

Testing laboratory for climatic, mechanical
and corrosive environmental stress



CERTIFICATE of QUALITY TEST

Test report - No. 10996.02 / 14

Client	Baumer Hübner GmbH Max-Dohrn-Str. 2 + 4 10589 Berlin	
Equipment under test	Incremental Encoder 1 sample manufacturing date	HOG 165C DN 1024 I SN 70001050789 December 2014
Purpose	<i>Test of the dynamic-mechanical robustness and operability under defined environmental conditions</i>	
Test program	<i>Vibration, sinusoidal 20 g</i> <i>Shock, half-sine 300 g</i>	<i>according to IEC 60068-2-6</i> <i>according to IEC 60068-2-27</i>
Test date	5 February to 11 February 2015	
Realization / results	see page 2 to 3	
Total number of pages	7 (incl. 2 appendices)	
Test result	<p>During and after the tests of the Incremental Encoder HOG 165C no external damages were determined.</p> <p>The operability of the specimen was ensured at any time.</p> <p>The further evaluation will be done by the client.</p>	

Dipl.-Ing. R. Lein
head of test lab / test manager
Berlin, 12 February 2015



Dipl.-Ing. M. Geburtig
test engineer

1 Purpose

Test of the dynamic-mechanical robustness and operability of the **Incremental Encoder HOG 165C** under defined environmental conditions.

2 Equipment under test (EUT)

Incremental Encoder	HOG 165C DN 1024 I
SN	70001050789
delivery date of the EUT	17 December 2014

3 Basics

3.1 Demands of the client

3.2 Used standards

IEC 60068-1:1988 + Corr. 1988 + A1:1992 **DIN EN 60068-1:1995-03**
„Environmental testing - Part 1: General and guidance“

IEC 60068-2-6:2007 **DIN EN 60068-2-6; VDE 0468-2-6:2008-10**
„Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)“

IEC 60068-2-27:2008 **DIN EN 60068-2-27; VDE 0468-2-27:2010-02**
„Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock“

IEC 60068-2-47:2005 **DIN EN 60068-2-47:2006-03**
„Environmental testing - Part 2-47: Tests - Mounting of specimens for vibration, impact and similar dynamic tests“

4 Test program

4.1 Vibration, sinusoidal - Test Fc

according to IEC 60068-2-6

specimen	operating, with observation by the client driving (100 ± 5) rpm by external motor
frequency range	10 - 2000 Hz
amplitude	10 – 22 Hz ± 10 mm
acceleration	22 – 2000 Hz 196.2 m/s ² (20 g)
sweep rate	1 octave / min
number of axes	3
test duration	1:30 h (2 cycles per axis / 3 x 0:30 h)

4.2 Shock, half-sine - Test Ea

according to IEC 60068-2-27

specimen	not operating
acceleration	2943 m/s ² (300 g)
pulse duration	app. 1.5 ms
number of directions	6
test duration	18 shocks (3 shocks in each direction)

5 Realization

The environmental tests were carried out one by one according to the program of testing methods, according to the standards and to the demands of the client.

Visual inspection

Before and after each single test, the **Incremental Encoder** was examined visually for mechanical damages and any other changes.

Functional test

The functional test were realized during the vibration tests by the client.

Failure criteria

- mechanical or functional damages or any other changes

Fastening of the specimen during dynamic-mechanical tests

The specimen was mounted to an aluminum fixture by the client.

This aluminum fixture with the specimen was directly installed in the respective axis on the vibration / shock table, see pictures in appendix 2.

Because of a mechanical defect in the aluminum fixture during the test in the X-axis, for the remainder of the test (approximately 5 minutes) the fixture was supported by a clamping yoke.

