



# Eddyfi Ectane 3<sup>®</sup>

## *User's Manual*

Version 1.0

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This document was prepared with particular attention to usage to ensure the accuracy of the information it contains. It corresponds to the version of the product manufactured prior to the date appearing on the back cover. There may, however, be some differences between this document and the product, if the product was modified after publication.

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

Manual version A

Part number: SXSC2047A

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# Chapter 1: Important Information, Safety Precautions, and Conventions

# 1. Important Information – Please Read Before Use

## Intended Use

The Ectane® 3 is designed to perform non-destructive inspections using electromagnetic testing (ET) technologies for surface and tube inspection.

### **WARNING!**



**Do not use the Ectane 3 for any purpose other than its intended use.**

## Instruction Manual

This instruction manual contains essential information on how to use the instrument safely and effectively. Before using the Ectane 3, please review this user manual. Use the instrument as intended.

Keep this manual in a safe place for future reference.

## Instrument Compatibility

Use only approved ancillary equipment provided by Eddyfi with this instrument.

### **CAUTION**



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

## Repair and Modifications

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

## CAUTION



To prevent human injury and/or instrument damage, do not disassemble, modify, or repair the instrument.

## Equipment Disposal

Before disposing of the Ectane 3, check your local laws, rules, and regulations, and follow them accordingly.

## 2. Marking and Symbols

The following symbols can appear on the instrument and pertain to safety regulations that should be followed carefully.



The exclamation mark label is used as a general warning sign. It indicates that you should refer to this user manual to obtain the information necessary to ensure the proper protection of the instrument and its users.



The lightning flash with arrowhead label is used as a high voltage sign. It indicates the presence of hazardous voltages (within the product enclosure or accessible externally) that can be of sufficient magnitude to constitute a risk of electric shock to persons. Always refer to the user manual to ensure proper protection and safe practices.



The “Crossed-Out Wheeled Bin” marking acts as a reminder that the product should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling in accordance with the local regulations applicable to Waste Electrical and Electronic Equipment (WEEE).

### 3. General Precautions – Please Read Before Use

- Before turning on the instrument, carefully read the instructions contained in this manual.
- Carefully follow the installation and operation procedures.
- Respect safety warnings on the instrument and in this manual.
- The Ectane 3 should only be used by qualified personnel.
- When carrying the Ectane 3, it is the user's responsibility to make sure that the safety precautions used are in accordance with the local department of transportation's (or equivalent governing body) rules and regulations.
- The electrical plug shall only be inserted in a power outlet providing a protective earth contact. You must not negate the protective action by using an extension cord (power cable) without a protective conductor (grounding). Grounding one conductor of a two-conductor outlet is not sufficient protection.
- The instrument must only be connected to a power source corresponding to the type indicated on the rating plate.
- If the equipment is used in a manner not specified by Eddyfi Technologies, the protection provided on the equipment may be rendered ineffective.
- Do not install substitute parts or perform any unauthorized modifications to the instrument.
- Service instructions, when applicable, are for trained service personnel only. To avoid dangerous electric shock, do not perform any service unless qualified to do so.
- When using an Ectane® 3 with some highly sensitive probes, it is possible that some high intensity electromagnetic phenomena (e.g., voltage arcs from welding machines, electrical transients created by commuting high power inductive loads, and so on) create visible disturbances observable in the acquired data. Since probes are electromagnetic-sensitive devices and are intended to receive and amplify low intensity electromagnetic fields, it is normally expected that high intensity external electromagnetic disturbances would be observable on the screen.
- For any problems or questions regarding this instrument, contact Eddyfi Technologies, or an authorized Eddyfi Technologies representative.

## 4. Battery Precautions

See Chapter 4, Battery Precautions for more information.

## 5. Battery Charger Precautions

### CAUTION



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

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**Note** *The battery charger is optional.*

---

- Do not expose the battery charger or its power supply to water or liquids. The charger case is not sealed.
- Do not open the battery charger or power supply case. They contain no user-serviceable parts.
- Do not cover the fan exhaust or obstruct airflow; this would cause overheating.
- Use only the included power supply and observe terminal polarity.
- Place the charger away from external heat sources.

## 6. Regulatory Compliance

### FCC Compliance (USA)

This equipment was 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 equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user's guide, may cause harmful interference to radio communications. Operation of this equipment 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.

## ICES Compliance (Canada)

This ISM device complies with Canadian ICES-001(A).

*Cet appareil ISM est conforme à la norme NMB-001(A) du Canada.*

## AS/NZS Compliance (Australia/New Zealand)

This device complies to the applicable regulations and standards for Australia (and New Zealand) as defined by the Australian Communications and Media Authority (ACMA).

## CE marking (EU)

Eddyfi declares that Ectane equipment complies to the essential requirements of Electromagnetic Compatibility (EMC, 2014/30/EU), Low Voltage (LVD, 2014/35/EU) and Restriction of Hazardous Substances (RoHS, 2011/65/EU, 2015/863/EU and 2017/2102) directives.

Please find the full EU Declaration of Conformity on the Eddyfi website:

[www.eddifytechnologies.com](http://www.eddifytechnologies.com)

## UKCA marking (UK)

Hereby, Eddyfi declares that Ectane equipment complies to the essential requirements of Electromagnetic Compatibility (EMC, S.I. 2016 No. 1091), Electrical Equipment Safety (S.I. 2016 No. 1101) and Restriction of Hazardous Substances (RoHS, S.I. 2012 No. 3032, and S.I. 2021 No. 422) Statutory Instruments.

Please find the full UKCA Declaration of Conformity on the Eddyfi website:

[www.eddifytechnologies.com](http://www.eddifytechnologies.com)

## 7. Calibration and Warranty Seals

Calibration and warranty seals are located in the instrument and will be broken if parts of the instrument are disassembled.

**IMPORTANT:** Broken seals void the calibration certification and product warranty.

## 8. Safety Indications

The purpose of the various safety indications in this manual are meant to ensure operator safety and instrument integrity.

**WARNING!** The Warning sign indicates a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, can result in personal injury. Do not proceed beyond a Warning sign until the indicated conditions are fully understood and met.



**CAUTION** The Caution sign indicates a hazard. It calls attention to a procedure, practice, or the like that, if not correctly performed or applied, can result in material damage or loss of data. Do not proceed beyond a Caution sign until the indicated conditions are fully understood and met.



**IMPORTANT** The IMPORTANT indication calls attention to important information or information essential to completing a task.

---

**Note** *The Note calls attention to an operating procedure, practice, or the like that requires special attention. A Note also indicates related, parenthetical information that is useful, but not essential.*

---

## 9. Typographical Conventions

The various typographical conventions used in this document to describe the operations of the instrument are explained below and were designed to standardize and simplify the look and feel of this document.

### *Italic*

An italic typeface is used to indicate emphasis on a specific word or phrase (i.e., This option should never be selected.)

### **Bold**

A bold typeface is used to indicate the name of a menu item or a named user-interface element (i.e., the File menu, the Options button, etc.) Generally, items in bold typeface are capitalized to reflect the capitalization used on screen.

### SMALL CAPITALS

Small capitals are generally used when reference is made to inscriptions found “as is” on an instrument (buttons, connectors, indicator lights, etc.)

## 10. Technical Support

Eddyfi is firmly committed to providing the highest level of customer service and product support. If you experience difficulties when using our instrument, or if it fails to operate as described, first consult this user manual, and then, if are still in need of assistance, please contact Eddyfi at [support@eddyfi.com](mailto:support@eddyfi.com)

# Chapter 2: Introducing Ectane

# 1. Introducing the Ectane 3

Eddyfi's innovative Ectane® 3 unleashes the full potential of electromagnetic testing (ET) technologies for surface and tube inspection. This high-performance ET data acquisition system offers the following key features:

- Light, rugged, portable, and sealed
- SmartMUX™: integrated, universal, and programmable Eddy Current Testing (ECT) array multiplexer for up to 256 elements
- Multi-technology for tube inspections: ECT, RFT, NFT, MFL, ECA, RFA, NFA and IRIS<sup>1</sup> ultrasound technology
- FA support with dedicated low-frequency multiplexor<sup>1</sup>
- Battery power and backup for flexibility and 100 % uptime
- Plug-and-play connectivity— no more BootP
- Standard and proprietary SmartMUX connectors

The Ectane 3 is controlled by a computer running Microsoft Windows® 8.1, Windows® 10, Windows® 11, and Eddyfi's Magnifi® 4.8 or older running on a 32bits operating system as well as Eddyfi's Magnifi® 5.0 or higher running on a 64 bits operating system. This computer is referred to as the workstation in this document. For details about Magnifi, refer to the Magnifi User Manual.

## 2. Standard Equipment and Accessories

All Ectane 3 instruments come with the following standard equipment and accessories:

- Two high-capacity batteries
- One power adapter (100 V– 240 V)
- One region-specific power cord
- One high-quality shielded Ethernet cable
- One protective cap for ethernet connector
- One protective cap for SmartMUX array connector (for selected models only)
- One robust and waterproof transport case with wheels and retractable handle

---

<sup>1</sup> Patent pending

### 3. Instrument Description

The Ectane 3 is available in 11 different configurations.

The E option indicates ECT capabilities.

The number after the letter E in certain model names listed below indicates the maximum number of available channels for ECA probes with this instrument.

The RNM option indicates RFT, NFT, and MFL capabilities. The I option indicates IRIS capabilities.

#### Possible Configurations of the ECTANE 3

The Ectane 3 has the following configurations:

- Ectane3-E
- Ectane3-E64
- Ectane3-E128
- Ectane3-E256
- Ectane3-I
- Ectane3-ERNM
- Ectane3-ERNMI
- Ectane3-E64RNM
- Ectane3-E64RNMI
- Ectane3-E128RNM
- Ectane3-E128RNMI

### 4. Front Plate Descriptions

The front plate panel of the Ectane 3 enables the user to perform the following:

- Power ON/OFF the instrument via the power button.
- Plug the power supply cable to use the instrument, charge the batteries or both via the power socket.

- Connect the ECTANE 3 to a network or to other instruments via the Ethernet connector.
- Estimated battery remaining life display of the 2 removable batteries.
- Connect ECT probes via the 4 pin connector
- Connect RFT, NFT and MFL probes via the 19 pin connector.
- Connect IRIS probes via the BNC connector.

The Ectane 3 comes with one of eight different front plates:

- Ectane 3 E (without SmartMUX)
- Ectane 3 E64 and E128
- Ectane 3 E256
- Ectane 3 I
- Ectane 3 ERNM (without SmartMUX)
- Ectane 3 ERNMI (without SmartMUX)
- Ectane 3 E64RNM and E128RNM
- Ectane 3 E64RNMI and E128RNMI

The following figures demonstrate each of the eight variations.

