

# Operating manual

## Leakage detector

### LD 400



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## 2 Important information

Dear customer,

thank you for purchasing our leakage detector **LD400**! Please read these operating instructions thoroughly and observe our notices before performing the commissioning. Only if the described regulations and notices are precisely observed, can the flawless function of the device and the safe operation be guaranteed.

In case of a non-observance or non-compliance, no claims for the resulting damages can be asserted based on the manufacturer's liability.

Any kind of modification of the equipment, provided that it does not correspond to the intended and described processes, will lead to the expiry of the warranty and exclusion of liability.

The device is solely intended for the described purpose.

**CS instruments GmbH** shall not assume any warranty with respect to the suitability for any particular purpose, and shall not assume any kind of liability for errors which are printed in this manual. Nor for consequential damages in connection with the delivery, performance or use of this device.



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### 3 Safety instructions

#### 3.1 About this document

- Read through carefully this documentation and familiarize yourself with the product before putting it to use. Pay particular attention to the safety warnings to prevent injury and product damage.
- Keep this documentation to hand for easy reference when needed.
- Pass on this documentation to any subsequent users of the product.

#### 3.2 Ensure security



- Use the product only appropriate, in accordance with the regulations and within the parameters specified in the technical data. Do not apply force.
- Measure the unit away from or near energized parts!  
Please maintain a sufficient safety distance during the leak checking on electric systems, in order to avoid dangerous electrical shocks!
- Always switch on the device, **before** putting on the headphones! In case of high signal levels (bar graph in the red zone), the volume can be correspondingly high. The volume can be reduced with the help of the sensitivity adjustment.
- Never point the laser directly into the eyes! Absolutely devoid a direct irradiation of the eyes of humans and animals!  
Laser module: according DIN EN 60825-1:2015-07 Class 2 (<1mW)
- Observe the prescribed storage and operating temperatures
- By improper use of the device, the warranty will be lost.

#### 3.3 Environmental protection



- Disposal of faulty rechargeable batteries / empty batteries in accordance with applicable legal regulations
- Lead back the product after the end of the period of use to the separate collection for electric and electronic devices (observe local regulations) or return the product to CS Instruments GmbH for disposal.

## 4 General function description

Noises in the ultrasonic range develop when gases escape from leaks in piping systems (for example, leaking screw connections, corrosion etc.). With the LD 400 even the smallest leaks, which are inaudible to the human ear and also non-visible due to their size, can be detected even if they are several meters away. The LD 400 converts the inaudible ultrasonic to audible frequencies. With the conveniently wearable and soundproof headphones, these sounds can even be perceived in noisy environments. The LD 400 is the further development of the proven LD 300, and is able to perform convincingly through a significantly more sensitive sensor technology as well as an improved support during the leak detecting process.

With the help of an integrated laser pointer, which serves as a targeting device, the leak can be located even more accurately.

The sensitivity of the device can be further improved through the use of a specially designed acoustic trumpet, which can ensure a greater concentration of the sound waves.

