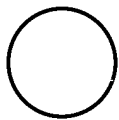




THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

COMMUNICATION CONCERNING THE APPROVAL GRANTED <sup>(1)</sup>/~~APPROVAL EXTENDED <sup>(4)</sup>~~/  
~~APPROVAL REFUSED <sup>(4)</sup>~~/~~APPROVAL WITHDRAWN <sup>(4)</sup>~~/~~PRODUCTION DEFINITELY  
DISCONTINUED <sup>(4)</sup>~~ OF A TYPE OF ELECTRICAL/ ELECTRONIC SUB-ASSEMBLY <sup>(1)</sup> WITH  
REGARD TO REGULATION NO. 10.05



Approval No: E11\*10R05/01\*10542\*00

1. Make (trade name of manufacturer): iO-Energies
2. Type and general commercial description(s): Family EQOPED; Electromagnetic Catalyst
3. Means of identification of type, if marked on the ~~vehicle/component/ separate technical unit~~: <sup>(1)</sup>  
Part Number (letters and numbers)
  - 3.1. Location of that marking: Around the metal cover (see details in the Information Document)
4. Category of vehicle: L and M category vehicles
5. Name and address of manufacturer:  
  
iO-Energies S.r.l.  
Via Provinciale, 26  
25079 Vobarno, fraz. Collio (BS)  
ITALY
6. In the case of components and separate technical units, location and method of affixing of the approval mark: Adhesive label affixed around the metal cover
7. Address(es) of assembly plant(s):

TECOPRESS S.r.l.  
Via Statale, 292-294  
44047 Dosso di Sant'Agostino (FE)  
ITALY

8. Additional information (where applicable): See appendix below
  9. Technical Service responsible for carrying out the tests: Vehicle Certification Agency
  10. Date of test report: 04 January 2019
  11. No. of test report: MSU448930
  12. Remarks (if any): None  
See Appendix below
  13. Place: BRISTOL
  14. Date: 09 JANUARY 2019
  15. Signature:   
D LAWLOR  
Chief Technical and Statutory Operations Officer
  16. The index to the information package lodged with the Approval Authority, which may be obtained on request, is attached.
  17. Reasons for extension: Not applicable
- (1) Strike out what does not apply.

## Appendix

to type-approval communication form No. E11\*10R05/01\*10542\*00

concerning the type-approval of an electrical/electronic sub-assembly under Regulation No. 10.05

1. Additional information:
  - 1.1. Electrical system rated voltage: 12/24 V. ~~pos~~/neg ground <sup>(1)</sup>
  - 1.2. This ESA can be used on any vehicle type with the following restrictions:
    - 1.2.1. Installation conditions, if any: See details in the enclosed manufacturer's specifications
  - 1.3. This ESA can be used only on the following vehicle types: L and M category vehicles with system at 12/24V
    - 1.3.1. Installation conditions, if any: See details in the enclosed manufacturer's specifications
  - 1.4. The specific test method(s) used and the frequency ranges covered to determine immunity were: (Please specify precise method used from Annex 9): According to par 6.10.3. of the ECE-R10/5: ESAs with no immunity related functions need not be tested for immunity to radiated disturbances and shall be deemed to comply with paragraph 6.7. and with Annex 9 of this Regulation
  - 1.5. Laboratory accredited to ISO 17025 and recognized by the Approval Authority responsible for carrying out the tests: INTEK S.p.A., Via Breve, 75, 25086 Rezzato (BS), ITALY
2. Remarks: None

(1) Strike out what does not apply.



THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

APPROVAL NUMBER: E11\*10R05/01\*10542\*00

**INFORMATION PACKAGE CONTENTS**

**INDEX REVISION NUMBER: Not applicable**

**Conformity of Production (COP) Declaration    COP Confirmed**

**Assessment Method    ISO/TS Cert and Control Plans**

**Date of Initial Clearance    December    2018**

**Date of Last Clearance    December    2018**

Total number of sheets: 16 (Sixteen)

Reasons for Revision:    Not applicable

Revision Date  
&  
Office Stamp



**Annex 2B**

**INFORMATION DOCUMENT No. MSS389083**

**DATE OF ISSUE: 22-01-2017**

**FOR TYPE APPROVAL OF AN ELECTRIC/ELECTRONIC SUB-ASSEMBLY WITH  
RESPECT TO ELECTROMAGNETIC COMPATIBILITY AGAINST  
ECE REGULATION No. 10 Rev.5**

- 1. Make (trade name of manufacturer):**  
iO-Energies
  
- 2. Type:**  
family EQOPED,  
Electromagnetic Catalyst
  
- 3. Means of identification of type, if marked on the component/~~separate technical unit:~~**  
Part Number (letters and numbers)
  - 3.1. Location of that marking:**  
Around the metal cover (see details in the Information Document)
  
- 4. Name and address of manufacturer:**  
iO-Energies s.r.l.  
Via Provinciale, 26  
25079 Vobarno, fraz. Collio (BS)  
ITALY  
  
**Name and address of authorized representative, if any: N/A**
  
- 5. In the case of components and separate technical units, location and method of affixing of the approval mark:**  
marking by adhesive label affixed around the metal cover
  
- 6. Address(es) of assembly plant(s):**  
TECOPRESS S.r.l.  
Via Statale, 292-294  
44047 Dosso di Sant'Agostino (FE)  
ITALY

**Annex 2B**

**INFORMATION DOCUMENT No. MSS389083**

**DATE OF ISSUE: 22-01-2017**

7. **This ESA shall be approved as a component / ~~STU~~**
8. **Any restrictions of use and conditions for fitting:**  
see Information Document
9. **Electrical system rated voltage:** +12/24 V DC, positive/negative ground

*Appendix 1: Description of the ESA chosen to represent the type (electrical block diagram and list of main components constituting the ESA (e.g. make and type of microprocessor, crystal, etc.):*

***Ref. to Information Document  
No. MSU448930 last release 04.01.2019***

*Appendix 2: Relevant test report(s) supplied by the manufacturer from a test laboratory accredited to ISO 17025 and recognised by the Approval Authority for the purpose of drawing up the type approval certificate:*

***Ref. to the Test Report No. MSU448930  
issued by Technical Service  
Vehicle Certification Agency***

10. **Charger:** ~~on-board / external~~
11. **Charging current:** ~~direct current / alternating current (number of phases/frequency)~~
12. **Maximal nominal current:** N/A
13. **Nominal charging voltage:** N/A
14. **Basic ESA interface functions:** N/A
15. **Minimum  $R_{sce}$  value (see chapter 7.11):** N/A



iO-ENERGIES Srl

# INFORMATION DOCUMENT

Type: family EQOPED

No. MSU448930

Date of issue : 19.12.2018

Date of last change : 19.12.2018

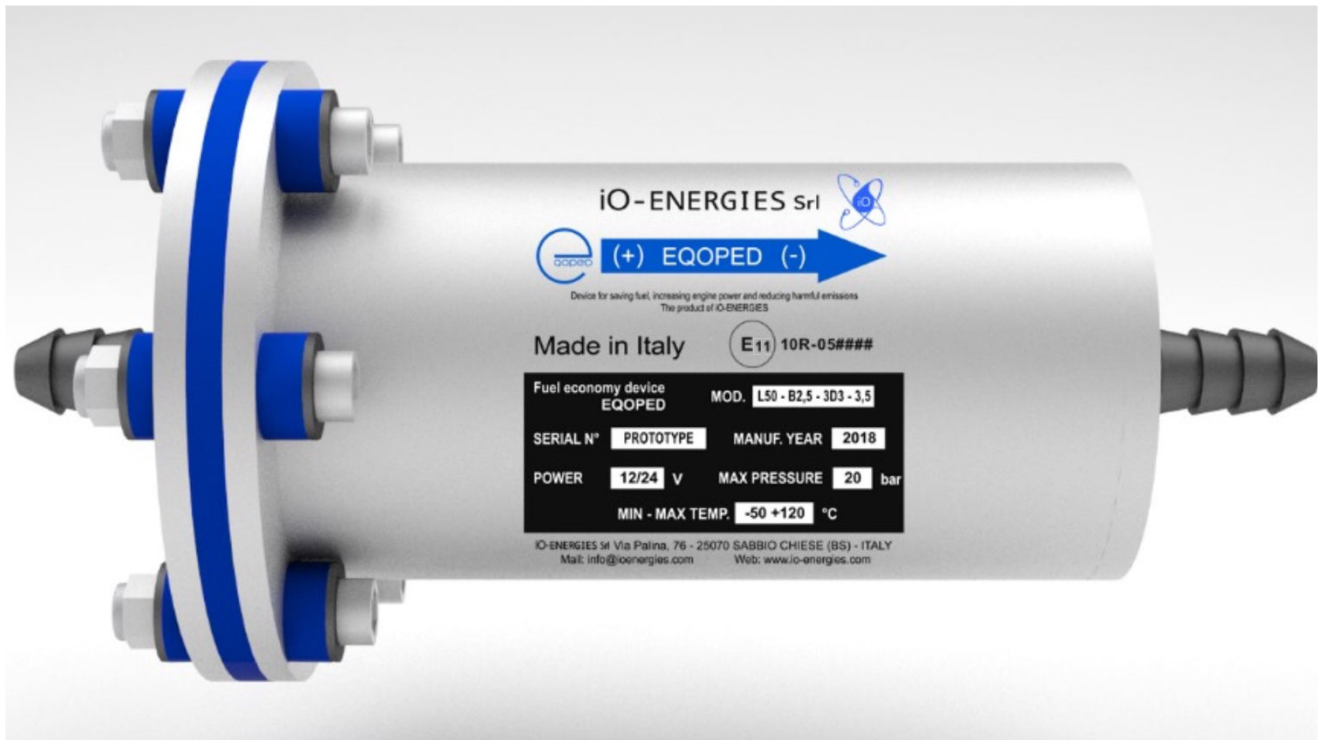
\*\*\*\*\*

- |  |              |
|--|--------------|
| • Label identification and position on the ESA | no. 1 sheet  |
| • Family description                           | no. 2 sheet  |
| • Installation Manual                          | no. 4 sheets |
| • Instruction Manual                           | no. 5 sheets |
| • Technical drawing (representative device)    | no. 1 sheet  |



## IDENTIFICATION OF THE LABEL

### METHOD OF AFFIX: ADHESIVE LABEL AROUND THE COVER



Example on the representative sample



### Family description

Type (Name): EQOPED  
Product description: Electromagnetic Catalyst

Function description: DEVICE FOR FUEL ECONOMY AND REDUCTION OF EXHAUST EMISSIONS

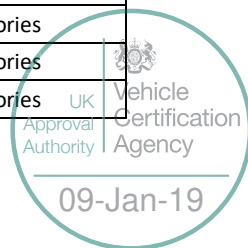
Voltage: +12/24V DC (negative referred at the vehicle body)



Electric parts are the same in all Products : internal wires; (+) external POSITIVE connector; (-) external NEGATIVE connector

The different parts are related to the metal cover that changes for the capacity as explained in the following table.

