

TEST REPORT		
Report Number	161/20/00128/BT	
Date of document	2020-05-15	
Total number of pages	16 pages	
Object	Degree of protection provided by enclosures (IP code)	
Applicant	Business Research S.r.l	
Equipment Under Test (EUT) description	NFC control device	
Model tested	LABKEY ONE NFC	
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Tested by (Name + Signature)	FABIO FERRARA Test engineer	
Verified by (Name + Signature)	MAURO MAJOLO Lab Manager	
Approved and issued by (Name + Signature)	ALESSANDRO ZUCCATO Lab Director	



1 OBJECT OF THE TESTS

The objective of the tests is the evaluation of the degree of protection (IP degree) provided by the enclosure of EUT in accordance to the requirements of specified reference standard

2 IDENTIFICATION

Testing laboratory name	
Name:	CREI Ven S.c.a.r.l.
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City:	35127 Padova – Italy
Phone:	+39-049-8704036
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Testing location/ address.....:	CREI Ven S.c.a.r.l. Corso Spagna, 12 Corso Stati Uniti, 4 35127 Padova – Italy +39-049-8704036
Secondary testing location / address :	<input checked="" type="checkbox"/> None <input type="checkbox"/> Same as the applicant <input type="checkbox"/> Other:
Applicant	
Name:	Business Research S.r.l.
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City:	35129, Padova - ITALY
Phone:	+ 39 049 8078 678
e-mail:	paolo@busnet.it
Refer to:	Mr. Paolo Moro



3 EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST (EUT)		
Trade Mark:	Bus Net	
Manufacturer:	Business Research S.r.l.	
Description:	NFC control system	
Model/Type reference:	LABKEY ONE NFC	
Ratings:	5 V	
Possible test case verdicts:		
- test case does not apply to the test object:	N/A	
- test object does meet the requirement:	P (Pass)	
- test object does not meet the requirement:	F (Fail)	
- test object has not been evaluated	N/E	
General remarks:		
The test results presented in this report relate only to the object tested.		
This report shall not be reproduced, except in full, without the written approval of the laboratory. Throughout this report a comma (point) is used as the decimal separator.		
Testing:		
Date of receipt of test item:	2020-05-05	
Date (s) of performance of tests:	2020-05-06 and 2020-05-12	
Sampling and adopted criteria:		
Equipment used for testing was selected by the customer. Sampling criteria adopted by the customer is unknown to CREI Ven laboratory.		
Documentation reference		
All the documentations and customer declarations are saved in the CREI Ven project 161/20		
Change record		
Report Number	Date	Modification



4 REFERENCE STANDARDS AND TEST METHODS

4.1 Reference standard

DOCUMENT	DATE	OBJECT
EN 60529	1991	Degree of protection provided by enclosures (IP code)
EN 60529 Ec	1993	
EN 60529/A1	2000	
EN 60529/A2	2013	

4.2 Test methods

DOCUMENT	DATE	OBJECT
EN 60529	1991	Degree of protection provided by enclosures (IP code)
EN 60529 Ec	1993	
EN 60529/A1	2000	
EN 60529/A2	2013	



5 TEST DESCRIPTION

5.1 First characteristic numeral of IP code

The first characteristic numeral of IP code, as specified in the reference standard, indicates that:

- the enclosure provides protection of persons against access to hazardous parts by preventing or limiting the ingress of a part of the human body or an object held by a person and simultaneously
- the enclosure provides protection of equipment against the ingress of solid foreign objects

Degree of protection against access to hazardous parts indicated by the first characteristic numeral

First characteristic numeral	Degree of protection		Test condition
	Brief description	Definition	
0	No test required		
1	Protected against access to hazardous parts with the back of the hand	The access probe, sphere of 50mm Ø, shall have adequate clearance from hazardous parts	See par. 12.2 of reference standard
2	Protected against access to hazardous parts with a finger	The jointed test finger of 12mm Ø, 80mm length, shall have adequate clearances from hazardous parts	See par. 12.2 of reference standard
3	Protected against access to hazardous parts with a tool	The access probe of 2.5mm Ø shall not penetrate	See par. 12.2 of reference standard
4	Protected against access to hazardous parts with a wire	The access probe of 1.0mm Ø shall not penetrate	See par. 12.2 of reference standard
5	Protected against access to hazardous parts with a wire	The access probe of 1.0mm Ø shall not penetrate	See par. 12.2 of reference standard
6	Protected against access to hazardous parts with a wire	The access probe of 1.0mm Ø shall not penetrate	See par. 12.2 of reference standard