Measuring and test equipment

vibration device	TV59335/AIT-440 (SN: 054-09, TIRA)
control channel 1 (vibration table)	acceleration sensor 352C22 (SN: LW139303, PCB)
measuring channel 3 (specimen - red)	acceleration sensor 352C22 (SN: LW166820, PCB)
Incremental Encoder test device	HENQ 1100 (provided by the client)
motor	(provided by the client)
power supply	(provided by the client)
notebook	(provided by the client)
shock table	STT 800 (TIRA)
control channel 1 (shock table)	acceleration sensor 752-500 (SN: 12858, Endevco)
Low Impedance Coupler	5118B2 (SN: C160003, Kistler)
oscilloscope	SDS 200 (SN: 03-090032B, softDSP)

6 Results

6.1 Vibration, sinusoidal – Test

During and after the test of the **Incremental Encoder HOG 165C** with

- **Vibration, sinusoidal**

(10 – 2000 Hz, ± 10 mm / 196.2 m/s², 3 x 0:30 h, operating with external drive and monitoring)

- **Test Fc**

no external damages nor other changes were determined at the specimen.

6.2 Shock, half-sine - Test Ea

During and after the test of the **Incremental Encoder HOG 165C** with

- **Shock, half-sine**

(2943 m/s², app. 1.5 ms, 6 x 3 shocks, not operating)

- **Test Ea**

no external damages nor other changes were determined at the specimen.

**During and after the tests of the Incremental Encoder
HOG 165C no external damages were determined.**

The operability of the specimen was ensured at any time.

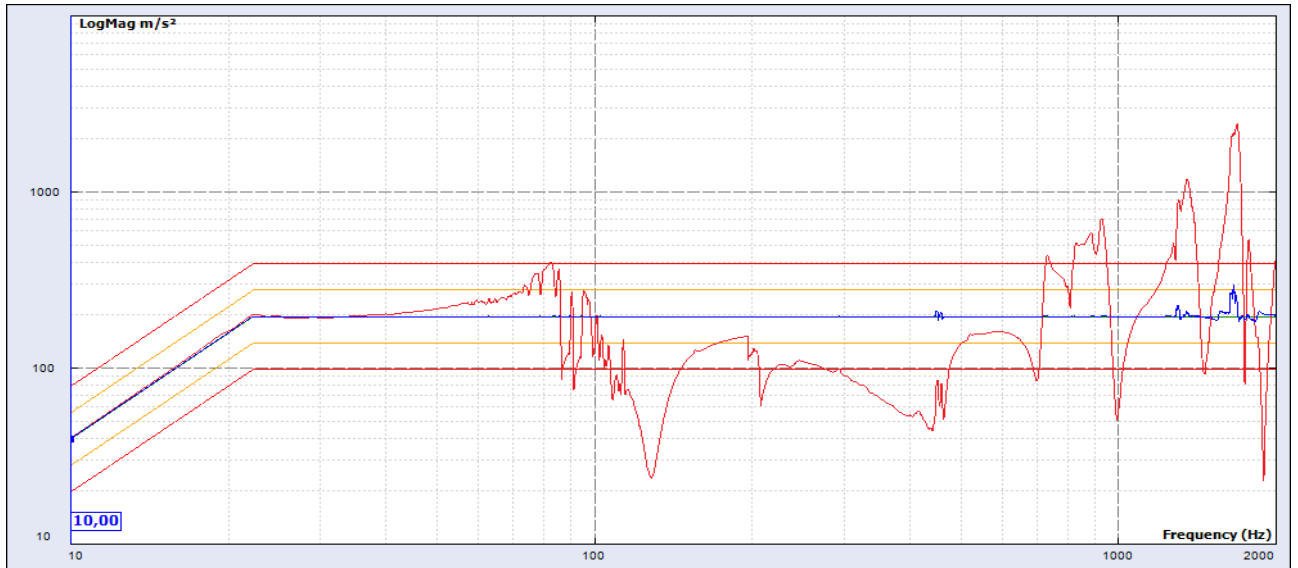
The further evaluation will be done by the client.

The results of the test only refer to the above mentioned equipment under test.

