AUCOTEAM

INGENIEURGESELLSCHAFT FÜR AUTOMATISIERUNGS- UND COMPUTERTECHNIK BERLIN

Testing laboratory for climatic, mechanical
and corrosive environmental stress

Deutscher Akkreditierungs Rat DAR

DAP-PL-3439.00

CERTIFICATE of QUALITY TEST

Test report - No. 9790.01 / 13

Client	**MEDER electronic AG** Robert-Bosch-Straße 4 78244 Singen		
Equipment under test	**MK02/4-1A66C-500W**		
	Art.-No.	2224713054	
	Date	13.03.2013	
	Quantity	2 Samples (#1.1 and #1.2)	
Purpose	***Tests for the certification of the degree of protection IP67 according to the standards and to the demands of the client.***		
Test program	***Protection against access to hazardous parts***	***IP6X***	*according to the IEC 60529*
	Protection against solid foreign objects	***IP6X***	*according to the IEC 60529*
	Protection against immersion	***IPX7***	*according to the IEC 60529*
Test period	03 April to 05 April 2013		
Realization / results	see page 2 to 4		
Total number of pages	6 (incl. 1 appendix)		

Test result

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

AUCOTEAM GmbH Berlin QUALITÄTSPRÜFUNG

Dipl.-Ing. R. Lein
Head of test lab / test manager

M.Eng. M. Sommerfeld
Test engineer

Berlin, 18 April 2013

1 Purpose

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK02/4-1A66C-500W*** were performed according to the specifications of the current standards and to the demands of the client.

2 Equipment under test (E.U.T.)

MK02/4-1A66C-500W

Art.-No.	2224713054
Date	13.03.2013
Quantity	2 Samples (#1.1 and #1.2)

3 Basics

3.1 Demands of the client

3.2 Used standards

IEC 60529:1989 + **A1**:1999 **DIN EN 60529; VDE 0470-1**:2000-09
„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 the IEC 60529 § 13.2

Before the dust test, the ***protection against access to hazardous parts IP6X*** shall be verified using a standardized wire. The access probe ∅ 1.0 mm (force 1 N) must not penetrate the housing at any point.

4.2 Degrees of protection tests IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

For the ***dust test IP6X*** the standard demands the use of vacuum. If no vacuum can be applied, because the EUT is a one piece cast, the VDE states that the substitute water test with a subsequent insulation measurement test can be performed instead.

EUT	not in function
EUT position	horizontal lying

Substitute water test for coated /cast specimens
The EUT will be placed in water for approx. 24 h at a depth of 20 cm. If after the test the insulation resistance remains unchanged, then the form closure of the casting compound is rendered. It can be then assumed that dust with vacuum would not be able to penetrate the specimen.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the high pressure steam jets test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IP6X the EUT will be examined externally for damage and any other alterations.

4.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

EUT	not in function
EUT position	horizontal lying
Test device	dip tank
Water depth	1 m
Boundary condition	the lowest point of the sample must be located 1m below the water surface
Water temperature	must not differ by more than 5 K from that of the sample
Test duration	30 min

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the immersion test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IPX7 the EUT will be examined externally for damage and any other alterations.

5 Realization

The tests for the ***degree of protection IP67*** for the two ***MK02/4-1A66C-500W,*** were carried out according to the test program (sections 4.1 to 4.3), in compliance with the specifications of the current standards and with the demands of the client.

Visual inspection
After the tests IP6X (substitute test with long term submersion) and IPX7 (immersion test), the specimens were examined for external damage and any other alterations.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
According to the demands of the client, the insulation resistances of the EUT were measured before and after the substitute test with long term submersion and the high pressure steam jets test.
For this, the following test setup was realized:

- two connecting lines were bridged with the shielded cable and measured against the sensor housing

The measurements were done with 500 VDC.

Acceptance criteria

The ***protection against access to hazardous parts IP6X*** is proven when a test wire (Ø 1 mm, force 1 N) cannot penetrate the housing of the specimen.

The ***protection against solid foreign objects IP6X (dust tight)*** is satisfactory, if at the end of the test no visible dust deposits are detected inside the housing of the specimen.

The ***protection against temporary immersion IPX7*** is considered proven if after the completion of the test no water has penetrated into the sample, or if it has it is in a quantity such that it does not impair the proper functioning or safety of the equipment.

Measurement and test devices

Name	Type	Serial No.	Maker	Remarks
Rigid IEC-steel wire	P 10.27	5011594	PTL	Access to hazardous parts test IP6KX
Dipping basin	-	-	AUCOTEAM	Substitute test for IP6X
Dip tank	TB 500L	-	AUCOTEAM	Immersion test IPX7
Portable compact tester	91-4A	0000035268	ELABO	Insulation resistance measurement

6 Results

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK02/4-1A66C-500W*** with

- ***Protection against access to hazardous parts*** ***IP6X***
- ***Protection against solid foreign objects*** ***IP6X***
- ***Protection against immersion*** ***IPX7***

neither mechanical damages nor any other changes of the specimen were determined.

6.1 Protection against access to hazardous parts IP6X

according to the IEC 60 529 § 13.2

The standardized test wire (Ø 1 mm, force 1 N) could not penetrate into the three housings.

6.2 Degrees of protection test IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IP6X	Insulation resistance after the test IP6X	Results
#1.1	533 V DC > 999,99 MOhm	533 V DC > 999,99 MOhm	**OK**
#1.2	537 V DC > 999,99 MOhm	536 V DC > 999,99 MOhm	**OK**

6.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IPX7	Insulation resistance after the test IPX7	Results
#1.1	533 V DC > 999,99 MOhm	535 V DC > 999,99 MOhm	**OK**
#1.2	536 V DC > 999,99 MOhm	532 V DC > 999,99 MOhm	**OK**

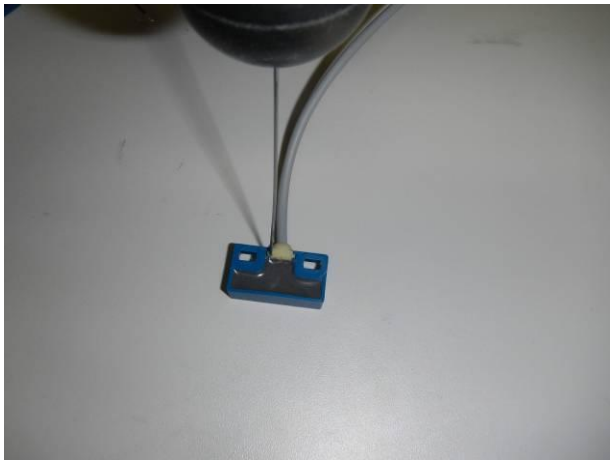
The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

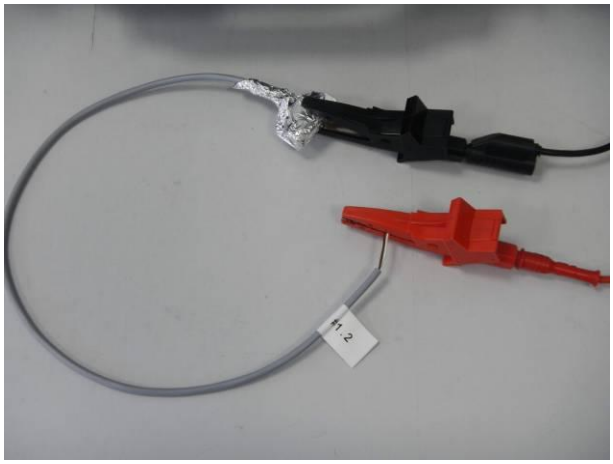
Pictures

picture 1
MK02/4-1A66C-500W - #1.1 and #1.2
with test wire (Ø 1 mm, 1N)
before the protection against hazardous parts IP6X



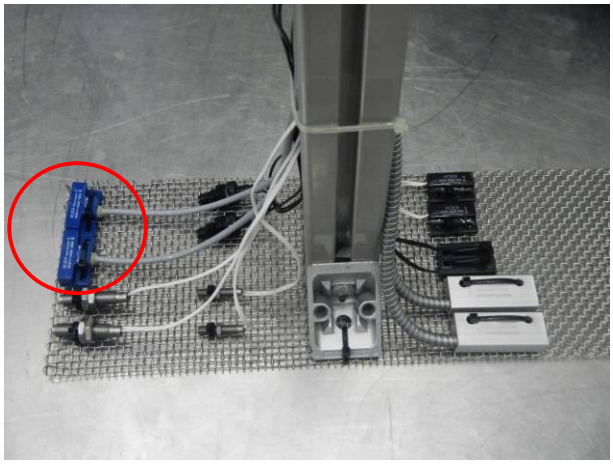
picture 2
MK02/4-1A66C-500W
with test wire (Ø 1 mm, 1N) on the EUT (#1.1)
during the protection against hazardous parts IP6X

picture 3
MK02/4-1A66C-500W - #1.1
during the insulation resistance measurement
before and after the tests IP6X and IPX7



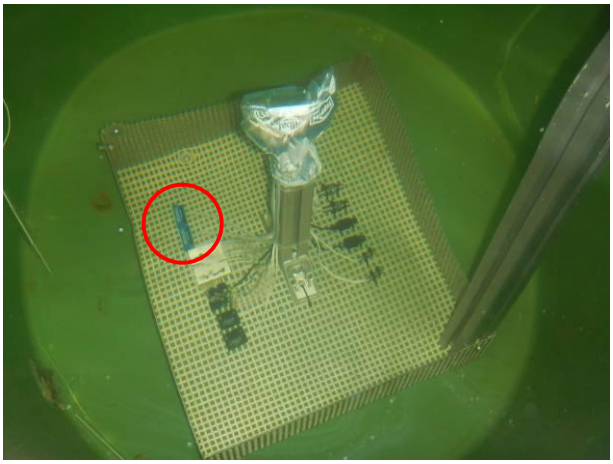
picture 4
MK02/4-1A66C-500W - #1.2
during the insulation resistance measurement
before and after the tests IP6X and IPX7

picture 5
MK02/4-1A66C-500W - #1.1 and #1.2
in the dip tank at a depth of 20 cm
during the test IP6X (substitute test)

