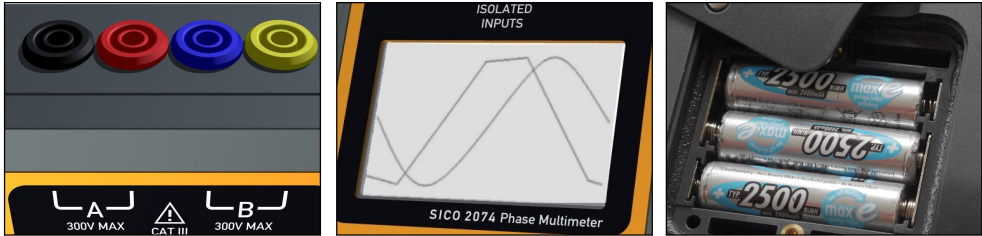


Phase Multimeter

SICO 2074



MANUAL



Dear customer,

Thank you for choosing the Phase Multimeter SICO 2074. We hope that your expectations are met and that we thus are able to support your work with this high-quality and accurate measuring device. The Phase Multimeter SICO 2074 was designed for being used in the industrial environment. It is equipped with two independent isolated inputs. Beside its phase and frequency measurement capability, the Phase Multimeter can be utilised as two independent ac voltmeters - contained in just one compact and lightweight housing. We hope that the design's focus on user's convenience and the high level of protection against electrical shock will like other intrinsic properties contribute to your satisfaction with the easy-to-use Phase Multimeter.

This manual serves as an introduction to your new device. Please read it carefully and completely for your own safety, for highest measuring accuracy, and for avoiding damages. Furthermore, it enables you to use all functions properly. The manual is part of the device. The user is responsible for keeping it until the disposal of the device. When handing the device to other users, the manual is required to be enclosed.

This product was designed, manufactured and tested with highest care and in compliance with European standards. Please contact us if the Phase Multimeter SICO 2074 does not work properly in accordance with the conditions described in this manual.

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Signal Concept GmbH confirms the conformity of the device according to the directives given by the European Parliament and Council 2014/30/EU (EMC-Directive), 2006/42/EC (Machinery Directive), 2014/35/EU (Low Voltage Directive), 85/374 EEC (Product Liability Directive), 2011/65/EU (RoHS Directive) and 2012/19/EU (WEEE Directive).



Signal Concept GmbH holds a Quality Management (DIN EN ISO 9001:2015), which is checked annually by TÜV Rheinland as accredited organization.

Gross weight	1.34 kg
Commodity code	90303100
Country of origin	Germany

Document no.:	2074 B	Copyright © 2025, Signal Concept GmbH All rights reserved. All data, properties and descriptions given in this operating manual may be changed at any time without giving notice. For the latest version please visit www.signalconcept.com
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Accessory

Please check if all of the components listed are included in the delivery.
If parts are missing or damaged, please contact your reseller.

Pieces	Item name	Order number
1	SICO 2074 Phase Multimeter	100630
1	SICO 2074 Transport case	100631
4	Measuring leads	100632
1	Set of Safety test probes (black and red)	100638
1	Set of Clip terminals KLEPS 2600 (black and red)	100639
1	SICO 2074 Manual	100634
3	Batteries, size AA	On request
1	SICO 2074 Acceptance test certificate 3.1 according to BS EN 10204	On request

Optional Accessory	1 Set of Crocodile clip, 30 mm (black and red)	100640
	SICO 2074 Z1 Adapter for vane relay type Siemens	100635
	SICO 2074 Z2 Adapter for vane relay type WSSB	100636
	SICO 2074 Z3 Adapter for valve track circuit relay	100637
	SICO 2074 Z4 Adapter to connect SICO 2074 to interlocking type STW SP Dr L 30	100643
	Casing with strap and set-up function	100641

6 Technical Data

6.1 General

Input configuration	dual, isolated against each other
Input resistance	≥ 1 megaohms
Power supply	three (rechargeable) batteries size AA
Operating temperature range	-20°C (-4°F) ... +55°C (131°F)
Temperature range for storage	-40°C (-40°F) ... +70°C (158°F)
Protection class	II
IP code	IP42
Dimensions in mm (inches)	175 x 92 x 39 (6.89 x 3.62 x 1.54)
Weight including batteries	375 g
Angle display	±180° or 0° ... 360° selectable
Waveform display	enabled for f = (20 ... 5000) hertz
Amplitude scaling	
scaling = off / standard	automatic: full scale
scaling = on	automatic: quasi-proportional
Time scaling	
periods = 1 / standard	automatic: 1 - 2 periods displayed for f = (11 .. 340) hertz
periods = 2	automatic: 2 - 4 periods displayed for f = (22 .. 680) hertz
Phase measuring principle	selective with respect to the fundamental frequency
Frequency range	20 hertz ... 9999 hertz
Voltage range (each input)	0.20 volts ... 400.0 volts (rms)
Maximum allowed continuous voltage (per input / between the inputs)	CATIII: 300 volts, CATII: 400 volts (rms)

