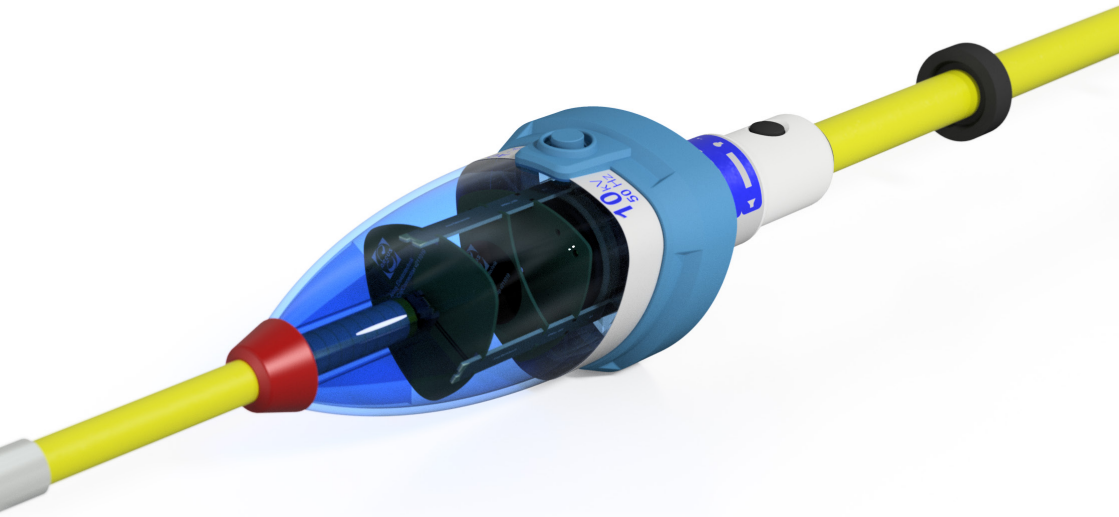
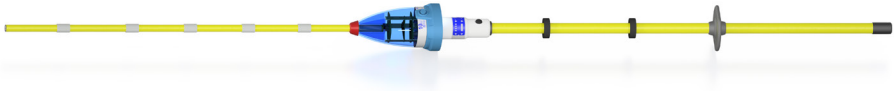
INSTRUCTIONS FOR USE

GA246GB-05.26

EN





ARCUSUNI
Capacitive Voltage Tester
50 Hz

Legal Notice

Table of Contents

IMPORTANT

READ CAREFULLY BEFORE USE

KEEP FOR FUTURE REFERENCE

1 General Information

The ARCUSUNI is a capacitive voltage tester of the complete type, which indicates the presence or absence of operating voltage in switchgear and/or on overhead lines.

Please note: The ARCUSUNI is available in various versions. Your voltage tester may therefore differ from the illustrations below.

1.1 EU Declaration of Conformity

The voltage tester complies with European directives as well as the supplementary national and international requirements. Conformity is indicated by the CE marking.

CE

1.2 Applicable directives and standards

Directives

- EMC Directive (2014/30/EU)
- RoHS Directive (2011/65/EU)
- WEEE Directive (2012/19/EU)

Standards

- **IEC 61243-1:2021** Live working – Voltage testers
  Part 1: Capacitive type for AC voltages above 1 kV
- **EN IEC 61326-1:2021** Electrical measuring, control, regulation and laboratory equipment – EMC requirements, General requirements

1.3 Symbols

The following symbols may appear in the Instructions for Use and on the voltage tester and must be observed:

Table 1: Overview of symbols

Symbol	Meaning
	System type: effectively single-point earthed single-phase system (railway power lines)
	System type: effectively centre-earthed single-phase system (railway power lines)
	System type: effectively star-point earthed three-phase system (overhead lines and switchgear)
	Marking of auxiliary equipment and tools for working on live parts in accordance with IEC 60417-5216
	Indoor type: for use in dry conditions; typically indoors
	Outdoor type: for use during precipitation; suitable for indoor and outdoor use
	Visual signal
	Acoustic signal
	Continuous signal
	Alternating signal
	Rising and falling signal

Symbol	Meaning
	Siren
	Melody
	STOP: Operating voltage present
	OK: No operating voltage present
	Dispose of at local return and collection points (WEEE Directive 2012/19/EU)
	Follow the Instructions for Use
	Battery type
	CE marking

2 Safety

2.1 Intended use

Use the voltage tester exclusively to check for operating voltage in switchgear and/or on overhead lines.

Intended use includes compliance with all information provided in these Instructions for Use.

Any use beyond the intended use is considered misuse.

2.2 Improper use

The voltage tester must not be used as follows:

- in factory-assembled, type-tested switchgear in accordance with IEC 62271
- in systems without a neutral point
- on overhead contact systems of electric railways (contact wire)

2.3 Presentation of warning notices

Warning notices alert you to risks and inform you on how to avoid them. You will find warning notices before steps that involve hazards. Follow all warning notices.

Warning notices are presented as follows:

⚠ DANGER

This format indicates a hazardous situation where **failure to heed** the warning notice **will result in death or serious, irreversible injury**.