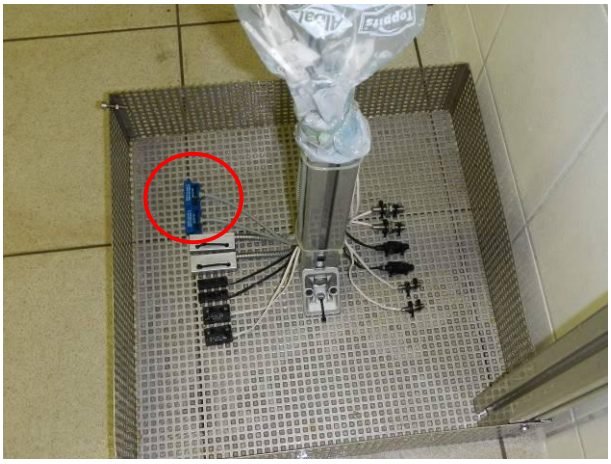


picture 6
MK02/4-1A66C-500W - #1.1 and #1.2
without visible external damage
after the test IP6X (substitute test)

Picture 7
MK02/4-1A66C-500W - #1.1 and #1.2
mounted on a test frame
after the immersion test IPX7



Picture 8
MK02/4-1A66C-500W - #1.1 and #1.2
in the dip tank at a depth of 1 m
after the immersion test IPX7



Picture 9
MK02/4-1A66C-500W - #1.1 and #1.2
mounted on a test frame
after the immersion test IPX7

Picture 10
MK02/4-1A66C-500W - #1.1 and #1.2
without visible external damage
after the immersion test IPX7

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Testing laboratory for climatic, mechanical
and corrosive environmental stress

DAP-PL-3439.00

CERTIFICATE of QUALITY TEST

Test report - No. 9790.04 / 13

Client	**MEDER electronic AG** Robert-Bosch-Straße 4 78244 Singen		
Equipment under test	**MK11-1A66B-500W**		
	Art.-No.	9112661054	
	Date	13.03.2013	
	Quantity	2 Samples (#4.1 and #4.2)	
Purpose	***Tests for the certification of the degree of protection IP67 according to the standards and to the demands of the client.***		
Test program	***Protection against access to hazardous parts***	***IP6X***	*according to the IEC 60529*
	Protection against solid foreign objects	***IP6X***	*according to the IEC 60529*
	Protection against immersion	***IPX7***	*according to the IEC 60529*
Test period	03 April to 05 April 2013		
Realization / results	see page 2 to 4		
Total number of pages	6 (incl. 1 appendix)		

Test result

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

AUCOTEAM GmbH Berlin QUALITÄTSPRÜFUNG

Dipl.-Ing. R. Lein
Head of test lab / test manager

M.Eng. M. Sommerfeld
Test engineer

Berlin, 18 April 2013

1 Purpose

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK11-1A66B-500W*** were performed according to the specifications of the current standards and to the demands of the client.

2 Equipment under test (E.U.T.)

MK11-1A66B-500W

Art.-No.	9112661054
Date	13.03.2013
Quantity	2 Samples (#4.1 and #4.2)

3 Basics

3.1 Demands of the client

3.2 Used standards

IEC 60529:1989 + **A1**:1999 **DIN EN 60529; VDE 0470-1**:2000-09
„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 the IEC 60529 § 13.2

Before the dust test, the ***protection against access to hazardous parts IP6X*** shall be verified using a standardized wire. The access probe ∅ 1.0 mm (force 1 N) must not penetrate the housing at any point.

4.2 Degrees of protection tests IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

For the ***dust test IP6X*** the standard demands the use of vacuum. If no vacuum can be applied, because the EUT is a one piece cast, the VDE states that the substitute water test with a subsequent insulation measurement test can be performed instead.

EUT	not in function
EUT position	horizontal lying

Substitute water test for coated /cast specimens
The EUT will be placed in water for approx. 24 h at a depth of 20 cm. If after the test the insulation resistance remains unchanged, then the form closure of the casting compound is rendered. It can be then assumed that dust with vacuum would not be able to penetrate the specimen.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the high pressure steam jets test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IP6X the EUT will be examined externally for damage and any other alterations.

4.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

EUT	not in function
EUT position	horizontal lying
Test device	dip tank
Water depth	1 m
Boundary condition	the lowest point of the sample must be located 1m below the water surface
Water temperature	must not differ by more than 5 K from that of the sample
Test duration	30 min

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the immersion test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IPX7 the EUT will be examined externally for damage and any other alterations.

5 Realization

The tests for the ***degree of protection IP67*** for the two ***MK11-1A66B-500W,*** were carried out according to the test program (sections 4.1 to 4.3), in compliance with the specifications of the current standards and with the demands of the client.

Visual inspection
After the tests IP6X (substitute test with long term submersion) and IPX7 (immersion test), the specimens were examined for external damage and any other alterations.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
According to the demands of the client, the insulation resistances of the EUT were measured before and after the substitute test with long term submersion and the high pressure steam jets test.
For this, the following test setup was realized:

- two connecting lines were bridged with the shielded cable and measured against the sensor housing

The measurements were done with 500 VDC.

Acceptance criteria

The ***protection against access to hazardous parts IP6X*** is proven when a test wire (Ø 1 mm, force 1 N) cannot penetrate the housing of the specimen.

The ***protection against solid foreign objects IP6X (dust tight)*** is satisfactory, if at the end of the test no visible dust deposits are detected inside the housing of the specimen.

The ***protection against temporary immersion IPX7*** is considered proven if after the completion of the test no water has penetrated into the sample, or if it has it is in a quantity such that it does not impair the proper functioning or safety of the equipment.

Measurement and test devices

Name	Type	Serial No.	Maker	Remarks
Rigid IEC-steel wire	P 10.27	5011594	PTL	Access to hazardous parts test IP6KX
Dipping basin	-	-	AUCOTEAM	Substitute test for IP6X
Dip tank	TB 500L	-	AUCOTEAM	Immersion test IPX7
Portable compact tester	91-4A	0000035268	ELABO	Insulation resistance measurement

6 Results

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK11-1A66B-500W*** with

- ***Protection against access to hazardous parts*** ***IP6X***
- ***Protection against solid foreign objects*** ***IP6X***
- ***Protection against immersion*** ***IPX7***

neither mechanical damages nor any other changes of the specimen were determined.

6.1 Protection against access to hazardous parts IP6X

according to the IEC 60 529 § 13.2

The standardized test wire (Ø 1 mm, force 1 N) could not penetrate into the three housings.

6.2 Degrees of protection test IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IP6X	Insulation resistance after the test IP6X	Results
#4.1	536 V DC > 999,99 MOhm	536 V DC > 999,99 MOhm	**OK**
#4.2	535 V DC > 999,99 MOhm	533 V DC > 999,99 MOhm	**OK**

6.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

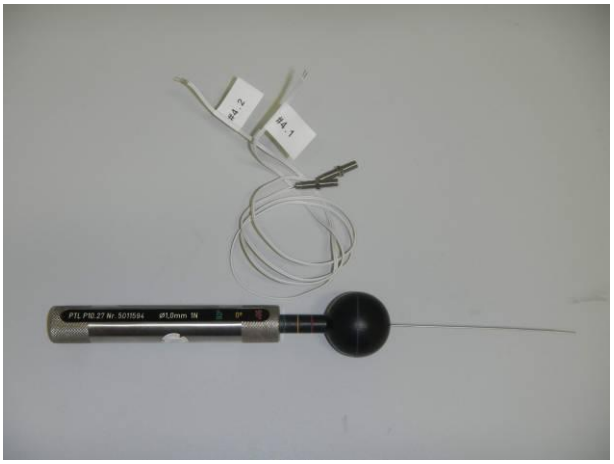
EUT No.	Insulation resistance before the test IPX7	Insulation resistance after the test IPX7	Results
#4.1	536 V DC > 999,99 MOhm	533 V DC > 999,99 MOhm	**OK**
#4.2	533 V DC > 999,99 MOhm	533 V DC > 999,99 MOhm	**OK**

The tests were carried out according to the specifications of the standards and to the demands of the client.

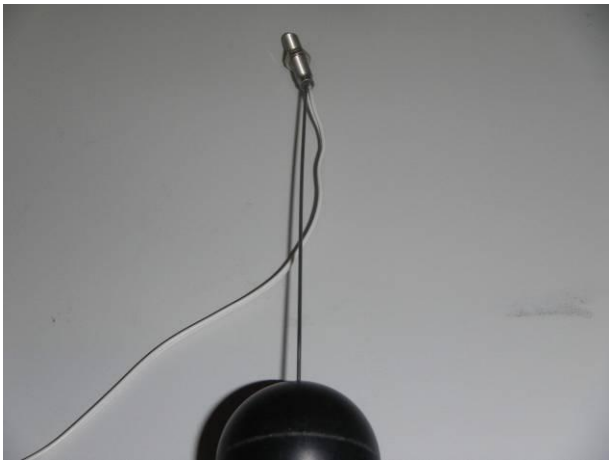
The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

Pictures

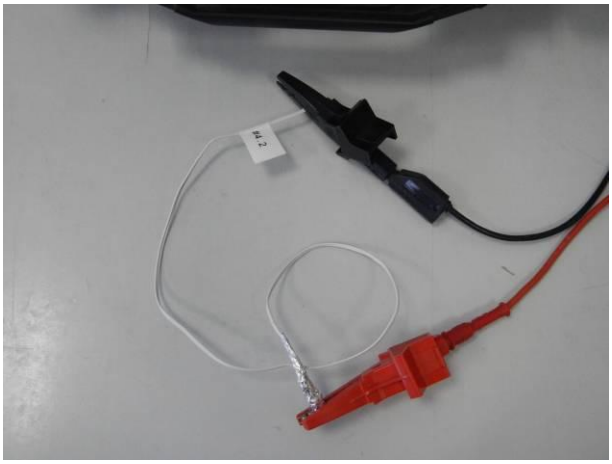


picture 1
MK11-1A66B-500W - #4.1 and #4.2
with test wire (Ø 1 mm, 1N)
before the protection against hazardous parts IP6X

