# Test Report

| | | | | | |
|---|---|---|---|---|---|
| Document No. | C0018642 | Copy No. | 1 | Number of pages | 30 |
| Apparatus | Cubicle | | | | |
| Designation | GIOVE-120 | | | | |
| Serial Number | | | | | |
| Manufacturer | Elettromeccanica Galli Italo S.p.A. | | | | |
| Client | Elettromeccanica Galli Italo S.p.A.<br>Viale Prealpi 31<br>22036 - Erba CO | | | | |
| Tested for | | | | | |
| Date(s) of tests | November 17 - 18, 2020 | | | | |
| Tested by | CESI S.p.A. - LPS Laboratory<br>Testing & Certification Division<br>via Pastrengo, 9<br>24068 SERIATE BG - ITALY | | | | |
| Test performed | SEISMIC QUALIFICATION TEST – IEEE Std 693 – Severity 0,5 g | | | | |



The apparatus, constructed in accordance with the description, drawings and photographs incorporated in this document has been subjected to the series of proving tests in accordance with:

IEC 60068-2-57 - 2013
IEC 60068-2-6 - 2009

The results are shown in the record of proving tests and the oscillograms attached hereto. The ratings assigned by the Manufacturer are listed on the ratings page.
The document applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

January 12, 2021

| Date | Bontempi Paolo<br>C0018642 3560 AUT<br>Test Engineer in charge | The Manager - Arcidiaco Lorenzo<br>C0018642 821814 APP<br>Approved By<br>Document Digitally Signed |
|---|---|---|



The laboratory meets the requirements of the Standard EN ISO/IEC 17025: 2005 "General Requirements for the Competence of Testing and Calibration Laboratories". The in force status of the accreditation and the list of accredited tests may be checked in the WEB site: www.accredia.it

LAB N° 0030 L

Shaping a Better Energy Future

# Notes

**STL-Member**

CESI Group members are founder members of the SHORT-CIRCUIT TESTING LIAISON (STL) which has been established in 1969. STL is a forum for voluntary international cooperation of testing organizations.

**CESI Group Test Documents description**

**STL Type Test Certificate of …….**

Issued for type tests of high voltage products (> 1 $kV_{ac}$; > 1,5 $kV_{dc}$), which have successfully been carried out in full compliance with the relevant specifications or standards and STL Guides valid at the time of the test. The STL Type Test Certificate consists of documents unequivocally identifying the test object and describes all conditions under which the tests were conducted. It gives evidence of the unobjectionable behavior of the test object during the tests in line with the normative documents applied as well as of the results of successful testing.

**Type Test Certificate of …….**

Issued for type tests of high voltage products (> 1 $kV_{ac}$; > 1,5 $kV_{dc}$), which have successfully been carried out in full compliance with the relevant specifications or standards valid at the time of the test. The Type Test Certificate consists of documents unequivocally identifying the test object and describes all conditions under which the tests were conducted. It gives evidence of the unobjectionable behavior of the test object during the tests in line with the normative documents applied as well as of the results of successful testing.

**Test Certificate of (complete / selected) Type Tests**

Issued if type tests of low voltage products (< 1 $kV_{ac}$; < 1,5 $kV_{dc}$) requested by the relevant product standard were passed. For these tests the equipment under test must be clearly identified by technical description, drawings, and additional specifications.

**Certificate of Design Verification**

Issued for passed design verification tests according to IEC 61439. For these tests the equipment under test must be clearly identified by technical description, drawings, and additional specifications.

**Type Test Report**

Issued for high and low voltage products if parts of selected type tests have been passed; those shall be carried out in full compliance with the relevant standards but (for high voltage products) do not fulfill all STL requirements for issuing a Type Test Certificate. For these tests the equipment under test must be clearly identified by technical description, drawings, and additional specifications.

**Test Report**

Issued for all other tests on high and low voltage products which have been carried out according to specifications, standards and/or client instructions

**On-Site Test Record**

Issued as a record of results acquired during the on-site tests / measurements

**Test Award**

Can be additionally issued for all named types of test documents above if the tests to be referenced were passed

## *Table of contents*

# 1 SUMMARY OF MAIN TEST RESULTS

**TABLE 1: Test configuration and measurement positions**

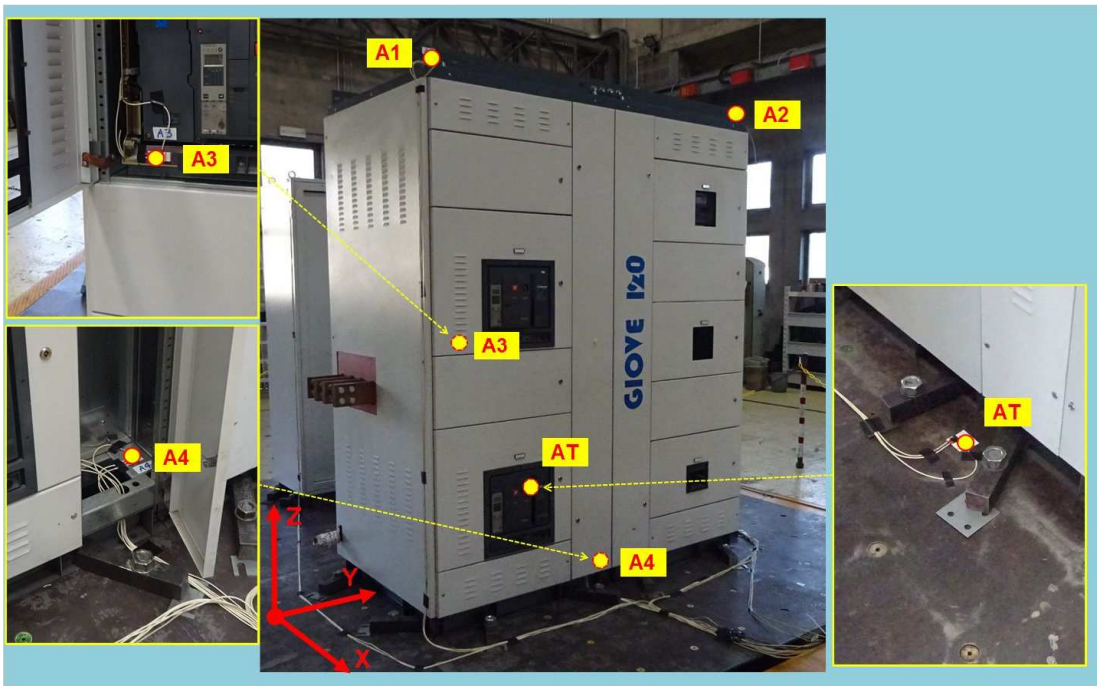



**TABLE 2: Main resonance frequencies evolution and damping ratio detected in frequency search tests**

| | | 1 | 2 | 3 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Measure -ment position | | Beginning frequency search | | | Final frequency search | | |
| | | Axis: X | Y | Z | X | Y | Z |
| A1 | Resonance [Hz] | 5.38 | 4.79 | 19.39 | 4.35 | 4.35 | 19.05 |
| | Damping ratio % | *7,2%* | *5,6%* | | *8,7%* | *6,1%* | |
| | Amplification [g/g] | 9.5 | 11.5 | 4.3 | 8.5 | 11.8 | 4.0 |
| A2 | Resonance [Hz] | 5.38 | - | - | 4.57 | - | - |
| | Damping ratio % | - | - | - | - | - | - |
| | Amplification [g/g] | 10.8 | - | - | 8.6 | - | - |
| A3 | Resonance [Hz] | 5.35 | 4.83 | 22.67 | 4.36 | 4.35 | 22.29 |
| | Damping ratio % | - | - | - | - | - | - |
| | Amplification [g/g] | 6.3 | 7.5 | 8.8 | 5.2 | 7.6 | 7.9 |

