

# ECTANE 3

The Most Advanced Surface Array and Tube Inspection Test Instrument



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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 B

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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.**

## User Manual

This user 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.
- The instrument may be operated in the rain. When operating the instrument in wet weather, ensure that the battery compartment door is closed, and the caps are plugged on the IPEX or ETHERNET connectors if unused.



- 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.*

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- 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. Optional Magnetic Probe Precautions



The Ectane 3 can be used to perform inspections with external probes and accessories that generate significant magnetic fields. Eddyfi recommends the following precautions when using such a product. The products marked with the adjacent icon contain a permanent magnet with a static magnetic field that is below the 2 T occupational exposure limit, but above the 5 mT limit for interference with implanted medical

devices such as pacemakers, Implantable Cardioverter Defibrillators (ICDs), and other devices. If you have an implanted medical device, consult your healthcare provider before using this product. Keep this product away from any implanted medical device at all times. This warning is based on guidelines from the International Commission on Non-Ionizing Radiation Protection (ICNIRP). Eddyfi does not recommend the use of this product near implanted medical devices.

## 7. 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 (<https://eddyfi.com/declaration-c-eu>).

## 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 (<https://eddyfi.com/declaration-c-uk>).

## China RoHS compliance

China RoHS (Restriction of Hazardous Substances) is a regulation implemented by the Ministry of Information Industry (MII) in the People's Republic of China to address the environmental impact of electronic and electrical products. Modeled after the European Union's RoHS Directive, China RoHS aims to restrict the use of certain hazardous substances in electronic and electrical equipment, thereby reducing the potential harm these substances can cause to human health and the environment.

China RoHS reflects the growing global awareness of the need to minimize the environmental impact of electronics, promote responsible manufacturing practices, and ensure the safe handling of electronic waste.



The China RoHS mark plays a pivotal role in signaling a product's commitment to environmentally conscious practices. However, it's crucial to underline that this mark doesn't directly correlate with the product's Environment-Friendly Use Period (EFUP). The EFUP, represented by the acronym, signifies a specific duration during which designated controlled substances, as outlined by the China RoHS regulation, are intentionally safeguarded against leakage or chemical deterioration within the confines of the product. This distinct timeframe, meticulously evaluated and affirmed, spans an impressive 15 years for the Ectane 3 instrument. Within this stipulated period, the integrity of the controlled substances integrated into the Ectane 3 is vigilantly maintained, preventing any degradation or escape into the surrounding environment.

**Note:** The EFUP encapsulates the meticulous engineering that strives to align with sustainability principles, preserving the substances and mitigating their environmental impact. However, it's paramount to clarify

that the EFUP is distinct from the product's functional and performance-related lifespan. While the EFUP focuses solely on substance preservation, the product's overall functionality and operational effectiveness may span beyond this designated timeframe. This differentiation underscores the multifaceted nature of assessing products, encompassing ecological considerations as one facet among several that both consumers and manufacturers must take into account.

Table listing restricted substances for China RoHS 3

部件名称 Part name	有害物质 - Hazardous substances									
	(Pb) 铅	(Hg) 汞	(Cd) 镉	(Cr(VI)) 六价铬	(PBB) 多溴联苯	(PBDE) 多溴二苯醚	(BBP) 邻苯二甲酸苄丁酯	(DBP) 邻苯二甲酸二丁酯	(DEHP) 邻苯二甲酸二乙基己酯	(DIBP) 邻苯二甲酸二异丁酯
电缆和连接器组件 Cables and Connector assemblies	X	O	O	O	O	O	O	O	O	O
电气和电子零件 Electrical & Electronics parts	X	O	O	O	O	O	O	O	O	O
金属部件 Metal parts	X	O	O	O	O	O	O	O	O	O
塑料件 Plastic parts	O	O	O	O	O	O	O	O	O	O
橡胶件 Rubber parts	O	O	O	O	O	O	O	O	O	O

印制电路板及配件 Printed circuit board and accessories	○	○	○	○	○	○	○	○	○	○
电池及配件 Battery and accessories	○	○	○	○	○	○	○	○	○	○
粘合剂、密封剂和标签 Adhesives, Sealants and Labels	○	○	○	○	○	○	○	○	○	○

(本表格依据SJ/T11364的规定编制) This table is compiled according to SJ/T 11364 standard.

O: (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.)

Indicates that the concentration of the hazardous substance in all homogeneous materials for the part is below the relevant threshold of the GB/T 26572 standard.

X: (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.)

Indicates that the concentration of the hazardous substance in at least one homogenous material of the part is above the relevant threshold of the GB/T 26572 standard.



## 8. Calibration and Warranty Seals

Calibration and warranty seals are hidden under the front-left bumper of the Ectane 3 to prevent accidental damages.

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

## 9. 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.

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**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.*

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## 10. 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.)

## 11. 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

# 3



# 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 array multiplexer for up to 256 elements
- Multi-technology for tube inspections: ECT, RFT, RFA, NFT, MFL, ECA, and IRIS<sup>1</sup> ultrasound technology
- Battery power and backup for flexibility and 100 % uptime
- Plug-and-play connectivity— no more *BootP*
- Standard 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 robust and waterproof transport case with wheels and retractable handle

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<sup>1</sup> Patent pending

### 3. Instrument Description

The Ectane 3 is available in 11 different configurations.

The number after the letter E in certain model names listed below indicates the maximum number of available channels 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:

- Ectane 3 E
- Ectane 3 E64
- Ectane 3 E128
- Ectane 3 E256
- Ectane 3 I
- Ectane 3 ERNM
- Ectane 3 ERNMI
- Ectane 3 E64RNM
- Ectane 3 E64RNMI
- Ectane 3 E128RNM
- Ectane 3 E128RNMI

### 4. Front Plate Descriptions

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

- Connect the ECTANE 3 to a network (via Ethernet) or to other instruments
- Connect ECT, RFT, MFL and IRIS probes

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.