Protection against solid foreign objects

First characteristic numeral	Degree of protection		Test condition
	Brief description	Definition	
0	No test required		
1	Protected against solid foreign objects of 50mm Ø and greater	The object probe, sphere of 50mm Ø, shall not fully penetrate See note 1	See par. 13.2 of reference standard
2	Protected against solid foreign objects of 12.5mm Ø and greater	The object probe, sphere of 12.5mm Ø, shall not fully penetrate See note 1	See par. 13.2 of reference standard
3	Protected against solid foreign objects of 2.5mm Ø and greater	The object probe of 2.5mm Ø, shall not penetrate at all See note 1	See par. 13.2 of reference standard
4	Protected against solid foreign objects of 1.0mm Ø and greater	The object probe of 1.0mm Ø, shall not penetrate at all See note 1	See par. 13.2 of reference standard
5	Dust protected	Ingress of dust is not totally prevented, but dust shall not penetrate in a quantity to interfere with satisfactory operation of the apparatus or to impair safety	See par. 13.4 and 13.5 of reference standard
6	Dust protected	No ingress of dust	See par. 13.4 and 13.6 of reference standard

Note 1: the full diameter of the object probe shall not pass through an opening of the enclosure



5.2 Second characteristic numeral of IP code

The second characteristic numeral of IP code, as specified in the reference standard, indicates the degree of protection provided by enclosures with respect to harmful effects on the equipment due to the ingress of water

Second characteristic numeral	Degree of protection		Test condition
	Brief description	Definition	
0	No test required		
1	Protected against vertically falling water drops	Vertically falling drops shall have no harmful effects	See par. 14.2.1 of reference standard
2	Protected against vertically falling water drops when enclosure tilted up to 15°	Vertically falling drops shall have no harmful effects when the enclosure is tilted at any angle up to 15° on either side of vertical	See par. 14.2.2 of reference standard
3	Protected against spraying water	Water sprayed at an angle up to 60° on either side of the vertical shall have no harmful effects	See par. 14.2.3 of reference standard
4	Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effects	See par. 14.2.4 of reference standard
5	Protected against water jets	Water projected in jets against the enclosure from any direction shall have no harmful effects	See par. 14.2.5 of reference standard
6	Protected against powerful water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects	See par. 14.2.6 of reference standard
7	Protected against Immersion Tank	The enclosure is completely immersed in water	See par. 14.2.7 of reference standard

5.3 Degree of protection against access to hazardous parts indicated by the additional letter

The additional letter indicates the degree of protection of persons against access to hazardous parts.

Additional letters are only used

- If the actual protection against access to hazardous parts is higher than that indicated by the first characteristic numeral
- Or if only the protection against access to hazardous parts is indicated, the first characteristic numeral being replaced by an X

Additional letter	Degree of protection		Test condition
	Brief description	Definition	
A	Protected against access with the back of the hand	The access probe, sphere of 50mm Ø, shall have adequate clearance from hazardous parts	See par. 15.2 of reference standard
B	Protected against access with a finger	The jointed test finger of 12mm Ø, 80mm length, shall have adequate clearances from hazardous parts	See par. 15.2 of reference standard
C	Protected against access with a tool	The access probe of 2.5mm Ø, 100mm length shall have adequate clearance from hazardous parts	See par. 15.2 of reference standard
D	Protected against access with a wire	The access probe of 1.0mm Ø, 100mm length shall have adequate clearance from hazardous parts	See par. 15.2 of reference standard



6 TEST RESULTS

Tests for protection against access to hazardous parts indicated by the first characteristic numeral			
For details see par. 5.1 of this report			
Test Date		2020-05-12	
Temperature 24°C		Humidity 50%	Pressure 1010hPa
Degree of protection		IP6X	
Access probe		Test wire 1,0 mm diameter, 100 mm long with a test force of 1 N (569/LAB) <i>For more details of access probe see Tab VI of EN 60529</i>	
Test condition		The access probe is pushed against or inserted through any openings of the enclosure with the force specified in Tab. VI of EN 60529	
Acceptance condition		The protection is satisfactory if adequate clearance is kept between the access probe and hazardous parts. <i>For more details see par 12.3 of EN 60529</i>	
Note		There are no openings which allow the access within the appliance.	
Result		PASS	



TEST PHOTOGRAPHS - Tests for protection against access to hazardous parts indicated by the first characteristic numeral