**TABLE 3: Summary of maximum values measured during Tri-Axial Seismic Test**

| TEST n. | | 4 |
|---|---|---|
| | | 0,5g |
| ATx | g | 0.71 |
| ATy | g | 0.62 |
| ATz | g | 0.54 |
| A1x | g | 2.60 |
| A1y | g | 1.89 |
| A1z | g | 2.13 |
| A2x | g | 2.26 |
| A3x | g | 1.37 |
| A3y | g | 1.63 |
| A3z | g | 2.36 |
| A4x | g | 0.75 |
| A4y | g | 0.60 |
| A4z | g | 0.83 |
| A yaw | g | 0.08 |
| A pitch | g | 0.07 |
| A roll | g | 0.06 |
| S long | mm | 14.81 |
| S lat | mm | 16.79 |
| S vert | mm | 11.30 |

## 2 REFERENCE DOCUMENTS

|1| Standard accredited by ACCREDIA: IEC 60068-2-57 (2013-04), Par, 8,1, 8,2, 8,3, 8,5 "Environmental testing Part 2-57: Test Ff: Vibration – Time-history and sine beat method".

|2| Standard accredited by ACCREDIA: IEC Publication 60068-2-6, 2009: "Environmental testing, Part 2: Tests method, Test Fc: Vibration (sinusoidal)"

|3| IEEE Std 693™ – 2018 (*): "IEEE Recommended Practice for Seismic Design of Substations"

|4| Standard ISO 2041 (*): "Vibration and shock vocabulary".

|*| The standard reported in |3| and |4| is not accredited by ACCREDIA following the standard UNI CEI ISO/IEC 17025: 2005.
In this document remainder and in the first page all activities not subjected to accreditation are marked by (*).

# 3 SPECIFIC INFORMATION

## *3.1 Customer*

Elettromeccanica Galli Italo S.p.A.
Viale Prealpi 31
22036 Erba CO

## *3.2 Unit under test*

Tests were performed on Elettromeccanica Galli Cubicle GIOVE-120. This report refers to test on Unit 1.

Unit 1: Cubicle GIOVE-120;

- Dimensions of the Rack module fixed inside standard cabinet: (width, depth, height) 1900 x 1000 x 2300 mm, weight: 1550 kg.

*The definition and the characteristics of the Unit(s) under test are responsibility of Customer; CESI didn't carry out sampling of the Unit(s).*

*Photo 1: GIOVE-120 Cubicle*

### 3.3 Test Objective

Following procedures of docs |1| ÷ |3| the Unit was submitted to vibration tri-axial seismic tests.

### 3.4 Test Date

Tests were performed from 17 to 18 November 2020.

### 3.5 Date of arrival of the units at the CESI laboratory

The Units were received on November 12, 2020.

### 3.6 Contract documents

- CESI Offer 600027728 dated July 18, 2019.

  Activity code: B9012195

- Client Order Elettromeccanica Galli Italo S.p.A.201667 dated June 16, 2020;
  CESI Prot. n. 0070012307.

### 3.7 Testing laboratory

CESI - LPS Laboratory P610

Testing & Certification Division (TCE)

via Pastrengo, 9

24068 SERIATE BG - ITALY

ISMES

Trademark of CESI

CESI - LPS Laboratory of Seriate (Structural Testing Laboratory P610) is accredited with respect to Standard EN ISO/IEC 17025: 2005 by ACCREDIA for the execution of:

"Environmental testing Part 2-57: Test Ff: Vibration – Time-history and sine beat method" IEC 60068-2-57: 2013;

- "Environmental testing Part 2: Tests method, Test Fc: Vibration (sinusoidal)" IEC 60068-2-6, 2009;

- "Environmental testing Part 2: Tests - Test Ea and guidance: Shock" IEC Publication 60068-2-27, 2008.

The CESI quality management system for performing laboratory investigations and tests in structural field is conforming with standard UNI EN ISO 9001:2008, as certified in SGS CH13/0677.00.

### 3.8 Responsabilities

Chief Engineer Gino Pucci

Test Engineer: Paolo Bontempi

Technician: Maurizio Capelli

### *3.9 Witnesses*

Simone Riva (Elettromeccanica Galli Italo S.p.A.)

# 4 EXPERIMENTAL ACTIVITIES

## *4.1 Mounting Techniques*

Unit 1 Cubicle GIOVE-120 was fixed to the shaking table "MASTER" by means of clamps with M30 bolts (tightening torque = 500 Nm).

*Photo 2: Fixing of Unit to shaking table*


## *4.2 Unit condition and functional checks*

During the seismic test the Unit was in no-operating condition.

Controls before, during and after the vibration and seismic tests have been performed by Elettromeccanica Galli Italo S.p.A. technician as summarized in par. 6; all results relevant to these controls are of Elettromeccanica Galli Italo S.p.A. responsibility.

## *4.3 Orientation and measuring positions*

The reference directions and the measuring positions are indicated in Table 1.

Reference directions were defined as: horizontal X, Y and vertical Z.

The identification of measuring positions was made using three characters:

• 1st character (letter/s), type of measurement: A = acceleration

• 2nd character (number): transducer location on the unit.

• 3rd character (letter): sensitivity direction of transducer (X, Y or Z axis).

Accelerometric control and measuring positions adopted were numbered as follows:

- AT Control positions placed on the shaking table;
- A1 Measuring positions on the top of cubicle frame (left side);
- A2 Measuring position on the top of cubicle frame (right side);
- A3 Measuring positions on the switchgear support;
- A4 Measuring positions on the bottom of the cubicle frame (in the middle);

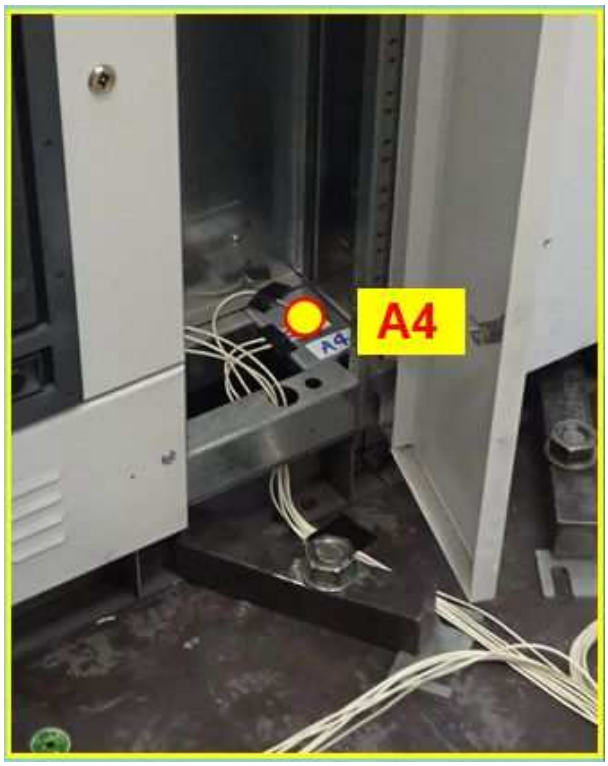
Details of measuring positions are shown in photos 3 ÷ 6.