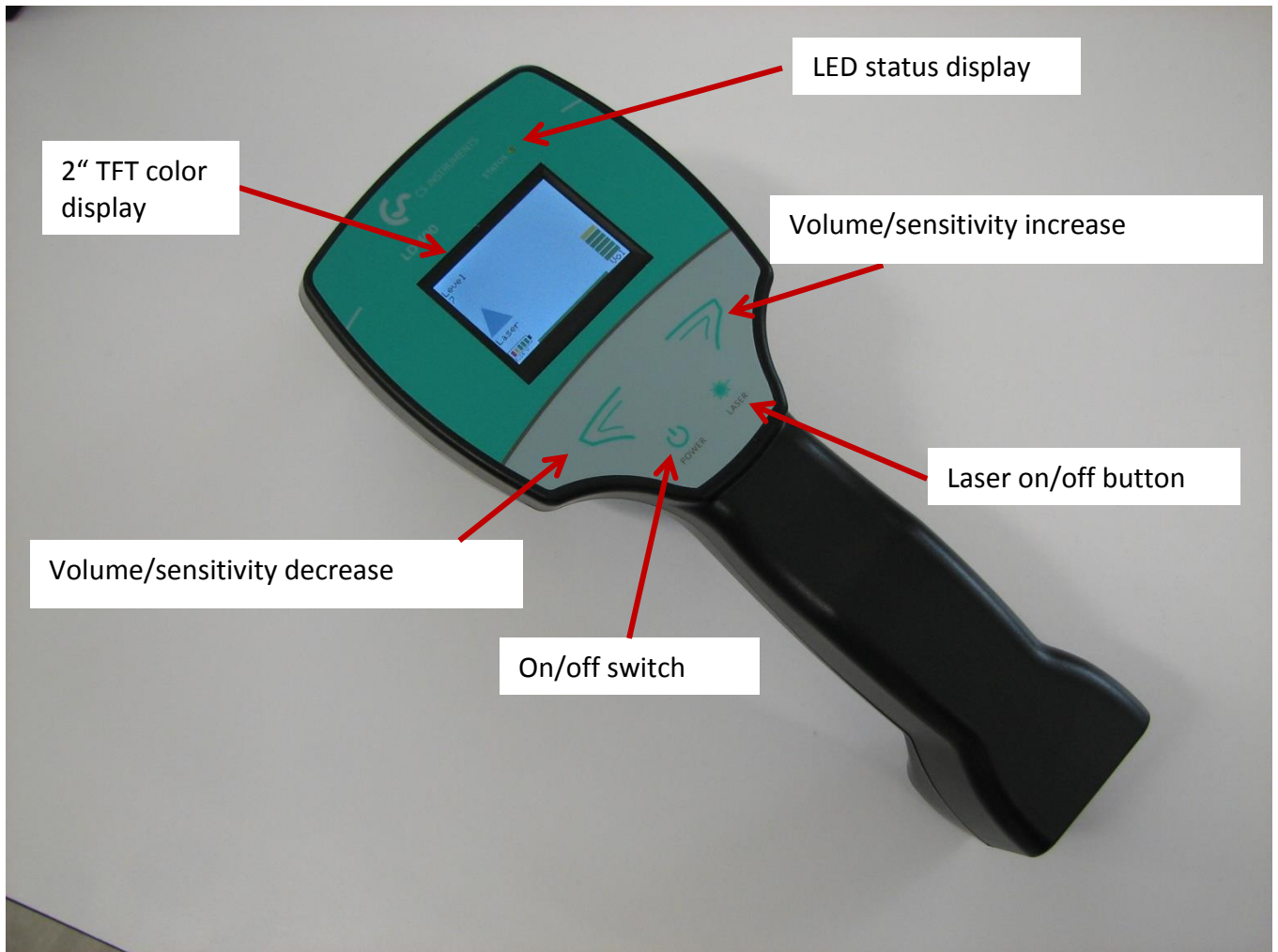
This acoustic trumpet acts as a directional microphone, that suppresses annoying background noises and also facilitates the precise localization of leaks in inaccessible areas.

The internal laser pointer can also be used without restrictions due to the special construction of the acoustic trumpet.

## 5 Device components and controls

### 5.1 The front side

The device components and controls of the front side are described in the following picture.