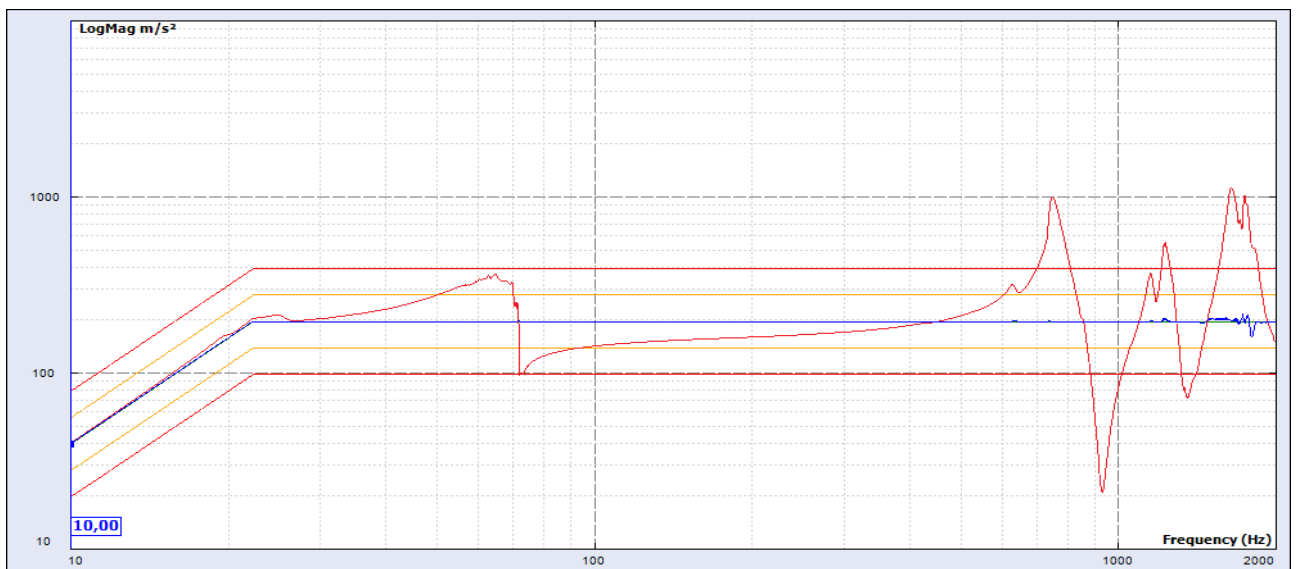
The report or individual pages of this test report may only be copied following the written consent of the test laboratory. The test report-No. 10996.02 / 14 includes 3 pages and appendix 1 to 2.