*Photo 3: Measuring points, general view*

*Photo 4: AT Reference point placed on the shaking table*


*Photo 5: A3 Measuring point placed on the switchgear support*

*Photo 6: A4 Measuring point placed on the bottom of the cubicle frame*




## *4.4 Performed tests*

Tests were performed with reference to docs. |1|÷ |3|.

Test procedures have been verified by Elettromeccanica Galli Italo S.p.A..

The following test sequence was applied:

• Frequency search along X, Y and Z directions, not simultaneously.

• Tri-Axial Seismic Time History Test, with Time Histories synthesised from doc. |3|, Required Response Spectrum following spectra with damping at 5%: IEEE Std 693™ – 2018, Severity 0,5/0,4 g, with Freq. Range 1,96 ÷ 50,00 Hz.

• Frequency search along X, Y and Z directions, not simultaneously. Final frequency search was repeated after the seismic test, to verify eventual change on the resonant frequencies of the Units.

**Table 4: List of performed tests, in chronological sequence.**

| Test n. | Test Type | Axis | Test Parameters | Ref. Diag. | Note |
|---|---|---|---|---|---|
| 1 | Resonance Search Tests | X | Frequency range: 0,50 ÷ 50,00 Hz<br>Peak value: ± 0,05 g (accel.)<br>Sweep Rate: 0,80 oct/min<br>N. of sweep: 1 (UP) | 1 ÷ 3 | See table 2 and par. 6. |
| 2 | | Y | See Test n.1 | 4, 5 | |
| 3 | | Z | See Test n.1 | 6, 7 | |
| 4 | Seismic Test With RRS from IEEE 693-2018 \|3\| Level: 0,5/0,4 g | XYZ | RRS: See docs. \|1\|, \|3\|;<br>Damping: 5% (X, Y and Z);<br>Range: 1,96 ÷ 50,00 Hz;<br>Seismic duration: 40 s;<br>Strong part: > 20 s;<br>Level: 0,5 g (horizontal);<br>0,4 g (vertica); | 8, 9 | See table 3 of par. 6. |
| 5 | Resonance Search Tests | X | See Test n.1 | 1 ÷ 3 | See table 2 and par. 6. |
| 6 | | Y | See Test n.1 | 4, 5 | |
| 7 | | Z | See Test n.1 | 6, 7 | |

### *4.4.1 Resonant frequency search test*

In order to check the resonance frequencies and damping ratio of the Unit (at the first vibration resonant frequency), a frequency sinusoidal scanning was performed in each of the three reference directions X, Y and Z, not simultaneously before and after the seismic tests.

The tests were performed, in accordance with doc. |2| - |4|, as follows:

- frequency range: 0,5 ÷ 50,0 Hz;
- number of sweep: 1 (UP);
- sweep rates: 0,8 octave/min;
- peak excitation levels: 0,05 g (1 g = 9,81 m/s$^2$).

Signals coming from the measurement positions were recorded as "absolute response functions" in the frequency domain. For the acceleration signals only, the "absolute transfer functions" were calculated.

The unit damping was calculated at the first resonance frequency using the following formula, based on the measurement of the width of the respective resonance peak ("half-power bandwidth" method):

$$\zeta = \frac{f_1 - f_2}{2 \cdot f_0} \cdot 100$$

where:

- ζ is the percent damping (%)
- f0 is the resonant frequency value
- f1 and f2 are the frequency values corresponding to the "half-power points", determined starting from the peak response value divided by $\sqrt{2}$.

This calculation method is strictly applicable to single degree of freedom system.

The frequency sinusoidal scanning was repeated after the seismic tests, to verify eventual change on the resonant frequencies response of the Unit.

*(The response function in the frequency domain is the measure (modulus and phase) of the unit response having the same frequency of the fundamental of the excitation. The absolute response function in the frequency domain is a complex function of a real variable. The absolute transfer function is the ratio between the absolute response function in a measurement position (output) and that in the control position (input). Being the absolute response function a complex quantity, the absolute transfer function was calculated frequency by frequency, through the ratio of the moduli and the difference of the phases.*

### *4.4.2 Seismic tests*

Triaxial multifrequency tests, in accordance with doc. |1| ÷ |3|, were carried out with simultaneous but independent input time histories on the horizontal X and Y and vertical Z axes, each producing Required Response Spectrum.

Horizontal and Vertical Required Response Spectrum data with diagrams representation (in lin-log scale) are reported below (table 5).

Main characteristics of the synthesised reference time histories were as follows:

- ZPA — Horizontal (X and Y) 0,50 g; Vertical (Z) 0,40 g;
- analysis frequency range: 1,96 ÷ 50,0 Hz;
- damping: 5 %;
- strong part of time history: > 20 s;
- time history duration: 40,00 s;
- sampling rate: 400 Hz.

Main characteristics of the digital recordings of the time histories were:

- duration: 40,96 s;
- cut-off frequency of low-pass filters: 80 Hz.

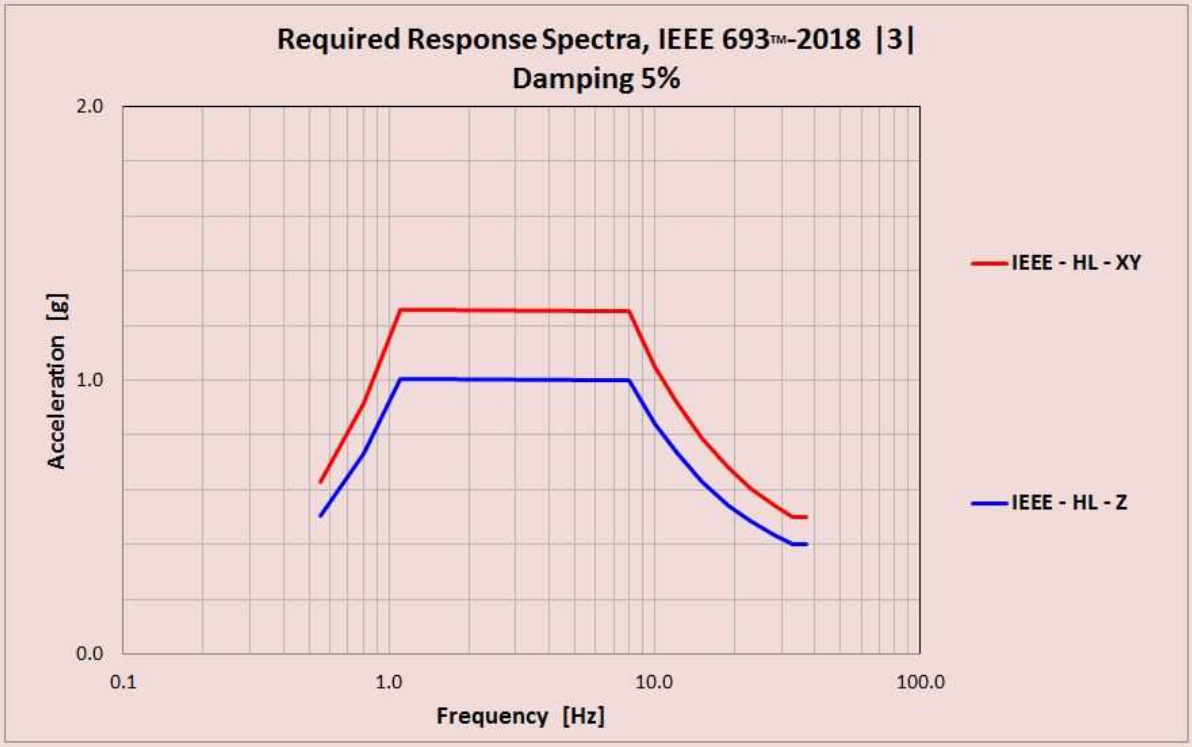
Before the earthquake pulse at full level, pulses at increasing levels were performed to improve the reproduction of the target Time History on the shaking table (2 at 18%, 1 at 25%, 1 at 35%, 1 at 50%, 1 at 71%).