⚠ WARNING

This format indicates a hazardous situation where **failure to heed** the warning notice **could result in death or serious, irreversible injury**.

⚠ CAUTION

This format indicates a hazardous situation where **failure to heed** the warning notice **could result in minor or moderate injuries**.

NOTICE

This format indicates a situation where **failure to heed** the notice could result in **damage to property**.

2.4 Safety instructions

The voltage tester is designed in accordance with the state of the art and current health and safety requirements. Nevertheless, residual risks remain which require careful handling.

The residual hazards and the resulting conduct and measures are listed below.

2.4.1 Danger from electric current

To avoid dangerous situations caused by electric current, you must strictly observe the following safety instructions:

Use

- Use the voltage tester exclusively for the nominal voltage, nominal frequency and corresponding system type specified in the Section *Technical Data* and on the voltage tester's label.
- Use the voltage tester exclusively to indicate the presence or absence of operating voltage in switchgear and/or on overhead lines.
- Observe the measures to be carried out in accordance with DIN EN 50110-1 regarding the establishment and verification of a de-energised state when working on electrical installations.

Type

- Use the voltage tester only with the associated insulating rods (see labels on head section and insulating rod).
- Only use a voltage tester of the indoor type in dry conditions.
- Only use the voltage tester during precipitation [FH7.1]if both the head section and the insulating rods are of the outdoor type.
- Do not apply voltage to voltage testers of the outdoor type for longer than 1 minute continuously during precipitation.

Contact electrode

- Only use fork contacts after consulting ARCUS (see back cover for contact details). There is a risk that the bridging safety (protection against flash-overs) will be compromised.
- Do not stick any external labels onto the contact electrode extension. There is a risk that the bridging safety will be compromised.

2.4.2 Danger due to lack of user qualification

To avoid dangerous situations caused by a lack of user qualification, you must strictly observe the following safety instructions:

Basic requirements

- The use, maintenance and servicing of the voltage tester must be carried out exclusively by skilled persons and instructed persons in accordance with DIN EN 50110-1 (see Section 9.3.1 for definition).
- To avoid accidents and health hazards, ensure you receive training on safe use before using the voltage tester for the first time.
- Only persons who can be expected to carry out their work reliably are authorised to use the voltage tester.
- Persons whose reaction times are impaired, e.g. by drugs, alcohol or medication, are **not** authorised to use the voltage tester.

Legal and regulatory requirements

In addition to these Instructions for Use, please observe the relevant national laws, regulations, standards, and internal company regulations in the currently applicable version, e.g.:

- Country-specific training guidelines for skilled persons
- EN 50110-1 Operation of electrical installations – Part 1: General requirements
- Relevant regulations of the employers' liability insurance associations

2.4.3 Danger due to incorrect test results

- Please note that if the system's **operating voltage is reduced** (e.g. 20 kV instead of 110 kV), the voltage tester's indication [FH9.1]may be false de-pending on the nominal voltage.
- Please note that only contact with an uninsulated part of the system ensures a correct indication. Contact with a **coated** part of the system under test may result in a **false** indication.
- In the case of **intricate and/or complex conductor arrangements**, check for a clear indication, as stray fields and interference voltages may occur with such arrangements.
- In systems with capacitors, wait for the **discharge times** to elapse before con-firming the absence of voltage.
- Information on discharge times is provided by the manufacturer, must be defined by the operator and, where applicable, must be clearly indicated. For stationary capacitor banks, you can find the discharge times in the VDE 0560 series of standards.
- Ensure that the voltage tester is not guided near, between or along **conductive parts at the same potential**, which form an area of equal potential. This may result in a false indication; in the worst case, indicating the absence of voltage on live parts.

3 Description

3.1 Construction

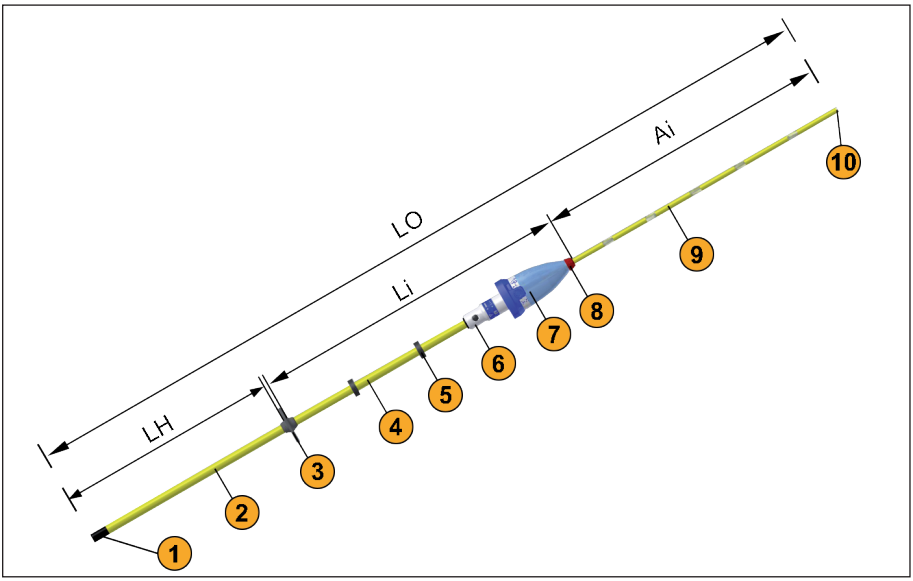


Figure 1: Construction of the ARCUSUNI

Legend

1 Protective cap or coupling for handle extension (depending on the version)
2 Handle (length LH)
3 Hand guard
4 Insulating part (length Li)
5 Rain sheds
6 Coupling and battery compartment
7 Indicator unit / housing
8 Limit mark
9 Contact electrode extension
10 Contact electrode