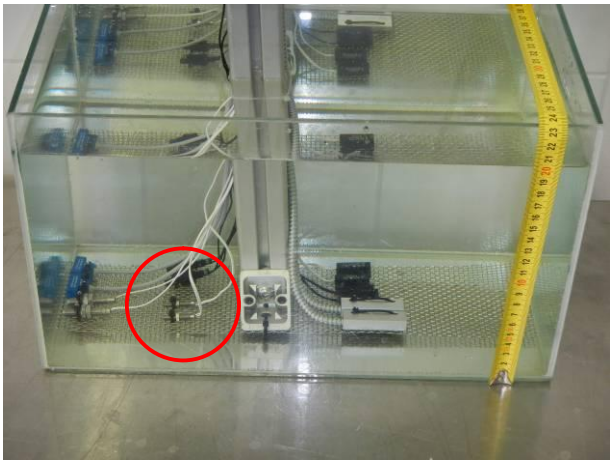


picture 2
MK11-1A66B-500W
with test wire (Ø 1 mm, 1N) on the EUT (#4.1)
during the protection against hazardous parts IP6X

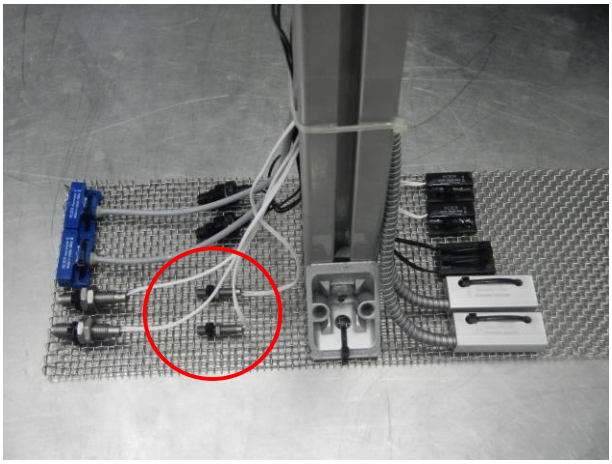
picture 3
MK11-1A66B-500W - #4.1
during the insulation resistance measurement
before and after the tests IP6X and IPX7



picture 4
MK11-1A66B-500W - #4.2
during the insulation resistance measurement
before and after the tests IP6X and IPX7

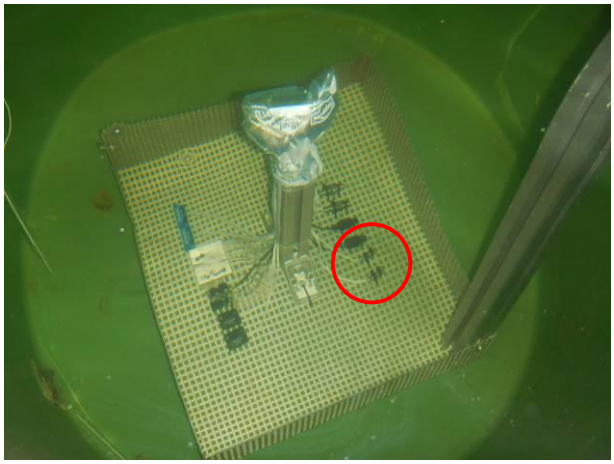


picture 5
MK11-1A66B-500W - #4.1 and #4.2
in the dip tank at a depth of 20 cm
during the test IP6X (substitute test)

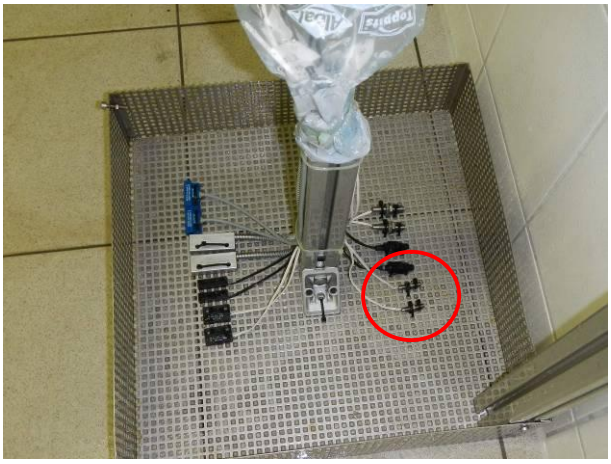


picture 6
MK11-1A66B-500W - #4.1 and #4.2
without visible external damage
after the test IP6X (substitute test)

Picture 7
MK11-1A66B-500W - #4.1 and #4.2
mounted on a test frame
after the immersion test IPX7



Picture 8
MK11-1A66B-500W - #4.1 and #4.2
in the dip tank at a depth of 1 m
after the immersion test IPX7



Picture 9
MK11-1A66B-500W - #4.1 and #4.2
mounted on a test frame
after the immersion test IPX7

Picture 10
MK11-1A66B-500W - #4.1 and #4.2
without visible external damage
after the immersion test IPX7

AUCOTEAM
INGENIEURGESELLSCHAFT FÜR AUTOMATISIERUNGS- UND COMPUTERTECHNIK BERLIN

Testing laboratory for climatic, mechanical
and corrosive environmental stress

DAP-PL-3439.00

CERTIFICATE of QUALITY TEST

Test report - No. 9790.03 / 13

Client	**MEDER electronic AG** Robert-Bosch-Straße 4 78244 Singen		
Equipment under test	**MK11/M8-1A66B-500W**		
	Art.-No.	9118266054	
	Date	13.03.2013	
	Quantity	2 Samples (#3.1 and #3.2)	
Purpose	***Tests for the certification of the degree of protection IP67 according to the standards and to the demands of the client.***		
Test program	***Protection against access to hazardous parts***	***IP6X***	*according to the IEC 60529*
	Protection against solid foreign objects	***IP6X***	*according to the IEC 60529*
	Protection against immersion	***IPX7***	*according to the IEC 60529*
Test period	03 April to 05 April 2013		
Realization / results	see page 2 to 4		
Total number of pages	6 (incl. 1 appendix)		

Test result

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

AUCOTEAM GmbH Berlin QUALITÄTSPRÜFUNG

Dipl.-Ing. R. Lein
Head of test lab / test manager

M.Eng. M. Sommerfeld
Test engineer

Berlin, 18 April 2013

1 Purpose

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK11/M8-1A66B-500W*** were performed according to the specifications of the current standards and to the demands of the client.

2 Equipment under test (E.U.T.)

MK11/M8-1A66B-500W

Art.-No.	9118266054
Date	13.03.2013
Quantity	2 Samples (#3.1 and #3.2)

3 Basics

3.1 Demands of the client

3.2 Used standards

IEC 60529:1989 + **A1**:1999 **DIN EN 60529; VDE 0470-1**:2000-09
„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 the IEC 60529 § 13.2

Before the dust test, the ***protection against access to hazardous parts IP6X*** shall be verified using a standardized wire. The access probe ∅ 1.0 mm (force 1 N) must not penetrate the housing at any point.

4.2 Degrees of protection tests IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

For the ***dust test IP6X*** the standard demands the use of vacuum. If no vacuum can be applied, because the EUT is a one piece cast, the VDE states that the substitute water test with a subsequent insulation measurement test can be performed instead.

EUT	not in function
EUT position	horizontal lying

Substitute water test for coated /cast specimens
The EUT will be placed in water for approx. 24 h at a depth of 20 cm. If after the test the insulation resistance remains unchanged, then the form closure of the casting compound is rendered. It can be then assumed that dust with vacuum would not be able to penetrate the specimen.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the high pressure steam jets test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IP6X the EUT will be examined externally for damage and any other alterations.

4.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

EUT	not in function
EUT position	horizontal lying
Test device	dip tank
Water depth	1 m
Boundary condition	the lowest point of the sample must be located 1m below the water surface
Water temperature	must not differ by more than 5 K from that of the sample
Test duration	30 min

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the immersion test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IPX7 the EUT will be examined externally for damage and any other alterations.

5 Realization

The tests for the ***degree of protection IP67*** for the two ***MK11/M8-1A66B-500W,*** were carried out according to the test program (sections 4.1 to 4.3), in compliance with the specifications of the current standards and with the demands of the client.

Visual inspection
After the tests IP6X (substitute test with long term submersion) and IPX7 (immersion test), the specimens were examined for external damage and any other alterations.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
According to the demands of the client, the insulation resistances of the EUT were measured before and after the substitute test with long term submersion and the high pressure steam jets test.
For this, the following test setup was realized:

- two connecting lines were bridged with the shielded cable and measured against the sensor housing

The measurements were done with 500 VDC.

Acceptance criteria

The ***protection against access to hazardous parts IP6X*** is proven when a test wire (Ø 1 mm, force 1 N) cannot penetrate the housing of the specimen.

The ***protection against solid foreign objects IP6X (dust tight)*** is satisfactory, if at the end of the test no visible dust deposits are detected inside the housing of the specimen.

The ***protection against temporary immersion IPX7*** is considered proven if after the completion of the test no water has penetrated into the sample, or if it has it is in a quantity such that it does not impair the proper functioning or safety of the equipment.

Measurement and test devices

Name	Type	Serial No.	Maker	Remarks
Rigid IEC-steel wire	P 10.27	5011594	PTL	Access to hazardous parts test IP6KX
Dipping basin	-	-	AUCOTEAM	Substitute test for IP6X
Dip tank	TB 500L	-	AUCOTEAM	Immersion test IPX7
Portable compact tester	91-4A	0000035268	ELABO	Insulation resistance measurement

6 Results

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK11/M8-1A66B-500W*** with

- ***Protection against access to hazardous parts*** ***IP6X***
- ***Protection against solid foreign objects*** ***IP6X***
- ***Protection against immersion*** ***IPX7***

neither mechanical damages nor any other changes of the specimen were determined.

6.1 Protection against access to hazardous parts IP6X

according to the IEC 60 529 § 13.2

The standardized test wire (Ø 1 mm, force 1 N) could not penetrate into the three housings.