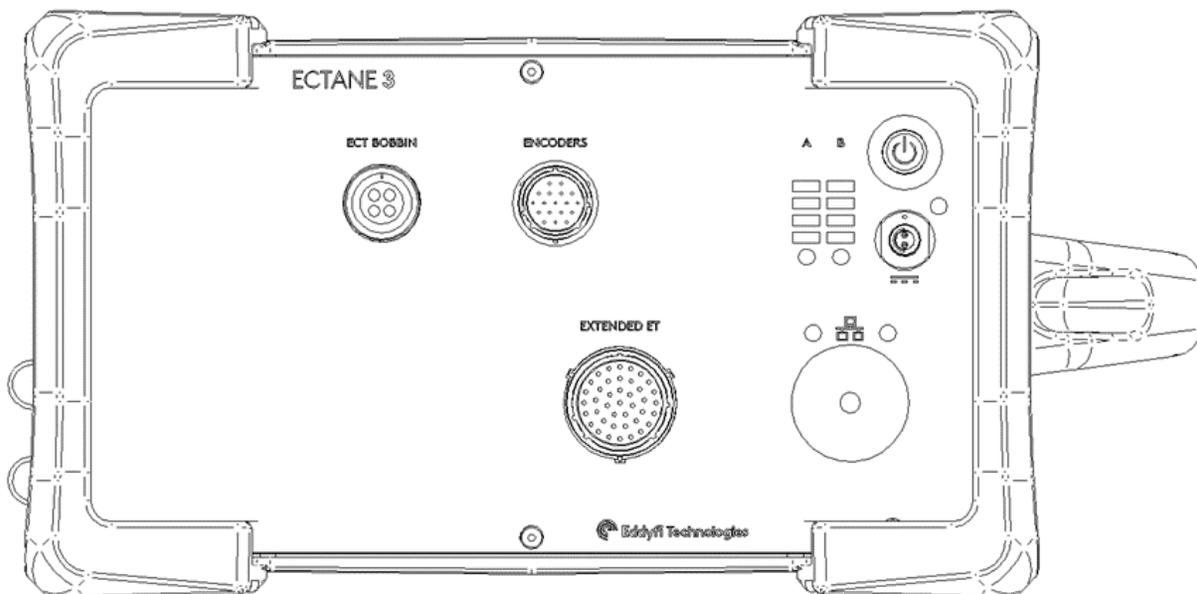


Figure 4-1 - Ectane 3 E

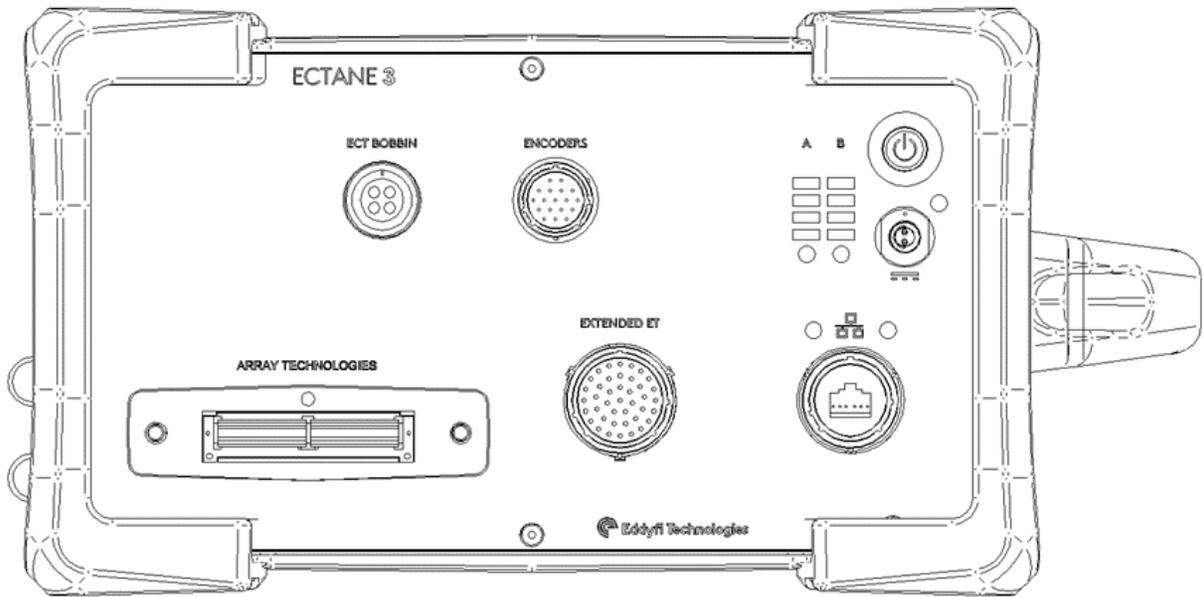


Figure 4-2 - Ectane 3 E64 and E128

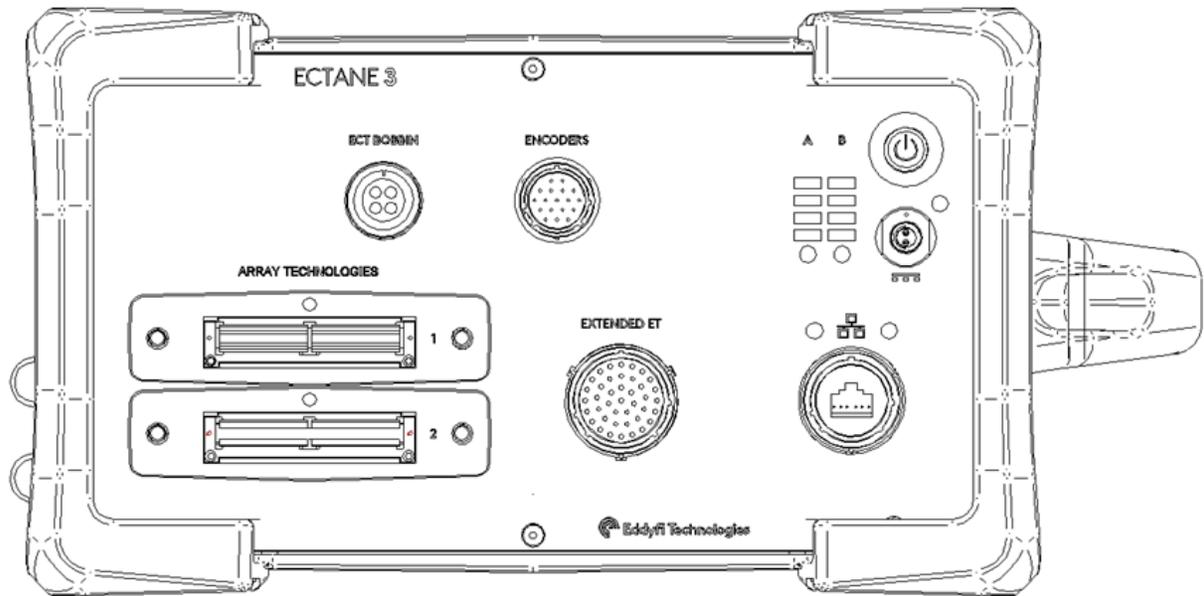


Figure 4-3 - Ectane 3 E256

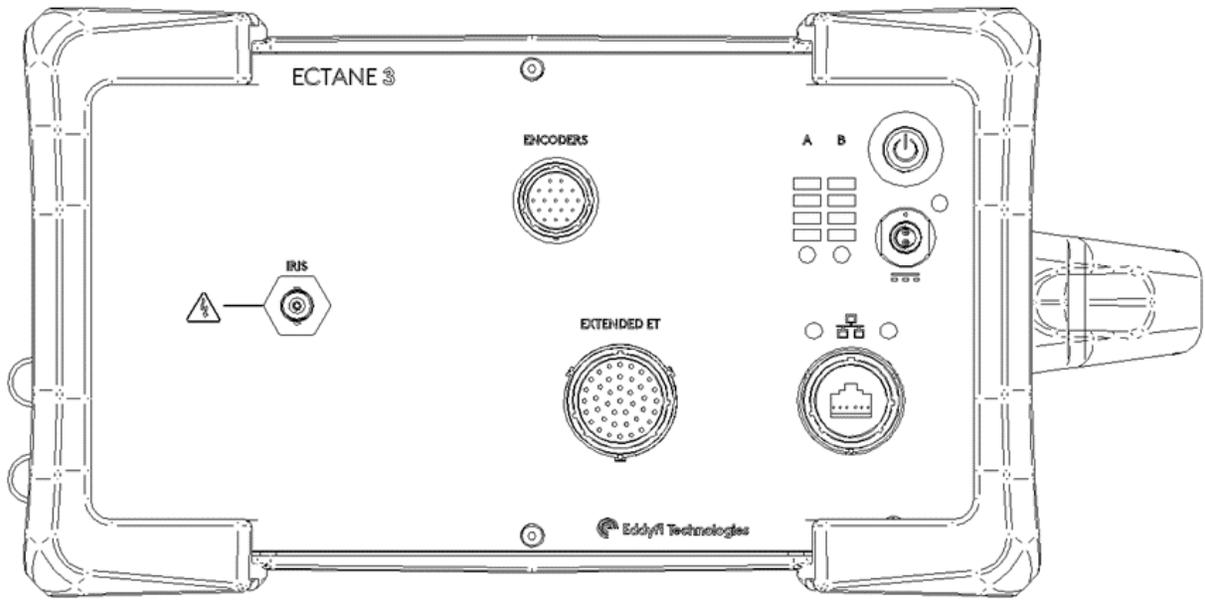


Figure 4-4 - Ectane 3 I

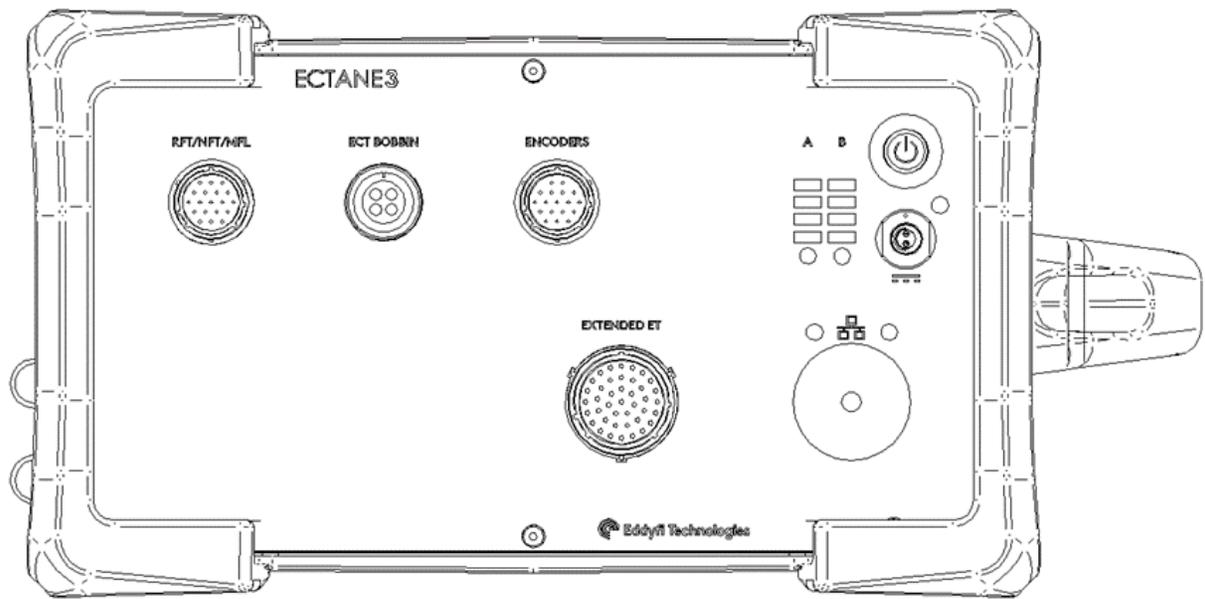


Figure 4-5 - Ectane 3 ERNM

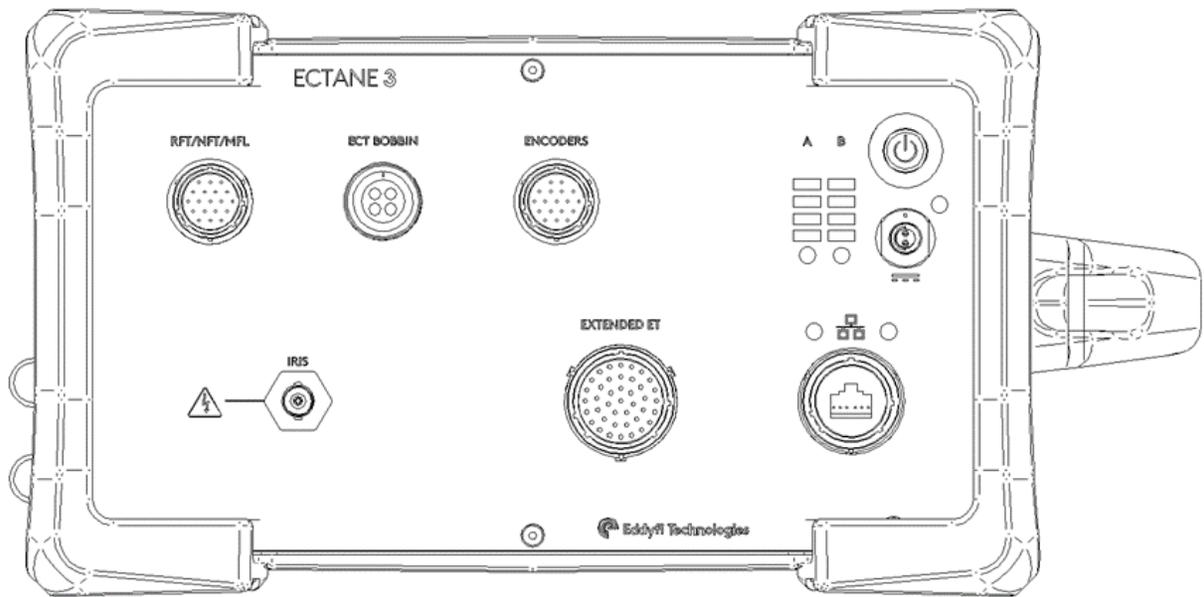


Figure 4-6 - Ectane 3 ERNMI

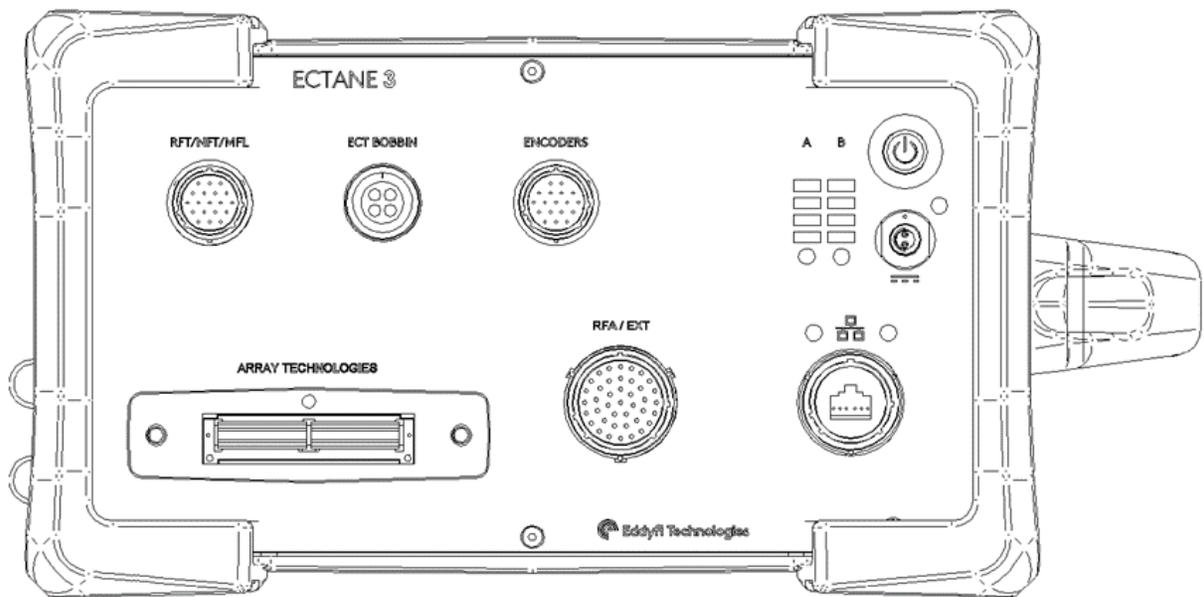


Figure 4-7- Ectane 3 E64RNM and E128RNM

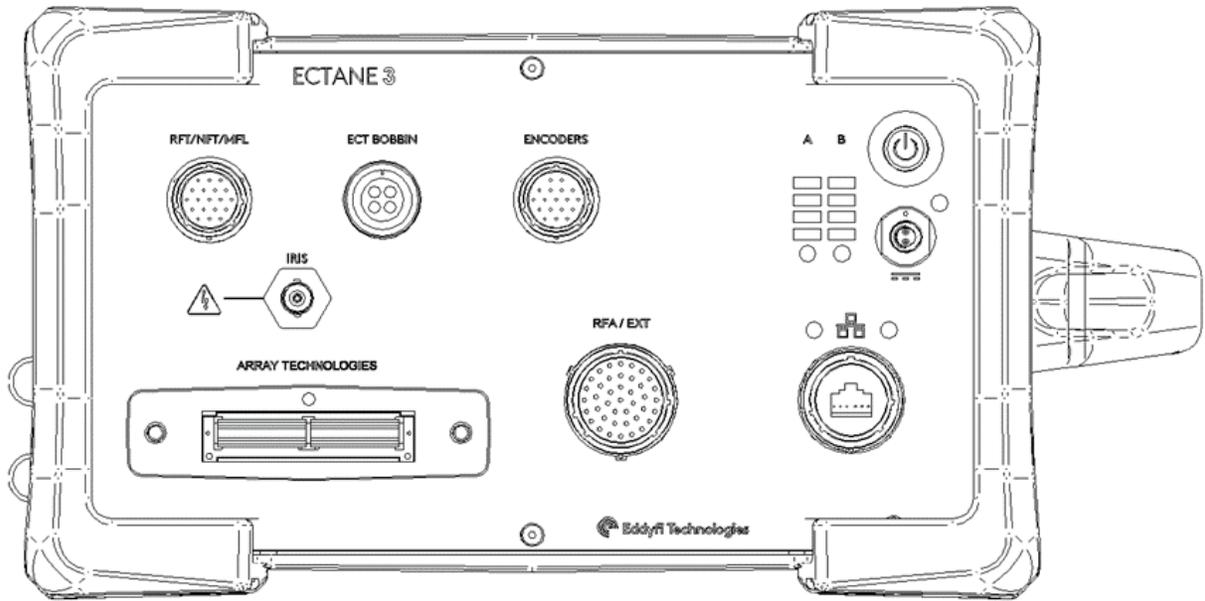


Figure 4-8- Ectane 3 E64RNMI and E128RNMI

## 5. Carrying Handle

The handle on the Ectane 3 can be used to lift and carry the instrument.

