

Testing laboratory for climatic, mechanical  
and corrosive environmental stress



## QUALITY TEST CERTIFICATE


Test report No. 10955.04 / 14

Client	<b>Baumer Hübner GmbH</b> Max-Dohrn-Str. 2+4 10589 Berlin	
Equipment under test	<b>Sensor head</b> Quantity	<b>MHAP XXX</b> 1 unit
Purpose	<b>Tests for the certification of the degrees of protection IP66 and IP67</b>	
Test program	<b>Contact protection test IP6X</b> <b>Immersion substitute test (dust test IP6X)</b> <b>Water jet test IPX6</b> <b>Water diving test IPX7</b>	<i>according to IEC 60529</i> <i>different to IEC 60529</i> <i>according to IEC 60529</i> <i>according to IEC 60529</i>
Test period	29 December 2014 to 28 January 2015	
Execution / results	see pages 2 to 4	
Total number of pages	6 (including 1 appendix)	


**Test results**                      **During the tests of the Incremental Sensor head MHAP XXX no external damages nor changes were determined.**

**The criteria used to verification the degree of protection IP66 and IP67 were met.**

**Further evaluation will be done by the client.**

  
Dipl.-Ing. R. Lein  
Head of the testing laboratory  
Berlin, 10 March 2015



  
M.Eng. M. Sommerfeld  
Test engineer

## 1 Purpose

Certification of the degrees of protection IP66 und IP67 for the **Sensor head MHAP XXX** under defined environmental conditions, according to the specifications of the standards and to the demands of the client.

## 2 Equipment under test

Sensor head	MHAP XXX
Quantity	1 unit
Arrival date of the samples	03 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 60529:1989 + A1:1999 + A2:2013	DIN EN 60529; VDE 0470-1:2014-09
„Degrees of protection provided by enclosures (IP Code)“	

## 4 Test program

### 4.1 Degree of protection IP6X (protection against access to hazardous parts)

according to IEC 60 529 § 13.2

Before the dust test, the **degree of protection IP6X** shall be realized.  
Protection against access to hazardous parts with a standardized wire.  
The access probe  $\varnothing$  1.0 mm (force 1 N) shall not penetrate into the housing at any point.

### 4.2 Immersion substitute test for dust protection IP6X (dust protection with negative pressure)

according demands of VDE

#### **Initial insulation test**

Before the test, the insulation resistance (voltage DC 500 V) between housing and electrical connections shall be measured.

The test of the **tightness of the specimen** shall be realized according the demands of VDE.

specimen	not operating
test equipment	dipping basin (200 mm deep)
water depth	200 mm below the surface (bottom side of the specimen)
water temperature	may not diverge more than 5 K from the specimens
temperature	
test duration	24:00 h

#### **Visual inspection**

After the protection test the specimen is examined for external defects and other changes.  
Since the specimen is sealed inside, the specimen will not be opened after the test.

After the test, the insulation resistance (voltage DC 500 V) between housing and electrical connections shall be measured and shall be compared against the initial value.

#### **Acceptance criterion**

The insulation resistance may not change significantly compared to the initial value before the test.

#### **4.3 Degree of protection IPX7 (protected against temporary immersion)**

according to IEC 60529 § 14.2.7

The test of the **degree of protection IPX7** shall be realized according to the standards:

specimen	not operating
test equipment	dipping basin (1000 mm deep)
water depth	1000 mm below the surface (bottom side of the specimen)
water temperature	may not diverge more than 5 K from the specimens
temperature	
test duration	0:30 h

##### ***Visual inspection***

After the protection test the specimen is examined for external defects and other changes. Since the specimen is sealed inside, the specimen will not be opened after the test. After the test, the insulation resistance (voltage DC 500 V) between housing and electrical connections shall be measured and shall be compared against the initial value.

##### ***Acceptance criterion***

The insulation resistance may not change significantly compared to the initial value before the test.

#### **4.4 Degree of protection IPX6 (protected against powerful water jets)**

according to IEC 60529 § 14.2.6

The test of the **degree of protection IPX6** shall be realized according to the standards:

specimen	not operating
test equipment	water-jet of a standardized spray nozzle (inside diameter 12.5 mm)
water flow rate	100 l/min $\pm$ 5 %
water pressure	according to water flow rate
specimen position	in operating position on turning-knob
water temperature	may not diverge more than 5 K from the specimens
temperature	
distance	2.5 ... 3.0 m (between spray nozzle and specimen housing)
test duration	minimum 3 min

##### ***Visual inspection***

After the protection test the specimen is examined for external defects and other changes. Since the specimen is sealed inside, the specimen will not be opened after the test. After the test, the insulation resistance (voltage DC 500 V) between housing and electrical connections shall be measured and shall be compared against the initial value.

##### ***Acceptance criterion***

The insulation resistance may not change significantly compared to the initial value before the test.

## 5 Realization

The environmental tests were carried out one by one according to the program of testing methods (complex 4.1 to 4.4), 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 external defects and any other changes.

