TRR
ARCA base module

02/09/2019

Agenda

- PRESSURE TEST: test and results

- MECHANICAL and TEMPERATURE TESTS: PROPOSAL for tests, material configuration, procedure

PRESSURE TEST

See the document in the indico page of this meeting

Mechanical and temperature tests

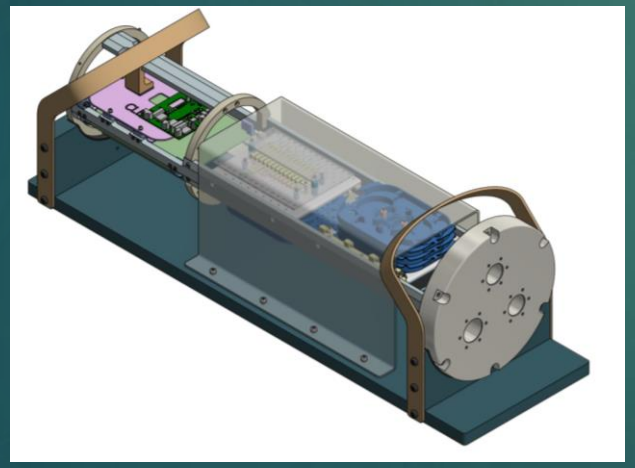
In its life the ARCA base module will be transported in four different configurations/conditions:

1. From the base module integration to the DU site (Figure 1)
2. From the DU site devoted up to the calibration (i.e. Genoa) to the DU site devoted to the LOM loading
3. From the DU site to the harbour
4. From the harbour to the deployment site and seabed

Mechanical and temperature tests

The Configurations are:

1. The internal frame is in its transportation box and it is completed with the optics and the boards, everything cabled and tested with the exception of the connection to the base penetrator on the flange. The frame is mounted on the flange.



Mechanical and temperature tests

The Configurations are:

2. The base module is closed and connected to the VEOC, it is in the set of DU boxes.
3. The base module is mounted on the anchor and connected to the jumper, the hydrophone and the VEOC. It is shipped by the truck .
4. The base module is mounted on the anchor, connected to the jumper, the hydrophone and the VEOC and it is transported by the big ship until the deployment site and lowered down in the sea by the ship cable.

IN ALL CONFIGURATIONS THE BASE MODULE IS OFF!

Mechanical configuration to test (PROPOSAL)

Configurations to test: 1) and 3) .

1) It can be tested as in the reality
3) It can be tested partially because the jumper and the hydrophone will not be mounted. The proposal is to mount the BEOC leaving free the fibers free to be used for the test(on the high pressure side). So the configuration should be slightly different from the one of figure 2.

The configuration 2)can be considered similar to 3) by "blocking" the base module in the DU box.
The other configurations were never discussed to be tested, DOES everyone accept?

Figure 1

ORCA base module transportation example:
@ Sylvain: was the internal frame or the base module in?

Figure 2

OFP base penetrator set up example:

I.SGURA

Mechanical configuration to test (PROPOSAL)

DRAWBACKS (or additional work) TO TEST BOTH CONFIGURATIONS 1) and 3).

- The internal frame should be tested after the transportation from Bologna to Sopavib
- The internal frame should be tested, at Sopavib, at the end of the test
- Configuration 3) should be finalized after the test 1). This means connection to the base penetrator module, closure of the base module.

DO YOU AGREE?

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TEST PROCEDURE: 1° OPTION

5.1.5.1 Vibrations

	Frequency range	Amplitude and acceleration	Sweep speed	Duration	Number of cycles
Frequency sweep (b)	5 Hz to 25 Hz 25 Hz to 150 Hz	amp. = ±2 mm acc.= 50 m/s²	1 oct/min	1h	

The table parameters must be understood as the following:

- Each frequency sweep has to be applied on the 3 axis
- For the first range of frequencies, the amplitude is fixed at ±2mm (4mm peak-to-peak) and the acceleration varies (from 0.2G to 5.0G)
- For the second range of frequencies, the acceleration is fixed at 5G and the amplitude varies (from ±2mm to ±0.1mm)

