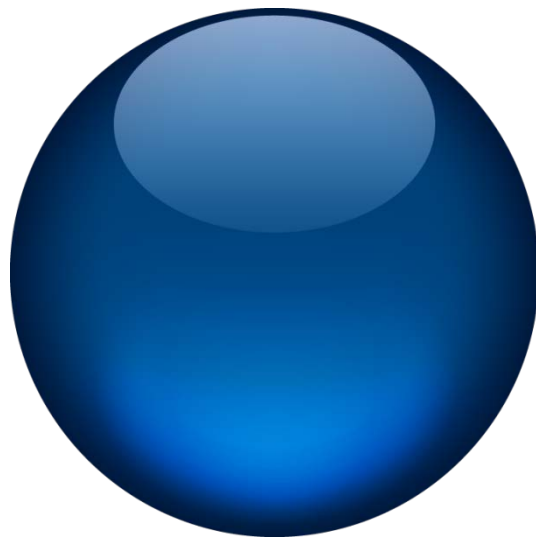




PHINS COMPACT C3

INTERFACE CONTROL DOCUMENT

Document Revision History

Edition	Date	Comments
A	09/2016	Creation

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Abbreviations and Acronyms

Abbreviations and acronyms are described in the document *Inertial Products - Principle & Conventions* (Ref.: MU-INS&AHRS-AN-003).

Text Usage

Bold	Bold text is used for items you must select or click in the software. It is also used for the field names used into the dialog box.
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<i>Italic</i>	Italic text is the result of an action in the procedures. It is also used for referencing to other document titles.

Icons



The **Note** icon indicates that the following information is of particular interest and should be read with care.

Important

The **Important** mention indicates that the following information should be read to forbid or prevent a product dysfunction or a faulty operation of the equipment.



The **Caution** icon indicates that the following information should be read to forbid or prevent product damage.



The **Warning** icon indicates that possible personal injury or death could result from failure to follow the provided recommendation.

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1 INTRODUCTION

This document is the PHINS COMPACT C3 Interface Control Document. It provides general information on the PHINS COMPACT C3 interface, with a focus on mechanical and electrical interfaces.

2 WARNINGS

2.1 ESD (Electrostatic Discharge) Sensitive Device



This product may be damaged by ESD. Such damage may result in subtle performance or life degradation, or complete device failure. Appropriate storage and handling precautions should be taken at all times to avoid ESD damage.



The PHINS COMPACT C3 sub-assemblies devices are prone to damage because of electrostatic charges made by human body. These charges may be up to 4000 volts and cause damage without being noticed.

It is recommended to follow ESD precautions during manipulation of these sub-assemblies.

2.2 Magnetic clearance

PHINS COMPACT C3 must be kept away of strong magnetic fields.

2.3 Handling storage specification and instruction



PHINS COMPACT C3 is made of 2 sub-assemblies, they are matched. They shall be maintained all time together and not mixed with other PHINS Compact C3 serial number sub-assemblies.

- Handle them with care and avoid subjecting it to sudden or severe chock, to any liquids or solvents.
- Limit the presence of dusts in the product area.
- Refer to the Qualification chapter of the PHINS COMPACT C3 Product Specification for environmental specification.

The IMU sub-assembly includes precise sensors which measure the accelerations and the rotations (thus the shocks and the vibrations...). Incorrect handling (drop, shock or hit,) outside the specification range (refer to PHINS COMPACT C3 Product Specification) may degrade the product performance.

Genrally, all necessary precautions should be taken to protect the exposed components like electronic, fiber, etc.



Only a qualified people shall unpack the product and handle the unpacked product.

The IMU suba-assembly is composed of optical fiber, this one must not be handled or touched with fingers or any king of tool.

Only the metallic part and the heat sink can be touched.

The product can be deteriorated if these rules are not met.

To extract the product from its packaging or to handle the product, place only your hand on the metallic parts.

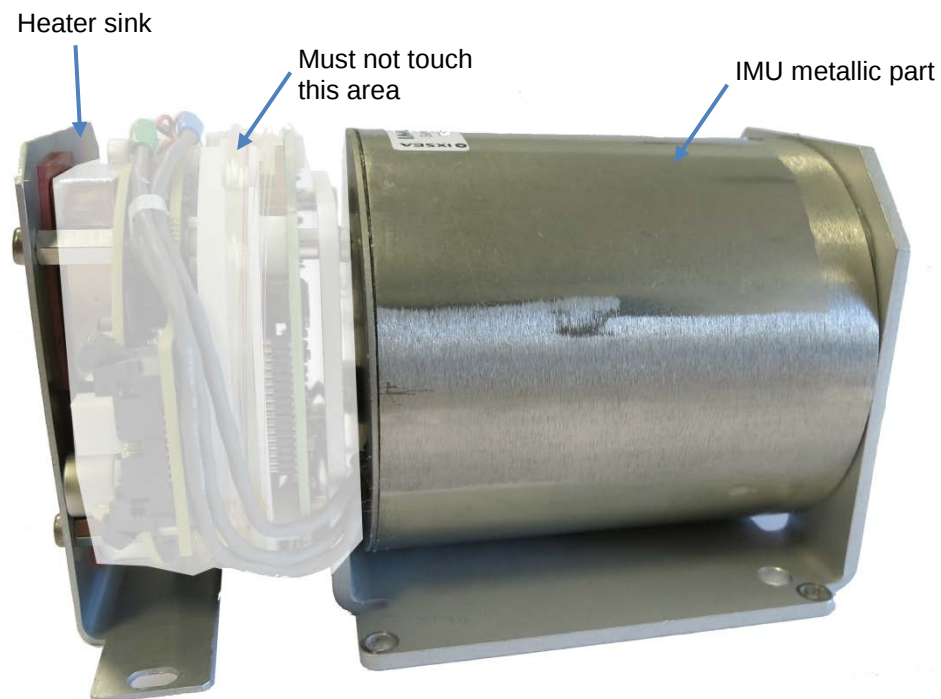


Figure 1 – IMU

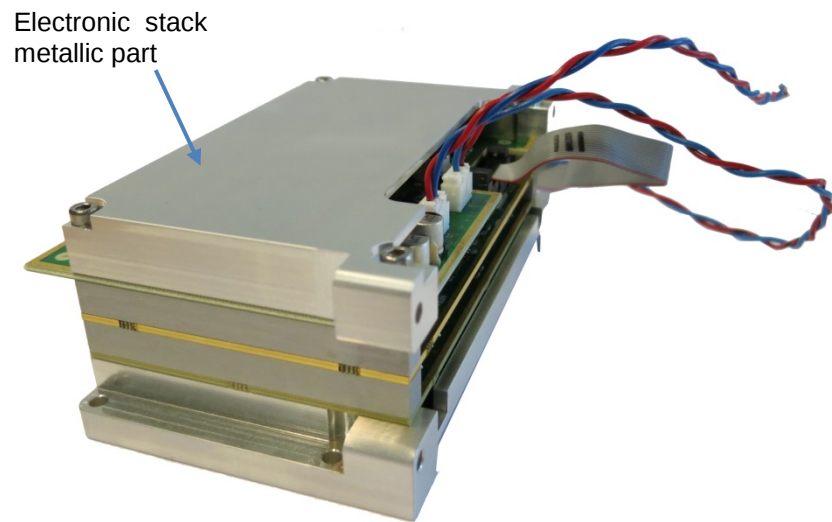


Figure 2 – Electronic stack

3 GENERAL INTERFACE SPECIFICATION

3.1 Communication link

PHINS COMPACT C3 is able to receive and transmit data through 5 configurable asynchronous serial communication lines (Digital I/O):

- Baud rates, parity and number of stop bits can be configured independently for each of the 5 serial links.
- Electrical level can be configured independently for each of the 5 serial links.