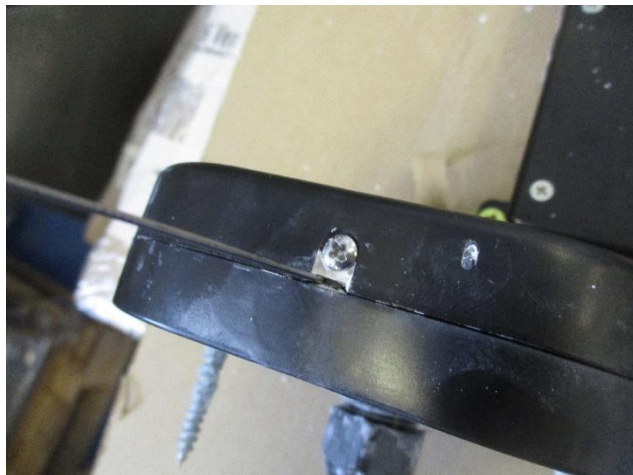
IP6X test



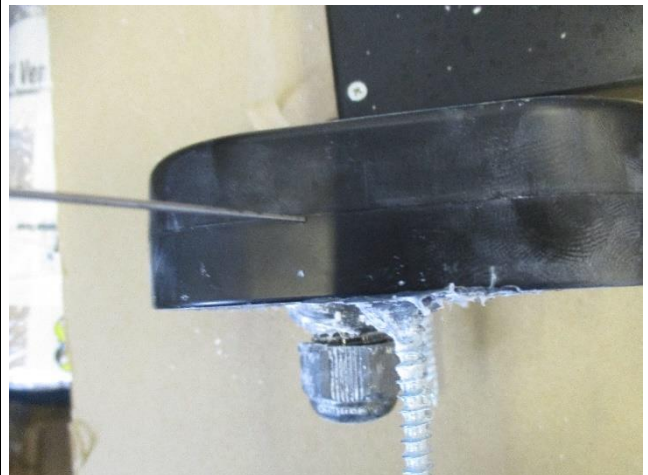
IP6X test



IP6X test



IP6X test





Tests for protection against solid foreign objects indicated by the first characteristic numeral For details see par. 5.1 of this report	
Test Date	2020-05-12
Temperature 24,2°C	Humidity 50%
	Pressure 1010 hPa
Degree of protection	IP6X
Category of enclosure	Category 1
Access probe	Dust chamber with vacuum (688/LAB + 689/LAB + 728/LAB) <i>For more details of access probe see Tab VII of EN 60529</i>
Duration of test	8h
Test condition	The enclosure under test is supported inside the test chamber and the pressure inside the enclosure is maintained below the surrounding atmospheric pressure by a vacuum pump
Acceptance condition	The protection is satisfactory if no deposit of dust is observable inside the enclosure at the end of the test <i>For more details see par 13.3, 13.4, 13.5 and 13.6 of EN 60529</i>
Note	There is no trace of talcum powder within the appliance.
Result	PASS

TEST PHOTOGRAPHS - Tests for protection against solid foreign objects indicated by the first characteristic numeral