6.2 Degrees of protection test IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IP6X	Insulation resistance after the test IP6X	Results
#3.1	533 V DC > 999,99 MOhm	533 V DC > 999,99 MOhm	**OK**
#3.2	536 V DC > 999,99 MOhm	537 V DC > 999,99 MOhm	**OK**

6.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IPX7	Insulation resistance after the test IPX7	Results
#3.1	533 V DC > 999,99 MOhm	535 V DC > 999,99 MOhm	**OK**
#3.2	537 V DC > 999,99 MOhm	535 V DC > 999,99 MOhm	**OK**

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

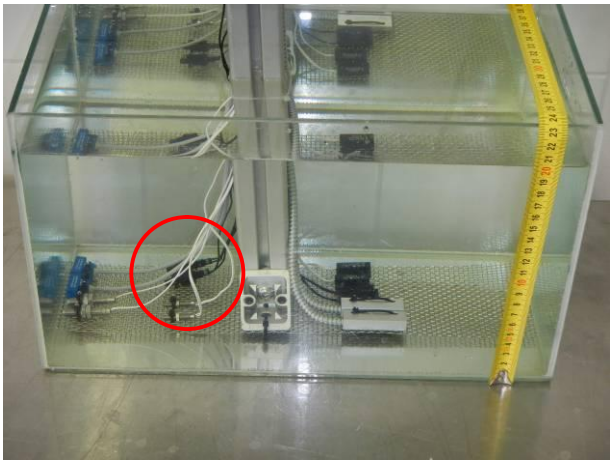
Pictures

picture 1
MK11/M8-1A66B-500W - #3.1 and #3.2
with test wire (Ø 1 mm, 1N)
before the protection against hazardous parts IP6X

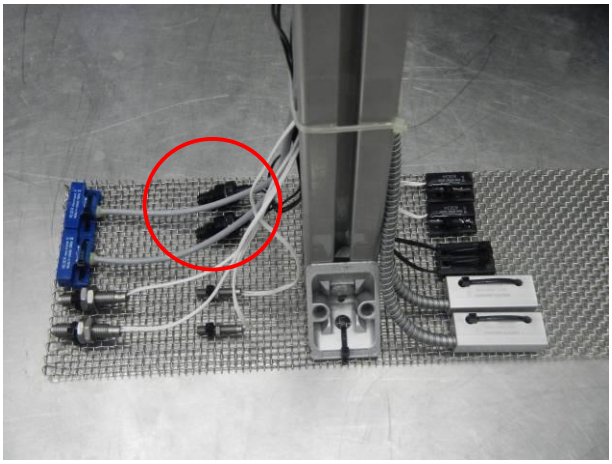
picture 2
MK11/M8-1A66B-500W
with test wire (Ø 1 mm, 1N) on the EUT (#3.1)
during the protection against hazardous parts IP6X

picture 3
MK11/M8-1A66B-500W - #3.1
during the insulation resistance measurement
before and after the tests IP6X and IPX7

picture 4
MK11/M8-1A66B-500W - #3.2
during the insulation resistance measurement
before and after the tests IP6X and IPX7

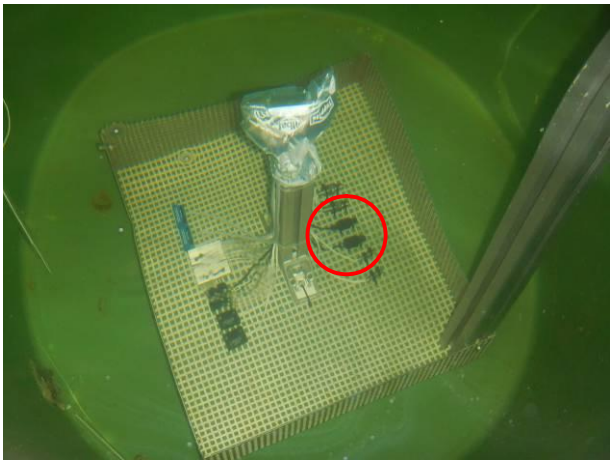


picture 5
MK11/M8-1A66B-500W - #3.1 and #3.2
in the dip tank at a depth of 20 cm
during the test IP6X (substitute test)



picture 6
MK11/M8-1A66B-500W - #3.1 and #3.2
without visible external damage
after the test IP6X (substitute test)

Picture 7
MK11/M8-1A66B-500W - #3.1 and #3.2
mounted on a test frame
after the immersion test IPX7



Picture 8
MK11/M8-1A66B-500W - #3.1 and #3.2
in the dip tank at a depth of 1 m
after the immersion test IPX7

Picture 9
MK11/M8-1A66B-500W - #3.1 and #3.2
mounted on a test frame
after the immersion test IPX7

Picture 10
MK11/M8-1A66B-500W - #3.1 and #3.2
without visible external damage
after the immersion test IPX7

AUCOTEAM
INGENIEURGESELLSCHAFT FÜR AUTOMATISIERUNGS- UND COMPUTERTECHNIK BERLIN

Testing laboratory for climatic, mechanical
and corrosive environmental stress

DAP-PL-3439.00

CERTIFICATE of QUALITY TEST

Test report - No. 9790.02 / 13

Client	**MEDER electronic AG** Robert-Bosch-Straße 4 78244 Singen		
Equipment under test	**MK11/S8-1A66B-500W**		
	Art.-No.	9119266054	
	Date	13.03.2013	
	Quantity	2 Samples (#2.1 and #2.2)	
Purpose	***Tests for the certification of the degree of protection IP67 according to the standards and to the demands of the client.***		
Test program	***Protection against access to hazardous parts***	***IP6X***	*according to the IEC 60529*
	Protection against solid foreign objects	***IP6X***	*according to the IEC 60529*
	Protection against immersion	***IPX7***	*according to the IEC 60529*
Test period	03 April to 05 April 2013		
Realization / results	see page 2 to 4		
Total number of pages	6 (incl. 1 appendix)		

Test result

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

AUCOTEAM GmbH Berlin QUALITÄTSPRÜFUNG

Dipl.-Ing. R. Lein
Head of test lab / test manager

M.Eng. M. Sommerfeld
Test engineer

Berlin, 18 April 2013

1 Purpose

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK11/S8-1A66B-500W*** were performed according to the specifications of the current standards and to the demands of the client.

2 Equipment under test (E.U.T.)

MK11/S8-1A66B-500W

Art.-No.	9119266054
Date	13.03.2013
Quantity	2 Samples (#2.1 and #2.2)

3 Basics

3.1 Demands of the client

3.2 Used standards

IEC 60529:1989 + **A1**:1999 **DIN EN 60529; VDE 0470-1**:2000-09
„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 the IEC 60529 § 13.2

Before the dust test, the ***protection against access to hazardous parts IP6X*** shall be verified using a standardized wire. The access probe ∅ 1.0 mm (force 1 N) must not penetrate the housing at any point.

4.2 Degrees of protection tests IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

For the ***dust test IP6X*** the standard demands the use of vacuum. If no vacuum can be applied, because the EUT is a one piece cast, the VDE states that the substitute water test with a subsequent insulation measurement test can be performed instead.

EUT	not in function
EUT position	horizontal lying

Substitute water test for coated /cast specimens
The EUT will be placed in water for approx. 24 h at a depth of 20 cm. If after the test the insulation resistance remains unchanged, then the form closure of the casting compound is rendered. It can be then assumed that dust with vacuum would not be able to penetrate the specimen.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the high pressure steam jets test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IP6X the EUT will be examined externally for damage and any other alterations.

4.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

EUT	not in function
EUT position	horizontal lying
Test device	dip tank
Water depth	1 m
Boundary condition	the lowest point of the sample must be located 1m below the water surface
Water temperature	must not differ by more than 5 K from that of the sample
Test duration	30 min

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the immersion test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IPX7 the EUT will be examined externally for damage and any other alterations.

5 Realization

The tests for the ***degree of protection IP67*** for the two ***MK11/S8-1A66B-500W,*** were carried out according to the test program (sections 4.1 to 4.3), in compliance with the specifications of the current standards and with the demands of the client.

Visual inspection
After the tests IP6X (substitute test with long term submersion) and IPX7 (immersion test), the specimens were examined for external damage and any other alterations.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
According to the demands of the client, the insulation resistances of the EUT were measured before and after the substitute test with long term submersion and the high pressure steam jets test.
For this, the following test setup was realized:

- two connecting lines were bridged with the shielded cable and measured against the sensor housing

The measurements were done with 500 VDC.

Acceptance criteria

The ***protection against access to hazardous parts IP6X*** is proven when a test wire (Ø 1 mm, force 1 N) cannot penetrate the housing of the specimen.

The ***protection against solid foreign objects IP6X (dust tight)*** is satisfactory, if at the end of the test no visible dust deposits are detected inside the housing of the specimen.

The ***protection against temporary immersion IPX7*** is considered proven if after the completion of the test no water has penetrated into the sample, or if it has it is in a quantity such that it does not impair the proper functioning or safety of the equipment.

Measurement and test devices

Name	Type	Serial No.	Maker	Remarks
Rigid IEC-steel wire	P 10.27	5011594	PTL	Access to hazardous parts test IP6KX
Dipping basin	-	-	AUCOTEAM	Substitute test for IP6X
Dip tank	TB 500L	-	AUCOTEAM	Immersion test IPX7
Portable compact tester	91-4A	0000035268	ELABO	Insulation resistance measurement

6 Results

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK11/S8-1A66B-500W*** with

- ***Protection against access to hazardous parts*** ***IP6X***
- ***Protection against solid foreign objects*** ***IP6X***
- ***Protection against immersion*** ***IPX7***

neither mechanical damages nor any other changes of the specimen were determined.

6.1 Protection against access to hazardous parts IP6X

according to the IEC 60 529 § 13.2

The standardized test wire (Ø 1 mm, force 1 N) could not penetrate into the three housings.