PHINS COMPACT C3 is able to receive and transmit data through a 10/100 Mbps/s Ethernet link:

- TCP/IP and UDP protocols are available
- 7 input / 5 output virtual ports can be opened simultaneously

The output frequency can be selected as presented in the *Interface Library* document.

PHINS COMPACT C3 can be connected to a PC for configuration, installation and display purposes through the Web-based Graphical Interface. The I/O signal is available:

- Either through the Ethernet connector (see section 5.5).
- Or through the digital I/O connector (see section 5.6).



By default, access to the Web-based User Interface is possible through the Ethernet connector. On RS232 serial link, the Installation and Repeater output has to be configured in PPP mode to have access to the Web-based User Interface (see *Network Set-up Guide* (Ref.: MU-INS&AHRS-AN-005) for more details).

For the Ethernet link, the following parameters are defined by default:

- IP Address: 192.168.36.1xx, xx being the last two numbers of the PHINS COMPACT C3 serial number
- Connection through http web server (port 80)
- Repeater flow available in TCP (port 8110)

By default, serial repeater link is configured as follows:

- Protocol used : PHINS Standard (Refer to *INS Interface Library* document (Ref.: MU-INSIII-AN-001) for a description of PHINS Standard data frame output)
- Baudrate : 57.6 kBauds
- Flow Control : Odd, 2 stop bits
- Refresh rate : 5 Hz (200 ms)

3.2 Software interfaces and library

Input and output digital interfaces are user-configurable with a comprehensive set of protocols (or formats) to be selected from the digital interface library.

Digital protocols in binary format and NMEA compliant ASCII format are available for input and output data.

To get details on protocols, please refer to *INS - Interface Library* document (Ref.: *MU-INSIII-AN-001*).

System configuration and operation can be performed either through the Web-based User Interface (refer to the Inertial Products - Marine Applications, Web-based interface user guide, ref.: *MU-INSIII-AN-021*) or through a set of control command messages (refer to *INS – Advanced Configuration*, ref.: *MU-INSIII-AN-004*).

3.2.1 WEB BASED INTERFACE

The PHINS COMPACT C3 Web-based user interface runs either on a workstation or on a laptop and allows full installation and operation of the system.

The user interface requires a web-client (e.g.: Firefox) and is qualified with PC running Windows XP operating system with the following minimum requirements:

- Minimum processor frequency : 2 GHz
- Minimum RAM : 2 048 Mo
- Minimum storage available : 10 Go

Web-client versions and add-on required are detailed in the web MMI user guide and these versions can be found on the CD delivered with the product.

3.2.2 CONTROL COMMAND

The control command allows to interaction the following features:

- Installation
 - ☐ Misalignment configuration
 - ☐ Level arms configuration
 - ☐ Communication link configuration (physical parameter and software parameters)
 - ☐ External sensor configuration & management
 - ☐ INS starting modes
 - ☐ Depth management
- Operation
 - ☐ Software reset
 - ☐ User position fix
 - ☐ Software activation/deactivation of external sensor
 - ☐ Data display (including all navigation and quality check data)
 - ☐ Internal data logger

4 MECHANICAL SPECIFICATIONS

4.1 PHINS COMPACT C3 Sub-Assemblies

The PHINS COMPACT C3 product is composed of the IMU and the electronic stack sub-assemblies, they are matched:

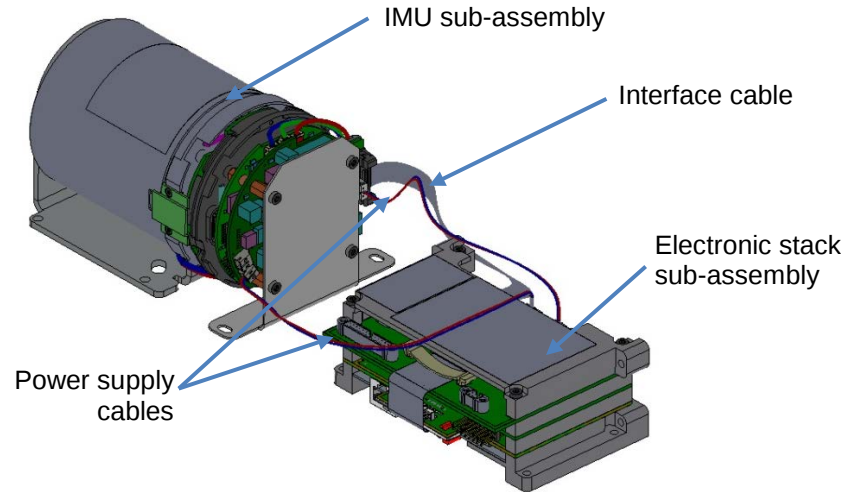


Figure 3 - PHINS COMPACT C3

The two sub-assemblies are linked by the following cables:

- 2 power supply cables
- 1 interface cable

Refer to section 4.6 to connect the cables.

4.2 IMU sub-assembly Mechanical Alignment

The IMU sub-assembly base plate is designed with two holes for alignment of axis X_1 with a reference direction on the matching adaptation plate fixed onboard the vehicle.

It is recommended to perform an harmonization of your product against your platform, using the alignment holes.

4.3 IMU sub-assembly Reference Frame Centre

The reference frame centre P of the IMU sub-assembly is the intersection of the three IMU reference axis X1, X2 and X3 defined in *Inertial Products - Principle & Conventions* (Ref.: MU-INS&AHRS-AN-003).

The reference frame centre, P, is the sensing point of the measurements and the reference point for the determination of external sensor lever arms (Refer to the document *Inertial Products - Principle & Conventions* (Ref.: MU-INS&AHRS-AN-003) for details). It is shown in Figure 4 – IMU sub-assembly housing dimensions and reference frame centre P.

