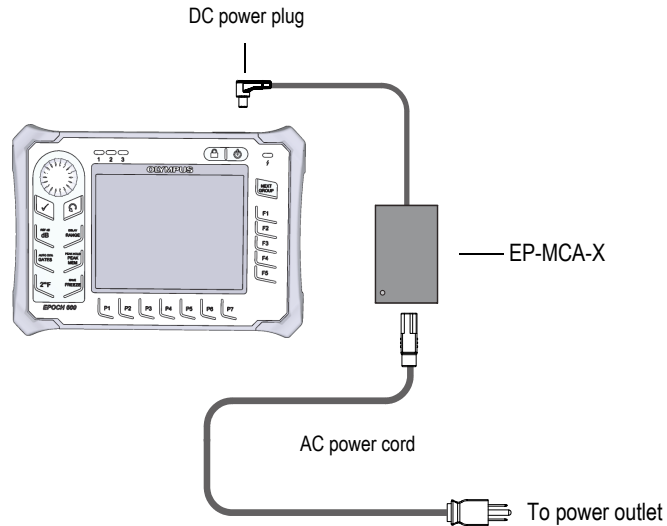


Figure 1-8 Connecting the charger/adaptor

2. Lift the rubber seal that covers the AC adaptor connector on top of the EPOCH 600 instrument.
3. Connect the DC output power cable from the AC charger/adaptor to the adaptor connector (see Figure 1-9 on page 29).

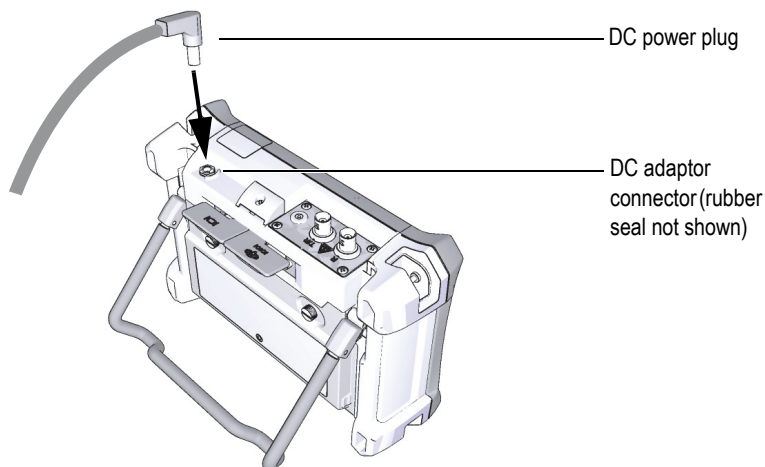


Figure 1-9 Connecting the DC power plug

The power status of the AC charger/adaptor and the battery charge condition are indicated both on the front panel of the EPOCH 600, as well as in the user interface (see Table 1 on page 29).

Table 1 AC charger/adaptor power indicator status





Power indicator status	AC line power connected	Indicator meaning	Battery indicator
Green	Yes	Internal battery fully charged	
Red	Yes	Internal battery is charging	
Off	No	AC charger/adaptor not connected	

Table 1 AC charger/adaptor power indicator status (continued)

Power indicator status	AC line power connected	Indicator meaning	Battery indicator
Green	Yes	AC charger/adaptor connected No battery installed	

1.4.3 Alkaline Batteries

The EPOCH 600 comes standard with an alkaline battery holder (P/N: 600-BAT-AA [U8780295]). This holder accommodates 8 AA size alkaline batteries in situations where an AC power source is not available and the internal Li-ion battery is discharged. When operated under typical inspection conditions, the alkaline batteries will provide 3+ hours of continuous operation.

To install the alkaline battery holder

1. Unfold the instrument pipe stand.
2. Loosen the two thumb screws securing the battery compartment cover at the back of the instrument, and then remove the battery compartment cover (see Figure 1-10 on page 31).
3. Remove the lithium-ion battery (if installed) [see Figure 1-10 on page 31].

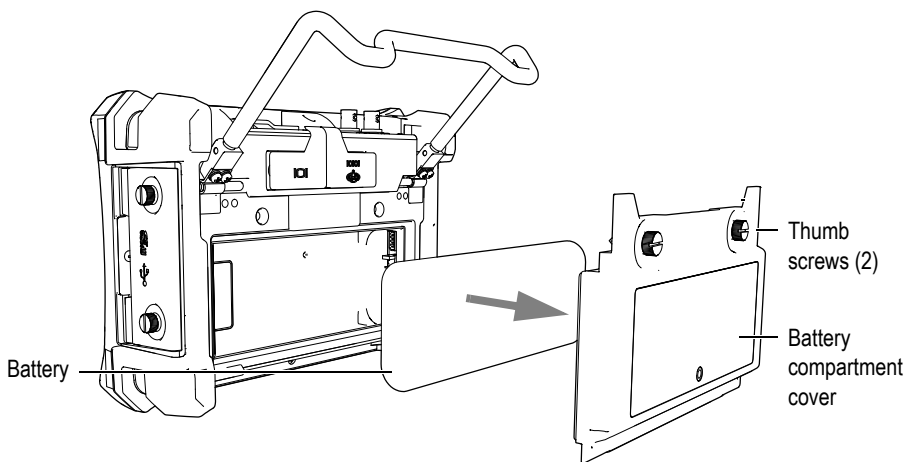


Figure 1-10 Removing the battery compartment cover and the lithium-ion battery

4. Install 8 AA size alkaline batteries into the alkaline battery holder.
5. Connect the alkaline battery holder connector into the instrument.
6. Position the alkaline battery holder in the battery compartment (see Figure 1-11 on page 31).