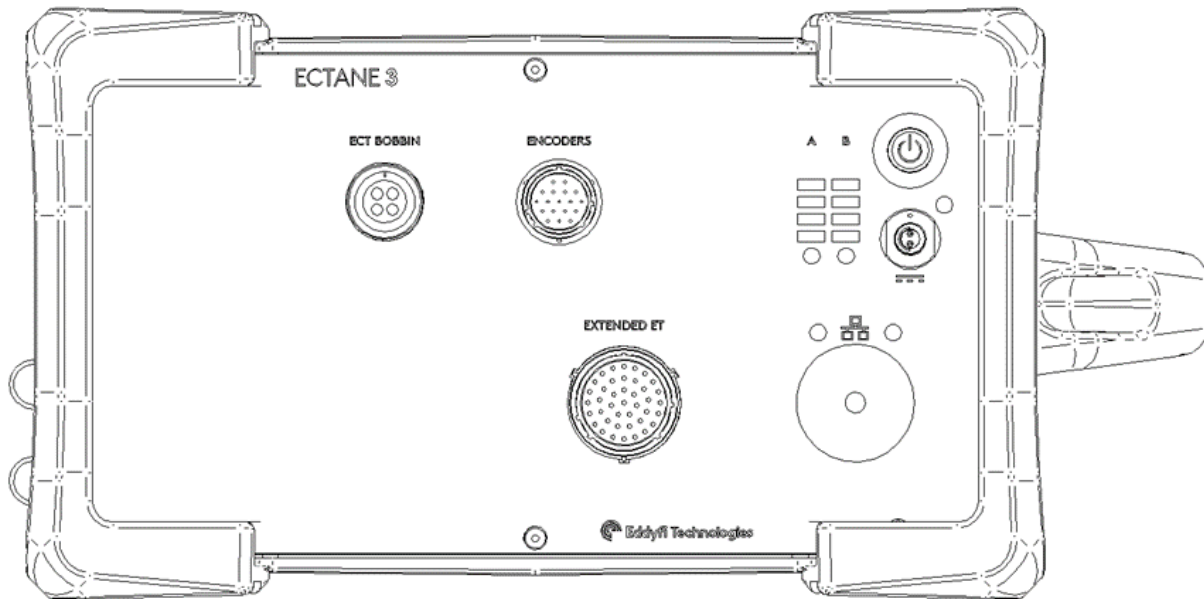


Figure 1 - Ectane 3 E

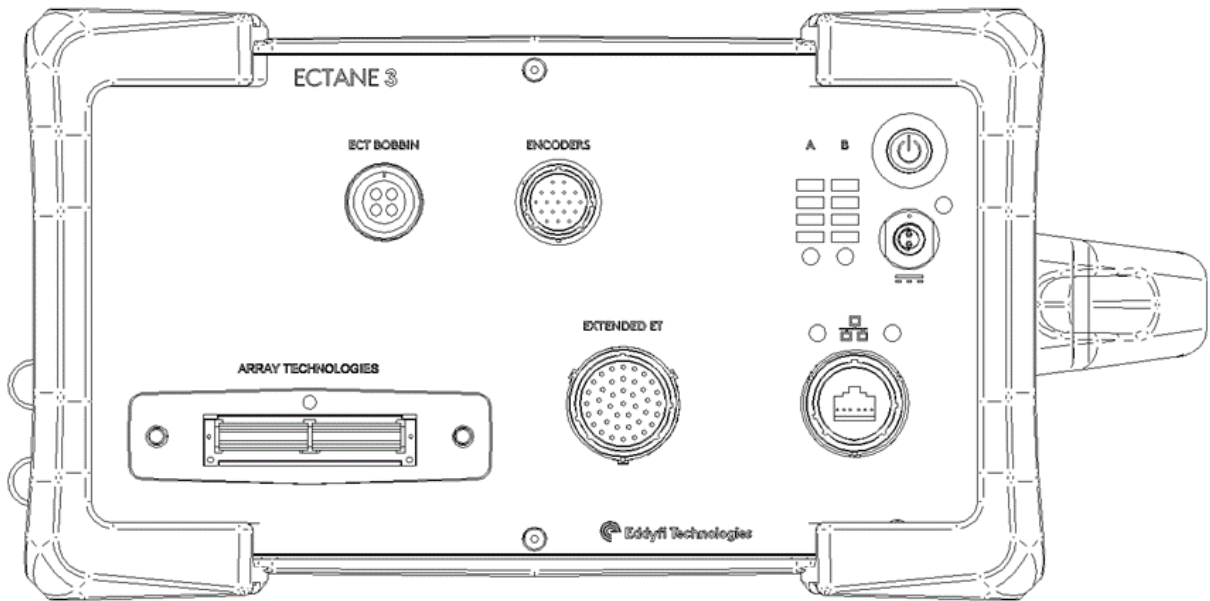


Figure 2 - Ectane 3 E64 and E128

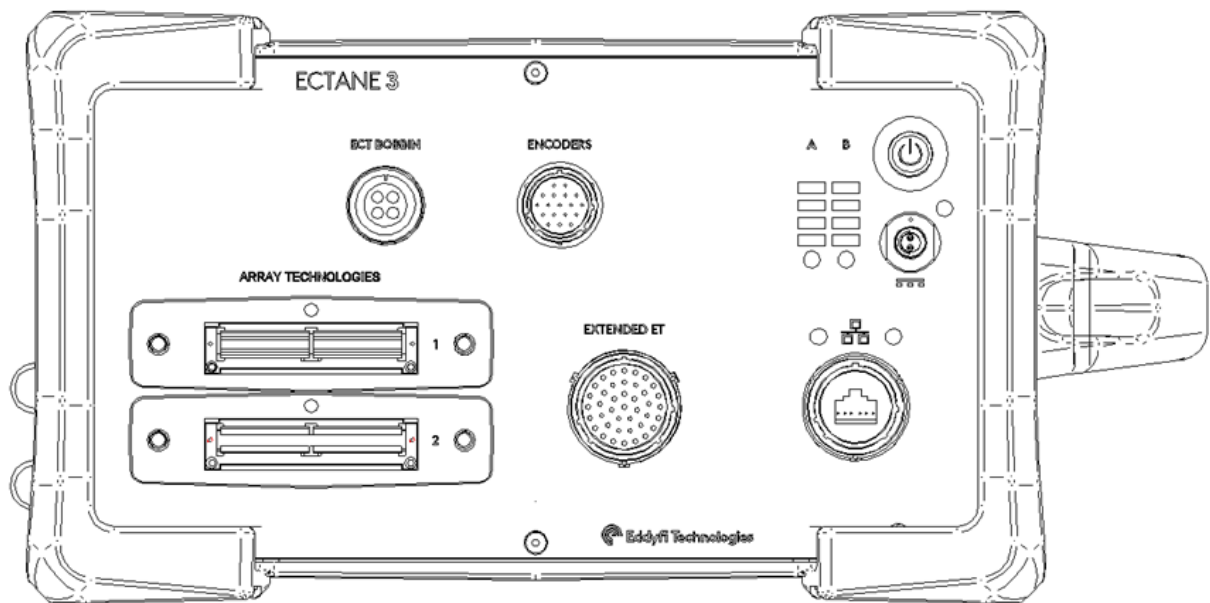


Figure 3 - Ectane 3 E256

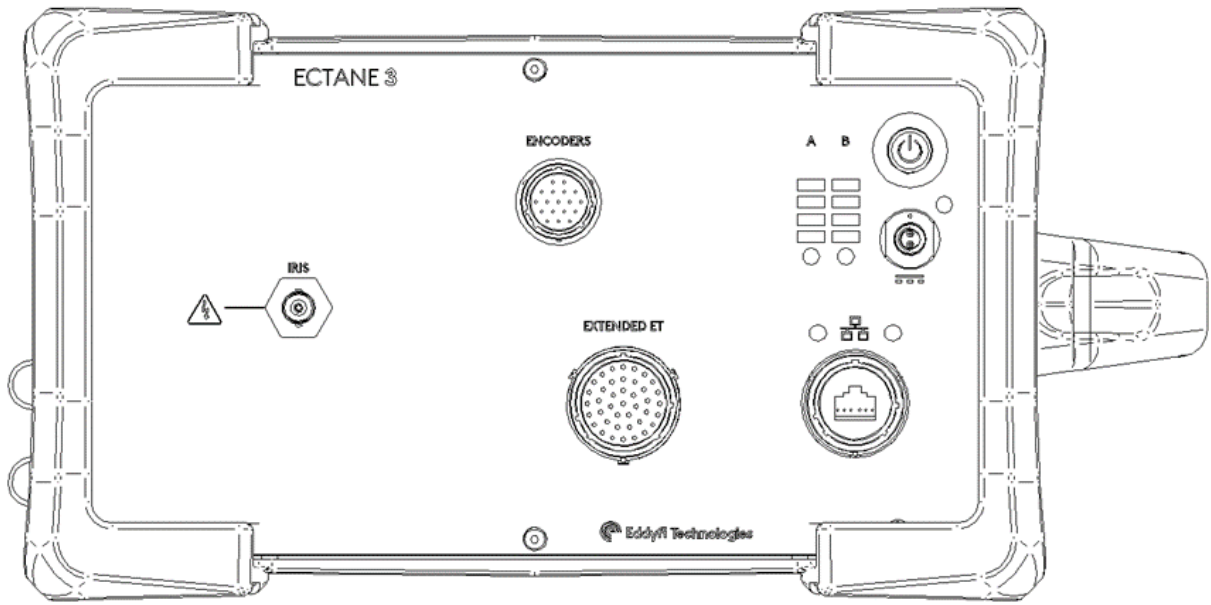


Figure 4 - Ectane 3 I

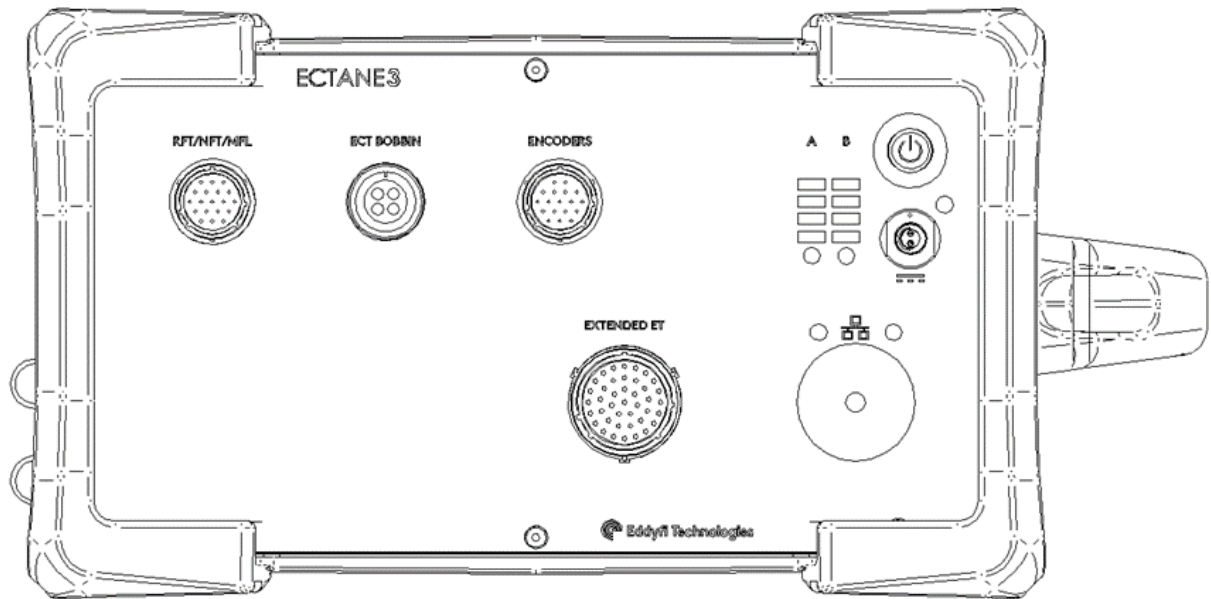


Figure 5 - Ectane 3 ERNM

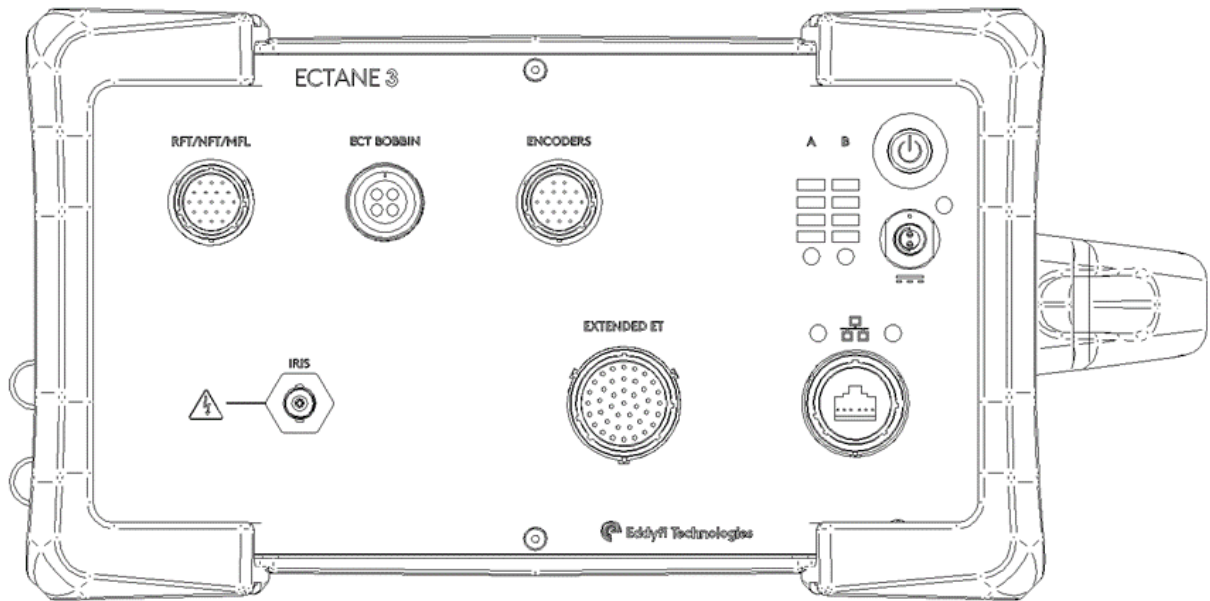


Figure 6 - Ectane 3 ERNMI

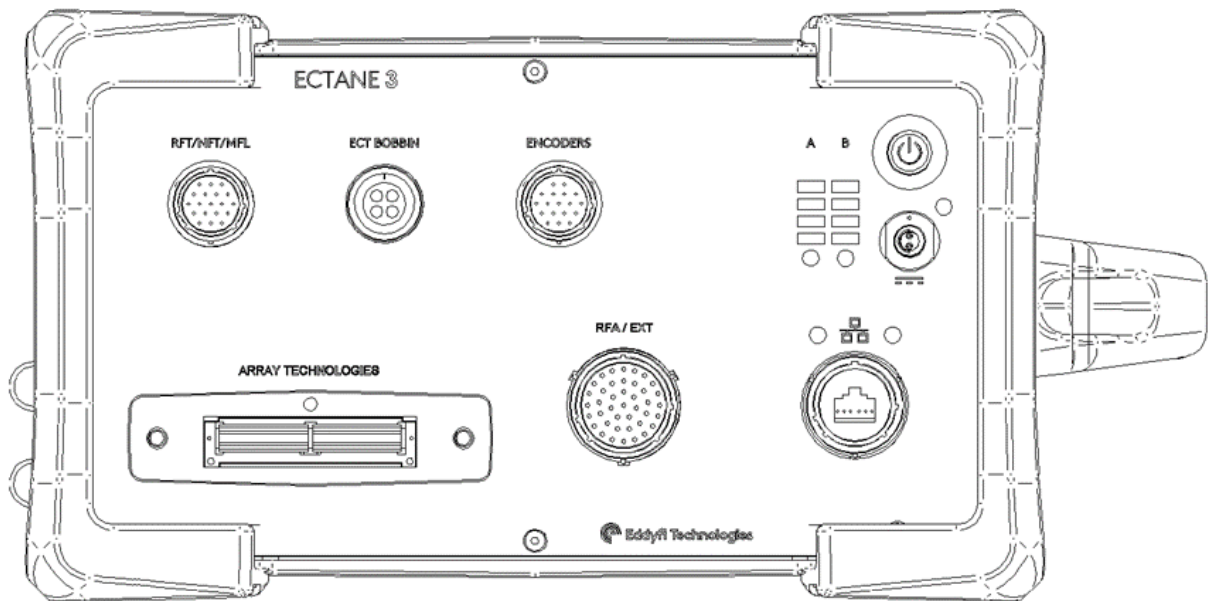


