

Testing laboratory for climatic, mechanical  
and corrosive environmental stress



## CERTIFICATE of QUALITY TEST

### Test report - No. 10996.01 / 14

<b>Client</b>	<b>Baumer Hübner GmbH</b> Max-Dohrn-Str. 2 + 4 10589 Berlin	
<b>Equipment under test</b>	<b>Incremental Encoder</b> 1 sample manufacturing date	<b>FOG 9 DN 1024 TTL</b> SN 70001050788 December 2014
<b>Purpose</b>	<b><i>Test of the dynamic-mechanical robustness under defined environmental conditions</i></b>	
<b>Test program</b>	<b><i>Vibration, sinusoidal 10 g</i></b> <b><i>Shock, half-sine 100 g</i></b>	<i>according to IEC 60068-2-6</i> <i>according to IEC 60068-2-27</i>
<b>Test date</b>	20 January 2015	
<b>Realization / results</b>	see page 2 to 3	
<b>Total number of pages</b>	6 (incl. 2 appendices)	
<b>Test result</b>	<b>During and after the tests of the Incremental Encoder FOG 9 no external damages were determined. The further evaluation will be done by the client.</b>	

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Berlin, 21 January 2015



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## 1 Purpose

Test of the dynamic-mechanical robustness of the **Incremental Encoder FOG 9** under defined environmental conditions.

## 2 Equipment under test (EUT)

<b>Incremental Encoder</b>	<b>FOG 9 DN 1024 TTL</b>
SN	70001050788
delivery date of the EUT	17 December 2014

## 3 Basics

### 3.1 Demands of the client

### 3.2 Used standards

<b>IEC 60068-1:1988 + Corr. 1988 + A1:1992</b>	<b>DIN EN 60068-1:1995-03</b>
„Environmental testing - Part 1: General and guidance“	
<b>IEC 60068-2-6:2007</b>	<b>DIN EN 60068-2-6; VDE 0468-2-6:2008-10</b>
„Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)“	
<b>IEC 60068-2-27:2008</b>	<b>DIN EN 60068-2-27; VDE 0468-2-27:2010-02</b>
„Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock“	
<b>IEC 60068-2-47:2005</b>	<b>DIN EN 60068-2-47:2006-03</b>
„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 – 16 Hz ± 10 mm
acceleration	16 – 2000 Hz 98.1 m/s <sup>2</sup> (10 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	981 m/s <sup>2</sup> (100 g)
pulse duration	6 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 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 353B18 (SN: 102393, PCB)
measuring channel 3 (specimen - red)	acceleration sensor 352C22 (SN: LW166820, PCB)

## 6 Results

### 6.1 Vibration, sinusoidal – Test

During and after the test of the **Incremental Encoder FOG 9 with**

- **Vibration, sinusoidal** - Test Fc  
(10 – 2000 Hz,  $\pm 10$  mm / 98.1 m/s<sup>2</sup>, 3 x 0:30 h, not operating)

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 FOG 9 with**

- **Shock, half-sine** - Test Ea  
(981 m/s<sup>2</sup>, 6 ms, 6 x 3 shocks, not operating)