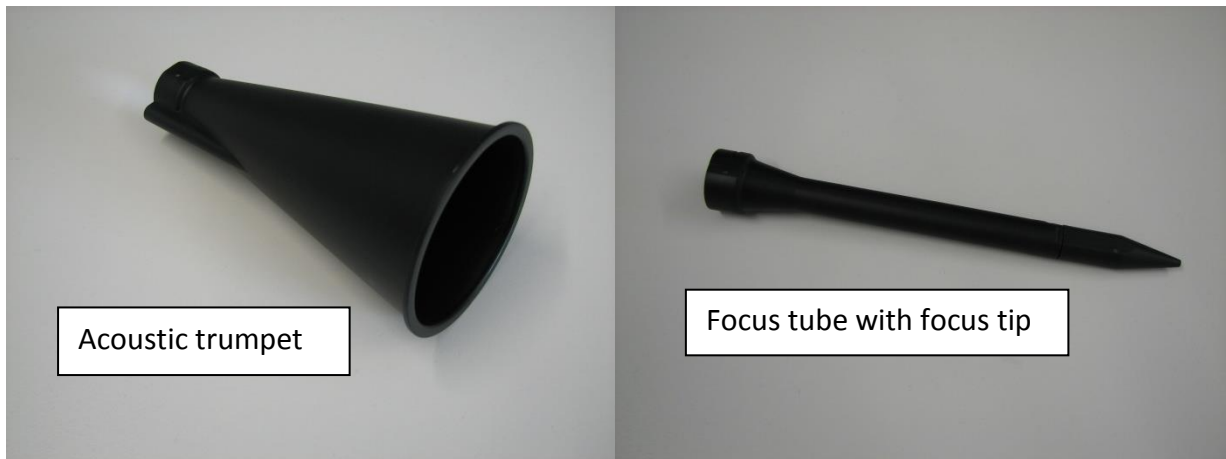


## 5.2 Sensor head and connections



## 6 Accessories

Further accessories are available for the LD400 with which the leak detection can be facilitated and improved.

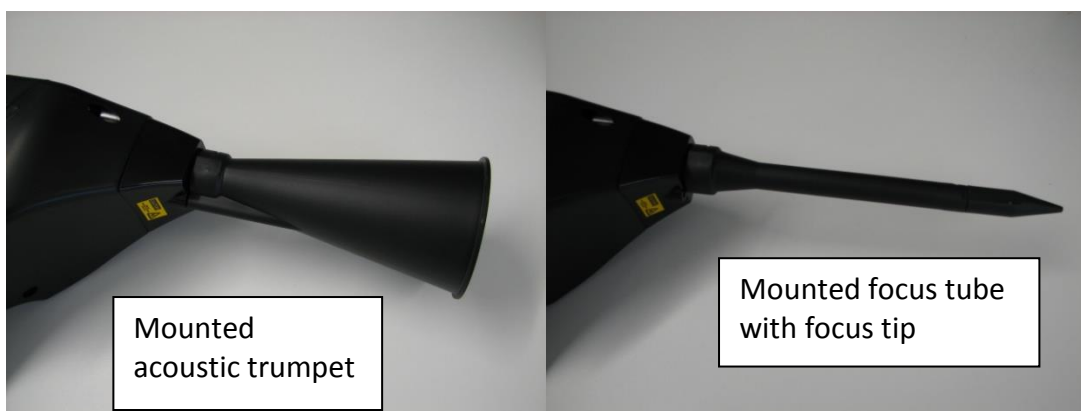


### 6.1 Acoustic trumpet

Through the concentration of sound waves, the acoustic trumpet creates an acoustic amplification which enables a more precise detection of the leak. Through its special design, the integrated laser pointer will remain usable. The acoustic trumpet is simply placed onto the sensor head and slightly twisted until the latch head reaches the stopper. While doing this, please proceed with caution to prevent an over-winding of the cone.

### 6.2 Focus tube with focus tip

The focus tube with the tip is used for the detection of very small leaks, in order to locate and pinpoint them precisely. Just like with the acoustic trumpet, the tube is placed onto the sensor head and latched with a twisting motion.



## 7 Commissioning

### 7.1 Switching-on

A pressing and holding of the on-off-button for about 1s, will switch on the device and a Start-Up sequence will appear on the display. Pressing the button again will switch off the device.