} Head section

The voltage tester is made up of several parts and consists of a single- or multi-part insulating rod with a handle and a head section with an indicator unit.

The voltage tester must be held by the **handle** (2) (length LH) during the voltage test. Depending on the version, there is either a **protective cap** (1) or a **coupling** at the end of the handle for attaching a handle extension.

The **hand guard** 3 separates the handle from the **insulating part** 4 . The hand guard is a safety device designed to prevent the hands from slipping and coming into contact with the insulating part.

The insulating part (length Li) provides the necessary insulation and the required safety distance from the system part being tested for the absence of voltage.

Depending on the version, the **rain sheds** 5 attached to the insulating part provide protection during precipitation.

The insulating part can be attached to the indicator unit via the **coupling**. 6

The **button** 11 for switching the voltage tester on and off is located on the **indicator unit** 7. The indicator unit indicates whether the system is de-energised by means of acoustic and visual signals.

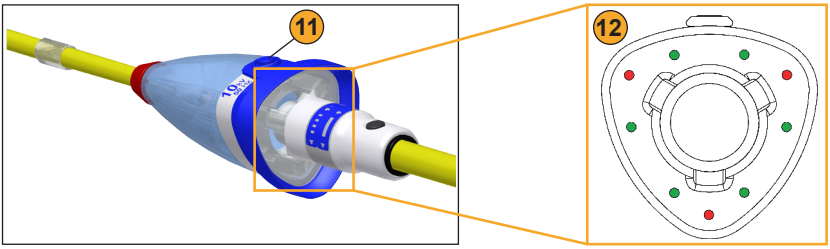


Figure 2: Indicator unit

Legend
11 On/off button
12 Red and green LED indication

The red **limit mark** 8 indicates the physical limit up to which the voltage tester may be inserted between live parts or may come into contact with them.

The red limit mark, together with the **contact electrode extension** 9 and the **contact electrode** 10 , forms the **insertion depth** (length Ai). The insertion depth serves to minimise the influence of stray fields on the indicator unit.

The contact electrode is fitted with an internal thread for attaching optional accessories (e.g. a fork contact).

3.2 Versions

Depending on the application, the voltage testers may differ in **length** and **type**.

Indoor type

Voltage testers of the *indoor* type have no rain sheds on the insulating part and are suitable for use in dry conditions, usually indoors.

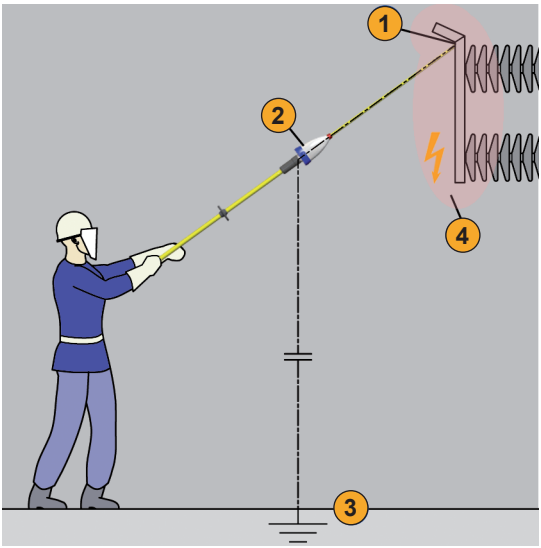
Outdoor type

Figure 3: Voltage tester with rain sheds on the insulating part

Voltage testers of the *outdoor* type are fitted with rain sheds on the insulating part and are suitable for the following applications:

- Indoors and outdoors
- During precipitation and thick fog

3.3 Function



Legend
1 Contact electrode
2 Indicator unit
3 Earth
4 Electric field

Figure 4: Function of the voltage tester

The voltage tester checks whether operating voltage is present on a system part or not.

The voltage tester measures a very low capacitive current between the contact electrode (1) connected to high voltage, the indicator unit (2), and earth (3).

The voltage tester has the following features:

- High indication reliability thanks to the fully tested contact electrode ex-tension
- Highly visible visual signals via the transparent indicator unit
- Clearly audible acoustic signals via the piezo buzzer
- Easy battery replacement – no tools required

3.4 Labelling

DANGER

If the voltage tester is used incorrectly due to illegible labelling, this may result in an incorrect test result.

Therefore, ensure that the labelling is always clearly legible. Have a damaged label replaced immediately.

The symbols shown on the labels are explained in Section 1.3.