ITEM	Product Code	P/N.	INPUT diameter	OUTPUT diameter	Engine type	Engine Capacity	Vehicle category
<b>MOTOR CARS AND TRUCKS</b>							
1	Model-0032	M-32	6 - 12 mm	6 - 12 mm	Petrol	1000-1500 cm3	All M-categories
					Diesel	1500-2000 cm3	All M-categories
2	Model-0037	M-37	6 - 12 mm	6 - 12 mm	Petrol	1500-2000 cm3	All M-categories
					Diesel	2000-2500 cm3	All M-categories
3	Model-0042	M-42	6 - 12 mm	6 - 12 mm	Petrol	2000-2500 cm3	All M-categories
					Diesel	2500-3000 cm3	All M-categories
4	Model-0047	M-47	6 - 12 mm	6 - 12 mm	Petrol	2500-3000 cm3	All M-categories
					Diesel	3000-4000 cm3	All M-categories
5	Model-0052	M-52	7 - 13 mm	7 - 13 mm	Petrol	3000-4000 cm3	All M-categories
					Diesel	4000-5000 cm3	All M-categories
6	Model-0057	M-57	7 - 13 mm	7 - 13 mm	Petrol	4000-5000 cm3	All M-categories
					Diesel	5000-6000 cm3	All M-categories
7	Model-0062	M-62	8 - 16 mm	8 - 16 mm	Diesel	6000-7500 cm3	All M-categories
8	Model-0067	M-67	8 - 16 mm	8 - 16 mm	Diesel	7500-9000 cm3	All M-categories
9	Model-0072	M-72	10 - 18 mm	10 - 18 mm	Diesel	9000-11000 cm3	All M-categories
10	Model-0077	M-77	10 - 18 mm	10 - 18 mm	Diesel	11000-14000 cm3	All M-categories
<b>MOTORCYCLES, SCOOTERS, MOTORIKHSI, MOTOROLLERS</b>							
11	Model-0028	L-28	5 - 11 mm	5 - 11 mm	Petrol	125-250 cm3	All L-categories
12	Model-0032	L-32	5 - 11 mm	5 - 11 mm	Petrol	250-500 cm3	All L-categories
13	Model-0036	L-36	5 - 11 mm	5 - 11 mm	Petrol	500-750 cm3	All L-categories
14	Model-0040	L-40	5 - 11 mm	5 - 11 mm	Petrol	750-1000 cm3	All L-categories





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P. IVA e C.F. 03543220986, R.E.A. n° BS - 543056 Tel. +39 320 33 104 11  
E-mail: [info@ioenergies.com](mailto:info@ioenergies.com) [www.io-energies.com](http://www.io-energies.com)

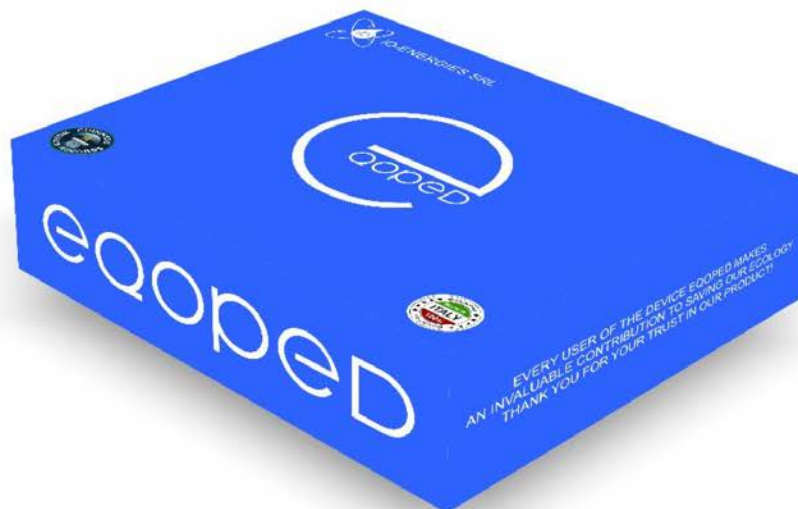
### *Family description - packaging*

Type (Name): EQOPED

Product description: Electromagnetic Catalyst

Function description: DEVICE FOR FUEL ECONOMY AND REDUCTION OF EXHAUST EMISSIONS

Voltage: +12V DC (negative referred at the vehicle body)





iO-ENERGIES Srl

## INSTALLATION MANUAL

### Electromagnetic Device “EQOPED”



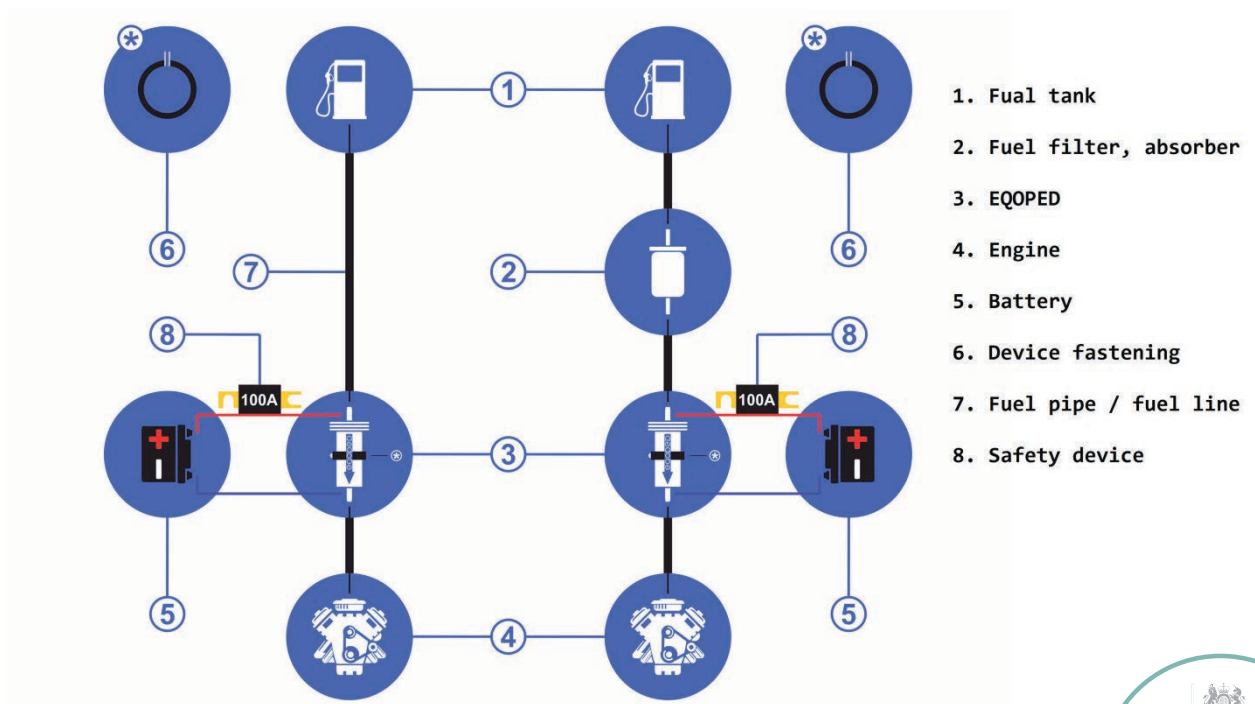


## INSTALLATION MANUAL

Fuel system of every engine has its peculiarities. Consequently, in order to properly install the device EQOPED, the following steps need to be taken:

1. Enter the VIN-code of your automobile into the software for searching spare parts for the automobile. Find the point of connection closest to engine (quick-detachable connection). In case of trucks, if there are no quick-detachable connections, an appropriate installation kit for a particular model of engine can be selected.
2. Make sure that the model of EQOPED to be installed corresponds to the type of engine of your vehicle. If your car is equipped with a hybrid system, you should choose a device only based on cubic capacity and type of fuel used.
3. Before installation of EQOPED, make sure that the engine has cooled down and pressure in the fuel system is zero. Prepare all necessary tools and components for installation of EQOPED.
4. Find an appropriate spot for installation of EQOPED. Place the device in such a way that battery or battery leads are within reachable distance from electrical wires of EQOPED. Pipes of EQOPED should also be accessible to connection points of the fuel system of your automobile. If the pipeline of EQOPED in your vehicle is longer than necessary, it should be shortened only to the extent as required, so that installation can be carried out aesthetically and technically correct.
5. Disconnect the fuel feed pipeline. Make sure that it is the feeding line of the fuel system. Connect the fuel pipe of EQOPED in such a way that direction of fuel flow is the same as the direction shown, with an arrow, on the body of EQOPED. Fasten the fuel line with clamping collars.
6. Hold the device with the connected feeding pipeline in a vertical position. Start the engine, and when the fuel appears at the (top) end of pipeline/hose, shut down the engine and press the pipeline/hose coming from EQOPED with forceps to stop fuel from leaking. EQOPED should be freed from air bubbles by vibrating and shaking. Forceps are then removed, and vibration should be continued holding the device in a vertical position. Press the feeding pipeline/hose of EQOPED again with

- forceps, and connect it to the connection point of the engine. Tightly fasten the clamping collar.
7. Start the engine and check if the connections of pipelines are leak-proof.
  8. Connect the electrical connections to the battery or battery leads. It is very important that connection points of EQOPED to battery are dry and without taints or oxidation. Otherwise, the rate of fuel economy and reduction of exhaust emissions may be affected considerably.
  9. Start the engine and make sure that all connections are leakless and properly connected.
  10. Install the device in such a way, so that the factory nameplate / data plate of the device can be visually seen for convenience of further maintenance.
  11. Fasten the electric wires and fuel pipeline using the clamps provided with EQOPED.
  12. Check if installation and all connections are carried out securely. Make sure that connection points and EQOPED are not touching any shaking or vibrating parts of the engine. All connections and components of the device should be placed as far as possible from exhaust manifold of the engine.





### **ATTENTION**

All recommendations on installation of the device EQOPED shall be followed without fail.

Installation of the device ignoring the instructions and mandatory steps may result in vehicle catching fire.

Nonobservance of this installation manual of EQOPED may lead to malfunctioning of the device, and, consequently affect the results of fuel economy and emissions reduction.



### **VERY IMPORTANT**

Where the device pipes are connected to injector rail close to engine, use quick-detachable metal connecting pipe.

It is forbidden to use a safety device of different structure or capacity.

If deformed in an accident, safety device protects EQOPED by cutting off power from on-board power network of the vehicle.

Fill in the guarantee form and enter the VIN-code of your vehicle.

The above steps will ensure safe and lasting operation of EQOPED in your vehicle.

If you have any questions regarding installation or operation of the device - EQOPED, please send your enquiry to the manufacturer by email: [info@ioenergies.com](mailto:info@ioenergies.com).



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E-mail: [info@ioenergies.com](mailto:info@ioenergies.com) [www.io-energies.com](http://www.io-energies.com)





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## INSTRUCTION MANUAL

### Electromagnetic Device "EQOPED"





## INSTRUCTION MANUAL

**THANK YOU FOR PURCHASING OUR PRODUCT - A DEVICE FOR FUEL ECONOMY AND REDUCTION OF EXHAUST EMISSIONS CALLED "EQOPED".**

**ATTENTION** 

**To avoid accidents, please install the device "EQOPED" strictly according to the instructions and in specialized service centers!**

**Any works with the fuel system shall be carried out very carefully, using all required means to prevent fuel from leaking onto the engine, as well as on the clothes and the human body.**

- 1) Define an appropriate place, in the engine room, for installation of the device, so that the device is installed as close to the engine as possible. At the same time, there should not be any other electromagnetic device within a 15-20 cm radius.
- 2) Depending on the make of your vehicle, disconnect the fuel supply clip-on chuck from the fuel filter-absorber (diesel engine) or from connection point of the pipeline to injector rail (petrol or diesel engine). Starting the engine, you will visually ascertain that this is fuel supply line. Close the fuel pipe/ hose with a special clamp.
- 3) Prepare the place for installation of EQOPED to subsequently fasten it onto the body panel, so that the device connection is accessible, in length, to both the battery and the vehicle's fuel line.
- 4) EQOPED has manufacturer's tag, which, with an arrow, shows fuel direction through the device. Connect the fuel tube of EQOPED to the fuel supply line of your vehicle. Do not connect the outlet tube of the device at this stage.