### 7.2 Louder/quieter

With the volume increase and decrease buttons the volume in the earpiece and the sensitivity can be increased or respectively decreased in 16 steps. By pressing and holding the respective button, the value will automatically increase or decrease.

### 7.3 Laser

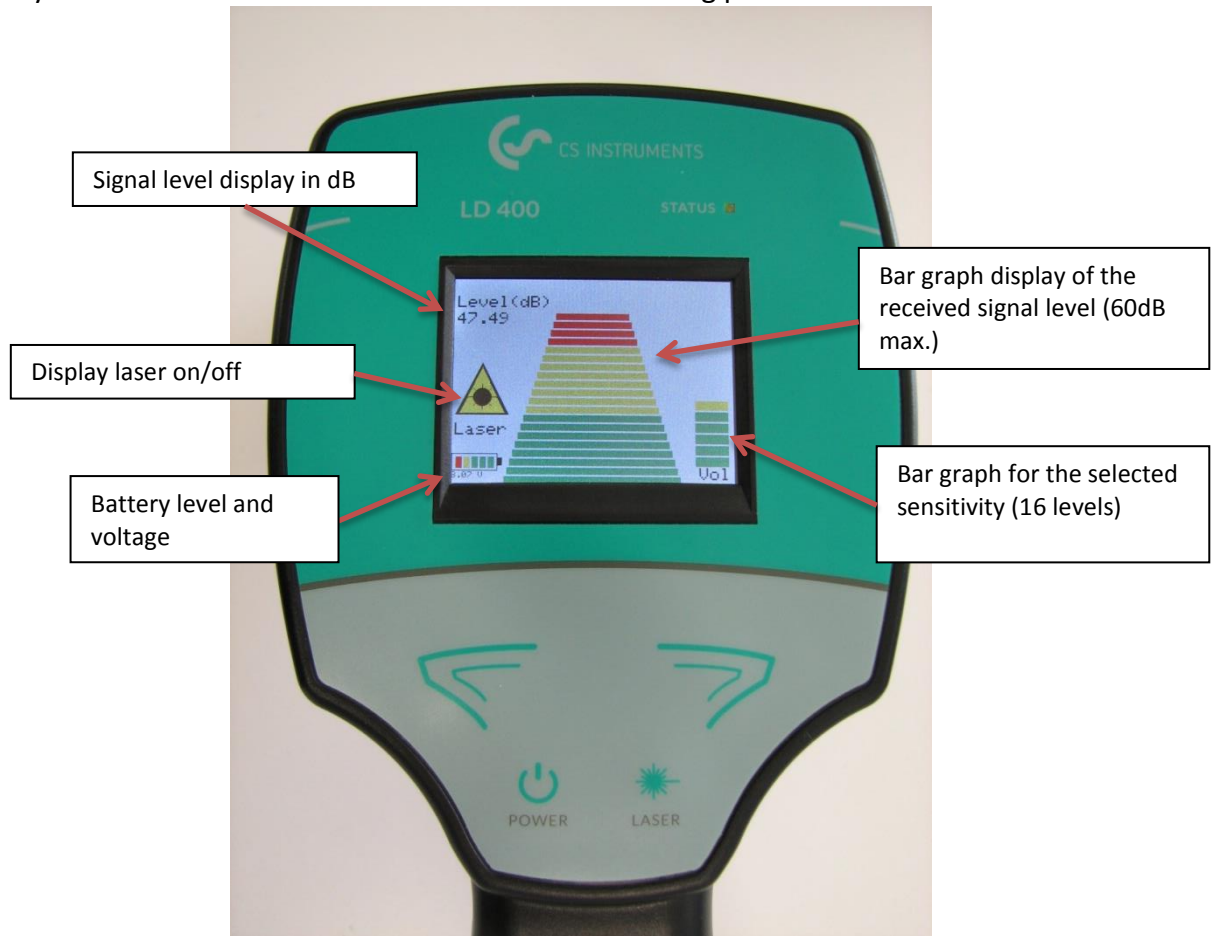
The integrated laser pointer can be switched on or off with the laser on/off button. In the on state, a laser warning symbol will appear in the display. In the off state, the triangle will remain grey.