3.4.1 Labelling on the indicator unit

There are 2 labels attached to the voltage tester's indicator unit.

Label 1 is located on the housing, label 2 on the battery compartment.

Label 1

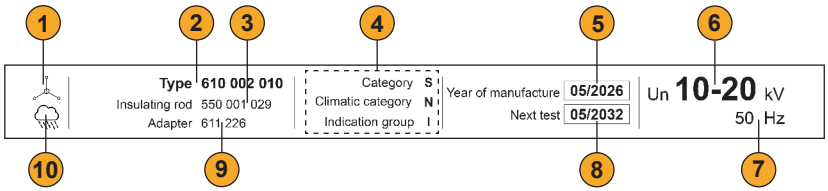


Figure 5: Example of label 1 on the indicator unit

Legend

1 System type (see Sect. 9.4)
2 Voltage tester item no.
3 Insulating rod item no.
4 Classification (see Sect. 9.3.2)
5 Year of manufacture
6 Nominal voltage
7 Nominal frequency
8 Date of next test
9 Adapter item no.
10 Type

Label 2

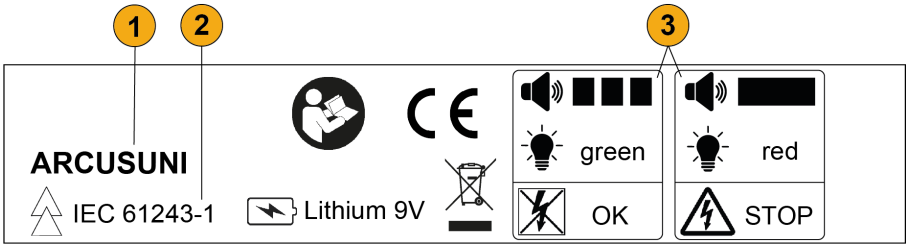


Figure 6: Example of label 2 on the indicator unit

Legend
1 Product name
2 Compliance standard
3 Explanation of visual and acoustic signals (see Section 6.3)

3.4.2 Labelling on the insulating rod

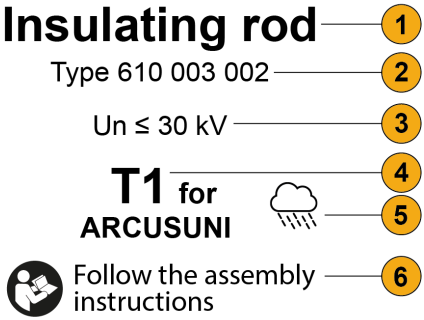


Figure 7: Example of a label on the insulating rod

Legend
1 Product name
2 Item number
3 Nominal Voltage (insulating rod)
4 Designation of rod or rod section (see also the Section *Assembly*)
5 Type
6 Usage instructions

4 Delivery, Transport and Storage

DANGER

Improper transport or storage can damage the voltage tester. Safe operation can then no longer be guaranteed.

It is therefore essential to comply with the instructions for transport and storage.

4.1 Environmental conditions

The following environmental conditions must be observed during delivery, transport, and storage:

Humidity:	20 % bis 96 %
Temperature range:	–25 °C bis +55 °C
Basic requirements:	No dust, no direct sunlight

4.2 Checking for transport damage upon delivery

NOTICE

Always record any transport damage on the delivery documents, as the damage will otherwise not be covered by the relevant insurance.

The voltage tester is packaged for dispatch in such a way that it is protected against damage caused by normal impact and transport stresses.

Once you have received the delivery, proceed as follows:

- Check whether the packaging was damaged during transport.
- Unpack the voltage tester.
- Check the voltage tester for any transport damage.
- Check the delivery note to ensure the consignment is complete.
- If the delivery was properly packaged but parts are damaged and/or missing, contact ARCUS immediately (see back cover for contact details).
- Keep the original packaging in case you wish to forward the product.
- Dispose of any packaging material that is no longer required in accordance with the regulations applicable in your country.

4.3 Scope of delivery and accessories

The following components are included as standard:

Table 2: Scope of delivery

Designation	Image / ID
Voltage tester including battery (9V lithium block) and insulating rod (single or multi-section)	
Instructions for Use	GA246

The following components may be included in the scope of delivery as optional extras:

Table 3: Optional accessories

Designation	Image
Handle extension	
Adapter for multi-purpose rod	
Fork contact	
Carrying case	
Quiver bag	

4.4 Storage

- If the voltage tester has become damp, wipe it dry with a clean, lint-free cloth before storing.
- If you do not intend to use the voltage tester for more than 3 months, remove the battery. The longer the battery remains unused in the voltage tester, the more it may discharge.
  Instructions on how to remove the battery can be found in Section 7.1.3
- Store the voltage tester in a dry and clean place.

4.5 Transport

Ensure that the voltage tester is protected from surface damage and impacts during transport. Transport the voltage tester, for example, in a suitable quiver bag or carrying case.

5 Assembly and Disassembly

5.1 Assembly

DANGER

Safe operation of the voltage tester is only guaranteed if all parts are fully and correctly assembled.