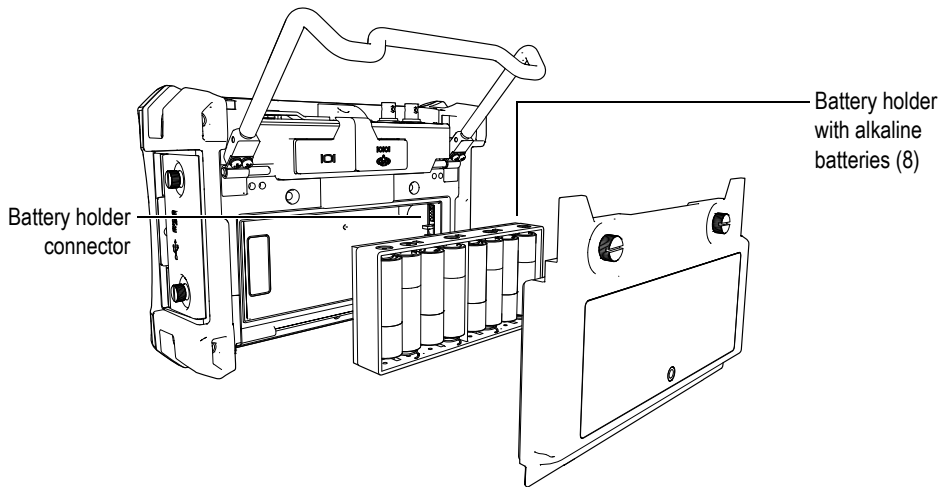


Figure 1-11 The alkaline battery holder

7. Install the battery compartment cover at the back of the instrument, and then tighten the two thumb screws.

NOTE

When alkaline batteries are installed in the instrument, the battery indicator in the user interface displays **ALK**. The AC charger/adaptor does not recharge the batteries installed in the alkaline battery holder.

1.5 Installing the MicroSD Card

The 2-GB MicroSD card is included with every EPOCH 600 shipment.

To install the MicroSD removable memory card

1. Remove the card from its packaging.
2. Loosen the two thumb screws, and then open the EPOCH 600 side door (see Figure 1-12 on page 32).

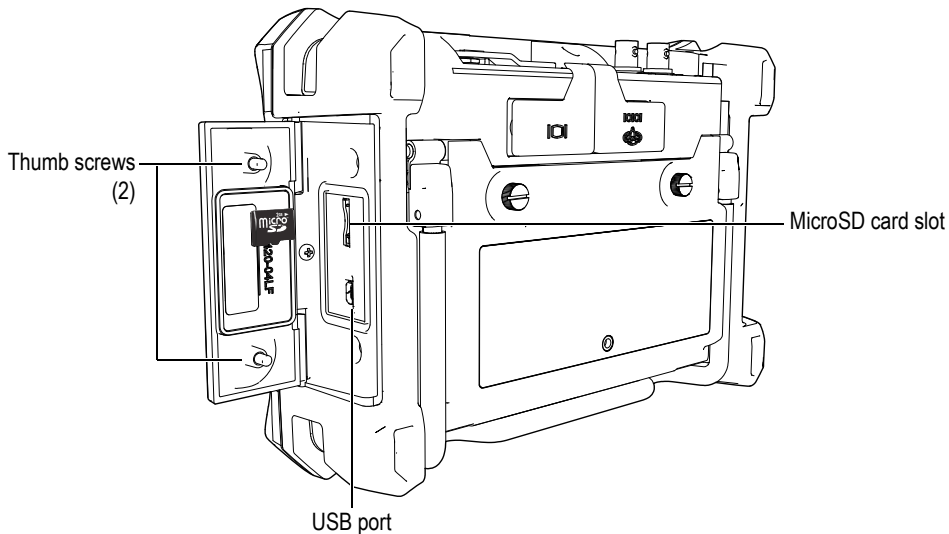


Figure 1-12 The side door

3. Hold the card so that the MicroSD label faces toward the rear of the instrument.
4. Carefully slide the card into the MicroSD slot until it clicks (see Figure 1-12 on page 32).

NOTE

To remove the MicroSD card, carefully push the card into the instrument and release. A spring mechanism will partially eject the card, and then you can grasp and remove it from the instrument.

2. Basic Operation

This chapter is intended to quickly provide guidance for users who are familiar with ultrasonic flaw detection, but are new to the EPOCH 600. More detailed descriptions of these topics, along with a comprehensive guide to more advanced functions, are covered in the *EPOCH 600 User's Manual* (P/N: DMTA-10006-01EN), included with every EPOCH 600 on a CD-ROM. This chapter is organized in the following manner:

- “Basic Operation” on page 35
- “Pulser and Receiver Settings” on page 41
- “Gates” on page 44
- “Calibration” on page 47
- “Data Logger” on page 51

2.1 User Interface

The EPOCH 600 uses a blend of direct-access keys and software menus to achieve full control over the instrument. The direct-access keypad provides instant control over functions that are commonly used during inspections. The software menus provide access to the majority of instrument functions, such as pulser/receiver settings, automated calibration, measurement setups, software features, data logging capabilities, and more.

Adjusting the value of a selected parameter is achieved using either the EPOCH 600 adjustment knob or the navigation keypad. The parameter adjustment method is determined by the configuration of the instrument selected at time of ordering. Both methods are outlined below.

2.1.1 Menus and Parameters

The majority of functions on the EPOCH 600 can be accessed and adjusted using the horizontal and vertical keys in the software user interface. The vertical keys, located on the right side of the display, are called menus, and the horizontal keys along the bottom of the display are called parameters, functions, or submenus (see Figure 2-1 on page 36). Each menu or parameter can be selected for adjustment by pressing its corresponding [F<n>] or [P<n>] key on the instrument keypad (see Figure 2-1 on page 36).

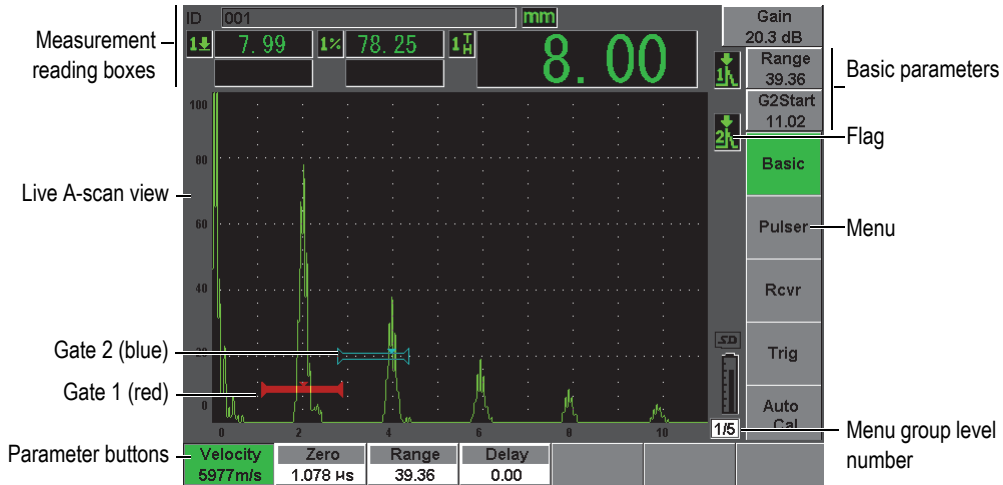


Figure 2-1 Software main display elements

There are five groups of menus on the EPOCH 600. Each menu group is identified with a number (1/5, 2/5, 3/5, 4/5, and 5/5). To scroll through all menu groups, use the [NEXT GROUP] key (see Figure 2-2 on page 37).