***Warning: Never point the laser directly into the eyes! Absolutely devoid a direct irradiation of the eyes of humans and animals!***

## 8 Display

The display elements are shown and described in the following picture.



### 8.1 Signal strength (level)

In the middle of the display, a bar graph is displayed depending on the received signal strength. A numerical value of the received signal strength in dB will also appear in the upper-left corner of the display. The max. level to be displayed is **60 dB**.

### 8.2 Volume/sensitivity

The selected volume/sensitivity will appear on the right side in a bar with up to 16 steps.

### 8.3 Battery level

On the bottom left, a battery symbol is displayed with a battery level bar. The current battery voltage in volts is also displayed below it.

## 9 Battery charging

The battery is charged within the device. For this, the supplied plug-in power supply is connected to the built-in charging socket of the LD400 and the 230V socket.



The LD400 checks the charge status of the battery and automatically starts the charging process. The following scenarios are possible:

- If the battery is sufficiently charged, the status LED will flash green after the connection of the power supply and no additional charging will be performed.
- If the charge state of the battery is too low, the charging process will automatically start and the LED will light up red. The charging is automatically discontinued after the battery reaches its full capacity. The LED will then be permanently illuminated in green.
- A red blinking LED signals a charging error. This may have caused during charging outside the valid temperature range (0-40 °C).

### Comment<sup>1</sup>:

Switching on the device during charging, the display will show additionally a progress bar with The text "Charging".

### 9.1 Protection of exhaustive discharge

To protect the Li-ION accumulator of exhaustive discharge the device is switching off automatically if a cell voltage of 6,4V will be reached.

<sup>1</sup> Available with FW-version V1.12

## 10 Applications

The typical applications for the LD 400 include the detection of:

- Leaks in pressure and vacuum systems
- Leaks in containers
- Leakage points in the pneumatic brakes of trucks and trains
- Leaks in piping systems
- Leaks in oxygen connections in hospitals
- Leaks in steam separators - leaky valves
- electrical partial discharges on seals

Also defective bearings in engines and transmissions produce sounds in the ultrasonic range, which can be protected with the LD400.

### ***10.1 Leakage detection in compressed air systems***

Compressed air is one of the most costly forms of energy. In Germany alone, 60,000 compressed air systems are consuming 14.000.000.000 KWh of electricity each year. 15% to 20% of these could easily be saved (Peter Radgen, Fraunhofer Institut, Karlsruhe). Much of these costs are attributable to leaks in compressed air systems. The air simply "escapes" unused.

Large openings can be detected easily (you can clearly hear the hissing sound), but often holes smaller than 1 mm<sup>2</sup> remain undetected because they cannot be heard. The LD 400 is perfectly suited for the detection of these small openings.

The unit is focused on the pipe or the component where leaks are suspected. Initially the sensitivity will be set to half of the full value. The integrated laser will assist the location detection from a certain distance. The sensitivity will then be varied with the volume control until the characteristic sound can be heard.

A significant sensitivity improvement can already be attained with the help of the acoustic trumpet which is already included in the set. Through this, it is possible to determine leakages even from larger distances.

To detect very small openings, a focus tube with a directional tip is attached onto the sensor, and the suspicious points are directly approached in close proximity.

## 11 Special product features

- Ruggedness and low weight ensure a fatigue-free operation within industrial environments
- improved detection of leakages with an optional acoustic trumpet
- modern lithium-ion battery with a high capacity and an external battery charger
- Operating time > 10 h
- simple operation via keypad

## 12 Scope of delivery

The LD400 is available either as a stand-alone device or as a set. The set contains all the components and accessories, which are housed protected in a rugged and shock-resistant transport case.