Assembly of multi-section insulating rods

For multi-section insulating rods, please observe the labels on the individual rods

The rod sections must (where applicable) be assembled in the following order:

Head section	Rod section T4	Rod section T3	Rod section T2	Rod section T1	Handle extension

Figure 8: Assembly sequence for multi-section insulating rods

Assembly of the insulating rod and head section

1. Press the push button on the insulating rod downwards.
2. Slide the head section onto the insulating rod until the push button clicks audibly into place.

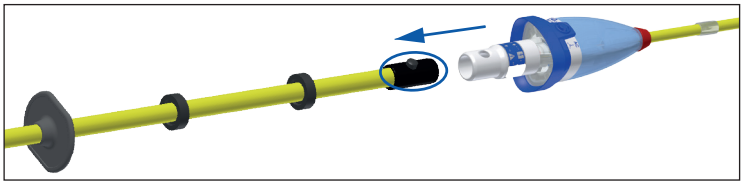


Figure 9: Assembly of the insulating rod and head section

Assembly of the multi-purpose insulating rod and head section using an adapter

1. Place the bayonet (4) of the handle extension onto the spindle shaft (3) of the multi-purpose insulating rod.
2. Gently guide the cross pin (2) through the recesses in the bayonet.
3. Turn the bayonet clockwise until the cross pin clicks into place.
4. Tighten the knurled nut (1) until you establish a secure, play-free connection between the multi-purpose insulating rod and the adapter.

5. Then proceed as shown in Figure 9.

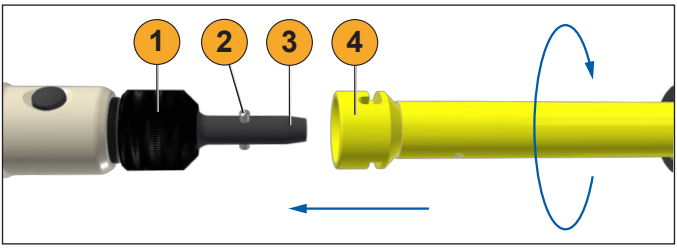


Figure 10: Assembly using an adapter

Assembly of a fork contact

Screw any fork contact present hand-tight into the contact electrode extension until it stops.

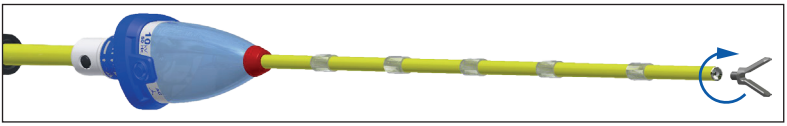


Figure 11: Assembly of the fork contact

5.2 Disassembly

To disassemble proceed as follows:

1. Unscrew the fork contact (if present) from the contact electrode extension.
2. Pull the head section off the insulating rod. To do this, press the push button on the insulating rod downwards.
3. Release the adapter from the bayonet. To do this, loosen the knurled nut.
4. Then push the adapter towards the rod and turn it anticlockwise until you can remove the adapter.
5. Disassemble multi-section insulating rod.

6 Use

It is essential that you follow the sequence of steps below and do not skip any of them (see Sections 6.1 to 6.4).

6.1 Visual inspection

DANGER

If the voltage tester is damaged, safe operation cannot be guaranteed.

If you identify an irreparable defect during one or more of the following checks, you must withdraw the voltage tester from further use.

Check the following points before operating the voltage tester:

- Are the insulating rod, head section, and any accessories (e.g. the screw-in fork contact) correctly, completely, and securely mounted?
- Is the hand guard present and securely mounted?
- Is the limit mark present and clearly visible?
- Are all the rain sheds present and securely mounted?
- Is the voltage tester clean and dry?
- Is the voltage tester free from scratches, cracks, or fractures?
- Are hollow parts (e.g. the insulating rod) that were sealed when new, still sealed?
- Are all labels present and clearly legible (see Section 3.4)?
- Does the voltage tester match the intended application according to the labelling (see Section 3.4)?
- Was the last periodic test carried out within the specified time (see Section 7.2)?

6.2 Switching on and self-test

6.2.1 Switching on

WARNING

Ensure the voltage tester is not in contact with live parts whilst switching on.

Switch on the voltage tester by pressing the on/off button for at least 2 seconds.
Note: If the button remains pressed after the self-test has started, the voltage tester issues an **error message** (see Section *Error messages*)
.

The voltage tester automatically performs a self-test after switching on.

WARNING

The LEDs and the piezo buzzer are not tested during the self-test. Therefore, check the following points when switching on the voltage tester:

- **LEDs:** Do the 6 red and 6 green LEDs on the indicator unit light up?
- **Piezo buzzer:** Is the acoustic signal audible?

6.2.2 Automatic self-test

The automatic self-test takes approx. 20 seconds. The following components are checked during the self-test:

- All electronic components
- Contact electrode extension
- Battery charge level

Table 4: Signals during the self-test

Signal		Bedeutung
		Self-test in progress
		

Self-test successful

After a **successful** self-test, the voltage tester automatically switches to the *ready for operation* state

Table 5: Signals following a successful self-test

Signal		Meaning
		Self-test successful; Battery charge level OK
		
		Self-test successful; Battery charge level low → Replace battery promptly (see Section 7.1.3)
		

Table 6: Signals in ready for operation state

Signal		Meaning
		Voltage tester ready for operation
		

Self-test unsuccessful

If the self-test is **unsuccessful**, the voltage tester issues a brief **error message** and switches itself off automatically.

