

TECHNICAL DOCUMENTATION |

M2M MANTIS

Redacted by Thierry COUTURIER

Approved by Fabien DURAND

Date : 11/09/2022

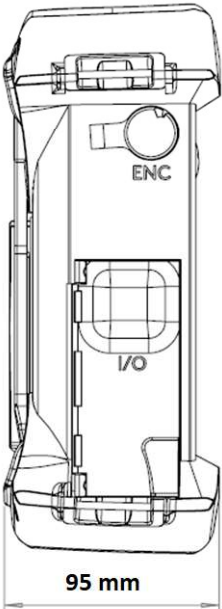
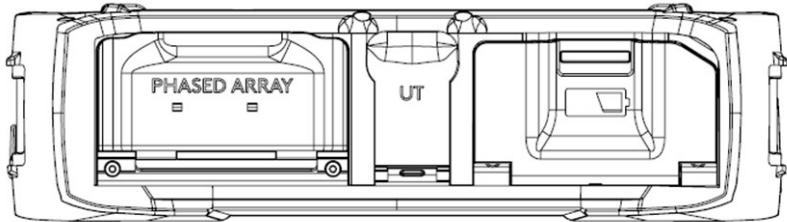
Revision C.7

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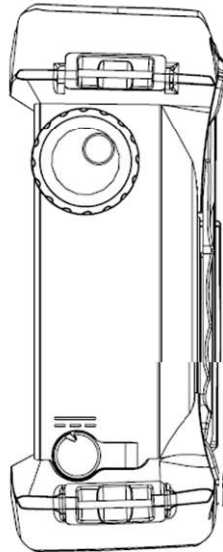
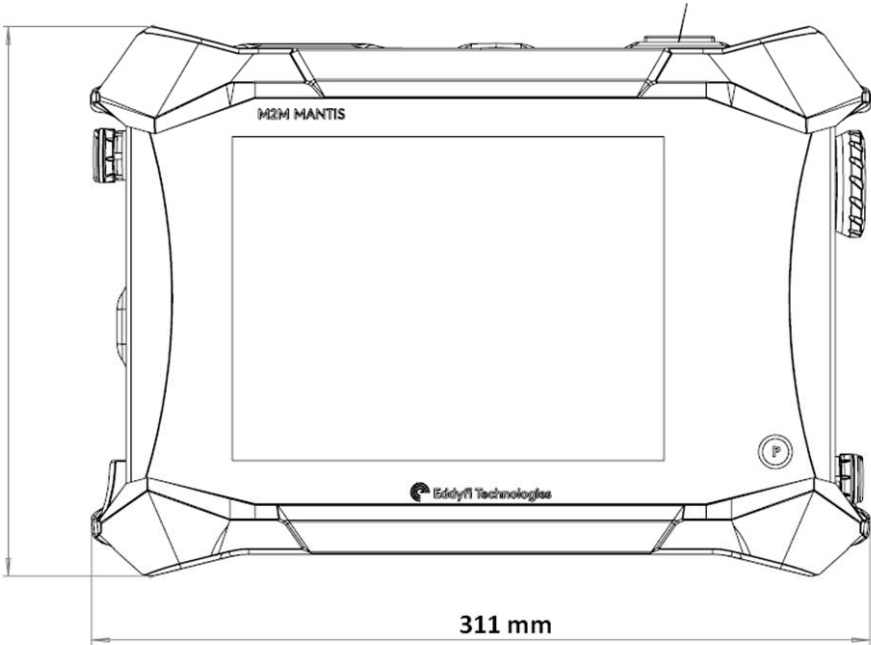
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1. MECHANICAL DRAWING

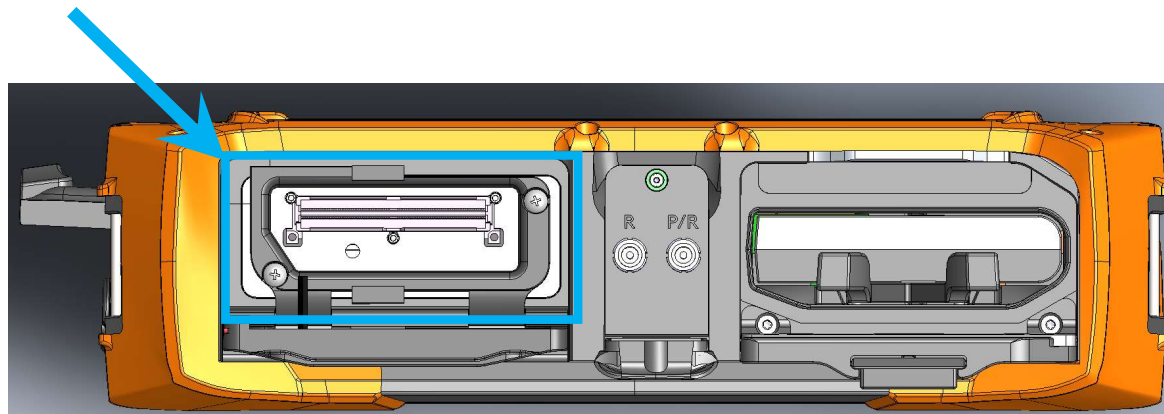


220 mm



2. PHASED ARRAY CONNECTOR

IPEX Connector Location



Connector Information

Supplier: I-PEX

Reference: 30046-160T-F

Matching Connector

Supplier: I-PEX

References:

- straight: 30056-160T-F
- right angle: 30047-160T-04F



Connector Utility

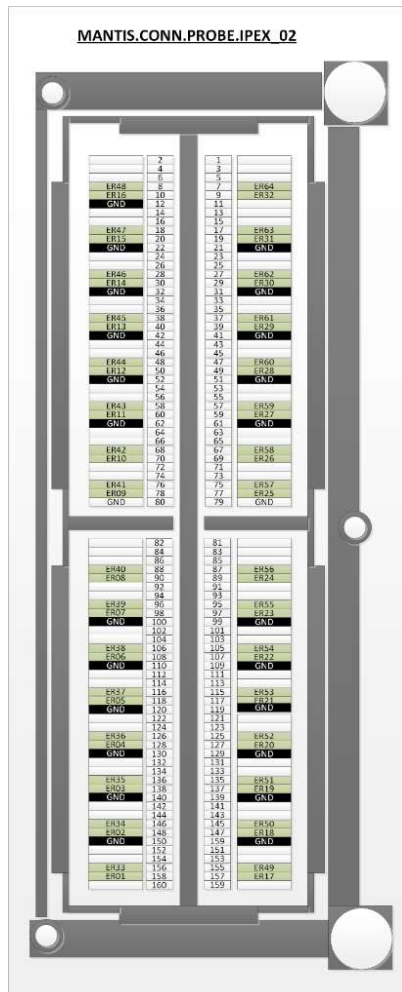
- For Phased-array probe with IPEX connector
- For probe splitters or probe adaptors
- Compatible with IPEX easy-latch adaptor frame:
 - IMP_0061-EASYLATCH-ADAPT



For electric safety reasons, only accessories approved by Eddyfi Technologies can be used. Before purchasing any probe, please contact us.

2. PHASED ARRAY CONNECTOR

Connector Mapping

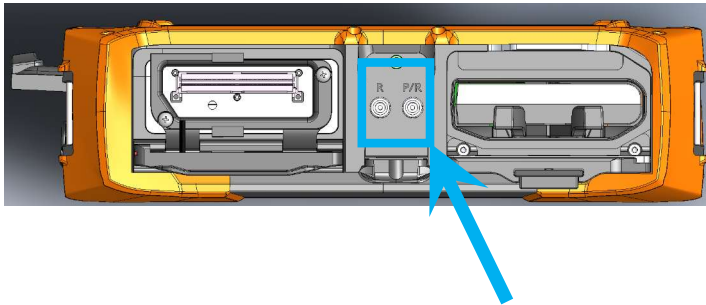


Connector Signal Description

Signal Name	Description	User matching signal
ER1 to ER64	Phased-array channel number 1 to 64	Phased-array probe channel 1 to 64
GND	Ground pin	For better ultrasound result, all GND pin have to be connected to probe ground.

3. UT CONNECTORS

Connectors Location



Connector Utility

On MANTIS, there is one UT channel that can be used:

- in Pitch/Catch mode.
 - P/R: Pulser
 - R: Receiver
- in Pulse/Echo mode.
 - P/R: Pulser / Receiver
 - R: not connected

Connector Information

Supplier: LEMO

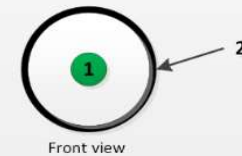
Reference: ERN.00.250.CTL

Matching Connector

- UT connector is NimCAMAC standard.
- Supplier: LEMO
- Reference: FFA.00.250.CTAC31

Connector Mapping

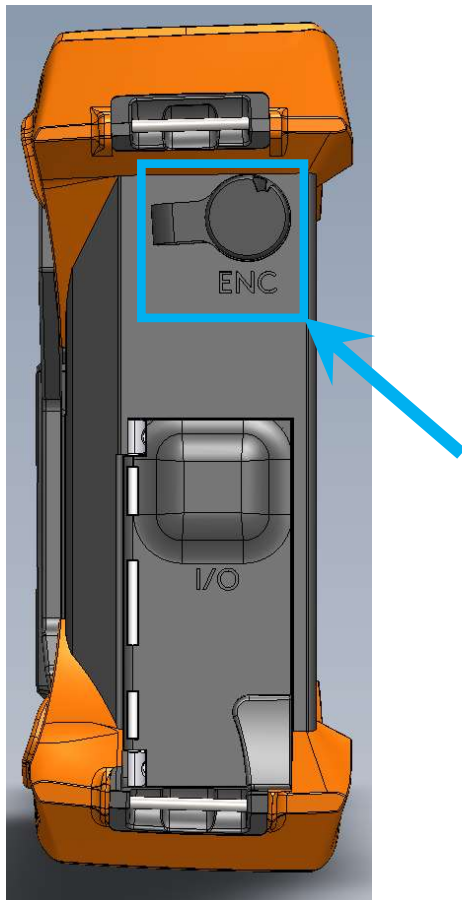
Pin number	Pin signification
1	U.T
2	GND



For electric safety reasons, only accessories approved by EDDYFI can be used. Before purchasing any probe, please contact us.