5.1.5.2 Chocks

	Number of shocks	Number of axis	Description
"Hard" shocks	3	±3	acc.= 15 G duration=11ms
"Soft" shocks	500	±3	acc.= 10G duration=16ms

5.2.5.1 Climatic cycling

	Temperature & HR	Duration
Ramping up	20°C to 70°C HR not specified	2h
Stand	70°C 93% HR	96h
Ramping down	70°C to 20°C HR not specified	2h

5.2.5.2 Thermal shock

	Temperature	Duration
Warm phase	50°C	2h
Cold phase	10°C	15min

PROCEDURE APPROVED FOR THE OFP BASE PENETRATOR(s)

I.SGURA

PROCEDURE: 2° OPTION

Environmental tests	Parameters
Climatic tests	+50°C ± 2°C at 93%RH ± 3%RH Duration: 48 hours
Vibrations	Reference of the standard: MIL STD 810F (see Table 3) On 5 axis Duration: 30 minutes by axis Transversal axis skipped because of much lower level
Mechanical shocks	Waveform: half-sine ±3 shocks – 15 G / 11 ms on vertical & longitudinal axis ±500 shocks – 10 G / 16 ms on vertical & longitudinal axis

Table 4: ORCA base module stress test description.

Table extracted by KM3Net DU Qualification Plan KM3NeT_QUAL_2018_001 v5

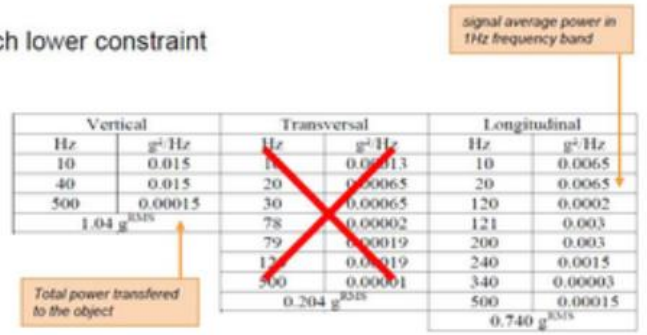
https://elog.km3net.de/Qualification/863

QUALIFICATION « SOPAVIB TEST PROGRAM»

- Following procedure « **MIL STD 810F** »: originally military but variant adapted to civil business
- **TEST PROGRAM:**

1. Atmospheric conditioning: -10°C & +50°C/93%HR (12h + 12h)
2. Vibrations: (Rem:1h # 1600km)
   Vertical & Longitudinal axis
   Transversal skipped because of much lower constraint

   2 configurations:
   > In transportation box:
   1h30 duration
   > Mounted on « anchor » support
   0h30 min duration



