INSTRUCTION FOR USE

GA240GB-12.21

ARCUSPHASE DSP

1x VDS

CONTENTS

CONTENTS

This instruction for use, specially its safety information, is to be read and to be observed by everyone before working with the ARCUSPHASE DSP (Digital Signal Processor)!

Keep this instruction for use to have information available when required.
In case you will hand over the ARCUSPHASE DSP to another person, include the instruction for use!

FIELD OF APPLICATION AND USAGE

ARCUSPHASE DSP is design for inspection of encapsulated switchgear up to 52 kV rated voltage and 50 Hz nominal frequency.

For usage observe EN 50110-1 or standardised safety rules of your country and internal operational instructions!

SAFETY INFORMATION

Instruction for use: special remarks

Warning !
All warnings are marked with this symbol. Do not ignore any warning. Failure in observance may lead to injuries or death.

Attention !
All safety hints are marked with this symbol. Do not ignore any safety hint. Failure in observance may lead to damage of devices or long-term health damages.

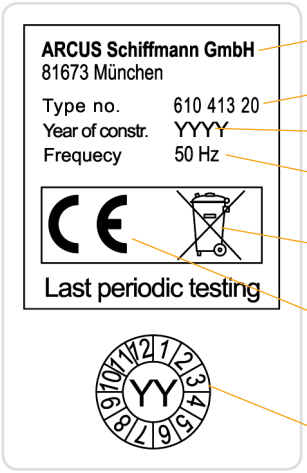
Information !
All information is marked with this symbol. Do not ignore any information. It contains important details to facilitate working and improve apprehension.

Recommendation !
All recommendations are marked with this symbol. They will contain details for optimum usage of the device.

ARCUSPHASE DSP: special remarks

VDS = Voltage Detecting System
LR = Low Resistance System

Before use of this ARCUSPHASE DSP, please examine labels for suitability of detector for its intended usage. For simplification symbols are explained as follows.



Required qualification of operating personnel

Operation and maintenance of this ARCUSPHASE DSP is to be carried out only by electricians or specially trained personnel following EN 50110-1 or the standardised safety rules of the respective country. Further it needs to be secured that before start of work the operating personnel was trained for this operation.

Prevention of dangers

Only use ARCUSPHASE DSP for inspection of encapsulated switch-gear up to 52 kV rated voltage and 50 Hz nominal frequency!

Make sure that your ARCUSPHASE DSP is configured for the correct operating and nominal voltage!

Standard supply of ARCUSPHASE DSP includes a measuring line for coupling parts according to EN 61243-5 with LR-system. With suitable interface adaptors, ARCUSPHASE DSP can be used on other coupling parts to EN 61243-5 (Spare parts and accessories → page 47)!

Prevention of dangers (continued)

Measurement with a wrong interface adaptor on the connections can damage the ARCUSPHASE DSP and may lead to personal injuries!

For examination of encapsulated switchgear trained personnel is required!

Directly before each use the ARCUSPHASE DSP is to be examined for faultless function. The built-in self-test device is destined for this purpose (→ page 19-26)!

Absence of voltage at the working place always is to be verified on all phases!

Use of the ARCUSPHASE DSP does not relieve from observance of EN 50110-1 requirements regarding necessary steps to produce and secure a de-energised condition during work on electric installations!

In case of very bright environment, secure clearness of OLED-display (e.g. by giving shadow by hand).

Only use spare parts manufactured by ARCUS Schiffmann (→ page 47)!

Maintain the ARCUSPHASE DSP well!

Carry out regular periodic testing! The last date of periodic testing of your ARCUSPHASE DSP can be found on the label (→ page 7). The next date for periodic testing can be found under **Main menu** -> **Instrument information**.

Relevant regulations of the professional association are to be observed!

DESCRIPTION OF VOLTAGE DETECTOR

Measurement line
with plug for LR-system

OLED-display
Indication of measured values

LED (green/red)
Status indication of tests and measurements

ON/OFF button

LED (blue)
Battery status

Navigation button

Test sockets
for self-test with interface adaptor[1)]

Menu-/Enter-button

Test sockets
for self-test without interface adaptor

1) HR-, LRM- and LRP-interface adaptor

ARCUSPHASE DSP is a 1-polar voltage detector according to EN 61243-5, with visual indication.

The following test and measurement options are integrated:
- Self-test (→ page 19-26)
- Periodic testing of coupling parts (→ page 27-31)
- Voltage test (→ page 27-31)
- Frequency measurement (→ page 31-33)
- Oscilloscope (→ page 33-35)
- FFT (→ page 35-36)

UNPACKING AND EXAMINATION

The ARCUSPHASE DSP is packed to be protected against normal impact and damage during transport.
Unpack and examine the ARCUSPHASE DSP as follows:
- Unpack the ARCUSPHASE DSP and make sure you have received all parts listed on the packing list.
- Examine the ARCUSPHASE DSP for damages from transportation. In case packing is damaged and you have to expect damage or loss of supplied parts, this is to be noted on the delivery documents, otherwise insurance will not pay! If shipment is packed orderly and parts are damaged or missing, please contact ARCUS Schiffmann.

Recommendation !
Stock all packing material to be available in case the ARCUSPHASE DSP needs to be returned to ARCUS Schiffmann.

START OF OPERATION

Putting into service of model with batteries:
Open the battery cover on the bottom side of the detector and insert the supplied batteries with correct pole connection (→ page 48-49). Then close the battery cover.

Putting into service of model with rechargeable batteries:
First completely load the rechargeable batteries in the supplied battery charger. Open the battery cover on the bottom side of the detector and insert the charged rechargeable batteries with correct pole connection (→ page 48-49). Then close the battery cover.

STORAGE AND TRANSPORT

We recommend to store ARCUSPHASE DSP in dry and clean condition. Make sure that ARCUSPHASE DSP is not kept or stored in places with high temperature, moisture, or large amounts of dust.

MEASURING LINE

Your ARCUSPHASE DSP is equipped with a removable measuring line (for fast exchange at the location).

For use with ARCUSPHASE DSP, only use a measuring line supplied by ARCUS Schiffmann!

A damaged measuring line has to be exchanged (Spare parts and accessories → page 47)!