appendix 1 – vibration and shock protocols

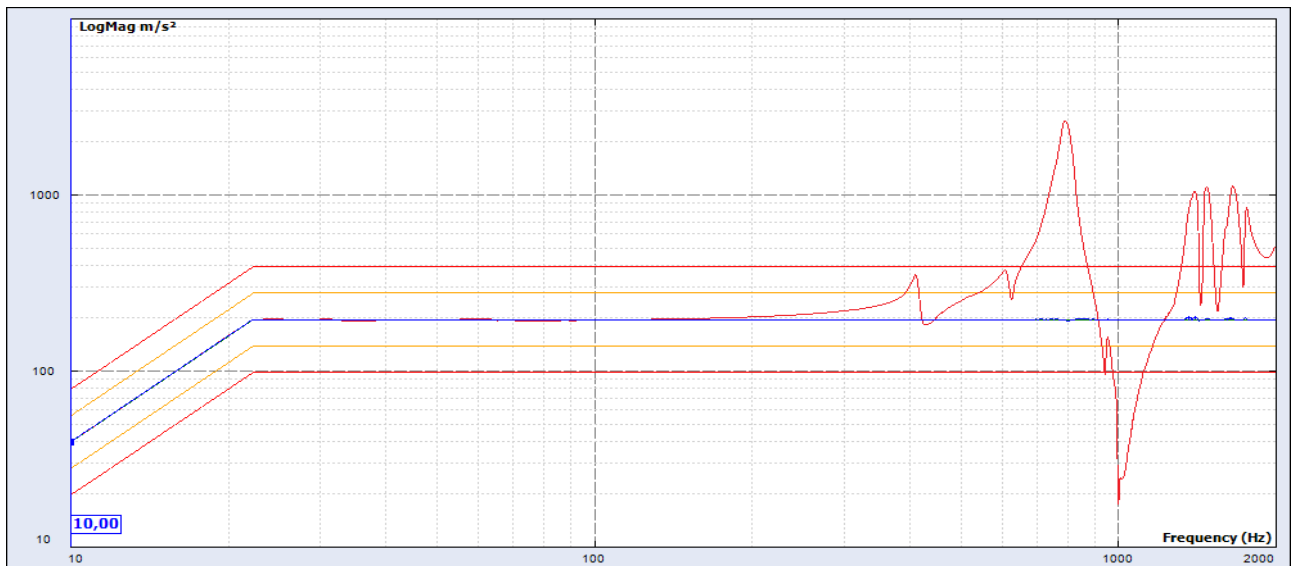
appendix 2 – pictures



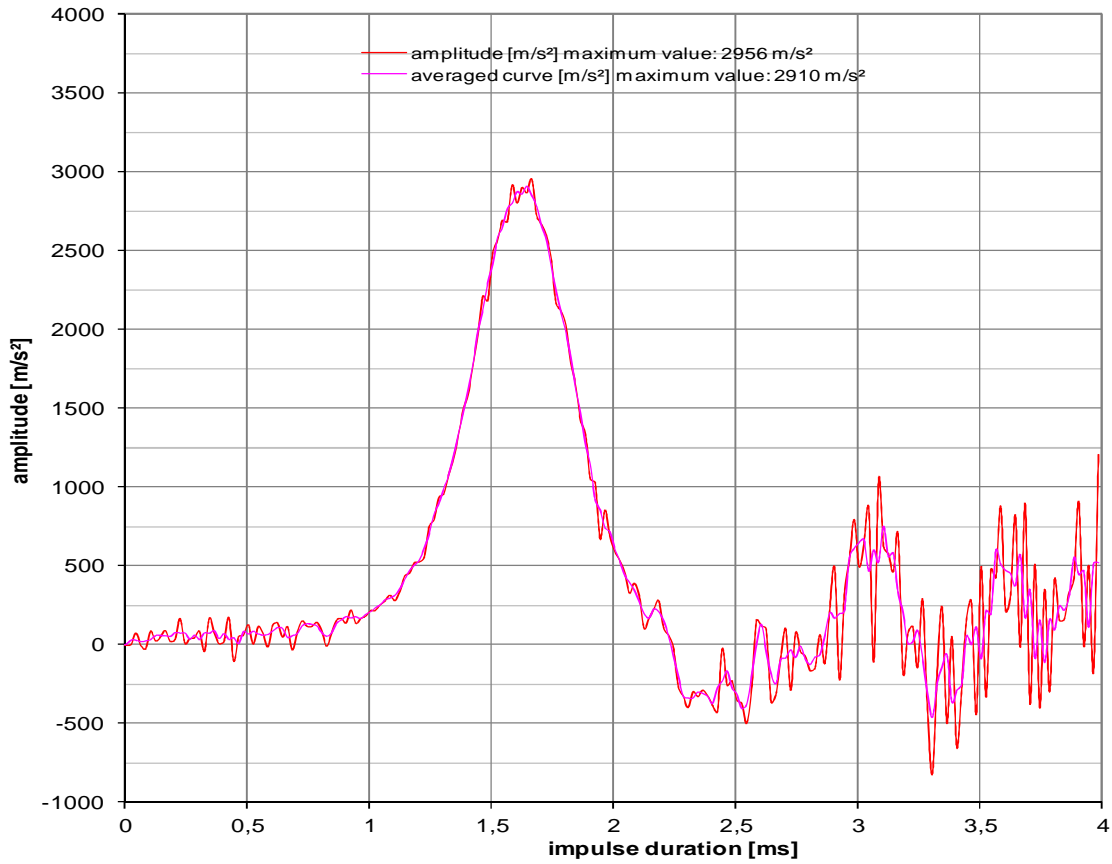
Vibration, sinusoidal, X-axis, - control channel, - acceleration at specimen (channel 3)