4. ENCODER CONNECTOR

Connector Location



Connector Information

Supplier: Connector type LEMO EGG

Reference: EGG.1K.316.CLL

Matching Cable

Supplier: LEMO (Connector Male 16 Pin)

Reference: FGG.1K.316.CLAC65Z



Connector Utility

CONNECT UP TO 3 DIFFERENT ENCODERS

- +5V TTL inputs
- quadrature mode or clock/dir mode

Number of available encoders : 2 or 3 depending on software setup and option.

• INPUTS/OUTPUTS :

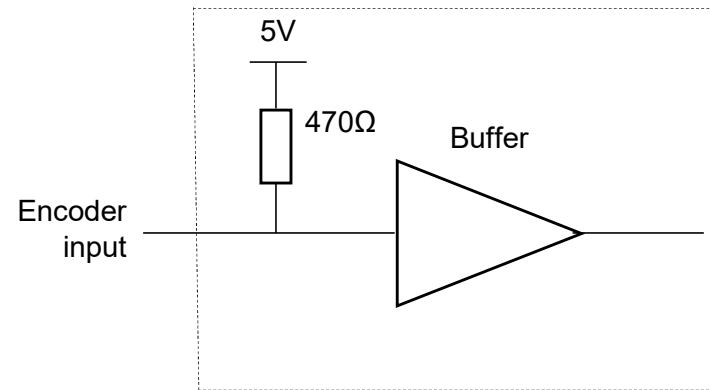
- 2 TTL inputs

4. ENCODER CONNECTOR

Connector Mapping

Pin number	Pin signification quadrature mode	Pin signification clk/dir mode
1	Analog In	Analog In
2	DC 5V	DC 5V
3	Synchro 1 In	Synchro 1 In
4	Synchro 2 In	Synchro 2 In
5	Not used	Not used
6	Not used	Not used
7	Not used	Not used
8	Not used	Not used
9	Encoder 1 phase A	Encoder 1 Clock
10	Encoder 1 phase B	Encoder 1 Direction
11	Encoder 2 phase A	Encoder 2 Clock
12	Encoder 2 phase B	Encoder 2 Direction
13	Not used	Not used
14	Encoder 3 phase A	Encoder 3 Clock
15	Encoder 3 phase B	Encoder 3 Direction
16	GND	GND

Operation Encoder



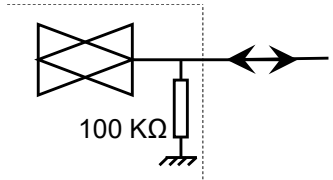
Front View of the Connector

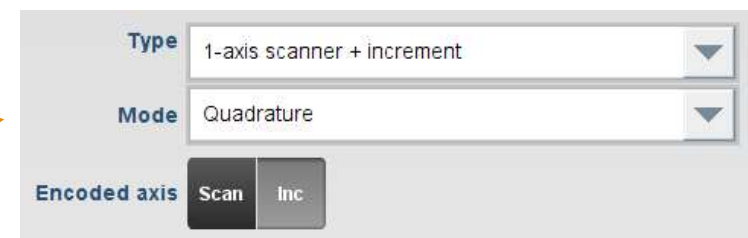
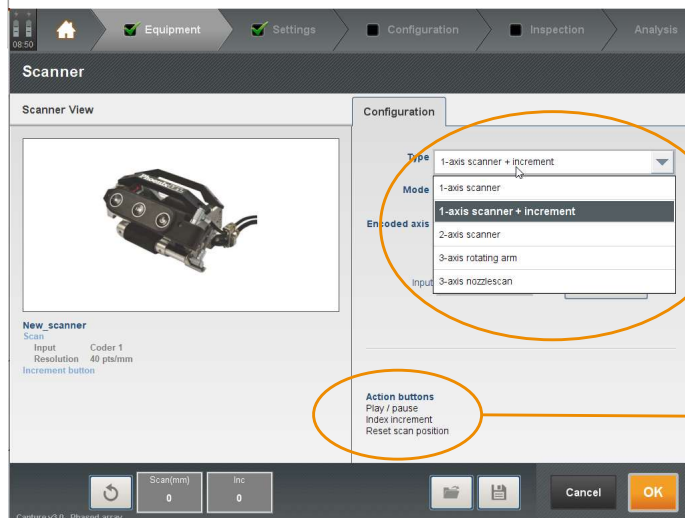


Signal Name	Description	User matching signal
Encoder Phase A/B	TTL 5V	<ul style="list-style-type: none"> - Absolute Max current -50 mA - Max frequency = 4 MHz

