



# EASY SHAKER

WATER-IN-OIL [W/O]

BASE NUMBER [BN]

VISCOSITY [ALUVis]

SALT-IN-OIL [SAWOIL]

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# INTRODUCTION

This guidance does not claim to clarify everything in detail. This data can be viewed in the document “EasyShaker Handbook”.

The purpose of this document is:

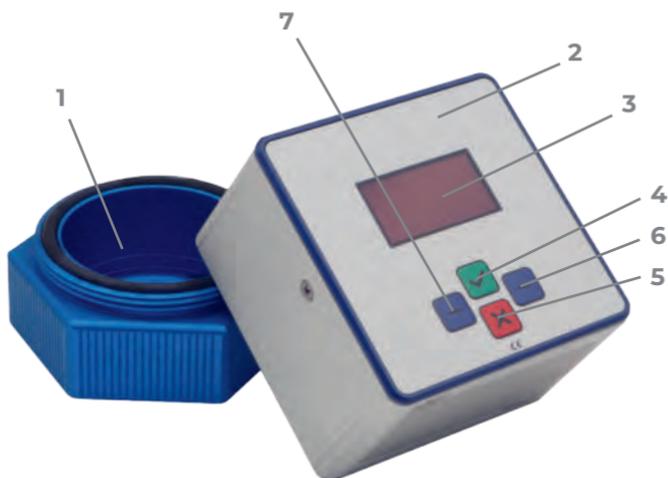
- 1.** To provide everything that is important for testing
- 2.** To provide a quick workaround for small errors

The individual components are described on the following pages. To avoid misunderstandings, it is important to follow the nomenclature for all topics.

# EASYSHAKER TEST DEVICE

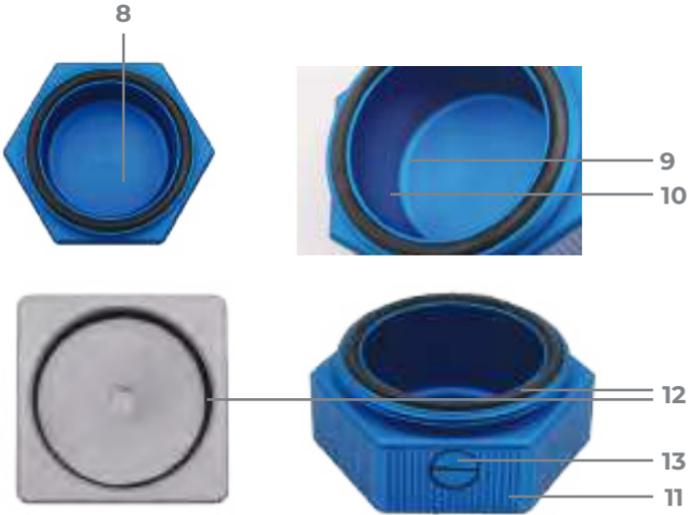
## Overview & Components

### Bottom & Head



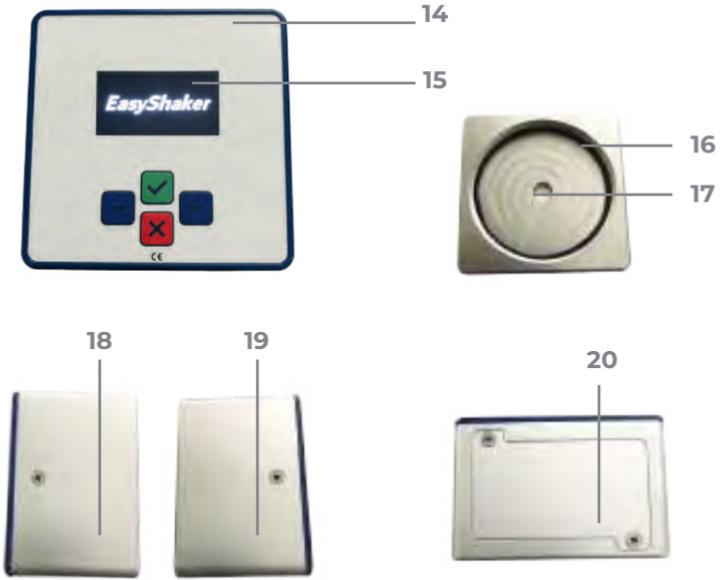
No.	Component
1	Bottom part with reaction chamber
2	Functional unit/"head part" with pressure sensor, input buttons and display
3	Display
4	On-/Save-/Confirmation button
5	Off-/Back-/Cancel button
6	Cursor Button to the right or entry of smaller values
7	Cursor Button to the left or enter larger values