Start the engine, hold the device and the fuel pipes upward (arrow on the device) as long as the fuel starts filling the pipeline and the device. Shut off the engine, waggle the device in different directions so as to remove air blocks from the device, otherwise the device will not function properly. Start the engine again and make sure that fuel is coming from the feeding







tube of the device. Shut off the engine, close the pipeline / hose for connection to the engine. After connection, as soon as you make sure that all clamps of fuel line are leak-tight, start the engine for 5-10 minutes. Inspect all connections both in idle mode, as well as at maximum engine speed. Visually check all connection points on the fuel line once again to ensure leakproofness.

- 5) Fasten the device in an accessible under-hood space of your car so that the factory nameplate / data plate of the device with the serial numbers, model, and the arrow showing the direction of fuel are easily visible. It is very important that fuel lines should not have any creases or jams. These will create resistance to the fuel pump, and the fuel capacity may decrease, which may lead to undesirable consequences at the time of driving the car.
- 6) Electrical wire of the device should be connected to the battery without any other sources. The negative wire (-) is connected first, then the plus wire (+) is connected. This is very important for proper operation of EQOPED. Make sure the wiring plugs are securely connected to the battery.
- 7) If the battery of your car is installed in the luggage compartment or at a remote location from EQOPED, different cars have an output from the battery in the engine compartment. You must connect EQOPED's electrical wiring to the positive terminal of the battery and to the negative clamping on your car.
- 8) Make sure that all connections of the device are correct, as shown in fig. 1.
- 9) Upon completion of installation of EQOPED, you are required to drive 100 km for the full functioning of the device.

**ATTENTION**



All works related to installation of «EQOPED» shall be carried out by qualified specialists of service and maintenance center, who passed special training.

The direction indicator of the fuel shown on the device must match the direction of the car's fuel.



The polarity indicators of the electrical connection of EQOPED must correspond to those markings indicated on the body.

The device works only if the battery and the generator of your car are in working condition.



**Be careful when installing the device. It is covered with a special dielectric varnish of high strength, which protects the device from external atmospheric phenomena and electrical noises.**



**A leaky connection of the device may result in a fire in the vehicle.**

It is forbidden to disconnect the fuel lines without disconnecting the terminals of electrical wires of EQOPED.

It is forbidden to reinstall the device on a diesel engine, after using it on a petrol engine and vice-versa.

It is forbidden to install a fuse, which does not correspond to 40A.

It is forbidden to install a device that does not match your engine displacement.

It is forbidden to dismantle or change the electric wire, which is provided by the manufacturer with the device.

It is forbidden to install the device near high-temperature devices and units of your car.

It is forbidden to use the device for engines with gas equipment, as fuel tubes are designed to use petrol or diesel fuel.

It is forbidden to fasten the device without rubber seals provided by the manufacturer's factory.

It is forbidden to use the voltage above 24V.

**WARNING** 

Do not attempt to open EQOPED, as it is designed for a one-time assembly. Reassembly of the device is not possible. After removing the internal parts, the device will lose its properties and effect on fuel.



If this manual is not followed, the manufacturer is not responsible for proper functioning of the device and for safety of your vehicle.

The device does not need maintenance throughout the whole operation period.

The manufacturer's warranty for the device is 2 years or 60,000 km of driving, provided that installation and operation of the device are carried out in accordance with the requirements and recommendations of the manufacturer.

Service life of the device can be from 7 to 10 years of operation, which is confirmed by numerous tests.

Every user of the device EQOPED makes an invaluable contribution to saving our ecology.

Thank you for your trust in our product!

All the best wishes from our team.



iO-ENERGIES Srl

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E-mail: [info@ioenergies.com](mailto:info@ioenergies.com) [www.io-energies.com](http://www.io-energies.com)





## Test Report: Electromagnetic Compatibility – ESA

### Legislation

UNECE Regulation 10.05 to Supplement 1

### Test Details

Location of Test: INTEK S.p.A. Via Breve, 75 25086 Rezzato (BS) - ITALY  
Date of Test: 19 December 2018 and 27 January 2015  
VCA Representative(s): F. Barbierato  
Manufacturer's Representative(s): No attendance  
Reason for Test Report: New approval

### Manufacturer Details

Name and Address: iO-Energies S.r.l.  
Via Provinciale, 26 25079 Vobarno, fraz. Collio (BS) - ITALY  
Type: Family EQOPED  
Commercial Description: Electromagnetic catalyst  
Category: ESA/Component for L and M category vehicles at 12/24V DC

### Conclusion

The above mentioned component was tested in accordance with the above mentioned legislation and was found to comply in all respects. This report relates only to the items tested.

Signature:

Name: Francesco Barbierato  
Position: Type Approval Engineer  
Date: 04 January 2019

### List of Annexes

Annex	No of Pages	Subject
I	5	Broad-band EMI radiated test – Horizontal polarization
II	5	Broad-band EMI radiated test – Vertical polarization
III	8	ISO 7637-2 tests
IV	2	ESA/Component photo identification
V	3	Photos of test set-up



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### Worst Case Rationale

Regarding the component object of this Homologation we consider not influent any dimensional characteristics of the variants and we assume that the tested P/N. M-32 is considered as representative of the family under the EMC point of view.  
The variants are different for dimensions, all other constructive particulars (materials used and the proportional factor for the internal parts) are the same.

*Note: Include information on variants and versions this report covers, as applicable. Supporting documents may be annexed to this report*

### Significant Interpretations, Alternative Test Methods, New Technologies

None

### Tests Required

	Yes, NA, See Report ... / Approval ... / Annex ...
Radiated Emissions:	Performed only the Broad-band radiated test, because accordingly to par 6.10.1. of the ECE-R10/5: <i>"Where an electrical/electronic system or ESA does not include an electronic oscillator with an operating frequency greater than 9 kHz, it shall be deemed to comply with paragraph 6.6.2. and with Annex 8 of this Regulation"</i>
Radiated Immunity:	NA, accordingly to par 6.10.3. of the ECE-R10/5: <i>"ESAs with no immunity related functions need not be tested for immunity to radiated disturbances and shall be deemed to comply with paragraph 6.7. and with Annex 9 of this Regulation"</i>
BCI Immunity:	Method not applied, see Note before acc. with par 6.10.3.
Free Field Immunity:	Method not applied, see Note before acc. with par 6.10.3.
150 mm Stripline Immunity:	Method not applied, see Note before acc. with par 6.10.3.
800 mm Stripline Immunity:	Method not applied, see Note before acc. with par 6.10.3.
Transient Testing:	Yes accordingly with Annex 10 of the ECE-R10/5

### Component Specification

Component Part Number: Tested representative P/N. M-32

### Manufacturer's Documentation

Manufacturer's documentation is complete and reflects the agreed specification for the component tested, and covers all variants and versions agreed in the worst case rationale.

Yes

### Facility and Equipment Checks

Calibration certificates checked and valid, recorded in the following table:

Yes



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Equipment	Serial / Certificate No.	Calibration due*
EMI Receiver	0692 P	2019-03
Biconical log-periodic antenna	0308 P	2019-08
Coaxial cable (external)	0820 P	2019-03
Coaxial cable (internal)	0817 P	2019-03
LISN on positive line + 50 $\Omega$	0653 P	2019-03
LISN on negative line + 50 $\Omega$	0654 P	2019-03
Line Impedance Stab. Network	0643 P	2018-04
Regulated DC power source	0342 N	NSC
DC power source	1109 N	NSC
Oscilloscope 500 MHz - 2 GS/s	0861 P	2019-08
Function generator	0806 N	NSC
Voltage probe	1095 P	2019-08
Coaxial cable Sync out	0678 N	NSC
Simulator for Automotive Transients for Pulses 1, 2a, 3a/3b	0644 P	2019-02
Battery Supply Simulator - DC Voltage Source for Pulses 2b, 4	0645 P	2019-02
Software	0679 SW	NSC

\*Specify calibrated date + (interval) or calibration due date.  
NSC = Not subject to Calibration



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Test Requirements		Complies Yes / NA
<b>Radiated Emissions</b>		
CISPR25, 4.5.	Measuring equipment complies with CISPR 16-1-4 (2010).	Yes
	Types and calibration date: Full Anechoic chamber SIDT, ref. ID 0309P 2015/01 (with due date 2019/01)	
<b>Test Location</b>		
Ann 7, 3.1. Ann 7, 3.3.	Test performed in: - A.L.S.E (Absorber-lined Shielded Enclosure)* - <del>O.A.T.S (Open Area Test Site)*</del> <i>*Strikethrough, as appropriate.</i>	Yes
Ann 7, 3.3.	O.A.T.S level is a clear area, free from electromagnetic reflecting surfaces, within a circle of 15 m minimum radius.	NA
Ann 7, 3.3.	Measuring equipment is outside 15 m minimum radius circle.	NA
Ann 7, 3.4.	Ambient noise is at least 6 dB below reference limits, in either case.	Yes
<b>Test Arrangements</b>		
CISPR25, 4.4.2.	EUT and antenna are more than 2 m from the walls and ceiling, and 1 m from the nearest absorber material.	Yes
CISPR25, 6.1.1.	Ground plane is 900 ± 50 mm high and made from 0.5 mm thick copper, brass or galvanised steel.	Yes
CISPR25, 6.1.1.	Ground plane is at least 2,000 mm length x 1,000 mm width.	Yes
CISPR25, 6.4.2.3.	ESA and harness are supported at 50 ± 5 mm above the ground plane on low relative permittivity material.	Yes
CISPR25, 6.4.2.3.	Face of the ESA is within 200 mm ± 10 mm from the edge of the ground plane.	Yes
CISPR25, 6.4.2.4.	Length of test harness, parallel to the front of the ground plane, is 1,500 ± 75 mm and does not exceed 2,000 mm.	Yes
CISPR25, 6.4.2.4.	Long segment of test harness is located parallel to the edge of the ground plane, facing the antenna at a distance of 100 ± 10 mm from the edge.	Yes



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CISPR25, 6.1.2.	Power supply is Artificial Network (AN) rated at 50 Ω/50 μH.	Yes
	EUT is:	Yes
CISPR25, 6.1.2.	<ul style="list-style-type: none"> <li>- Remotely grounded (vehicle power return line longer than 200 mm): two artificial networks are required, one for the positive supply line and one for the power return line*</li> <li>- <del>Locally grounded (vehicle power return line 200 mm or shorter): one artificial network is required for the positive supply*</del></li> </ul> <p><i>*Strikethrough, as appropriate.</i></p>	
CISPR25, 6.1.2.	Case of the ESA is:	Yes
	<ul style="list-style-type: none"> <li>- Grounded, simulating actual vehicle configuration*</li> <li>- <del>Not grounded, simulating actual vehicle configuration*</del></li> </ul> <p><i>*Strikethrough, as appropriate.</i></p>	
CISPR25, 6.1.2.	AN is electrically bonded to the ground plane.	Yes
	<b>Antenna</b>	
	Types and calibration date:	
	Bi-Log periodic antenna Calibration date valid until 2019	
CISPR25, 6.4.2.6.	Height of the phase centre is 100 ± 10 mm above the ground plane.	Yes
CISPR25, 6.4.2.6.	No part of any antenna radiating element is closer than 250 mm to the floor.	Yes
CISPR25, 6.4.2.6.	Radiating elements of the measuring antenna are not closer than 1,000 mm to any absorber material, except that used on the floor, and are not closer than 2,000 mm to the walls or ceiling of the shielded enclosure.	Yes
CISPR25, 6.4.2.6.	Phase centre (for biconical) or tip (for log-periodic) is 1,000 ± 50 mm from the harness.	Yes
CISPR25, 6.4.2.6.	Antenna calibrated for this distance to correct measuring point (phase centre or tip).	Yes
CISPR25, 6.4.2.6.	Phase centre of the antenna is in line with the centre of the longitudinal part of the wiring harness.	Yes
Ann 7, Ann 8, 4.3.	Pre-test sweep supplied to show compliance throughout frequency range 30 to 1,000 MHz.	Yes
Ann 7, Ann 8, 4.3.	Test frequencies chosen from pre-test data.	Yes





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### Narrowband Test Results

Ann 8, 2.