4. ENCODER CONNECTOR

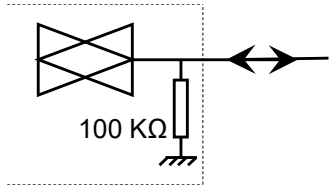
Connector Signal Description 2/3

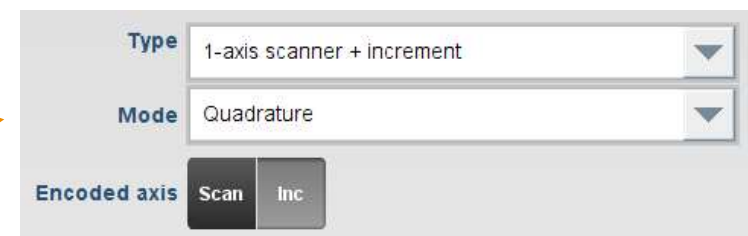
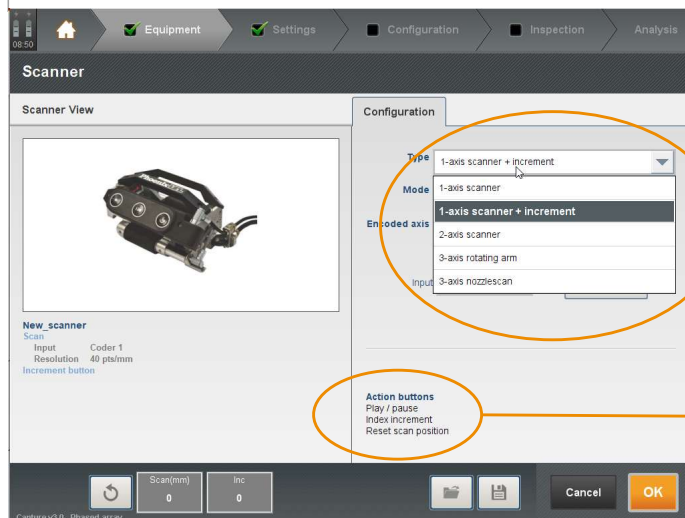
Signal Name	Description	User matching signal
Synchro1	<p>Synchro1 Input/Output</p> <p>TTL 5V</p> 	<ul style="list-style-type: none"> - If configured as <u>OUTPUT</u> (see in Capture software as below, Type ≠ "1-axis encoder +increment") <ul style="list-style-type: none"> - TTL 5V - = PRF = 5V/100ns pulse generated with each Pulser signal (IPEX connector). - Signal can be used to synchronize an external system - Jitter = 10ns. - Absolute Max output current +/-50 mA - If configured as <u>INPUT</u> (see in Capture software as below, Type = "1-axis encoder +increment") <ul style="list-style-type: none"> - TTL 5V, active on High level - Max Input current 50µA - When connected to Phased Array Wheel probe, Synchro1 is used as « Index Increment » (short press) and « Scan Encoder Reset » (long press > 2sec).



4. ENCODER CONNECTOR

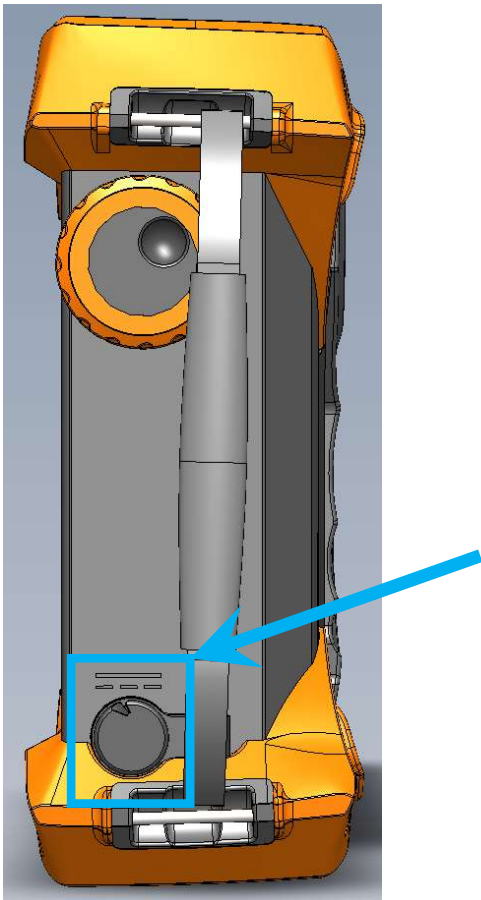
Connector Signal Description 3/3

Signal Name	Description	User matching signal
Synchro2	<p>Synchro2 Input/Output</p> <p>TTL 5V</p> 	<ul style="list-style-type: none"> - If configured as <u>OUTPUT</u> (see in Capture software as below, Type ≠ "1-axis encoder +increment") <ul style="list-style-type: none"> - TTL 5V - = PRF = 5V/100ns pulse generated with each Pulser signal (IPEX connector). - Signal can be used to synchronize an external system - Jitter = 10ns. - Absolute Max output current +/-50 mA - If configured as <u>INPUT</u> (see in Capture software as below, Type = "1-axis encoder +increment") <ul style="list-style-type: none"> - TTL 5V, active on High level - Max Input current 50µA - When connected to Phased Array Wheel probe, Synchro2 is used as « Pause/Resume » to toggle Pause/Resume.



5. POWER CONNECTOR

Connector Location



Connector Utility

- This connector is the general system power supply.
- When plugged, the external power supply is used to :
 - Power the unit
 - Charge batteries
- Even if the unit is off, the battery are charged by the external power supply.
- Use only the wall adaptor supplied with the MANTIS by EDDYFI.