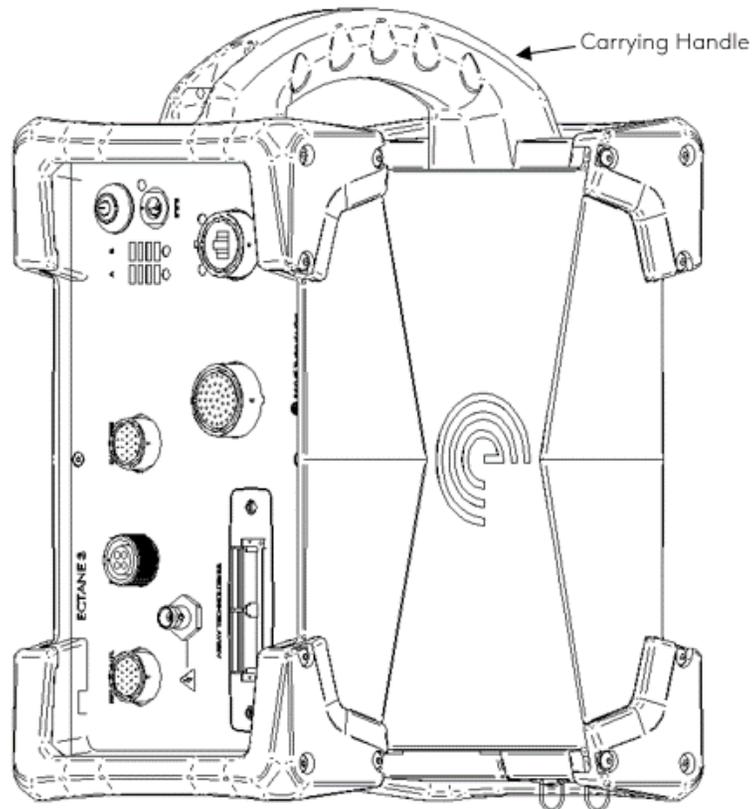


Figure 5-1 – Carrying handle

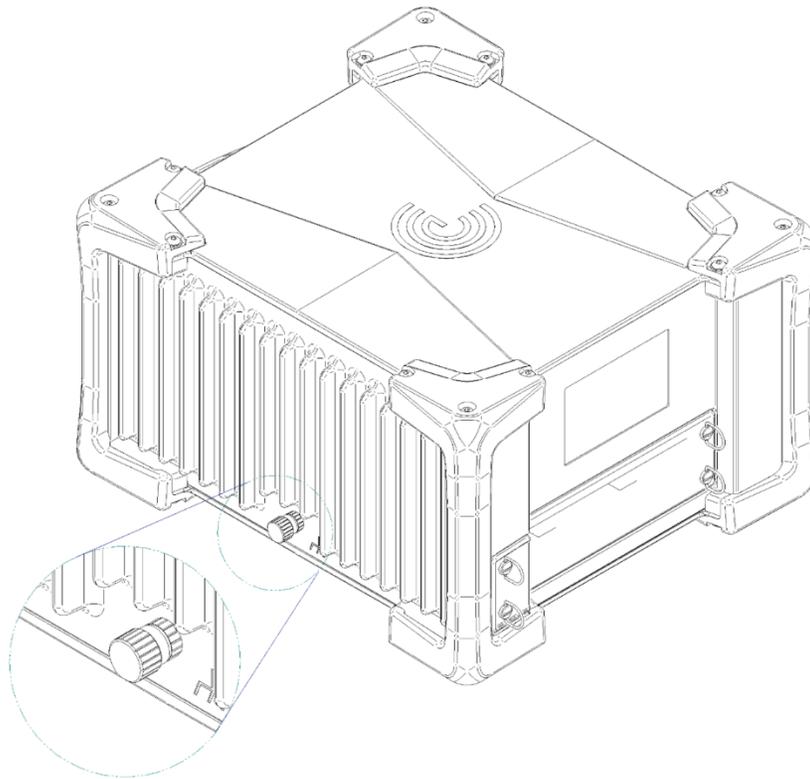
## 6. Chassis Ground Connector

The ground connector, which is used to ground the Ectane 3's chassis when the situation requires it, is found at the rear of the instrument.

### **WARNING!**



**This instrument must be connected according to the manufacturer's instructions to prevent risks of electric shocks. A bad grounding may produce a short circuit that can damage the electronic components or cause electric shocks.**



**Figure 6-1 - Chassis ground connector**

The ground connector is a simple screw that you remove to insert the ground wire, putting the screw back in to secure the connection.