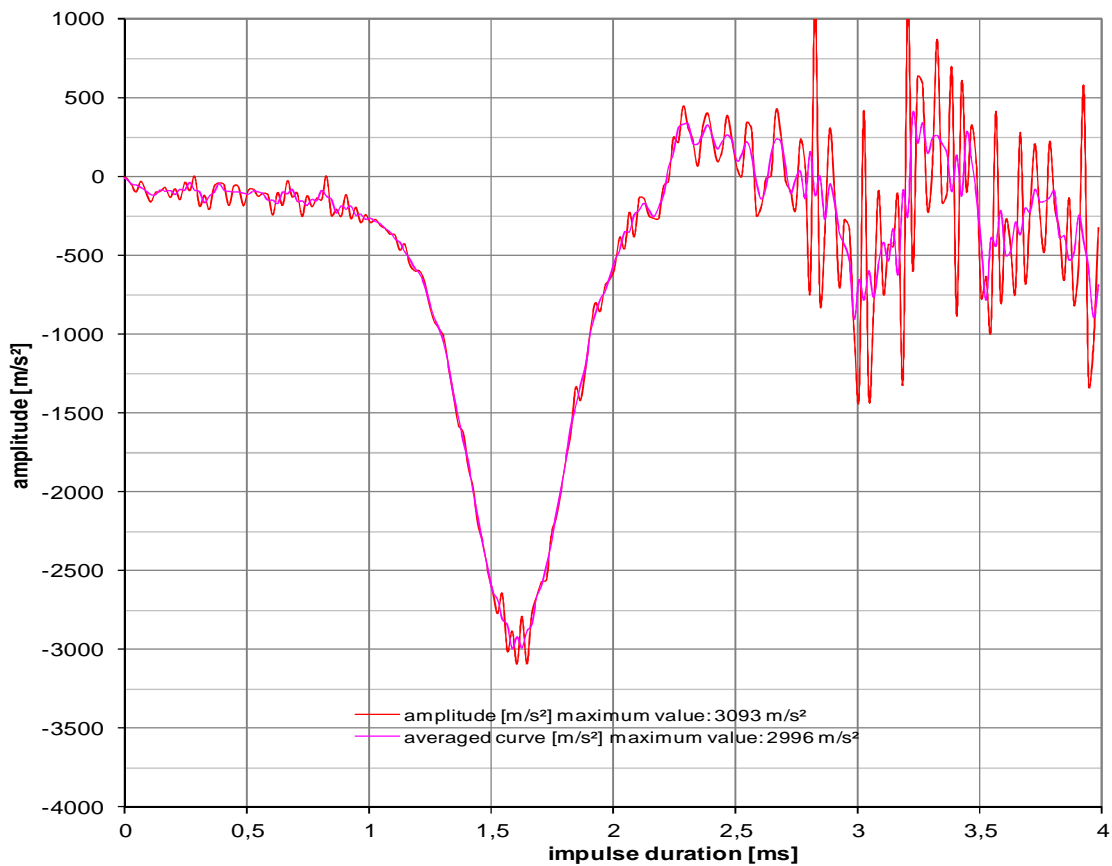
Vibration, sinusoidal, Y-axis, - control channel, - acceleration at specimen (channel 3)



Vibration, sinusoidal, Z-axis, - control channel, - acceleration at specimen (channel 3)



Shock, half-sine (control channel)