Connector Information

Supplier: LEMO

Reference: EGG.0K.302.CLL

Matching Cable



Do not use another external power supply

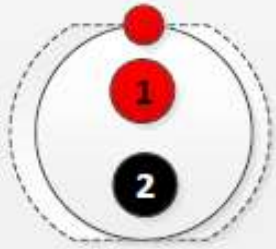
Supplier: EDDYFI

Reference: CAB_0061_MANTIS_DC_POWER

5. POWER CONNECTOR

Connector Mapping

<u>Pin number</u>	<u>Pin signification</u>
1	+15V DC
2	GND



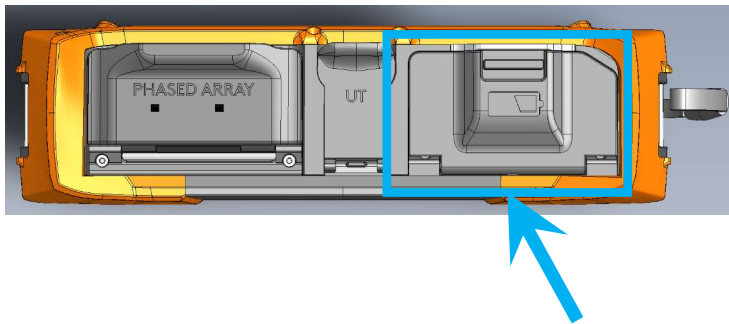
Front view



When the power cable is plugged, the position of the unit should allow to easily unlock the connector. This is in order to shut down the unit in case of emergency.

6. BATTERY SLOT

Battery Location



Battery Information



Do not use another external power supply
Do not use another battery

Supplier: EDDYFI

Reference: ADD-BATT-NI2020

Battery Charger Information

2 possibilities to charge batteries :

- Use the MANTIS
- Use an external dual charger:
 - **Supplier:** EDDYFI
 - **Reference:**

Battery Charge-discharge

There are two batteries on MANTIS.
One INTERNAL and one External.

WHEN PLUGGED, THE WALL ADAPTER :

- Supplies power to charge the batteries (unit off) :
 - If each of them has with a different charge level, the lower battery is charged at first. Then when the two batteries have the same charge level, they are charged at the same time. It takes 4 hours to completely charge 2 flat batteries.

WITHOUT WALL ADAPTER, BATTERIES ARE USED TO PROVIDE MANTIS POWER :

- If batteries have different charge levels, the MANTIS drains more power from the most charged battery until the levels are equal. Then MANTIS equally drains power from the 2 batteries.

IF YOU USE AN EXTERNAL CHARGER, CHARGE IS FASTER.

6. BATTERY - Hot-swap feature

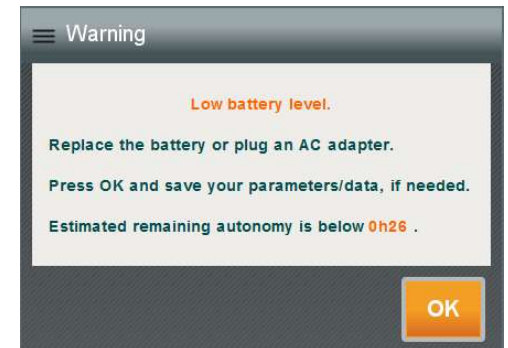
Hot-swap feature

MANTIS has a removable battery and an internal **Lithium-Ion** battery, non-removable. The internal one allows the hot swap of the removable battery. The internal battery can be replaced by Eddyfi only.

Lithium-Ion technology is currently one of the most effective solutions for powering portable instruments in harsh environments. This **Lithium-Ion** technology is limited in terms of use regarding its operating temperature and the MANTIS includes an overheating detection to protect the batteries.

To benefit from the hot swap function offered by the MANTIS, here are some tips:

1. Keep the charge of the internal battery above its minimum charge level so that the removable battery can be removed while the internal battery continues to power the MANTIS.
2. Plug in the power supply before replacing the removable battery.
3. As soon as you get the orange display (at the top left in CAPTURE software), click on the orange area to display an informative message:



How to easily charge the internal battery

1. Place the MANTIS in a cool environment.
2. Switch off the MANTIS.
3. Plug the power supply → the internal battery will automatically start charging, as soon as its temperature is below 45°C.

6. BATTERY SLOT

Hot-swap feature (...)

Hot environment

- To facilitate internal battery charge, as soon as the Mantis is not in use, turn it off and connect the power supply, in a cool environment, cold enough to have the internal battery temperature below 45°C.

Remove the removable battery so that you can check that the internal is charging or not. If you keep the removable battery in, the information charging or not refers to both batteries.



- When the MANTIS is on, the batteries will start charging as soon as their internal temperature is below 45°C.
- When the MANTIS is stopped, it cools down and the internal battery can start charging as soon as its internal temperature drops below 45°C, with the power connected.

Cold environment

- To facilitate internal battery charge, as soon as the Mantis is not in use, turn it off and connect the power supply to charge the internal battery, in a warm environment, warm enough to have the internal battery temperature above +2°C.
- When the MANTIS is on, the internal heat of the MANTIS can warm the batteries and the internal battery can start charging as soon as its internal temperature exceeds +2°C, with the power connected.