Figure 7- Ectane 3 E64RNM and E128RNM

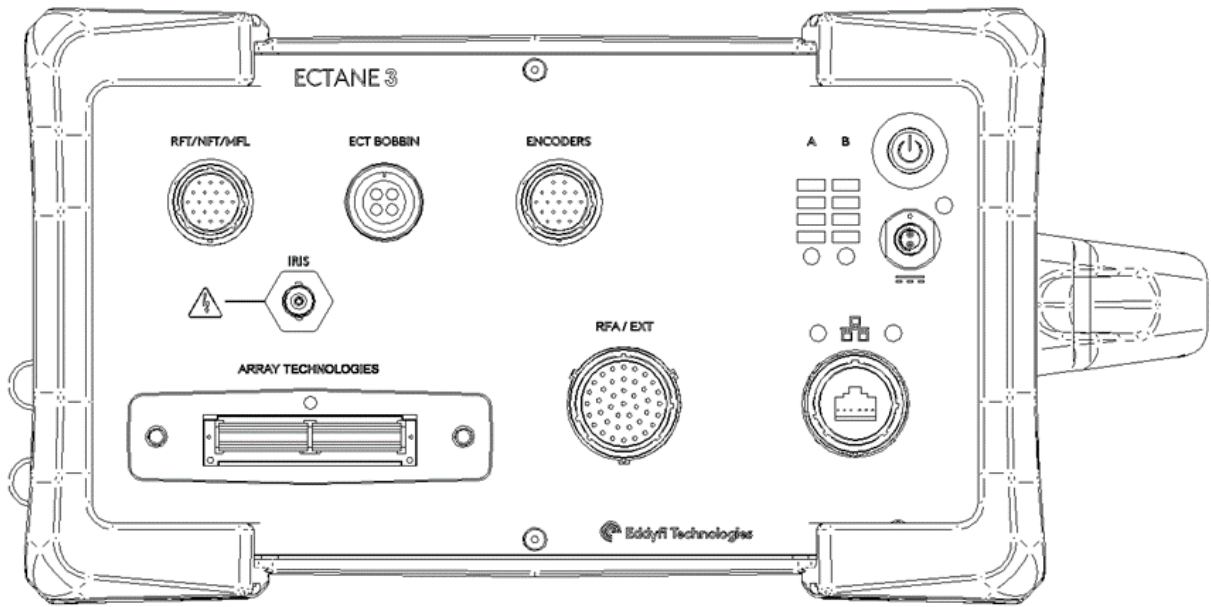


Figure 8- Ectane 3 E64RNMI and E128RNMI

## 5. Carrying Handle

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

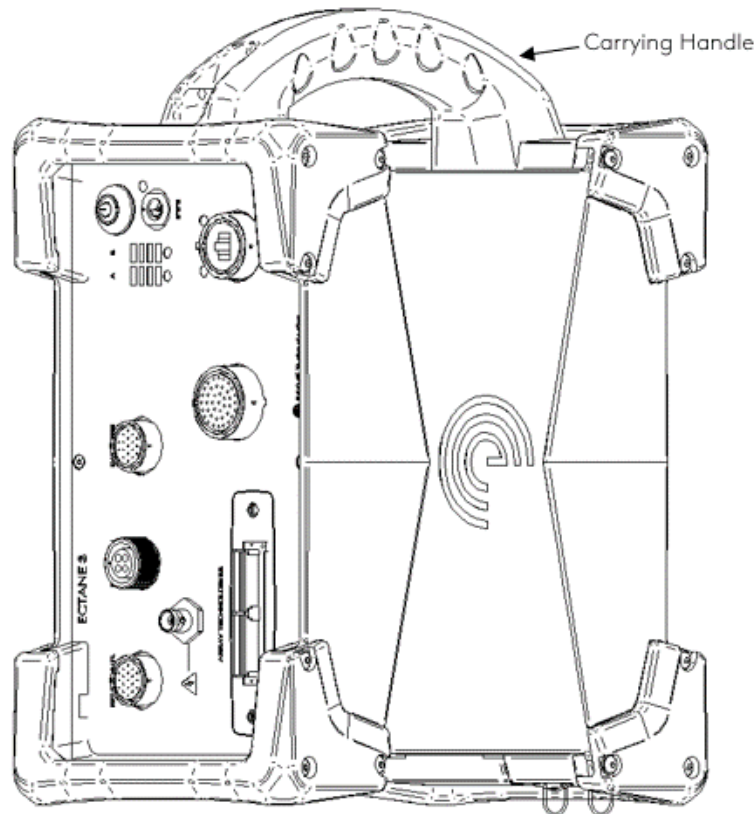


Figure 9 – Carrying handle

## 6. Chassis Ground Connector

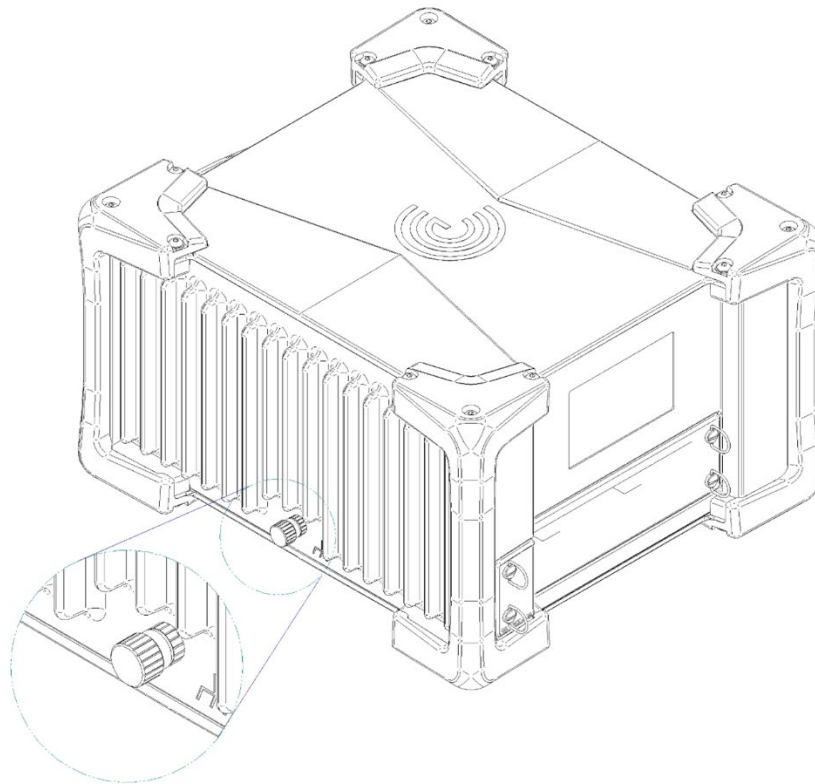
The ground connector, which is used to ground the Ectane 3's chassis when the situation requires it, is found at the rear of the instrument.