## Bottom Part – View On Top



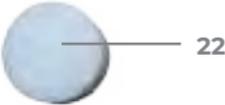
No.	Component
8	Reaction chamber
9	1 <sup>st</sup> inner marker [~10ml]
10	2 <sup>nd</sup> inner marker [~20ml]
11	Ribbed surface
12	Bottom seal
13	Emergency venting. To be used only in case of overpressure due to incorrect use.

# Head Part – View On Top



No.	Component
14	Front plate
15	Display incl. start screen "EasyShaker"
16	Inner sealing ring head part
17	Ceramic surface pressure sensor
18	Right side incl. service screw
19	Left side incl. service screw
20	Battery cover incl. 2-fold screw connection

# Accessories



No.	Component
21	50 ml Beaker
22	Agitator/Mixer
23	5 ml Syringe



No.	Component
24	BN Reagent
25	WiO Reagent



No.	Component
26	WiO Reagent Jelly
27	Sprayer / Cleaner [available separately; in a case]

## First Start-Up

- 1 Unscrew the battery cover
- 2 Remove the battery discharge protector
- 3 Screw the battery cover back on
- 4 The unit will now start automatically
- 5 Select "Settings" with the blue cursor button and confirm with the green confirmation button
- 6 Select "Set Cylinders" and type in the number of cylinders of your machine. Default = 12
- 7 Confirm 2x
- 8 Select "Set Time" and enter the current time
- 9 Confirm
- 10 Select "Set Date" and enter the current date
- 11 Confirm

## Change Batteries

- 1 Unscrew the battery cover
- 2 Remove batteries
- 3 Insert new batteries
- 4 Screw the battery cover back on
- 5 The unit will now start automatically

## Switching On & Off

ON:  
Press the green  
button



OFF:  
Press & hold the red  
button for 3 seconds,



\*The unit switches off  
automatically after 10 minutes  
without input.

# Menu navigation

## Settings

Name	Description
Set USER level	Selection from the different password protected user levels.
BN Settings	To check/create/manage the BN references. Under „Set Bn meas. time“ the methodology can also be adjusted with a known password.
Set Cylinders	Number of cylinders of your machine. Is needed to assign the measured values correctly.
WiO Settings	Password protected area to adjust the measuring time and the WiO-basic calibration function.
Set time	Time setting.
Set date	Date setting.
Sensor settings	Password protected area for sensor calibration.

## Test BN

Name	Description
Slot 1 – 7	Selection of the reference oil to determine the TBN/BN of your used oil.
Select meas. Type	Selection of the sample source [from which cylinder].
BN measurement	Summary of the amount of reagent and sample.

## Test WiO

Name	Description
Select WiO Range	Selection of the measuring range. The smallest possible measuring range is always the most accurate.
WiO Measurement	Summary of the amount of reagent, agitator and sample.

## Read results

Name	Description
Select meas. Type	Preselection of the sample source from which the results are to be read.
Result 1/...	Display of the measurement results Start with the most current value.

# Cleaning the device

**Please note the following instructions in detail:**

- ! After each measurement procedure from BN to WiO and vice versa, the device should be cleaned thoroughly. BN reagent reacts with WiO reagent and will otherwise lead to incorrect measurements.
- ! The outer sealing ring should generally be wiped with an absorbent cloth after each measurement and freed from reagent/sample residues.
- ! Our Test Kit Cleaner is approved as a cleaning agent. So-called "Cold cleaners" are also generally suitable. If you are unsure, especially with regard to resistance, ask your distributor!