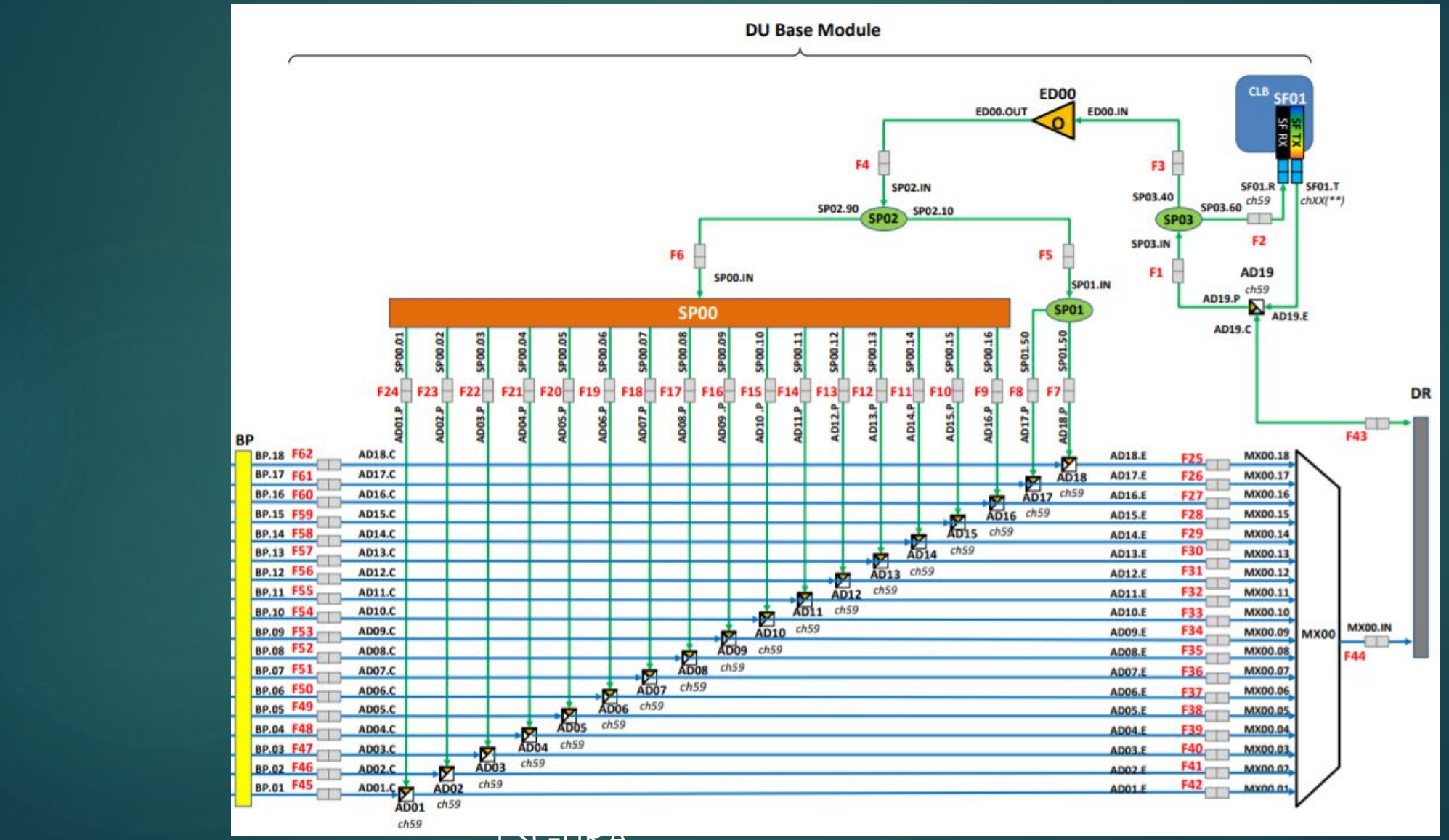
3. Shocks:
   ±3 shocks ½ sine 15G/11ms → representative of real shock (hard but rare)
   ±500 shocks ½ sine 10G/16ms → representative of shake (soft but repeated)
   Vertical & Longitudinal axis
   In the same 2 configurations mentioned above
   Transversal skipped because of much lower constraint