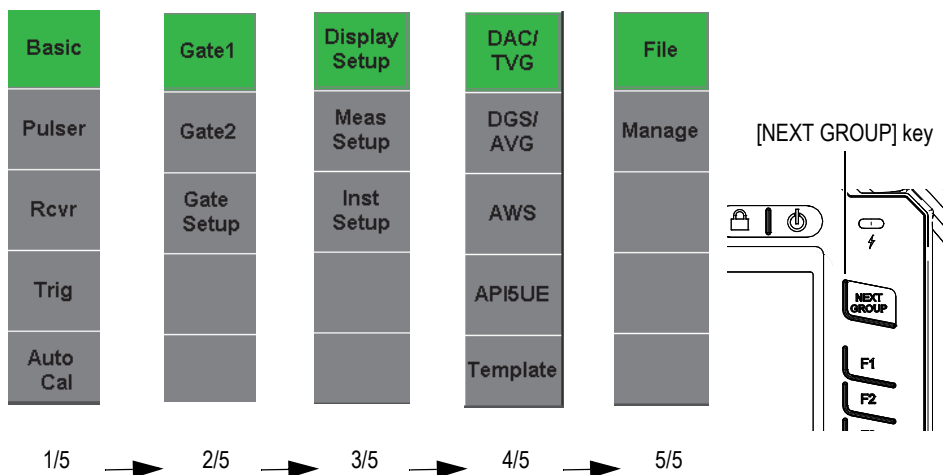


Figure 2-2 The menu groups and their level numbers

2.1.2 Parameter Adjustment – Knob Configuration

Once a parameter is selected, you can modify it using the adjustment knob. You can adjust most parameters in either coarse or fine increments. To toggle between coarse and fine adjustment, press the [CHECK] key.

Coarse adjustment selection is indicated by brackets around the parameter key (see Figure 2-3 on page 37). Fine adjustment is selected when no brackets are displayed.



Figure 2-3 Coarse and fine adjustment selection

2.1.3 Parameter Adjustment – Navigation Pad Configuration

Once a parameter is selected, you can modify it using the arrow keys on the navigation pad (see Figure 2-4 on page 38). You can adjust most parameters in either coarse or fine increments. The up and down arrows adjust in coarse increments, and the left and right arrows adjust in fine increments.

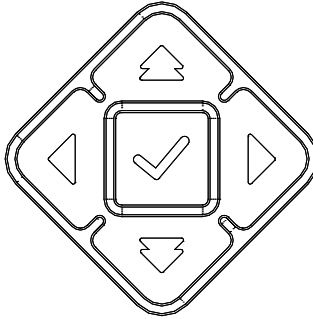


Figure 2-4 Arrow keys on the navigation pad

2.1.4 Direct-Access Keys

To facilitate fast adjustment of common parameters, the EPOCH 600 features a set of direct-access keys (see Figure 2-5 on page 39). When pressed, the software interface jumps directly to the associated parameter or activates the correct function.

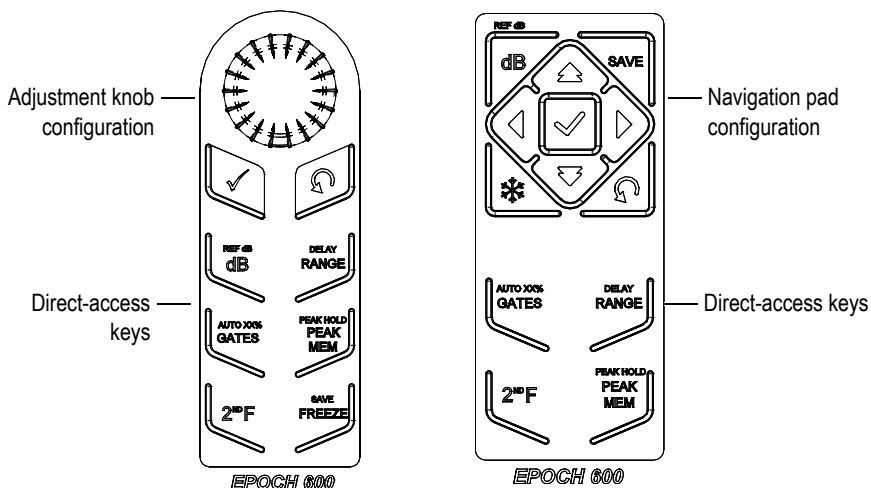


Figure 2-5 The direct-access keys – Both configurations (English)

The EPOCH 600 is also offered in an international-symbol version (see Figure 2-6 on page 39).

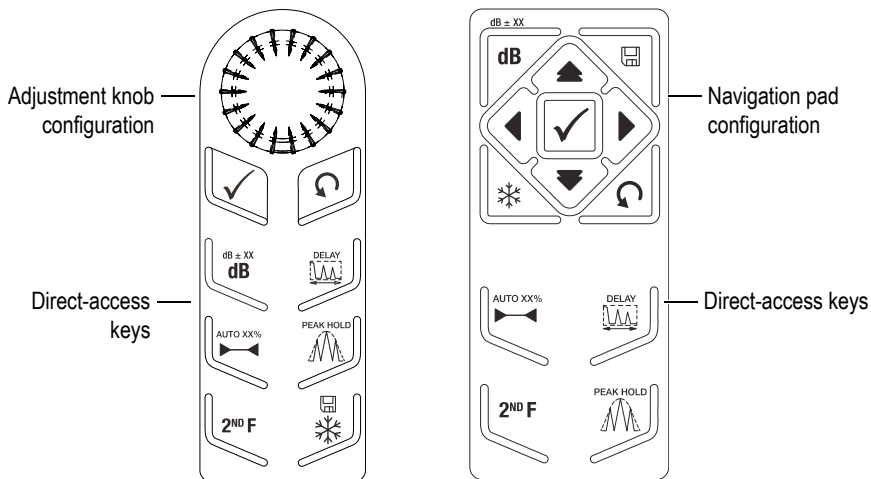


Figure 2-6 The direct-access keys – Both configurations (international symbols)

When the **[RANGE]**, **(DELAY)**, **[dB]**, or **(REF dB)** direct-access keys are pressed, common preset values appear above the **[P<n>]** parameter keys. To select a preset value, press the corresponding **[P<n>]** parameter key.