AUTOMATIC SWITCH-OFF

If no button is pressed or no measurement is carried out for 2 min. in operating status, ARCUSPHASE DSP automatic switch-off will be activated.

When in measurement mode **current L1** the test result is “residual voltage present“ or “no voltage present“ and no button is pressed for 2 min., ARCUSPHASE DSP switches off automatically. (Periodic testing on couplings and voltage test → page 27-31)!

If no button is pressed for 8 sec. in both menus, ARCUSPHASE DSP automatically changes to measurement mode.

DETECTOR SWITCH-ON OR -OFF

By pressing the ON/OFF button, ARCUSPHASE DSP will be switched on or off. During switch-on an automatic self-test is carried out by ARCUSPHASE DSP.

SYMBOLS

Symbols shown on the display inform about detector state. The main symbols are listed below.

ARCUSPHASE DSP in measurement mode *Periodic testing:*
Caution: Current I is lower than threshold current It!

ARCUSPHASE DSP in measurement mode *Periodic testing:*
Caution: Current I is not measureable!

ARCUSPHASE DSP in measurement mode *Periodic testing:*
Attention: Voltage is present and coupling faulty!

ARCUSPHASE DSP in measurement mode *Frequency:*
Attention: f ≥ 51 Hz or f ≤ 49 Hz

ARCUSPHASE DSP in measurement mode *Periodic testing:*
In order: Voltage is present and coupling operates faultlessly!

ARCUSPHASE DSP in measurement mode *Frequency:*
In order: f ≤ 51 Hz and f ≥ 49 Hz

Measuring channel L1 is selected and no voltage present.

Measuring channel L1 is not selected and voltage is present.

Configured operating voltage is indicated.

Configured nominal voltage is indicated.

Battery charge condition: 100 %

Battery charge condition: 80 %

Battery charge condition: 60 %

Battery charge condition: 40 %

Battery charge condition: 20 %

Mode for LRP-interface is active.

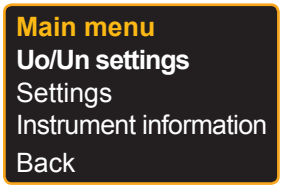
Mode for LRM- or LR-interface is active.

Mode for HR-interface is active.

MENU NAVIGATION

Your ARCUSPHASE DSP is equipped with 2 menus, the **Main menu** and the menu **Measurement mode**. With these you have access to functions and settings of your detector.

Main menu:
To open the **main menu**, press the button MENU/ENTER. To open a menu item, navigate to the menu item by pressing the navigation buttons and press the MENU/ENTER-button.



The **Main menu** contains the following subitems:

Uo/Un setting: Here the required operating and nominal voltage can be set (→ page 37-39).

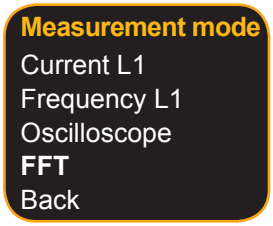
Settings: Date, clock, button sounds, warning sounds, and required language can be selected (→ page 40-44).

Instrument information: Indicates the version of the firmware and the date for the next periodic testing.

Back: Here one can leave the **Main menu** and return to **Measurement mode**.

Measurement mode:

To open the menu **Measurement mode**, press one of both navigation buttons. To open a menu item, navigate to the menu item by pressing the navigation buttons and press the MENU/ENTER-button.



In the menu **Measurement mode** one can select the following measurements:

Current L1: Here one can set the periodic testing for the measurement channel L1 and measure the current L1 (→ page 27-31).

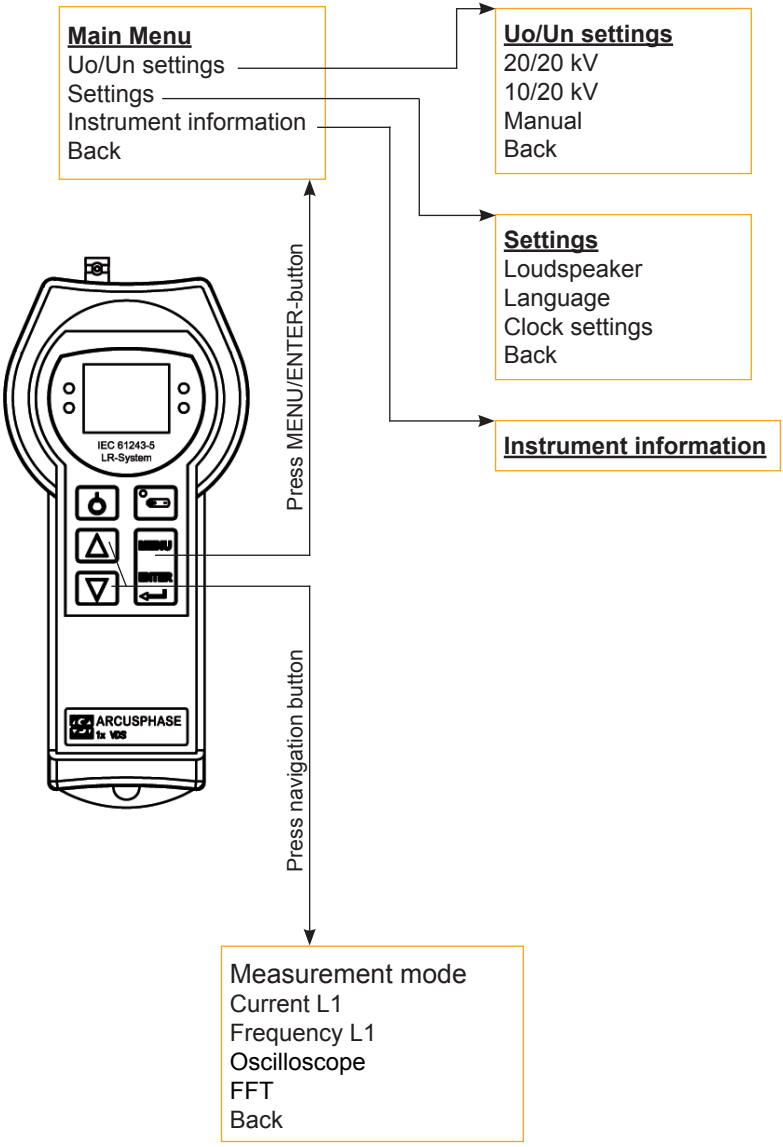
Frequency L1: Here one can measure the frequency of measurement channel L1 (→ page 31-33).

