


Testing laboratory for climatic, mechanical
and corrosive environmental stress




CERTIFICATE of QUALITY TEST

Test report - No. 10996.05 / 14

Client	Baumer Hübner GmbH Max-Dohrn-Str. 2 + 4 10589 Berlin	
Equipment under test	Incremental Encoder 1 sample manufacturing date	HOG 16 DN 2048 I SN 700001050792 December 2014
Purpose	<i>Test of the dynamic-mechanical robustness 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 January to 21 January 2015	
Realization / results	see page 2 to 3	
Total number of pages	7 (incl. 2 appendices)	
Test result	During and after the tests of the Incremental Encoder HOG 16 no external damages were determined. The further evaluation will be done by the client.	


Dipl.-Ing. R. Lein
head of test lab / test manager
Berlin, 22 January 2015




Dipl.-Ing. M. Geburtig
test engineer

1 Purpose

Test of the dynamic-mechanical robustness of the **Incremental Encoder HOG 16** under defined environmental conditions.

2 Equipment under test (EUT)

Incremental Encoder	HOG 16 DN 2048 I
SN	700001050792
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	not operating
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.

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

Measuring and test equipment

vibration device	TV59335/AIT-440 (SN: 054-09, TIRA)
control channel 1 (vibration table)	acceleration sensor 353B03 (SN: 41543, PCB)
measuring channel 3 (specimen - red)	acceleration sensor 352C22 (SN: LW166820, PCB)
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 16 with**

- Vibration, sinusoidal

(10 – 2000 Hz, ± 10 mm / 196.2 m/s², 3 x 0:30 h, not operating)

- 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 16 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 16 no external damages were determined.**

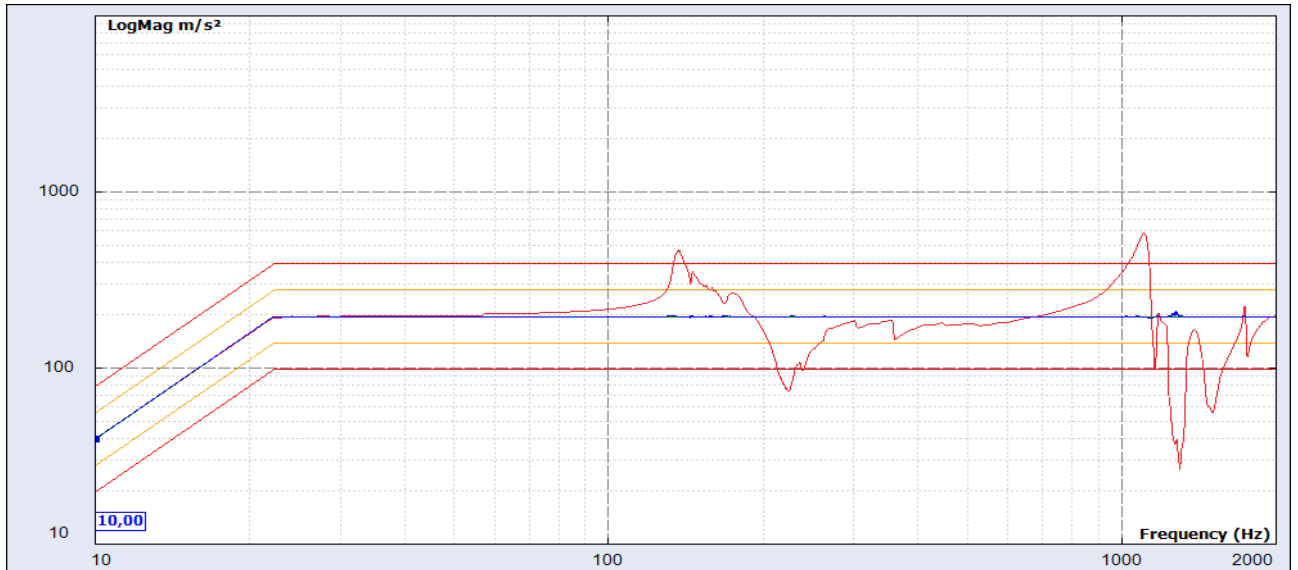
The further evaluation will be done by the client.

