

# **VLD TESTER**

**VT-120-S01**

## **Installation and Usage Instructions**

These installation and usage instructions contain the information necessary for the proper installation, commissioning, operation and maintenance of the product. If further detailed information regarding the usage and servicing of the product is required, contact the manufacturer or its representative.



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# 1 General provisions, definitions

## 1.1 Manufacturer's declaration

The manufacturer declares that if the product is used in a manner other than that specified in this manual, it may malfunction or be damaged or destroyed. The manufacturer shall not be liable for any damage resulting from the use of the product in a manner other than that specified in this manual. Any other use or connection of the product, except for the procedures and connections specified in the manual, is considered incorrect and the manufacturer shall not be liable for the consequences caused by such actions. The manufacturer shall not be liable for damage to or destruction of the product caused by the improper placement, installation, incorrect operation or use of the product contrary to these instructions. The manufacturer shall not be liable for the malfunction of, damage to or destruction of the product resulting from unprofessional replacement of parts or the use of non-original spare parts. The manufacturer shall not be liable for the loss of or damage to the product due to natural disasters or other natural circumstances.

The Declaration of Conformity/Product Safety Assurance can be downloaded from the manufacturer's website at [www.saltek.eu](http://www.saltek.eu).

## 1.2 Abbreviations, acronyms, terms and definitions

The product was developed, manufactured and tested in accordance with the requirements of European standards, in particular EN 61010-1, and this manual primarily uses definitions, abbreviations and technical terms based on these standards.

# 2 Safety

## 2.1 Use of the product, user qualifications

The VT-120-S01 product is intended for testing the functionality of Class 2 voltage limiters (SALTEK BVL series), particularly for railway DC power supply systems up to a nominal voltage of 3 kV. Only personnel with the necessary electrical engineering qualifications for working on electric traction, familiar with the function of the product and its correct use are authorised to use it. Unauthorised and incorrect handling of the product can cause serious damage to property, health and life.

## 2.2 Symbols and important instructions

### 2.2.1 Symbols used in the text

Pay special attention to information marked with the following pictograms:



Important information to ensure the correct functioning of the product and the safety of the product operator and those who may come into contact with the equipment being tested. It is essential to follow all instructions marked in this way to avoid damage to property, railway infrastructure, health and life.



Risk of electric shock. This symbol draws attention to important instructions that must be followed to prevent electric shock during product installation, operation and maintenance.



Notice of important information for product operation.

## 2.2.2 Symbols used on the device

The device is marked with the following safety and information pictograms:



Before using and handling the product, read the installation and usage instructions.



**125 V DC MAX**  
**220 mA DC MAX**  
**10 W MAX**

Maximum output voltage, current and power at EARTH and RAIL terminals.



The product must be disposed of in an environmentally friendly manner in accordance with electrical waste recycling regulations.



The product complies with the relevant EU requirements.



The product is equipped with reinforced insulation between hazardous live parts and accessible parts.

## 2.3 Safety precautions

Product safety – the VT product series has been developed and manufactured based on the latest technical and technological knowledge, using modern electrical and electronic components and with a focus on ensuring the maximum safety of the product operator as well as the railway infrastructure and technology, people and animals that may come into contact with it. In order to ensure the maximum level of protection, it is necessary in particular to:

- only use the product for the purpose for which it is intended
- use the product in accordance with the instructions given in the installation and usage instructions, with which the persons operating the product must be familiarised
- prevent unauthorised persons from using the product
- if the product is damaged (e.g. due to excessive overloading, etc.), immediately have the damaged parts inspected by a professional or completely replace the product with a defect-free device



During installation, operation and maintenance, observe the principles and standards of safe work on electrical equipment, in particular EN 50110 (or the relevant national version of the standard).



The device contains a rechargeable battery – the guidelines for handling devices containing batteries must be followed.

### 3 Product description

#### 3.1 General product description

The VT-120-S01 is a portable tester used to verify the functionality of Class 2 VLDs (SALTEK BVL 45/60/120 series). After connecting the disconnected VLD and selecting the correct type, pressing the START TEST button will measure the triggering voltage and then the leakage current at the withstand voltage. The result is shown by the relevant LED lighting up and the results are displayed on the LCD.