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

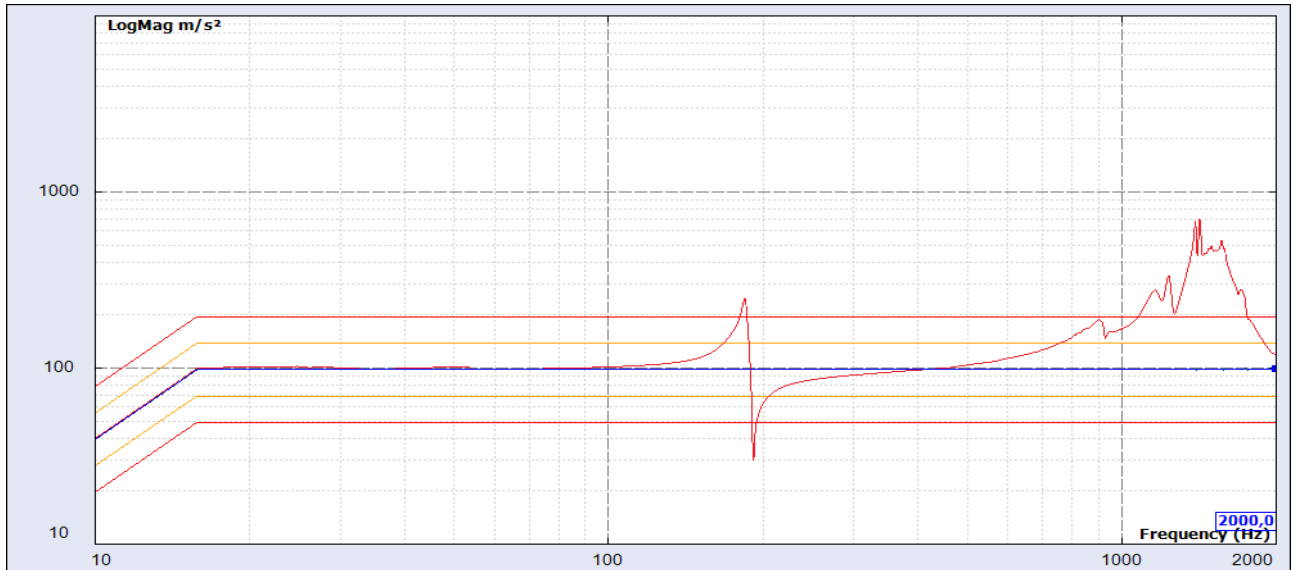
**During and after the tests of the Incremental Encoder  
FOG 9 no external damages were determined.  
The further evaluation will be done by the client.**

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

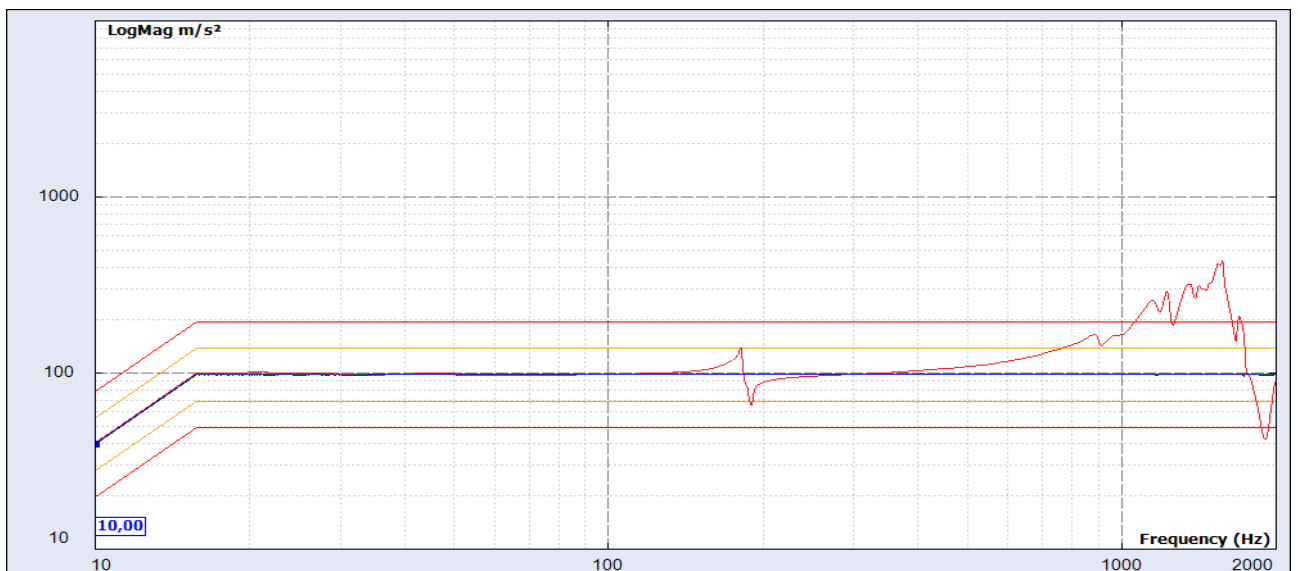
The report or individual pages of this test report may only be copied following the written consent of the test laboratory. The test report-No. 10996.01 / 14 includes 3 pages and appendix 1 to 2.