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

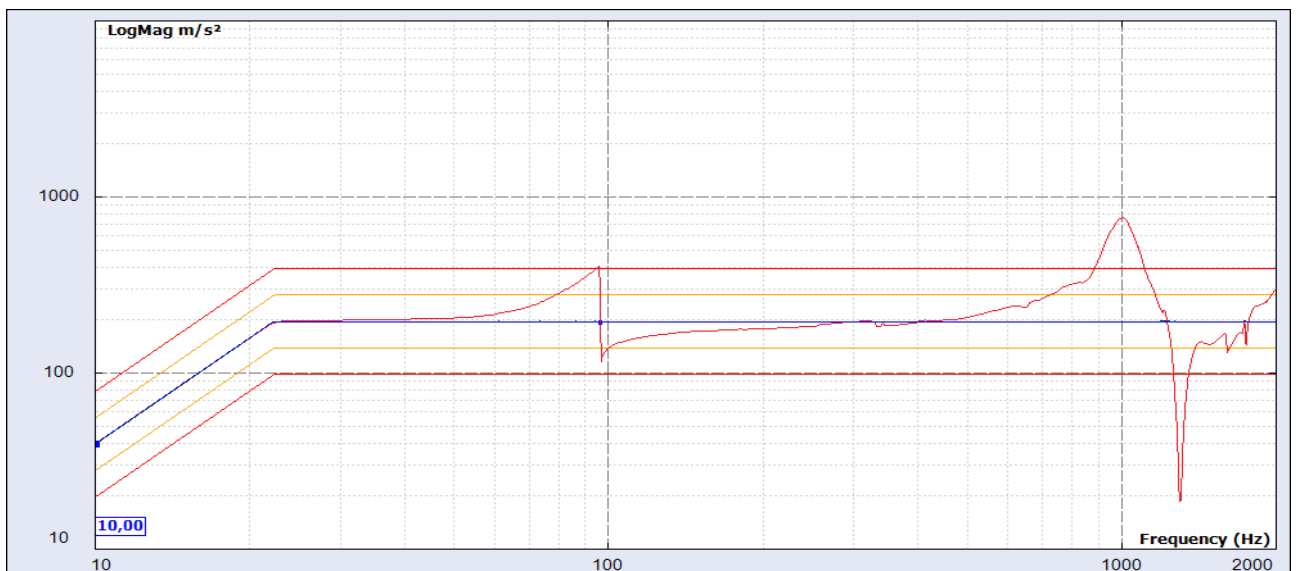
The report or individual pages of this test report may only be copied following the written consent of the test laboratory. The test report-No. 10996.05 / 14 includes 3 pages and appendix 1 to 2.