### 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 10 - 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 11. See Chapter 4, Battery Precautions, for more information.

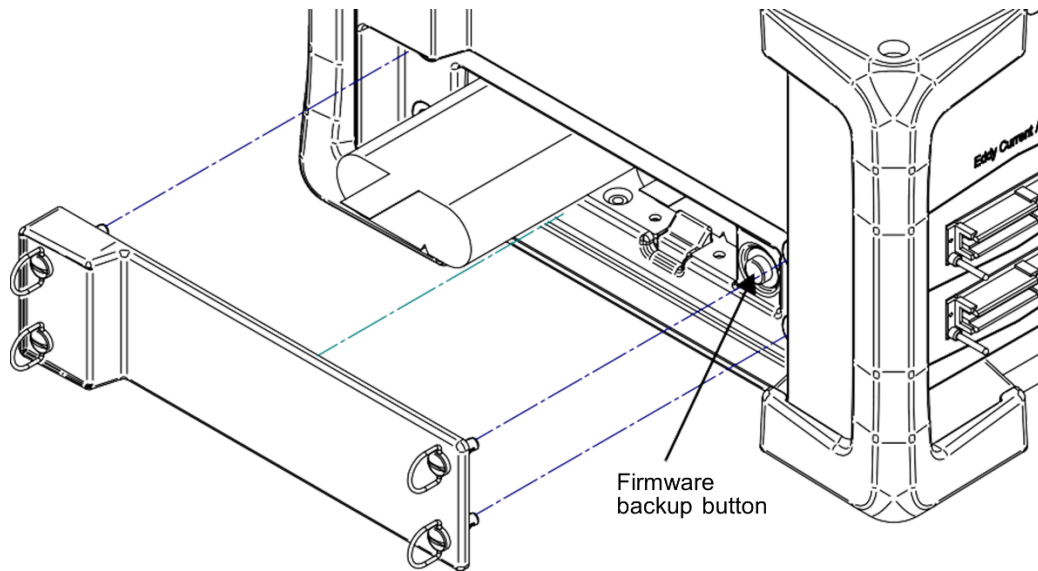


Figure 11 - Battery compartment

**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.

<p><b>WARNING!</b></p> 	<p><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></p>
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**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. Make sure the instrument is disconnected from the power line.
2. Install the Ectane 3 away from heat sources, leaving a minimum clearance of 5 cm (2 in.) to allow for heat dissipation.
3. Using an Ethernet cable, connect the Ectane 3 to the computer.
4. 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.