Test Response Spectra (TRS) were computed on the digital recordings of the position AT.

Time history tests were performed increasing the test level up to get not only the dominance of the RRS by the TRS, but also a peak acceleration higher than the spectral ZPA (= Zero Period Acceleration).

The spectra adopted for seismic test are coming from doc. |3|, damping 5 %.

Table 5: Adopted RRS




IEEE 693™ - 2005
High Level (HL)
Damping 5%

| Freq. [Hz] | Accel. XY [g] | Accel. Z [g] |
|---|---|---|
| 0.55 | 0.629 | 0.503 |
| 0.80 | 0.915 | 0.732 |
| 1.10 | 1.258 | 1.007 |
| 8.00 | 1.250 | 1.000 |
| 10.00 | 1.052 | 0.842 |
| 12.00 | 0.920 | 0.736 |
| 15.00 | 0.788 | 0.630 |
| 19.00 | 0.677 | 0.541 |
| 23.00 | 0.604 | 0.483 |
| 28.00 | 0.543 | 0.434 |
| 33.00 | 0.500 | 0.400 |
| 37.00 | 0.500 | 0.400 |

# 5 TEST EQUIPMENT

## *5.1 Excitation equipment*

Tests were carried out on the triaxial shaking table "MASTER" having the following features:

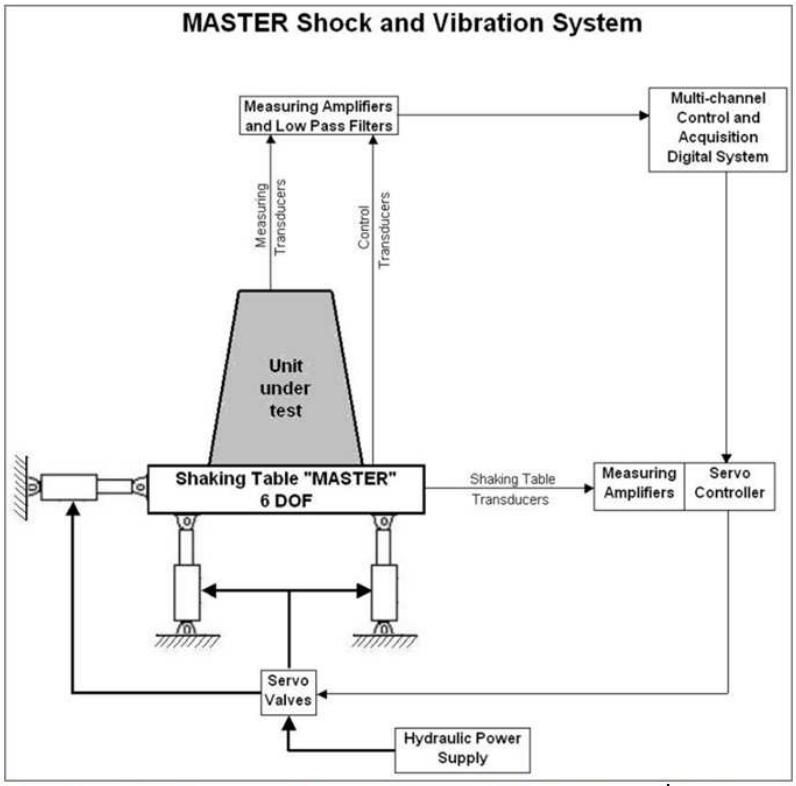
- dimensions of table: 4000x4000 mm;
- bare table weight: 108 kN;
- stroke: 200 mm;
- max peak sinusoidal velocity: 0,44 m/s;
- max peak acceleration (bare table): 5 g (shock);
- frequency range (sinusoidal tests): 0 ÷ 120Hz
- max specimen pay load: 300 kN.

The table can carry out tests with simultaneous and independent excitation along three orthogonal directions and three rotations.

## *5.2 Motion control, data acquisition and processing equipment*

Digital system SIGNAL STAR multi-channels manufactured by DATA PHYSIC France (DELL workstation Precision 410 with analog/digital converter on 32 channels and 16 bits).

**Block scheme of the excitation and processing equipment**




*Spurious motion measured at the distance of: yaw1879 mm, pitch 1540 mm and roll 1340 mm.*

The acquisition and control system generate the motion with the requested features and feedback the shaking table motion using the signal coming from the control accelerometer. Analog signals coming from the control and measuring transducers were amplified and conveyed to an analog/digital converter which sent the data to the hard disk of the afore mentioned computer for the recording and subsequent processing.

## *5.3 Application programs - Software*

The digital system SIGNAL STAR, employed software application program to control the shaking table motion and data recording. For the present tests programme the following packages have been adopted:

- Sweep sine tests:

  Sweep sine vibration control I*PS, Version: 4.5.1.10 on October 8th, 2004;
- Tri-axial seismic tests:

  Shock spectrum vibration control, I*PSCN, Version: 4.5.1.6 on November 17th, 2004;
- Elaboration data:

  Data post processing I*PP, Version: 4.5.0.0 on October 7th, 2004.

## *5.4 Environmental conditions*

Laboratory environmental conditions measured were:

- Temperature: 18 ÷ 20 °C;
- Humidity: 45 %.

(transducer LA CROSS TECHNOLOGY, model WS8610+TX3TH).

## *5.5 Measuring equipment*

During the tests single axis transducers were employed:

**A - Piezoresistive MEMS Sensor accelerometers**

| | |
|---|---|
| Manufacturer: | Measurement Specialties; |
| model: | 58-0050-360-01; |
| measuring range: | ± 50 g; |
| sensitivity: | 1 mV/g with Voltage supply 5 Vdc |
| resonance frequency: | 4000 Hz; |
| frequency response: | 0 to 900 Hz ±½ dB; |
| transverse sensitivity: | <3%. |

Measuring instrumentation (accelerometers, amplifiers, filters, acquisition system) is subjected to periodic calibration program, in accordance with internal procedure.

Serial numbers of the employed transducers are listed in the table 6.

The reported expanded uncertainties are determined in accordance with the Publication JCGM 100 "Evaluation of measurements data - Guide to the expression of uncertainty in measurement" and are based on a standard uncertainty multiplied by a coverage factor k = 2, which for a normal distribution provides a level of confidence of approximately 95 %.

Measurement Specialties Accelerometer:

- Acceleration (0,5 - 2 Hz) ± 6,0 %;
- Acceleration (2 - 100 Hz) ± 5,0 %.