Note

- While the MANTIS is ON, the maximum ambient temperature that allows charging the batteries is 30°C (MANTIS V3; units delivered after July 2022), and 23°C (MANTIS V2; units delivered before July 2022).
- While the MANTIS is ON, the battery can reach 75°C when the ambient temperature is below 60°C. For safety reason, the maximum authorized operating temperature is 45°C (ambient).
- CAPTURE software, driving the MANTIS, does not monitor independently the internal and the removable batteries. The indicator, displayed at the top left of CAPTURE software, displays a global information only.
- For the proper functioning of the battery manager, the Capture versions recommended are Capture 3.4.1 or later and Capture 3.1.11 or earlier



6. BATTERY SLOT

Lithium-Ion battery technology

Battery charge

- A Ion-Lithium battery does not start charging if its internal temperature is above 45°C or below +2°C.
- A battery will start charging as soon as its internal temperature is below 45°C and above +2°C.
- Once a battery starts charging, it will continue to charge until it is full, or its internal temperature exceeds 54°C or drops below -10°C.
- If it stops charging due to too high or too low internal temperature (above 54°C, below -10°C), the battery will automatically start charging again as soon as its internal temperature drops below 45°C or exceeds +2°C.
- If the battery has reached 54°C while charging, it stops charging until it cools below 45°C.

Battery discharge

- The battery works properly until its internal temperature remains below 75°C and above -10°C.
- Once its internal temperature exceeds 75°C, the battery stops and no longer provides power. It can start discharging again as soon as its internal temperature drops below 65°C.
- Too high or too low temperature affects the battery lifetime.

7. FRONT PANEL

Front Panel View



Meaning

BATTERY STATUS

- Push the « BATTERY » button to check the battery level :
 - GREEN for 5 seconds - Charged above 30%
 - ORANGE for 5 seconds - Charged between 10 to 30%
 - RED for 5 seconds - Charged below 10%
 - BLINKING - Charging

You can check the battery level even if the unit is off.

ON/OFF

Push this button to power ON the unit.

If the unit is frozen, you can push the ON/OFF button for 10 seconds to force the power down or remove the battery and press the RESET button.

Press on ON/OFF button briefly to shut down properly the MANTIS.

7. FRONT PANEL

Front Panel View



Meaning

CLICKABLE SCROLL WHEEL

- TURN the wheel to adjust values, cursors, ...
- PRESS the wheel to validate the new value, position, ...

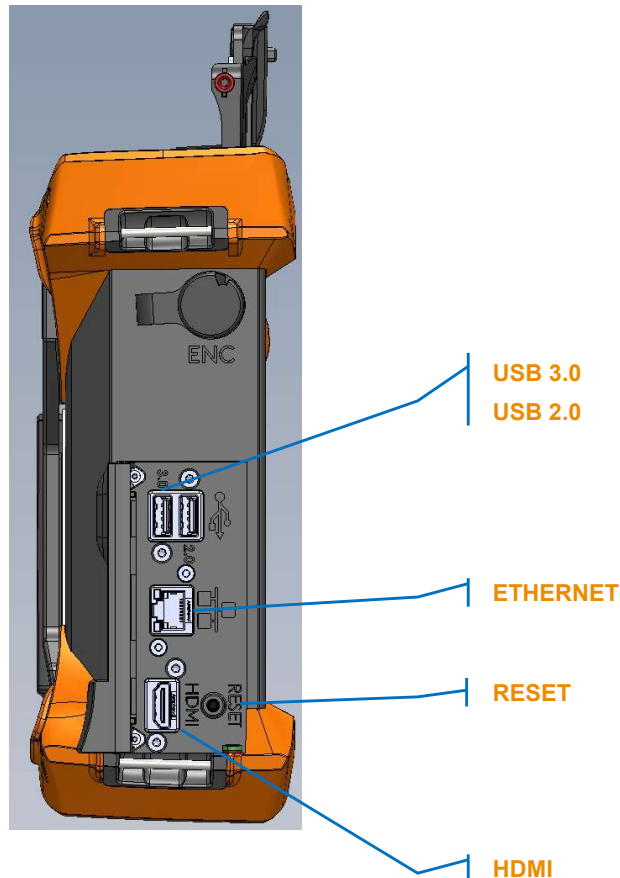
MODE button

MODE button can be used to disable/enable the touch screen and use a USB mouse.

- To disable the touch screen feature, press the button for more than 3 seconds
- To enable the touch screen feature, press the button for more than 3 seconds.

8. I/O CONNECTOR

Connector Location



RESET

- Disconnects the internal battery.
- If the additional battery is not in and the power supply is unplugged, RESET button powers down immediately and completely the MANTIS.

Connector Utility

USB

- Two USB port. Each port can accept any USB compatible devices.
- 1x USB3.0: Hi-speed USB, can transfers data at up to 625 MB/s.
- 1x USB2.0: Standard USB. USB3.0 device can be connected, but with USB2.0 speed.
- USB 5VDC protected at 0.5A, by resettable fuse (unit reboot required).

HDMI DISPLAY PORT

- 1x HDMI for video output



The external screen will be automatically detected by the MANTIS and will keep same screen resolution as MANTIS (1024x768).