2.1.5 Special Functions

There are several special functions to be aware of while using the EPOCH 600:

- After adjusting a parameter using direct-access keys, you can get back to the previous menu group using the **[ESCAPE]** key or the **[NEXT GROUP]** key.
- Pressing the **[ESCAPE]** key from any menu group will return the user to the **Basic** menu, which is the default menu at start-up.
- The **[LOCK]** key (knob configuration only) automatically locks adjustment of all parameters to prevent any unwanted parameter modifications due to an accidental movement of the knob (see Figure 2-7 on page 40).

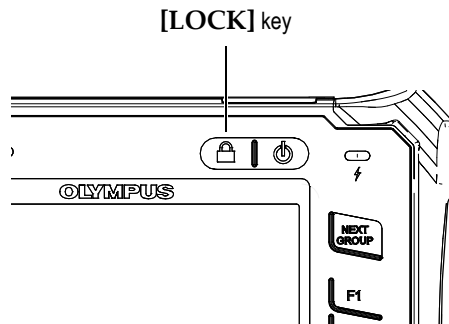


Figure 2-7 Adjustment knob configuration – **[LOCK]** key

- Pressing **[2ND F]**, **(AUTO XX%)** activates the AutoXX% feature, which automatically adjusts the gain in order to set the gated echo amplitude to XX% of full screen height (the default XX value is 80 %). (See Figure 2-8 on page 41.)

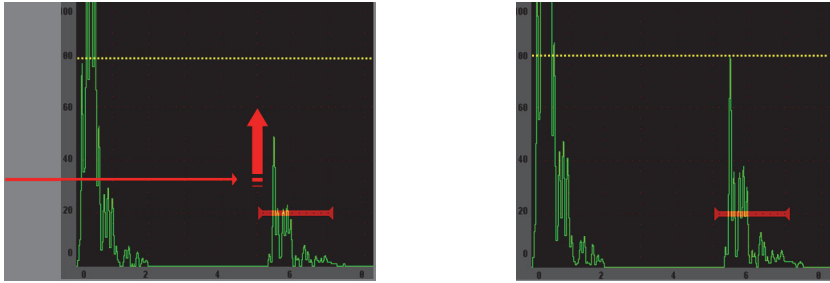


Figure 2-8 The AutoXX% feature

2.1.6 Submenus

When selecting some items, such as **Display Setup**, the **[NEXT GROUP]** key scrolls through rows within the submenu, the adjustment knob or navigation pad arrows are used to adjust the selected value, and the **[ESCAPE]** key returns to the live A-scan view.

2.2 Pulser and Receiver Settings

The EPOCH 600 allows access to most of its pulser and receiver settings through the **Pulser** and the **Rcvr** menus. System sensitivity (gain) and reference gain are controlled exclusively using the direct-access keys.

2.2.1 Sensitivity

The system sensitivity (gain) is adjusted using the **[dB]** direct-access key.

To adjust the system sensitivity

1. Press **[dB]**.
 2. Adjust the value:
 - ◆ Using the navigation pad arrow keys or by rotating the adjustment knob in either coarse or fine increments
- OR
- ◆ Pressing one of the **[P<n>]** parameter keys to select the corresponding preset value

Gain can also be automatically adjusted using the AUTO XX% feature. See “Special Functions” on page 40.

2.2.2 Reference Gain

You can define a reference gain by pressing [2ND F], (REF dB). This sets the current gain as the reference gain and activates a scanning gain for further adjustments (see Figure 2-9 on page 42).

When the reference gain is set, the [P<n>] parameter keys allow access to the following functions:

- **Add:** Combines current scanning gain with current reference gain and sets the resultant as the new reference gain.
- **Scan dB:** Toggles between current scanning gain and 0.0 dB scanning gain.
- **Off:** Turns off reference gain feature (scanning gain is lost).
- **+6 dB:** Increases the scanning gain by 6 dB.
- **-6 dB:** Decreases the scanning gain by 6 dB.

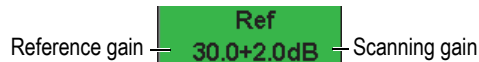


Figure 2-9 The reference and scanning gains

2.2.3 Pulser

The EPOCH 600 main pulser functions are accessible by selecting the **Pulser** menu. Each individual pulser parameter is displayed above the parameter keys, and can be adjusted by pressing the corresponding [P<n>] parameter key.

The following pulser functions are available for live adjustment in the **Pulser** menu:

- **PRF Mode:** Selects either Auto or Manual PRF adjustment mode. **Auto** changes the PRF setting based on the screen range, and **Manual** allows manual adjustment of PRF in 10-Hz increments.
- **PRF:** Pulse Repetition Frequency (PRF) values range: from 10 Hz to 2000 Hz in 10-Hz increments
- **Energy:** Pulse voltage values available: 0 V, 100 V, 200 V, 300 V, or 400 V
- **Damp:** Pulse damping values available: 50 Ω, 100 Ω, 200 Ω, or 400 Ω

- **Mode:** pulse modes available: **P/E** (pulse-echo), **Dual**, and **Thru** (through-transmission)
- **Pulser:** Pulser waveforms available: **Spike** or **Square** (tunable square wave)
- **Freq:** Pulse frequency (square wave pulse width) ranges from 0.1 MHz to 20.00 MHz

NOTE

The Spike pulse is equivalent to a 20-MHz square wave pulse.

2.2.4 Receiver

The EPOCH 600 standard receiver functions are accessible by selecting the **Rcvr** menu. Each individual receiver parameter is displayed above the parameter keys, and can be adjusted by pressing the corresponding [P<*n*>] parameter key.