IP6X test



IP6X test



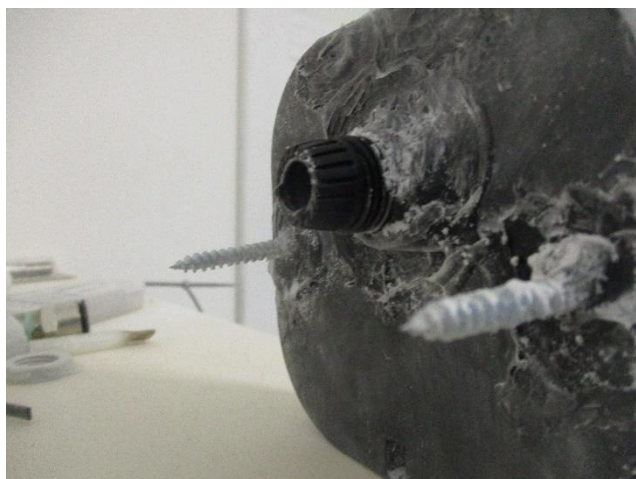
IP6X test



IP6X test



IP6X test

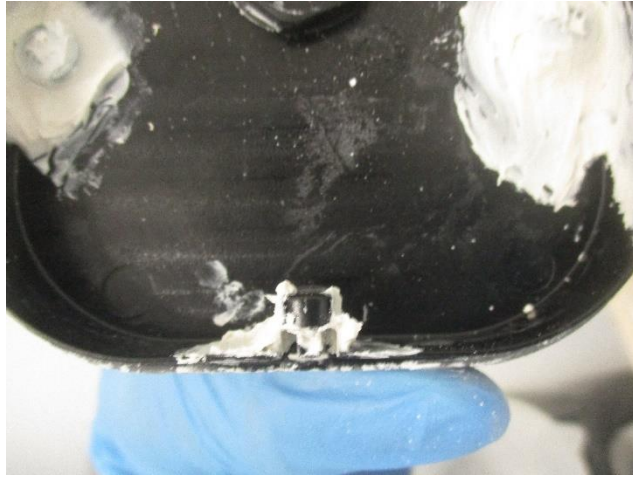


IP6X test





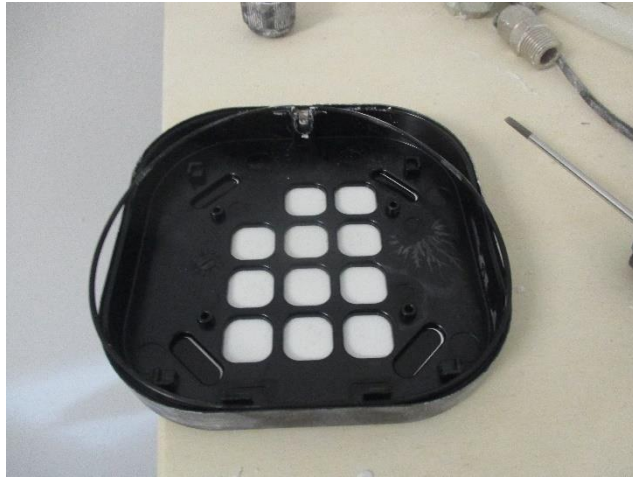
IP6X test



IP6X test



IP6X test



IP6X test





Tests for protection against water indicated by the second characteristic numeral	
For details see par. 5.1 of this report	
Test Date	2020-05-06
Temperature 25,5°C	Humidity 42%
	Pressure 1010 hPa
Degree of protection	IPX5
Test means	Water jet hose nozzle of fig. 6 – nozzle 6,3 mm diameter, distance 2,5 m to 3 m (698/LAB) <i>For more details of access probe see Tab VIII of EN 60529</i>
Duration of test	1 min/m ² at least 3 min
Water flow rate	12,5 l/min±5%
Test condition	See par 14.2.5 of EN 60529
Acceptance condition	After testing in accordance with the appropriate requirements of 14.2.1 to 14.2.6 of EN 60529, the enclosure shall be inspect for ingress of water In general, if any water has entered, it shall not: <ul style="list-style-type: none">- be sufficient to interfere with the correct operation of the equipment or impair safety- deposit on insulation parts where it could lead to tracking along the creepage distances- reach live parts or windings not designed to operate when wet- accumulate near the cable end or enter the cable if any <i>For more details see par 14.3 of EN 60529</i>
Note	The water entered in the EUT enclosure do not: <ul style="list-style-type: none">- be sufficient to interfere with the correct operation of the equipment or impair safety- deposit on insulation parts where it could lead to tracking along the creepage distances- reach live parts or windings not designed to operate when wet- accumulate near the cable end or enter the cable if any
Result	PASS



TEST PHOTOGRAPHS - Tests for protection against water indicated by the second characteristic numeral