#### 3.2 Dimensions

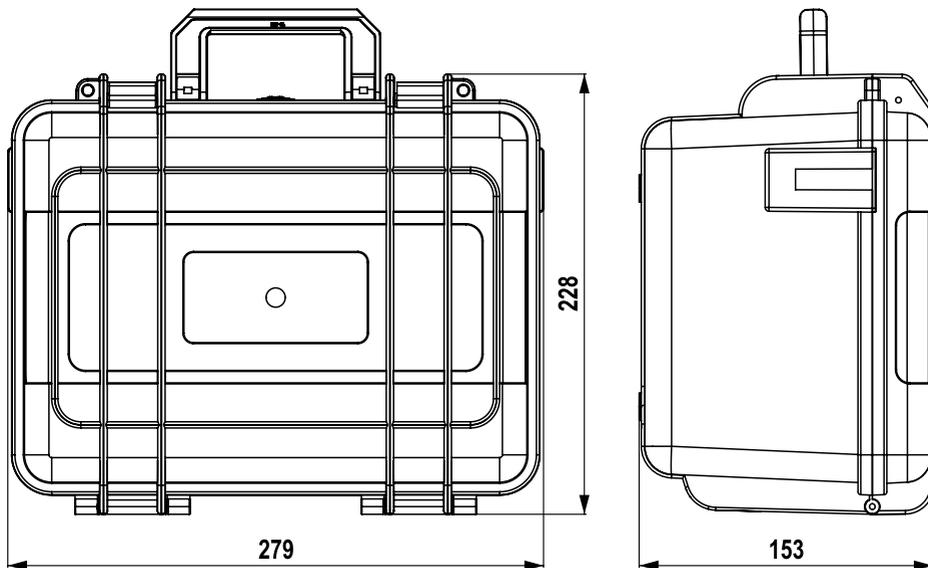


Fig. 1: Dimensions

### 3.3 Control panel

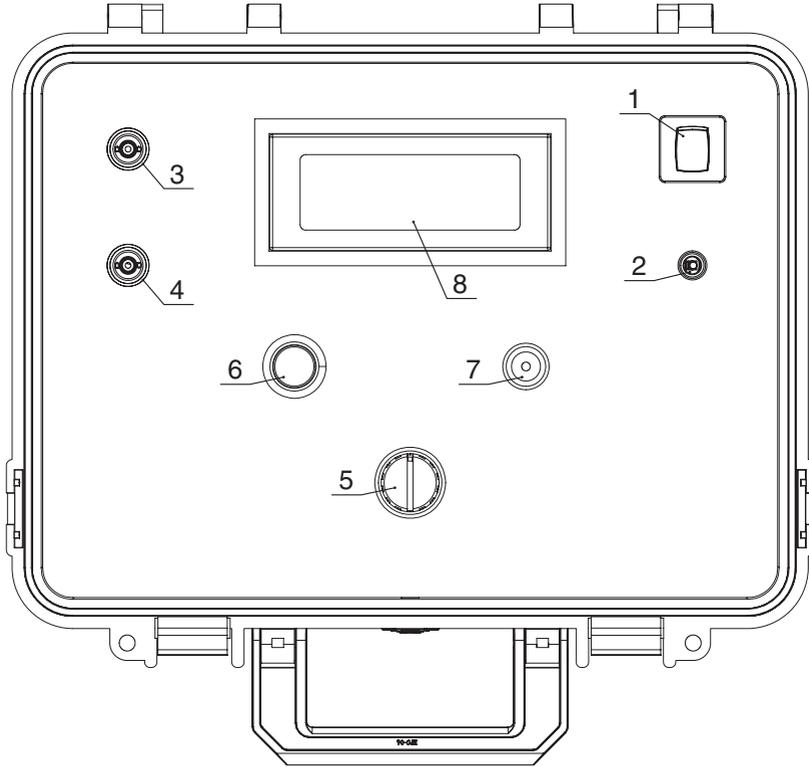


Fig. 2: Control panel

1	POWER switch (turns the device on/off)
2	Battery charging connector
3	RAIL connector/terminal
4	EARTH connector/terminal
5	VLD TRIGGERING VOLTAGE rotary switch (VLD starting voltage setting)
6	START TEST button (start diagnostic)
7	LED (indicates testing result)
8	Display (shows measurement results and additional information)

## 4 Transport and storage

The product is a sensitive electrical and electronic device. Do not expose it to strong shocks or excessive humidity and temperatures. The limits for storage and transportation of the product are:

Storage temperature range: -20 to +60 °C



Longer term storage may cause a decrease in the battery capacity. Recommended storage temperatures are -20 to +40 °C for 1–3 months, and -20 to +20 °C for 3–12 months.

Humidity range: 10 to 70 %

Protect the product from falling or overturning!

When receiving the product from the carrier, check that the packaging is not damaged and that it does not show signs of a fall/impact, etc. If you find any signs of damage, contact the carrier or distributor.

Storage of the unpackaged product is only possible in a dry and temperature-controlled warehouse.



Do not use a product that has been dropped or otherwise visibly damaged during transport, or has been exposed to extreme temperatures or other influences that could result in damage to the electrical and electronic components of the product! There is a risk of injury!

The standard delivery includes:

- VT-120-S01
- installation and usage instructions
- charger
- measuring cable (x2)



After unpacking, check the delivery is complete



After unpacking the product, let it acclimatise for at least 2 hours.