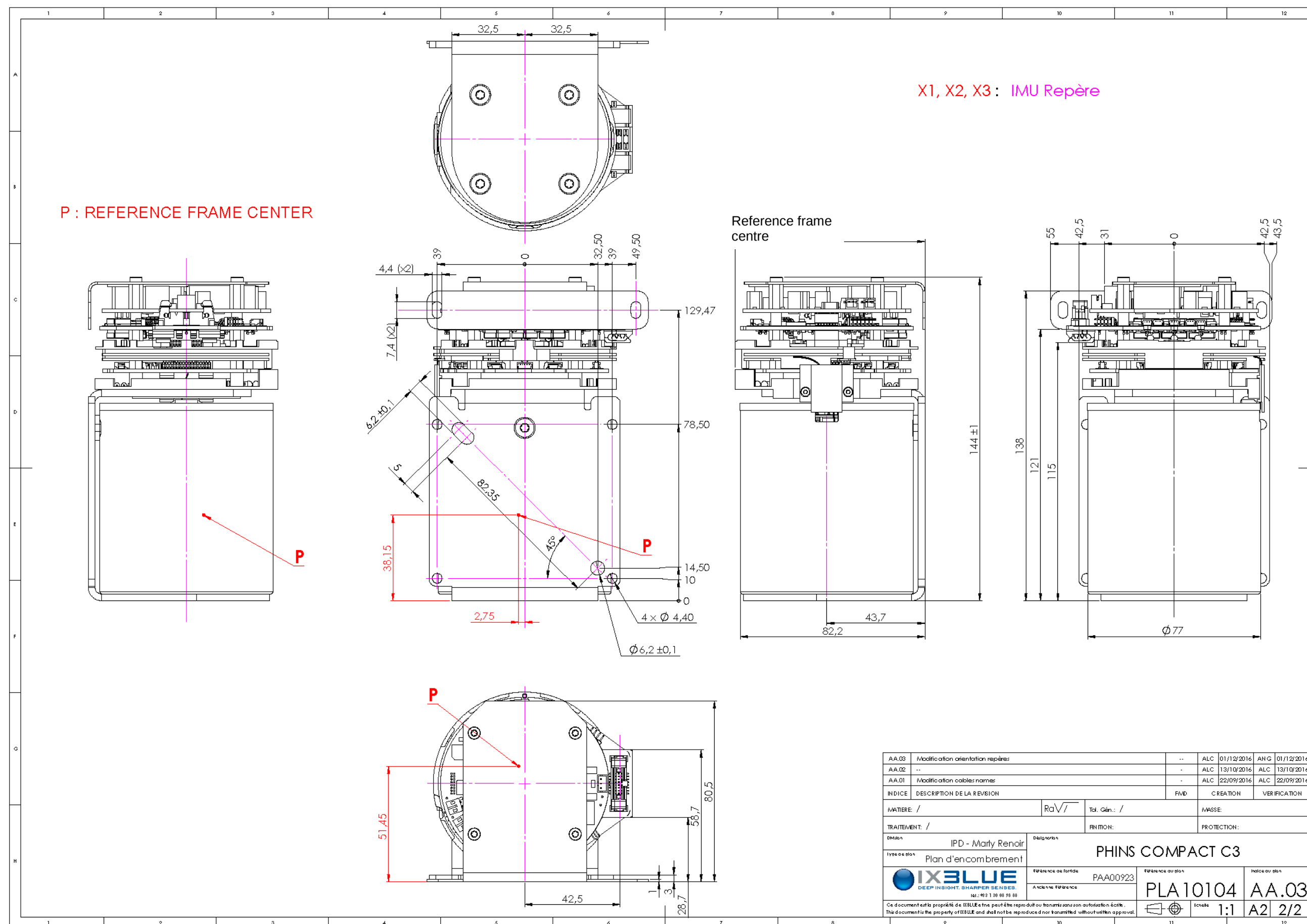


Figure 4 – IMU sub-assembly housing dimensions and reference frame centre P

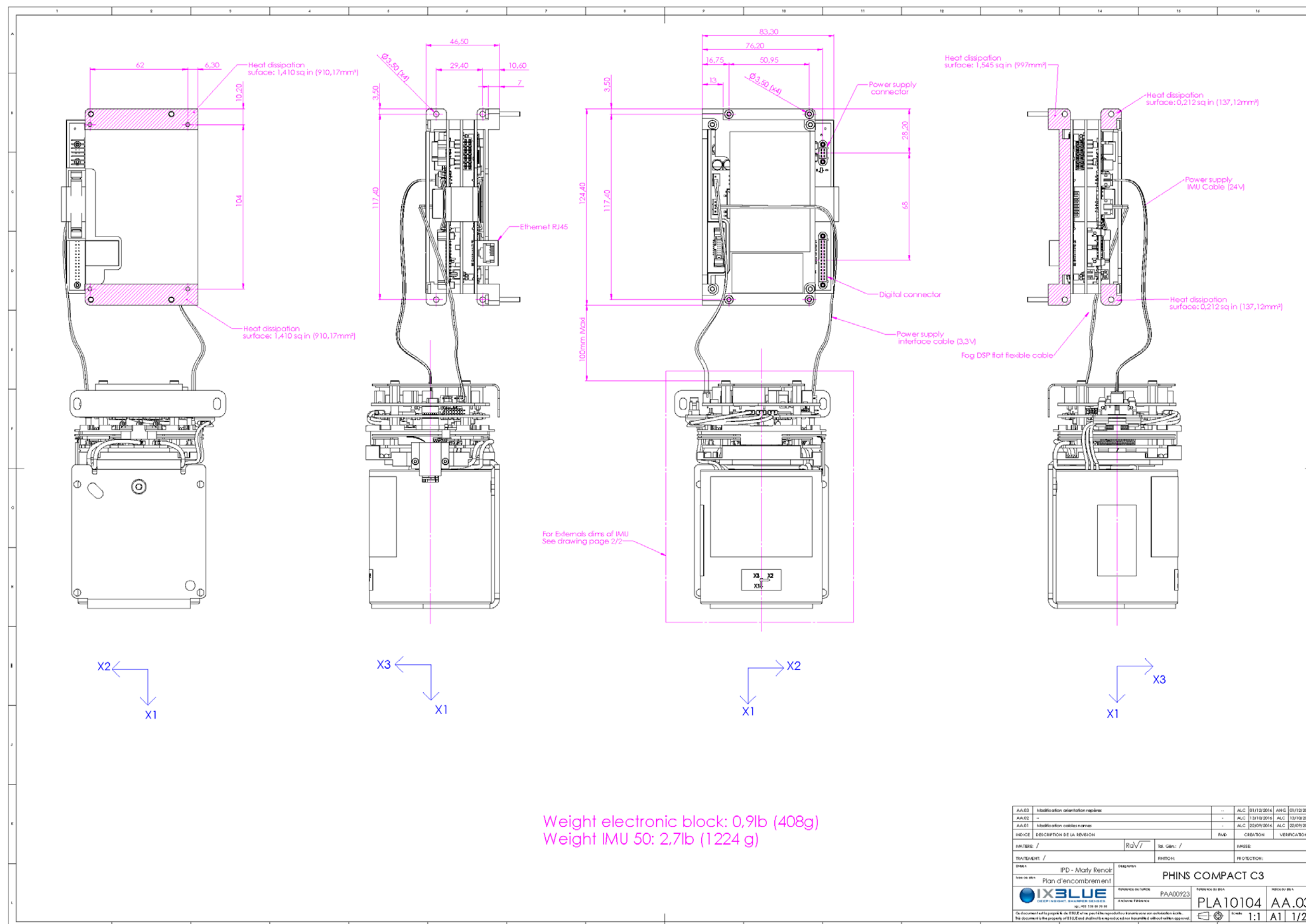
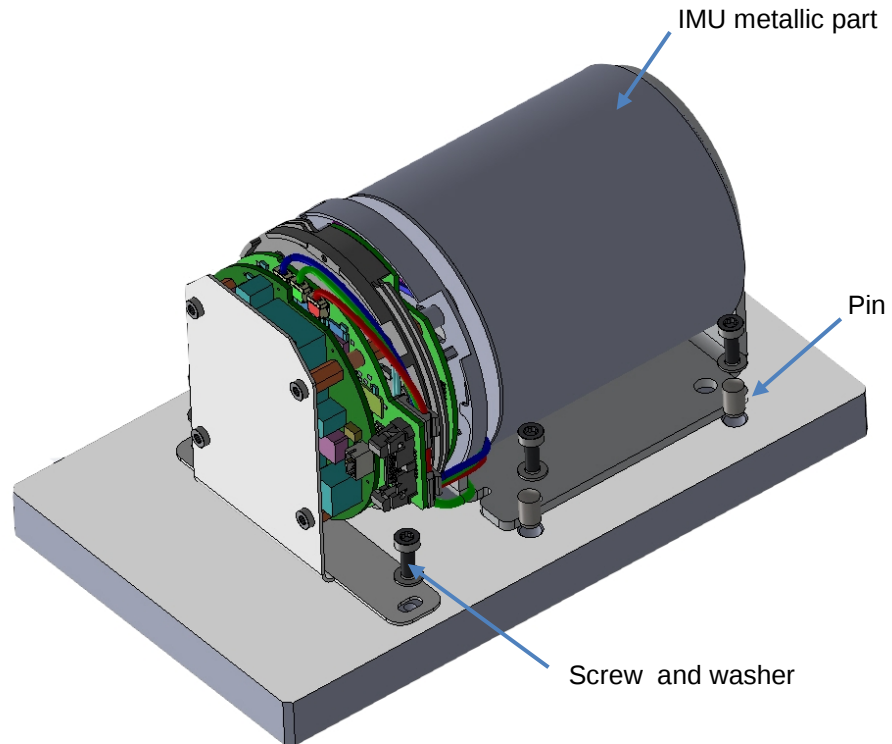