Oscilloscope: This will indicate the time response of one or several voltages (→ page 33-35).

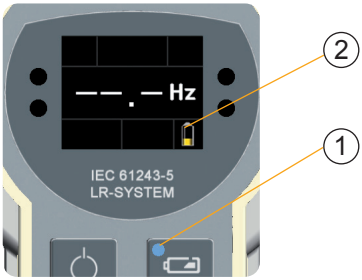
FFT: Indication of frequency components of a signal (→ page 35-36).

Back: Here you can leave the menu point **Measurement mode**.

Menu navigation - overview



INDICATION BATTERY STATUS



When the LED (1) for battery state flashes, and the display shows a yellow battery symbol (2), battery should soon be exchanged (Battery change → page 48-49).

Indication display	Indication LED-battery status	Battery status
	No indication.	100 %
	No indication.	80 %
	No indication.	60 %
	No indication.	40 %
	LED flashes.	20 %

USAGE IN GENERAL

Use of the ARCUSPHASE DSP does not relieve from observance of EN 60110-1 requirements regarding necessary steps to produce and secure a de-energised condition during work on electric installations.

Standard supply of ARCUSPHASE DSP includes measuring lines for coupling parts to EN 61243-5 with LR-system. With suitable interface adaptors, ARCUSPHASE DSP can also be used on other coupling parts to EN 61243-5 (Spare parts and accessories → page 47)!

USAGE IN GENERAL (CONTINUED)

Only use ARCUSPHASE DSP for inspection of encapsulated switchgear up to 52 kV rated voltage and 50 Hz nominal frequency!

ARCUSPHASE DSP conforms to protection class IP 54 and is allowed for use under humidity (outdoor type)!

Trained personnel is required for examination of encapsulated switchgear!

ARCUSPHASE DSP is to be examined for faultless function before each usage. For this purpose it is provided with a built-in self-testing device (→ page 19-26)!

Absence of voltage at the working place always is to be verified on all phases!

Measurement with a wrong interface adaptor on a connection can damage the ARCUSPHASE DSP and may lead to personal injuries!

Only use accessories supplied by ARCUS Schiffmann!

Maintain the ARCUSPHASE DSP well!

Only remove the protector for battery exchange (→ page 48-49)! It protects the detector from mechanical damage.

Carry out regular periodic testing! The last date of periodic testing of your ARCUSPHASE DSP can be found on the backside label (→ page 7).
The next date for periodic testing can be found under **Main menu** -> **Instrument information**.

Relevant regulations of the professional association are to be observed!

Incidental harmonics are eliminated by built-in low-pass filters!

Harmonics exceeding 50% of the base frequency in its amplitude, may result in measuring faults!

SELF-TEST WITHOUT INTERFACE ADAPTOR

Information !
During self-test of ARCUSPHASE DSP, the user is to observe faultless function of LEDs as they are not included in the self-test!

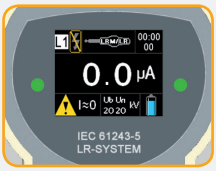
Fit the measuring line into the test socket until it catches, as shown.

ARCUSPHASE DSP
during self test

Press the ON/OFF button to start the self-test of ARCUSPHASE DSP.

Automatic self-test is performed...

During self-test, 2 red, 2 green LEDs beside the display will shine, and the blue LED of the battery state indication.



After successful self-test, the detector automatically changes to measurement mode for measurement channel L1, and is ready to operate.

After self-test, remove measuring line from the test socket.

The self-test of ARCUSPHASE DSP includes the measurement line L1. The indication on the left shows that during self-test a problem with the measurement line has occurred. Make sure that the measurement line is completely plugged into the measurement socket.
A damaged measurement line must be exchanged (Spare parts and accessories → page 47)!

Warning !
In case ARCUSPHASE DSP will not change to **Measurement mode** after self-test, the detector must be withdrawn from further usage (Help in case of malfunction → page 44-46)!

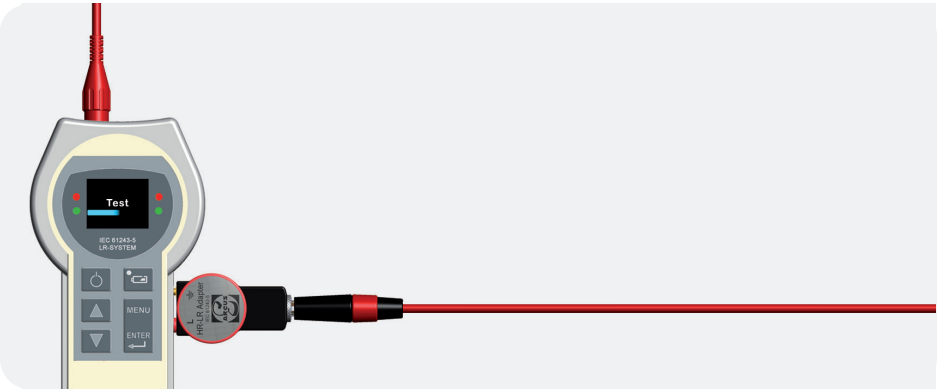
In case self-test will recognise a defect in the detector, this will be indicated on the display. Afterwards automatic switch-off of ARCUSPHASE DSP will be activated.

When the battery charge is very low, this is indicated in the display. Afterwards automatic switch-off of ARCUSPHASE DSP will be activated.

SELF-TEST WITH HR-ADAPTOR

Information !
During self-test of ARCUSPHASE DSP, the user is to observe faultless function of LEDs as they are not included in the self-test!

Plug the measurement line into the HR-adaptor until it locks, then plug the adaptor into the test socket at the right side of the detector until stop.



Press the ON/OFF button to start the self-test of ARCUSPHASE DSP.

Automatic self-test is performed...

During self-test, 2 red, 2 green LEDs beside the display will shine, and the blue LED of the battery state indication.

After successful self-test, the detector automatically changes to measurement mode for measurement channel L1, and is ready to operate.

After self-test, remove measuring line and the HR-adaptor from the test sockets.