The following table lists the components with their respective order numbers.

| Description                                           | Order number     |
|-------------------------------------------------------|------------------|
| <b>LD 400 ultrasound detector set, consisting of:</b> | <b>0601 0104</b> |
| LD 400 <b>ultrasound detector basic device</b>        | 0560 0104        |
| Acoustic trumpet                                      | 0530 0109        |
| Soundproof headset                                    | 0554 0104        |
| Focus tube with directional tip                       | 0530 0104        |
| Battery charger                                       | 0554 0009        |
| Transport case                                        | 0554 0106        |
| Operating manual                                      | 0554 0011        |

## Technical Data LD400

|                          |                                                                           |
|--------------------------|---------------------------------------------------------------------------|
| <b>CE</b>                |                                                                           |
| Handheld case dimensions | 263 x 96 x 88 mm                                                          |
| Weight                   | 0.4 kg, complete set in the case approx. 2.8 kg                           |
| Frequency range          | 40kHz (+/- 2kHz)                                                          |
| Power supply             | Internal 7.4 V lithium-ion battery                                        |
| Operating time           | > 10 h                                                                    |
| Operating temperature    | -5 °C to +40 °C                                                           |
| Charging                 | Ext. battery charger (included in the scope of delivery)                  |
| Charging time            | approx. 1.5 h                                                             |
| Storage temperature      | -10 °C to +50 °C                                                          |
| Laser                    | Wavelength 645-660nm, output < 1mW (Laser class 2)                        |
| Connections              | 3.5 mm jack for headphones, power jack for connecting an external charger |

## 13 Performance chart

It shows the detection distance of various hole diameters at different pressures (lab environment).

| <b>Pressure / diameter</b> | <b>0.1 mm</b> | <b>0.2 mm</b> | <b>0.5 mm</b> |
|----------------------------|---------------|---------------|---------------|
| 0.5 bar                    | 2 m           | 2 m           | 10 m          |
| 5.0 bar                    | 8 m           | 14 m          | 18 m          |

## 14 Appendix

In the appendix on the following pages you will find the Declaration of Conformity for the electromagnetic compatibility and the Test Report of the Li-ion batteries used.



## KONFORMITÄTSERKLÄRUNG

### DECLARATION OF CONFORMITY

Wir  
We CS Instruments GmbH  
Am Oser 28c, 24955 Harrislee

Erklären in alleiniger Verantwortung, dass das Produkt  
Declare under our sole responsibility that the product

Ultraschall-Leckagesuchgerät: LD 400  
Leakage detector: LD 400

den Anforderungen folgender Richtlinien entsprechen:  
We hereby declare that above mentioned components comply with requirements of the following EU directives:

|                                                                     |                          |
|---------------------------------------------------------------------|--------------------------|
| Elektromagnetische Verträglichkeit<br>Electromagnetic compatibility | 2014/30/EU<br>2014/30/EC |
| Niederspannungsrichtlinie<br>Low Voltage Directive                  | 2014/35/EU<br>2014/35/EC |

#### Angewandte harmonisierte Normen:

Harmonised standards applied:

|                                                               |                                              |
|---------------------------------------------------------------|----------------------------------------------|
| EMV-Anforderungen<br>EMC requirements                         | EN 61326-1: 2013-07<br>EN 61000-3-2 : 2015-3 |
| Sicherheit von Lasereinrichtungen<br>Safety of laser products | EN 60825-1: 2015-07 Class2 (<= 1mW)          |

#### Folgende Messungen wurden vorgenommen

Following measurements were made:

|                                                                                        |                                     |
|----------------------------------------------------------------------------------------|-------------------------------------|
| Störaussendung<br>Radiated emission                                                    | EN 55011:2011-04 Klasse A / Class A |
| Störfestigkeit<br>Radiated, radio frequency electromagnetic immunity test              | EN 61000-4-3:2011-04                |
| Entladung statischer Elektrizität (ESD)<br>Electrostatic discharge immunity test (ESD) | EN 61000-4-2:2009-12                |

Anbringungsjahr der CE Kennzeichnung: 14

Year of first marking with CE Label: 14

Das Produkt ist mit dem abgebildeten Zeichen gekennzeichnet.  
The product is labled with the indicated mark.