## **7. Battery Compartment**

The Ectane 3 can be powered by an external AC/DC supply or by two, high-power batteries. The batteries are accessible from a side access panel, as shown Figure 7-1. See Chapter 4, Battery Precautions, for more information.

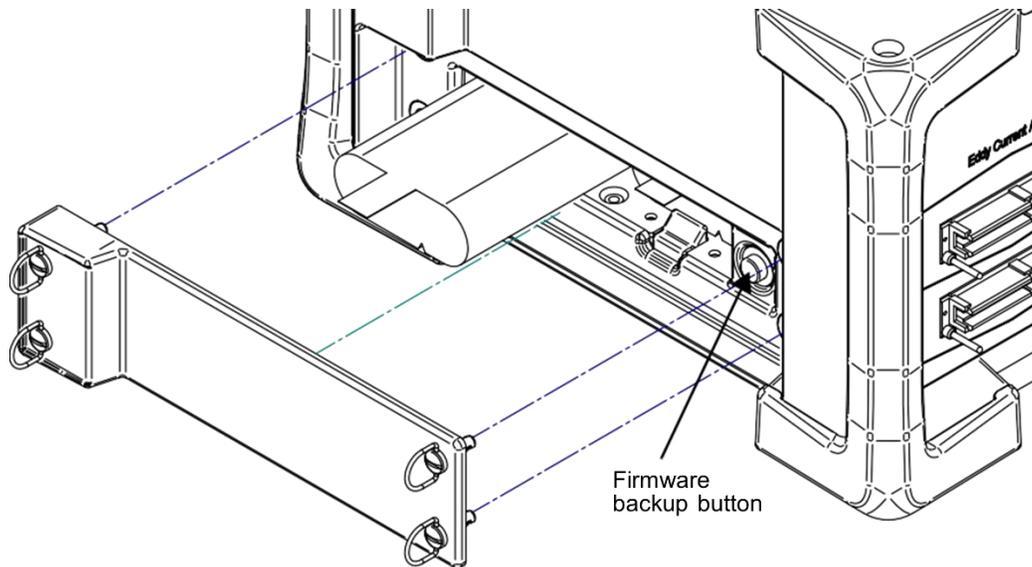


Figure 7-1 - Battery compartment

**IMPORTANT:** Certain events such as a disconnection during download can cause the firmware to become corrupted. This issue may cause Magnifi to be unable to connect to the instrument or download a new version of firmware. This can be fixed by using the firmware backup button. Hold down this button and turn on the instrument. You must hold down the button for 5 seconds after turning on the instrument. This will reset the firmware. You can then try connecting the instrument to Magnifi again and/or downloading the new firmware.

# Chapter 3: Preparing the Instrument

# 1. Setting Up the Instrument

To properly set up the Ectane® 3:

1. Remove the instrument from its transportation case.
2. Position the instrument on a level and stable surface. You can position it horizontally or vertically.

|  |  |
|--|--|
| <b>WARNING!</b><br> | <b>Never use the instrument when it is upside down (batteries on top). This position prevents the batteries from properly dissipating heat and can lead the Ectane 3 to enter its power safe mode. For details about the power safe mode, see Environmental Conditions on page 53.</b> |
|--|--|

**IMPORTANT** Regardless of how you position the instrument, you must *always have a minimum clearance of 10 cm (4 in.)* on all sides of the instrument. Always position the instrument away from heat sources. This ensures proper heat dissipation while the instrument is in use.

**CAUTION** When in use, and depending on the loaded setup, the instrument can generate a non-negligible amount of heat. It should not cause any kind of harm but can prove uncomfortable to the touch. Therefore, when moving the instrument, always use the carrying handle.



## 2. Connection Procedure

To connect the instrument, follow these instructions.

1. Install the Ectane 3 away from heat sources, leaving a minimum clearance of 10 cm (4 in.) to allow for heat dissipation.
2. Using an Ethernet cable, connect the Ectane 3 to the computer.
3. Using the appropriate cables, connect the components required by your setup to the corresponding Ectane 3 connector. See Connection Configurations for more details.

## 3. Connection Configurations

The Ectane 3 allows various test configurations shown in the following figures.

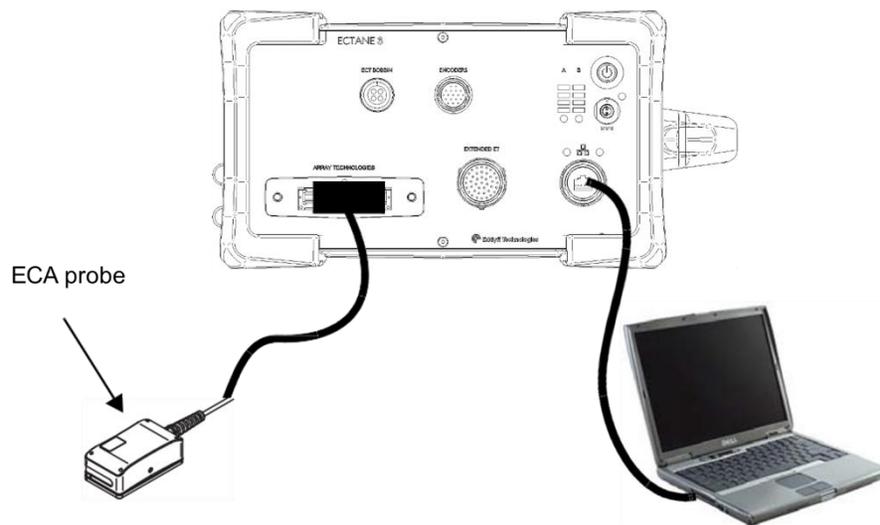


Figure 3-1 - Typical configuration 1: Ectane 3 E64 or E128 with SmartMUX™

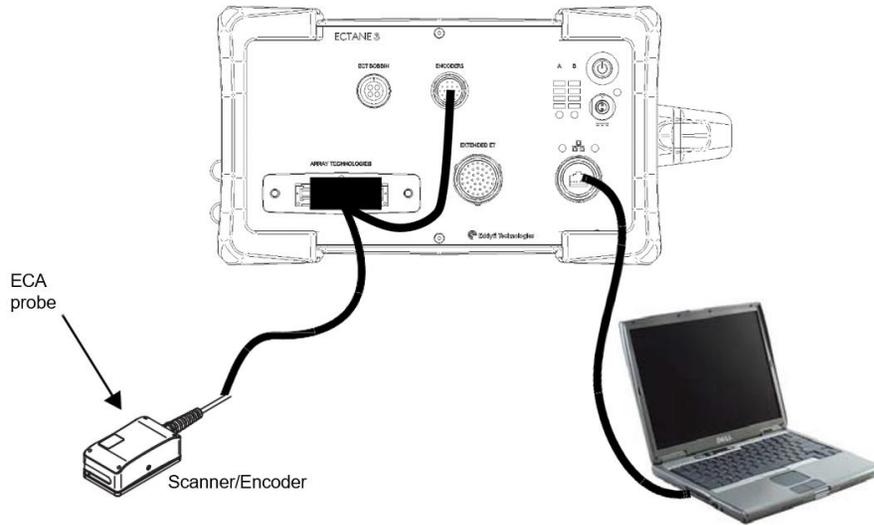


Figure 3-2 - Typical configuration 2: Ectane 3 with SmartMUX, scanner, and probe

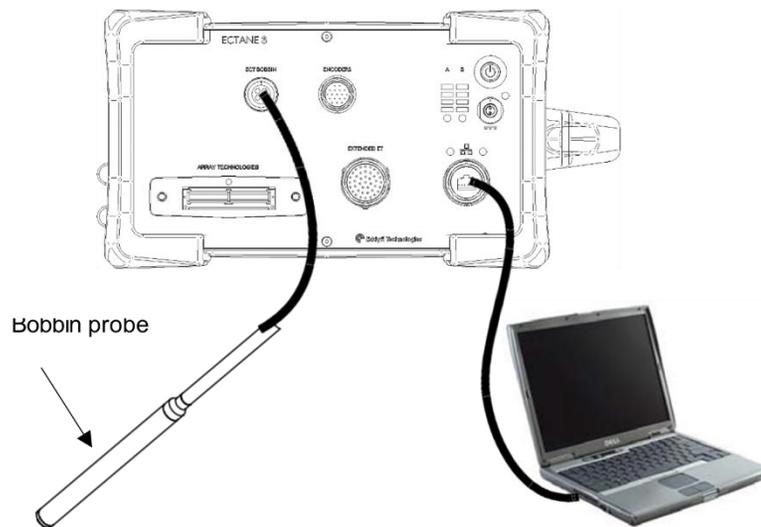


Figure 3-3 - Typical configuration 3: Ectane 3 E64 and E128 with ECT probe

## 4. Starting the Instrument

Once you have properly connected all the components of your inspection setup, you can start the Ectane 3.

1. Connect the power adapter to the power cord.

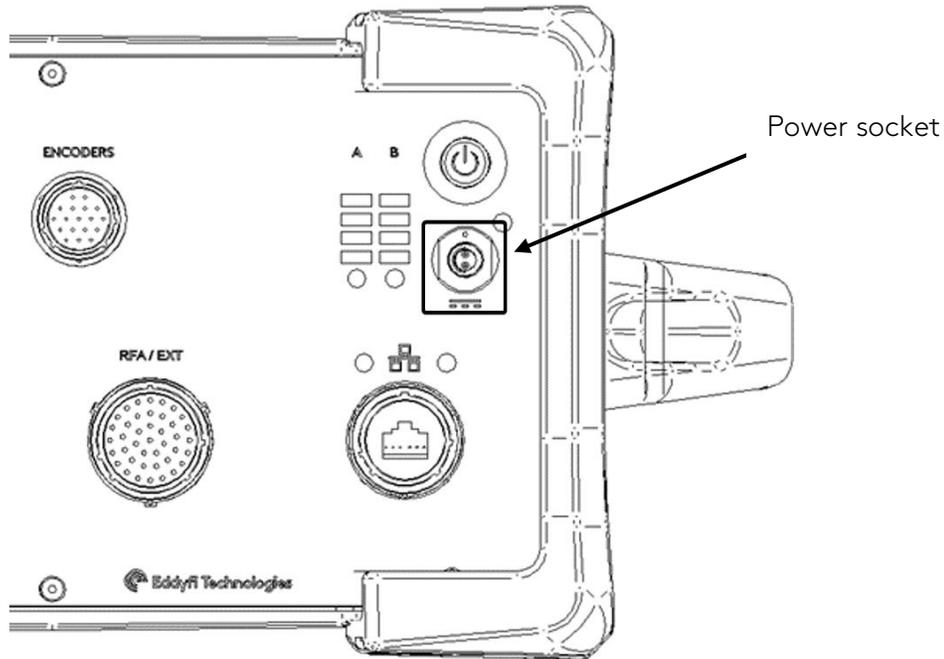


Figure 4-1 – Power socket

2. Connect the power adapter to the power socket on the front of the Ectane 3.
3. Connect the power cord to the power outlet.
4. If batteries are present, they will automatically start charging. The light indicator will give the information.
5. Press the power button until it clicks. The power button lights up orange.

## 5. Understanding Indicators

There are various indicators on the front panel of the Ectane 3. The following pages explain the behaviors of these indicators.

### Power Indicators

Two indicators are assigned to the instrument's power status:

- Power button indicator

LED integrated in the power button. Lights up orange when the Ectane 3 is ON.