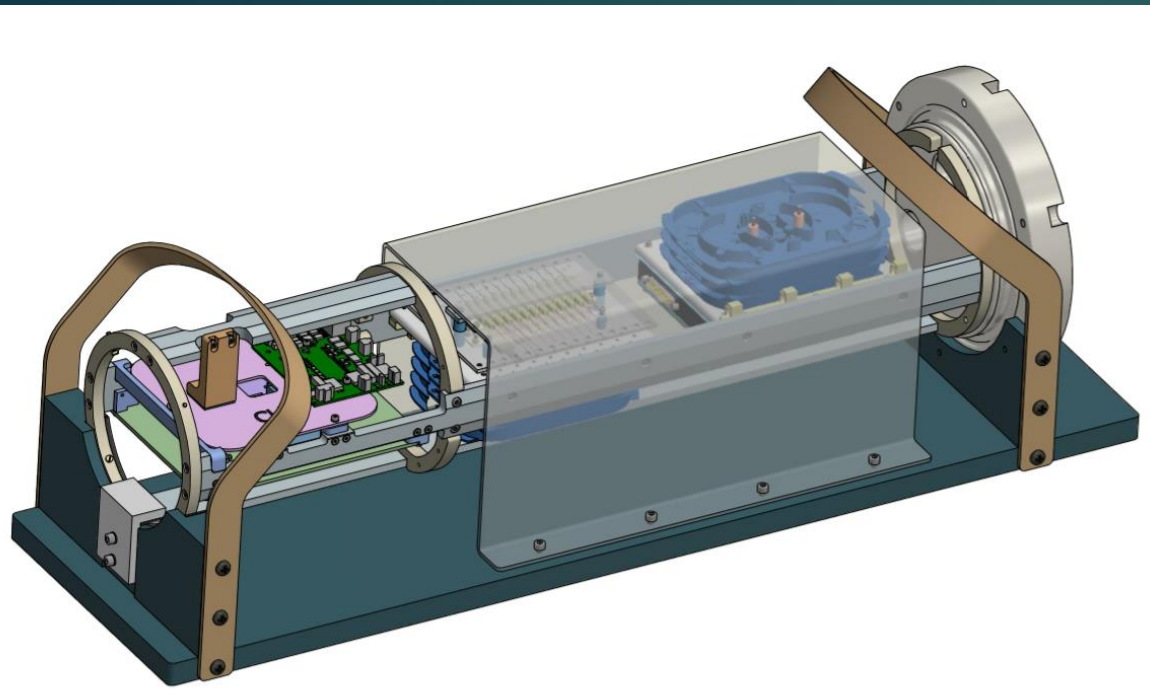
PROCEDURE

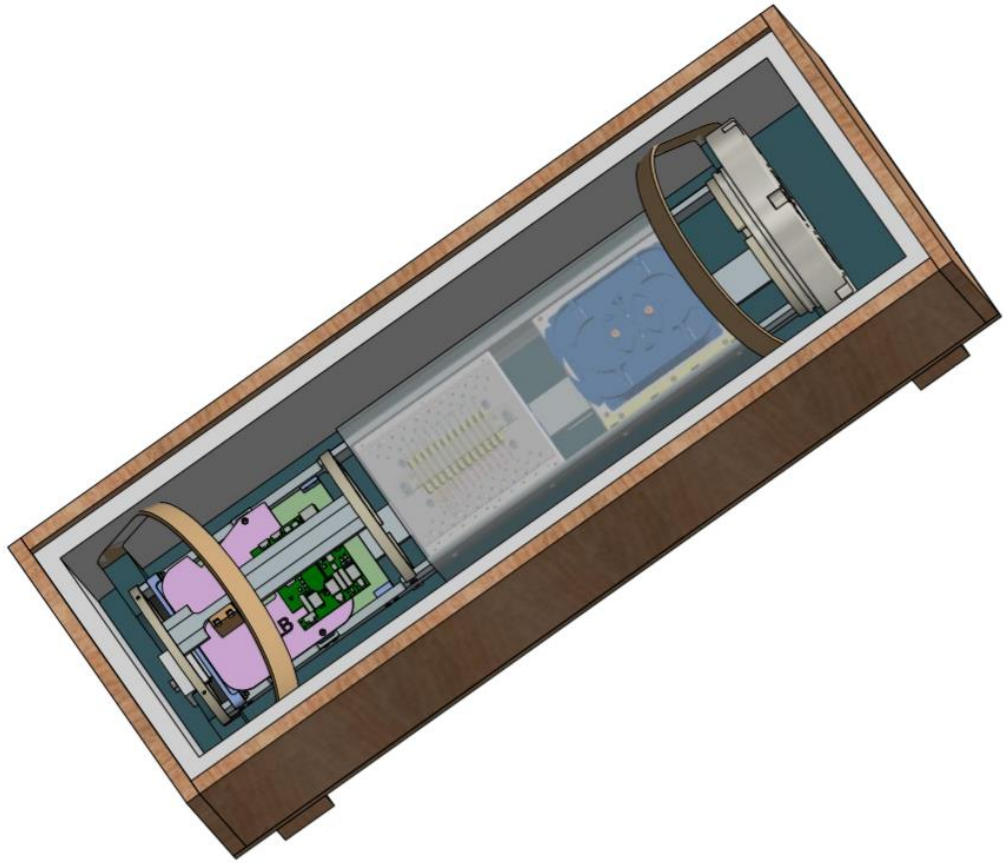
OPTION 1 or 2?
I AM NOT AN EXPERT I CONSIDERED THE PAST EXPERIENCE