A list of possible error messages, along with their causes and remedies, can be found in the following Section *Error messages*.

6.2.3 Error messages

DANGER

Troubleshooting must be limited to battery replacement only.
Repairs to the electronics or the rectification of mechanical damage must only be carried out by ARCUS.

Table 7: Error messages

Signal		Possible causes	Remedy
		Button held down too long	Release the button once the self-test has started
		Battery too low	Replace the battery (see Section 7.1.3)
		Electronics faulty Contact electrode extension faulty	Contact ARCUS
	No signal	Battery flat Electronics faulty	Replace the battery (see Section 7.1.3)
	No signal	Contact electrode extension faulty	Contact ARCUS
	No signal	LED faulty	Contact ARCUS
	No signal	Piezo buzzer faulty	Contact ARCUS

Please contact ARCUS to resolve any errors (see back cover for contact details).

Please also contact ARCUS if an error reoccurs after the battery has been replaced.

6.3 Testing the system part for operating voltage

Once the voltage tester is in the ready for operation state, you can begin testing the system part.

DANGER

During the test procedure, hold the voltage tester only by the handle.

Proceed as follows to test the system part:

1. Verify the absence of voltage at the work area.
2. Approach the system part to be tested while maintaining a safe distance.

   DANGER

   Guide the voltage tester between live parts up to the red limit mark at most (see Figure 12).
3. Place the contact electrode on the system part to be tested.

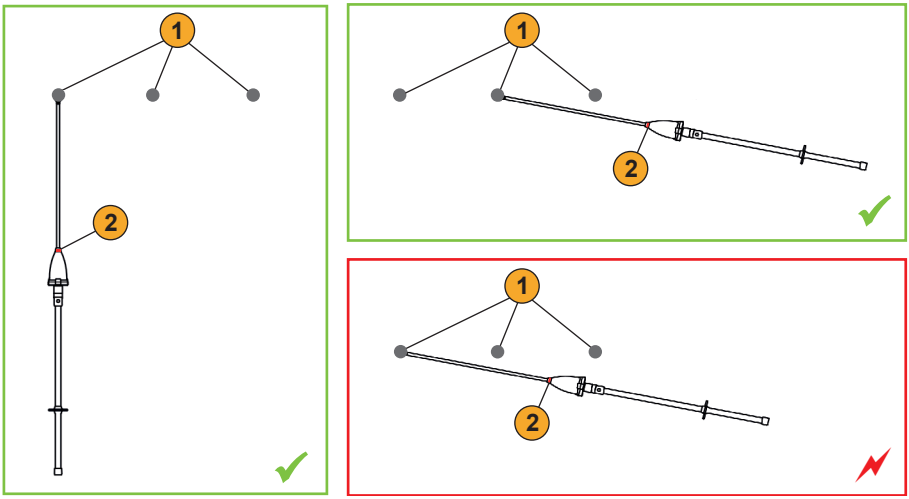


Figure 12: Placing the voltage tester – green OK; red not OK

Legend
1 Phase conductors or system parts that may be live
2 Limit mark

Depending on the system type and the respective response values (see Section 9.4), the voltage tester indicates **operating voltage is present** (Table 8) or **no operating voltage is present** (Table 9).

Table 8: Signals when operating voltage is present

Signal		Meaning
		Operating voltage present
		

Table 9: Signals when operating voltage is absent

Signal		Meaning
		No operating voltage present
		

6.4 Self-test and switching off

6.4.1 Performing an automatic self-test

After the voltage test, a new self-test must be performed:

1. Remove the voltage tester from the system part being tested.
2. Switch off the voltage tester by pressing the on/off button.
3. Switch the voltage tester back on by pressing the on/off button for at least 2 seconds.
4. The voltage tester performs the self-test as described in Section 6.2.2.

If the final self-test is unsuccessful, the previous testing of the system part for operating voltage must be deemed invalid.

6.4.2 Switching off

Switch off the voltage tester by pressing the on/off button.

7 Maintenance and Repair

7.1 Maintenance

A list of spare parts and accessories that may be required can be found in Section 9.2.

7.1.1 Cleaning

⚠ WARNING

Use only water and a lint-free cloth to clean the voltage tester.

The following agents and methods must **not** be used for cleaning, as they may damage the voltage tester:

- Cleaning agents (detergents)
- Abrasive cleaners
- Alcohol
- Steam cleaning
- High pressure

Clean the voltage tester whenever it becomes soiled:

- Wipe the voltage tester with a damp, lint-free cloth.
- Dry the voltage tester thoroughly.

7.1.2 Maintaining insulating properties

Once a year, apply a thin layer of silicone paste to the insulating rods to preserve the voltage tester's insulating properties.

7.1.3 Replacing the battery and O-ring

Only replace the battery and O-ring in a clean and dry environment. Ensure that no dirt, moisture or foreign objects are trapped during replacement.