Figure 5 – PHINS COMPACT C3, electronic stack sub-assembly housing dimensions

4.4 IMU installation

For the dimension of the IMU, refer to Figure 4 – IMU sub-assembly housing dimensions and reference frame centre P.

The IMU can be fixed through 6 screws CZX M4x10 and 6 flat washers ZU4 in stainless steel (not provided).

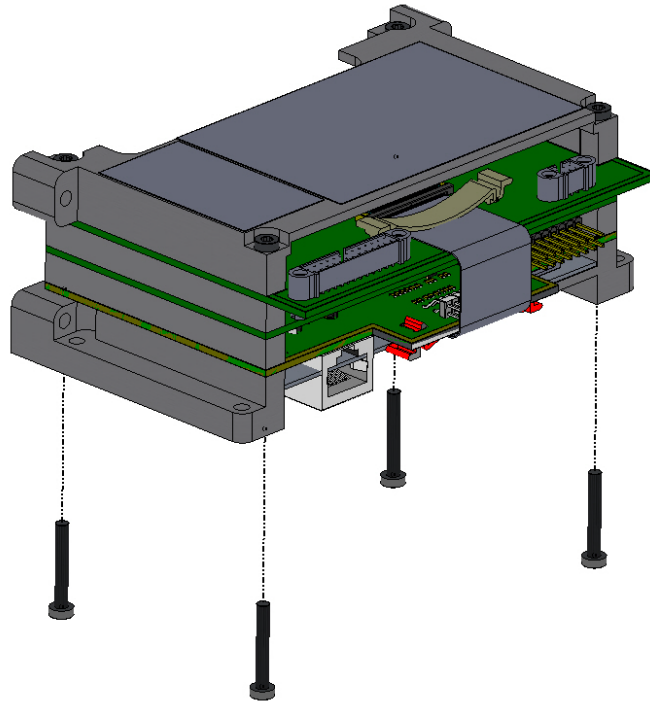


4.5 Electronic stack sub-assembly installation

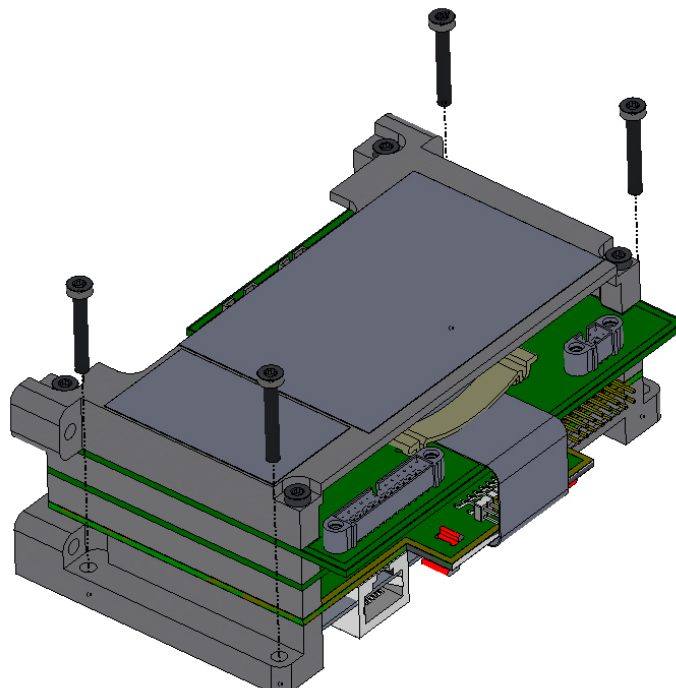
For the dimension of the electronic stack, refer to Figure 5 – PHINS COMPACT C3, electronic stack sub-assembly housing dimensions.