Operational mode of ESA:

As in Normal use, powered at 13,5V. Gasoline flux 2,5 l/min

Ann 8, 2.

Detector used and bandwidth:

Average, 120 kHz

6.6.2.

ESA meets narrowband emissions limits, with both vertical and horizontal polarisations.

Yes

### Broadband Test Results

Ann 7, 2.

Operational mode of ESA:

As in Normal use, powered at 13,5V. Gasoline flux 2,5 l/min

Ann 7, 2.

Detector used and bandwidth:

MaxPeak and Quasi-Peak, 120 kHz

6.5.2.

ESA meets broadband emissions limits, with both vertical and horizontal polarisations.

Yes



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## Radiated Immunity

### Test Method(s) used and Frequency Range(s)

ISO11452-4	BCI frequency range between 20 and 400 MHz:	---	MHz	NA
ISO11452-2	Free field frequency range between 80 and 2,000 MHz:	---	MHz	NA
ISO11452-3	TEM cell frequency range between 20 and 200 MHz:	---	MHz	NA
ISO11452-5	150 mm stripline frequency range between 20 and 400 MHz:	---	MHz	NA
ISO11452-5	800 mm stripline frequency range between 20 and 2,000 MHz:	---	MHz	NA

Maximum frequency step sizes do not exceed:

Frequency Band (MHz)	Linear Steps (MHz)	Log Steps (%)	Actual Steps Used	
20 - 200	5	5	---	NA
200 - 400	10	5	---	NA
400 - 1000	20	2	---	NA
1000 - 2000	40	2	---	NA

### Test Arrangements (General)

Ann 9, 2.2.	Operational mode of ESA: ---	
Ann 9, 2.3.	Extraneous equipment in place during calibration.	NA
Ann 9, 2.4.	Test equipment used is the same as for calibration.	NA
Ann 9, 2.5.	Loads and actuators are as realistic as possible.	NA
Ann 9, 2.5.	Case of ESA is: - Grounded, simulating actual vehicle configuration* - Not grounded, simulating actual vehicle configuration* *Strikethrough, as appropriate.	NA
Ann 9, 3.1.	Test frequency range is 20 to 2,000 MHz.	NA
Ann 9, 3.1.	Test signal is R.F. sine wave amplitude, modulated by a 1 kHz sine wave at a modulation depth of $0.8 \pm 0.04$ , in the 20 - 800 MHz band	NA



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	and pulse modulation (time on 577 $\mu$ s, period 4,600 $\mu$ s) in the 800 – 2,000 MHz band.	
6.8.2.1.	Pre-test sweep supplied to show compliance throughout frequency range 20 to 2,000 MHz.	NA
Ann 9, 3.2.	Test frequencies chosen from pre-test data.	NA
6.8.2.2.	No degradation of immunity related functions during the tests.	NA

### BCI Immunity

	Calibration date: ---	
ISO11452-4, 5.	Shielded area used: ---	
	Comments: ---	
ISO11452-4, 8.3.2.1.	Forward power used to achieve specified current.	NA
<b>Installation of ESA under Test</b>		
Ann 9, 4.3.2.	Current probe located 150 $\pm$ 10 mm from ESA connectors.	NA
Ann 9, 4.3.2.	ESA installed: - In a vehicle, as per ISO 11451-4* - On a ground plane, as per ISO 11452-4* <i>*Strikethrough, as appropriate.</i>	NA
ISO11452-4, 7.1.	Ground plane is made from at least 0.5 mm thick copper, brass or galvanised steel.	NA
ISO11452-4, 7.1.	Minimum width of the ground plane is 1,000 mm and the minimum length is 1,500 mm, or length of the entire underneath of equipment plus 200 mm, whichever is greater.	NA
ISO11452-4, 7.1.	Height of the ground plane is 900 $\pm$ 100 mm.	NA
ISO11452-4, 7.1.	Ground plane is bonded to the shielded enclosure, with the straps at a distance no greater than 300 mm apart.	NA
ISO11452-4, 7.2.	- ESA remotely grounded (vehicle power return line longer than 200 mm): two artificial networks are required, one for the positive supply line and one for the power return line)* - ESA locally grounded (vehicle power return line 200 mm or shorter): one artificial network is required, for the positive supply*	



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*\*Strikethrough, as appropriate.*

ISO11452-4, 7.2.	Power supply is Artificial Network (AN) rated at 50 Ω/5 μH.	NA
ISO11452-4, 7.3.	ESA and harness supported 50 ± 5 mm above ground plane, on low relative permittivity material.	NA
ISO11452-4, 7.3.	Face of the ESA within 100 mm from the edge of the ground plane.	NA
ISO11452-4, 7.3.	Distance of at least 500 mm between ESA and any metal parts, such as the walls of the shielded enclosure (exception is ground plane).	NA
ISO11452-4, 7.4.	Length of test harness is 1,000 ± 100 mm, unless specified.	NA
	Actual wiring harness length: <input type="text" value="---"/> m	NA

**BCI Test Results**

6.8.2.1.	No malfunction at 60 mA or below. Comments: <input type="text" value="---"/>	NA
----------	--	----



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### Free Field Immunity

Calibration date:

---

ISO11452-2, 5.

Semi-anechoic chamber used:

---

ISO11452-2,  
8.3.1.

Test field defined by:

NA

- Forward power\*
- Another parameter, directly related\*

\*Strikethrough, as appropriate.

ISO11452-2,  
8.3.2.

Antenna is at a distance of 1,000 ± 10 mm from the reference point.

NA

ISO11452-2,  
8.3.2.

Reference point is 150 ± 10 mm above the ground plane.

NA

ISO11452-2,  
8.3.2.

Reference point is 100 ± 10mm from the edge of the ground plane.

NA

ISO11452-2,  
8.3.2.

For frequencies from 80 - 1,000 MHz, the reference point is in the centre of the harness.

NA

ISO11452-2,  
8.3.2.

For frequencies from 1,000 - 2,000 MHz, the reference point is in line with the ESA.

NA

### Test Arrangements

ISO11452-2, 7.1.

Ground plane is made from at least 0.5 mm thick copper, brass or galvanised steel.

NA

ISO11452-2, 7.1.

Minimum width of the ground plane is 1,000 mm and the minimum length is 2,000 mm.

NA

ISO11452-2, 7.1.

Height of the ground plane is 900 ± 100 mm.

NA

ISO11452-2, 7.1.

Bonding straps are at a distance no greater than 300 mm apart.

NA

ISO11452-2, 7.2.

Power supply is Artificial Network (AN) rated at 50 Ω/5 μH.

NA

ISO11452-2, 7.2.

- ESA remotely grounded (vehicle power return line longer than 200 mm): two artificial networks are required, one for the positive supply line and one for the power return line)\*
- ESA locally grounded (vehicle power return line 200 mm or shorter): one artificial network is required, for the positive supply\*

\*Strikethrough, as appropriate.

ISO11452-2, 7.3.

AN mounted directly on the ground plane and cases bonded to the ground plane.

NA



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ISO11452-2, 7.3.	ESA and harness supported $50 \pm 5$ mm above table, on low relative permittivity material.	NA
ISO11452-2, 7.3.	Face of the ESA located $200 \pm 10$ mm from the edge of the ground plane.	NA
ISO11452-2, 7.4.	Test harness parallel to the front edge of the ground plane.	NA
ISO11452-2, 7.4.	Total length of harness does not exceed 2,000 mm.	NA
ISO11452-2, 7.4.	Actual wiring harness length: <span style="border: 1px solid black; padding: 2px;">---</span> m	NA
	or Length is $1,500 \pm 75$ mm between ECU and AN.	NA
ISO11452-2, 7.4.	Harness is at a distance of $100 \pm 10$ mm from the edge of the ground plane.	NA
ISO11452-2, Fig 1	Front face of ESA is at least 1.0 m from all other conductive structures.	NA
ISO11452-2, Fig 1	ESA harness is at least 2.0 m forward from the chamber wall.	NA
<b>Antenna Type(s) and Frequency Range(s)</b>		
Ann 9, 4.1.2.	Antenna is vertically polarised.	NA
ISO11452-2, 7.6.	Antenna is in the same position as the calibration.	NA
ISO11452-2, 7.6.	Phase centre is $100 \pm 10$ mm above the ground plane.	NA
ISO11452-2, 7.6.	Antenna elements are no closer than 250 mm to the floor of the facility, no closer than 0.5 m to any radio absorbent material, and no closer than 1.5 m to the wall of the facility.	NA
ISO11452-2, 7.6.	Distance between wiring harness and antenna is $1,000 \text{ mm} \pm 10$ mm, measured from the phase-centre of the biconical antenna, or the nearest part of the log-periodic and horn antennas.	NA
Ann 9, 3.1.	Test signal modulation is: - AM, 1 kHz modulation, 80 % depth in 20 - 800 MHz frequency range; - PM, ton $577 \mu\text{s}$ , period $4,600 \mu\text{s}$ in 800 - 2,000 MHz frequency range.	NA



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6.8.2.	<b>Free Field Immunity Test Results</b>	NA
	No malfunction at 25 V/m or below.	
	Comments:	
	---	

**150 mm Stripline Immunity**

Calibration date:  
---

ISO11452-5, 5.3.1.	Stripline housed in a shielded room.	NA
ISO11452-5, 6.2.2.	Test field defined by:	NA
	<ul style="list-style-type: none"> <li>- Forward power*</li> <li>- Another parameter, directly related*</li> </ul> <i>*Strikethrough, as appropriate.</i>	
ISO11452-5, 6.2.3.	Field probe in the centre of stripline.	NA