6.2 Accuracy Specification

AC voltage measurement	± 0.5 % of reading, ± 1 digit (f ≤ 4 kilohertz) ± 1.0 % of reading, ± 1 digit (f > 4 kilohertz) (≤ 20 volts : 1 digit = 0.01 volts > 20 volts : 1 digit = 0.1 volts)
Frequency measurement	± 0.2 % of reading, ± 1 digit (1 digit = 1 hertz)
Phase measurement	± 1°, ± 1 digit (1 digit = 0.1°)

6.3 Inspection

It is recommended to have the device inspected every two years.

5 Handling

5.1 Cleaning

We recommend to clean the Phase Multimeter with a damp, solvent-free cloth. In order not to damage the device’s surface, do not use abrasive cleaning agents or those containing alcohol.

5.2 Storage

Storage should be in a cool and dry place. For storing the measuring device during a longer period, we recommend to remove the batteries.

5.3 Transport

To protect the measuring device from dust, dirt, shocks and damages, always use the supplied transport case.

5.4 Failures

The SICO 2074 Phase Multimeter performs internal tests for ensuring its proper functioning. In case of failures, information will be shown in the display.

Failure	Possible cause
Voltage is not displayed	<ul style="list-style-type: none">• Signal amplitudes are out of specifications• Non-periodic or considerably distorted signals
Frequency is not displayed	<ul style="list-style-type: none">• At least one frequency is out of specifications• Signal amplitudes are out of specifications• At least one instable frequency• Frequencies at inputs A and B differ
Phase angle is not displayed	<ul style="list-style-type: none">• At least one signal is not periodic• Only one signal is connected to the device• Instable phase between the inputs

If nevertheless the failure could not be solved or be matched with one of the examples above, please contact the manufacturer.

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1 Safety Instructions

The Phase Multimeter SICO 2074 is to be used exclusively according to the description in this manual. Otherwise, the protection given by the measuring device can be limited.

To avoid the damage of persons or products, mind the following guidelines!



Follow the valid guidelines for working on railway facilities.


When using the measuring device in or near the track, make sure your working area is kept clear of running trains!

Repairs may only be carried out by the manufacturer or a company authorized by the manufacturer.

Only use accessories approved to be used with the device.

Do not use the measuring device in environments with explosive gases, steam or dust.

Do not drop or shock the SICO 2074 Phase Multimeter.



Check the device and accessories (leads, plugs) for visible damages or insulation faults. Those parts must not be used!

Plugs shall be fully inserted into the sockets.

First disconnect leads or probes from the inspected system followed by unplugging them from the Phase Multimeter.

To avoid any electrical hazard do not connect leads to the measuring device while it is opened. Disconnect all leads before you open the battery cover.

Disposal


Electric and electronic devices must not be given to the general rubbish, since they mostly contain noxious elements. Instead, dispose them at the collecting points for special waste.

4.2 Waveform Display

Entering the *Settings* menu from the graphical waveform display enables you to change mode-specific settings. Changes made in this mode are not retained upon shutdown/start-up.

By changing the (automatic) *scaling* parameter to *on*, both waveforms (only in dual-trace mode) are displayed with full-scale amplitudes with respect to the height of the graphical window. This makes signal evaluation easier when the two signals differ much in their amplitudes. When (automatic) *scaling* is *off*, both amplitudes appear however in a natural relation to each other.

By changing the *period's* parameter, the number of periods shown on the graphical display can be adjusted. Note that this only will have an effect at signal frequencies below 300 hertz.

	Input A (red & black socket)	=	reference phase
	Input B (yellow & blue socket)	=	phase to be measured
	displayed phase	=	phase to be measured minus reference phase

The Phase Multimeter relates the phase angle at input B to that present at input A. The phase-measuring result can also be understood as a vector belonging to signal B with the ac (rms) voltage being its length and the phase value representing its angle related to that of signal A.