The voltage tester is designed so that no tools are required to perform the replacement.

Replacing the battery

Replace the battery whenever the corresponding error message is received during the self-test (see Sections 6.2.2 and 6.2.3), but at least every 6 months.

Only replace the battery only with a 9V block battery (alkaline or lithium).

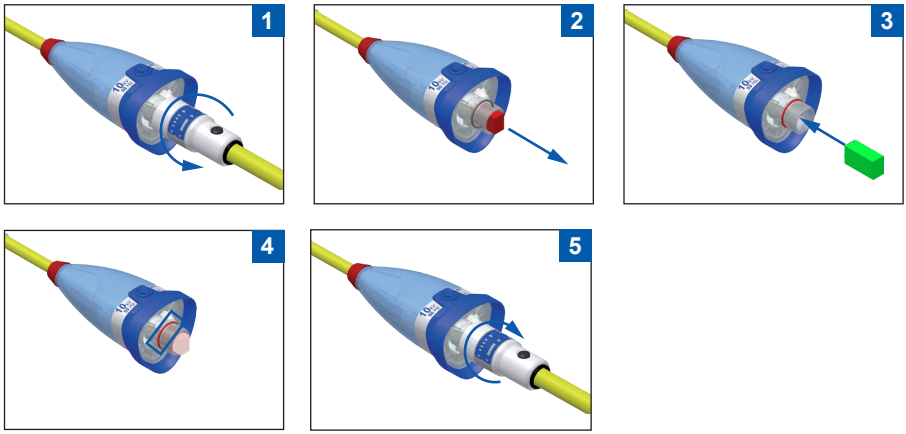


Figure 13: Battery replacement procedure

1. Unscrew the battery housing (including the insulating rod, if applicable) from the indicator unit.
2. Remove the old battery.
3. Insert the new battery. Make sure you insert the new battery with the correct polarity (+/-).
   The voltage tester confirms the battery has been inserted correctly with a short signal: a beep, LED lights up red.
   Note: Ensure you do not press the on/off button while replacing the battery. Otherwise, the voltage tester issues an error message (see Section *Error messages*).
4. Check the O-ring for damage and ensure it is securely fitted. Replace a damaged O-ring (see Subsection *Replacing the O-ring*).
5. Screw the battery housing (including the insulating rod, if applicable) onto the indicator unit until it stop.

Replacing the O-ring

In your voltage tester, an O-ring ensures the battery compartment is protected from moisture and dirt from the outside.

Replace the O-ring if you identify any damage while replacing the battery.

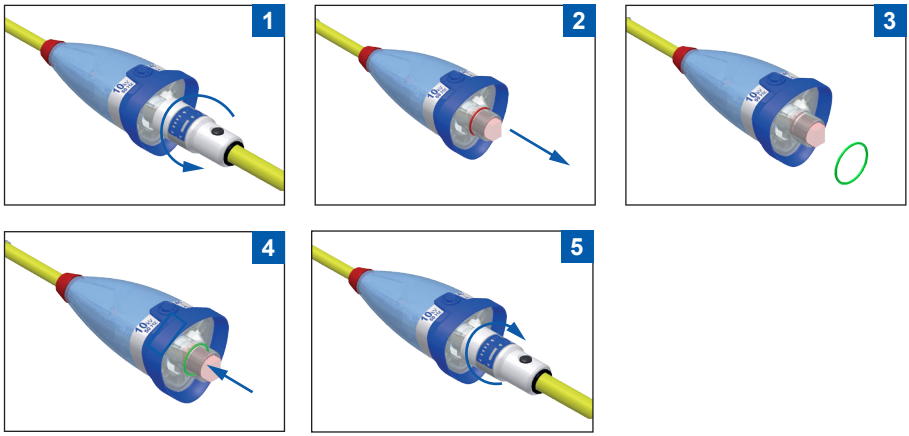


Figure 14: O-ring replacement procedure

1. Unscrew the battery housing (including the insulating rod, if applicable) from the indicator unit.
2. Pull the old O-ring off the battery compartment.
3. Prepare the new O-ring for assembly:
   - Carefully clean the new O-ring with a cloth.
   - Carefully clean the O-ring groove with a cloth.
   - Lubricate the O-ring with silicone paste. The silicone paste allows the O-ring to move in the groove and find its optimal position.
4. Slide the O-ring onto the battery compartment until it stops.
5. Screw the battery housing (including the insulating rod, if applicable) onto the indicator unit until it stops.

7.2 Periodic test

According to the product standard, periodic tests must be performed at regular intervals.

The periodic tests serve to ensure the functional reliability of the voltage tester – and thus your safety.

The date for the next periodic test can be found on label 1 of the indicator unit:

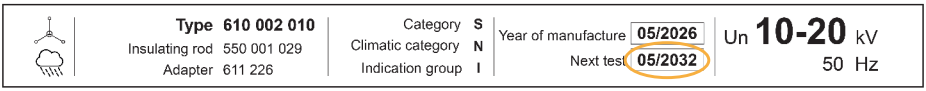


Figure 15: Date for the next periodic test

Periodic test services

As the manufacturer of voltage testers, ARCUS performs the periodic test of your voltage tester quickly and cost-effectively.