6.2 Degrees of protection test IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IP6X	Insulation resistance after the test IP6X	Results
#2.1	537 V DC > 999,99 MOhm	535 V DC > 999,99 MOhm	**OK**
#2.2	535 V DC > 999,99 MOhm	539 V DC > 999,99 MOhm	**OK**

6.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IPX7	Insulation resistance after the test IPX7	Results
#2.1	535 V DC > 999,99 MOhm	533 V DC > 999,99 MOhm	**OK**
#2.2	539 V DC > 999,99 MOhm	535 V DC > 999,99 MOhm	**OK**

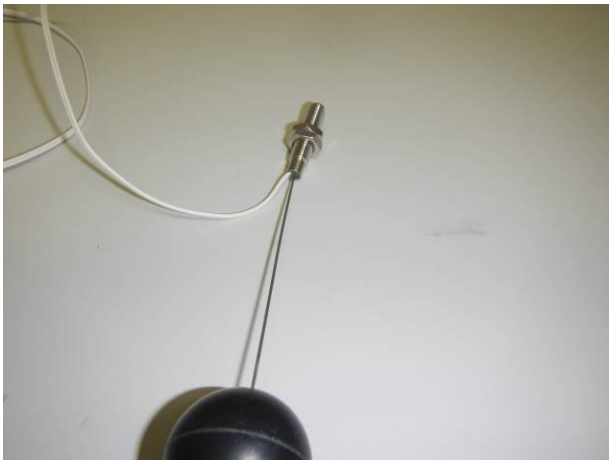
The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

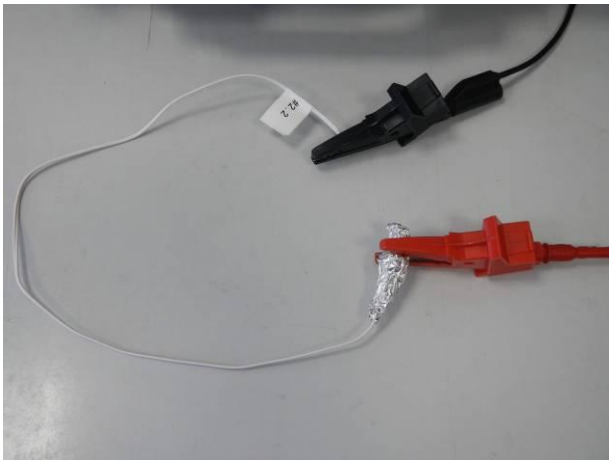
Pictures

picture 1
MK11/S8-1A66B-500W - #2.1 and #2.2
with test wire (Ø 1 mm, 1N)
before the protection against hazardous parts IP6X

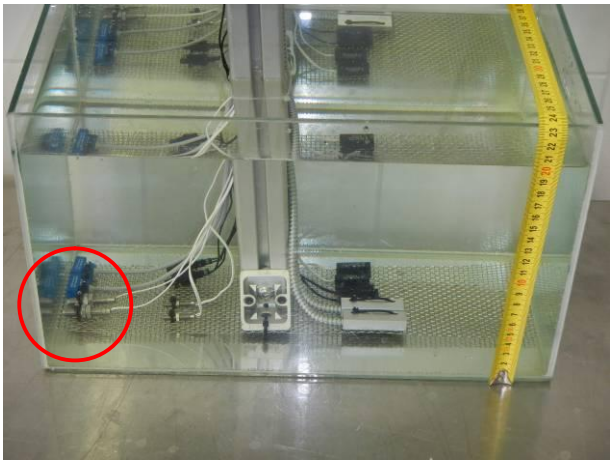


picture 2
MK11/S8-1A66B-500W
with test wire (Ø 1 mm, 1N) on the EUT (#2.1)
during the protection against hazardous parts IP6X

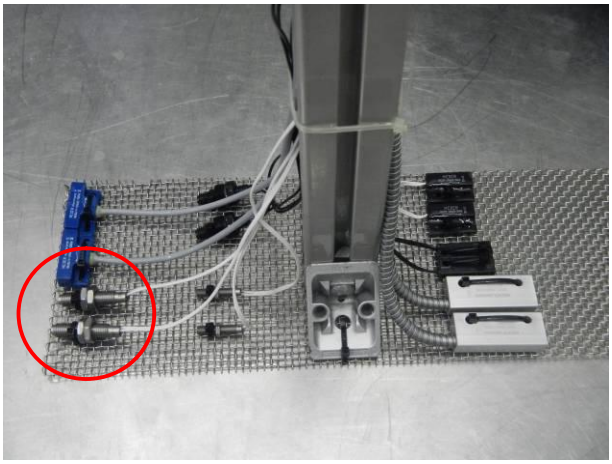
picture 3
MK11/S8-1A66B-500W - #2.1
during the insulation resistance measurement
before and after the tests IP6X and IPX7



picture 4
MK11/S8-1A66B-500W - #2.2
during the insulation resistance measurement
before and after the tests IP6X and IPX7

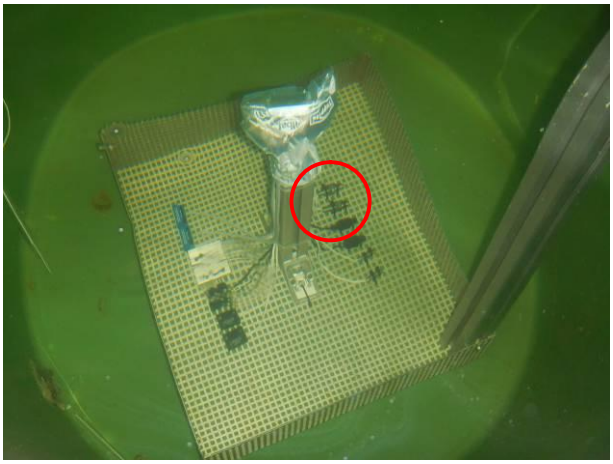


picture 5
MK11/S8-1A66B-500W - #2.1 and #2.2
in the dip tank at a depth of 20 cm
during the test IP6X (substitute test)

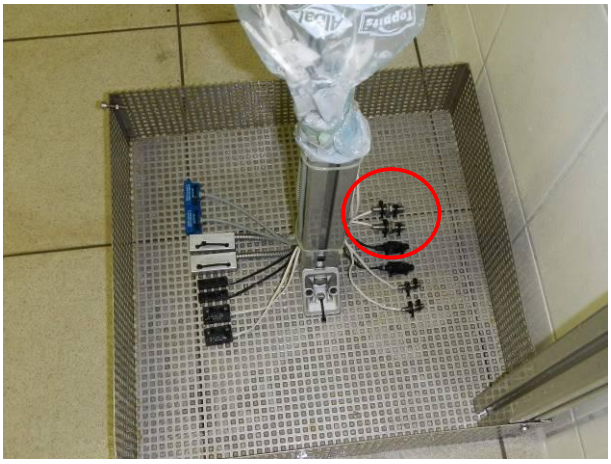


picture 6
MK11/S8-1A66B-500W - #2.1 and #2.2
without visible external damage
after the test IP6X (substitute test)

Picture 7
MK11/S8-1A66B-500W - #2.1 and #2.2
mounted on a test frame
after the immersion test IPX7



Picture 8
MK11/S8-1A66B-500W - #2.1 and #2.2
in the dip tank at a depth of 1 m
after the immersion test IPX7



Picture 9
MK11/S8-1A66B-500W - #2.1 and #2.2
mounted on a test frame
after the immersion test IPX7

Picture 10
MK11/S8-1A66B-500W - #2.1 and #2.2
without visible external damage
after the immersion test IPX7

AUCOTEAM
INGENIEURGESELLSCHAFT FÜR AUTOMATISIERUNGS- UND COMPUTERTECHNIK BERLIN

Testing laboratory for climatic, mechanical
and corrosive environmental stress

DAP-PL-3439.00

CERTIFICATE of QUALITY TEST

Test report - No. 9790.06 / 13

Client	**MEDER electronic AG** Robert-Bosch-Straße 4 78244 Singen		
Equipment under test	**MK21P-1A66B-500W**		
	Art.-No.	9212661054	
	Date	13.03.2013	
	Quantity	2 Samples (#6.1 and #6.2)	
Purpose	***Tests for the certification of the degree of protection IP67 according to the standards and to the demands of the client.***		
Test program	***Protection against access to hazardous parts***	***IP6X***	*according to the IEC 60529*
	Protection against solid foreign objects	***IP6X***	*according to the IEC 60529*
	Protection against immersion	***IPX7***	*according to the IEC 60529*
Test period	03 April to 05 April 2013		
Realization / results	see page 2 to 4		
Total number of pages	6 (incl. 1 appendix)		

Test result

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

AUCOTEAM GmbH Berlin QUALITÄTSPRÜFUNG

Dipl.-Ing. R. Lein
Head of test lab / test manager

M.Eng. M. Sommerfeld
Test engineer

Berlin, 18 April 2013

1 Purpose

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK21P-1A66B-500W*** were performed according to the specifications of the current standards and to the demands of the client.

2 Equipment under test (E.U.T.)

MK21P-1A66B-500W

Art.-No.	9212661054
Date	13.03.2013
Quantity	2 Samples (#6.1 and #6.2)

3 Basics

3.1 Demands of the client

3.2 Used standards

IEC 60529:1989 + **A1**:1999 **DIN EN 60529; VDE 0470-1**:2000-09
„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 the IEC 60529 § 13.2

Before the dust test, the ***protection against access to hazardous parts IP6X*** shall be verified using a standardized wire. The access probe ∅ 1.0 mm (force 1 N) must not penetrate the housing at any point.

4.2 Degrees of protection tests IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

For the ***dust test IP6X*** the standard demands the use of vacuum. If no vacuum can be applied, because the EUT is a one piece cast, the VDE states that the substitute water test with a subsequent insulation measurement test can be performed instead.

EUT	not in function
EUT position	horizontal lying

Substitute water test for coated /cast specimens
The EUT will be placed in water for approx. 24 h at a depth of 20 cm. If after the test the insulation resistance remains unchanged, then the form closure of the casting compound is rendered. It can be then assumed that dust with vacuum would not be able to penetrate the specimen.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the high pressure steam jets test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IP6X the EUT will be examined externally for damage and any other alterations.

4.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

EUT	not in function
EUT position	horizontal lying
Test device	dip tank
Water depth	1 m
Boundary condition	the lowest point of the sample must be located 1m below the water surface
Water temperature	must not differ by more than 5 K from that of the sample
Test duration	30 min

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the immersion test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IPX7 the EUT will be examined externally for damage and any other alterations.

5 Realization

The tests for the ***degree of protection IP67*** for the two ***MK21P-1A66B-500W,*** were carried out according to the test program (sections 4.1 to 4.3), in compliance with the specifications of the current standards and with the demands of the client.