Table 6: List of employed transducers

| TYPE | CHANNEL | POSITION NAME | PRODUCER | MODEL | SERIAL NUMBER |
|---|---|---|---|---|---|
| Accelerometer | 1 | ATx | MEAS | 58-0050 | A218571 |
| Accelerometer | 2 | ATy | MEAS | 58-0050 | A228335 |
| Accelerometer | 3 | ATz | MEAS | 58-0050 | A228336 |
| Accelerometer | 4 | A1x | MEAS | 58-0050 | A330461 |
| Accelerometer | 5 | A1y | MEAS | 58-0050 | A330469 |
| Accelerometer | 6 | A1z | MEAS | 58-0050 | A330460 |
| Accelerometer | 7 | A2x | MEAS | 58-0050 | A330464 |
| Accelerometer | 8 | A3x | MEAS | 58-0050 | A321569 |
| Accelerometer | 9 | A3y | MEAS | 58-0050 | A330466 |
| Accelerometer | 10 | A3z | MEAS | 58-0050 | A228330 |
| Accelerometer | 11 | A4x | MEAS | 58-0050 | A228332 |
| Accelerometer | 12 | A4y | MEAS | 58-0050 | A321568 |
| Accelerometer | 13 | A4z | MEAS | 58-0050 | A321567 |

# 6 END OF TESTS OBSERVATIONS

**CESI Laboratory statements**

- Tests were carried out with reference to documents |1|÷|3| and following Elettromeccanica Galli Italo indications
- During seismic test, in comparison with IEEE 693-2005 |3| Severity 0,5/0,4g, Level 100% RRS, we obtained in Control Position AT:
  - the required ZPA,
  - the strong part > 20s;
  - the complete envelope of RRS by TRS (represented in lin-log scale).
- Frequency resonance evolution (change between beginning and final resonance frequency) of the Unit 1 is reported in Table 2.

- After the tests CESI technicians verified the status of the Units only by visual inspection: no damages were detected.
- The results of further checks on the Unit are competence of Elettromeccanica Galli Italo.

**Elettromeccanica Galli Italo statements:**

*The following is stated by the Customer and CESI assumes no responsibility on this regard.*

- At the end of seismic tests, the tightening torque of the screws connecting the Cubicle to the steel base have been verified without loosened bolts;
- After seismic tests inspections have been performed by Elettromeccanica Galli Italo personnel on Cubicle GIOVE-120 (Unit 1): no structural visible damages on the Unit were detected.

# 7 LIST OF DIAGRAMS

This document contains a total of 9 diagrams. See Table 4 to associate the test with its diagrams.