- External power indicator

Lights up green when the external AC adapter is connected and powered.

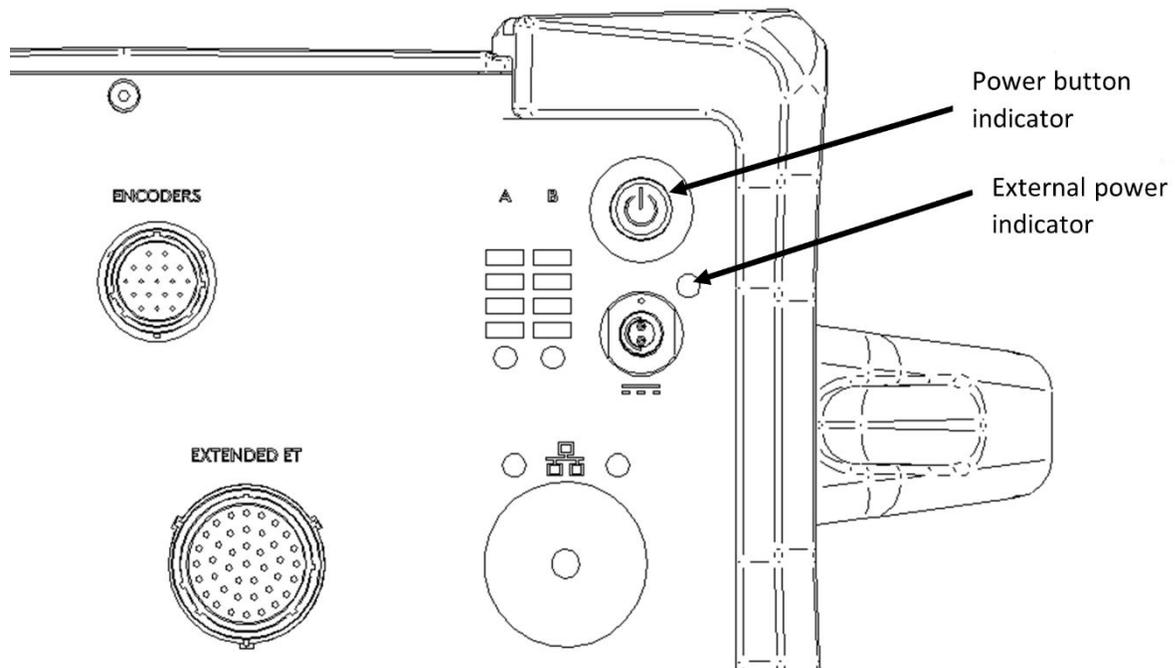


Figure 5-1 - Power indicators

## 6. Battery Indicators

Each battery has its own charge level indicator and charging status indicator.

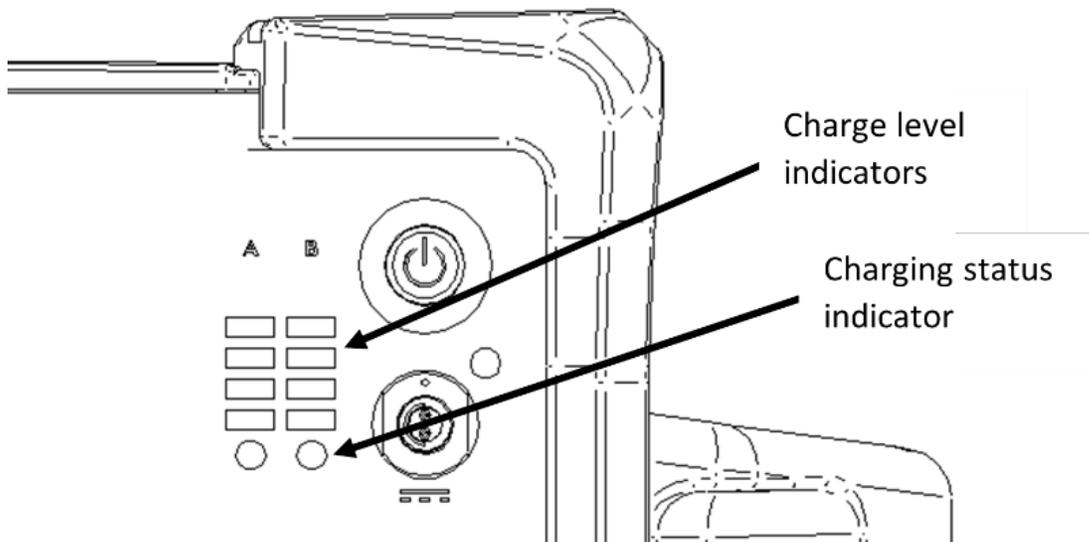


Figure 6-1 - Battery B indicators

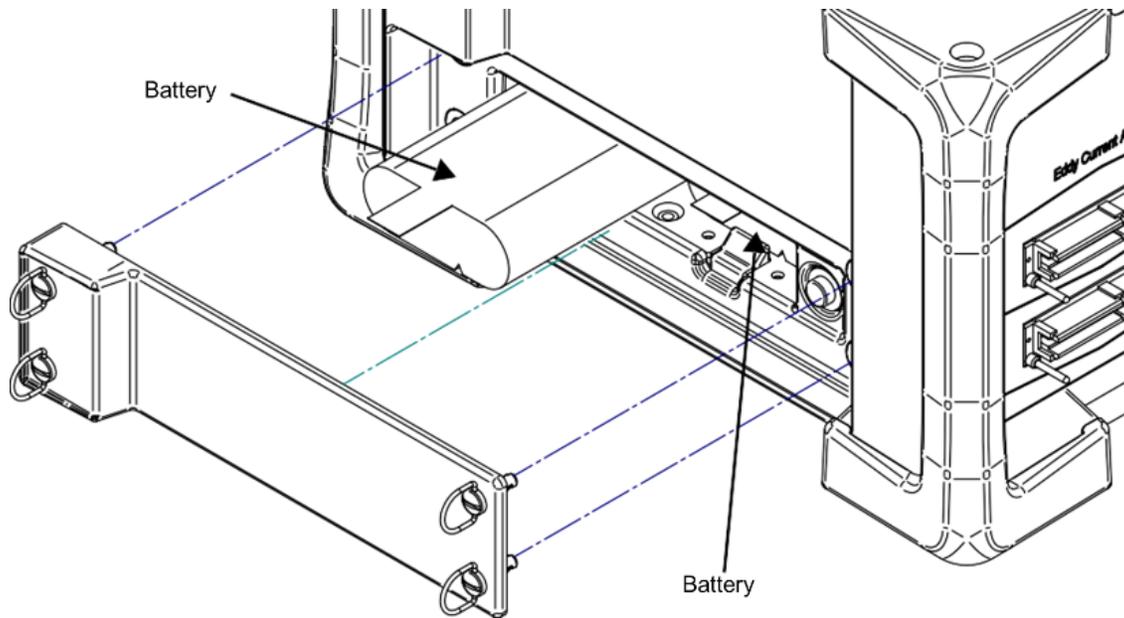


Figure 6-2 - Battery corresponding to battery indicators

Charge level indicators light up and blink depending on each battery's charge level, as explained below:

|                                 |                         |
|---------------------------------|-------------------------|
| LED 1 (from bottom) is blinking | Charge is less than 10% |
| LED 1 is solid                  | Charge is over 10%      |
| LED 2 is solid                  | Charge is over 25%      |
| LED 3 is solid                  | Charge is over 50%      |
| LED 4 is solid                  | Charge is over 75%      |

Charging status indicators can have one of five states:

|                          |   |
|--------------------------|---|
| Off                      | When the following two conditions are present: <ul style="list-style-type: none"> <li>• no external power</li> <li>• instrument is off</li> <li>• no batteries are installed</li> </ul> |
| Green is solid           | Battery is fully charged  |
| Orange is solid          | Battery is charging   |
| Orange is blinking       | Instrument shutdown due to low battery power  |
| Orange-green is blinking | Instrument shutdown due to overheating  |

---

**Note**      *Indicators are set off for up to 1 minute when the instrument is turned on.*

---

---

**Note**      *In the event that the Ectane 3 shuts down because of low battery power or overheating, the instrument automatically starts again once the shutdown condition clears.*

---

## 7. Connection Indicators

Just above the Ethernet port, two indicators provide the state of the communications between the Ectane 3 and your workstation.

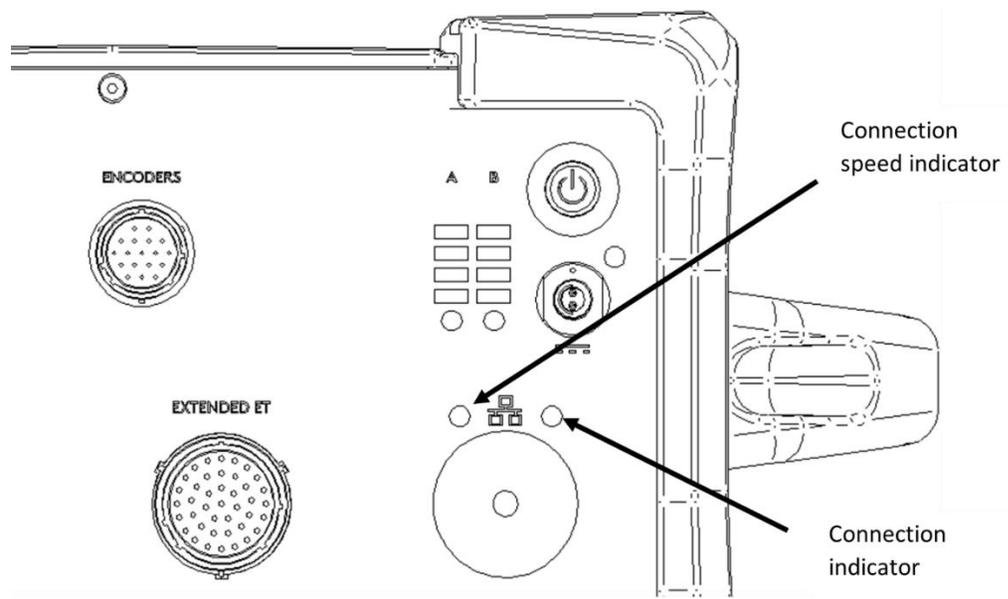


Figure 7-1 - Connection indicators

The connection speed indicator can be in one of three states:

|                 |  |
|-----------------|--|
| Orange is solid | Gigabit Ethernet communication is established  |
| Green is solid  | 100 Mbps Ethernet communication is established |
| Off             | 10 Mbps Ethernet communication is established  |

The connection indicator can be in one of three states:

|                   |   |
|-------------------|---|
| Green is blinking | Communication activity between the Ectane 3 and the workstation       |
| Green is solid    | Communication is established between the Ectane 3 and the workstation |
| Off               | No link between Ectane 3 and the workstation                          |

# Chapter 4: Managing Batteries

## 1. General

The Ectane® 3 uses lithium-ion rechargeable batteries. This type of battery does not suffer from the memory effect affecting previous generations of batteries.

### **WARNING!**



**Whenever carrying the Ectane 3 in its transport case, *remove the batteries from the instrument* and make sure that they cannot come in contact during transport, as this poses a significant fire and explosion hazard.**

**When carrying the Ectane 3, it is the user's responsibility to make sure that the safety precautions used are in accordance with the local department of transportation's (or equivalent governing body) rules and regulations.**

**The transport case of the Ectane 3 comes with two slots, fitted to receive batteries when they are removed from the instrument.**

---

#### **Note**

*Make sure that you do not replace the batteries by batteries other than the original lithium-ion rechargeable batteries from Emerging Power.*

---

## 2. Charging the Batteries

The Ectane 3 batteries recharge automatically when they are in the instrument when it is connected to a power outlet and turned on.