After each protection test, the insulation resistance between housing and electrical connections was measured and compared against the initial value before the test.

### **Failure criteria**

- mechanical damages or any other changes
- significantly changes of the insulation resistance between housing and electrical connections

### **Measurement and test devices**

Name	Type	Serial No.	Maker
Rigid IEC steel wire	P 10.27	50 11 594	PTL
Dipping basin	TB 500L	-	AUCOTEAM
Portable compact tester	91-4A	0000035268	ELABO
Standardized nozzle Ø12.5 mm	SD 12,5	-	Gödel
Turn table	-	-	AUCOTEAM
IR thermometer	Fluke 561	14950036	Fluke
DC-controller	3222	1149	Statron
Steel pump	EVMG 5 16N5	BHX230217	EBARA

## 6 Results

After the protection tests of the **Sensor head MHAP XXX with**

- **contact protection** (protection against access to hazardous parts)
- **immersion substitute test for dust test** (dust protection with negative pressure)
- **water immersion test** (protected against temporary immersion)
- **water jet protection test** (protected against powerful water jets)

- test IP6X
- test IP6X
- test IPX7
- test IPX6

no external damages were determined at the specimen.

The rigid steel wire IEC could not enter the housing at any point.

During the test of the insulation resistance between housing and electrical connections, the following values was measured:

- before the immersion substitute test IP6X 403 MΩ
- after the immersion substitute test IP6X 389 MΩ
- before the water immersion test IPX7 389 MΩ
- after the water immersion test IPX7 417 MΩ
- before the water jet protection test IPX6 417 MΩ
- after the water jet protection test IPX6 407 MΩ

The criteria used to verification the degree of protection IP66 and IP67 were met.

After the 3 protection tests the specimen was opened.

Traces of water on the sealing compound inside the cover were found.

**During the tests of the Incremental Sensor head MHAP XXX no external damages nor changes were determined.**

**The criteria used to verification the degree of protection IP66 and IP67 were met.**

**Further evaluation will be done by the client.**

The results of the tests refer only to the above mentioned equipment under test. This report, or individual pages of this test report, may only be copied following the written consent of the testing laboratory. This test report No. 10955.04 / 14 includes 5 pages and 1 appendix – pictures

**Pictures**



**Picture 1**  
Sensor head MHP XXX  
specimen with rigid steel wire (Ø 1 mm, 1 N)  
*during contact protection test IP6X*



**Picture 2**  
Sensor head MHP XXX  
specimen with rigid steel wire (Ø 1 mm, 1 N)  
*during contact protection test IP6X*



**Picture 3**  
Sensor head MHP XXX  
specimen with portable compact tester  
*insulation test before immersion substitute test IP6X*



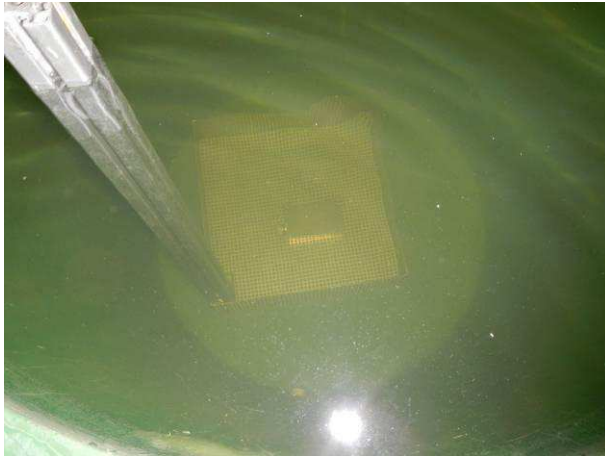
**Picture 4**  
Sensor head MHP XXX  
specimen in the dipping basin 200 mm  
*during the immersion substitute test IP6X*



**Picture 5**  
Sensor head MHP XXX  
specimen with portable compact tester  
*insulation test after the immersion substitute test IP6X before the immersion substitute test IP6X*



**Picture 6**  
Sensor head MHP XXX  
specimen mounted on the dipping knob  
*insulation test after the immersion substitute test IP6X before the immersion substitute test IP6X*



**Picture 7**  
Sensor head MHAP XXX  
specimen in the dipping basin 1000 mm  
during the immersion substitute test IP6X



**Picture 8**  
Sensor head MHAP XXX  
specimen with portable compact tester  
insulation test after the water immersion test IPX7



**Picture 9**  
Sensor head MHAP XXX on the  
turn table with water from the spray nozzle  
during the water jet test IPX6



**Picture 10**  
Sensor head MHAP XXX on the  
turn table with water from the spray nozzle  
during the water jet test IPX6



**Picture 11**  
Sensor head MHAP XXX  
specimen with portable compact tester  
insulation test after the water jet test IPX6



**Picture 12**  
Sensor head MHAP XXX  
traces of water on the sealing compound inside  
after the protection tests IP67 and IPX6