## 5 Commissioning

Before using the tester, charge the built-in batteries. Connect the charger supplied with the device to the CHARGE connector and let it charge until the battery is fully charged (charging is indicated by a yellow LED, full charge by a green LED on the charger). We recommend charging with the tester turned off.



Do not use a charger other than the one supplied with the tester by the manufacturer to charge the battery – there is a risk of damage to the batteries, the device and, in extreme cases, a risk of fire or injury. Do not use the device while it is charging.

## 6 Testing procedure

### 6.1 Testing principle and tested parameters

For a Class 2 VLD, the following parameters are essential for assessing the operational condition according to the EN 50526-2 standard:

- $U_T$  - triggering voltage (real value)
- $U_{Tn}$  - nominal triggering voltage (specified by the manufacturer)
- $T_R$  - response time of thyristors
- $U_W$  - non-triggering voltage
- $I_L$  - leakage current

These parameters are measured and analysed automatically in the VT-120-S01 in the following phases:

1. Setting a test voltage of approximately 5–10 % (depending on the VLD type) higher than the  $U_{Tn}$  specified by the manufacturer and verifying whether the thyristor of the relevant polarity in the VLD is activated (switched on) within the specified time interval. The response time  $T_R$  is also evaluated along with the voltage. This is measured for both polarities.
2. Setting a test voltage of approximately 5–10 % (depending on the VLD type) lower than the  $U_W$  specified by the manufacturer and checking that the VLD does not activate. At the same time, the leakage current  $I_L$  is measured and compared with the maximum permitted value. This is measured for both polarities.

## 6.2 Test evaluation

For the duration of the test, the **orange LED** is lit to indicate the progress of the test.

If the VLD function is in accordance with the standard and therefore fully functional, the **green LED** will light up and the display will show “TEST OK” and the selected values ( $t_{on}$  – time to switch on,  $i_L$  – leakage current).

If non-compliance with the standard is detected during the test, the **red LED** will light up indicating a defective VLD. At the same time, the display will show “FAILED!” and an error message (see Chapter 6.3). In this case, it is necessary to replace the VLD (or have it checked in the manufacturer’s laboratory).

## 6.3 Error messages

- **ERROR** – damage or device error, do not perform measurements! If the message persists even after restarting the device, contact the seller or distributor.
- **NOT TRIGGERED** – the circuit may be open, the VLD did not switch on (damage, type set incorrectly) or the switch on occurred after more than 5 ms.
- **SHORT CIRCUIT** – the circuit is shorted or the switching was done too quickly.
- **OVERCURRENT** – the current flowing at  $U_W$  exceeds the limit of 5 mA due to damage or the VLD was set incorrectly (the set  $U_W$  exceeds the  $U_T$  of the product).

## 6.4 Off-track VLD testing procedure

1. Open the tester case and connect the included test cables to the RAIL and EARTH terminals.
2. Turn on the device by pressing the POWER button. The display backlight will turn on. If the display indicates low battery, it must be charged first (see Chapter 5).
3. Use the VLD TRIGGERING VOLTAGE rotary switch to set the test parameters depending on the VLD type being tested
  - a. Position 45 –  $U_{Tn} = 45$  V (BVL-xxx-45-xxx)
  - b. Position 60 –  $U_{Tn} = 60$  V (BVL-xxx-60-xxx)
  - c. Position 120 –  $U_{Tn} = 120$  V (BVL-xxx-120-xxx)



The VLD type can be found on the nameplate of each BVL.

4. Connect the test leads to both terminals of the VLD under test (polarity does not matter).
5. Press the START TEST button to start the test process and wait for the result (see Chapter 6.2). The test information is shown on the display, then the tester automatically enters the ready state for the next measurement.
6. Disconnect the test leads from the VLD under test.



During the test, do not touch the metal parts of the test leads or the VLD under test. During the test, a test voltage of up to 125 V DC may appear on the metal parts! For the same reason, before the test make sure that the test leads and no part of the VLD under test are connected to other conductive objects.

## 6.5 Procedure for testing an already installed VLD along the track



For reliable testing results and to ensure the safety of the tester operator and other people and technology around the track, it is necessary to disconnect the ungrounded VLD terminal from the track. The main reasons for this measure are:

- a. The risk of high touch voltage that may occur during measurements on the connected rail (due to a traction failure or even due to normal train operation in a given traction section) and the resulting risk of injury or even death to personnel performing the VLD test (especially if the tested VLD is non-functional).
- b. Risk of damage to the tester due to the effect of track voltage potentials during measurement.
- c. High probability of test result distortion due to the presence of external sources of track potential.
- d. Distortion of the test result due to imperfect insulation of the tracks from the protective earth (e.g. contamination of the ballast, crossing with other roads, damaged insulating elements between the track and the rail bed, etc.). The parallel presence of impedance between the track and the protective earth mainly affects the size of the measured leakage currents.