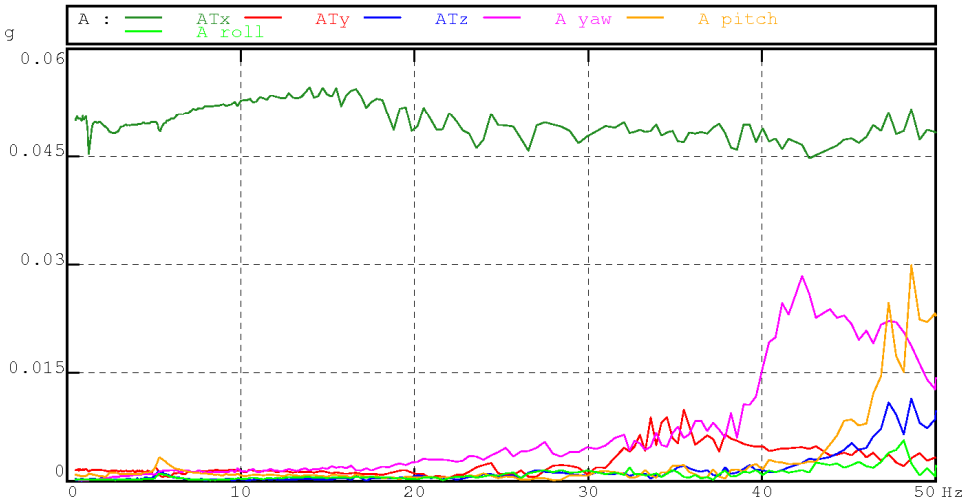
**Diagram 1**

**Galli Elettromeccanica - Electrical Cubicle GIOVE-120**

**Tests n. 1, 5 - Resonant Frequency Search tests - Axis X**

Response curve of Control Channel with transversal and rotational motions

**Test n. 1**




**Test n. 5**

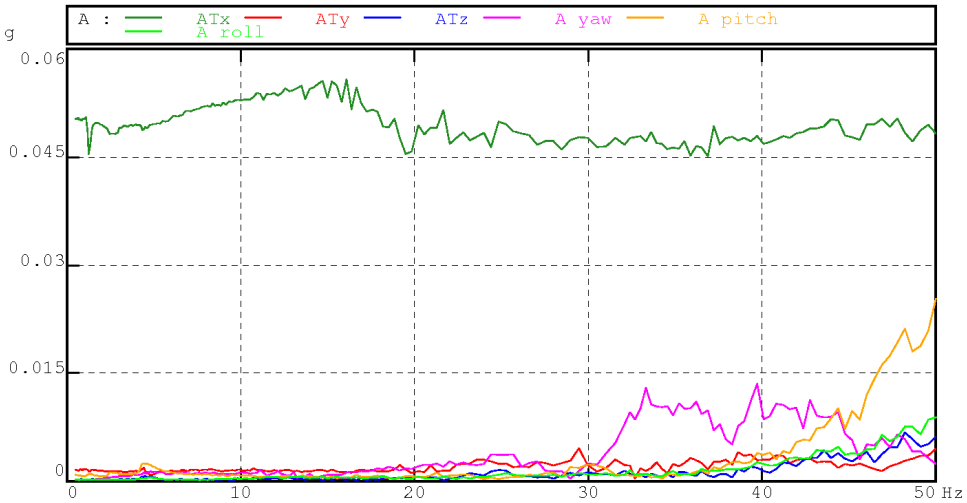


**Diagram 2**

**Galli Elettromeccanica - Electrical Cubicle GIOVE-120**

**Tests n. 1, 5 - Resonant Frequency Search tests - Axis X**

Transfer function of Measurement positions with Control Channel

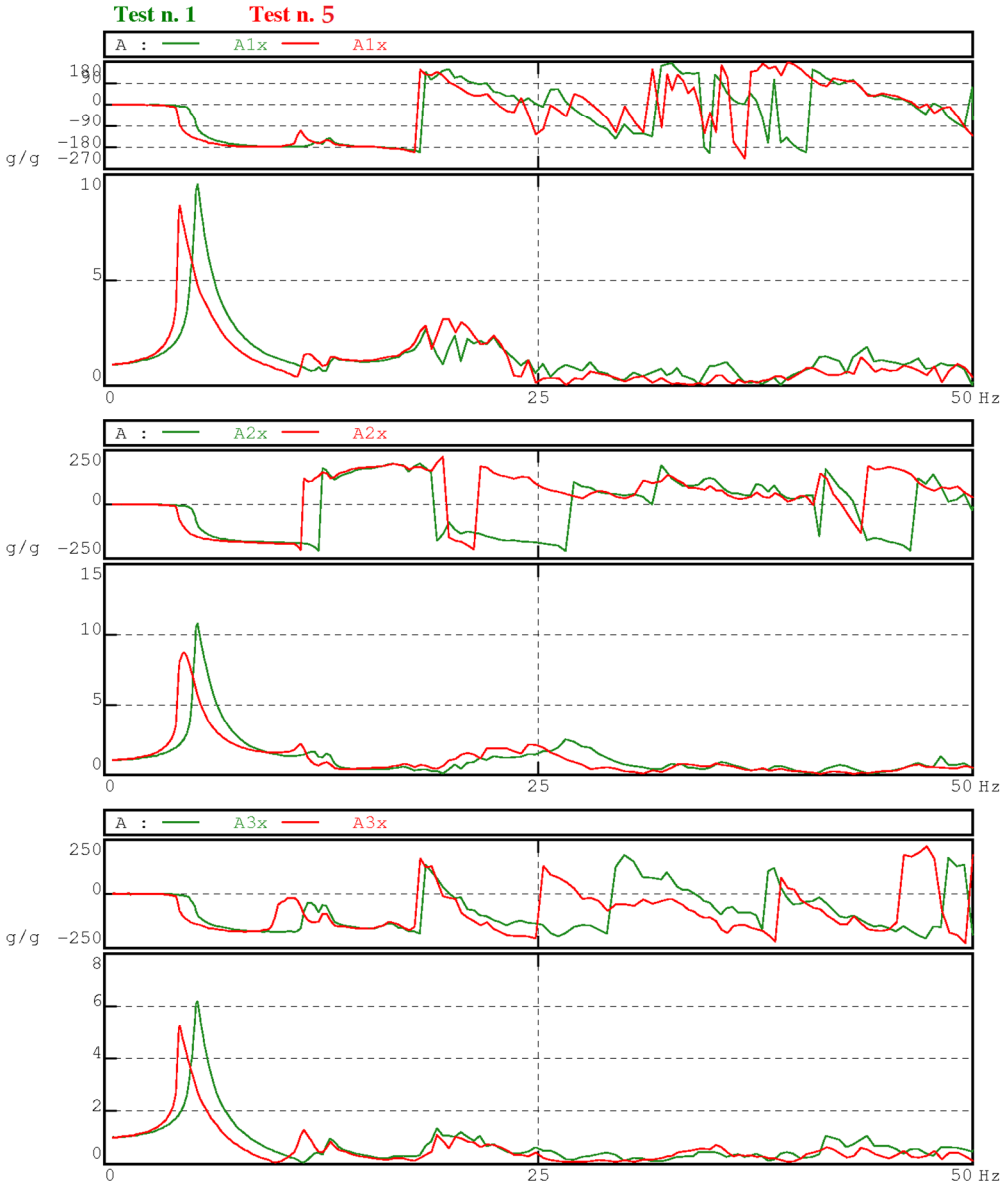


**Diagram 3**

**Galli Elettromeccanica - Electrical Cubicle GIOVE-120**

**Tests n. 1, 5 - Resonant Frequency Search tests - Axis X**

Transfer function of Measurement positions with Control Channel

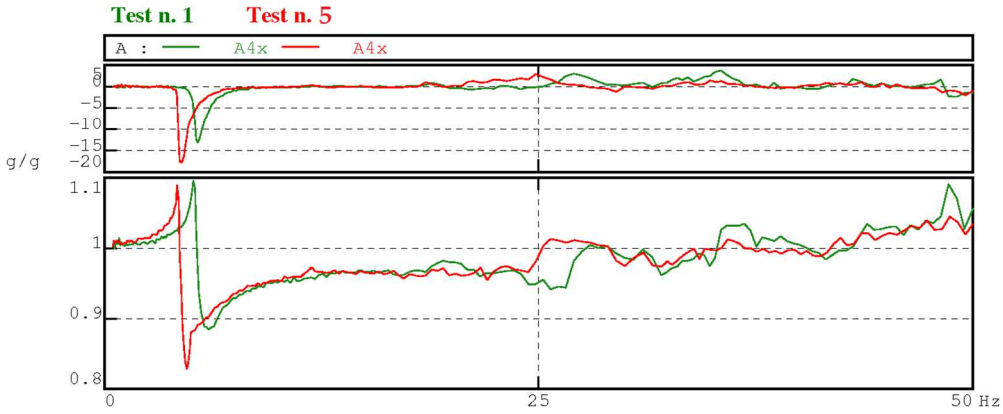


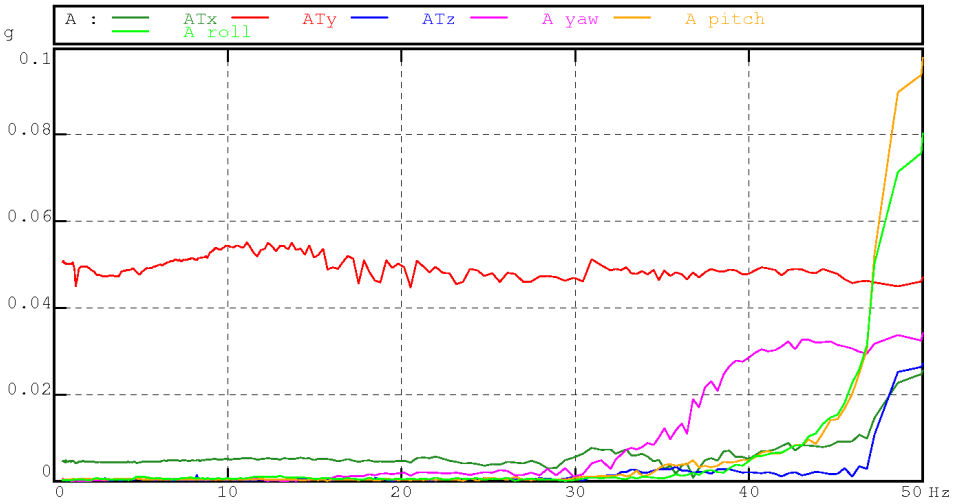
