# Manual

# Horizontal Sieve Shaker AS 400 control

Translation

# Table of Contents

# 1 Notes on the manual

This manual provides technical guidelines for the safe operation of the device. Read this manual through carefully before installing, putting into service and operating the device. Reading and understanding this manual is essential for handling the device safely and as intended.

This manual does not contain any repair instructions. Please contact your supplier or contact Retsch GmbH directly if anything is unclear or you have questions about these guidelines or the device, or in the case of any faults or necessary repairs.

You can find further information about your device at **https://www.retsch.com** on the pages for the specific device concerned.

**Amendment status:**
The document amendment 0001 of the "Horizontal Sieve Shaker AS 400 control" manual has been prepared in accordance with the Directive of Machinery 2006/42/EC.

## 1.1 Disclaimer

This manual has been prepared with great care. We reserve the right to make technical changes. We assume no liability for personal injuries resulting from the failure to follow the safety information and warnings in this manual. No liability will be assumed for damage to property resulting from the failure to follow the information in this manual.

## 1.2 Copyright

## 1.3 Explanation of signs and symbols

In this manual, the following signs and symbols are used:

| Signs and symbols | Meaning |
|---|---|
| ⓘ | Reference to recommendation and/or important information. |
| **Bold font** | Labelling of an important term. |
| • .<br>• .<br>• | Lists |
| (1), (2), (…)<br>(A), (B), (..) | The components have a fixed marking. |
| ⇨ | Action steps of instructions. |
| ➔ | Result of an action step |

| | |
|---|---|
|  | Within these operating instructions, the **Retsch sieving machine AS 400 control** is mostly referred to as a **device**. |

## 1.4 Explanations of the Safety Instructions

The following **warnings** in this manual warn of possible risks and damage:

**DANGER** D1.0000

**Risk of fatal injuries**
Source of danger

– Possible consequences if the danger is ignored.
- **Instructions and information on how to avoid the risk.**

**Fatal or serious injuries** may result if the “Danger” sign is disregarded. There is a **very high risk** of a life-threatening accident or lasting personal injury. The signal word **DANGER** is additionally used in the running text or in instructions.

**WARNING** W1.0000

**Risk of life-threatening or serious injuries**
Source of danger

– Possible consequences if the danger is ignored.
- **Instructions and information on how to avoid the risk.**

**Life-threatening or serious injuries** may result if the “Warning” sign is disregarded. There is an **increased risk** of a serious accident or of a possibly fatal personal injury. The signal word **WARNING** is additionally used in the running text or in instructions.

**⚠ CAUTION** C1.0000

**Risk of injuries**
Source of danger

– Possible consequences if the danger is ignored.
- **Instructions and information on how to avoid the risk.**

**Average to slight injuries** may result if the “Caution” sign is disregarded. There is an average or slight risk of an accident or personal injury. The signal word **⚠ CAUTION** is additionally used in the running text or in instructions.

***NOTICE*** N1.0000

**Type of damage to property**
Source of the damage to property

– Possible consequences if the information is ignored.
- **Instructions and information on how to avoid the damage to property.**

**Damage to property** may result if the information is disregarded. The signal word ***NOTICE*** is additionally used in the running text or in instructions.

# 2 Safety

**CAUTION**

C2.0002

**Risk of injury**
Lack of knowledge of the manual

- The manual contains all safety-related information. Disregarding the manual can therefore lead to injuries.
- **Read the manual carefully before operating the device.**

**Target group:**

The AS 400 control has been designed for preparing samples in a laboratory environment. laboratory environment.  This manual is therefore directed at persons who work with this device in a comparable environment and who already have experience with similar equipment.

The AS 400 control is a modern, efficient, state-of-the-art product from Retsch GmbH. Its reliability is ensured when used as intended and with knowledge of this technical documentation.

## 2.1 Intended use of the device

The particle size distribution of soils, building materials, chemicals, fertilizers, fillers, grains, woodchips, coffee, plastics, flour, metal powders, minerals, nuts, seeds, sand, washing powder, cement clinker and many other substances can be easily and quickly analysed.

The Horizontal Sieve Shaker of the Retsch GmbH is successfully deployed in almost all areas of industry and research within the scope of quality control, especially where there are high demands regarding easy operability, speed, precision and reproducibility.

The AS 400 control is specially designed for test sieves with an outer diameter from 100 mm to 400 mm. For an optimum measurement result it is recommended to exclusively use test sieves from Retsch GmbH.

## 2.2 Improper use

The AS 400 control may only be used as intended. Any uses other than the described intended use are regarded as improper use.

The device is not suitable for processing sample materials that can form explosive air mixtures.

Any form of claims for damage to equipment or personal injury resulting from improper use and/or the failure to comply with the safety instructions shall be ruled out.