Three (3) means of installing the electronic stack sub-assembly:

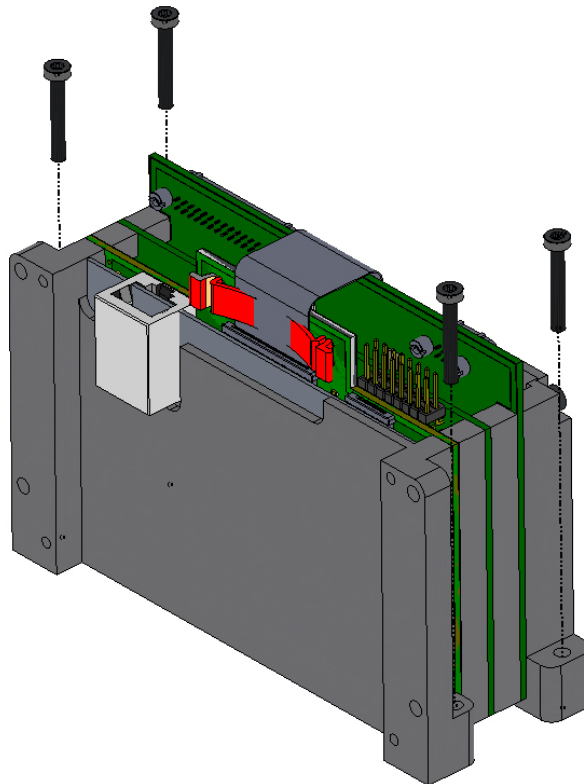
- Fixing horizontally with 4 screws (M3 thread with maximum length of 8 mm ; not provided) on the bottom:



- Fixing horizontally with 4 screws (not provided) from the top:



- Fixing vertically with 4 screws (not provided):



4.6 Connecting the PHINS COMPACT C3 sub-assemblies

PHINS COMPACT C3 is composed of the IMU and the electronic stack sub-assemblies. Three cables link the IMU to the electronic stack.

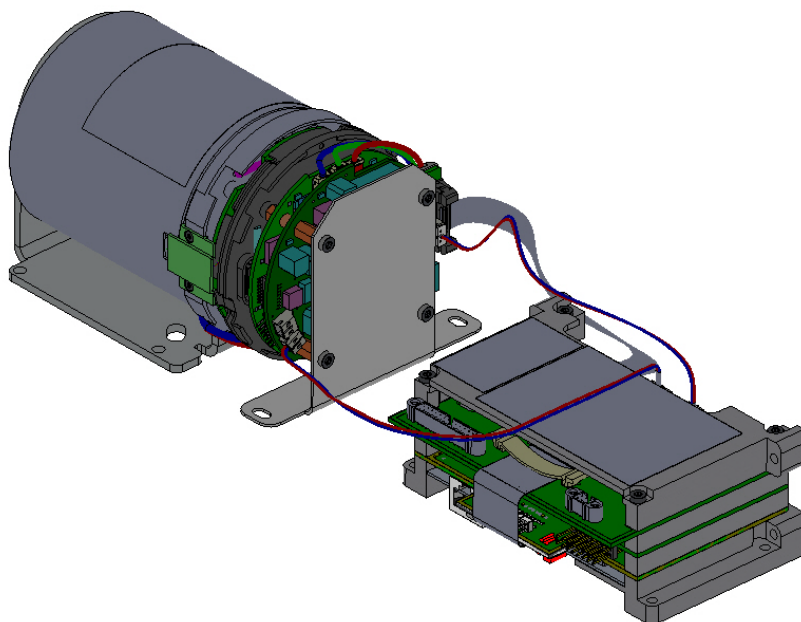


Figure 6 – PHINS COMPACT C3 sub-assemblies connected

To connect the IMU and the electronic stack:

- Put your hand on the IMU metallic part.
- Connect the power supply cables between the electronic stack and the IMU sub-assemblies.
- Connect the interface cable between the electronic stack and the IMU sub-assemblies.

The following table gives the cable references.

Electronic stack connector		IMU connector	Cable Reference
J3	Connected to	J1	SCA00260
J4		J2	SCA00420
J10		J14	SCA00062

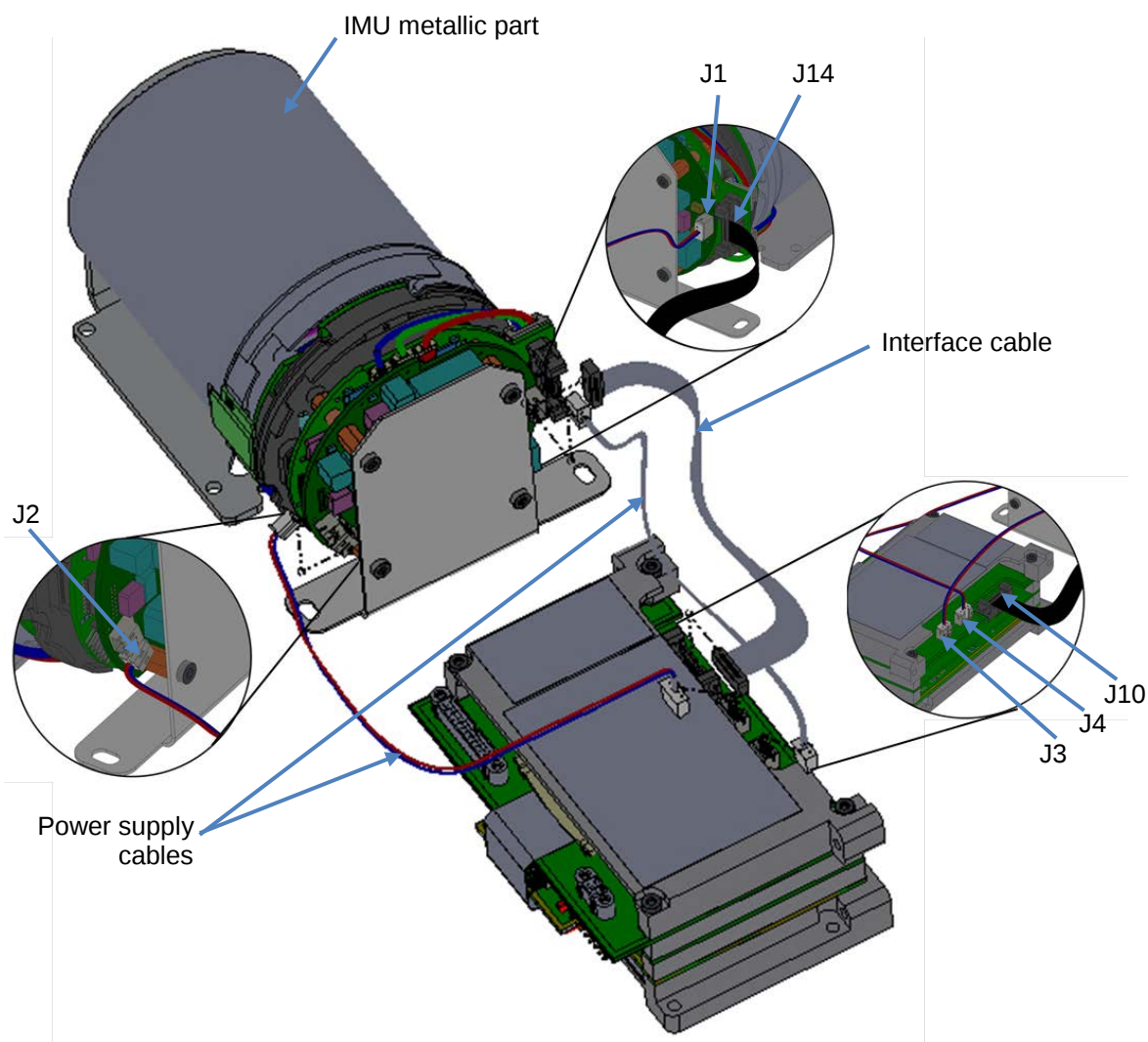


Figure 7 – PHINS COMPACT C3 Connection

5 ELECTRICAL INTERFACE SPECIFICATIONS

5.1 Overview of PHINS COMPACT C3 Electrical Interface

The electronic interfaces are managed by the electronic stack. It is composed of the processor board, the DSP4 board and the interface board.