Visual inspection
After the tests IP6X (substitute test with long term submersion) and IPX7 (immersion test), the specimens were examined for external damage and any other alterations.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
According to the demands of the client, the insulation resistances of the EUT were measured before and after the substitute test with long term submersion and the high pressure steam jets test.
For this, the following test setup was realized:

- two connecting lines were bridged with the shielded cable and measured against the sensor housing

The measurements were done with 500 VDC.

Acceptance criteria

The ***protection against access to hazardous parts IP6X*** is proven when a test wire (Ø 1 mm, force 1 N) cannot penetrate the housing of the specimen.

The ***protection against solid foreign objects IP6X (dust tight)*** is satisfactory, if at the end of the test no visible dust deposits are detected inside the housing of the specimen.

The ***protection against temporary immersion IPX7*** is considered proven if after the completion of the test no water has penetrated into the sample, or if it has it is in a quantity such that it does not impair the proper functioning or safety of the equipment.

Measurement and test devices

Name	Type	Serial No.	Maker	Remarks
Rigid IEC-steel wire	P 10.27	5011594	PTL	Access to hazardous parts test IP6KX
Dipping basin	-	-	AUCOTEAM	Substitute test for IP6X
Dip tank	TB 500L	-	AUCOTEAM	Immersion test IPX7
Portable compact tester	91-4A	0000035268	ELABO	Insulation resistance measurement

6 Results

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK21P-1A66B-500W*** with

- ***Protection against access to hazardous parts*** ***IP6X***
- ***Protection against solid foreign objects*** ***IP6X***
- ***Protection against immersion*** ***IPX7***

neither mechanical damages nor any other changes of the specimen were determined.

6.1 Protection against access to hazardous parts IP6X

according to the IEC 60 529 § 13.2

The standardized test wire (Ø 1 mm, force 1 N) could not penetrate into the three housings.

6.2 Degrees of protection test IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IP6X	Insulation resistance after the test IP6X	Results
#6.1	533 V DC > 999,99 MOhm	537 V DC > 999,99 MOhm	**OK**
#6.2	536 V DC > 999,99 MOhm	535 V DC > 999,99 MOhm	**OK**

6.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IPX7	Insulation resistance after the test IPX7	Results
#6.1	537 V DC > 999,99 MOhm	536 V DC > 999,99 MOhm	**OK**
#6.2	535 V DC > 999,99 MOhm	536 V DC > 999,99 MOhm	**OK**

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

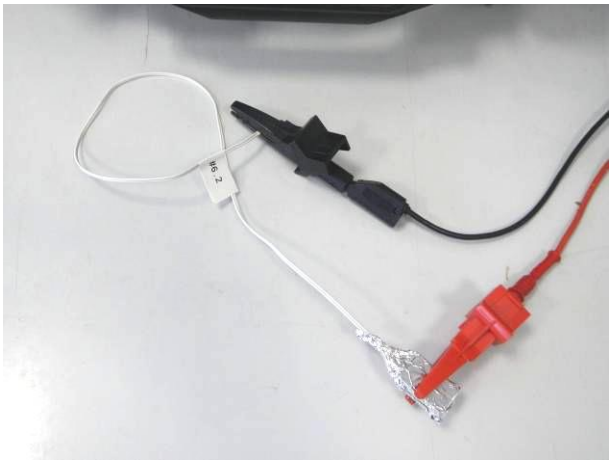
The further evaluation will be done by the client.

Pictures

picture 1
MK21P-1A66B-500W - #6.1 and #6.2
with test wire (Ø 1 mm, 1N)
before the protection against hazardous parts IP6X

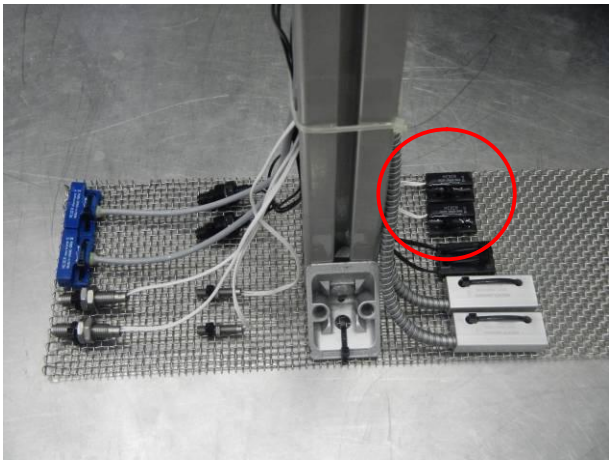
picture 2
MK21P-1A66B-500W
with test wire (Ø 1 mm, 1N) on the EUT (#6.1)
during the protection against hazardous parts IP6X

picture 3
MK21P-1A66B-500W - #6.1
during the insulation resistance measurement
before and after the tests IP6X and IPX7



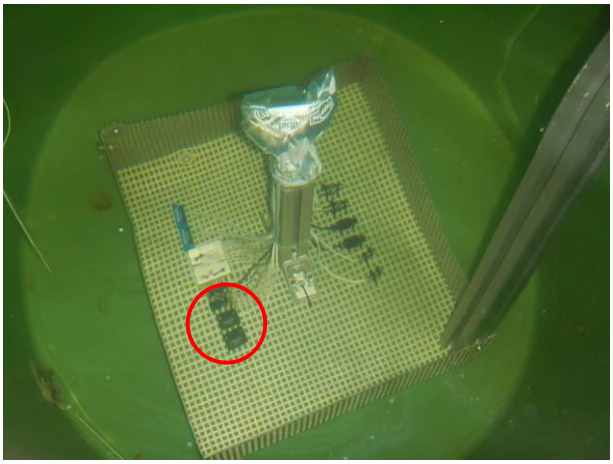
picture 4
MK21P-1A66B-500W - #6.2
during the insulation resistance measurement
before and after the tests IP6X and IPX7

picture 5
MK21P-1A66B-500W - #6.1 and #6.2
in the dip tank at a depth of 20 cm
during the test IP6X (substitute test)

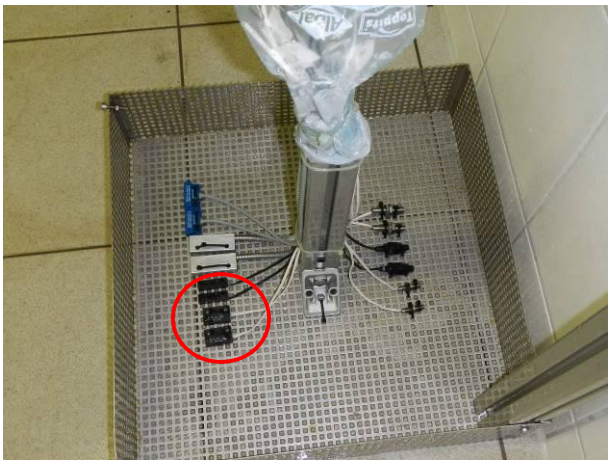


picture 6
MK21P-1A66B-500W - #6.1 and #6.2
without visible external damage
after the test IP6X (substitute test)

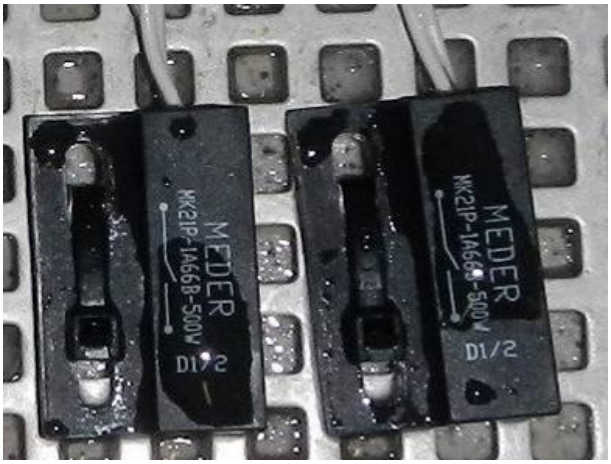
Picture 7
MK21P-1A66B-500W - #6.1 and #6.2
mounted on a test frame
after the immersion test IPX7



Picture 8
MK21P-1A66B-500W - #6.1 and #6.2
in the dip tank at a depth of 1 m
after the immersion test IPX7



Picture 9
MK21P-1A66B-500W - #6.1 and #6.2
mounted on a test frame
after the immersion test IPX7



Picture 10
MK21P-1A66B-500W - #6.1 and #6.2
without visible external damage
after the immersion test IPX7

AUCOTEAM
INGENIEURGESELLSCHAFT FÜR AUTOMATISIERUNGS- UND COMPUTERTECHNIK BERLIN

Testing laboratory for climatic, mechanical
and corrosive environmental stress

Deutscher Akkreditierungs Rat DAR
DAP-PL-3439.00

CERTIFICATE of QUALITY TEST

Test report - No. 9790.05 / 13

Client	**MEDER electronic AG** Robert-Bosch-Straße 4 78244 Singen		
Equipment under test	**MK26-1A66B-500W**		
	Art.-No.	926266054	
	Date	13.03.2013	
	Quantity	2 Samples (#5.1 and #5.2)	
Purpose	***Tests for the certification of the degree of protection IP67 according to the standards and to the demands of the client.***		
Test program	***Protection against access to hazardous parts***	***IP6X***	*according to the IEC 60529*
	Protection against solid foreign objects	***IP6X***	*according to the IEC 60529*
	Protection against immersion	***IPX7***	*according to the IEC 60529*
Test period	03 April to 05 April 2013		
Realization / results	see page 2 to 4		
Total number of pages	6 (incl. 1 appendix)		

Test result

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

AUCOTEAM GmbH Berlin QUALITÄTSPRÜFUNG

Dipl.-Ing. R. Lein
Head of test lab / test manager

M.Eng. M. Sommerfeld
Test engineer

Berlin, 18 April 2013

1 Purpose

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK26-1A66B-500W*** were performed according to the specifications of the current standards and to the demands of the client.

2 Equipment under test (E.U.T.)

MK26-1A66B-500W

Art.-No.	926266054
Date	13.03.2013
Quantity	2 Samples (#5.1 and #5.2)

3 Basics

3.1 Demands of the client

3.2 Used standards

IEC 60529:1989 + **A1**:1999 **DIN EN 60529; VDE 0470-1**:2000-09
„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 the IEC 60529 § 13.2

Before the dust test, the ***protection against access to hazardous parts IP6X*** shall be verified using a standardized wire. The access probe ∅ 1.0 mm (force 1 N) must not penetrate the housing at any point.