The self-test of ARCUSPHASE DSP includes measurement lines L1 and the HR-adaptor. The indication on the left shows that during self-test a problem with the measurement line or the HR-adaptor has occurred. Make sure that the measurement line or the HR-adaptor is completely plugged into the measurement sockets.
Damaged measurement line or HR-adaptor must be exchanged (Spare parts and accessories → page 47)!

Warning !
In case ARCUSPHASE DSP will not change to measurement mode after self-test, the detector must be withdrawn from further usage. (Help in case of malfunction → page 44-46)!

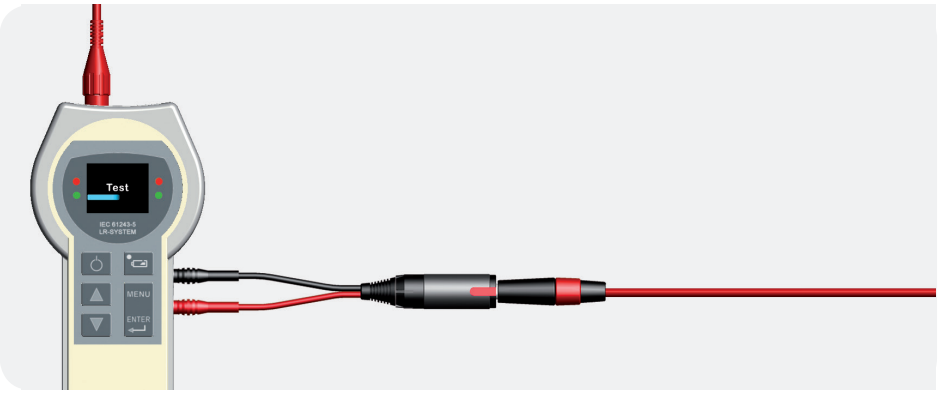
In case self-test will recognise a defect in the detector, this will be indicated on the display. Afterwards automatic switch-off of ARCUSPHASE DSP will be activated.

When the battery charge is very low, this is indicated in the display. Afterwards automatic switch-off of ARCUSPHASE DSP will be activated.

SELF-TEST WITH LRM-ADAPTOR

Information !
During self-test of ARCUSPHASE DSP, the user is to observe faultless function of LEDs as they are not included in the self-test!

Plug the measurement line into the LRM-adaptor until it locks, then plug the adaptor into the test socket at the right side of the detector until stop.



Press the ON/OFF button to start the self-test of ARCUSPHASE DSP.

Automatic self-test is performed...

During self-test, 2 red, 2 green LEDs beside the display will shine, and the blue LED of the battery state indication.

After successful self-test, the detector automatically changes to measurement mode for measurement channel L1, and is ready to operate.

After self-test, remove measuring line and the LRM-adaptor from the test sockets.

The self-test of ARCUSPHASE DSP includes measurement lines L1 and the LRM-adaptor. The indication on the left shows that during self-test a problem with the measurement line or the LRM-adaptor has occurred. Make sure that the measurement line and the LRM-adaptor are completely plugged into the measurement sockets. Damaged measurement line or LRM-adaptor must be exchanged (Spare parts and accessories → page 47)!

Warning !
In case ARCUSPHASE DSP will not change to measurement mode after self-test, the detector must be withdrawn from further usage. (Help in case of malfunction → page 44-46)!

In case self-test will recognise a defect in the detector, this will be indicated on the display. Afterwards automatic switch-off of ARCUSPHASE DSP will be activated.

When the battery charge is very low, this is indicated in the display. Afterwards automatic switch-off of ARCUSPHASE DSP will be activated.

SELF-TEST WITH LRP-ADAPTOR

Information !
During self-test of ARCUSPHASE DSP, the user is to observe faultless function of LEDs as they are not included in the self-test!

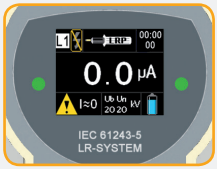
Plug the measurement line into the LRP-adaptor until it locks, then plug the adaptor into the test socket at the right side of the detector until stop.

Press the ON/OFF button to start the self-test of ARCUS-PHASE DSP.

Automatic self-test is performed...

During self-test, 2 red, 2 green LEDs beside the display will shine, and the blue LED of the battery state indication.

After successful self-test, the detector automatically changes to measurement mode for measurement channel L1, and is ready to operate.



After self-test, remove measuring line and the LRP-adaptor from the test sockets.

The self-test of ARCUSPHASE DSP includes measurement lines L1 and the LRP-adaptor. The indication on the left shows that during self-test a problem with the measurement line or the LRP-adaptor has occurred. Make sure that the measurement line and the LRP-adaptor are completely plugged into the measurement sockets.
Damaged measurement line or LRP-adaptor must be exchanged (Spare parts and accessories → page 47)!

Warning !
In case ARCUSPHASE DSP will not change to measurement mode after self-test, the detector must be withdrawn from further usage (Help in case of malfunction → page 44-46)!

In case self-test will recognise a defect in the detector, this will be indicated on the display. Afterwards automatic switch-off of ARCUSPHASE DSP will be activated.

When the battery charge is very low, this is indicated in the display. Afterwards automatic switch-off of ARCUSPHASE DSP will be activated.

CONNECTION OF ARCUSPHASE DSP TO THE COUPLING PART

After successful self-test, a number of different tests and measurements can be performed on following coupling parts according to EN 61243-5:

LR-system: Plug measurement lines directly into sockets of coupling parts.

HR-system: Consult instruction for use supplied with adaptor for correct usage (Spare parts and accessories → page 47).

LRM-system: Consult instruction for use supplied with adaptor for correct usage (Spare parts and accessories → page 47).

LRP-System: Consult instruction for use supplied with adaptor for correct usage (Spare parts and accessories → page 47).

PERIODIC TESTING OF COUPLING PARTS AND VOLTAGE TEST

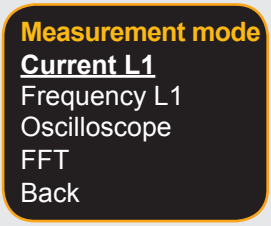
With ARCUSPHASE DSP one can carry out periodic testing and voltage tests on couplings according to EN 61243-5.