appendix 1 – vibration and shock protocols

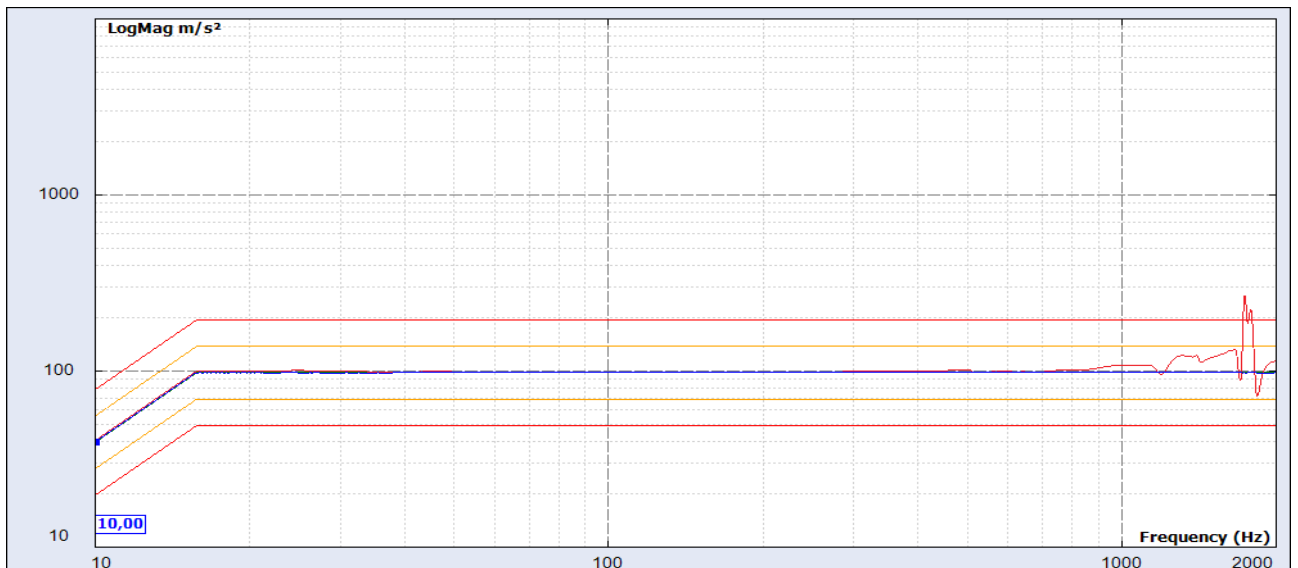
appendix 2 – pictures



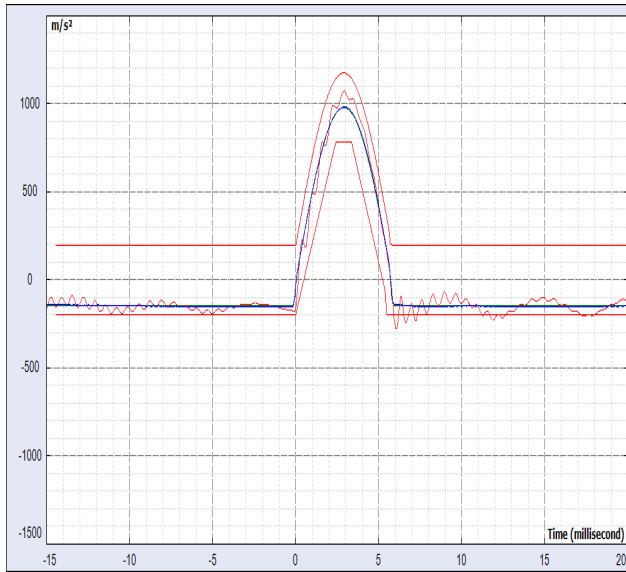
Vibration, sinusoidal, X-axis, - control channel, - acceleration at specimen (channel 3)



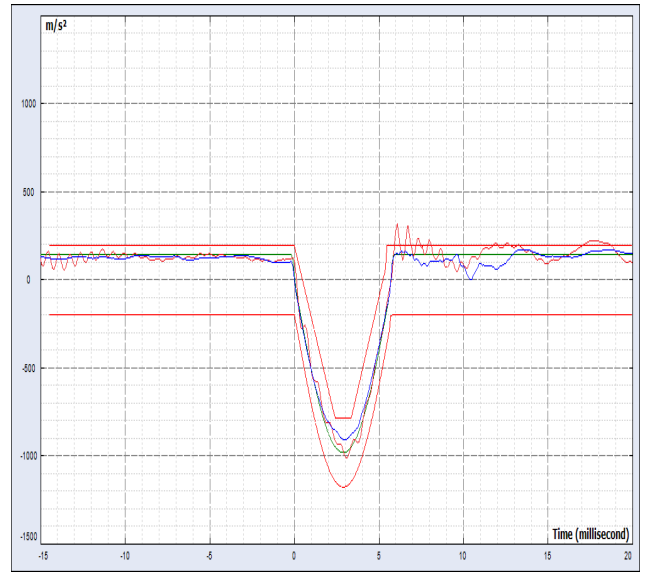
Vibration, sinusoidal, Y-axis, - control channel, - acceleration at specimen (channel 3)