4.2 Degrees of protection tests IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

For the ***dust test IP6X*** the standard demands the use of vacuum. If no vacuum can be applied, because the EUT is a one piece cast, the VDE states that the substitute water test with a subsequent insulation measurement test can be performed instead.

EUT	not in function
EUT position	horizontal lying

Substitute water test for coated /cast specimens
The EUT will be placed in water for approx. 24 h at a depth of 20 cm. If after the test the insulation resistance remains unchanged, then the form closure of the casting compound is rendered. It can be then assumed that dust with vacuum would not be able to penetrate the specimen.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the high pressure steam jets test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IP6X the EUT will be examined externally for damage and any other alterations.

4.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

EUT	not in function
EUT position	horizontal lying
Test device	dip tank
Water depth	1 m
Boundary condition	the lowest point of the sample must be located 1m below the water surface
Water temperature	must not differ by more than 5 K from that of the sample
Test duration	30 min

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the immersion test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IPX7 the EUT will be examined externally for damage and any other alterations.

5 Realization

The tests for the ***degree of protection IP67*** for the two ***MK26-1A66B-500W,*** were carried out according to the test program (sections 4.1 to 4.3), in compliance with the specifications of the current standards and with the demands of the client.

Visual inspection
After the tests IP6X (substitute test with long term submersion) and IPX7 (immersion test), the specimens were examined for external damage and any other alterations.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
According to the demands of the client, the insulation resistances of the EUT were measured before and after the substitute test with long term submersion and the high pressure steam jets test.
For this, the following test setup was realized:

- two connecting lines were bridged with the shielded cable and measured against the sensor housing

The measurements were done with 500 VDC.

Acceptance criteria

The ***protection against access to hazardous parts IP6X*** is proven when a test wire (Ø 1 mm, force 1 N) cannot penetrate the housing of the specimen.

The ***protection against solid foreign objects IP6X (dust tight)*** is satisfactory, if at the end of the test no visible dust deposits are detected inside the housing of the specimen.

The ***protection against temporary immersion IPX7*** is considered proven if after the completion of the test no water has penetrated into the sample, or if it has it is in a quantity such that it does not impair the proper functioning or safety of the equipment.

Measurement and test devices

Name	Type	Serial No.	Maker	Remarks
Rigid IEC-steel wire	P 10.27	5011594	PTL	Access to hazardous parts test IP6KX
Dipping basin	-	-	AUCOTEAM	Substitute test for IP6X
Dip tank	TB 500L	-	AUCOTEAM	Immersion test IPX7
Portable compact tester	91-4A	0000035268	ELABO	Insulation resistance measurement

6 Results

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK26-1A66B-500W*** with

- ***Protection against access to hazardous parts*** ***IP6X***
- ***Protection against solid foreign objects*** ***IP6X***
- ***Protection against immersion*** ***IPX7***

neither mechanical damages nor any other changes of the specimen were determined.

6.1 Protection against access to hazardous parts IP6X

according to the IEC 60 529 § 13.2

The standardized test wire (Ø 1 mm, force 1 N) could not penetrate into the three housings.

6.2 Degrees of protection test IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IP6X	Insulation resistance after the test IP6X	Results
#5.1	536 V DC > 999,99 MOhm	536 V DC > 999,99 MOhm	**OK**
#5.2	533 V DC > 999,99 MOhm	539 V DC > 999,99 MOhm	**OK**

6.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IPX7	Insulation resistance after the test IPX7	Results
#5.1	536 V DC > 999,99 MOhm	536 V DC > 999,99 MOhm	**OK**
#5.2	539 V DC > 999,99 MOhm	533 V DC > 999,99 MOhm	**OK**

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

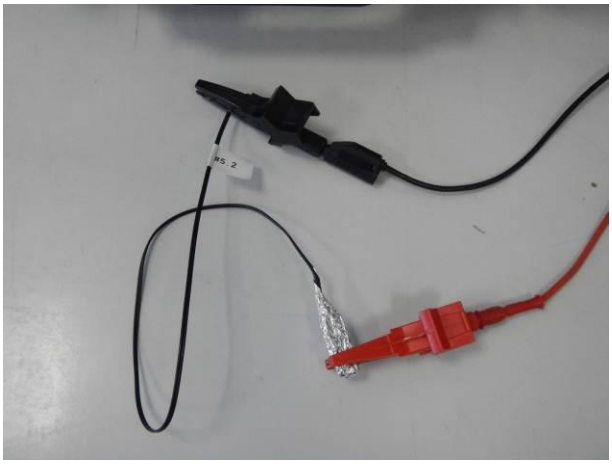
The further evaluation will be done by the client.

Pictures

picture 1
MK26-1A66B-500W - #5.1 and #5.2
with test wire (Ø 1 mm, 1N)
before the protection against hazardous parts IP6X

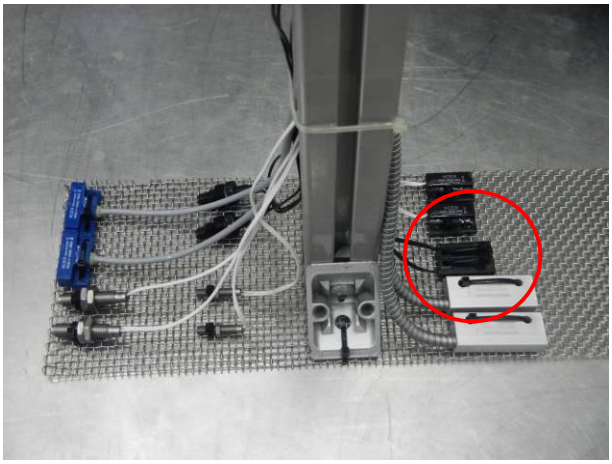
picture 2
MK26-1A66B-500W
with test wire (Ø 1 mm, 1N) on the EUT (#5.1)
during the protection against hazardous parts IP6X

picture 3
MK26-1A66B-500W - #5.1
during the insulation resistance measurement
before and after the tests IP6X and IPX7



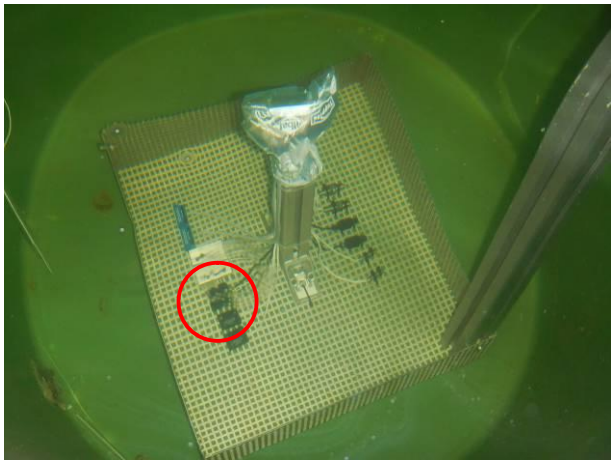
picture 4
MK26-1A66B-500W - #5.2
during the insulation resistance measurement
before and after the tests IP6X and IPX7

picture 5
MK26-1A66B-500W - #5.1 and #5.2
in the dip tank at a depth of 20 cm
during the test IP6X (substitute test)

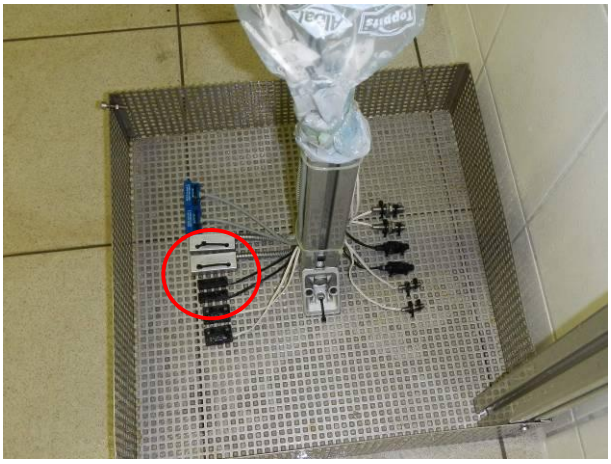


picture 6
MK26-1A66B-500W - #5.1 and #5.2
without visible external damage
after the test IP6X (substitute test)

Picture 7
MK26-1A66B-500W - #5.1 and #5.2
mounted on a test frame
after the immersion test IPX7



Picture 8
MK26-1A66B-500W - #5.1 and #5.2
in the dip tank at a depth of 1 m
after the immersion test IPX7



Picture 9
MK26-1A66B-500W - #5.1 and #5.2
mounted on a test frame
after the immersion test IPX7

Picture 10
MK26-1A66B-500W - #5.1 and #5.2
without visible external damage
after the immersion test IPX7

AUCOTEAM
INGENIEURGESELLSCHAFT FÜR AUTOMATISIERUNGS- UND COMPUTERTECHNIK BERLIN

Testing laboratory for climatic, mechanical
and corrosive environmental stress

DAP-PL-3439.00

CERTIFICATE of QUALITY TEST

Test report - No. 9790.07 / 13

Client	**MEDER electronic AG** Robert-Bosch-Straße 4 78244 Singen		
Equipment under test	**MK27-1A66B-500W**		
	Art.-No.	927266054	
	Date	26.03.2013	
	Quantity	2 Samples (#7.1 and #7.2)	
Purpose	***Tests for the certification of the degree of protection IP67 according to the standards and to the demands of the client.***		
Test program	***Protection against access to hazardous parts***	***IP6X***	*according to the IEC 60529*
	Protection against solid foreign objects	***IP6X***	*according to the IEC 60529*
	Protection against immersion	***IPX7***	*according to the IEC 60529*
Test period	03 April to 05 April 2013		
Realization / results	see page 2 to 4		
Total number of pages	6 (incl. 1 appendix)		

Test result

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

AUCOTEAM GmbH Berlin QUALITÄTSPRÜFUNG

Dipl.-Ing. R. Lein
Head of test lab / test manager

M.Eng. M. Sommerfeld
Test engineer

Berlin, 18 April 2013

1 Purpose

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK27-1A66B-500W*** were performed according to the specifications of the current standards and to the demands of the client.