Two connectors are available on the top of the PHINS COMPACT C3 electronic stack.

The Ethernet connector is available on the bottom left side of the electronic stack.

These connectors are referenced and identified by markings on the unit. They are all different and fool-proof to avoid any misconnection.

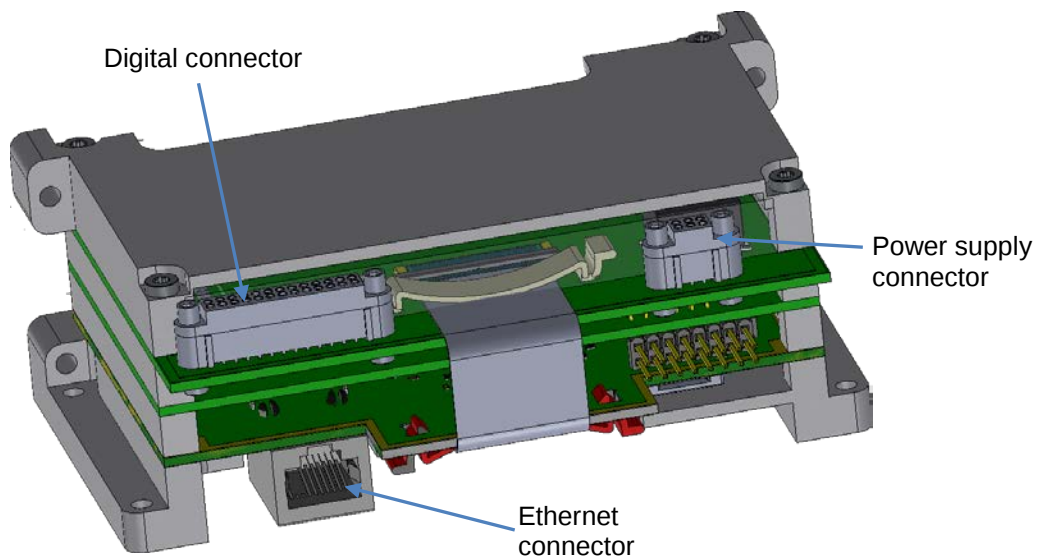


Figure 8 - PHINS Compact C3 electronic stack

The connector references are as follows:

Power supply: 221Y06F22 Nicomatic*

Digital: 221Y26F22 Nicomatic*

Ethernet: RJF22N02100BTX AMPHENOL SOCAPEX

*compatible with other brand models.

5.2 Listing of Electronic Stack Interfaces

PHINS COMPACT C3 is fitted with 3 connectors configured to provide the following:

	Ethernet connector	Digital connector	Power connector
Power system supply			1
Ethernet inputs	7		
Ethernet outputs	5		
RS232 inputs		5	
RS232 outputs		5	
Pulse Inputs		2	
Failure signal output (TTL)		1	

The I/O port configuration is done through the Web-based Graphical User Interface. Refer to document *INS – Marine applications – Web-based interface user guide (Ref.: MU-INSIII-AN-021)* for details.

5.3 Electrical recommendations

Important

- The digital cable should be shielded.
- SCA00260/SCA00420/SCA0062 are not shielded. It is recommended to plate them on the platform mechanical ground.
- Within the product, the mechanical ground and the electrical grounds are uncoupled, they should not be connected to each other.
- The digital grounds of the different signal are isolated from each other, so they should be kept isolated from each others.

5.4 Power Supply Connector Specifications

5.4.1 DEFINITION

The electronic stack sub-assembly is powered by, nominal, 24 Volts direct current.

The electronic stack sub-assembly can be powered on via a 3-wire cable for direct connection to a 24 V power supply.

The power supply connector is configured as shown in Figure 9.

5.4.2 CONNECTOR & PIN OUT

The electronic stack sub-assembly can be powered via a 3-wire cable for direct connection to a 24 V power supply.

The power supply connector is a 6 pins straight connector.



Figure 9 - Diagram of the power supply connector on the electronic stack

The assignment of the wires at the output is defined for each in Table 1.

Table 1 -The PHINS COMPACT C3 power supply wiring

Pin *	Name	Electrical characteristics
1	System Power In GND*	0 V/1 A ⁽¹⁾
4	System Power In GND*	0 V/1 A ⁽¹⁾
2	System Power In (+24 V)	20-32 V / 1A ⁽²⁾
5	System Power In (+24 V)	20-32 V / 1A ⁽²⁾
3	Mechanical GND	0V

⁽¹⁾ ⁽²⁾ Two pins are available to carry the current. These pins are linked together inside the product.

* Power supplies GND (0 V_{DC}) and Mechanical ground (housing) are insulated from each other and from serial GND_X.

** Pin 6 is not connected.



It is recommended to use an external power supply which is stable and filtered out from noise.

5.5 Ethernet Connector Specifications

5.5.1 DEFINITION

The Ethernet connector provides the following inputs and outputs:

- 7 inputs, which can be user-configured either with UDP or TCP. Configuration is made through the PHINS COMPACT C3 Repeater Software.
- 5 outputs, which can be user-configured either with UDP or TCP. Configuration is made through the PHINS COMPACT C3 Repeater Software.
- 1 input and 1 output dedicated to configuration and installation through connection to a computer, only in TCP.

These interfaces are user configurable (except for the dedicated Configuration I/O) through the Web-based User Interface. For details, refer to the documents:

- ❑ *INS – Marine applications, Web-based Interface User Guide (Ref.: MU-INSIII-AN-021)*
- ❑ *INS – Advanced configuration (Ref.: MU-INSIII-AN-004)*

They are used:

- For connection of external sensors to PHINS COMPACT C3: connecting a GPS or a log to get respectively external input of latitude and speed into PHINS
- For output of PHINS COMPACT C3 data to external systems
- For configuration and display purposes

Important

Do not use both the Ethernet link and the serial one to configure PHINS COMPACT C3 at the same time

5.5.2 CONNECTOR & PIN OUT

The Ethernet connector is AMPHENOL SOCAPEX RJF6MN. Refer to the figure below for the corresponding wiring. It offers an Ethernet Class D/Cat 5e connection for 10 Base T or 100 Base TX networks.