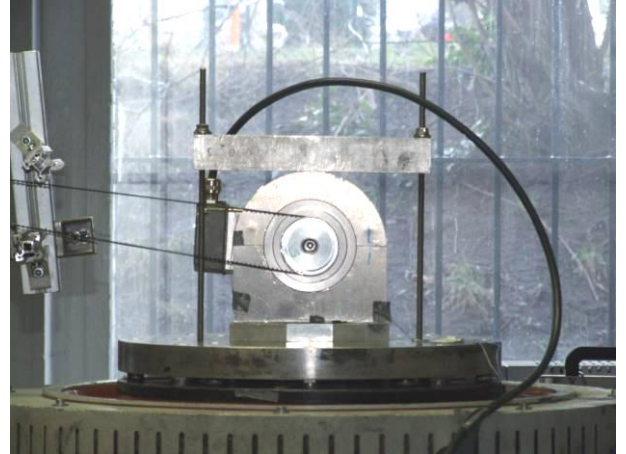


Shock, half-sine, inverted (control channel)

Pictures



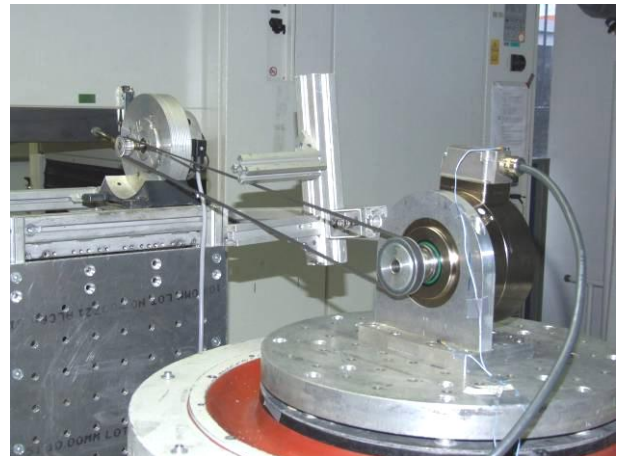
picture 1
Incremental Encoder HOG 165C
on the vibration test device
during vibration test in X-axis



picture 2
Incremental Encoder HOG 165C
on the vibration table with acceleration sensors and clamping yoke
during vibration test in X-axis



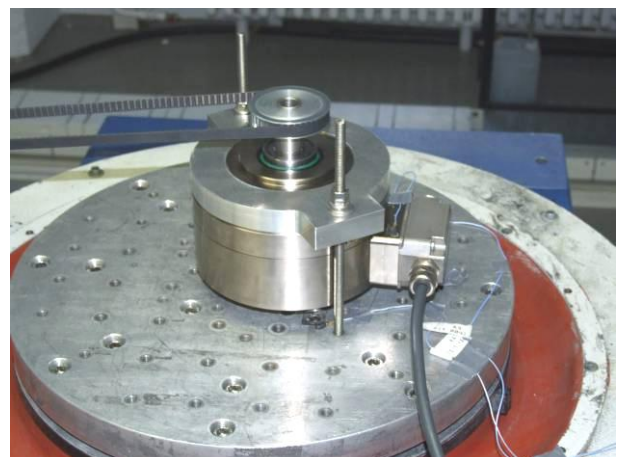
picture 3
Incremental Encoder HOG 165C
specimens on the vibration test device
during vibration test in Y-axis



picture 4
Incremental Encoder HOG 165C
on the vibration table with acceleration sensors
during vibration test in Y-axis



picture 5
Incremental Encoder HOG 165C
specimen on the vibration test device
during vibration test in Z-axis



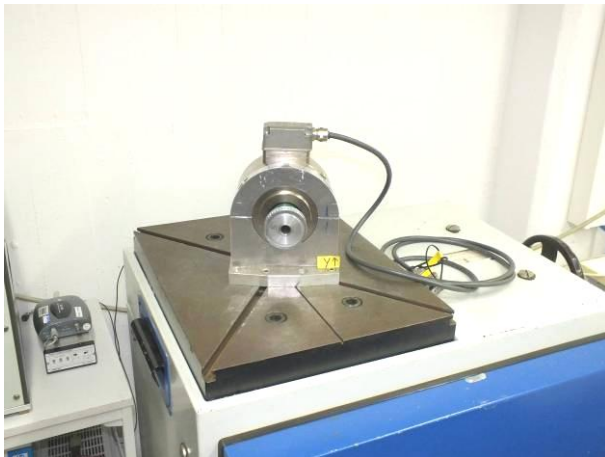
picture 6
Incremental Encoder HOG 165C
on the vibration table with acceleration sensors
during vibration test in Z-axis