The following receiver parameters are available for live adjustments in the **Rcvr** menu:

- **Filter:** Receiver filter setting
- **Rect:** Waveform rectification (**Full** [fullwave], **Half+** [halfwave positive], **Half-** [halfwave negative], **RF** [no rectification])
- **Reject:** Percent reject (from 0 % to 80 %)

The eight filters available on the EPOCH 600 allow broadband or narrowband settings to match the requirements of a given application. Each is a fully digital filter set with the following low-pass and high-pass cutoffs:

- 0.2 MHz–10 MHz
- 2.0 MHz–21.5 MHz
- 8.0 MHz–26.5 MHz
- 0.5 MHz–4.0 MHz
- 0.2 MHz–1.2 MHz
- 1.5 MHz–8.5 MHz
- 5.0 MHz–15 MHz
- DC–10 MHz

2.3 Gates

The EPOCH 600 features two standard, independent measurement gates: gate 1 and gate 2. Gate 1 is displayed as a red, solid horizontal line. Gate 2 is displayed as a blue, hollow horizontal line. These gates independently define digital measurements regions for amplitude, time-of-flight measurements, and other specialized readings. Each gate also features alarm and zoom functions.

2.3.1 Quickly Adjusting Basic Gate Parameters

The [GATES] direct-access key allows instant access to gate start, width, and level adjustments without requiring the user to enter any gate-related menus. This is the most common method for gate adjustments.

When the [GATES] key is pressed, the box above the first menu displays the gate 1 start position (see Figure 2-10 on page 44). Once selected, the knob or arrows can increase or decrease this value, in coarse or fine increments.

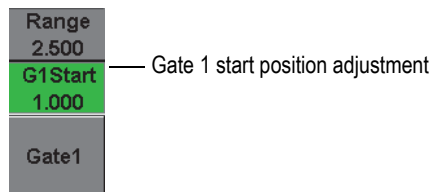


Figure 2-10 The Gate 1 start position adjustment

Pressing the [GATES] key repeatedly will scroll through the start, width, and level setting of every active gate. Pressing [ESCAPE] or [NEXT GROUP] returns the user to the menu group used prior to gate adjustment, allowing efficient adjustment of the gates with minimal interference for the operator.

For more comprehensive gate setup and adjustment, there are three menus that manage gate settings: **Gate1**, **Gate2**, and **Gate Setup**.

2.3.2 Gate 1 and Gate 2

Both **Gate 1** and **Gate 2** menus allow access to specific gate positioning and alarm functions. When either menu is selected, the following parameters become visible above the [P<n>] parameter keys.

- **Zoom:** Sets the display range to begin at the start position of the selected gate, and to stop at the end position of the selected gate (gate start + gate width).

NOTE

Pressing the **Zoom** [P<n>] parameter key repeatedly toggles the zoom on and off.

- **Start:** Adjusts the start position of the selected gate.
- **Width:** Adjusts the width of the selected gate.
- **Level:** Adjusts the screen height of the selected gate (from 3 % to 95 %).
- **Alarm:** Sets the alarm condition of the selected gate (**Off, Positive, Negative, Min Depth**)
- **Min Depth:** Visible only when the **Alarm** parameter is set to **Min Depth**. Adjusts the threshold in time-of-flight units that triggers a Min Depth alarm condition.
- **Status:** Turns the gate on or off (effects measurements, alarms, and visibility of gate on screen).

2.3.3 Gate Setup

The **Gate Setup** menu allows more advanced settings for each gate to be adjusted prior to inspection. These settings are visible above the [P<n>] parameter keys. The following gate settings are available in the **Gate Setup** menu:

- **G1 Mode:** Sets the measurement trigger mode of gate 1 (**Peak, 1stPeak, Edge**)
- **G1 RF:** Sets the polarity of the gate 1 when the instrument is operating in RF rectification (**Dual, Positive, Negative**)
- **G1 %Amp:** Used only in **Edge** mode. Sets the measurement trigger for the % amplitude digital measurement of gate 1 when in **Edge** detection mode (**High Peak, 1stPeak**).
- **G2 Mode/G2 RF/G2 %Amp:** Same settings as above, but for gate 2 only.
- **G2 Tracks:** Toggles tracking mode of gate 2 with respect to gate 1 on or off. Tracking ON is considered true echo-to-echo measurement mode.

Gate measurement modes, selected by **G1 Mode** or **G2 Mode**, determine which gated echo or echo parameters triggers a digital measurement.

- **Peak:** Acquires measurement readings based on the highest peak within the gated region (does not have to cross the gate threshold) [see Figure 2-11 on page 46].

- **1stPeak:** Acquires measurement readings based on the first peak to cross the gate threshold (level) [see Figure 2-11 on page 46].
- **Edge:** Acquires measurement readings based on the position of the first crossing point of a gated signal (see Figure 2-11 on page 46).

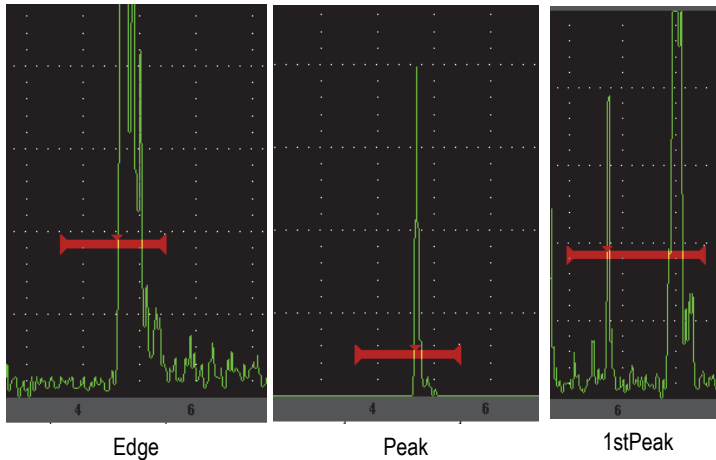


Figure 2-11 Measurement trigger in Edge, Peak, and 1stPeak modes

2.3.4 Alarm Indications

Whenever an alarm is triggered on either measurement gate, the operator is alerted in two different ways:

- An audible tone is emitted from the EPOCH 600
- One of two alarm indicators (LEDs) is illuminated on the front panel of the EPOCH 600 (see Figure 2-12 on page 46)

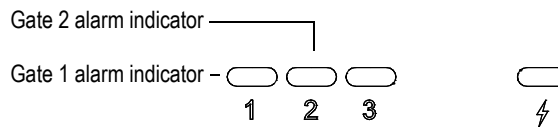


Figure 2-12 Gate 1 and gate 2 alarm indicator lights

NOTE

The EPOCH 600 is also capable of outputting alarm signals through the 9-pin D-sub connector on the back panel of the instrument.