The following description refers to manual configuration of ARCUSPHASE DSP for periodic testing or voltage detection of measurement channel L1.

ARCUSPHASE DSP configuration for measurement channel L1.

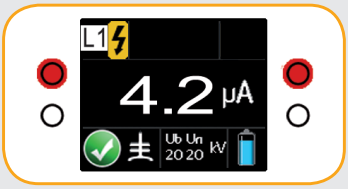
After successful self-test connect the red measurement line (L1) to coupling connection L1.

Activate the menu measurement mode by pressing one of the two navigation-buttons.

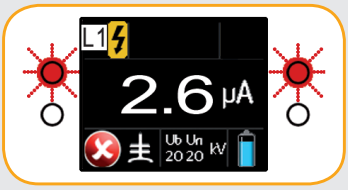


Scroll through the navigation button to menu point **Current L1** and confirm the selection with the MENU/ENTER-button.

Example of application:
Periodic testing and voltage test on LR-, LRM-, HR-systems.
Operating voltage Uo=20 kV, nominal voltage Un=20 kV, measurement channel L1



Voltage present - coupling ok
When the LED on the top shine red, the green OK-symbol and L1 with the yellow-filled voltage symbol appear, the coupling is OK.
Interface current I is ≥ 3.2 µA and voltage is present.



Voltage present – interface faulty
When the LED on the top flash red, the red DEFECT-symbol appears, then the coupling is faulty.
Interface current I is < 3.2 µA but ≥ 2.0 µA and voltage is present.

Residual voltage present
When the lower LED flash green, the ATTENTION-symbol and L1 with crossed-out voltage-symbol appear, then residual voltage is present.
Interface current I is < 2.0 µA but ≥ 0.3 µA.
Automatic switch-off of detector will be activated after 2 min.

No voltage present
When the lower LED shine green, the ATTENTION-symbol and L1 with crossed-out voltage-symbol appear, then the switch-gear is considered as de-energised.
Interface current I is < 0.3 µA.
Automatic switch-off of detector will be activated after 2 min.

Above example is exemplary. An overview about limit values and signalisation can be found in a table on page 30.

Overview of values and signalisation for periodic testing and voltage detection

Measured current I and interface					
Measurement channel L1 and voltage symbol					
LED					
Interface	**Uo/Un [kV]**	**Absence of voltage [µA]**	**Residual voltage present [µA]**	**Voltage present, Interface defect [µA]**	**Voltage present, Interface ok [µA]**
LR, LRM, HR	20/20	I < 0.3	0.3 ≤ I < 2.0	2.0 ≤ I < 3.2	I ≥ 3.2
LR, LRM, HR	10/20	I < 0.3	0.3 ≤ I < 1.3	1.3 ≤ I < 1.6	I ≥ 1.6
LRP	20/20	I < 0.3	0.3 ≤ I < 0.8	0.8 ≤ I < 1.3	I ≥ 1.3
LRP	10/20	I < 0.3	0.3 ≤ I < 0.4	0.4 ≤ I < 0.7	I ≥ 0.7
LR, LRM, HR	manual/manual	I < 0.3	0.3 ≤ I < 2.0 x (Uo/Un)	2.0 x (Uo/Un) ≤ I < 3.2 x (Uo/Un)	I ≥ 3.2 x (Uo/Un)
LRP	manual/manual	I < 0.3	0.3 ≤ I < 0.8 x (Uo/Un)	0.8 x (Uo/Un) ≤ I < 1.3 x (Uo/Un)	I ≥ 1.3 x (Uo/Un)

Table: Periodic testing and voltage test of coupling parts with LR-, LRM-, HR-, LRP-system

In general:

Indication **VOLTAGE PRESENT** needs to appear:
- in three-phase power networks within a conductor-earth voltage range of 45 % up to 120 % of the nominal voltage.

Indication **VOLTAGE PRESENT** must not appear:
- with conductor-earth voltage below 10 % of the nominal voltage

In case it was impossible to perform phase comparison correctly, this will be shown on the display and by LED (Help in case of malfunction → page 44-46).

Information !
After correct voltage detection, carry out the self-test a second time (→ page 19-26) as control for faultless function.

FREQUENCY MEASUREMENT

Information !
A frequency measurement is possible only when the interface current for L1 fulfills the following conditions:

LR-, LRM-, HR-system:

Uo/Un=20kV/20kV	I ≥ 3.2 µA
Uo/Un=10kV/20kV	I ≥ 1.6 µA
manual/manual	I ≥ 3.2 x (Uo/Un)

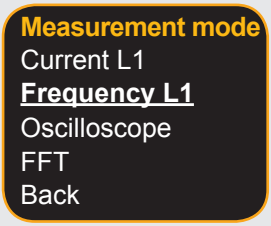
LRP-system:

Uo/Un=20kV/20kV	I ≥ 1.3 µA
Uo/Un=10kV/20kV	I ≥ 0.7 µA
manual/manual	I ≥ 1.3 x (Uo/Un)

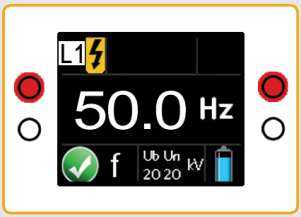
After successful self-test connect red measurement line L1 to phase L1 of coupling part.

Example of application:
Frequency measurement at LR-, LRM-, HR-systems.
Operating voltage Uo=20 kV, nominal voltage Un=20 kV,
interface current I ≥ 3.2 µA, *measuring channel L1*

Activate the menu **Measurement mode** by pressing a navigation-button.

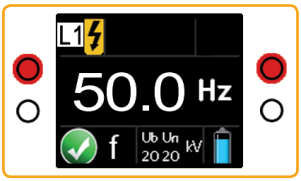
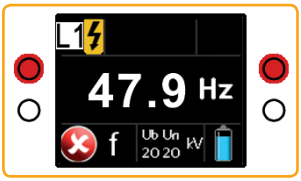


Scroll through the navigation buttons to menu point **Frequency L1** and confirm the selection with the MENU/ENTER-button.



Frequency: 50 Hz
Indication on OLED-Display, when
f < 51 Hz and f > 49 Hz (e.g. 50.0 Hz).
Voltage is present and
interface current is ≥ 3.2 µA.