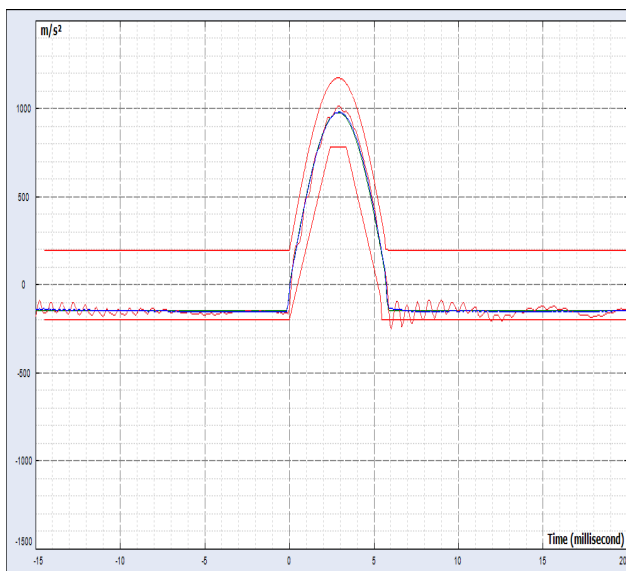
Vibration, sinusoidal, Z-axis, - control channel, - acceleration at specimen (channel 3)



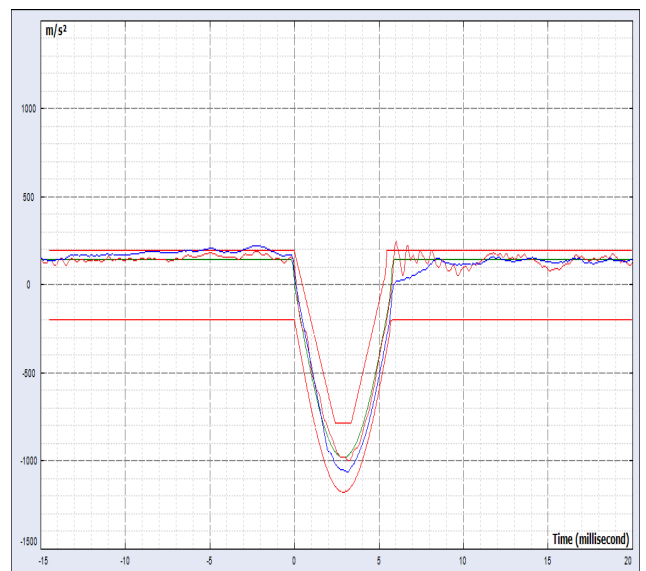
Shock, half-sine, X-axis, - control channel, - acceleration at specimen (channel 3)



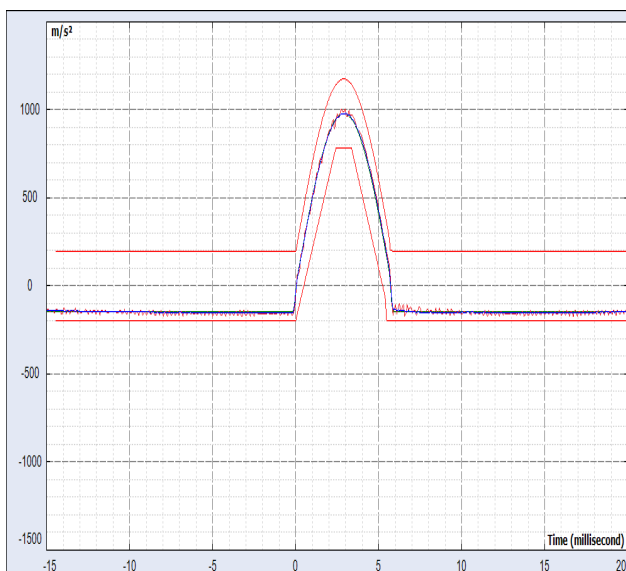
Shock, half-sine, Y-axis, - control channel, - acceleration at specimen (channel 3)