2.4 Calibration

The EPOCH 600 can be easily calibrated for both zero offset and velocity in order to provide accurate thickness (soundpath) measurements from indications. The EPOCH 600 utilizes an auto-calibration system for a simple, two-step approach. The section below outlines the most standard and basic calibration example. More detailed information on calibration can be found in the *EPOCH 600 User's Manual* (P/N: DMTA-10006-01EN).

2.4.1 Measurement calibration

Calibration for accurate digital measurements is typically accomplished using two known thicknesses of a representative material. In this section, the terms THIN and THICK will be used to refer to either two thicknesses of a block or plate (straight beam calibrations) or two lengths of an angled soundpath (angle beam calibration).

To begin calibration

1. Couple the transducer to the thin step of the material.
2. Position gate 1 around the resulting indication on screen.
3. Bring the indication to 80 % full screen height using the **(AUTO XX%)** function.
4. Select the **Auto Cal** menu (see Figure 2-13 on page 48).

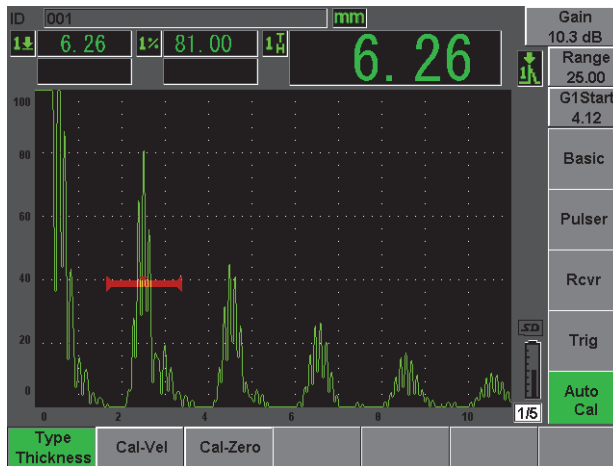


Figure 2-13 The Auto Cal menu

5. Use the Mode parameter to select the appropriate calibration mode (**Thickness** for straight beam or **Soundpath** for angle beam are the most common).
6. Press **Cal-Zero** (see Figure 2-14 on page 48).

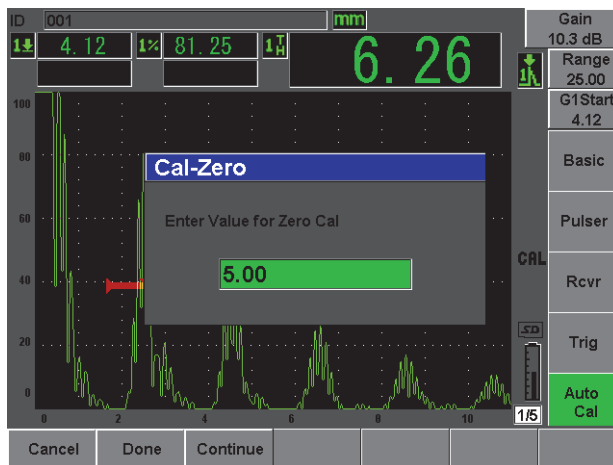


Figure 2-14 The Cal-Zero value

7. Use the knob or arrow keys to adjust the displayed value to the appropriate thickness. For this example, the transducer is coupled to a 5 mm step.
8. Press **Continue** to accept the adjusted value, and then move on to the second calibration step.
9. Couple the transducer to the thick step of material.
10. Position gate 1 around the resulting indication on screen.
11. Bring the indication to 80 % full screen height using the (**AUTO XX%**) function (see Figure 2-15 on page 49).
12. Press **[ESCAPE]** to return to the **Auto Cal** menu.

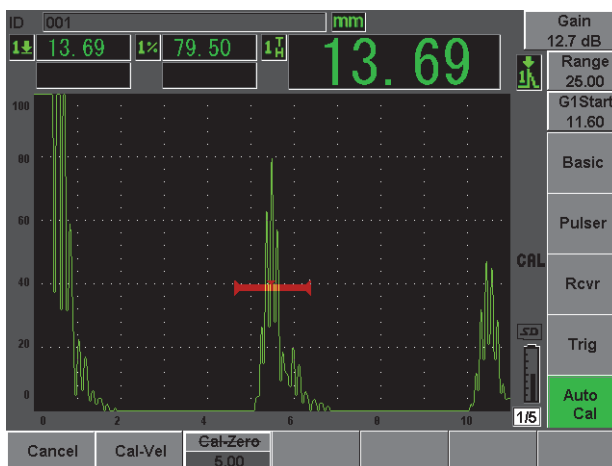


Figure 2-15 The gate 1 start

13. Press **Cal-Vel**.
14. Use the knob or arrow keys to adjust the displayed value to the appropriate thickness. For this example, the transducer is coupled to a 12.5 mm step (see Figure 2-16 on page 50).

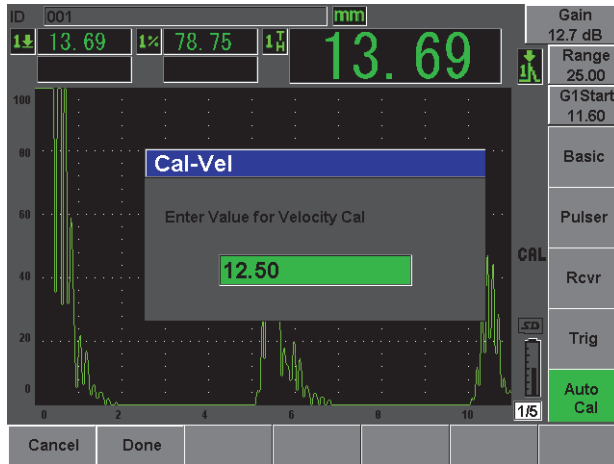


Figure 2-16 The Velocity Cal value

15. Press **Done** to accept the adjusted value and complete the calibration process.
16. Press [**RANGE**], and then adjust the screen range to the desired setting (see Figure 2-17 on page 50).