Above example is exemplary. An overview of limit values and signalisation can be found in the following table.

Signalisation	Frequency [Hz]	Description
	49 < f < 51	Interface and frequency are ok. The LED on the top shine red.
	45 < f ≤ 49 or 51 ≤ f ≤ 55	Interface is ok, frequency faulty. The top LED shine red.
	0 ≤ f ≤ 45 or f ≥ 55	Interface is ok, frequency not possible to measure. The top LED shine red.
	not possible to measure	Interface is defect, frequency not possible to measure. The LED on the top flash red.

Oscilloscope

The function “Oscilloscope“ shows the wave form of the input signal. Distortions or superpositions become visible. The time-base is not possible to change, but it is adjusted to show a sinus period with 50 Hz.

Information !
The function “Oscilloscope“ is possible only when the interface current for L1 fulfils the following conditions:

LR-, LRM-, HR-System:

Uo/Un=20kV/20kV	I ≥ 3.2 µA
Uo/Un=10kV/20kV	I ≥ 1.6 µA
manual/manual	I ≥ 3.2 x (Uo/Un)

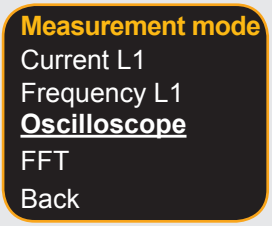
LRP-System:

Uo/Un=20kV/20kV	I ≥ 1.3 µA
Uo/Un=10kV/20kV	I ≥ 0.7 µA
manual/manual	I ≥ 1.3 x (Uo/Un)

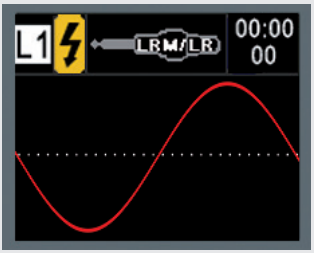
After successful self-test connect red measurement line L1 to connection L1 of the coupling part.

Example of application:
Oscilloscope at LR-, LRM-system.
Operating voltage Uo=20 kV, nominal voltage Un=20 kV,
interface current I ≥ 3.2 µA, *measuring channel L1*

Activate the menu **Measurement mode** by pressing a navigation-button.



Scroll through the navigation buttons to menu point **Oscilloscope** and confirm the selection with the MENU/ENTER-button.



Fundamental frequency 50 Hz.

Fundamental frequency 50 Hz with superposed harmonic (150 Hz).

FFT

Function FFT (Fast Fourier Transform) shows you the spectrum of available frequencies. The vertical axis is linear.

Information !
Function FFT is possible only when the interface current of L1 fulfils the following conditions:

LR-, LRM-, HR-System:

Uo/Un=20kV/20kV	I ≥ 3.2 µA
Uo/Un=10kV/20kV	I ≥ 1.6 µA
manueal/manual	I ≥ 3.2 x (Uo/Un)

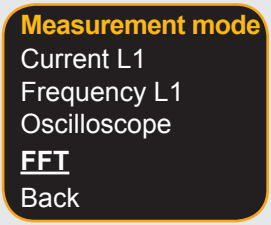
LRP-System:

Uo/Un=20kV/20kV	I ≥ 1.3 µA
Uo/Un=10kV/20kV	I ≥ 0.7 µA
manual/manual	I ≥ 1.3 x (Uo/Un)

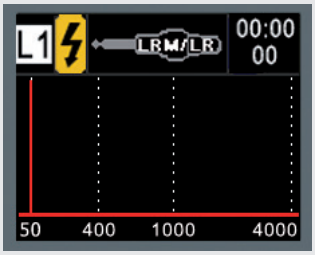
After successful self-test connect red measurement line L1 to connection L1 of the coupling part.

Example of application:
FFT at LR-, LRM-system.
Operating voltage Uo=20 kV, nominal voltage Un=20 kV,
interface current I ≥ 3.2 µA, *measuring channel L1*

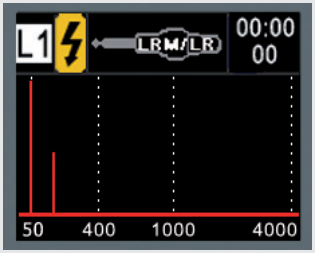
Activate the menu **Measurement mode** by pressing a navigation-button.



Scroll through the navigation buttons to menu point **FFT** and confirm the selection with the MENU/ENTER-button.



Fundamental frequency 50 Hz.



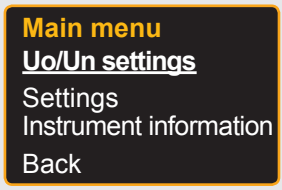
Fundamental frequency 50 Hz with superposed harmonic (150 Hz).

CONFIGURATION OF OPERATING AND NOMINAL VOLTAGE

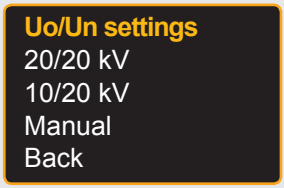
After successful self-test it is possible to set up the operating and nominal voltage of the switchgear to be tested. In this process it is possible to set up pre-configured values or user-defined values.

Menu point "Configuration of operating and nominal voltage".

Activate the **Main menu** after successful self-test by pressing the MENU/ENTER-button.



Scroll through the navigation buttons to menu point **Uo/Un settings**, and confirm the selection with the MENU/ENTER-button.

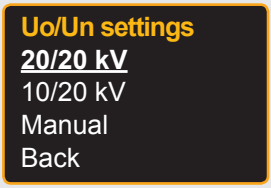


The submenu offers the following selection:
Uo/Un = **20/20 kV** (preset)
Uo/Un = **10/20 kV** (preset)
Manual:
Here you can configure your own values for operating voltage (Uo) and nominal voltage (Un).

On the following pages you will find application examples, on one hand how to set preset values, and on the other hand user-defined values for operating and nominal voltage.

CONFIGURATION OF OPERATING AND NOMINAL VOLTAGE (CONTINUED)

Configuration of preset values for operating and nominal voltage.

