



**roger schult**  
**german audio lab**

**Phase Shifter**  
**W2324**

**Operating Manual**  
**Quick Guide**

W2324 Operating Manual for api ® 500 system Version 02.2016  
roger schult D 50374 Erftstadt Peter-May-Str. 104

## **Table of Contents**

### **Page**

<b>2</b>	<b>Table of Contents</b>
<b>3</b>	<b>Introduction</b> <b>Safety Notices</b>
<b>4</b>	<b>Product Details</b> <b>Controls and Operation</b> <b>Phase shifter application examples</b>
<b>5</b>	<b>Installation</b> <b>Installing the W2324 module in an api ® 500 system</b> <b>Recycling</b>
<b>6</b>	<b>Specifications</b>
<b>7</b>	<b>Box contents and compatibility</b>
<b>8</b>	<b>Manufacturer, contact and support</b>

api ® is a registered trademark of AUTOMATED PROCESSES INC., NEW YORK, USA

**Dear customer, we sincerely thank you for purchasing our product.**

The W2324 module for the api ® 500 system that you have purchased was manufactured according to highest manufacturing standards adhering to all European and national guidelines currently in effect. EMV compatibility has been certified and the appropriate records are available at the manufacturer. Upon shipment, the product left the manufacturer in perfect working condition according to factory specifications.

In order to maintain the factory specs and guarantee safe operation in the future, we advise that you read the included operating manual as well as further safety documents (see below) - they contain important notes for operating and handling your product. When passing the unit on to third parties, please also make them aware of these documents.

Any use outside of the applications described in this manual may cause damage to the product and may further imply to hazards such as electrical shorts, fire, electric shocks, etc. The product must not be altered or modified. The enclosed safety and hazard notices about this product refer to the installation and operation in an api ® 500 system. Consequentially, there may be relevant guidelines and regulations that affect operation, even if they don't apply to our product directly. Installation and operation should therefor be carried out by trained personell only.

If you should have technical questions to this product, please contact our technical support team. You will find the contact details in the appendix of this manual.

# Controls and Operation

## Level (rotary control)

The module provides a 41-step rotary level control with a range of -5 dB to +5 dB. This level control allows adjusting the output level to compensate for potential level jumps caused by the phase shift.

## Phase (rotary control)

The phase control potentiometer provides a continuous phase shift of 10° to 125° with the phase switch in the bottom position. Extending the phase range by setting the phase switch to the top position (+180°) increases the phase shift by an additional 180°, resulting in a total range of 190° to 305°.

## Phase (switch)

This three-position switch is used to select the range of the phase shifter.

10° - 125°, bypass phase, 190° - 305° (switch positions bottom, center, top)

The center position "0" of the switch (bypass phase shifter) provides a means to compare the effect of the selected phase shift with the unprocessed, original phase of the source material.

## Frequency (rotary switch)

The phase shift is dependent on the selected frequency setting, which covers a range of 23 Hz to 1.57 kHz.

This frequency selection may be controlled by an 11-step ELMA switch with the following frequencies:

23 Hz / 36 Hz / 48 Hz / 73 Hz / 170 Hz / 230 Hz / 338 Hz / 470 Hz / 730 Hz / 1 kHz / 1.57 kHz

Please refer to this document for additional information: [www.rogerschult.com/bulletin/003](http://www.rogerschult.com/bulletin/003)

## Phase shifter application examples

- Compensate phase differences when recording with multiple microphones
- Compensate for time delays between main speakers and the subwoofer channel
- Reduce the influence of standing waves (room modes) of a loudspeaker setup in conjunction with one or more subwoofers
- Acoustically optimize the sound field in studio and live sound environments
- Reduce the acoustical energy caused by low frequency cancellations in live sound applications
- Creatively control tonal and harmonic contents in mix and mastering

## Installation in an api ® 500 system

### Instructions for installing the W2324 filter module

Please note that electric potential differences and electrostatic discharges (ESD) can destroy your api ® 500 system and the W2324 module. Please make sure to discharge any potential electrostatic charges by touching a plumbing pipe, heating pipe or any other piece of metal connected to earth before installing the W2324 module. Neutral electric potential is a prerequisite to any installation or reconfiguration of electronics modules and their interconnections.

Turn off your api ® 500 rack or console and all connected devices. Remove any blank panels that might cover the slot you have chosen for installation of the module.

Center the module between the two threaded mounting holes and evenly insert the module into the free slot without applying brute force. Secure the W2324 module with both screws. The module is ready for operation once the appropriate connections in the rear of the api ® box have been taken care of.

### Recycling

Please stay eco-friendly and dispose of all defective and obsolete devices at a certified collection facility according to local laws and regulations.



The crossed out wheeled bin label that can be found on your product indicates that this product should not be disposed of via the normal household waste stream. To prevent possible harm to the environment or human health please separate this product from other waste streams to ensure that it can be recycled in an environmentally sound manner. For more details on available collection facilities please contact your local movement Office or the retailer where you purchased this product.

# Specifications

## Technical Data

02 / 2016

Gain, 41-position rotary control	max. +/- 5 dB
Phase, continuously variable rotary control	10° - 125°
Mid indent at 90° phase	
Phase, 3-position flip switch	10° - 125° / 0 / + 180°
phase angle range	10° - 125° / bypass phase / 190° - 305°
Frequency, 11-position switch	23 Hz / 36 Hz / 48 Hz / 73 Hz / 170 Hz / 230 Hz 338 Hz / 470 Hz / 730 Hz / 1 kHz / 1.57 kHz

## Input (electronically balanced)

Reference input level	+6 dBu
Maximum input level	+20 dBu
Input impedance	10 kOhm

## Output (electronically balanced)

Reference output level	+6 dBu
Maximum output level	+25 dBu (0.003% THD+N)
Output impedance	40 Ohm
Gain at linear setting	0 dB (+0.1 / -0.2 dB)
Signal-to-noise ratio	< 100 dB
Noise level (UWTD / WTD)	< 91 dBq / < 81 dBq
Harmonic distortion	THD+N / 0 dBu 0.007%
Frequency range	20 Hz - 40 kHz (+/- 0.1 dB)
Delay time of hard bypass relays	max. 3 ms
Power supply	+/- 16V / max.120 mA
Module dimensions	115 mm x 172 mm (HxT)
Faceplate dimensions	19" / 3 RU, 1,5" x 5,25" (BxH)
Faceplate finish	Aluminium, chromated
Weight	0.575 kg

## **Box contents and compatibility**

### **Box contents**

- W2324 module in api ® 500 system
- Quick start guide in German
- Quick start guide in English

### **Compatibility**

The compatibility certification records for this product are available upon request from the manufacturer.

As all Roger Schult products, the W2324 is hand-crafted and precision-engineered in Germany.

**roger schult**  
german audio lab

D 50374 Erftstadt  
Peter-May-Strasse 104

[www.rogerschult.com](http://www.rogerschult.com)  
[info@rogerschult.com](mailto:info@rogerschult.com)

## Manufacturer

**roger schult**  
german audio lab

Peter-May-Str.104  
D 50374 Erftstadt

[www.rogerschult.com](http://www.rogerschult.com)  
[info@rogerschult.com](mailto:info@rogerschult.com)



W2324 phase shifter