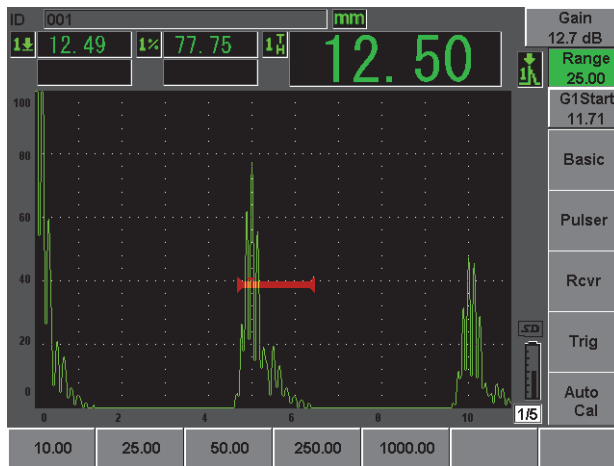


Figure 2-17 The Range value

2.4.2 Angle Beam Calibration

Angle beam calibrations typically require four steps. Each step is outlined below:

To perform angle beam calibration

1. Verify the Beam Index Point (B.I.P.).
2. Verify the refracted angle of wedge.
3. Complete the distance calibration using steps of section 2.4.1 on page 47 (**Calibration** mode set to **SoundPath** or **Depth** depending on the reflector type).
4. Set the sensitivity by capturing sensitivity hole or notch in gate 1, bringing the indication to 80 % screen height using (**AUTO XX%**), and then setting the reference gain by pressing [**2ND F**], (**REF dB**) [see Figure 2-18 on page 51].

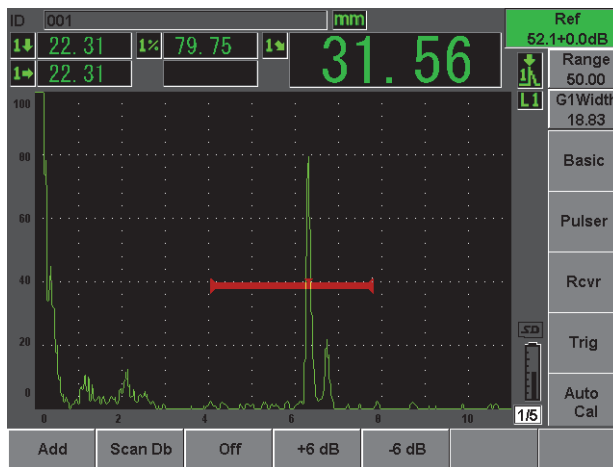


Figure 2-18 Reference gain setting

2.5 Data Logger

The EPOCH 600 features an onboard data logging system that allows standard storage of inspection files (Inc) and dedicated calibration files (Cal), as well as optional inspection files in corrosion style configurations (2D, 3D, Boiler, etc). Regardless of file type, each discrete data point saved on the EPOCH 600 stores all

active digital measurements, compressed A-scans, calibration data, alarm conditions, and active software features. The onboard memory is stored on a 2-GB MicroSD card, allowing storage of over 500,000 individual data points.

The section below outlines the procedure for setup and storage of the most basic and common file type, the calibration file. For full details and procedures on standard and optional file types, see the *EPOCH 600 User's Manual* (P/N: DMTA-10006-01EN).

2.5.1 Calibration Files

To setup and save a calibration file on the EPOCH 600, first complete all ultrasonic and software setups that will be saved within the calibration.

To complete all ultrasonic and software setups

1. Select the **File** menu.
2. Press the **Create** key to enter the file creation screen.
The **Create** screen appears (see Figure 2-19 on page 52).
3. In the **File Type** box, use the knob or arrow keys to select **Cal**.
4. Use the [NEXT GROUP] key to advance to the **Filename** box.
5. In the **Filename** box, create a file name (cannot exceed 32 characters) by pressing the **Edit** parameter key.

The screenshot shows the 'Create' screen with the following fields and controls:

- File Type:** A text box containing 'CAL'.
- Filename:** A text box containing 'ANGLE-4'. The label 'Filename' is highlighted in green.
- Description:** An empty text box.
- Inspector Id:** An empty text box.
- Location Note:** An empty text box.
- Calibration ID:** A text box with a numeric keypad below it. The keypad has a grid of letters (A-M, N-Z), numbers (0-9), and symbols (., /, -, +, <, >, %, &). The number '5' is highlighted in green.
- Navigation:** On the right side, there are buttons for '<<', '>>', '>>|', 'DEL', and 'INS'.
- Bottom:** An 'Edit' button is located at the bottom left.

Figure 2-19 The Create screen

6. Use the knob or arrows to navigate through the virtual keypad (see Figure 2-20 on page 53).
7. Insert a character by pressing **INS** (see Figure 2-20 on page 53).

The screenshot shows a 'Create' dialog box with the following fields and controls:

- *File Type:** Text field containing 'CAL'.
- *Filename:** Text field containing 'ANGLE-4'. The label is highlighted in green.
- Description:** Empty text field.
- Inspector Id:** Empty text field.
- Location Note:** Empty text field.
- *Calibration ID:** Empty text field.
- Virtual Keypad:** A grid of characters:

A	B	C	D	E	F	G	H	I	J	K	L	M
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
0	1	2	3	4	5	6	7	8	9	*	#	
.	?	/	.	-	+	<	>	%	&			

 The '5' in the second row, fifth column is highlighted in green.
- Navigation/Action Buttons:** '<<', '>>', '>>|', 'DEL', and 'INS' buttons are located on the right side of the dialog.
- Edit:** A button at the bottom left of the dialog.

Figure 2-20 The virtual keypad

8. Use the **[NEXT GROUP]** key to complete the file naming process.

NOTE

For creation of an incremental (Inc) file, you must first create a Start Point.

9. Press the **[NEXT GROUP]** key until the **Create** button is highlighted.
10. Press **Save** (see Figure 2-21 on page 54).