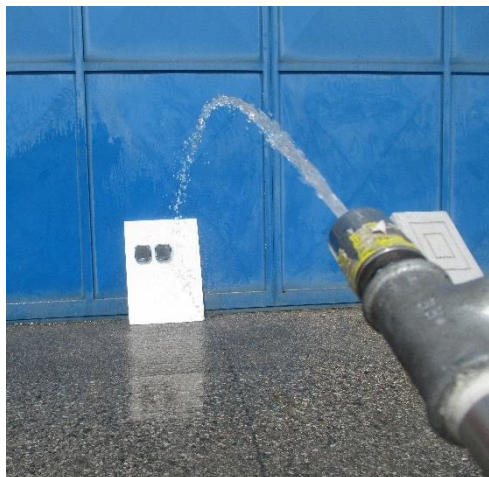
IPXX test



IPXX test



IPXX test



IPXX test



IPXX test



IPXX test





7 PHOTOGRAPHS

7.1 EUT's Photographs





8 MEASUREMENT UNCERTAINTY

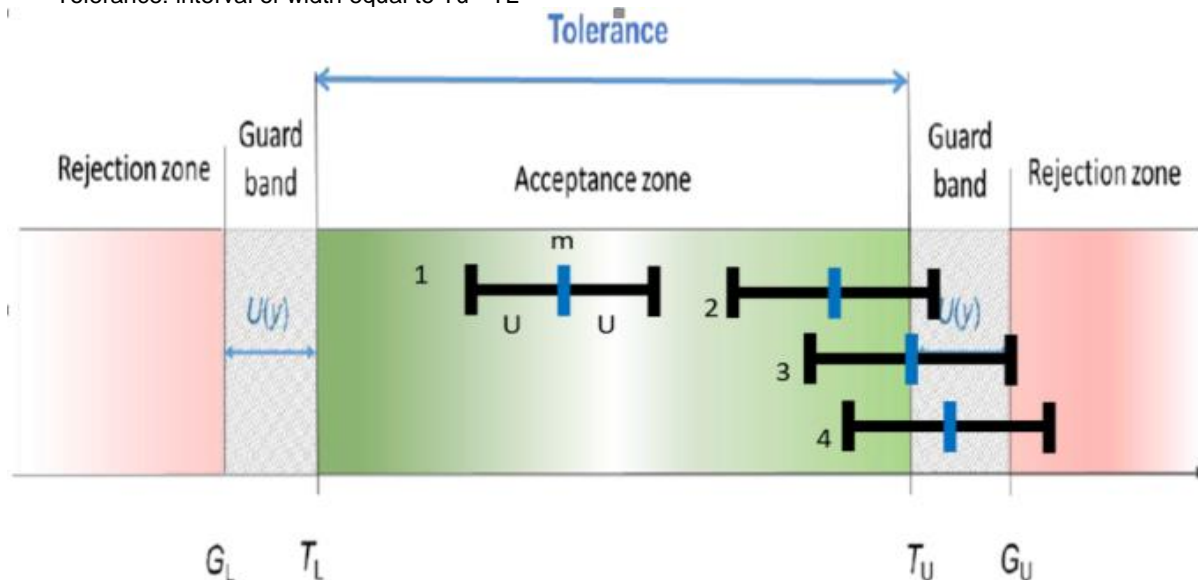
8.1 Decision Rule

Decision Rule

- A decision rule defines the role of uncertainty in assessing the conformity of measured values with respect to specification limits.
- The CREIven decision rule uses the “guard band” method minimizing the “supplier risk” (type 1 risk or alpha risk), that is the risk of refusing a compliant product.
- The “guard band” is established equal to the extended uncertainty U beyond the tolerance limit; $G_u = T_u + U$
- The probability distribution of the measurement uncertainty is assumed to be Gaussian
- If a test does not provide any Tolerance Limit the conformity assessment and the decision rule are not needed.

Nomenclature

- G_u : (G_L) width of the Upper (lower) guard band
- m : measured value
- P : probability of correct acceptance, ($1-P$: probability of refusing a compliant product)
- T_u : Upper Tolerance Limit
- T_L : Lower Tolerance Limit
- Tolerance: interval of width equal to $T_u - T_L$



Case	Decision Rule	Note
Case 1, 2, 3	Measurement complies with specifications	<ul style="list-style-type: none"> • $T_L \leq m \leq T_u$; the probability P of correct acceptance is: $100\% \geq P \geq 50\%$ • $m+U$ ($m-U$) always falls into the G_u (G_L)
Case 4	Measurement NOT complies with specifications	<ul style="list-style-type: none"> • $m > T_u$ (T_L): the probability P of correct acceptance is lower than 50% • $m+U$ ($m-U$) falls into the upper (lower) rejection zone

Note about qualitative tests: The uncertainty balance is applicable only to tests whose result is numerical. For the qualitative tests, are verified the tolerance and repeatability of the quantities that stimulate the EUT. Tolerances and repeatability of these quantities are part of the instrumentation calibration.

In accordance with:

- IEC Guide 115 Application of uncertainty of measurement to conformity assessment activities in the electrotechnical sector
- ILAC-G8:03/2009 Guidelines on the Reporting of Compliance with Specification
- EUROLAB Technical report nr 01/2017
- JGCM guide 106:2012



Parameter – Range	Expanded Uncertainty “ $\pm U$ ” ($k=2$ - coverage factor: 95%)
Time	1.0sec
Linear Dimension	
≤ 1 mm	0.05 mm
> 1 mm ≤ 25 mm	0.1 mm
> 25 mm	1.0 mm
Gas & Fluid pressure	5.0%

----- End of Test Report -----