**Installation of ESA under Test**

ISO11452-5, 5.3.1.	ESA is 200 + 20 - 0 mm from the edge of the active conductor.	NA
ISO11452-5, 5.3.1.	Peripherals are a minimum of 200 mm from the edge of the active conductor.	NA
ISO11452-5, 5.3.1.	Harness supported 50 mm above the ground plane and is placed in the centre of the stripline.	NA
ISO11452-5, 5.3.1.	Actual wiring harness length: <span style="border: 1px solid black; padding: 2px;">---</span> m	NA
	<u>or</u> Minimum length under stripline is 1,000 mm.	NA
ISO11452-5, 5.3.1.	All wires in the harness are terminated or open, according to the vehicle application.	NA
ISO11452-5, 5.3.1.	Device and peripherals connected to the ground plane, as specified by the vehicle installation.	NA
ISO11452-5, 5.3.1.	Power supply is Artificial Network (AN) rated at 50 Ω/5 μH.	NA
ISO11452-5, 5.3.1.	<ul style="list-style-type: none"> <li>- ESA remotely grounded (vehicle power return line longer than 200 mm): two artificial networks are required, one for the positive supply line and one for the power return line)*</li> <li>- ESA locally grounded (vehicle power return line 200 mm or shorter): one artificial network is required, for the positive supply*</li> </ul> <i>*Strikethrough, as appropriate.</i>	



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### 150 mm Stripline Test Results

6.8.2.	No malfunction at 50 V/m or below. Comments: ---	NA
--------	--	----

### 800 mm Stripline Immunity

Calibration date:

---

Ann 9, 4.5.2.1.	Stripline housed in a screened room.	NA
Ann 9, 4.5.2.1.	Stripline positioned a minimum of 2,000 mm from the walls or metallic enclosure.	NA
Ann 9, 4.5.2.1.	Stripline placed on non-conducting supports at least 400 mm above the floor.	NA
Ann 9, 4.5.2.2.	Field probe positioned within the central one-third of the longitudinal, vertical and transverse dimensions of the space between the parallel plates, with the system under test absent.	NA
Ann 9, 4.5.2.2.	Test field defined by: - Forward power* - Another parameter, directly related* <i>*Strikethrough, as appropriate.</i>	NA

### Installation of ESA under Test

Ann 9, 4.5.2.3.	ESA is within the central one-third of the stripline.	NA
Ann 9, 4.5.2.3.	ESA is supported on non-conducting material.	NA
Ann 9, 4.5.2.4.	Wiring loom is arranged as per Appendix 1, Figure 3.	NA
Ann 9, 4.5.2.4.	Associated equipment is a minimum of 1,000 mm from stripline.	NA

### 800 mm Stripline Test Results

Frequency Suggested (MHz)	Frequency (MHz)	Forward Power		Output Level		Field Strength (V/m)
		Cal. (W)	Test (W)	Cal. (dBm)	Test (dBm)	
---	---	---	---	---	---	---
---	---	---	---	---	---	---

6.8.2.	No malfunction at 12.5 V/m or below. Comments: ---	NA
--------	--	----





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### Transient Testing

Case of ESA is:

- Grounded, simulating actual vehicle configuration\*
- ~~Not grounded, simulating actual vehicle configuration\*~~

\*Strikethrough, as appropriate.

### Transient Immunity

6.9.1.

Test set up according to ISO 7637-2 (second edition 2004 and Amd.1:2008).

Yes

Ann 10, 2.

Supply lines and other lines, which may be connected to supply lines, are tested.

Yes

Test voltage and time parameters are within allowed envelopes.

Yes

Test pulses and duration according to the following:

Yes

Test Pulse	Immunity Test Level	Functional Status for Systems		Test Duration
		Related to Immunity-related Functions	Not Related to Immunity-related Functions	
1	III	C	D	5000 pulses
2a	III	B	D	5000 pulses
2b	III	C	D	10 pulses
3a	III	A	D	1 hour
3b	III	A	D	1 hour
4	III	B <i>(for ESA, which must be operational during engine start, or C, for other ESA)</i>	D	1 pulse

ESA operational after the tests, according to the above classification.

Yes

### Emission of Conducted Disturbances

6.9.1.

Test set up according to ISO 7637-2.

Yes

Ann 10, 3.

Supply lines and other lines, which may be connected to supply lines, are tested.

Yes



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Comments:

See Appendix 3 with test results

Slow pulses and fast pulses tested on both powering up and powering down.

Yes

Polarity of Pulse Amplitude	Maximum Allowed Pulse Amplitude	
	Vehicles with 12 V systems	Vehicles with 24 V system
Positive	+ 75 V	+ 150 V
Negative	- 100 V	- 450 V

Remarks

None

*Note: VCA apply measurement uncertainty to calibrated items but not test results.*

## Annex 1

Job Number ref.	MSU448930
Manufacturer's Name	iO-Energies S.r.l.
Manufacturer's Address	Via Provinciale, 26 25079 Vobarno – fraz. Collio (BS) - IT
Model Type & description	family EQOPET, Electromagnetic catalyzator
Category	ESA/Component for L and M category vehicles at 12/24V DC

### **Broad-Band EMI radiated test Horizontal polarization**

Electromagnetic catalyzator device for saving fuel, reduction of emissions and increasing engine power  
Tested P/N. M-32 (as representative model =Worst Case)  
Powered during the radiated test at +13.5 V DC

Operating condition during the test:

Device operates as normal use condition:

- continuous fuel catalyst function; gasoline flux 2,5 l/min

Horizontal polarization,  
file name 15\_0039\_fh\_a

Noise

file name 15\_0039\_fh\_b

Component

# INTEK S.p.A. - EMC Test Laboratory

## EUT Information

### Description:

EUT name: EQOPET  
 Manufacturer: IO-ENERGIES  
 Serial / Sample number: Sample n.1  
  
 Test specification: ECE R10-05  
 Test site: Fully anechoic chamber  
 Transducer: BiLog antenna - Horizontal at 1 m  
  
 Port under test: Enclosure  
 Power supply: 13,7 Vdc  
 Operating conditions: Noise floor  
  
 Remarks: --

## EMI Auto Test Template: ECE R10 rev5 BB QP

Hardware Setup: Electric Field Strength 30-1000 MHz  
 Measurement Type: Open-Area-Test-Site  
 Frequency Range: 30 MHz - 1 GHz  
 Graphics Level Range: 0 dB $\mu$ V/m - 100 dB $\mu$ V/m

### Preview Measurements:

Scan Test Template: Automotive Components pre BB

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	MaxPeak; Average	120 kHz	0,01 s	ESU 26 [ESU 26]

### Data Reduction:

Limit Line #1: ECE R10-05 ESA BB QP  
 Limit Line #2: ECE R10-05 ESA BB QP  
 Peak Search: 6 dB , Maximum Results: 10  
 Subrange Maxima: 10 Subranges , Maxima per Subrange: 10  
 Acceptance Offset: -10 dB  
 Maximum Number of Results: 100

### Maximization Measurements:

Template for Single Meas.: Automotive Components pre BB

### Final Measurements:

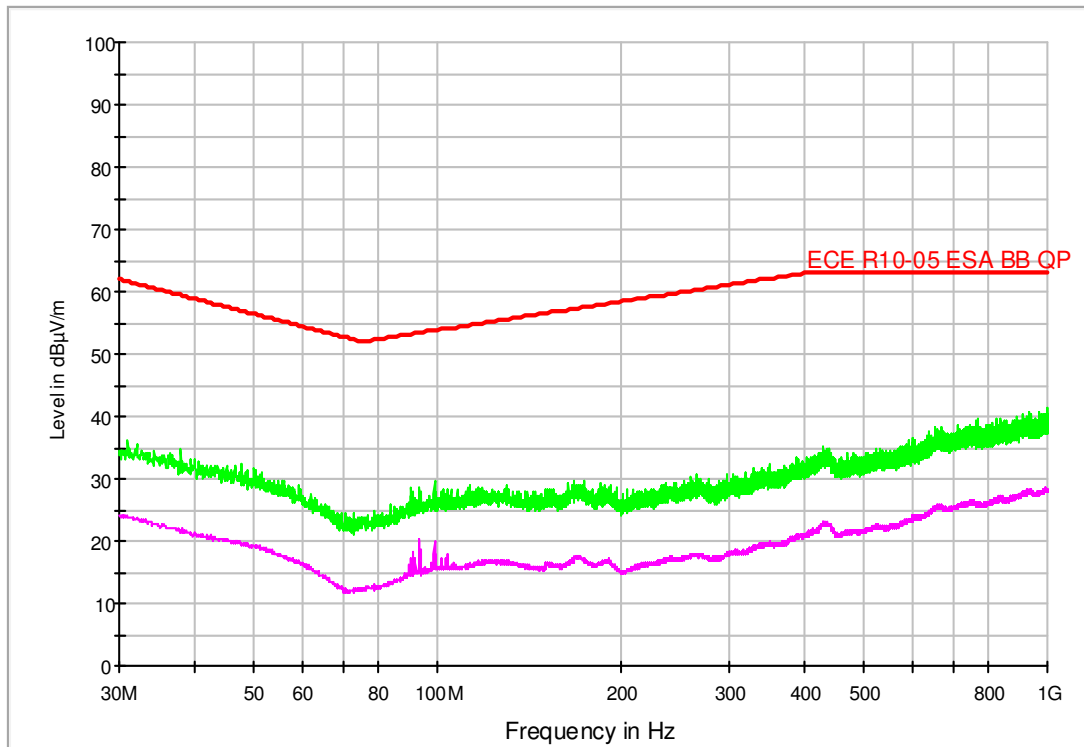
Template for Single Meas.: Automotive Components fin BB QP

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	QuasiPeak	120 kHz	1 s	ESU 26 [ESU 26]

### Report Settings:

Report Template: EMC Test Report

ECE R10 rev5 BB QP



— ECE R10-05 ESA BB QP.LimitLine      — Preview Result 1      — Preview Result 2

# INTEK S.p.A. - EMC Test Laboratory

## EUT Information

### Description:

EUT name: EQOPET  
 Manufacturer: IO-ENERGIES  
 Serial / Sample number: Sample n.1  
  
 Test specification: ECE R10-05  
 Test site: Fully anechoic chamber  
 Transducer: BiLog antenna - Horizontal at 1 m  
  
 Port under test: Enclosure  
 Power supply: 13,7 Vdc  
 Operating conditions: Operate  
  
 Remarks: --

## EMI Auto Test Template: ECE R10 rev5 BB QP

Hardware Setup: Electric Field Strength 30-1000 MHz  
 Measurement Type: Open-Area-Test-Site  
 Frequency Range: 30 MHz - 1 GHz  
 Graphics Level Range: 0 dB $\mu$ V/m - 100 dB $\mu$ V/m

### Preview Measurements:

Scan Test Template: Automotive Components pre BB

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	MaxPeak; Average	120 kHz	0,01 s	ESU 26 [ESU 26]

### Data Reduction:

Limit Line #1: ECE R10-05 ESA BB QP  
 Limit Line #2: ECE R10-05 ESA BB QP  
 Peak Search: 6 dB , Maximum Results: 10  
 Subrange Maxima: 10 Subranges , Maxima per Subrange: 10  
 Acceptance Offset: -10 dB  
 Maximum Number of Results: 100