2 Equipment under test (E.U.T.)

MK27-1A66B-500W

Art.-No.	927266054
Date	26.03.2013
Quantity	2 Samples (#7.1 and #7.2)

3 Basics

3.1 Demands of the client

3.2 Used standards

IEC 60529:1989 + **A1**:1999 **DIN EN 60529; VDE 0470-1**:2000-09
„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 the IEC 60529 § 13.2

Before the dust test, the ***protection against access to hazardous parts IP6X*** shall be verified using a standardized wire. The access probe ∅ 1.0 mm (force 1 N) must not penetrate the housing at any point.

4.2 Degrees of protection tests IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

For the ***dust test IP6X*** the standard demands the use of vacuum. If no vacuum can be applied, because the EUT is a one piece cast, the VDE states that the substitute water test with a subsequent insulation measurement test can be performed instead.

EUT	not in function
EUT position	horizontal lying

Substitute water test for coated /cast specimens
The EUT will be placed in water for approx. 24 h at a depth of 20 cm. If after the test the insulation resistance remains unchanged, then the form closure of the casting compound is rendered. It can be then assumed that dust with vacuum would not be able to penetrate the specimen.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the high pressure steam jets test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IP6X the EUT will be examined externally for damage and any other alterations.

4.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

EUT	not in function
EUT position	horizontal lying
Test device	dip tank
Water depth	1 m
Boundary condition	the lowest point of the sample must be located 1m below the water surface
Water temperature	must not differ by more than 5 K from that of the sample
Test duration	30 min

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
Before and after the immersion test, the EUT will undergo an insulation resistance measurement according to the specifications of the client.

Visual inspection
After the test IPX7 the EUT will be examined externally for damage and any other alterations.

5 Realization

The tests for the ***degree of protection IP67*** for the two ***MK27-1A66B-500W,*** were carried out according to the test program (sections 4.1 to 4.3), in compliance with the specifications of the current standards and with the demands of the client.

Visual inspection
After the tests IP6X (substitute test with long term submersion) and IPX7 (immersion test), the specimens were examined for external damage and any other alterations.

Insulation resistance measurement (measurement parameters 500 V DC, 1 minute)
According to the demands of the client, the insulation resistances of the EUT were measured before and after the substitute test with long term submersion and the high pressure steam jets test.
For this, the following test setup was realized:

- two connecting lines were bridged with the shielded cable and measured against the sensor housing

The measurements were done with 500 VDC.

Acceptance criteria

The ***protection against access to hazardous parts IP6X*** is proven when a test wire (Ø 1 mm, force 1 N) cannot penetrate the housing of the specimen.

The ***protection against solid foreign objects IP6X (dust tight)*** is satisfactory, if at the end of the test no visible dust deposits are detected inside the housing of the specimen.

The ***protection against temporary immersion IPX7*** is considered proven if after the completion of the test no water has penetrated into the sample, or if it has it is in a quantity such that it does not impair the proper functioning or safety of the equipment.

Measurement and test devices

Name	Type	Serial No.	Maker	Remarks
Rigid IEC-steel wire	P 10.27	5011594	PTL	Access to hazardous parts test IP6KX
Dipping basin	-	-	AUCOTEAM	Substitute test for IP6X
Dip tank	TB 500L	-	AUCOTEAM	Immersion test IPX7
Portable compact tester	91-4A	0000035268	ELABO	Insulation resistance measurement

6 Results

The tests for the certification of the ***degrees of protection IP67*** for the two ***MK27-1A66B-500W*** with

- ***Protection against access to hazardous parts*** ***IP6X***
- ***Protection against solid foreign objects*** ***IP6X***
- ***Protection against immersion*** ***IPX7***

neither mechanical damages nor any other changes of the specimen were determined.

6.1 Protection against access to hazardous parts IP6X

according to the IEC 60 529 § 13.2

The standardized test wire (Ø 1 mm, force 1 N) could not penetrate into the three housings.

6.2 Degrees of protection test IP6X – Substitute test with long term submersion

according to the VDE-regulation and as agreed upon with the client

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

EUT No.	Insulation resistance before the test IP6X	Insulation resistance after the test IP6X	Results
#7.1	533 V DC > 999,99 MOhm	532 V DC > 999,99 MOhm	**OK**
#7.2	536 V DC > 999,99 MOhm	535 V DC > 999,99 MOhm	**OK**

6.3 Immersion test IPX7 (temporary submersion)

according to the IEC 60529 § 14.2.7

The insulation resistance of the specimens was unchanged after the test.

The following insulation resistance values were recorded before and after the water tightness test:

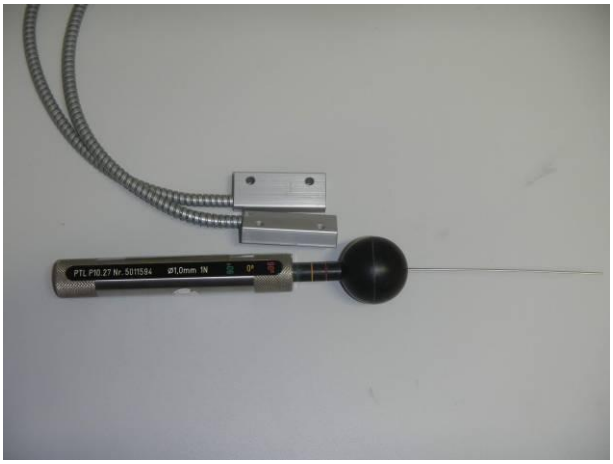
EUT No.	Insulation resistance before the test IPX7	Insulation resistance after the test IPX7	Results
#7.1	532 V DC > 999,99 MOhm	536 V DC > 999,99 MOhm	**OK**
#7.2	535 V DC > 999,99 MOhm	536 V DC > 999,99 MOhm	**OK**

The tests were carried out according to the specifications of the standards and to the demands of the client.

The insulation resistance of the specimens remained unchanged after the tests IP6X and IPX7.

The further evaluation will be done by the client.

Pictures



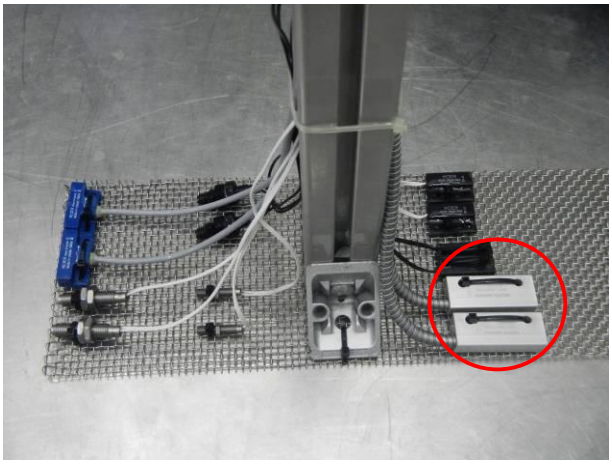
picture 1
MK27-1A66B-500W - #7.1 and #7.2
with test wire (Ø 1 mm, 1N)
before the protection against hazardous parts IP6X

picture 2
MK27-1A66B-500W
with test wire (Ø 1 mm, 1N) on the EUT (#7.1)
during the protection against hazardous parts IP6X

picture 3
MK27-1A66B-500W - #7.1
during the insulation resistance measurement
before and after the tests IP6X and IPX7

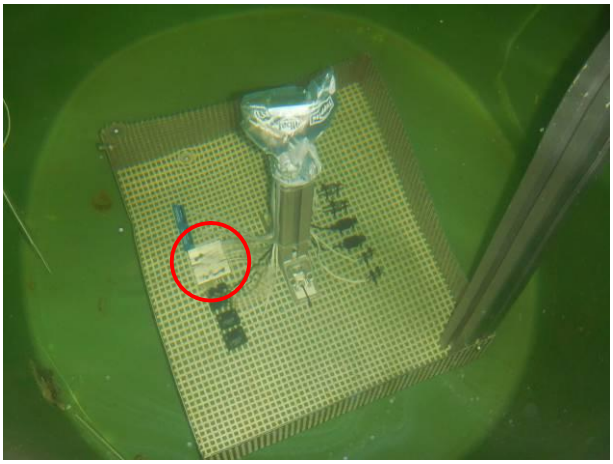
picture 4
MK27-1A66B-500W - #7.2
during the insulation resistance measurement
before and after the tests IP6X and IPX7

picture 5
MK27-1A66B-500W - #7.1 and #7.2
in the dip tank at a depth of 20 cm
during the test IP6X (substitute test)

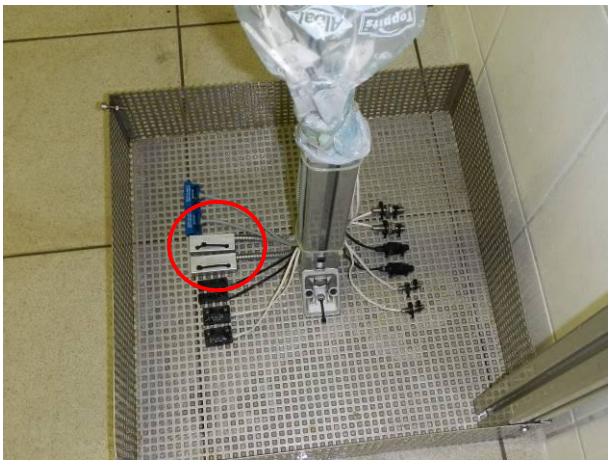


picture 6
MK27-1A66B-500W - #7.1 and #7.2
without visible external damage
after the test IP6X (substitute test)

Picture 7
MK27-1A66B-500W - #7.1 and #7.2
mounted on a test frame
after the immersion test IPX7



Picture 8
MK27-1A66B-500W - #7.1 and #7.2
in the dip tank at a depth of 1 m
after the immersion test IPX7



Picture 9
MK27-1A66B-500W - #7.1 and #7.2
mounted on a test frame
after the immersion test IPX7

Picture 10
MK27-1A66B-500W - #7.1 and #7.2
without visible external damage
after the immersion test IPX7