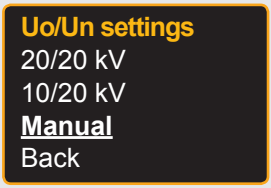


Scroll through the navigation buttons to the menu point with the suitable presetting, and confirm the selection with the MENU/ENTER-button.

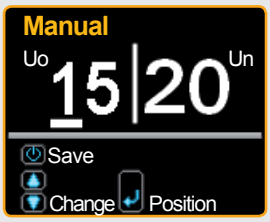
ARCUSPHASE DSP will now save your selection.

Your selection remains saved after switching off the ARCUSPHASE DSP.

Configuration of user-defined values for operating and nominal voltage.



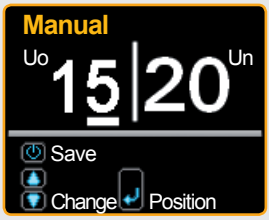
Scroll through the navigation buttons to menu point **Manual**, and confirm the selection with the MENU/ENTER-button.



Set the value for operating voltage Uo. Press the navigation buttons until the suitable value shows.

CONFIGURATION OF OPERATING AND NOMINAL VOLTAGE (CONTINUED)

Configuration of user-defined values for operating and nominal voltage.

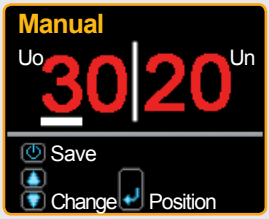


By pressing the Menu/Enter-button, the cursor jumps to the next position.
When the cursor has reached the final position, re-pressing the Menu/Enter-button causes change of the cursor to the first position.

With a brief push on the ON/OFF-button the setting is accepted.
ARCUSPHASE DSP will save your selection.

Your selection remains saved after switching off the ARCUSPHASE DSP.

Information !
When a value is set that is physically impossible, or would provoke a measurement fault, the numbers are shown in red.



Example:
The set operating voltage Uo is higher than the nominal voltage Un.
Uo/Un = 30/20 kV

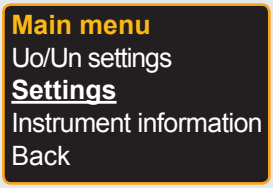
In case one tries to save this setting, depending on type of fault a signal is indicated and return to **Manual** is initiated.

LANGUAGE SELECTION

On your ARCUSPHASE DSP you can adjust the language for the display texts. This adjustment at the same time has an effect on the format for the dividers used, for instance number formats (dot instead of comma).

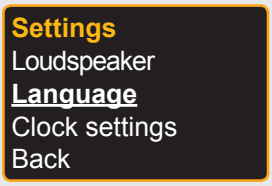
Configuration of language selection.

Activate the **Main menu** after successful self-test by pressing the MENU/ENTER-button.



Scroll through the navigation buttons to menu point **Settings**, and confirm the selection with the MENU/ENTER-button.

Scroll through the navigation buttons to the menu point **Language**.



By pressing of Menu-/Enter-button you confirm your selection.

Scroll through the navigation buttons to the language of choice, and confirm the selection with the MENU/ENTER-button.

ARCUSPHASE DSP will save your selection.

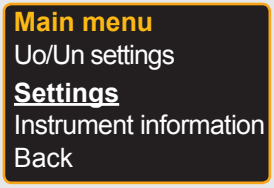
Your selection remains saved after switching off the ARCUSPHASE DSP.

SWITCH-ON OR SWITCH-OFF BUTTON SOUND

For best perception of button entries and warnings you can switch on button and warning sounds on your ARCUSPHASE DSP.

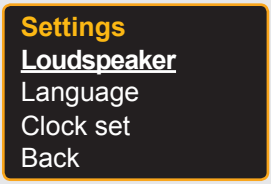
Switch on button and warning sound.

Activate the **Main menu** after successful self-test by pressing the MENU/ENTER-button.



Scroll through the navigation buttons to menu point **Settings**, and confirm the selection with the MENU/ENTER-button.

Scroll through the navigation buttons to the menu point **Loudspeaker**.



By pressing of Menu-/Enter-button you confirm your selection.

With this indication, the button and warning sound of your ARCUSPHASE DSP are switched off.
The soundless mode is indicated by the red symbol and OFF is selected.

By means of the navigation buttons the button and warning sound of your ARCUSPHASE DSP are switched on. The sound mode is indicated by the green symbol and On is selected.
Save your selection with a brief push on the ON/OFF button.

ARCUSPHASE DSP will now save your selection.

Your selection remains saved after switching off the ARCUSPHASE DSP.

Switching off button and warning sound is effected in analogue way.

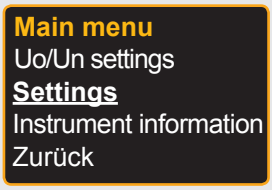
Recommendation !
Lifetime of the batteries extends when button and warning sound of your ARCUSPHASE DSP are only switched on when needed.

DATE AND TIME SETTINGS

You can set the date and time on your ARCUSPHASE DSP.

Configuration of date and time.

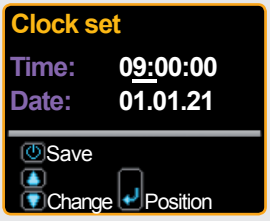
Activate the **Main menu** after successful self-test by pressing the MENU/ENTER-button.



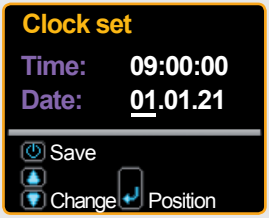
Scroll through the navigation buttons to menu point **Settings**, and confirm the selection with the MENU/ENTER-button.

Scroll through the navigation buttons to the menu point **Clock set**.

By pressing of Menu-/Enter-button you confirm your selection.



First set the value for the time. Press the navigation buttons until the value is visible.



By pressing the Menu/Enter-button, the cursor jumps to the next position.
When the cursor has reached the final position, re-pressing the Menu/Enter-button causes change of the cursor to the first position.

With a brief push on the ON/OFF-button the setting is accepted.

ARCUSPHASE DSP will now save your selection.

Your selection remains saved after switching off the ARCUSPHASE DSP.

HELP IN CASE OF MALFUNCTION

In case of malfunction please only change battery!
Repair of electronics or of mechanic damages is to be effected by ARCUS Schiffmann only!