An example:

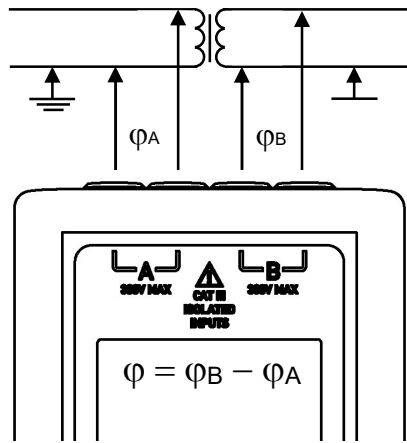
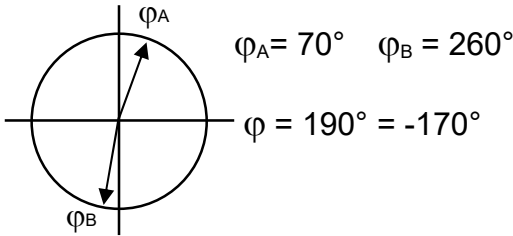



Fig. 4.1 Signal – Connector Assignment

 Note that the meter's frequency-selective phase angle derivation is advantageously performed on the fundamental signal frequency, yielding accurate results with many signal wave shapes.

4 Settings

Depending on the display mode currently active, two different *Settings* menus can be entered by long-pressing the right button.

4.1 Phase Angle Display

Entering the *Settings* menu from the phase angle display will enable you to change both mode-specific and more general settings. All changes are retained when the meter is switched off.

General settings include

- backlight brightness,
- contrast,
- power-off timeout (in minutes),
Shortly before shutdown is forced by timeout, the LCD backlight flashes a several times which indicates that the Phase Multimeter can be prevented from turning off by pressing any button.
- the default angle range at start-up, and
- display of the min / max value
Please note that the setting *min / max* uses a special, reduced display format for numbers and signs. To quit the setting *min / max* please deactivate it in the menu settings, which can be reached by long pressing the right key again.

2 Controls and Connectors

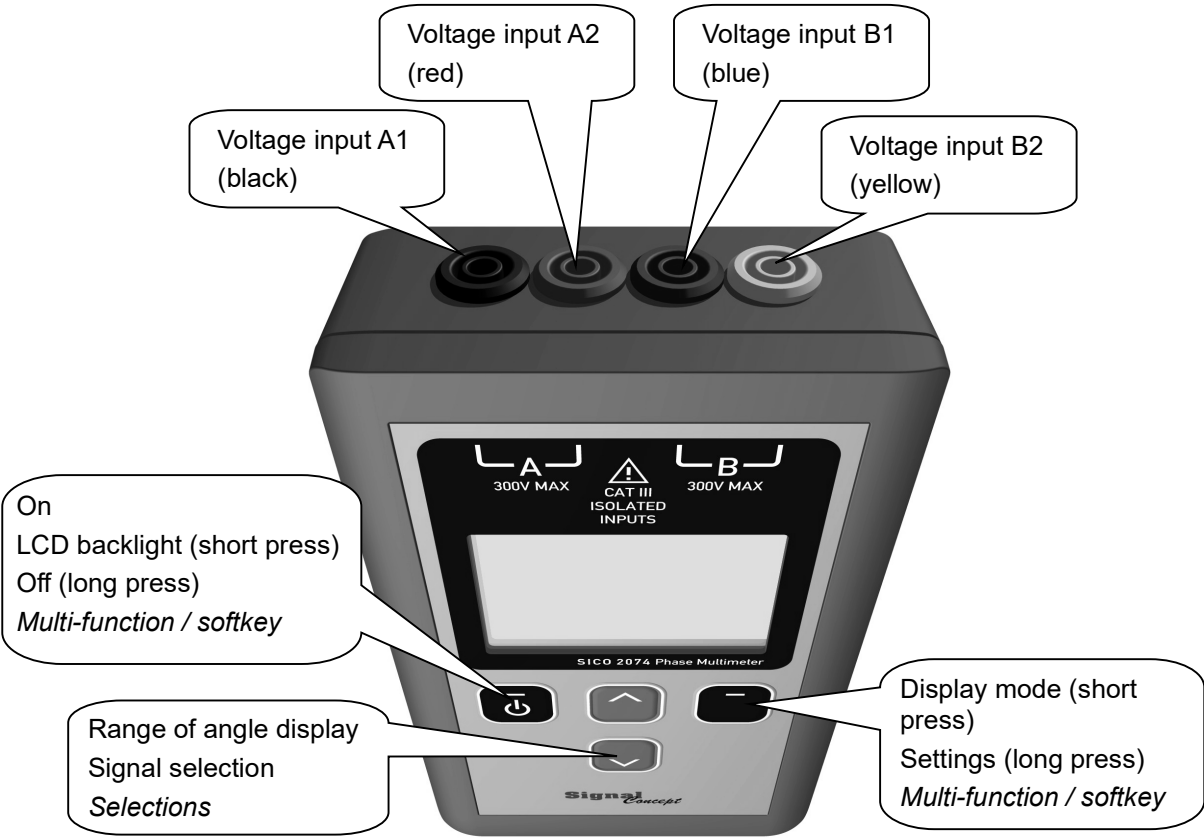


Fig. 2.1 Controls and connectors

With the **On/Off button** (left button) the Phase Multimeter SICO 2074 is switched on (short-pressed). It can always be switched off by long-pressing this button. With the Phase Multimeter being switched on, the backlight of the LC display can be turned on or off by short-pressing this button. In the *Settings* submenu the use of that button is indicated by the display.