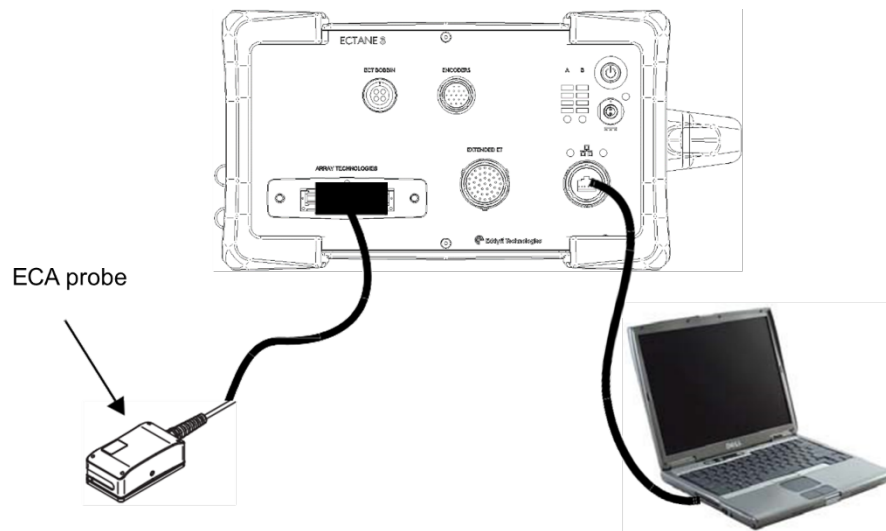


Figure 12 - Typical configuration 1: Ectane 3 with SmartMUX™

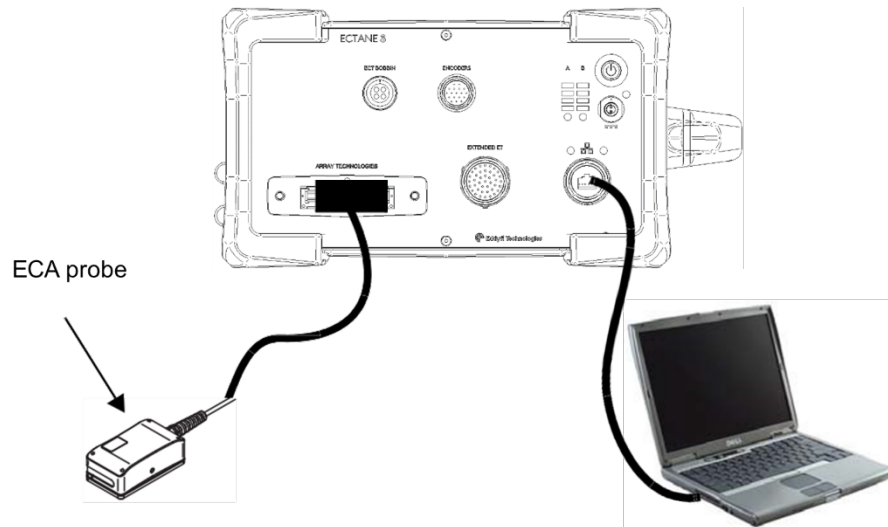


Figure 13 - Typical configuration 2: Ectane 3 with SmartMUX, scanner, and probe

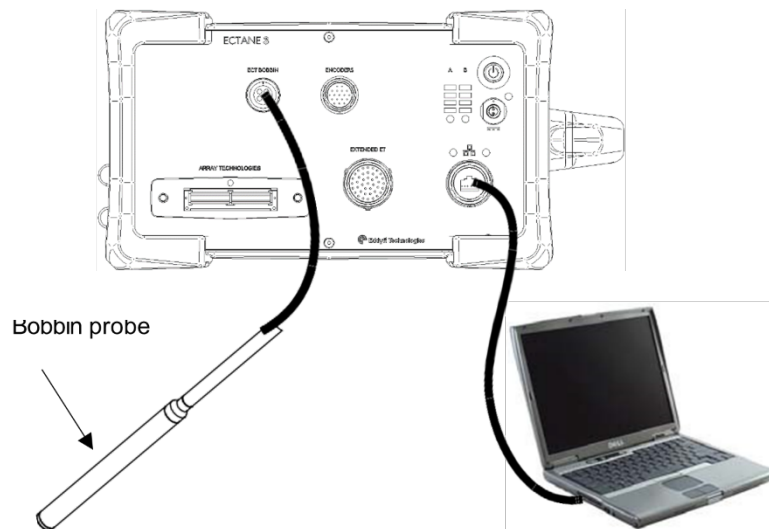


Figure 14 - Typical configuration 3: Ectane 3 with bobbin probe

## 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.

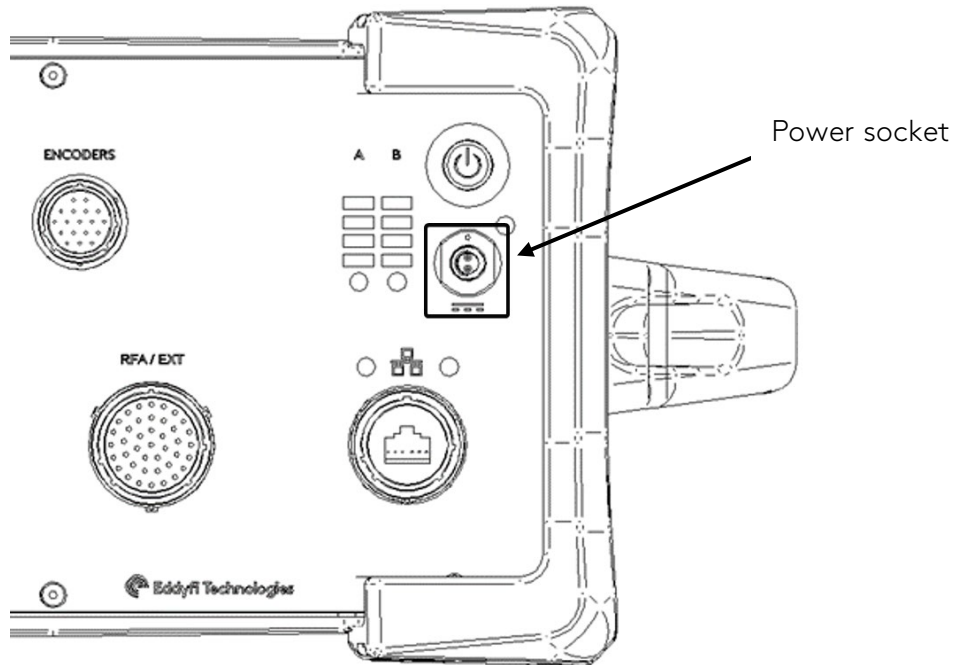


Figure 15 – Power socket

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. Press the power button until it clicks. The power button lights up orange and all the indicators on the front panel of the instrument light up.