Error/Fault OLED-Display	Possible reason	Remedy
No indication.	Batteries are empty.	Change batteries (→page 48-49).
	Batteries falsely fitted.	Fit batteries correctly (→page 48-49).
Despite new batteries no indication. LED do not work.	Electronics is defect.	Return ARCUSPHASE DSP to ARCUS Schiffmann. No guarantee when electronics was interfered with.

Error/Fault OLED-Display	Possible reason	Remedy
	Batteries are empty.	Change batteries. (→page 48-49).
	Measurement line or interface adaptor not (completely) in measurement socket.	Plug measurement line or interface adaptor into test socket.
	Defect measurement line or defect interface adaptor.	Exchange measurement line or interface adaptor.
Despite exchanged measurement line, indication: **L1 defect**	Electronics defect.	Return ARCUSPHASE DSP to ARCUS Schiffmann. No guarantee when electronics was interfered with.
	Electronics defect.	Return ARCUSPHASE DSP to ARCUS Schiffmann. No guarantee when electronics was interfered with.

Error/Fault LED	Possible reason	Remedy
No light.	Batteries empty.	Change batteries (→page 48-49).
	Batteries falsely fitted.	Fit batteries correctly (→page 48-49).
Despite new batteries no light signal.	Electronics defect.	Return ARCUSPHASE DSP to ARCUS Schiffmann. No guarantee when electronics was interfered with.

Error/Fault LED	Possible reason	Remedy
Red or green LED at the side of LED-display does not work.	LED is defect.	Return ARCUSPHASE DSP to ARCUS Schiffmann. No guarantee when electronics was interfered with.
LED indication of battery state shines despite battery change.	Electronics defect.	Return ARCUSPHASE DSP to ARCUS Schiffmann. No guarantee when electronics was interfered with.

ROUTINE MAINTENANCE AND UPKEEP

Handle ARCUSPHASE DSP with care and protect it against damage and soiling (e.g. by varnish, metal abrasion, etc.). Store ARCUSPHASE DSP in a dry place.

Cleaning

For cleaning use a watered cloth. Mind that the ARCUSPHASE DSP is totally dry before use!

Before each use

The ARCUSPHASE DSP is to be examined by a trained person for detectable damages and soiling ! In case parts are damaged and function is affected or labels are illegible, withdraw the ARCUSPHASE DSP from further use!

Latest after 6 years (periodic testing)

Periodic testing in regular intervalls is required! Last periodic testing is shown on backside label of ARCUSPHASE DSP (→ page 7).
The next date for periodic testing can be found under **Main menu** -> **Instrument information**.

SPARE PARTS AND ACCESSORIES

Plastic case
Outer dimensions[WxHxD]:
395 x 295 x 106 mm
Type No. 615 101

Carrying bag
Outer dimensions[WxHxD]:
250 x 130 x 80 mm
Type No. 615 098

Protector
Material: Lifoflex®
Type No. 610 400 03

Measurement line red
for LR-system,
2 m long
Type No. 610 400 05

HR-Adaptor
for HR-system
Type No. 610 401

LRM-Adaptor
for LRM-system
Earth and phase line
Type No. 610 406

LRP-Adaptor
for LRP-system
with plug 6 mm
and with earth line
Type No. 610 405
with plug 4 mm
and with earth line
Type No. 610 408

Alligator clip
with loss-protection
Type No. 610 405 02

Change of batteries

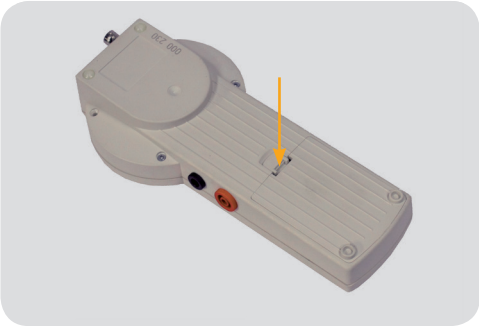
As the power consumption of batteries or rechargeable batteries is dependent on a number of factors, it is impossible to specify an exact lifetime. For reasons of better readability, the procedure described below is valid for batteries and for rechargeable batteries as well.

Before battery exchange, switch-off the ARCUSPHASE DSP and remove both measurement lines from the detector sockets, before opening the battery cover!

Batteries should only be changed in a clean and dry room! If this is impossible, secure that dirt, moisture and other foreign matter will not be enclosed when batteries are changed!

Always exchange the complete battery set, and never combine different battery types (either alkaline or lithium or NiHM rechargeable battery)!

Remove the protector from the ARCUSPHASE DSP casing.



Open the battery cover on the backside of the ARCUSPHASE DSP.

Remove battery cover.
Remove old batteries and replace them by new ones.
Make sure that new batteries are fitted with the correct pole connection!
Place battery cover back into casing in the correct position.
Use ARCUSPHASE DSP only after battery cover is tightened and protector is placed again on the casing!

Attention!
Old and used batteries are hazardous waste! Do not dispose in domestic waste but e.g. into a collection point.

WASTE DISPOSAL

Observe local regulations for disposal of ARCUSPHASE DSP and packing.
ARCUS Schiffmann will not be reliable for unsuitable disposal.
For queries concerning used materials please contact ARCUS Schiffmann.

TECHNICAL DATA

Nominal frequency:	50 Hz
Threshold value:	4.5 V at 2.0 MOhm
Environmental temperature	-20 °C up to +60 °C
Protection class:	IP 54
Usage:	Indoor and outdoor
Battery type:	3 x Alkali Mangan size LR6 or AA - 1.5 V or 3 x Lithium size FR6 or AA - 1.5 V or 3 x Mignon AA rechargeable battery size HR6 -1.2V
Standard:	EN 61243-5
Dimensions:	210 x 95 x 40 mm
Weight:	300 g (without measurement lines)

ANNEXURE

CE Conformity Declaration

Your ARCUSPHASE DSP fulfils the requirements of EU Guideline:
EMC Directive 2014/30/EU.

Conformity of the device with above directive is confirmed by the CE mark.

Product liability and guarantee

This instruction for use was written with greatest care and examined before publishing.

Basis for guarantee is the proven observation of this instruction for use for storage, operation, maintenance and care.
Valid are the “General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry“.

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