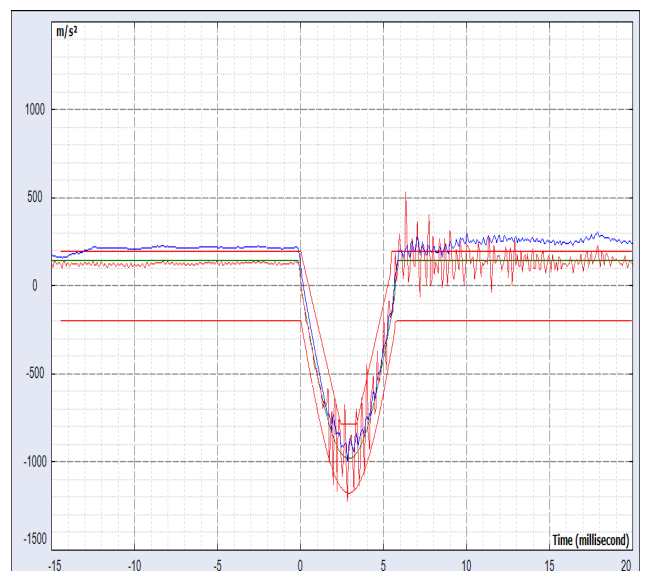
Shock, half-sine, Z-axis, - control channel, - acceleration at specimen (channel 3)



Shock, half-sine, Y-axis, - control channel, - acceleration at specimen (channel 3)



Shock, half-sine, Z-axis, - control channel, - acceleration at specimen (channel 3)

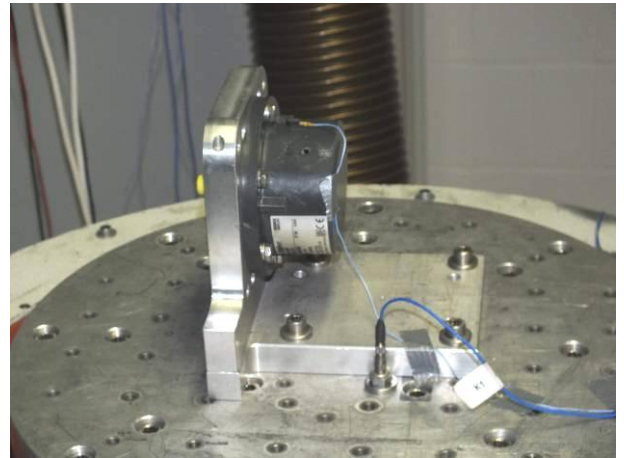




**Pictures**



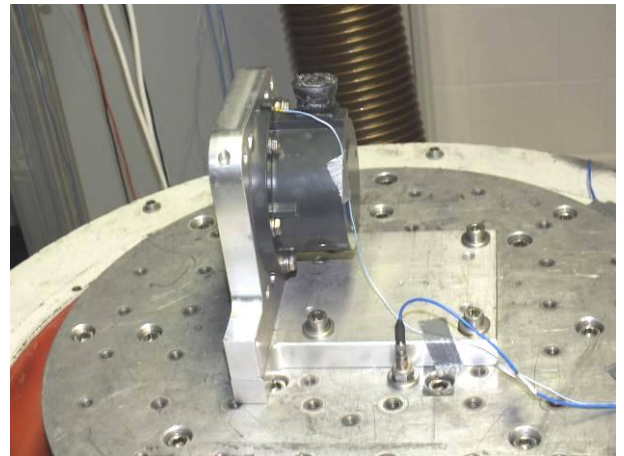
**picture 1**  
**Incremental Encoder FOG 9**  
on the vibration test device  
during vibration test and shock test in X-axis



**picture 2**  
**Incremental Encoder FOG 9**  
on the vibration table with acceleration sensors  
during vibration test and shock test in X-axis



**picture 3**  
**Incremental Encoder FOG 9**  
specimens on the vibration test device  
during vibration test and shock test in Y-axis



**picture 4**  
**Incremental Encoder FOG 9**  
on the vibration table with acceleration sensors  
during vibration test and shock test in Y-axis



**picture 5**  
**Incremental Encoder FOG 9**  
specimen on the vibration test device  
during vibration test and shock test in Z-axis



**picture 6**  
**Incremental Encoder FOG 9**  
on the vibration table with acceleration sensors  
during vibration test and shock test in Z-axis