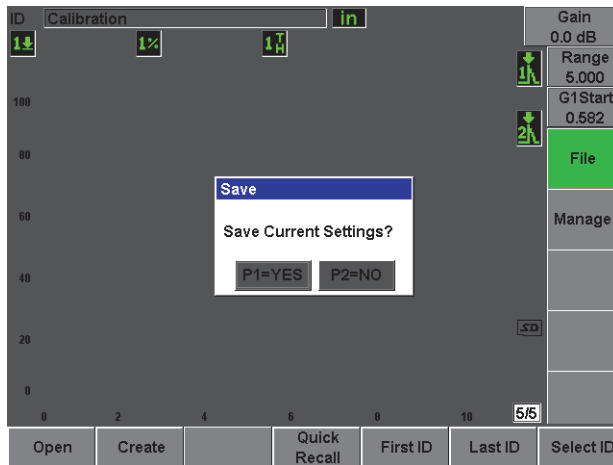


Figure 2-21 The Save dialog box

11. Press **[P1]** to accept the function.
The user is then returned to the live screen.

2.5.2 Other Create Functions

Two other file creation functions exist, and are described below:

- **Create:** Creates the file in memory but does not open this file as the active storage location. Typically used when creating several files at once without saving data.
- **Open:** Creates the file in memory, and then opens it as the active storage locations, but does not save any file parameters to the file until you press **[2ND F]**, (**SAVE**). Typically used for inspection files, where the file is created prior to the start of the inspection.

Appendix: Parts List

Table 2 EPOCH 600 basic kit (spares can be purchased)

Part Number	U8 Number	Description
EP600-BA-UEE-K	U8051216	EPOCH 600 instrument NOTE: The part number vary according to the instrument configuration. The instrument can be adapted to have different keypads, manual languages, power cords, etc. Contact your Evident representative for further information.
EP-MCA-X	See note	AC charger/adaptor NOTE: The part number vary according to the instrument configuration. You must specify the power cord type.
600-BAT-L	U8760056	EPOCH 600 lithium-ion rechargeable battery
600-TC	U8780294	EPOCH 600 instrument transport case
EP600-MANUAL-CD	U8778381	<i>EPOCH 600 User's Manual (CD-Rom)</i>
DMTA-10007-01EN	U8778365	<i>EPOCH 600 Basic Operation Manual</i>
DMTA-10008-01EN	U8778373	<i>EPOCH 600 Getting Started</i>
600-BAT-AA	U8780295	8-cell battery holder with connector plug
MICROSD-ADP-2GB	U8779307	2-GB MicroSD memory card with adaptors

Table 3 EPOCH 600 software options

Part Number	U8 Number	Description
EP600-DGS-AVG	U8140146	EPOCH 600 onboard DGS/AVG software option
EP600-AWS	U8140147	EPOCH 600 AWS D1.1/D1.5 software option
EP600-TEMPLATE	U8140148	EPOCH 600 template storage software option
EP600-API5UE	U8140149	EPOCH 600 API 5UE software option
EP600-XDATA	U8140150	EPOCH 600 expanded data logger software option
EP600-AVERAGE	U8140151	EPOCH 600 waveform averaging software option
GAGEVIEWPRO	U8140075	GageView Pro PC interface software
GAGEVIEWPRO-KIT-USB-A-AB	U8140076	GageView Pro PC interface software with USB A-AB cable, 6 feet

Table 4 EPOCH 600 optional accessories

Part Number	U8 Number	Description
EPXT-EC-X	See note	EPOCH external charger NOTE: The part number vary according to the instrument configuration. You must specify the power cord type.
600-STAND	U8780296	EPOCH 600 pipe stand assembly
EP4/CH	U8140055	EPOCH Series chest harness
600-DP	U8780297	EPOCH 600 display protectors (pack of 10)

Table 4 EPOCH 600 optional accessories (continued)

Part Number	U8 Number	Description
EPLTC-C-USB-A-6	U8840031	EPOCH LTC USB communication cable (mini-AB to TYPE-A/HOST)
EPLTC-C-USB-B-6	U8840033	EPOCH LTC USB communication cable (mini-AB to TYPE-B/CLIENT)
600-C-VGA-5	U8780298	5-feet EPOCH 600 VGA cable (1.5 meter)
EP1000-C-9OUT-6	U8779017	6-feet standard 9-pin communication cable (1.8 meter)
600-C-RS232-5	U8780299	5-feet EPOCH 600 RS232 cable (1.5 meter)
EP600-WARRANTY	U8780300	EPOCH 600 extended warranty (1 additional year)

List of Figures

Figure 1-1	Transport case contents	22
Figure 1-2	The EPOCH 600 connections	23
Figure 1-3	The top end connectors	24
Figure 1-4	The connectors behind the side door	25
Figure 1-5	The RS232/Alarms and VGA Out connectors	25
Figure 1-6	Location of the EPOCH 600 power key and indicator	26
Figure 1-7	Removing the lithium-ion battery	27
Figure 1-8	Connecting the charger/adaptor	28
Figure 1-9	Connecting the DC power plug	29
Figure 1-10	Removing the battery compartment cover and the lithium-ion battery ...	31
Figure 1-11	The alkaline battery holder	31
Figure 1-12	The side door	32
Figure 2-1	Software main display elements	36
Figure 2-2	The menu groups and their level numbers	37
Figure 2-3	Coarse and fine adjustment selection	37
Figure 2-4	Arrow keys on the navigation pad	38
Figure 2-5	The direct-access keys — Both configurations (English)	39
Figure 2-6	The direct-access keys – Both configurations (international symbols)	39
Figure 2-7	Adjustment knob configuration — [LOCK] key	40
Figure 2-8	The AutoXX% feature	41
Figure 2-9	The reference and scanning gains	42
Figure 2-10	The Gate 1 start position adjustment	44
Figure 2-11	Measurement trigger in Edge, Peak, and 1stPeak modes	46
Figure 2-12	Gate 1 and gate 2 alarm indicator lights	46
Figure 2-13	The Auto Cal menu	48
Figure 2-14	The Cal-Zero value	48
Figure 2-15	The gate 1 start	49
Figure 2-16	The Velocity Cal value	50
Figure 2-17	The Range value	50
Figure 2-18	Reference gain setting	51

Figure 2-19	The Create screen	52
Figure 2-20	The virtual keypad	53
Figure 2-21	The Save dialog box	54

List of Tables

Table 1	AC charger/adaptor power indicator status	29
Table 2	EPOCH 600 basic kit (spares can be purchased)	55
Table 3	EPOCH 600 software options	56
Table 4	EPOCH 600 optional accessories	56