The following services are included in the periodic test:

- Electrical and mechanical testing in accordance with IEC 61243-1
- Cleaning of the voltage tester
- Provision of the Instructions for Use
- Preparation of the test report
- Scheduling of the next periodic test and corresponding update of the labelling
- Return delivery of the voltage tester
- Archiving of test results throughout the entire product lifecycle at ARCUS

If you have any questions regarding periodic tests, please contact ARCUS (see back cover for contact details).

7.3 Repair

If repairs to your voltage tester are necessary, please contact ARCUS (see back cover for contact details).

8 Disposal

NOTICE

Improper disposal harms thecauses environmental damage.

- Observe national and local disposal regulations.
- Dispose of spent batteries and/or the voltage tester at your local return and collection points.
- If you are unsure about the materials used, ARCUS will be happy to provide you with information (see back cover for contact details).

9 Appendix

9.1 Technical Data

Item no.	U_n* [kV]	Quantity Rod sections	L_O* [mm]	L_T* [mm]
610 002 001	10	1	2060	1125
610 002 002	10 – 20	1	2060	1125
610 002 005	36	2	2920	1125
610 002 010	10 – 20	1	2552 / 3495	1380
610 002 011	10 – 20	1	1660	1125
610 002 012	10 – 36	1	2060	1125
610 002 013	110	2	3720 / 4974	1400
610 002 015	20		1660	1125
610 002 016	30		1660	1125
610 002 017	10 – 30		1660	1125
610 002 018	60 – 110		3720	1400

* U_n = nominal voltage, L_O = total length without/with handle extension, L_T = transport length

Parameter	SpecificationVersion/Value
Frequency	50 Hz
Class	S
Climate category	N
Humidity	20 % bis 96 %
Temperature range	–25 °C bis +55 °C (operation and storage)
Indicator group	I
Acoustic signal	Piezo buzzer, 95 dB
Visual signal	6 green LEDs, 6 red LEDs
Power supply	9V block battery (alkaline or lithium)
Standard	IEC 61243-1:2021
System Type	
Type	outdoor

9.2 Spare parts and accessories

Designation	Order no.
9V block battery (lithium)	071 8263
O-ring	035 8577
Silicone paste	625 004

If you have any questions or wish to order spare parts and accessories, contact ARCUS (see back cover for contact details).

9.3 Definitions

9.3.1 User qualification in accordance with EN 50110-1

Designation	Definition
Skilled person	A person who, on the basis of their technical training, knowledge and experience, as well as their knowledge of the relevant standards, is able to assess the work assigned to them and identify potential hazards.
Instructed person	A person who has been instructed by a qualified electricians-killed person on the tasks assigned to them and the potential hazards arising from improper conduct, and who has been trained where necessary, as well as instructed on the necessary protective equipment, personal protective equipment, and protective safety measures.

9.3.2 Classification of the voltage tester

Designation	Definition
Indicator group I	Display Indication with at least 2 different active signals, indicating the two states: *voltage present* and *voltage not present*
Climate category N (Normal)	Temperature: –25°C to +55°C Humidity: 20% to 96%
Class S	Voltage tester with contact electrode extension, suitable for switchgear and overhead lines

9.4 Response values

9.4.1 Response values in accordance with IEC 61243-1:2021

System type	Clear indication *Voltage present*	Clear indication *Voltage not present*
Effectively star-point earthed three-phase system 	The conductor-to-earth voltage of the system part of the system under test is **more than 45%** of the rated nominal voltage for which the voltage tester is designed	The conductor-to-earth voltage of the part of the installation system part under test is **less than 10%** of the nominal rated voltage for which the voltage tester is designed
Effectively centre-earthed single-phase system 	The conductor-to-earth voltage of the system part of the installation under test is **more than 39%** of the rated nominal voltage for which the voltage tester is designed	The conductor-to-earth voltage of the system part of the installation under test is **less than 9%** of the nominal rated voltage for which the voltage tester is designed
Effectively sin-gle-point earthed single-phase system 	The conductor-to-earth voltage of the system part of the installation under test is **more than 78%** of the rated nominal voltage for which the voltage tester is designed	The conductor-to-earth voltage of the system part of the installation under test is **less than 17%** of the nominal rated voltage for which the voltage tester is designed

9.4.2 Response values in accordance with DIN VDE V 0682-421:2014

System type	Clear indication *Voltage present*	Clear indication *Voltage not present*
Effectively centre-earthed single-phase system (traction power lines) 	The conductor-to-earth voltage of the system component part under test is **more than 39%** of the rated nominal voltage for which the voltage tester is designed	The conductor-to-earth voltage of the system part component under test is **less than 9%** of the nominal rated voltage for which the voltage tester is designed
Effectively sin-gle-point earthed sin-gle-phase sys-tem (railway power lines) 	The conductor-to-earth voltage of the system part of the installation under test is **more than 70%** of the nominal rated voltage for which the voltage tester is designed	The conductor-to-earth voltage of the system part of the installation under test is **less than 17%** of the nominal rated voltage for which the voltage tester is rateddesigned

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