---

#### **Note**

*Batteries do not recharge when their internal temperature exceeds 45°C (113°F). Batteries also do not power the Ectane if the instrument's internal temperature exceeds 55°C (131°F).*

---

An optional external charger is available from Eddyfi. It conditions and calibrates the batteries. This is important to maximize their useful life and to ensure accurate readings for the battery charger indicator in Magnifi®.

Eddyfi recommends calibrating batteries at least every six months (for more information about calibrating your batteries, see *Calibrating Batteries* on page 60).

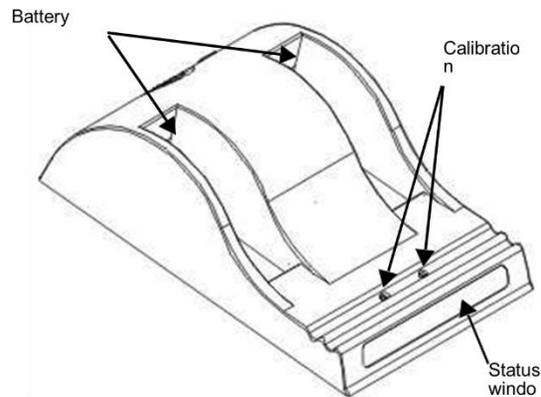


Figure 2-1- Battery charger

To charge the batteries with the optional external charger:

1. Place the charger on a flat and level surface, *away from heat and moisture sources*.
2. Insert the power supply's DC connector into the back of the external charger.
3. Connect the power supply to an AC supply using the supplied cable. All the LEDs flash momentarily to let you know that power is present.
4. Place the batteries into either battery bay, making sure that the 5-way connectors are fully seated. The LEDs in the status window display status information and the charger automatically begins charging the batteries.

### 3. Battery Charger LED Status Indicator

When batteries are in the charger, status LEDs in the status window display various information:

|                  |                                      |
|------------------|--------------------------------------|
| Green (blinking) | Battery is charging                  |
| Green (solid)    | Battery is fully charged             |
| Blue (blinking)  | Battery calibrating                  |
| Blue (solid)     | Battery fuel gauge calibrated        |
| Red (blinking)   | Battery gauge in need of calibration |
| Red (solid)      | Error                                |

## 4. Removing the Batteries

The batteries can remain in the Ectane 3 if so desired. However, there are times when you must remove them from Ectane 3 (e.g., for calibration purposes or before placing the instrument on an airplane).

To remove the batteries:

1. Turn each screw of the battery compartment door counter-clockwise a quarter of a turn.
2. The battery compartment door pops out.

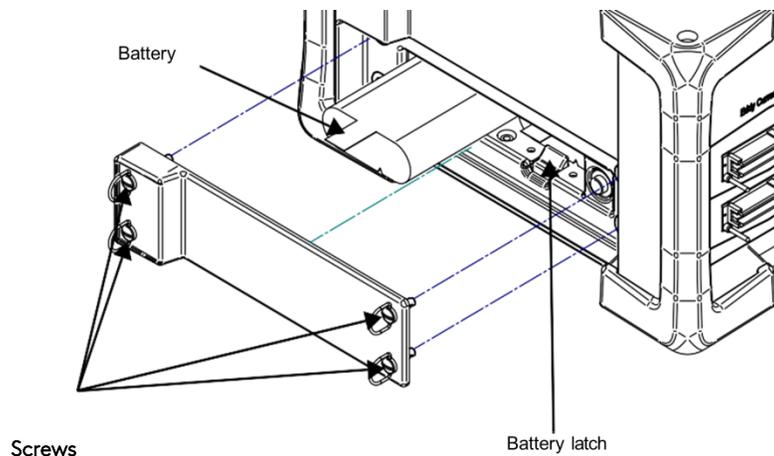


Figure 4-1 - Opening the battery compartment door

---

**Note**      *The screws are attached to the compartment door.*

---

3. Press down the latch holding the battery in place.
4. Pull the battery tab. The battery slides out.

---

**Note**      *The battery compartment is designed to hold the batteries firmly. You may need to use a certain amount of force to pull the batteries out.*

---

## 5. Hot-Swapping Batteries

You can remove the batteries in the Ectane 3 one at a time when the instrument is turned on. The Ectane 3 can run on only one battery.

Should the power left in the remaining battery be insufficient to keep the Ectane 3 running, the instrument will shut down without damaging electronic components. However, all the work in progress in Magnifi (acquisition, etc.) will be lost.

## 6. Understanding Battery Indicators

Each battery has its own charge level indicator and charging status indicator. For details about which charge level indicator relates to what battery, see Understanding Battery Indicators on 30.

See Figure 6-1 - Battery B indicators for details on the location of the indicators.

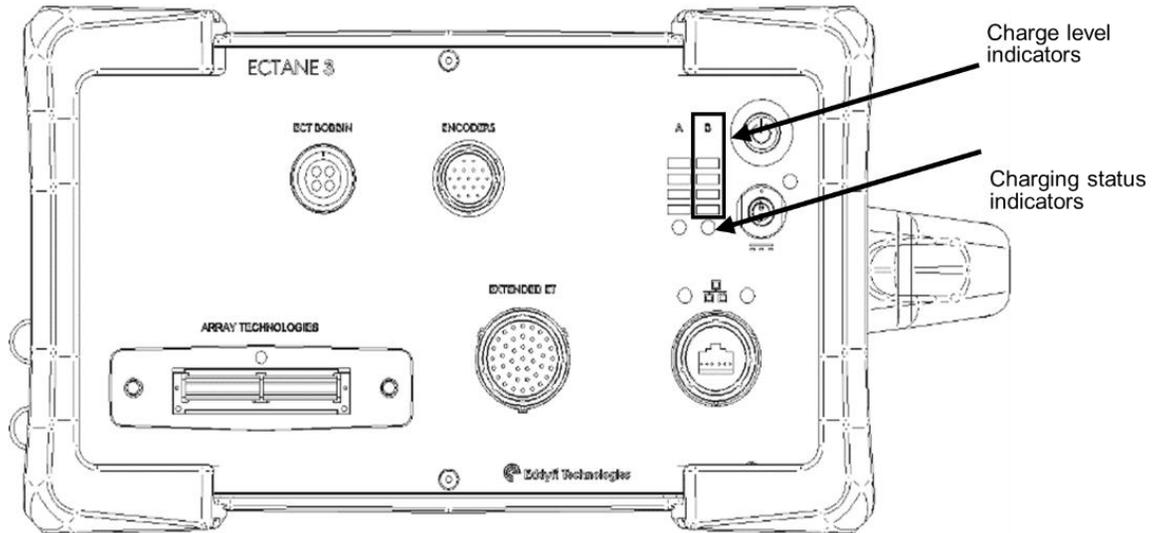


Figure 6-1 - Battery B indicators

# Chapter 5: Connector References

# 1. EXTENDED ET Connector (41 pins)

The EXTENDED ET connector is used to connect ECT and RFA probes (with the right instrument version). The signals of the EXTENDED ET connector are the generator outputs, the channel amplifier inputs, and a DC power supply. Multiplexing outputs are also available but restricted to specific instrument versions and multiplexer models.

|                           |   |
|---------------------------|---|
| Description               | 41-pin, female, shell 20 connector                              |
| Manufacturer, number      | Amphenol 58-570127-41S  |
| Suggested cable connector | ITT Cannon, KPT06B20-41P<br><i>or,</i><br>Amphenol PT06J-20-41P |

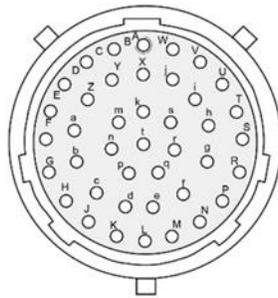


Figure 1-1 - EXTENDED ET connector

Table 1 – Extended ET connector pinouts

| Pin                 | I/O     | Signal                 | Description                                      |
|---------------------|---------|------------------------|--|
| A                   | Output  | ECT1 generator         | ECT1 generator output                            |
| B, C, D, E, F, G, H | Outputs | ECT1 Generator / 100 Ω | ECT1 generator outputs through 100 Ω             |
| J                   | -       |                        | Multiplexer mode selection                       |
| K                   | Input   | Identification         | Probe identification                             |
| L                   | -       | GND                    | Power supply ground to the instrument and casing |
| M                   | Output  | ECT2 generator         | ECT2 generator output                            |
| N, P                | Outputs | ECT2 Generator / 100 Ω | ECT2 generator outputs through 100 Ω             |

| Pin | I/O    | Signal                        | Description   |
|-----|--------|-------------------------------|---|
| R   | Output | ECT2 Generator / 100 $\Omega$ | ECT2 generator outputs through 100 $\Omega$ (if external MUX and motor encoder are not connected) |
|     | Input  | Motor rotation +              | Motor rotation feedback (if motor feedback is connected)  |
| S   | Output | ECT2 Generator / 100 $\Omega$ | ECT2 generator outputs through 100 $\Omega$ (if external MUX and motor encoder are not connected) |
|     | Input  | Motor rotation -              | Motor rotation feedback (if motor feedback is connected)  |
| T   | Output | MUX 0                         | Multiplexing signal output (bit 0) (if pin J is not grounded)                                     |
|     |        | CLK -                         | Clock - signal (if pin J is grounded)   |
| U   | Output | MUX 1                         | Multiplexing signal output (bit 1) (if pin J is not grounded)                                     |
|     |        | CLK +                         | Clock + signal (if pin J is grounded)   |
| V   | Output | MUX 2                         | Multiplexing signal output (bit 2) (if pin J is not grounded)                                     |
|     |        | +12.5 V supply                | +12.5 V supply voltage (if pin J is grounded)   |
| W   | Output | MUX 3                         | Multiplexing signal output (bit 3) (if pin J is not grounded)                                     |
|     |        | -12.5 V supply                | -12.5 V supply voltage (if pin J is grounded)   |
| X   | -      | GND                           | Power supply ground to the instrument and casing  |
| Y   | Output | -15 V supply                  | -15 V supply voltage (600 m A max.)   |
|     |        | Motor -                       | Probe motor drive (0-24 V, 2.0 A max., 10 W max.)   |
|     |        | SC -                          | Current source (1 A max., 10 W max.)  |
| Z   | Input  | In1 + input                   | Positive input of input amplifier 1   |
| a   | Input  | In1 - input                   | Negative input of input amplifier 1   |

| Pin      | I/O    | Signal                          | Description   |
|----------|--------|---------------------------------|---|
| <b>b</b> | Input  | In2 + input                     | Positive input of input amplifier 2   |
| <b>c</b> | Input  | In2 - input                     | Negative input of input amplifier 2   |
| <b>d</b> | Input  | In3 + input                     | Positive input of input amplifier 3   |
| <b>e</b> | Input  | In3 - input                     | Negative input of input amplifier 3   |
| <b>f</b> | Input  | In4 + input                     | Positive input of input amplifier 4   |
| <b>g</b> | Input  | In4 - input                     | Negative input of input amplifier 4   |
| <b>h</b> | -      | GND                             | Power supply ground to the instrument and casing  |
| <b>i</b> | Input  | In5 + input                     | Positive input of input amplifier 5   |
| <b>j</b> | Input  | In5 - input                     | Negative input of input amplifier 5   |
| <b>k</b> | Input  | In6 + input                     | Positive input of input amplifier 6   |
| <b>m</b> | Input  | In6 - input                     | Negative input of input amplifier 6   |
| <b>n</b> | Input  | In7 + input                     | Positive input of input amplifier 7   |
| <b>p</b> | Input  | In7 - input                     | Negative input of input amplifier 7   |
| <b>q</b> | Input  | In8 + input                     | Positive input of input amplifier 8   |
| <b>r</b> | Input  | In8 - input                     | Negative input of input amplifier 8   |
| <b>s</b> | -      | GND                             | Power supply ground to the instrument and casing  |
| <b>t</b> | Output | +15 V supply<br>Motor +<br>SC + | +15 V supply voltage (600 mA max.)<br>Probe motor drive (0–24 V, 2.0 A max., 10 W max.)<br>Current source (1 A max., 10 W max.) |