Harrislee, den 19.04.2016

  
Wolfgang Blessing Geschäftsführer

This declaration does not include any assurances regarding characteristics.  
The safety instructions of the accompanying product documentation must be observed.



报告编号(Report ID): H11133012221D~1

## 锂电池UN38.3测试报告

## Lithium Battery UN38.3 Test Report

|                              |                             |
|------------------------------|-----------------------------|
| 样品名称<br>(Sample Description) | Lithium-ion Battery 238700  |
| 委托单位<br>(Applicant)          | Jauch Quartz GmbH-Batteries |
| 生产单位<br>(Manufacturer)       | Jauch Quartz GmbH-Batteries |

No.: H11133012221D  
Code: ssak93kqv

13-DCNV-2

Report ID: H11133012221D~1 Page 1 of 11



Pony Testing International Group

### I. SAMPLE DESCRIPTION

|                      |                             |                                   |               |                        |             |
|----------------------|-----------------------------|-----------------------------------|---------------|------------------------|-------------|
| Sample Name          | Lithium-ion Battery         |                                   | Battery Type  | 238700                 |             |
| Client               | Jauch Quartz GmbH-Batteries |                                   |               |                        |             |
| Manufacturer         | Jauch Quartz GmbH-Batteries |                                   |               |                        |             |
| Nominal Voltage      | 7.2V                        | Rated Capacity                    | 2600mAh       | Limited Charge Voltage | 8.56±0.025V |
| Charge Current       | 1250mA                      | Maximum Continuous Charge Current | 2600mA        | End Charge Current     | 100mA       |
| Cut-off Voltage      | 5.5V                        | Maximum Discharge Current         | 5200mA        | Use                    | ---         |
| Cells Number         | 2PCS                        | Cell Model                        | 18650         | Rated Capacity         | 2600mAh     |
| Manufacturer of cell |                             | Samsung SDI Co., Ltd              |               |                        |             |
| Chemical component   |                             | Li-Ion                            |               |                        |             |
| Client date          | 2013-11-12                  |                                   | Finished date | 2013-12-02             |             |

### II. REFERENCE METHOD

《United Nations Recommendations On The Transport Of Dangerous Goods, Manual Of Tests And Criteria》(ST/SG/AC.10/11/Rev.5/Amend.1).

### III. TEST ITEM

- |                        |                           |
|------------------------|---------------------------|
| 1. Altitude simulation | 5. External short circuit |
| 2. Thermal test        | 6. Impact                 |
| 3. Vibration           | 7. Overcharge             |
| 4. Shock               | 8. Forced discharge       |

### IV. CONCLUSION

| IV. CONCLUSION         |                |          |            |
|------------------------|----------------|----------|------------|
| ITEM                   | SAMPLE NUMBER  | STANDARD | CONCLUSION |
| Altitude simulation    | N1~N4<br>C1~C4 | UN38.3   | PASS       |
| Thermal test           |                |          | PASS       |
| Vibration              |                |          | PASS       |
| Shock                  |                |          | PASS       |
| External short circuit |                |          | PASS       |
| Impact                 | N9~N13         |          | PASS       |
| Overcharge             | N5~N8 C5~C8    |          | PASS       |
| Forced discharge       | N14~N23 C9~C18 |          | PASS       |

The submitted battery and component cell were complied with the UN Manual of Tests and Criteria, Part III, sub-section 38.3.

Prepared by: *Peng Wei Kun*

Checked by: *cheng peng* Approved by: *P. J. Yan*

Approval Date: December 2, 2013

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