## 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.

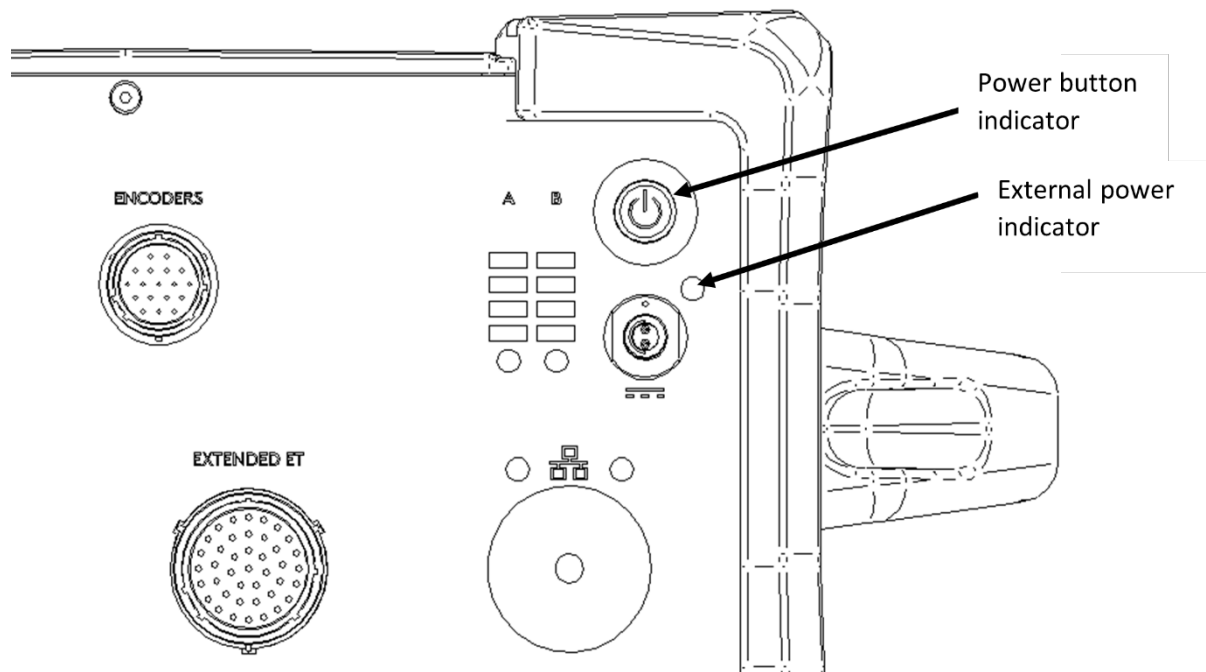


Figure 16 - Power indicators

## 6. Battery Indicators

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

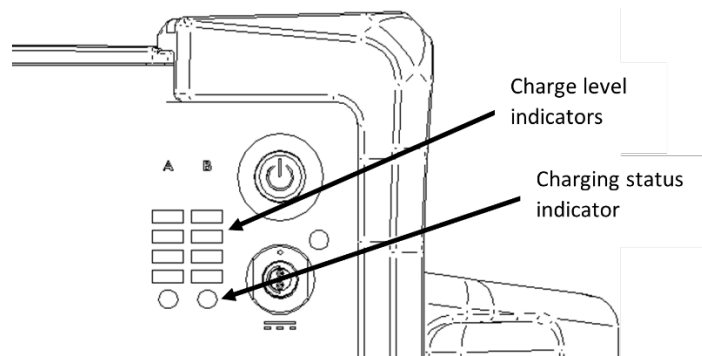
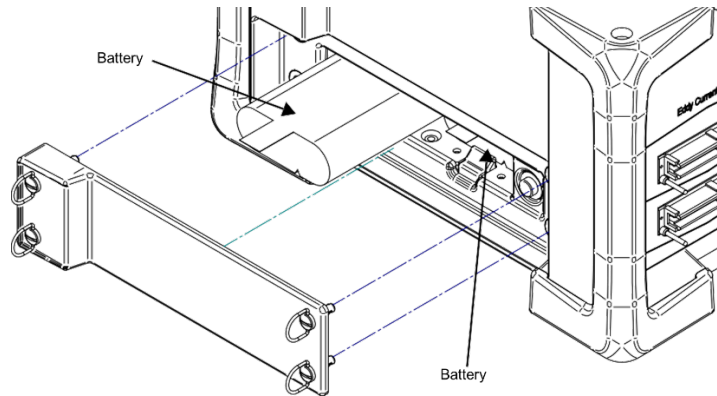


Figure 17 - Battery B indicators





**Figure 18 - 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.

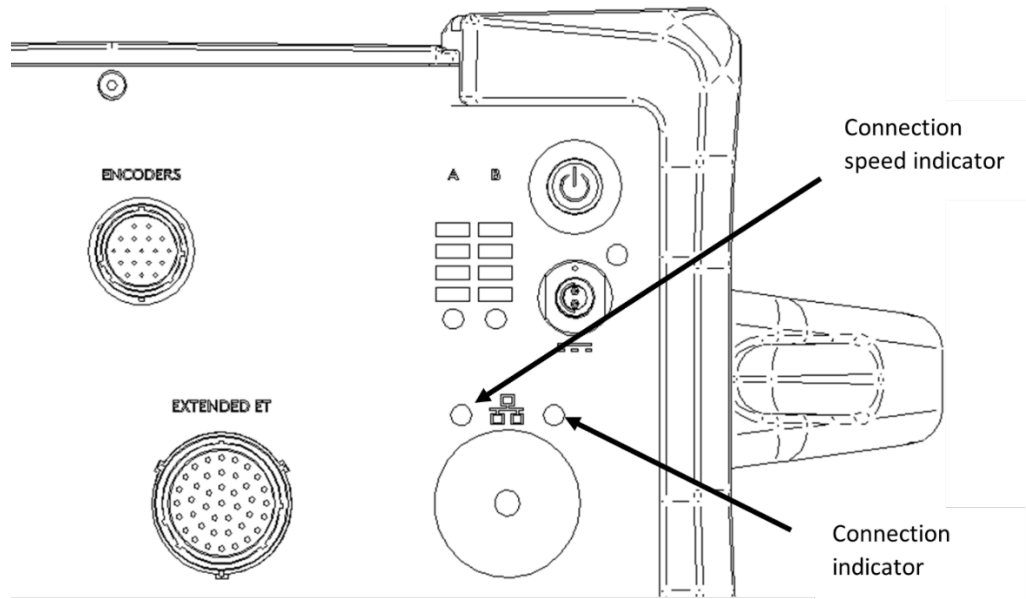


Figure 19 - Connection indicators

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 61).

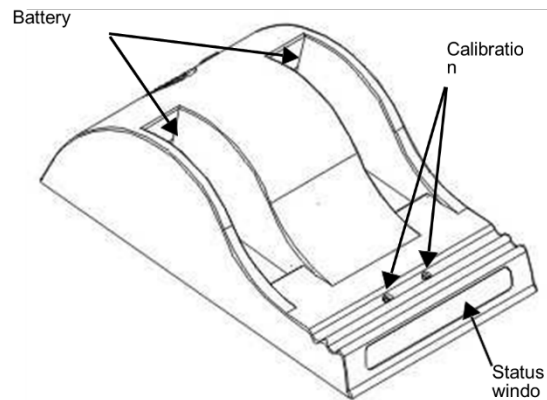


Figure 20- Battery charger

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.

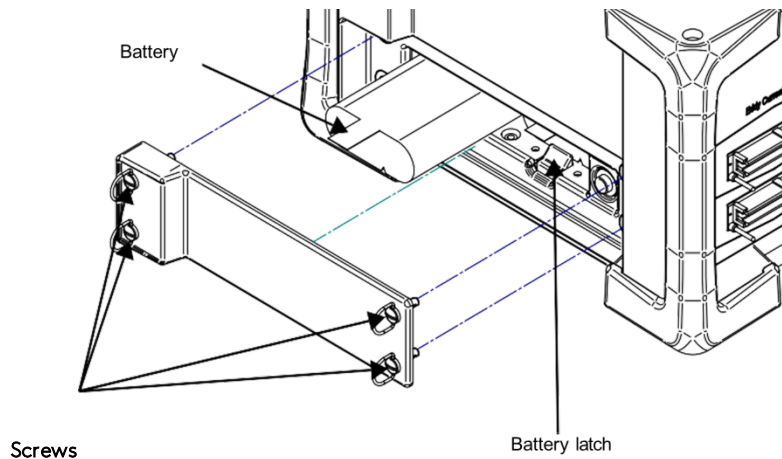


Figure 21 - Opening the battery compartment door

---

**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 22 - Battery B indicators for details on the location of the indicators.

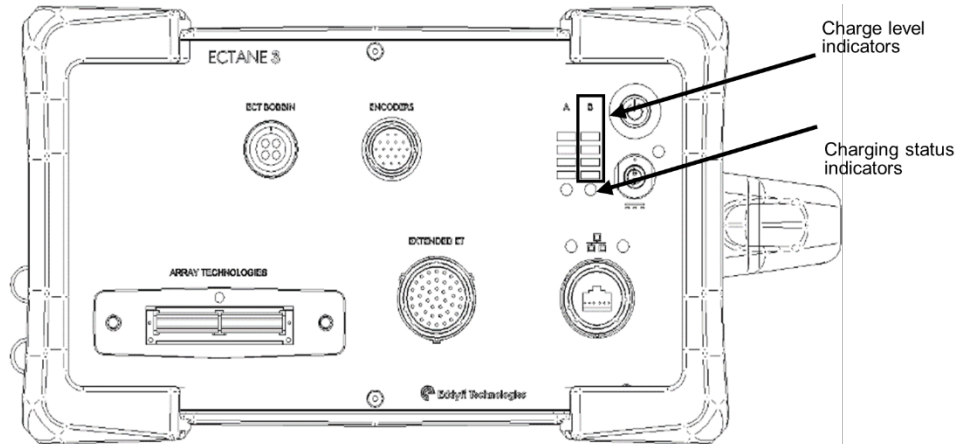


Figure 22 - Battery B indicators



Chapter 5

# Connector References

# 1. EXTENDED ET Connector (41 pins)

The EXTENDED ET connector is used to connect eddy current and remote field array 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 or, Amphenol PT06J-20-41P