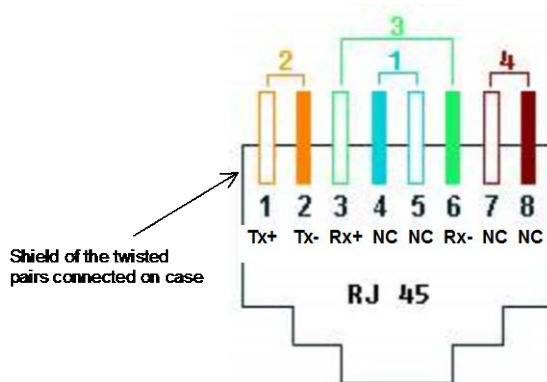


Figure 10 - Ethernet connector pin definition

5.6 Digital Connector Specifications

5.6.1 DIGITAL CONNECTOR DEFINITION

The digital connector provides connection of the PHINS COMPACT C3 to third party equipment for installation, for configuration and display/monitoring purposes.

PHINS COMPACT C3 is fitted with one digital connector configured to provide the following:

- 5 user-configurable digital inputs (RX). Pin assignment for the different inputs in RS232 electrical levels is detailed in Table 3 for wiring.
- 5 user-configurable digital outputs (TX). Pin assignment for the different outputs in Table 3 for wiring.
- 2 pulse inputs (IN). Pin assignment for the different pulse inputs is detailed in Table 3.
- 1 pulse outputs (OUT TTL). Pin assignment for the different pulse outputs is detailed in Table 3.
- 1 RS232 digital input (designated as Repeater RS232 RX) and 1 RS232 (designated as Repeater RS232 TX) dedicated to configuration and installation through configuration command. Pin assignment is detailed in Table 3. This I/O provides the same functionality as the one available from the dedicated Installation and Repeater connector.

Pin assignments are detailed in Table 2 for wiring.

5.6.2 DIGITAL CONNECTOR PINOUT

The digital connector is a 26 pins connector.



Figure 11 – Diagram of the digital connector

Table 2 -The PHINS COMPACT C3 digital connector wiring

Pin	Name	Pin	Name
1	Repeater: RS232_TX	14	Repeater: GND_R*
2	Repeater: RS232_RX	16	Port A: RS232_RX
3	Port A: RS232_TX	15	Port A: GND_A*
4	Port B: RS232_TX	17	Port B: GND_B*
5	Port B: RS232_RX	18	Port C: GND_C*
6	Port C: RS232_TX	19	Port C: RS232_RX
7	Port D: RS232_TX	20	Port D: GND_D*
8	Port D: RS232_RX	21	Port E: GND_E*
9	Port E: RS232_TX	22	Port E: RS232_RX
10	Pulse A: In TTL	23	Pulse A: GND_A*
11	Pulse B: In TTL	24	Pulse B: GND_B*
12	Pulse A: Out TTL	25	Pulse A: GND_A*

*: Serial GND and Pulse GND are common for a given port (i.e., GND_A for port A, GND_R for repeater port). Serial GND pins are isolated from each other (i.e., GND_A is isolated from GND_B) and from power supplies GND and Mechanical ground (housing)

Pins 13 and 26 are not connected.

Important

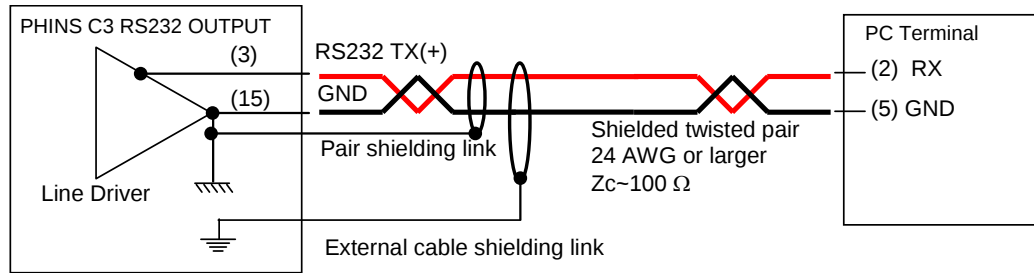
The digital cable should be shielded.

The grounds should be isolated from each other.

5.7 PHINS COMPACT C3 Recommended Wirings

Important

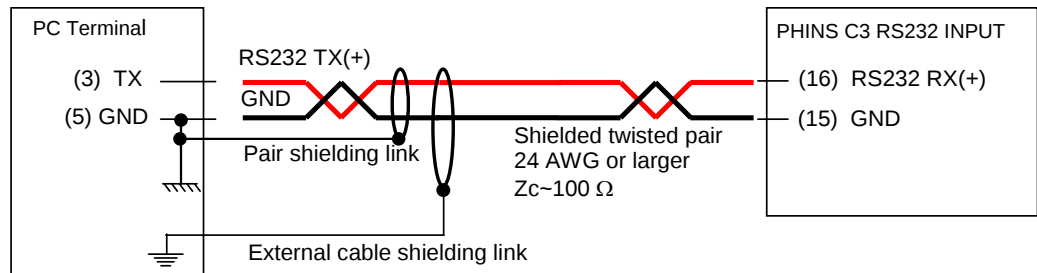
Shielded multi-twisted pairs must be used to avoid cross-talk problems between input and output, and this may give error or dysfunction. Shield link should be done at one end only to avoid ground loops unless shield is used as an electrical ground.



 All pins marked GND are common electrical ground and can be used indifferently.

 Mechanical GND connection is recommended through connector backshell on digital connector.

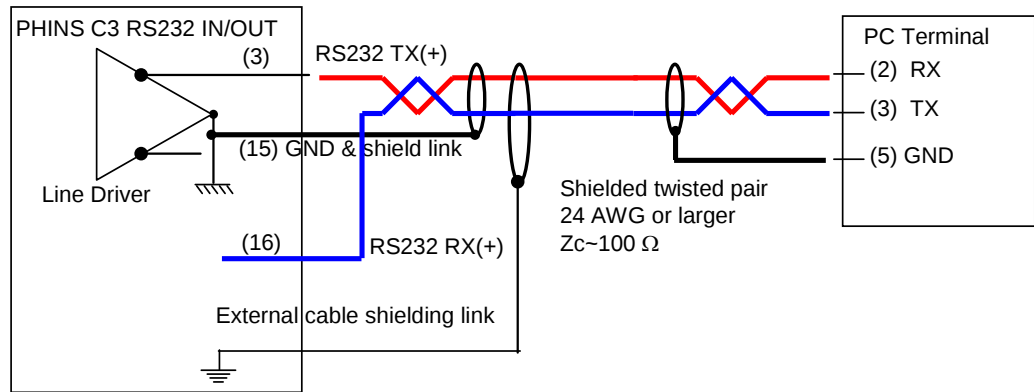
Figure 12 - Description of mono-directional RS232 Output wiring
(Port A example)



 All pins marked GND are common electrical ground and can be used indifferently.