appendix 1 – vibration and shock protocols

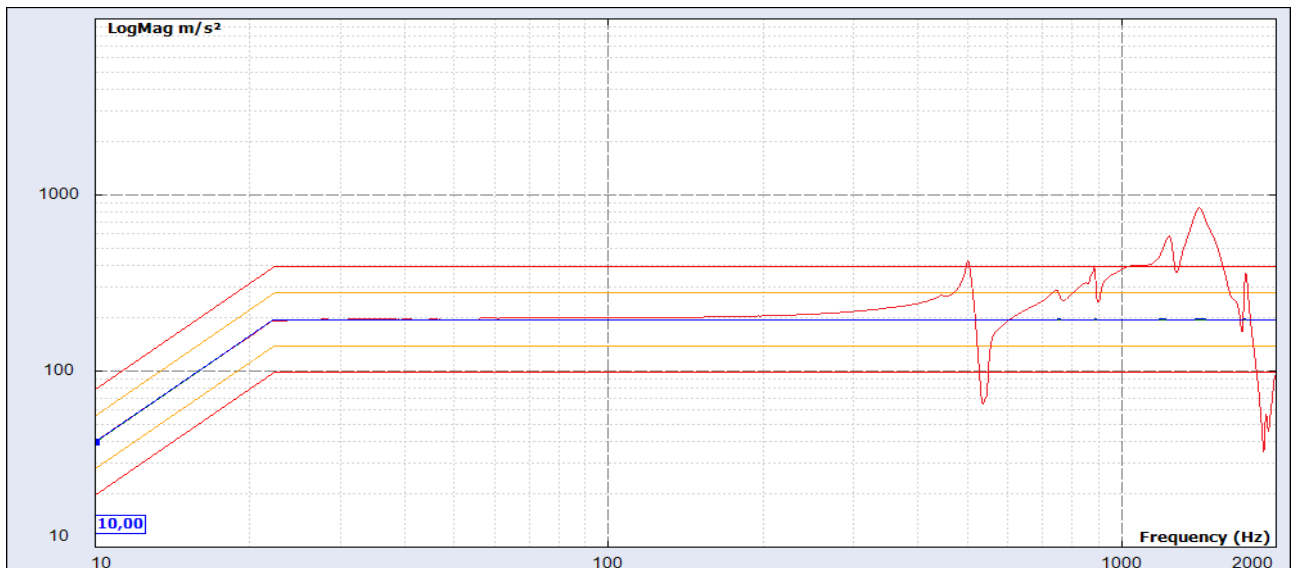
appendix 2 – pictures



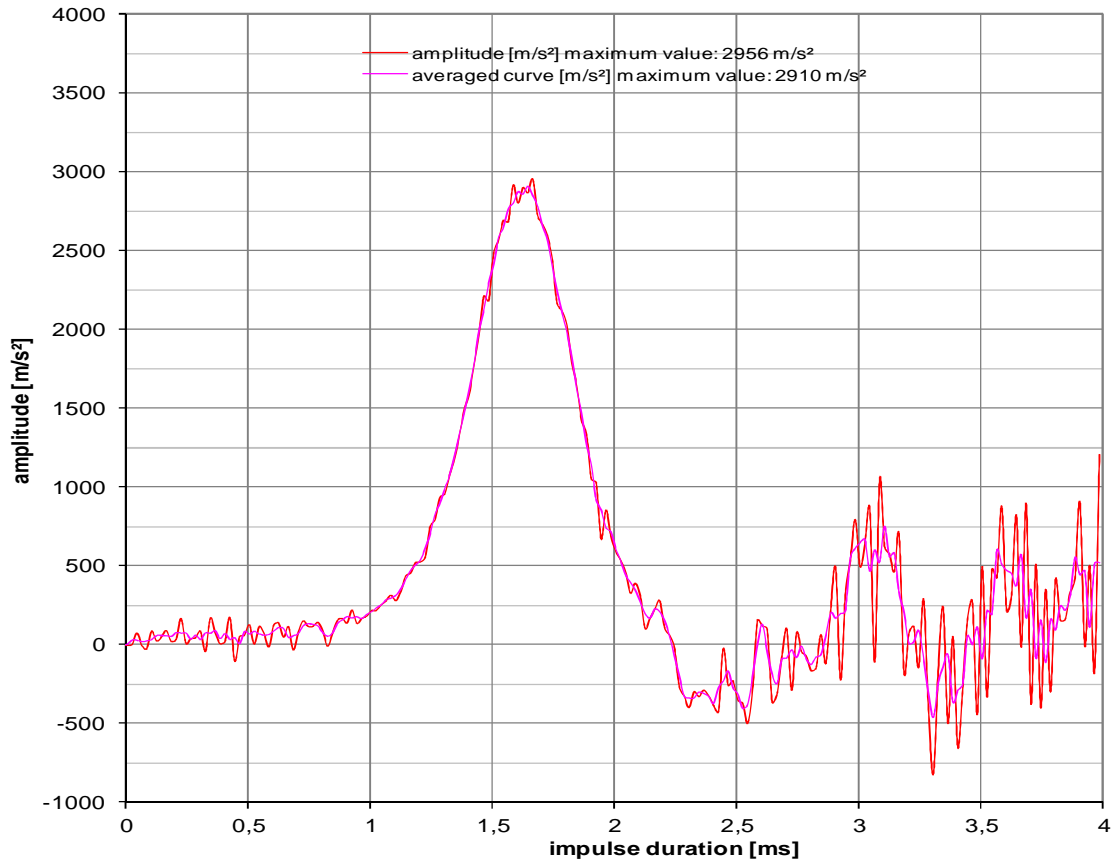
Vibration, sinusoidal, X-axis, - control channel, - acceleration at specimen (channel 3)