ETHERNET


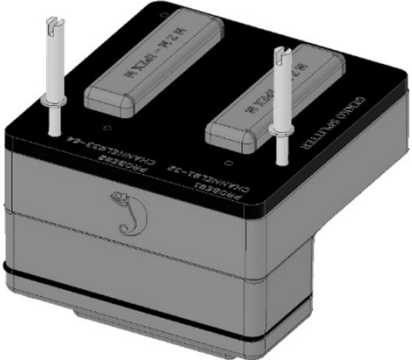
- When plugged to a network, the MANTIS appears with the name MANTIS-XXXX and the « Capture files» folder is shared with anybody: Refer to EDDYFI procedure:
 - PRO_GEKKO_INS_022-SHARING-USER-GUIDE
 - PRO_GEKKO_INS_027_GEKKO_V2_Connectivity_US-A
- The Ethernet controller is 1Gb/s speed.

**When the IO hatch is closed, the IO connectors area are waterproof.*



9. ACCESSORIES

Accessory Name	Description	Picture
<p>Easy-Latch</p> <p>EDDYFI ref : IMP_0061-EASYLATCH-ADAPT</p>	<p>This accessory allows the connection of a probe with an EASY LATCH connector to MANTIS.</p> <p>By default part of the MANTIS housing</p>	 A black plastic rectangular frame with a latch mechanism on the right side, used for connecting a probe to the MANTIS housing.
<p>Dongle Wi-Fi</p> <p>EDIMAX ref: EW-7811Un</p>	<p>This accessory allows the Wi-Fi connection to the MANTIS.</p>	 A small black USB Wi-Fi dongle with a gold-colored metal tip and the EDIMAX logo on the side.



9. ACCESSORIES_PROBE

Accessory Name	Description	Picture
<p>IPEX FRB Adaptor</p> <p>EDDYFI ref: ADAPT_IPEX_FRB_V2</p>	<p>This adaptor allows connection of a probe with an HYPERTRONICS (FRB) connector to the MANTIS.</p>	
<p>Available splitter models</p> <p>SPLITTER 1x64 -> 2x32 SPLITTER 1x128 -> 4x32 SPLITTER 1x128 -> 2x64 SPLITTER 1x64 -> 2x30 + 4 LEMO SPLITTER 1x128 -> 2x62 + 4 LEMO </p>	<p>The 64 channels of the MANTIS can be split into 2 I-PEX connectors, with or without additional LEMO-00 connectors (optional).</p> <p>Ref = SPLIT-IPEX-64-2X32 Ref = SPLIT-IPEX-128-2X64 Ref = SPLIT-IPEX-64-2X30+4LEMO Ref = SPLIT-IPEX-128-2X62+4LEMO</p>	

9. ACCESSORIES_BATTERIES

Accessory Name	Description	Picture
BATTERY EDDYFI ref : EDDYFI-BATTERY	Additional battery. 10.8V 8.7Ah / 94Wh	
BATTERY CHARGER EDDYFI ref : EDDYFI-CHARGER	External dual battery charger able to recharge 2 batteries in 4hours.	

9. ACCESSORIES_CABLES

Accessory Name	Description	Picture
Adaptor for MicroD25 system EDDYFI ref CAB_0069-ENC-MOLEX-LEMO	This cable allows connection of scanners with MicroD25 (MOLEX) encoder connector to MANTIS, LEMO16.	 A black cable with a MicroD25 (MOLEX) connector on one end and a LEMO16 connector on the other.
Adaptor for SUBD15 system EDDYFI ref : CAB_0104-ENC-MANTIS-DE15	This cable allows connection of scanners with SUBD15 encoder type to MANTIS, LEMO16.	 A black cable with a SUBD15 connector on one end and a LEMO16 connector on the other.



10. GLOBAL WARNINGS

Do not use the device for purposes other than those for which it was designed.

Do not inspect parts of the human body or animal body with MANTIS.

The use of non-compatible devices can cause device failure.

To avoid personal injury or property damage, do not disassemble, modify or attempt to repair the unit.

Carefully read the instructions in the user manual before turning the unit on.

Obey all safety warnings on the unit and those contained in the User Manual.

Do not install substitute parts or do not make modifications not allowed on the device.

Repair instructions, if any, are for technical staff qualified. To prevent dangerous electric shock, do not perform any repair unless qualified to do it. For any problems or question about this product, please contact EDDYFI NDT or an authorized representative of EDDYFI NDT.


The deterioration of the MANTIS screen is not covered by the guarantee.

Before turning on the power, connect the ground of the device to the protective conductor of the power cord (sector). The plug must be inserted only into a mains socket outlet with contact ground. You should never cancel function protection using an extension cord (power cable) without a protective conductor (grounding).

When the protective grounding seems corrupted, you must power down the unit and prevent unintentional operation.

The device must only be connected to a power source of the type described in the Technical document.

Prior to trash MANTIS, make sure to comply with local laws.

In accordance with European Directive 2002/96 / EC on waste electrical and electronic equipment (WEEE), this symbol  indicate that the product should not be disposed with municipal waste but must be part of a separate collection. Please consult your EDDYFI NDT local representative for instructions on returning the unit or find feasible collection arrangements in your country.

To have unconnected connectors IP certified, it is important to install rubber protectors of the unit before proceeding with cleaning the housing. Otherwise, the liquid may get into the slots or flow into the housing and damage the electronics boards.

The probes connected to the MANTIS must be equipped with reinforced insulation.