## RFT/NFT/MFL Connector (19 pins)

The RFT/NFT/MFL connector is used to connect the Remote-Field Testing (RFT), Near-field Testing (NFT) and Magnetic Flux Leakage (MFL) probes. The signals contained in the RFT/NFT/MFL connector are the generator outputs, the channel amplifier inputs, and a DC power supply.

|                           |   |
|---------------------------|---|
| Description               | 19-pin, female, shell 14 connector                                |
| Manufacturer, number      | Amphenol, 58-570124-19S<br><i>or</i><br>Souriau 851-02E1419S50A7  |
| Suggested cable connector | ITT Cannon, KPT06A14-19P027<br><i>or</i><br>Amphenol PT06J-14-19P |

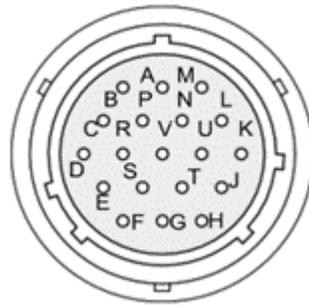


Figure 0-1 – RFT/NFT/MFL connector

Table 2 – RFT/NFT/MFL connector pinouts

| Pin | I/O    | Signal                  | Description                                    |
|-----|--------|-------------------------|--|
| A   | -      | GND                     | Ground   |
| B   | Input  | RFT_IN 4-<br>MFL4_IN 4- | Negative RFT input #4<br>Negative MFL input #4 |
| C   | Input  | RFT_IN 3+<br>MFL_IN 3+  | Positive RFT input #3<br>Positive MFL input #3 |
| D   | Input  | RFT_IN 3-<br>MFL3_IN 3- | Negative RFT input #3<br>Negative MFL input #3 |
| E   |        | +15 V supply            | +15 V supply voltage, 600 mA max.              |
| F   | Output | Drive2_OUT              | Coil driver #2 output                          |

| Pin | I/O    | Signal                 | Description                                    |
|-----|--------|------------------------|--|
| G   | -      | GND                    | Ground   |
| H   | Output | Drive1_OUT             | Coil driver #1 output                          |
| J   |        | -15 V supply           | -15 V supply voltage, 600 mA max.              |
| K   | Input  | RFT_IN 2+<br>MFL_IN 2+ | Positive RFT input #2<br>Positive MFL input #2 |
| L   | Input  | RFT_IN 2-<br>MFL_IN 2- | Negative RFT input #2<br>Negative MFL input #2 |
| M   | Input  | RFT_IN 1+<br>MFL_IN 1+ | Positive RFT input #1<br>Positive MFL input #1 |
| N   | Input  | RFT_IN 1-<br>MFL_IN 1- | Negative RFT input #1<br>Negative MFL input #1 |
| P   | Input  | RFT_IN 4+<br>MFL_IN 4+ | Positive RFT input #4<br>Positive MFL input #4 |
| R   | -      | GND                    | Ground   |
| S   | Input  | Identification         | Probe identification                           |
| T   | -      | NC                     | No connection                                  |
| U   | -      | GND                    | Ground   |
| V   | -      | GND                    | Ground   |

## 2. ECT BOBBIN Connector (4 pins)

The ECT BOBBIN connector allows you to connect standard 4-pin inspection probes.

|                           |                                   |
|---------------------------|-----------------------------------|
| Description               | 4-pin, female, shell 14 connector |
| Manufacturer, number      | Amphenol ACS02A-14S-2S (472)      |
| Suggested cable connector | Amphenol 97-3106A-14S-2P          |

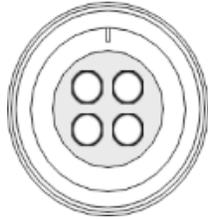


Figure 2-1 – ECT Bobbin connector

Table 3 ECT Bobbin connector pinouts

| Pin | Signal          |
|-----|-----------------|
| A   | Bobbin Abs/Diff |
| B   | Bobbin Diff     |
| C   | GND             |
| D   | GND             |

### 3. ENCODERS Connector (18 pins)

The ENCODERS connector allows the instrument to send and receive various signals such as the acquisition start and stop commands, the encoder and rotation synchronization signals, the relay outputs, etc.

|                           |  |
|---------------------------|--|
| Description               | 18-pin, female, shell 14 connector                             |
| Manufacturer, number      | Amphenol 58-570124-18S   |
| Suggested cable connector | ITT Cannon, KPT06B14-18P<br><i>or</i><br>Amphenol PT06J-14-18P |

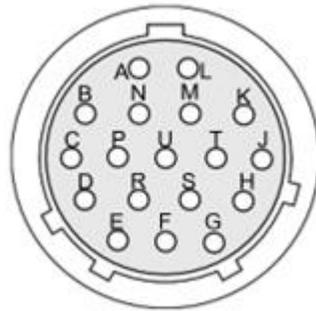


Figure 3-1 – Encoders connector

Table 4 – Encoders connector pinouts

| Pin | I/O       | Signal      | Description  |
|-----|-----------|-------------|--|
| A   | TTL Input | Φ B1        | Phase B axis 1   |
| B   | Output    | CLK_ACQ_OUT | Acquisition clock output (open drain with 10 kΩ pull-up)         |
| C   | TTL Input | Φ A2        | Phase A axis 2   |
| D   | -         | GND         | Encoders ground  |
| E   | TTL Input | Input 1     | User-defined input for software and hardware function activation |
| F   | TTL Input | Input 3     | User-defined input for software and hardware function activation |
| G   | TTL Input | Input 2     | User-defined input for software and hardware function activation |

| Pin | I/O           | Signal               | Description   |
|-----|---------------|----------------------|---|
| H   | Output        | Alarm                | Used to indicate that the probe is in the air (for tube inspections) (open drain with 10 k $\Omega$ pull-up). |
| J   | Relay contact | Relay 2              | Relay used for automatic acquisition sequence control   |
| K   | Relay contact | Relay 3              | Relay used for automatic acquisition sequence control   |
| L   | Relay contact | Relay 1              | Relay used for automatic acquisition sequence control   |
| M   | TTL Input     | CLKACQ               | Receives signal to trigger acquisition with probe position along the scanning axis                            |
| N   |               | NC                   | No connection - Reserved  |
| P   | TTL Input     | $\Phi$ B2            | Phase B axis 2  |
| R   | TTL Input     | $\Phi$ A3<br>Input 5 | Phase A axis 3<br>User-defined input for automatic acquisition sequence                                       |
| S   | Supply Output | +5 V                 |   |
| T   | TTL Input     | $\Phi$ B3<br>Input 4 | Phase B axis 3<br>User-defined input for automatic acquisition sequence                                       |
| U   | TTL Input     | $\Phi$ A3            | Phase A axis 3  |

## 4. IRIS Connector

The IRIS connector allows the instrument to control IRIS probes using the ultrasound technology.

|                           |                                    |
|---------------------------|------------------------------------|
| Description               | BNC Adapter, bulkhead, 50 $\Omega$ |
| Manufacturer, number      | Amphenol RF - AD-BNCJBNCJ-4        |
| Suggested cable connector | POMONA, 2249-C-120                 |

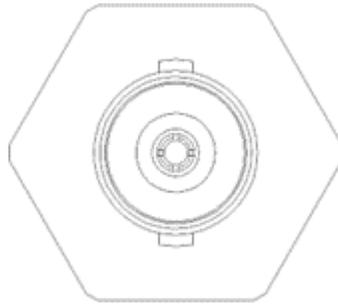


Figure 4-1 – IRIS connector

Table 5 – IRIS connector pinouts

| Pin    | Signal         | Description                              |
|--------|----------------|--|
| Center | Pulser output  | Ultrasound pulser outputs and ultrasound |
|        | Receiver input | receiver input                           |
| Shell  | Ground         | Power supply common to instrument casing |

## 5. Eddy Current Array Connectors

On Ectane 3 instruments equipped with the SmartMUX™ option, 160-pin connectors are available on the front of the instrument, under EDDY CURRENT ARRAY. These connectors are specific and designed by Eddyfi.

For details about the Eddyfi 160-pin connectors, contact Eddyfi directly at [info@eddyfi.com](mailto:info@eddyfi.com).

## 6. Ethernet Connector

The Ethernet connector is used to connect the Ectane 3 to a workstation through an Ethernet link. Eddyfi supplies a high-quality, military-grade circular Ethernet connector and cable. International Ethernet standards are used.

|                      |                                      |
|----------------------|--------------------------------------|
| Description          | RJ45, female connector               |
| Manufacturer, number | PEI Genesis, Amphenol<br>RJF22B00SCC |

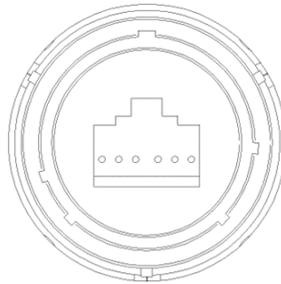


Figure 6-1 – Ethernet connector

Table 6 – Ethernet connector pinouts

| Pin | I/O           | Signal | Description           |
|-----|---------------|--------|-----------------------|
| 1   | Bidirectional | Bi DA+ | Bidirectional pair A+ |
| 2   | Bidirectional | Bi DA- | Bidirectional pair A- |
| 3   | Bidirectional | Bi DB+ | Bidirectional pair B+ |
| 4   | Bidirectional | Bi DC+ | Bidirectional pair C+ |
| 5   | Bidirectional | Bi DC- | Bidirectional pair C- |
| 6   | Bidirectional | Bi DB- | Bidirectional pair B- |
| 7   | Bidirectional | Bi DD+ | Bidirectional pair D+ |
| 8   | Bidirectional | Bi DD- | Bidirectional pair D- |

**IMPORTANT** The Ectane 3 must be linked to a workstation with at least a category 5e, shielded, Ethernet cable.

# Chapter 6: Specifications

# 1. General

This section presents the general specifications of the Ectane 3.

## System

|                                 |                     |
|---------------------------------|---------------------|
| Warm-up <sup>a</sup>            | 15 minutes          |
| Workstation link                | Ethernet 1000BASE-T |
| Transfer rate on Ethernet cable | 1 Gbps              |

<sup>a</sup>The warm-up time corresponds to the time required by the unit to reach its optimal accuracy after it is turned on. Eddyfi recommends waiting until the end of the warm-up period before balancing probes or performing acquisitions.