**Diagram 4**

**Galli Elettromeccanica - Electrical Cubicle GIOVE-120**

**Tests n. 2, 6 - Resonant Frequency Search tests - Axis Y**

Response curve of Control Channel with transversal and rotational motions

**Test n. 2**




**Test n. 6**

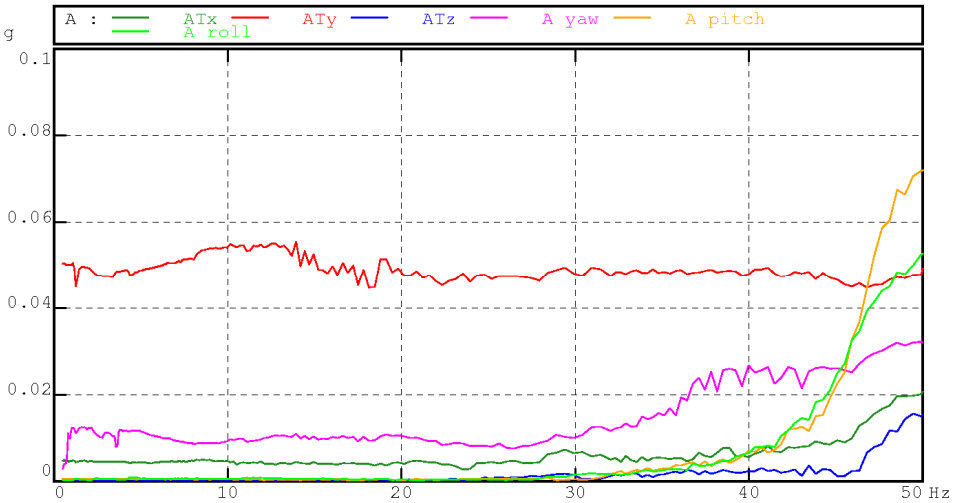


**Diagram 5**

**Galli Elettromeccanica - Electrical Cubicle GIOVE-120**

**Tests n. 2, 6 - Resonant Frequency Search tests - Axis Y**

Transfer function of Measurement positions with Control Channel

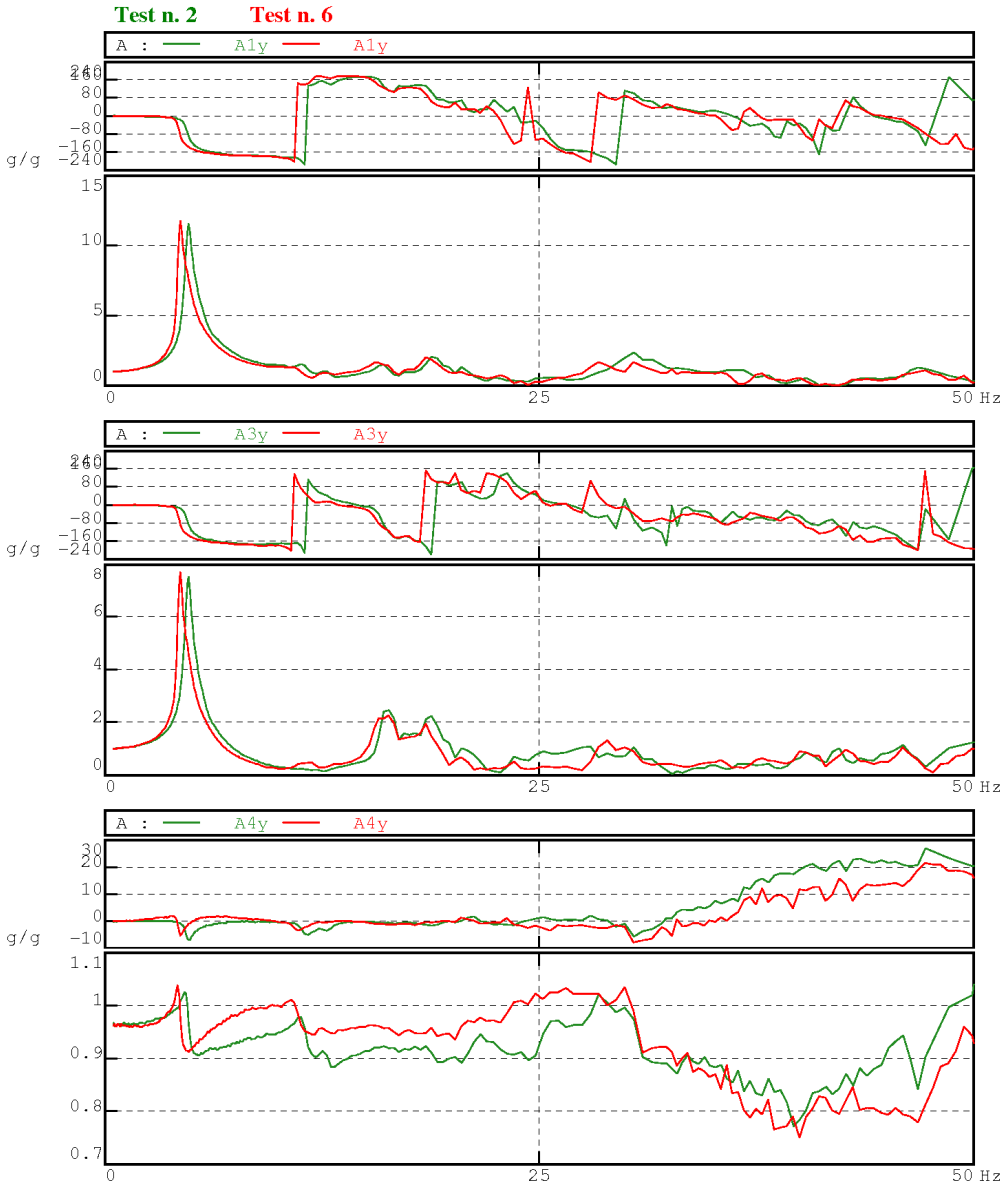


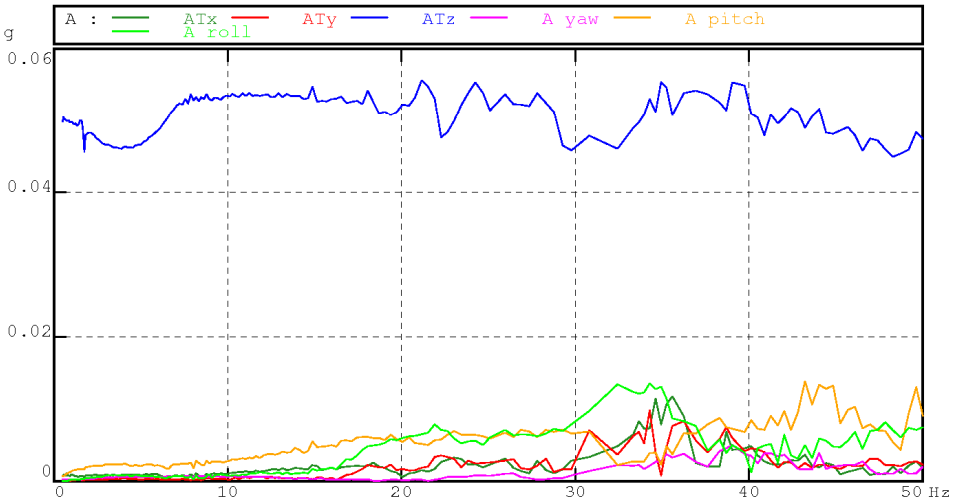
**Diagram 6**

**Galli Elettromeccanica - Electrical Cubicle GIOVE-120**

**Tests n. 3, 7 - Resonant Frequency Search tests - Axis Z**

Response curve of Control Channel with transversal and rotational motions

**Test n. 3**




**Test n. 7**

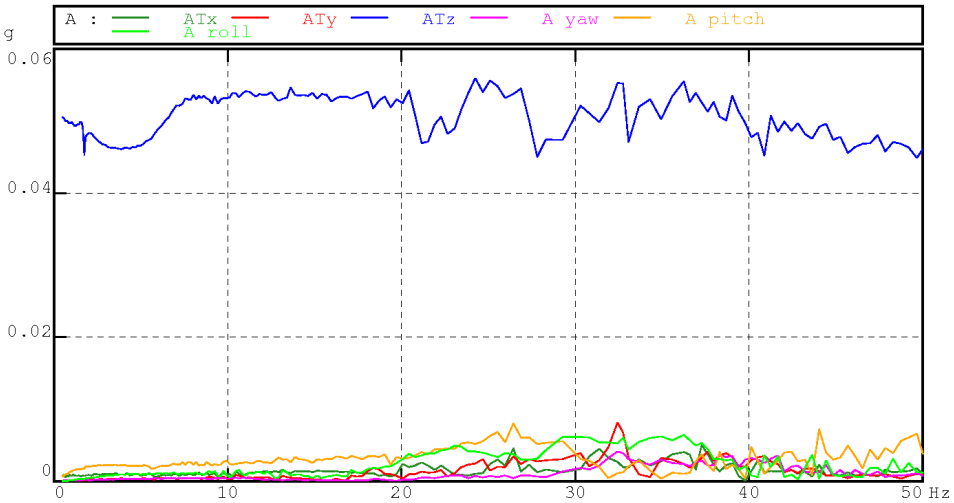