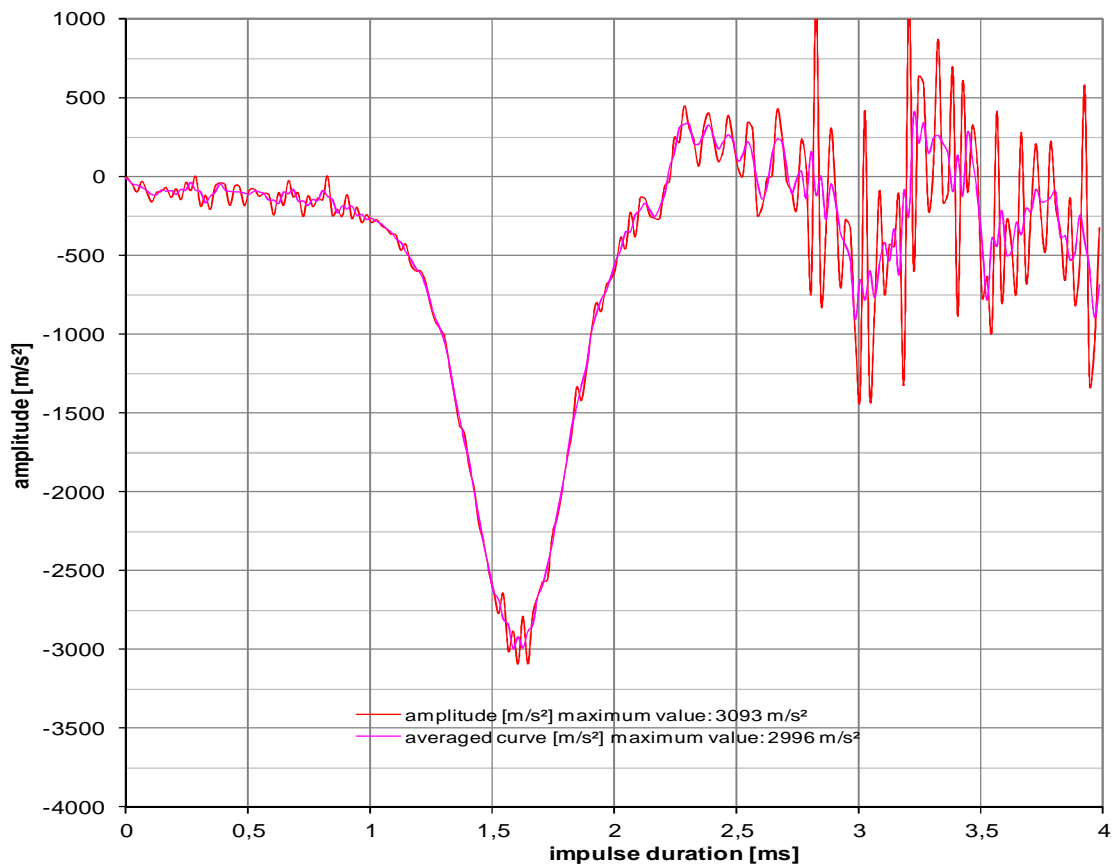
Vibration, sinusoidal, Y-axis, - control channel, - acceleration at specimen (channel 3)



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



Shock, half-sine (control channel)

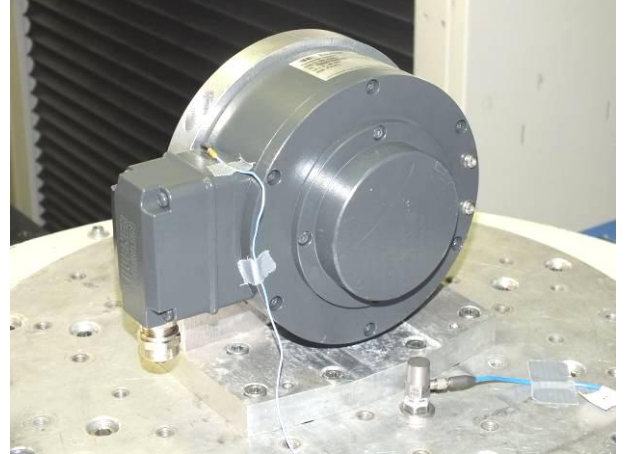


Shock, half-sine, inverted (control channel)

Pictures



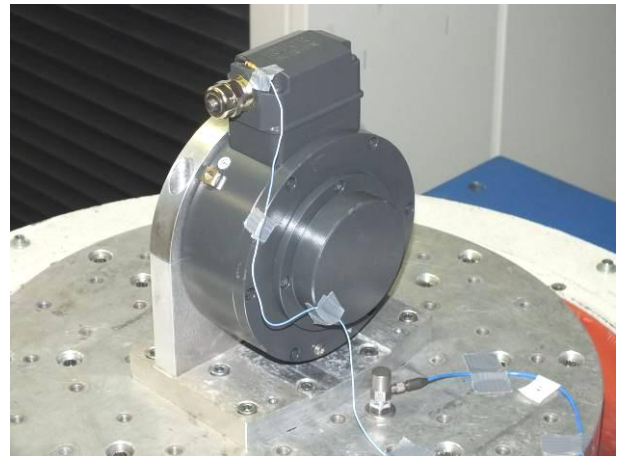
picture 1
Incremental Encoder HOG 16
on the vibration test device
during vibration test in X-axis



picture 2
Incremental Encoder HOG 16
on the vibration table with acceleration sensors
during vibration test in X-axis