## Test Procedure WiO

- 1** Start the device by pushing the green button.
- 2** Select "Test WiO" by using a blue button and confirm with the green button.
- 3** Select the measuring range with the blue button and confirm your selection with the green button.
- 4** Open the device and place the bottom part in front of you.
- 5** Add 20 ml of WiO solvent by using the 50 ml Beaker and/or fill up to the 2nd inner marker of the reaction chamber. See page 7.
- 6** To rinse the syringe, fill and empty it 2 – 3 times with the Oil sample. Use the 5 ml syringe for this.
- 7** Fill 5/3/2/1 ml of your oil sample according to your measuring range. The Volume will be displayed.
- 8** Transfer a portion of the reagent paste. You do not need to be too precise.
- 9** Add 1x mixer/agitator [plastic slice] into the reaction chamber.
- 10** Place the head part on the bottom part and carefully screw the head part onto the bottom part with approx. 2 – 3 turns.
- 11** Lift both parts and screw them tight. Then start the test by pushing the green button.
- 12** Hold the device in both hands and shake initially approx. 5 s powerfully.
- 13** Shake back and forth as constantly as possible until the timer has run out [after 2 minutes]. Small Hint: Best results are achieved if you shake to the left or right from time to time.
- 14** The result can be read on the display.

# Quick Guide WiO Testing

Select measuring range

- 1** 0.03 – 1.2 V%
- 2** 0.03 – 2.5 V%
- 3** 0.03 – 5.0 V%
- 4** 0.03 – 10.0 V%



Open the device and fill up to the second marker with the WiO Solvent [approx. 20 ml].



**Range 1**

Add 5 ml of your sample.



**Range 2**

Add 3 ml of your sample.



**Range 3**

Add 2 ml of your sample.



**Range 4**

Add 1 ml of your sample.

Add: 1x sachet WiO Reagent Jelly + 1x Agigator.



Close the test unit completely and press OK to start the test.



Hold the test unit with both hands and shake powerfully for about 5 seconds + constantly for 2 minutes.



**The result is shown on the display.**

# BASE NUMBER [BN IN MGKOH/G]

## Record BN reference values

- 1 Start the device by pushing the green button.
- 2 Select "Settings" by using a blue button and confirm with the green button.
- 3 Select "BN Settings" with the blue button and confirm your selection with the green button.
- 4 Select "Edit BN ref. list" with the blue button and confirm your selection with the green button.
- 5 Select "Vacant slot 1 – 7" to create a new reference or select an existing one to edit it.
- 6
  - a Select "Read reference" to read an existing reference oil.
  - b Select "Add manually" to enter a known reference pressure value [in Pa].
  - c Select "Delete" to delete an existing reference pressure value.
  - d Select "Add through test" to determine the reference pressure of a lubricating oil sample by means of a 3-fold determination.  
The average value is automatically saved.

**Please note: The following instructions are based on "Add through test"**

- 7 Open the device and place the bottom part in front of you.
- 8 Add 10 ml of BN Reagent by using the 50 ml Beaker and/or fill up to the 1<sup>st</sup> inner marker<sup>2</sup>.
- 9 To rinse the syringe, fill and empty it 2 – 3 times with the Oil sample. Use the 5ml syringe for this.
- 10 Fill 5 ml of your oil sample into the reaction chamber. The Volume will be displayed.

<sup>1</sup>Reference List is only available by orders in advance | <sup>2</sup>Accuracy is significantly improved when using the beaker

- 11 Place the head part on the bottom part and carefully screw the head part onto the bottom part with approx. 2 – 3 turns.
- 12 Lift both parts and screw them tight.
- 13 Start the test by pushing the green button.
- 14 Hold the device in both hands and shake initially approx. 5 seconds powerfully.
- 15 Shake back and forth as constantly as possible until the timer has run out [after 1 minutes].  
Small Hint: Best results are achieved if you shake to the left or right from time to time.
- 16 The result can be read on the display.
- 17 Clean the device especially the reaction chamber and the inner head part.
- 18 Repeat steps 6-15 2 times to obtain the average value of the 3-fold determination.
- 19 Confirm the calculated mean value with green. Note: The individual results should not differ from each other by more than 20 %.
- 20 Select the number in the upper field and change it according to the fresh oil specification, e.g. BN0700TH\*. Confirm with OK according to the display and then press the green button on the keypad.
- 21 The new reference value is stored/saved.