**Diagram 7**

**Galli Elettromeccanica - Electrical Cubicle GIOVE-120**

**Tests n. 3, 7 - Resonant Frequency Search tests - Axis Z**

Transfer function of Measurement positions with Control Channel

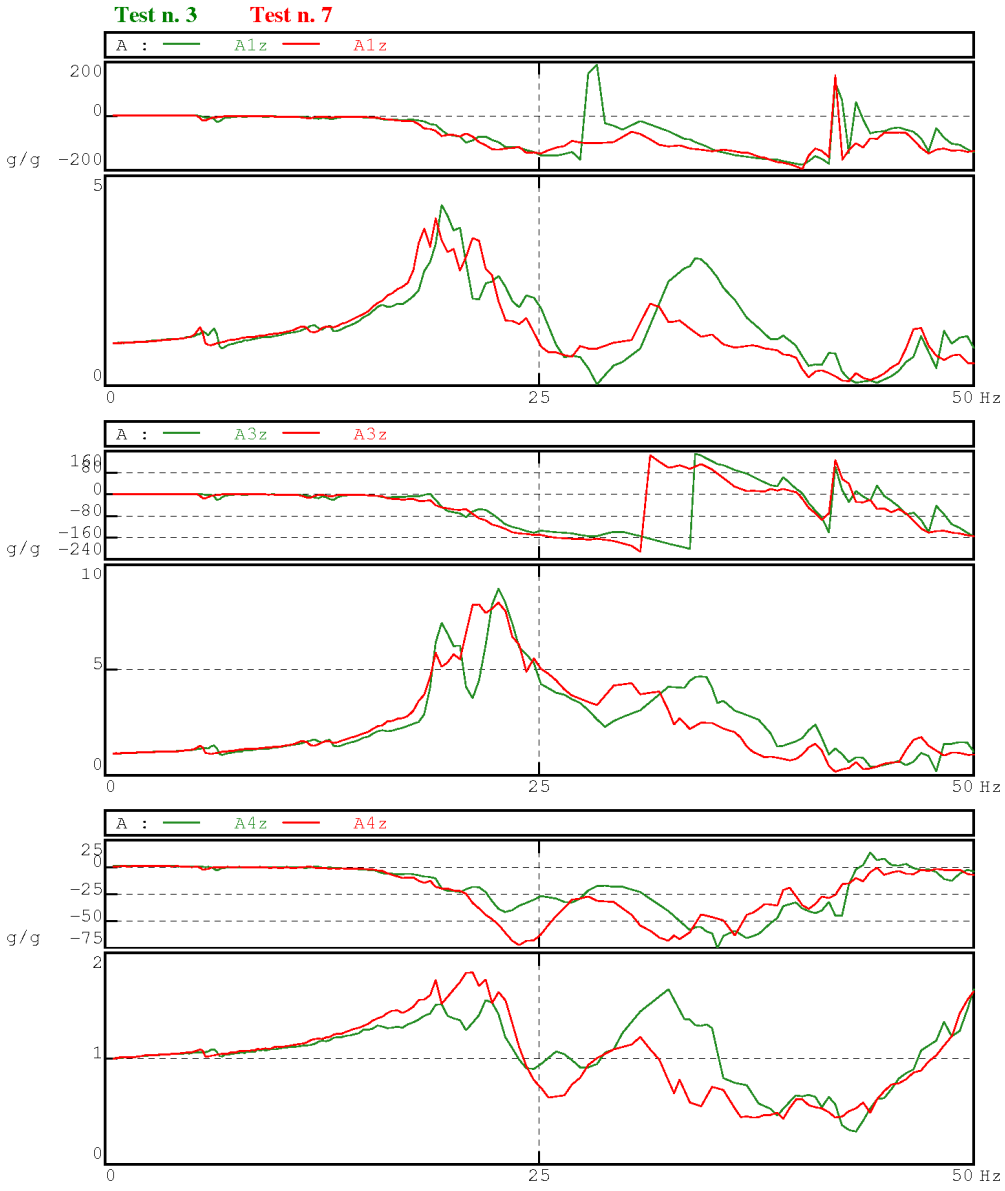
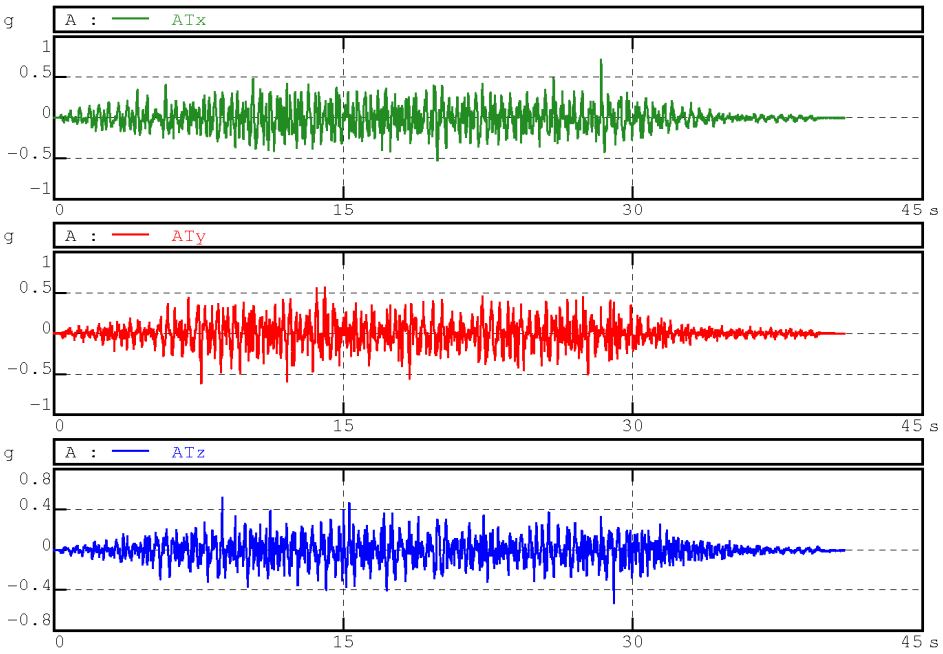


**Diagram 8**

**Galli Elettromeccanica - Electrical Cubicle GIOVE-120**

**Test n. 4 - Triaxial Seismic Test - IEEE Std 693 - 2018, Damping 5% - Severity 0,5 / 0,4 g**

Time Histories of Reference Channels **ATx** **ATy** **ATz**




Overplot between: **RRSxy** **RRSz** **TRS-ATx** **TRS-ATy** **TRS-ATz**

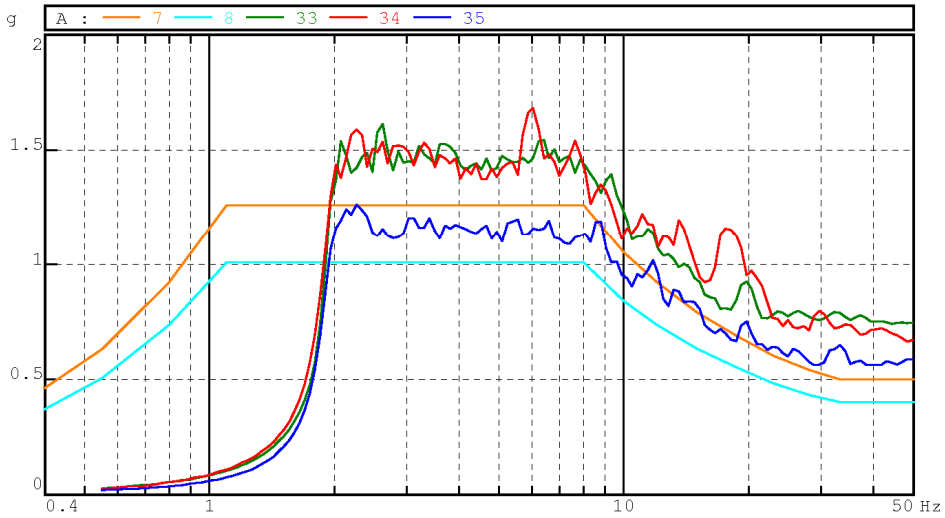


**Diagram 9**

**Galli Elettromeccanica - Electrical Cubicle GIOVE-120**

**Test n. 4 - Triaxial Seismic Test - IEEE Std 693 - 2018, Damping 5% - Severity 0,5 / 0,4 g**

Measurement positions time histories (blocks)