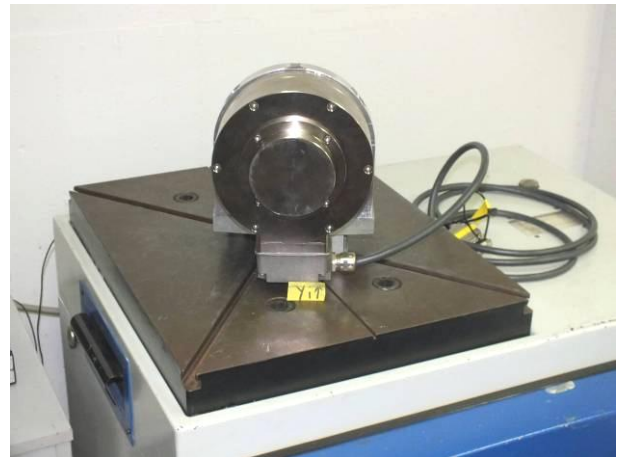
picture 7
Incremental Encoder HOG 165C
on the shock table with acceleration sensor
during shock test in X-axis, positive direction



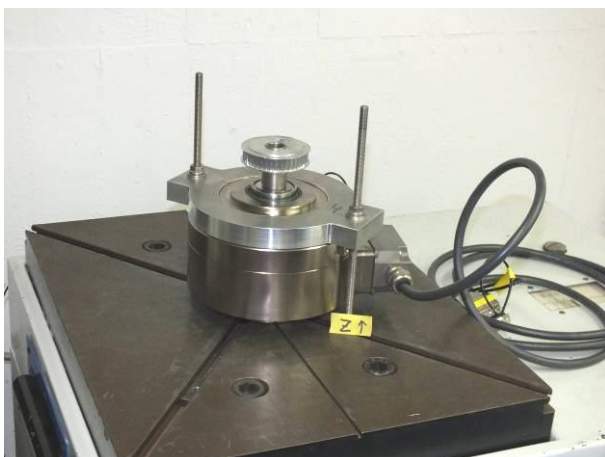
picture 8
Incremental Encoder HOG 165C
on the shock table with acceleration sensor
during and shock test in X-axis, negative direction



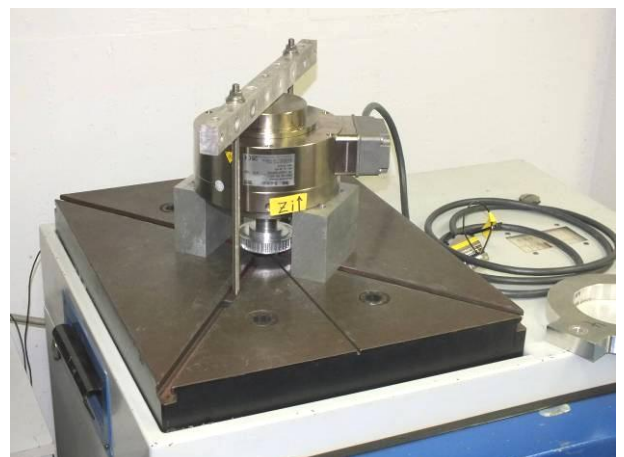
picture 9
Incremental Encoder HOG 165C
on the shock table with acceleration sensor
during shock test in Y-axis, positive direction



picture 10
Incremental Encoder HOG 165C
on the shock table with acceleration sensor
during shock test in Y-axis, negative direction



picture 11
Incremental Encoder HOG 165C
on the shock table with acceleration sensor
during shock test in Z-axis, positive direction



picture 12
Incremental Encoder HOG 165C
on the shock table with acceleration sensor
during shock test in Z-axis, negative direction