### Maximization Measurements:

Template for Single Meas.: Automotive Components pre BB

### Final Measurements:

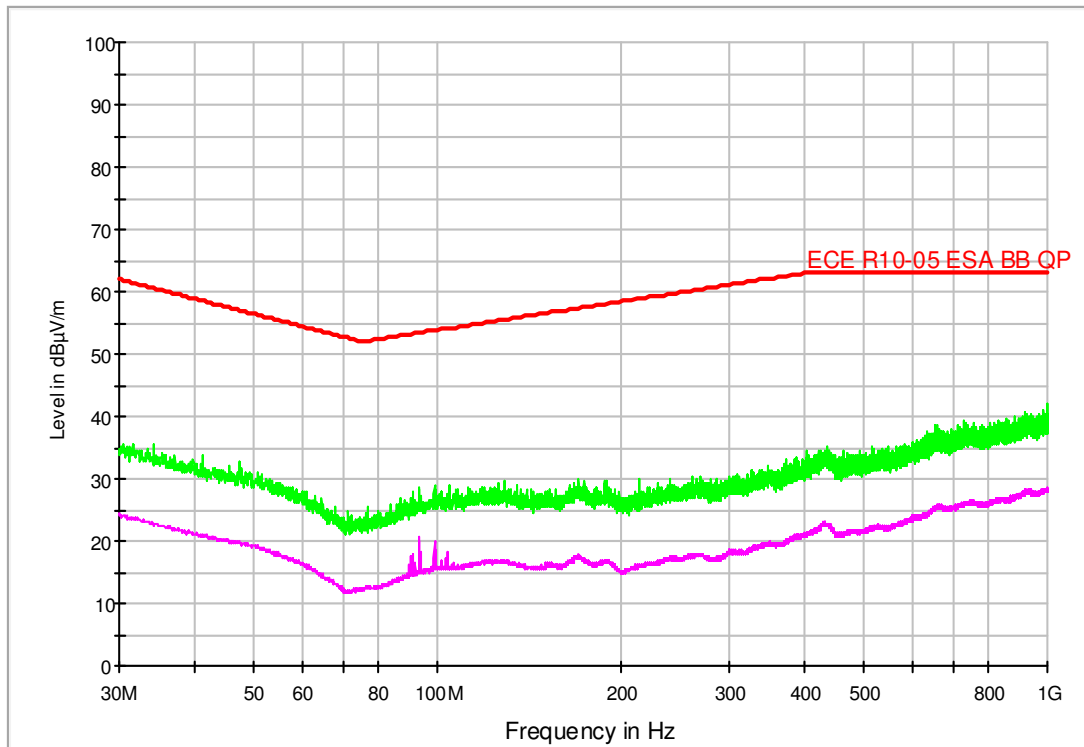
Template for Single Meas.: Automotive Components fin BB QP

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	QuasiPeak	120 kHz	1 s	ESU 26 [ESU 26]

### Report Settings:

Report Template: EMC Test Report

ECE R10 rev5 BB QP



— ECE R10-05 ESA BB QP.LimitLine

— Preview Result 1

— Preview Result 2

## Annex 2

Job Number ref.	MSU448930
Manufacturer's Name	iO-Energies S.r.l.
Manufacturer's Address	Via Provinciale, 26 25079 Vobarno – fraz. Collio (BS) - IT
Model Type & description	family EQOPET, Electromagnetic catalyzator
Category	ESA/Component for L and M category vehicles at 12/24V DC

### **Broad-Band EMI radiated test Vertical polarization**

Electromagnetic catalyzator device for saving fuel, reduction of emissions and increasing engine power  
Tested P/N. M-32 (as representative model =Worst Case)  
Powered during the radiated test at +13.5 V DC

Operating condition during the test:

Device operates as normal use condition:

- continuous fuel catalyst function; gasoline flux 2,5 l/min

Vertical polarization,

file name 15\_0039\_fv\_a      Noise

file name 15\_0039\_fv\_b      Component



# INTEK S.p.A. - EMC Test Laboratory

## EUT Information

### Description:

EUT name: EQOPET  
 Manufacturer: IO-ENERGIES  
 Serial / Sample number: Sample n.1

Test specification: ECE R10-05  
 Test site: Fully anechoic chamber  
 Transducer: BiLog antenna - Vertical at 1 m

Port under test: Enclosure  
 Power supply: 13,7 Vdc  
 Operating conditions: Noise floor

Remarks: --

## EMI Auto Test Template: ECE R10 rev5 BB QP

Hardware Setup: Electric Field Strength 30-1000 MHz  
 Measurement Type: Open-Area-Test-Site  
 Frequency Range: 30 MHz - 1 GHz  
 Graphics Level Range: 0 dB $\mu$ V/m - 100 dB $\mu$ V/m

### Preview Measurements:

Scan Test Template: Automotive Components pre BB

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	MaxPeak; Average	120 kHz	0,01 s	ESU 26 [ESU 26]

### Data Reduction:

Limit Line #1: ECE R10-05 ESA BB QP  
 Limit Line #2: ECE R10-05 ESA BB QP  
 Peak Search: 6 dB , Maximum Results: 10  
 Subrange Maxima: 10 Subranges , Maxima per Subrange: 10  
 Acceptance Offset: -10 dB  
 Maximum Number of Results: 100

### Maximization Measurements:

Template for Single Meas.: Automotive Components pre BB

### Final Measurements:

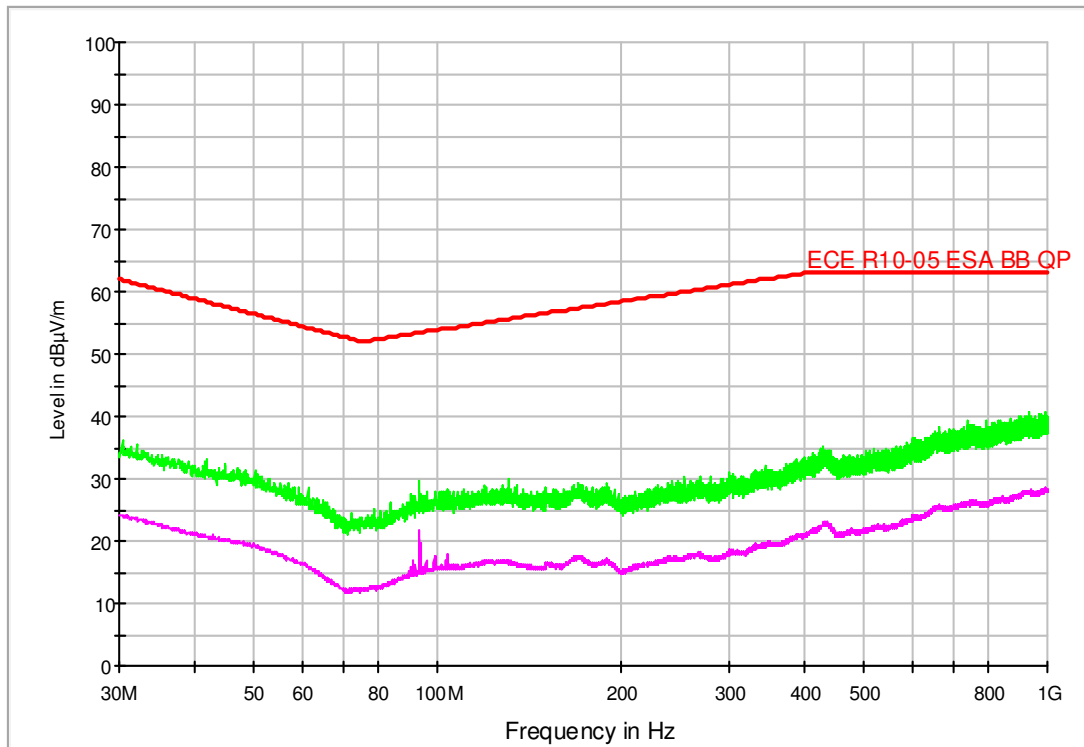
Template for Single Meas.: Automotive Components fin BB QP

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	QuasiPeak	120 kHz	1 s	ESU 26 [ESU 26]

### Report Settings:

Report Template: EMC Test Report

ECE R10 rev5 BB QP



— ECE R10-05 ESA BB QP.LimitLine      — Preview Result 1      — Preview Result 2

# INTEK S.p.A. - EMC Test Laboratory

## EUT Information

### Description:

EUT name: EQOPET  
 Manufacturer: IO-ENERGIES  
 Serial / Sample number: Sample n.1  
  
 Test specification: ECE R10-05  
 Test site: Fully anechoic chamber  
 Transducer: BiLog antenna - Vertical at 1 m  
  
 Port under test: Enclosure  
 Power supply: 13,7 Vdc  
 Operating conditions: Operate  
  
 Remarks: --

## EMI Auto Test Template: ECE R10 rev5 BB QP

Hardware Setup: Electric Field Strength 30-1000 MHz  
 Measurement Type: Open-Area-Test-Site  
 Frequency Range: 30 MHz - 1 GHz  
 Graphics Level Range: 0 dB $\mu$ V/m - 100 dB $\mu$ V/m

### Preview Measurements:

Scan Test Template: Automotive Components pre BB

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	MaxPeak; Average	120 kHz	0,01 s	ESU 26 [ESU 26]

### Data Reduction:

Limit Line #1: ECE R10-05 ESA BB QP  
 Limit Line #2: ECE R10-05 ESA BB QP  
 Peak Search: 6 dB , Maximum Results: 10  
 Subrange Maxima: 10 Subranges , Maxima per Subrange: 10  
 Acceptance Offset: -10 dB  
 Maximum Number of Results: 100

### Maximization Measurements:

Template for Single Meas.: Automotive Components pre BB

### Final Measurements:

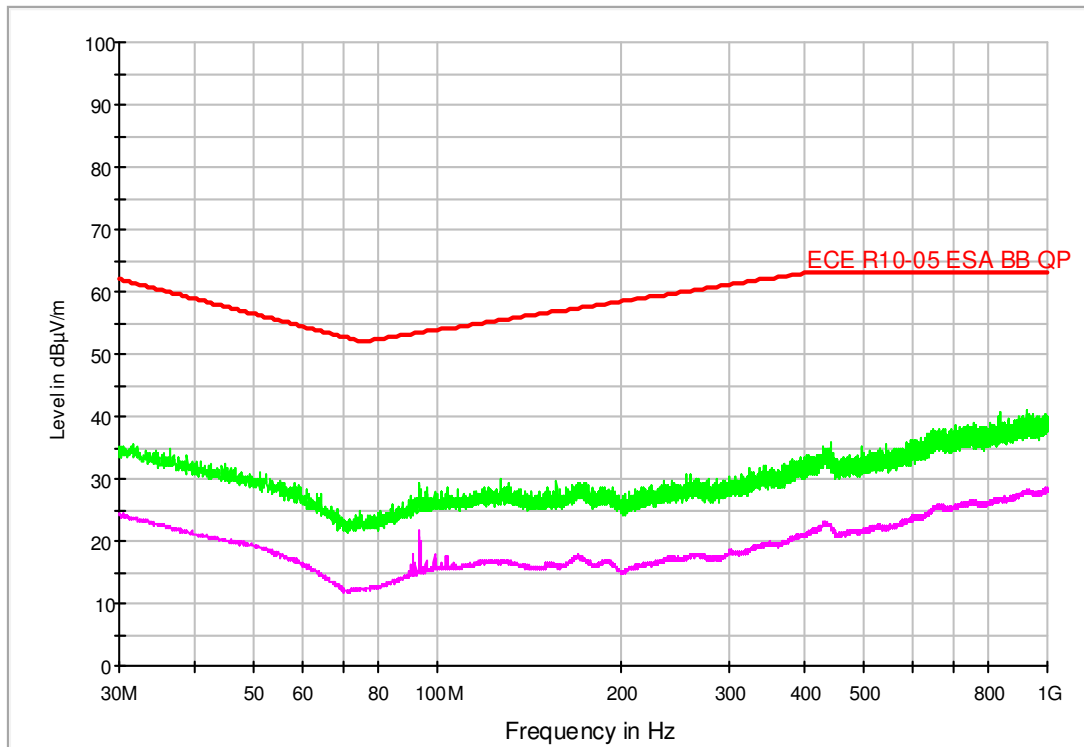
Template for Single Meas.: Automotive Components fin BB QP