By short-pressing the **right button** you can toggle between phase angle display and waveform display. By long-pressing this button, one of the *Settings* submenus is entered. Which submenu exactly is opened depends on the display you start from. Within *Settings*, the respective functions of the multi-function buttons are displayed.

With the two **arrow buttons**, you can make general selections or choose between display options. Within *Settings*, menu selections can be made and values can be changed with these buttons.

i Make sure, both the inputs are correctly assigned to the signals to be inspected which is as essential as ensuring the correct polarity of each input in order to get the right phase angle displayed.

⚡ Both inputs are individually isolated. Moreover, each input is designed in a balanced differential manner; thus not making a ground connection necessary. Nevertheless, for the sake of avoiding ambiguity of the angle readings, the black socket (input A1) and the blue socket (input B1) should be related to the respective reference potential.

3 Operation

3.1 Familiarising with the Phase Measurement

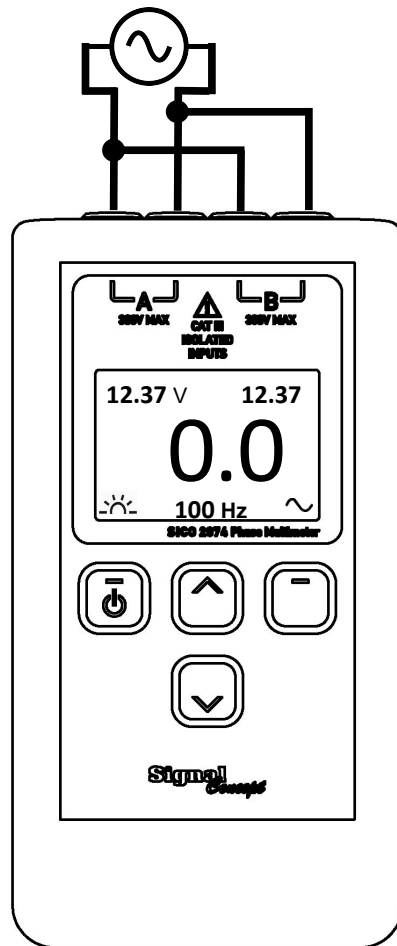


Fig. 3.1 Test Configuration

The test can be left out by experienced users.

Please connect the provided measuring leads with the pair of sockets A1 and A2 as well as with B1 and B2 and consecutively with an appropriate AC voltage source as shown in the figure 3.1 on the right.

1. Switch on the Phase Multimeter.
2. A value near $\pm 0^\circ$ or 360° is shown.
3. Both voltages and the common frequency are displayed simultaneously.
4. Toggle between the two phase display modes by pressing of one of the arrow buttons. Either a range of 0° to 360° (full circle) or $\pm 180^\circ$ (half circle) is displayed.
5. By pressing the right button, you can choose either a numerical phase value or a waveform signal representation (graphical mode).

Within the graphical mode, one of three signal selections can be chosen by using the arrow buttons: signal A, signal B, signals A and B.

3.2 Phase Angle Display

With two signals having the same frequency being connected to the two inputs, both ac voltages (rms), the common frequency, and the phase angle are displayed. With only one signal being connected to the meter, both its ac voltage (rms) and frequency are displayed.

3.3 Waveform Display

The waveform mode is intended for evaluation of signal shape and quality as well as for comparing two signals with respect to timing aspects. This mode is entered by pressing the right button. Single-signal as well as combined-signal displays can be selected with both arrow buttons. The waveform display is similar to that of a dual-trace oscilloscope while it triggers on input A in the dual-trace mode. For returning to the phase angle display, please press the right button again.

Please note that the graphical signal representation is however not intended for exact measurement as a result of the automatic scaling in either direction. Up to a frequency of approx. 340 hertz, between one and two signal periods are displayed. Both the ac voltage (rms) and the frequency values are displayed together with the waveform(s) currently being selected.



Due to the frequency-selective nature of the signal processing applied, accurate phase angle measurement can be carried out even on distorted signals and in the presence of noise or interferences.