BACK SLIDES

Optical scheme of the ARCA BASE MODULE







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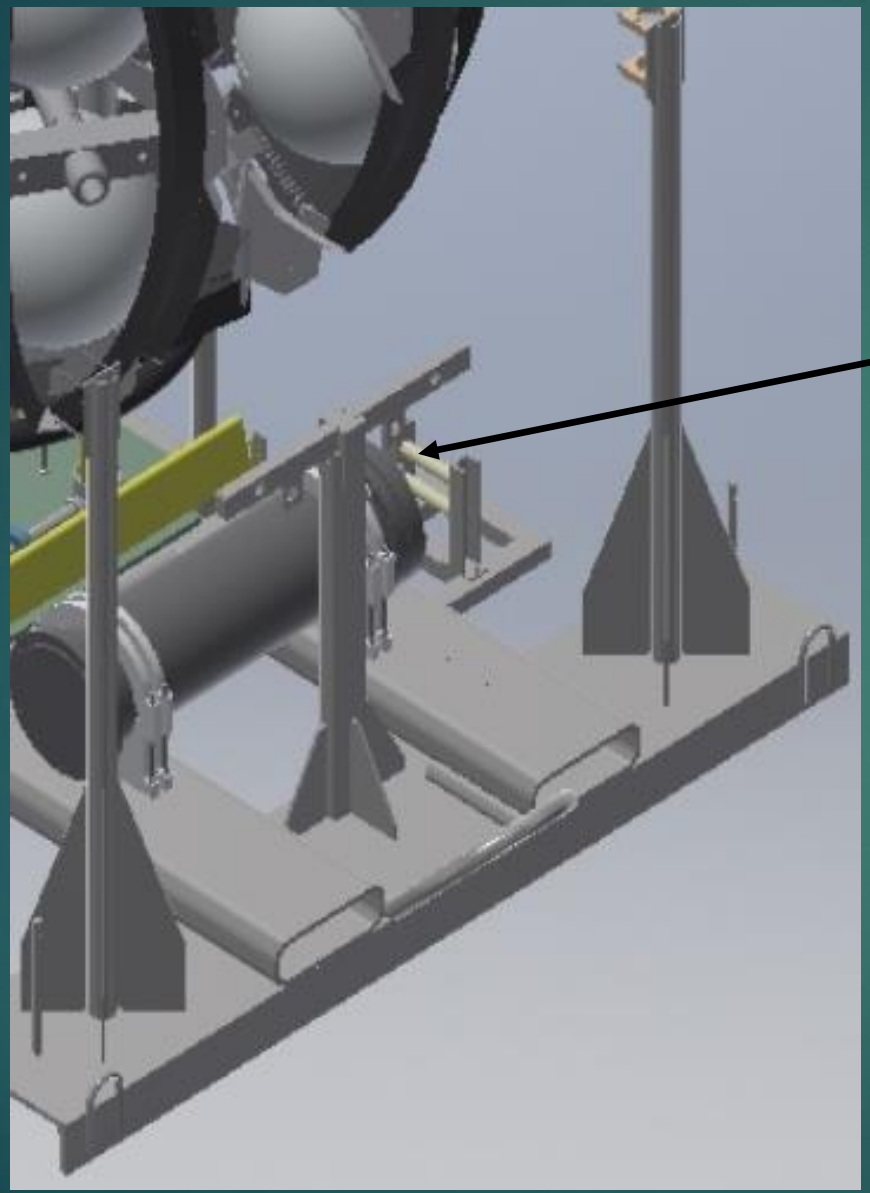

On the ARCA anchor:
support for the fixation of the jumper and hydrophone cable for avoiding the cable oscillation

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