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1 GHz	QuasiPeak	120 kHz	1 s	ESU 26 [ESU 26]

### Report Settings:

Report Template: EMC Test Report

ECE R10 rev5 BB QP



— ECE R10-05 ESA BB QP.LimitLine

— Preview Result 1

— Preview Result 2

Job Number ref.	MSU448930
Manufacturer's Name	iO-Energies S.r.l.
Manufacturer's Address	Via Provinciale, 26 25079 Vobarno – fraz. Collio (BS) - IT
Model Type & description	family EQOPET, Electromagnetic catalyzator
Category	ESA/Component for L and M category vehicles at 12/24V DC

### ISO 7637-2 tests

Electromagnetic catalyzator device for saving fuel, reduction of emissions and increasing engine power

Tested P/N. M-32 (as representative model =Worst Case)

Powered during the radiated test at +13.5 V DC

- Date of test : 19.12.2018
- Ambient conditions during test :  $T_{amb} = 23.7 \pm 2^{\circ}\text{C}$  (allowed  $23 \pm 5^{\circ}\text{C}$ )  
Hr =  $20.8 \pm 10\%$  (not def. by ECE)
- Tested by the method(s) according to : ISO 7637-2 (2004)
- Operating conditions during test : (#1) ESA operates as normal condition in a simulated installation; checked the maintaining of the ionizing parameters through monitoring status via a multimeter.

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Category	ESA/Component for L and M category vehicles at 12/24V DC

**ISO 7637-2 tests****§6.9. of the ECE-R10/05**

Specifications concerning the immunity of ESAs to transient disturbances conducted along supply lines.

**Measuring records at 12V**

Power supply	Operat. Cond.	Tested Pulse	Test Level	Voltage Level	No. pulses/ test time	Requirements / Limit	Test results
+13,5VDC	(#1)	1	III	-75V	5000	[D]	[B] passed
+13,5VDC	(#1)	2a	III	+37V	5000	[D]	[B] passed
+13,5VDC	(#1)	2b	III	+10V	10	[D]	[B] passed
+13,5VDC	(#1)	3a	III	-112V	1 h	[D]	[B] passed
+13,5VDC	(#1)	3b	III	+75V	1 h	[D]	[B] passed
Var.VDC	(#1)	4	III	-6V	1	[D]	[B] passed

- [A] All functions perform as designed during and after exposure to disturbance.  
 [B] All functions perform as designed during exposure to disturbance.  
 All functions return automatically to within normal limits after exposure is removed.  
 [C] All functions return automatically to within normal limits after exposure is removed.  
 [D] All functions do not return automatically to within normal limits after exposure is removed and the ESA is reset by simple "operator/use" action

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Category	ESA/Component for L and M category vehicles at 12/24V DC

## ISO 7637-2 tests

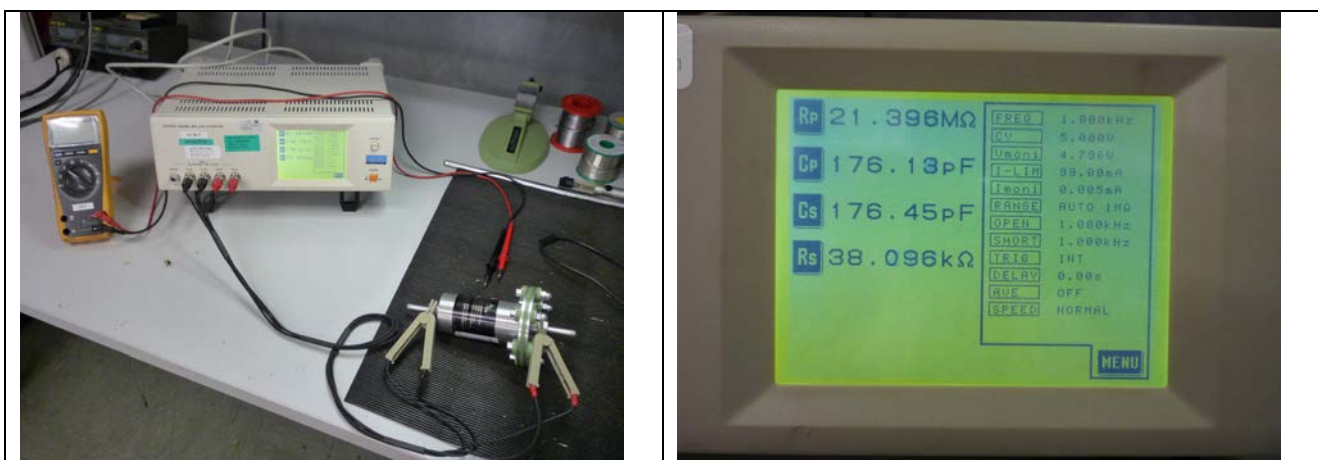
Ionizing voltage characteristic through monitoring status via a multimeter:  
 FLUKE type 177 ref. INTEK ID 0737 P, cal. 2014-05-07 (due 1 year)

During these measures is present a gasoline flux at 2,5 l/min.  
 The component was not powered.

Ref. value before starting ISO pulse tests, measured between the supply terminals	166 mV
after Pulse 1	850 mV
after Pulse 2a	900 mV
after Pulse 2b	900 mV
after Pulse 3a	910 mV
after Pulse 3b	930 mV
after Pulse 4	940 mV

On the Component without gasoline we have also measured the Impedance parameters before and after the ISO pulse test so the following image shown the value saved.  
 The same Impedance parameters are maintained equal at the end of ISO tests.

For this measurement we have used a LCR HiTester by HIOKI mod. 3532-50.  
 INTEK ID 0778 P, Cal. 2013-10-04 Due 2015-10



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## ISO 7637-2 tests

### §6.9. of the ECE-R10/05

Specifications concerning the emission of transient conducted disturbances generated by ESAs on supply lines.

#### Measuring records at 12V

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The measured maximum pulse amplitude has been below the maximum permissible limit indicated in table 2, point 6.9. of the Regulation.

<i>Pulse amplitude (Us)</i>	<i>Limit for Us for severity level</i>	<i>Transient emissions for ESA powered at 12V</i>		<i>Result / Comments</i>
		<i>Slow</i>	<i>Fast</i>	
Positive	+75 V	0 V	0 V	Passed
Negative	-100 V	0 V	0 V	Passed



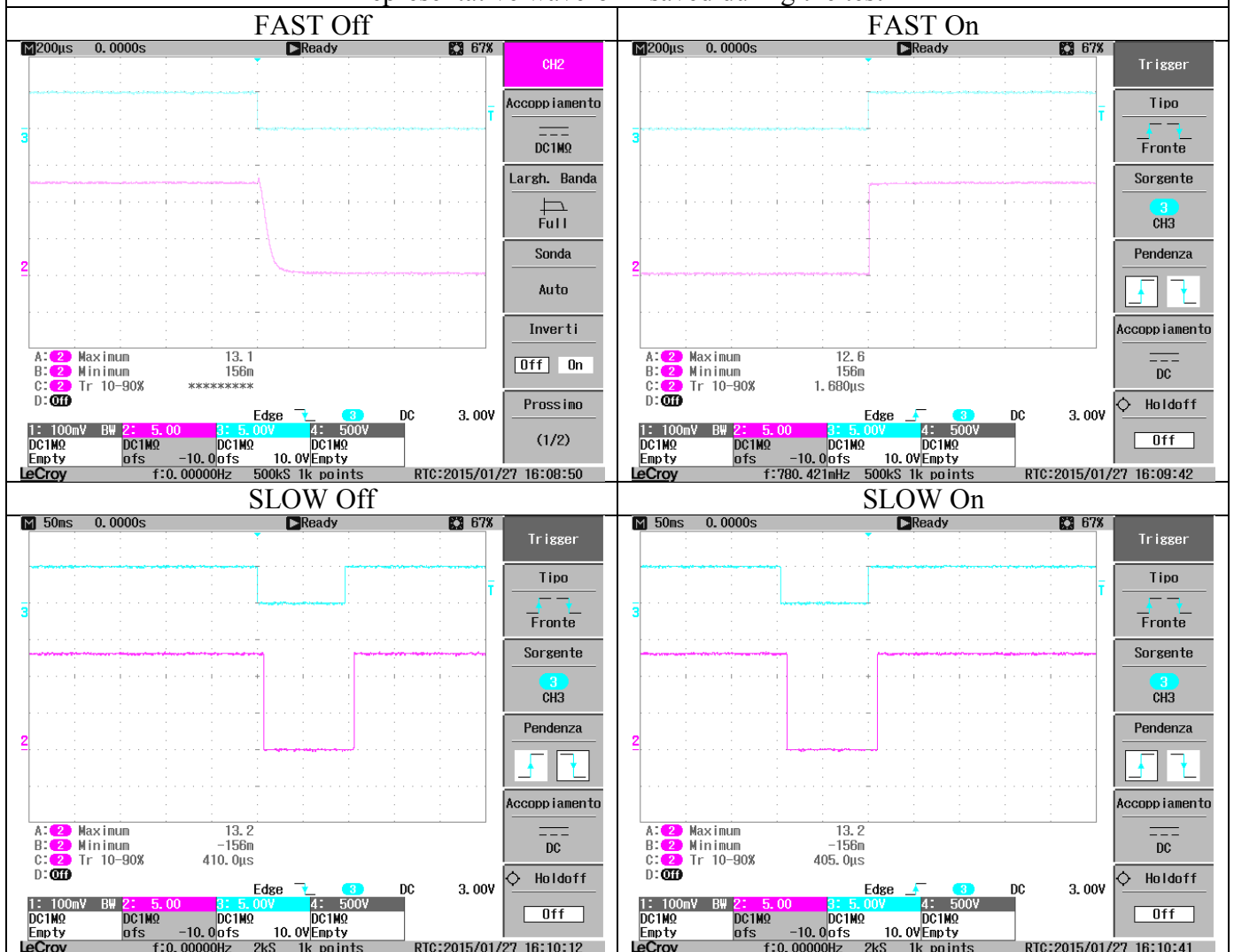
Job Number ref.	MSU448930
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## ISO 7637-2 tests

§6.9. of the ECE-R10/05  
 Specifications concerning the emission of transient conducted disturbances generated by  
 ESA/Component on supply lines.