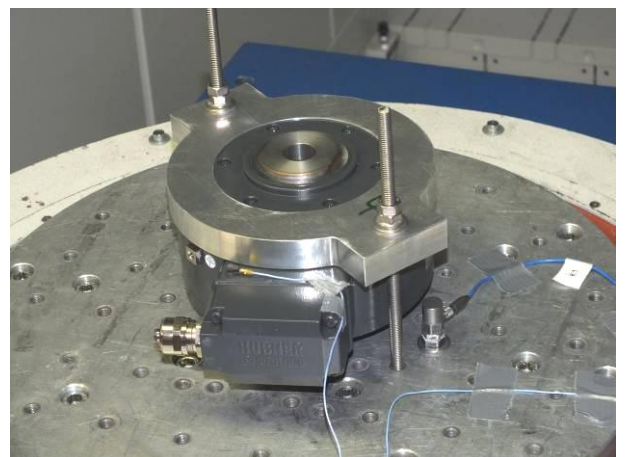
picture 3
Incremental Encoder HOG 16
specimens on the vibration test device
during vibration test in Y-axis



picture 4
Incremental Encoder HOG 16
on the vibration table with acceleration sensors
during vibration test in Y-axis



picture 5
Incremental Encoder HOG 16
specimen on the vibration test device
during vibration test in Z-axis



picture 6
Incremental Encoder HOG 16
on the vibration table with acceleration sensors
during vibration test in Z-axis



picture 7
Incremental Encoder HOG 16
on the shock table with acceleration sensor
during shock test in X-axis, positive direction



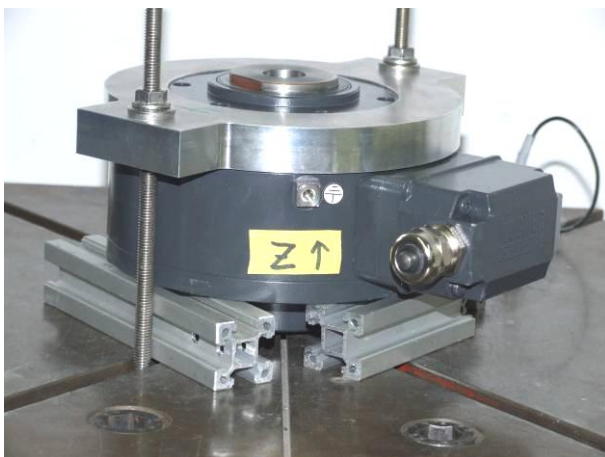
picture 8
Incremental Encoder HOG 16
on the shock table with acceleration sensor
during and shock test in X-axis, negative direction



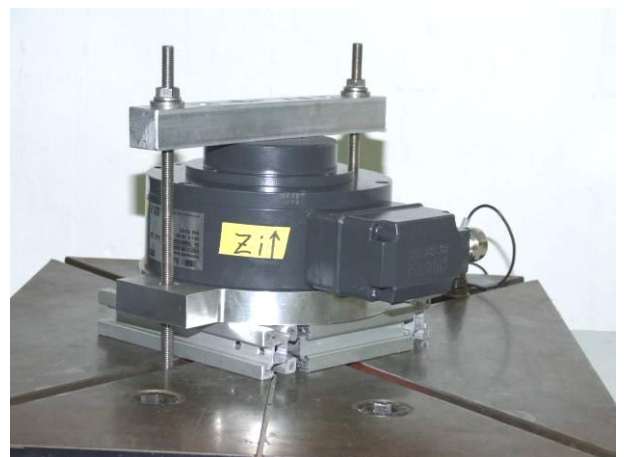
picture 9
Incremental Encoder HOG 16
on the shock table with acceleration sensor
during shock test in Y-axis, positive direction



picture 10
Incremental Encoder HOG 16
on the shock table with acceleration sensor
during shock test in Y-axis, negative direction



picture 11
Incremental Encoder HOG 16
on the shock table with acceleration sensor
during shock test in Z-axis, positive direction



picture 12
Incremental Encoder HOG 16
on the shock table with acceleration sensor
during shock test in Z-axis, negative direction