## Power Requirements

|                               |  |
|-------------------------------|--|
| Power configuration           | 100 W external AC/DC power supply of 15 VDC or battery (removable) |
| Voltage                       | 100 – 240 VAC, ±10 %   |
| Frequency                     | 50 / 60 Hz   |
| Maximum input current         | 1.5 A  |
| Battery type                  | Li204SX-7800 rechargeable<br>Lithium- ion, DOT-compliant           |
| Battery autonomy <sup>a</sup> | 8 hours  |

<sup>a</sup> Typical (with two batteries in the instrument)

## Environmental Conditions

|                         |   |
|-------------------------|---|
| Operating temperature   | 0°C to 45°C (32°F to 113°F)                 |
| Storage temperature     | -20°C to 60°C (-4°F to 140°F)               |
| Relative humidity       | 95%, non-condensing                         |
| Pollution degree rating | 2   |
| Protection              | IP65  |
| Compliance              | ASME, EN61010-1, EMC, CE,<br>WEEE, and RoHS |

<sup>a</sup> The Ectane 3 warns you through Magnifi® when its operating temperature reaches 65°C (149°F), and then enters power safe mode to better protect itself when the operating temperature reaches 70°C (158°F). In power safe mode, some internal circuitry shuts down, acquisitions are stopped, and the instrument becomes inactive for work purposes until the condition that initiated the power safe mode is corrected.

## Housing

|   |   |
|---|---|
| Dimensions (WxHxD)                      | 279.6 mm × 254 mm × 158.8 mm<br>(11.0 in. × 10.0 in. × 6.25 in.)<br>(identical to Ectane 2) |
| Net weight, with batteries <sup>a</sup> | 6.8 kg (15 lb)  |
| Net Weight, without<br>batteries        | 5.9 kg (13 lb)  |

<sup>a</sup> Ectane 3 E64 or E128 with batteries.

## Ethernet Cable

|                |                                |
|----------------|--------------------------------|
| Type           | At least category 5e, shielded |
| Maximum length | 100 m (328 ft)                 |

## Motor Drive for Rotating Probes

|                                   |        |
|-----------------------------------|--------|
| Voltage                           | 0-24 V |
| Maximum peak output current       | 2 A    |
| Maximum continuous output current | 1 A    |
| Maximum continuous power          | 10 W   |

## Current Source for Saturation Probes

|                        |       |
|------------------------|-------|
| Range                  | 0-1 A |
| Maximum output power   | 10 W  |
| Maximum output voltage | 15 V  |

## 2. Inspection Techniques

This section presents the Ectane 3's operating specifications by inspection technique.

### Eddy Current Testing (ECT)

|                          |              |
|--------------------------|--------------|
| Probe inputs             | 8            |
| Number of frequencies    | 8            |
| Frequency range          | 5 Hz – 10MHz |
| Generators/ Coil drivers | 2            |

|                              |                                       |
|------------------------------|---------------------------------------|
| Generator output/ Coil drive | Up to 20 V, peak-to-peak              |
| Injection modes              | Multiplexed, simultaneous, continuous |
| Receiver gain                | 41 dB range, 23 – 64 dB               |
| Data resolution              | 16 bits                               |
| Acquisition/ Sampling rate   | Up to 50 000 per second               |

## Eddy Current Array (ECA)

|                    |  |
|--------------------|--|
| Number of channels |  |
| Ectane 3 E64       | Up to 64 channels for each ECT frequency (max. 5 frequencies)  |
| Ectane 3 E128      | Up to 128 channels for each ECT frequency (max. 5 frequencies)   |
| Ectane 3 E256      | Up to 256 channels for each ECT frequency (max. 2 frequencies)<br>or<br>Up to 128 channels for each ECT frequency (max. 5 frequencies) |
| Multiplexer        | SmartMUX™: integrated, universal, and programmable   |

|                             |                                     |
|-----------------------------|-------------------------------------|
| Connector type <sup>a</sup> | Single or double, 160-pin connector |
|-----------------------------|-------------------------------------|

- The Ectane 3 uses an ID device found in Eddyfi probes. This ID device contains information that helps set up acquisitions and confirm compatibility between setup and probe.

## Remote/Near-Field Testing (RFT/ NFT)

|                             |  |
|-----------------------------|--|
| Probe inputs                | 4 on 19-pin RFT/NFT/MFL connector<br>8 on 41-pin EXTENDED ET connector |
| Number of frequencies       | 5  |
| Frequency range             | 5 Hz – 250 MHz   |
| Generators/Coil drivers     | 2  |
| Generator output/Coil drive | 20 V, peak-to-peak   |
| Receiver gain               | 50 dB range, 36 – 86 dB  |
| Acquisition/Sampling rate   | Up to 20 000 per second  |
| Connector type              | 19-pin RFT/NFT/MFL connector<br>41-pin EXTENDED ET connector           |

## Remote Field Array (RFA)

|                       |              |
|-----------------------|--------------|
| Probe inputs          | Up to 32     |
| Number of frequencies | 2            |
| Frequency range       | 5 Hz – 2 kHz |

|                             |                              |
|-----------------------------|------------------------------|
| Generators/Coil drivers     | 2                            |
| Generator output/Coil drive | 20 V, peak-to-peak           |
| Receiver gain               | 41 dB range, 23 - 64 dB      |
| Acquisition/Sampling rate   | Up to 2 000 per second       |
| Connector type              | 41-pin EXTENDED ET connector |

### Magnetic Flux Leakage (MFL)

|                |   |
|----------------|---|
| Probe inputs   | 4 on 19-pin RFT/NFT/MFL connector 8 on 41-pin EXTENDED ET connector |
| Receiver gain  | 41 dB range, 23 - 64 dB   |
| Connector type | 19-pin RFT/NFT/MFL connector<br>41-pin EXTENDED ET connector        |

### Internal Rotary Inspection System (IRIS)

|                       |                                  |
|-----------------------|----------------------------------|
| Number of UT channels | 1, pulse-echo                    |
| Transducer frequency  | 5 MHz, 10 MHz, 15 MHz, or 20 MHz |
| Pulsing rate          | Up to 30 kHz                     |
| Pulser voltage        | 75 - 200 V (25 V steps)          |

|               |   |
|---------------|---|
| Pulse width   | Automatically adjusted for transducer frequency                             |
| Receiver gain | 8 – 72 dB (in 1 dB steps)   |
| Receiver DAC  | Up to 20 dB/ $\mu$ s  |
| RF Filters    | 4 user-selectable filters for 5 MHz, 10 MHz, 15 MHz, and 20 MHz transducers |
| Digitizer     | 12 bits, 100 MHz  |
| Gates         | 3; target pin, front wall, back wall  |

# Chapter 7: Maintenance & Troubleshooting

# 1. Preventive Maintenance

Due to its design, the Ectane 3 only requires minimal maintenance.

The instrument has no moving parts, therefore the Ectane 3 also does not require any preventive maintenance by the user. Only a regular inspection of the instrument is recommended, to ensure that it is properly grounded.

Eddyfi strongly recommends an annual calibration and a factory-performed preventive maintenance by an officially qualified Eddyfi technician.

## Cleaning the Instrument

The Ectane 3 external surfaces (i.e., casing, and front panel), can be cleaned when necessary. This section explains the procedure to appropriately clean the instrument.

To clean the instrument:

1. Make sure that the instrument is off and that the power cord is disconnected.
2. To bring the instrument back to its original finish, clean the casing and the front panel with a soft cloth.

### **WARNING!**



**Do not clean the instrument with a spray or water jet.  
If you do, connector contacts can remain wet and produce short circuits when connected.**

3. To remove stubborn stains, use a cloth moistened with soft soapy solution. Do not use abrasive products or powerful solvents as they can damage the finish.
4. Wait until the instrument is completely dry before connecting the power cord and cables.

## 2. Calibrating Batteries

To ensure that your batteries perform at their full capacity for the longest possible time, it is important to calibrate them on a regular basis.

Calibration consists in a standard battery charge followed by a deep discharge, and a complete charge. This procedure usually takes between 10 and 13 hours, whereas a standard charge only takes about 3.5 hours.

Calibrate batteries by placing them in the optional, external charger and then pressing the recalibrate button. (See Charging the Batteries on page 35)

Eddyfi recommends calibrating your batteries at least once every six months.

## **CAUTION**



During calibration, the charger may become warm.

## **3. Troubleshooting**

To troubleshoot the Ectane 3, you must first connect it to a workstation running Magnifi®. Troubleshooting information is found in the Magnifi documentation.

## **4. Firmware Corruption**

If the Ectane 3 firmware becomes corrupted, you must start the instrument from a backup firmware. This procedure is explained in the Magnifi documentation.

To locate the backup firmware button, see Battery Compartment on page 23.

# Appendix A: Accessories

## **1. Protective Caps**

If you need to tackle challenging inspection environments where dust or nuclear contamination is present, you need protective caps to cover the Ectane 3 connectors. All the connectors have specific protective caps. Contact your Eddyfi representative for more information about pricing and availability.

## **2. Adapters and Connectors**

The Ectane 3 connectors were chosen to match the most common connectors in use today. However, you may have specific needs outside the connectors supplied with the Ectane 3. Eddyfi offers a comprehensive array of adapters and specialty connectors to suit your needs. Contact your Eddyfi representative for more information about pricing and availability.

## **3. Battery Charger and Batteries**

The Ectane 3 comes with batteries but depending on your work environment and your workload, you may require additional batteries and the optional battery charger. Contact your Eddyfi representative for more information about pricing and availability.

## **4. Remote Control**

The Ectane 3 can be operated through an optional remote control. Contact your Eddyfi representative for more information about pricing and availability.

# Appendix B: Legal Notice

# 1. Limited Warranty

The limited warranty applicable to the product is contained in Eddyfi's applicable Sales & Rentals Terms and Conditions (<https://www.eddyfi.com/en/salesterms>) at the time of purchase (the "Ts&Cs").

For illustrative purposes only, and except as otherwise provided in the Ts&Cs at the time of publication, mechanical products, spare parts, probes, and cables are warrantied to the original customer only for use solely by customer or direct affiliate, against defects in material and workmanship for a period of 12 months from the date of delivery.

Additional coverage may be provided under any Hardware Maintenance Plan (HMP) purchased by the customer. Probes and cables are considered consumables and require periodic replacement due to wear. Eddyfi does not warrant the service life of probes, cables, and other consumables. Eddyfi does not warrant any products against damages or defects caused by wear and tear, negligence, misuse, abnormal operating conditions, alterations, or damage caused by events beyond the control of Eddyfi.

Eddyfi shall not be liable for product defects caused by or resulting from any inaccuracies in any drawing, description or specification supplied by the customer, as applicable.

Upon customer's written request during the warranty period, Eddyfi, at its discretion, will repair or replace defective products within a reasonable time. The original term of warranty applies, without extension, for repaired or replacement products. All defective products shall be sent to Eddyfi freight prepaid by customer in appropriate packaging to prevent damage in transit.

The Limited Product Warranty does not apply to periodic calibration or minor maintenance as described in this user guide or any other product manual or information.

All customer paid repairs performed by Eddyfi are warrantied against defects in materials and workmanship for 90 days from the completion of repair.

Upon customer's written notice of defect within the 90day period, Eddyfi will replace the defective part(s) and/or re-perform the service. This warranty is limited to failures in areas directly related to the repair performed.

## **2. Disclaimer**

The materials in this user guide are for informational purposes only. Eddyfi reserves the right to change, without notice, product offerings and specifications.

Except as expressly provided above, Eddyfi makes no representations or warranties with respect to this user guide or with respect to the products described herein.

Eddyfi shall not be liable for any damages, losses, costs, or expenses, direct, indirect or incidental, consequential or special, arising out of, or related to the use of this user guide or the products described herein.

## **3. Trademarks**

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