Measuring records at 12V

Representative waveform saved during the test



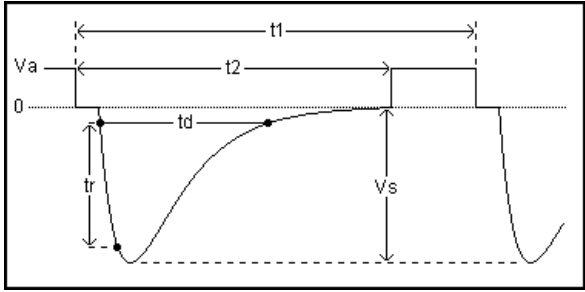
Job Number ref.	MSU448930
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## ISO 7637-2 tests

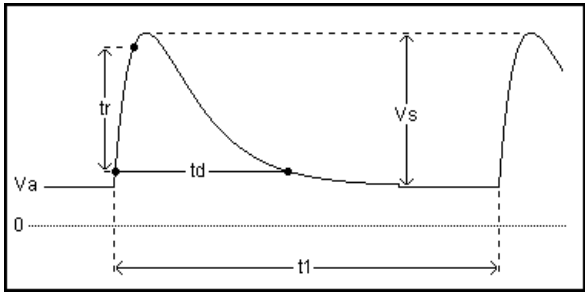
+12 V DC system

Resume of all parameters for each pulse applied on the ESA

Pulse 1 - Test Level III		
Vs:	-75	V
t1:	1	s
t2:	200	ms
tr:	1	us
td:	2000	us
Ri:	10	Ohm
Coupling:	Battery	
Events:	5000	
Test duration:	01:23:20	h



Pulse 2a - Test Level III		
Vs:	+37	V
t1:	0,8	s
tr:	1	us
td:	50	us
Ri:	2	Ohm
Coupling:	Battery	
Events:	5000	
Test duration:	01:06:20	h



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## ISO 7637-2 tests

Pulse 2b - Test Level III		
Vs:	10.0	V
t1:	1.0	s
t6:	1	ms
td:	200	ms
Int:	1.0	s
Ri:	0.0	Ohm
t12:	1	ms
tr:	1	ms
Events:	10	
Test duration:	00:00:28	h

Pulse 3a - Test Level III		
Vs:	-112	V
f1:	10	kHz
t4:	10	ms
t5:	90	ms
tr:	5	ns
td:	100	ns
Ri:	50	Ohm
Coupling:	Battery	
Test duration:	1	h

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## ISO 7637-2 tests

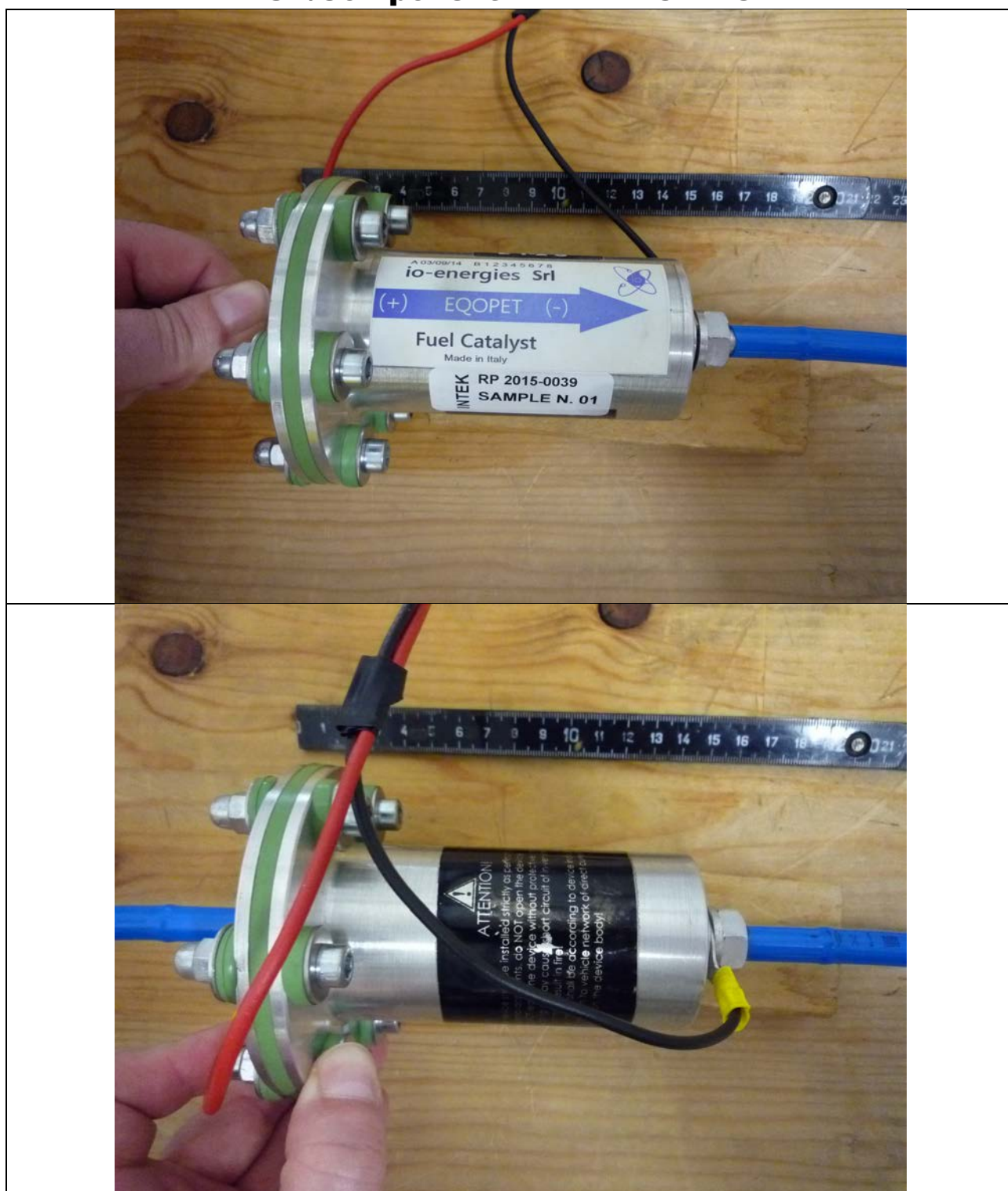
Pulse 3b - Test Level III		
Vs:	+75	V
f1:	10	kHz
t4:	10	ms
t5:	90	ms
tr:	5	ns
td:	100	ns
Ri:	50	Ohm
Coupling:	Battery	
Test duration:	1	h

Pulse 4 - Test Level III		
Va1:	-6.0	V
Va2:	-2,5	V
t1:	1.0	s
t6:	5	ms
t7:	15	ms
t8:	50	ms
t9:	10	s
t11:	5	ms
Events:	1	
Test duration:	00:00:19	h

\*\*\*\*\* END of DOCUMENT \*\*\*\*\*

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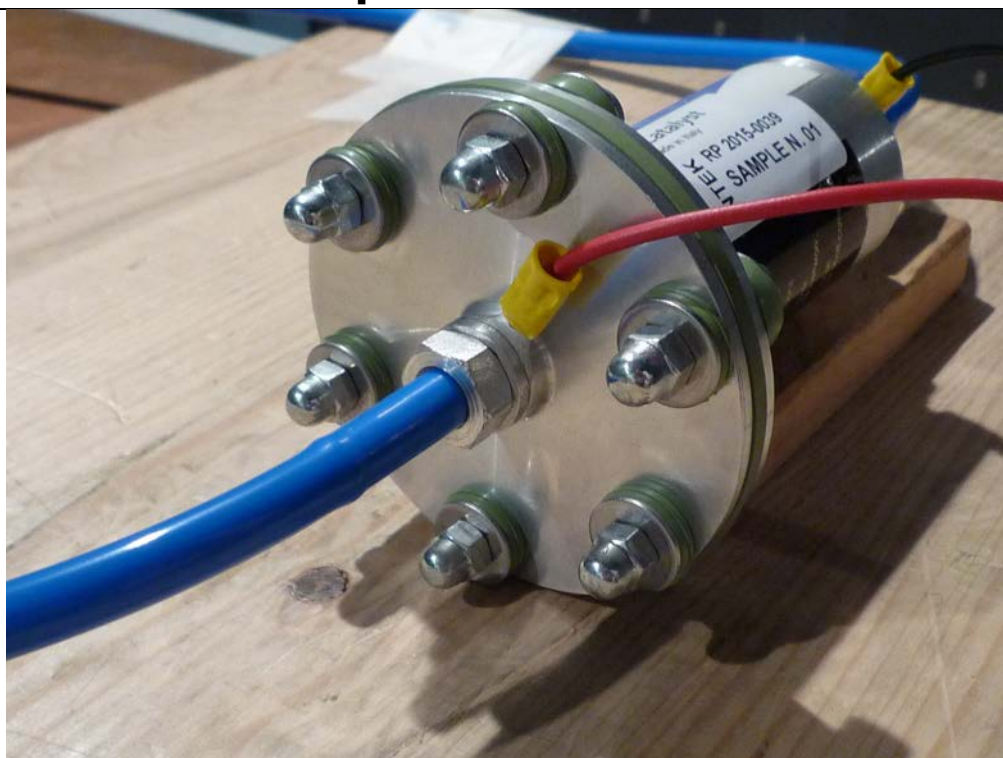
## ESA/Component IDENTIFICATION



## Annex 4

Job Number ref.	MSU448930
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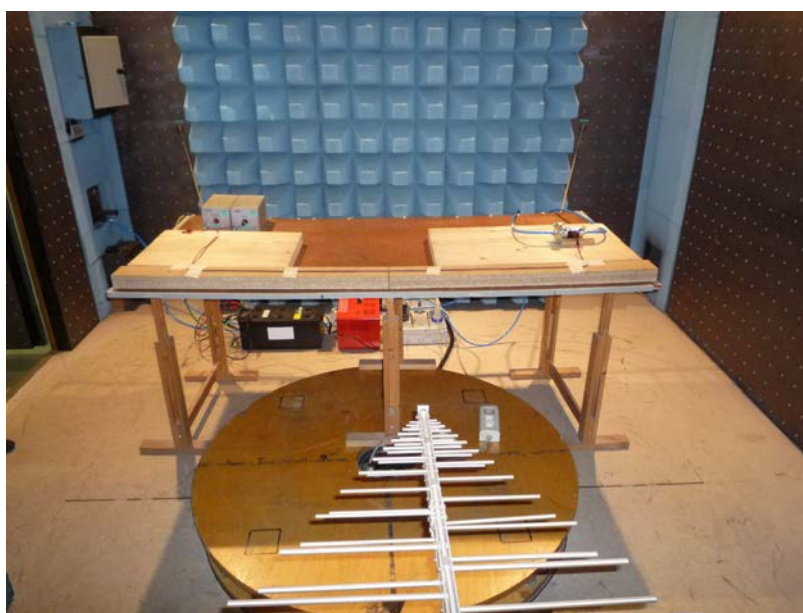
### ESA/Component IDENTIFICATION



## Annex 5

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### Photos of TEST SET-UP



View of the radiated emission test set-up with BiLog antenna



View of the Components under Homologation

## Annex 5

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### Photos of TEST SET-UP



External ancillary equipments used to simulate a normal function



ISO 7637-2 test set-up



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### Photos of TEST SET-UP



Conducted emission test set-up