10. GLOBAL WARNINGS

To avoid injury, be careful not to place your fingers between the support leg and body of the unit and in any connector of the unit.

Avoid touching the inner conductor of I-PEX and LEMO connectors to reduce the risk of electric shock. The tension of the inner conductor of UT connectors can reach 315 V and the voltage of the inner conductor PA connector can reach 135 V.

Do not insert your finger inside two sink fins on the back of the unit.

Do not insert your finger between back rubber part and axis needed for carrying strap.

The MANTIS system have V.E.S.A compatible fixation on the back. Please contact EDDYFI before using these fixation plot.

Do not insert your finger in the two batteries slot.

It is forbidden to handle the unit by the top rubber part.

The unit has not been designed to be installed in vertical position. Please always use the back-support leg to ensure the stability of the unit.

To completely disable the unit, unplug the AC adaptor, remove the battery and, if needed, press the RESET button.



11. BATTERY WARNINGS

Do not attempt to open, crush or puncture the battery; this may cause injury.

Do not incinerate. Keep the battery away from fire and other sources of extreme heat. Exposure of battery to extreme heat sources (over 80 °C) may cause an explosion.

Do not drop the battery, do not hit and do not subject it to other abuse because it could expose the corrosive and explosive content of the cells.

Do not short-circuit the terminals of the battery. A short circuit can cause severe damage to the battery and make it unusable.

Do not expose the battery to moisture or rain; this may cause an electric shock.

Charge the batteries only through the MANTIS or external charger approved by EDDYFI NDT.

Do not store the battery if the battery level is below 30%. Recharge the battery charge level between 30% and 70% before storing.

Remove the batteries from MANTIS when storing the device during a long time.

The transport of Li-ion batteries is governed by the Recommendations on the transportation of dangerous goods in United States. Governments, intergovernmental organizations and other international organizations must follow the provisions contained in these recommendations to promote global harmonization in this area. Among these organizations include the International Civil Aviation Organization (ICAO) the International Air Transport Association (IATA), the Maritime Organization international (IMO), the Department of the US Transportation (USDOT), and others. Please contact the carrier to check what are the regulations before shipping Li-ion batteries.



12. CLEANING

External surfaces of MANTIS, that is to say the housing, protector of the LCD screen can be cleaned when it is necessary. Make sure the unit is closed, the power cord is disconnected and the batteries are removed.

Disconnect all cables and connectors and check that the protectors rubber are closed on all external MANTIS port. Make sure that the battery compartment cover is securely closed. To restore the original appearance of the unit, clean the housing with a soft cloth. To remove stubborn stains, use a damp cloth with a solution mild soap. Do not use abrasives or strong solvents which could damage the finish. Once you have removed the protective connectors, make sure they are dry before connecting anything else. If the connectors are wet, dry it with a soft dry cloth or let them air dry.

Never use abrasives or strong solvents to clean the MANTIS screen. Clean with a damp cloth and washer fluid. If you have no washer fluid, use a standard glass cleaner. If appropriate, use a soft brush to remove paper towel waste.

13. TECHNICAL SPECIFICATIONS

GENERAL	
Size	311mm x 220mm x 95mm
Operating temperature	-10 to 45°C
Storage temperature	-10 to 60°C
Weight (g)	4.2 Kg with battery
Power supply	2 Li-Ion batteries (1 internal battery)
Battery run time	4h (hot swap capabilities)
Internal storage	SSD 256 Go
U.S Connectors	IPEX for P.A. channels LEMO for conventional channels
Power input	Wall adapter 15V / 6A
Number of conventional channel	2 LEMO connectors: 1 P/R, 1 R
Maximum number of activates channels in transmission	64
Maximum number of activates channels in reception	16

CONNECTIC	
Encoder Input*	3 TTL Quadrature or clock/dir
Synchro Input Output*	2 TTL inputs

DISPLAY	
Dimension	21cm (8,4')
Brightness	800 cd/m2
Resolution	1024x768
Contrast	600:1
Screen technology	Resistive touch screen

PROTECTION	
IP grade	Designed for IP65

* Number of encoder and I/O depends on software package and version.

14. TROUBLE SHOOTING

1. The MANTIS is frozen and cannot be started.	Press the ON/OFF button for more than 10 seconds.
2. The MANTIS turns off, but the keyboard stays on.	Disconnect the power supply, remove the battery. Then press the RESET button, located on the left of the MANTIS, close to the HDMI connector. Try to restart the unit.
3. The touch screen does not properly work, there is unexpected pressure points.	The MODE button can disable the touch screen and then a USB mouse can be used. <ul style="list-style-type: none">- To disable the touch screen feature, press the button for more than 3 seconds- To enable the touch screen feature, press the button for more than 3 seconds. Replace the protection film.
4. The batteries do not charge as expected.	Refer to Battery section to operate a correct charge of the internal battery.
5. There is no independent information related to the internal and removable battery.	As CAPTURE software can only get global information related to the batteries, remove the removable battery to get information related to the internal battery only, To get information related to the removable battery, remove the battery and press the test button of this battery.
6. The MANTIS turns off, unexpectedly.	Update CAPTURE software if your CAPTURE software version is 3.3 or older. Refer to Battery section to operate a correct charge of the internal battery.

Contact us

Any questions or Hardware problems:

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