**Please observe the following input rules when naming BN and lubricating oils:**

BN 100 CHE \*

· Prefix - (not changeable)

· TBN of the fresh oil

· Manufacturer

· = Entered/changed manually

## Test Procedure BN

- 1** Start the device by pushing the green button.
- 2** Select "Test BN" by using a blue button and confirm with the green button.
- 3** Select your BN Reference Slot of your choice with the blue button and confirm your selection with the green button.
- 4** Select your meas. Type [source of your sample] f. ex. BN Cyl. 6.
- 5** Open the device and place the bottom part in front of you.
- 6** Add 10 ml of BN Reagent by using the 50 ml Beaker and/or fill up to the 1<sup>st</sup> inner marker into the reaction chamber. See page 7.
- 7** To rinse the syringe, fill and empty it 2 – 3 times with the Oil sample. Use the 5ml syringe for this.
- 8** Fill 5 ml of your oil sample into the reaction chamber.
- 9** Place the head part on the bottom part and carefully screw the head part onto the bottom part with approx. 2 – 3 turns.
- 10** Lift both parts and screw them tight.
- 11** Start testing by pushing the green button.
- 12** Hold the device in both hands and shake initially approx. 5 seconds powerfully.
- 13** Shake back and forth as constantly as possible until the timer has run out [after 1 minute]. Small Hint: Best results are achieved if you shake to the left or right from time to time.
- 14** The result can be read on the display.

## Quick Guide BN Testing

Select reference

**Slot: OIL 1 – 7\***

Slot 1 – 7.

Unscrew the test unit. Then fill up to the first marker with BN Reagent [10 ml].

Add 5 ml of your sample.

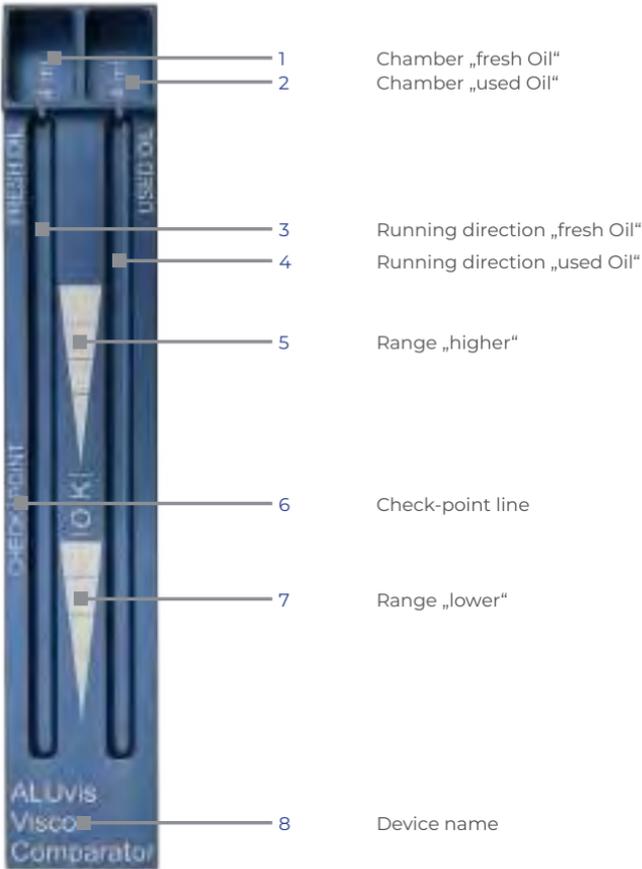
Close the device unit completely and press OK to start the test.

Hold the device with both hands and shake powerfully for about 5 s + constantly for 55 s.

**The result is shown on the display.**

\*Reference oils can be set via settings → Edit BN ref. list → Vacant slot 1 – 7

## Device Components



## Test Procedure

### Viscosity Comparator for used/fresh oil

1. Fill the chamber labelled "Fresh Oil" [longitudinal label] with 4 ml of fresh lubricating oil.
2. Fill the chamber labelled "Used Oil" [longitudinal label] with 4 ml of used oil sample.
3. Press the rocker down [Press on AluVis] so that the oil samples „flow“ = „Inclined position“.
4. When the fresh oil reaches the "Check | Point" line, stop and let the rocker fall back to the horizontal position.
5. Compare how far your used oil has flowed using the middle scale.

#### Evaluate the results:

- a. Is it between the | OK | All is well!
- b. If it is in the range "higher" than | OK | the viscosity is higher than the fresh oil.
- c. If it is in the range "lower" than | OK | the viscosity is lower than the fresh oil.