Testing procedure:

1. Bypass the conductively installed VLD, i.e. connect the tracks and the protected infrastructure with an external cable with sufficient cross-section. This will prevent the risk of injury when disconnecting the VLD or testing it yourself.

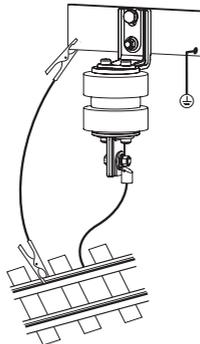


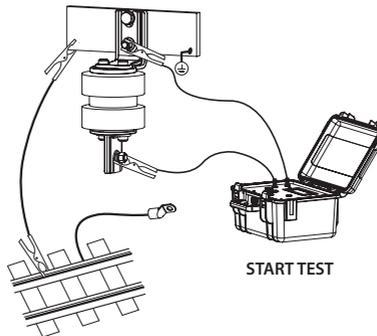
Fig. 3: VLD bridging (point 1)

2. Disconnect the cable connecting the VLD terminal to the rail (the second, grounded terminal can remain connected, i.e. there is no need to remove the VLD from the bracket).
3. Open the tester case and connect the included test cables to the RAIL and EARTH terminals.
4. Turn on the tester with the POWER button. The display backlight will turn on. If the display indicates low battery, it must be charged first (see Chapter 5).
5. Use the VLD TRIGGERING VOLTAGE rotary switch to set the test parameters depending on the VLD type being tested
  - a. Position 45 –  $U_{Tn} = 45 \text{ V}$  (BVL-xxx-45-xxx)
  - b. Position 60 –  $U_{Tn} = 60 \text{ V}$  (BVL-xxx-60-xxx)
  - c. Position 120 –  $U_{Tn} = 120 \text{ V}$  (BVL-xxx-120-xxx)



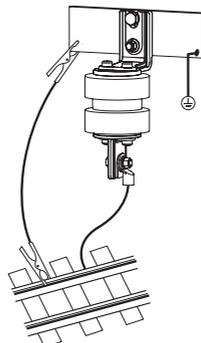
The VLD type can be found on the nameplate of each BVL.

6. Connect the test leads to both terminals of the VLD under test (polarity does not matter).
7. Press the START TEST button to start the test process and wait for the result (see Chapter 6.2). The test information is shown on the display, then the tester automatically enters the ready state for the next measurement.



**Fig. 4:** Disconnecting the VLD from the track (point 2), connecting and starting the tester (points 3–7)

8. Disconnect the test leads from the VLD under test and turn off the tester.
9. Connect the free VLD terminal back to the rail.



**Fig. 5:** Disconnecting the tester and connecting the VLD back to the track (points 8 and 9)

10. Remove the external shorting cable between the track and the protected infrastructure.

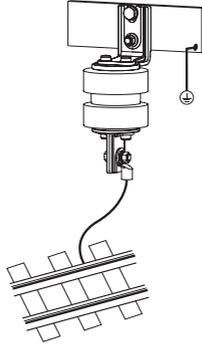


Fig. 6: Returning the VLD to its original state (point 10)



During the test, do not touch the metal parts of the test cables or the VLD under test. During the test, a test voltage of up to 125 V DC may appear on the metal parts!

## 7 Maintenance

The device does not require any special maintenance. The product must not be disassembled by unauthorised persons.

### 7.1 Cleaning

To clean the surface of the device or accessories, use a soft, damp cloth. Allow to dry completely before using again.

### 7.2 Accessory specifications

If it is necessary to replace the supplied accessories, the following type designation must be observed for correct and safe function:

- testing cables
  - cable: SLK-4A-XXX
  - crocodile clip: FCR79900RB
- charger: Mascot 3546 LI 4-cell

## 8 Technical data

Parameter name / Product type	VT-120-S01
Number of adjustable measurements (positions)	3
Output voltage range	35 - 125 V
Maximum output current	220 mA
Automatic discharge of the measured object	no
Battery accumulator	Li-ion 12,6 V, 6800 mAh
Charging adapter power supply	100 - 240 V AC, 50 - 60 Hz
Charging time	4 h
Battery life / number of measurements	8 h / 100+
Display type	LCD
Weight	2,5 kg
Location (when charging)	Inside
Location (in operation)	Outdoor
Temperature range (charging) (min/max)	10 °C / 45 °C
Temperature range (operating) (min/max)	-10 °C / 40 °C
Altitude	up to 4000 m above sea level
Relative humidity (min/max)	10 % / 95 %
Pollution degree (IEC 60664-1)	2
Degree of protection (lid closed)	IP 57
Degree of protection (lid open)	IP 20
Degree of mechanical resistance	IK 08 (5 J)
According to standard (as amended)	EN 61010-1, EN IEC 61326-1
Order number	A07125





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