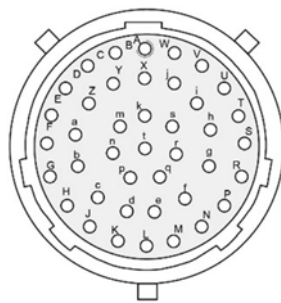


Figure 23 - EXTENDED ET connector

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 Ω	ECT2 generator outputs through 100 Ω (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 Ω	ECT2 generator outputs through 100 Ω (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	Input	In2 + input	Positive input of input amplifier 2
c	Input	In2 - input	Negative input of input amplifier 2
d	Input	In3 + input	Positive input of input amplifier 3
e	Input	In3 - input	Negative input of input amplifier 3
f	Input	In4 + input	Positive input of input amplifier 4
g	Input	In4 - input	Negative input of input amplifier 4
h	-	GND	Power supply ground to the instrument and casing
i	Input	In5 + input	Positive input of input amplifier 5
j	Input	In5 - input	Negative input of input amplifier 5
k	Input	In6 + input	Positive input of input amplifier 6
m	Input	In6 - input	Negative input of input amplifier 6
n	Input	In7 + input	Positive input of input amplifier 7
p	Input	In7 - input	Negative input of input amplifier 7
q	Input	In8 + input	Positive input of input amplifier 8
r	Input	In8 - input	Negative input of input amplifier 8
s	-	GND	Power supply ground to the instrument and casing
t	Output	+15 V supply	+15 V supply voltage (600 mA max.)
		Motor +	Probe motor drive (0-24 V, 2.0 A max., 10 W max.)
		SC +	Current source (1 A max., 10 W max.)

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

The RFT/NFT/MFL connector is used to connect the remote field (RFT) and magnetic flux leakage probes. The signals contained in the RFT/NFT/MFL connector are the RFT generator outputs, the RFT channel amplifier inputs, and a DC power supply.

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

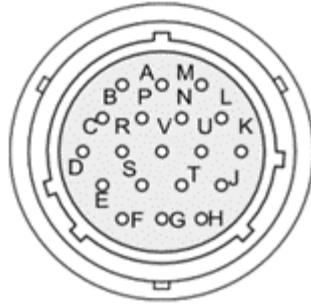


Figure 24 – RFT/NFT/MFL connector

Table 2 – RFT/NFT/MFL connector pinouts

Pin	I/O	Signal	Description
A	-	GND	Ground
B	Input	RFT_IN 4- MFL4_IN 4-	Negative RFT input #4 Negative MFL input #4
C	Input	RFT_IN 3+ MFL_IN 3+	Positive RFT input #3 Positive MFL input #3
D	Input	RFT_IN 3- MFL3_IN 3-	Negative RFT input #3 Negative MFL input #3
E		+15 V supply	+15 V supply voltage, 600 mA max.
F	Output	Drive2_OUT	Coil driver #2 output
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+ MFL_IN 2+	Positive RFT input #2 Positive MFL input #2
L	Input	RFT_IN 2- MFL_IN 2-	Negative RFT input #2 Negative MFL input #2
M	Input	RFT_IN 1+ MFL_IN 1+	Positive RFT input #1 Positive MFL input #1
N	Input	RFT_IN 1- MFL_IN 1-	Negative RFT input #1 Negative MFL input #1
P	Input	RFT_IN 4+	Positive RFT input #4

Pin	I/O	Signal	Description
		MFL_IN 4+	Positive MFL input #4
R	-	GND	Ground
S	Input	Identification	Probe identification
T	-	NC	No connection
U	-	GND	Ground
V	-	GND	Ground

### 3. 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

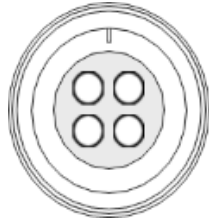


Figure 25 – ECT Bobbin connector

Table 3 ECT Bobbin connector pinouts

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

## 4. 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 or Amphenol PT06J-14-18P

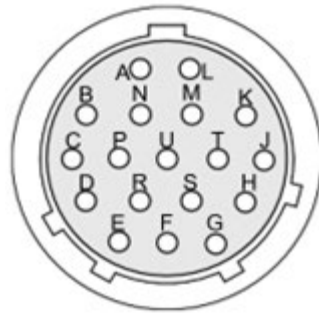


Figure 26 – Encoders connector

Table 4 – Encoders connector pinouts

Pin	I/O	Signal	Description
A	TTL Input	$\Phi$ B1	Phase B axis 1
B	Output	CLK_ACQ_OUT	Acquisition clock output (open drain with (open drain with 10 k $\Omega$ pull-up)
C	TTL Input	$\Phi$ 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 Input 5	Phase A axis 3 User-defined input for automatic acquisition sequence
S	Supply Output	+5 V	
T	TTL Input	$\Phi$ B3 Input 4	Phase B axis 3 User-defined input for automatic acquisition sequence
U	TTL Input	$\Phi$ A3	Phase A axis 1

## 5. IRIS Connector

The IRIS connector allows the instrument to control IRIS probes.

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

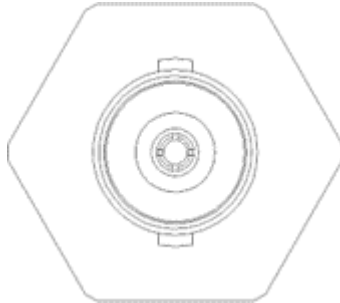


Figure 27 – IRIS connector

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

## 6. 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).

## 7. 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 RJF22B00SCC

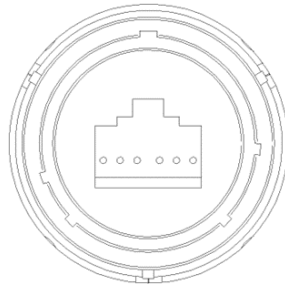


Figure 28 – Ethernet connector

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>°</sup>	15 minutes
Workstation link	Ethernet 1000BASE-T
Transfer rate on Ethernet cable	1 Gbps

<sup>°</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 Supply Specifications

Power supply source	External power supply unit and/or (one or two) removable batteries
Instrument power supply	15Vdc, 100 W
External AC/DC power supply	240V/50 Hz, 110V/60 Hz, 0.6-1.5 A
Battery characteristics	10.8V 8.7Ah, Lithium-ion type, 8h autonomy with two batteries
Operating conditions	Indoor use only

## Environmental Conditions

Environment	Indoor/Outdoor <sup>a</sup>
Operating temperature <sup>b</sup>	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
Altitude	2000 m maximum
Pollution degree rating	2
Protection	IP65 <sup>a</sup>
Approvals	ASME, CE, UKCA, IEC 61010-1, IEC 61326-1, FCC15, ICES-001

<sup>a</sup>Outdoor use and IP65 rating for the instrument only with the battery door closed and the caps plugged on the IPEX or ETHERNET connectors if unused.

<sup>b</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)	299 mm × 253 mm × 174 mm (11.75 in. × 10.00 in. × 6.8 in.) (Identical to Ectane 2)
Net weight <sup>a</sup>	6.8 kg (15 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) or 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

<sup>a</sup>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 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 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 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 warranted 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.

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