# SPOT TEST [OPTIONAL AVAILABLE]

## Test Procedure

1. Take your Spot Test paper according to the specification / number of samples.
2. Heat the sample according to the test procedure and specification<sup>1</sup>.
3. Mix samples according to your test specification<sup>2</sup>.
4. Drop one drop onto the middle of the Spot Test papers.
5. Let the Spot Test paper dry. According to ASTM D4740 at 98-102 °C in a closed oven for 1 h.
6. Compare your sample with the image on the right.

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<sup>1</sup> we recommend to heat the samples for at least 20 minutes at 80-100°C degrees.

<sup>2</sup> we recommend min. 1x 50/50 + 1x 20/80 + 1x 60/40 ratio of the 2 substances to be mixed.

Rating ASTM D4740	Reference Spot	Spot Description	Fuel Status
1		Homogeneous spot, no inner ring	Compatible / Stable
2		Faint or poorly defined inner ring	Will deposit some sludge Handle carefully Consider chemical additives Do not overheat Increase purifier Blow down frequency
3		Well-defined inner ring, only slightly darker than the background	As for 2 but increased sludge potential
4		Well-defined inner ring, thicker than the ring in reference spot no. 3 and somewhat darker than the background	Incompatible / Unstable
5		Very dark solid or nearly solid area in the center, the central area is much darker than the background	Incompatible / Unstable

# SAWOIL TEST [SALT-IN-OIL]

## Components

27	50 ml Tube
28	50 ml Beaker
29	5 ml Pipette
30	SaWOil 200 ml Reagent Bottle
31	SaWOil Reagent Stick

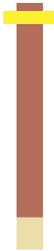
## Test Procedure

1. Have the following items ready: 50 ml tube, 50 ml beaker, SaWOil Reagent Bottle, SaWOil test strip can, your sample and 5 ml Pasteur pipette.
2. Fill the 50 ml tube with 40 ml oil sample.
3. Add 10 ml of SaWOil Reagent in the same tube. Total fill level = 50 ml.
4. Close the 50 ml tube with the cap.
5. Shake vigorously for approx. 1 minute. Then let the mixture rest for 30 min.

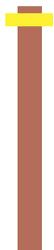
6. Transfer 10 ml of the lower aqueous phase from the 50 ml tube into the beaker [50 ml] by using the pateur pipette 2-3 times, rinse pipette several times in aqueous phase so that no oil is taken along.
7. Take a sawoil-Stick and place it slightly diagonally with the yellow line upwards in the 50 ml beaker with the aqueous solution.
8. Wait for 4 min [reaction time].

## EVALUATION

**SALT:** Result Positive = SALT in the solution



**NO SALT:** Result Negative = NO SALT in the solution



# TROUBLESHOOTING

## General

Description/ name of the error	Possible source of error	Possible solutions
<b>Leakage</b>	Sealing ring dirty Sealing ring punctured/ broken.	Remove the upper and lower sealing ring. Inspect them for possible faults. If no fault is found, clean, dry and replace.
<b>EasyShaker can no longer be opened</b>	EasyShaker was not opened directly after the measurement. This could result in a pressure > 1Bar.	Lowly open the drain screw. See page 7. Then clean and dry the screw and seal. Then close tightly with the screw and seal. <b>CAUTION FOR EMER- GENCIES ONLY. SPLASH HAZARD.</b>
<b>EasyShaker can no longer be switched On/Off</b>	Batteries are empty.	Replace the batteries with new and/or charged batteries.
<b>I can't find my results?</b>	Please note: The storage capacity turnover 100 measured values. After that the measured values are always overwritten/ deleted starting from the oldest.	Select "Read results". Select the relevant sample source. For Example BN Cyl. 4. The results will be displayed.

## Water-in-Oil

Description/ name of the error	Possible source of error	Possible solutions
<b>My results are too high!</b>	BN reagents react strongly with WiO reagents.	Clean and dry the device.
<b>My results are too low!</b>	The device leaks because the sealing rings were damaged and not completely cleaned of WiO paste.	New calibration of your reference oil.

## Base number

Description/ name of the error	Possible source of error	Possible solutions
<b>My results are too high!</b>	BN Reference value is too low.	New calibration of your reference oil.
<b>My results are too low!</b>	BN Reference value is too high.	New calibration of your reference oil.