 Mechanical GND connection is recommended through connector backshell on digital connector.

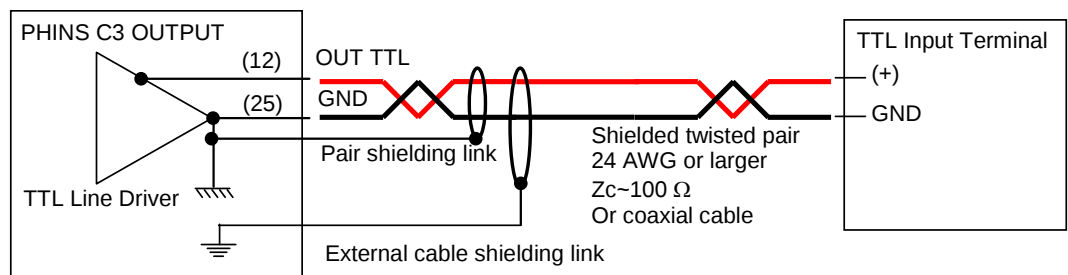
Figure 13 - Description of mono-directional RS232 Input wiring
(Port A example)



⏏ All pins marked GND are common electrical ground and can be used indifferently.

⏏ Mechanical GND connection is recommended through connector backshell on digital connector.

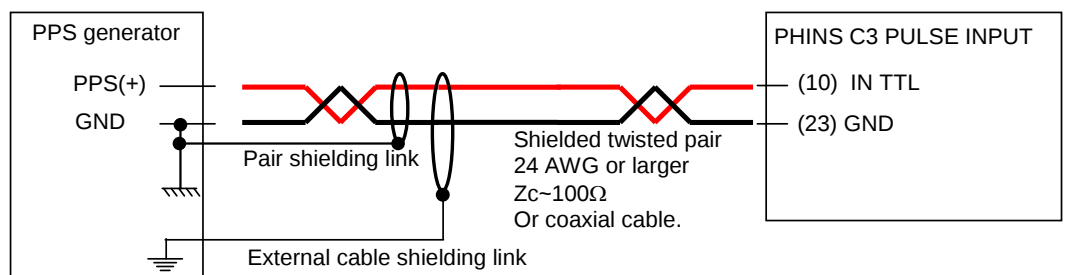
**Figure 14 - Description of bi-directional RS232 Output wiring
(Port A example)**



⏏ All pins marked GND are common electrical ground and can be used indifferently.

⏏ Mechanical GND connection is recommended through connector backshell on digital connector.

**Figure 15 - Description of the Pulse Output wiring with a Shielded Twisted Pair
(Pulse A example)**



⏏ All pins marked GND are common electrical ground and can be used indifferently.

⏏ Mechanical GND connection is recommended through connector backshell on digital connector.

**Figure 16 - Description of the Pulse Input wiring with a Shielded Twisted Pair
(Port A example)**

5.8 Electrical Schematics for RS232 interfaces

Each RS232 input and output is based on a separate MAX3160 driver powered by its own DC/DC converter and isolated from each other and from the internal digital power by an ISO7220AD isolator.

Figure 13 and 14 detail input and output RS232 electrical schematics.

The following table details input impedance of each port and output current that can be delivered by each port driver:

Table 3 – RS232 Input characteristics

	RS232
Input impedance	5 k Ω
Minimum input LOW threshold	0.8 V
Maximum input HIGH threshold	2.4 V
Minimum differential threshold	N/A

The following table details input impedance of each port and output current that can be delivered by each port driver:

Table 4 – RS232 Output characteristics

	RS232
Output impedance	100 Ω
Max. output drive current	110 mA
Output voltage (no load)	± 11 V
Output voltage (loaded)	10.8 V (3 k Ω)

For TLL/pulse signal characteristics, refer to INS – Interface library (ref.: MU-INSIII-AN-001).

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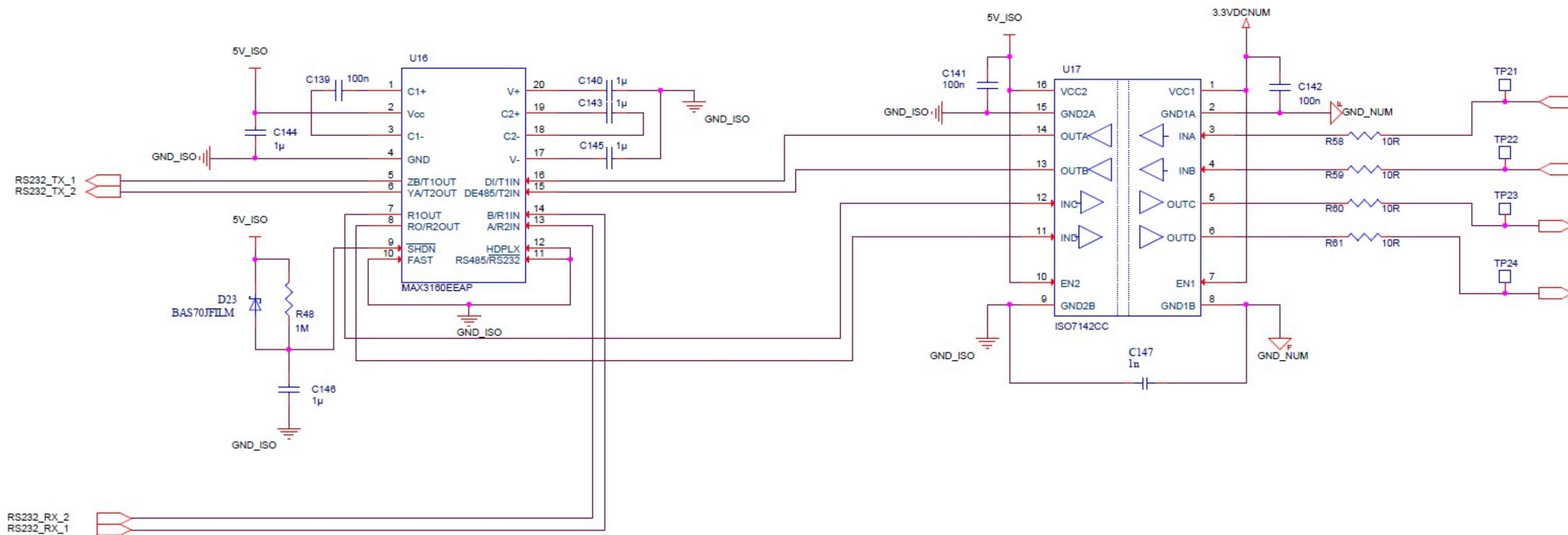


Figure 17 – RS232 electrical schematic

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