## 2.3 Obligations of the operating company

### 2.3.1 Provisions

The user bears responsibility for ensuring that people working with the device and the corresponding equipment have taken note of and understood all relevant safety regulations.

### 2.3.2 Personnel

- Ensure that only trained personnel are deployed whose training and experience enable them to recognise risks and avoid potential hazards.
- Staff should be given regular training on using the device, and in particular regarding sudden events.
- Only allow trainee staff to work on the device when they are being supervised by qualified personnel.
- Check the safety awareness of staff regularly.
- Define staff responsibilities according to qualification and job description.
- Provide staff with personal protective equipment (PPE).
- Ensure that the following conditions have been met:
  - Staff have read and understood this Manual, and in particular the chapter on Safety.
  - Staff are aware and take note of the relevant accident prevention and safety regulations.
  - Staff wear the designated personal protective equipment (PPE) when working with the device.

### 2.3.3 Workstation and device

- Ensure that there is sufficient lighting and ventilation at the workstation.
- Ensure that the exhaust air is properly conducted outside.
- All signs on the device must be kept in a legible condition.
- Ensure that all inspections and servicing work prescribed in this Manual are carried out.

### 2.3.4 Qualification of personnel

| Work/operating phase | Qualification |
|---|---|
| Transport<br>Installation<br>Commissioning<br>Operation<br>Controlling<br>Installation of additional equipment<br>Servicing<br>Disposal | Qualified employee who has been trained in the safe use of the device. |
| Work on the electrical equipment on the device | Electrician who, on the basis of his/her training, knowledge and experience is able to evaluate the work assigned and recognise potential hazards. |

### 2.3.5 Personal protective equipment (PPE)

**Recommendations for personal protective equipment**

| Work/operating phase | Personal protective equipment (PPE) |
|---|---|
| Transport<br>Set up | Safety footwear |
| Commissioning<br>Installation of additional equipment<br>Maintenance | No PPE required |
| Disposal | Safety footwear |
| Normal operation (operation and control) | No PPE required |

## 2.4 Protective Equipment

**Emergency stop switch**

The device is not equipped by default with an emergency stop switch. In case of emergency, the device must be switched off by pressing the main switch or by disconnecting the device from the power supply.

## 2.5 Repairs

This manual does not contain any repair instructions. For safety reasons, repairs may only be carried out by Retsch GmbH or an authorised representative or by qualified service technicians.

**In case of repair, please inform…**

…the Retsch GmbH representative in your country,
…your supplier, or
…Retsch GmbH directly.

**Service address:**

## 2.6 Preventing risks during normal operation

Non-compliance with the following safety instructions is contrary to the intended use and constitutes a danger to personnel and a risk to operational safety.

**Transport and set up**

- Wear protective footwear during transport and set up.
- The device may only be connected to sockets with PE conductor.
- When connecting the device, the values on the nameplate must match the values of the electrical connection.

**Operation**

- Read the manual before using the appliance.
- Only operate the device at a workstation with sufficient space for secure set up of the device.
- Check the mains lead for damage before operation.
- Do not operate the device if damage is visible or suspected.
- Only operate the device in accordance with technical limits of use.
- Before operating the device, take measures to allow for limited communication during operation.
- Pay attention to the surroundings during grinding, as it is difficult to notice acoustic signals due to the background noise.
- Do not operate the device in potentially explosive atmospheres.
- Observe safety data sheets of samples and follow the instructions by taking appropriate measures in advance.

**Maintenance and repair**

- Before maintenance, switch off the device with the main switch.
- The device may only be cleaned dry or with a damp cloth.
- Do not clean the device with compressed air.
- Repairs may only be carried out by the manufacturer of the device or an authorised representative.

## 2.7 Preventing damage to equipment

- Protect the device from condensation in case of expected strong temperature fluctuations (e.g. during air transport).
- When transporting the device, avoid any impacts and vibrations.
- Observe the conditions for the installation site when setting up the device.
- The device may only be cleaned dry or with a damp cloth.
- Do not use solvents or aggressive cleaning agents for cleaning.
- For maintenance, only use original spare parts.

## 2.8 Confirmation Form for the Managing Operator

This manual contains essential instructions for operating and maintaining the device which must be strictly observed. It is essential that they be read by the user and by the qualified staff responsible for the device before the device is commissioned. This manual must be available and accessible at the place of use at all times.

The user of the device herewith confirms to the managing operator (owner) that he has received sufficient instructions about the operation and maintenance of the system. The user has received the manual, has read and taken note of its contents and consequently has all the information required for safe operation and is sufficiently familiar with the device.

The managing operator should for legal protection have the user confirm the instruction about the operation of the device.

I have read and taken note of the contents of all chapters in this manual as well as all safety instructions and warnings.

| **User** |
| --- |
| |
| Surname, first name (block letters) |
| Position in the company |
| Place, date and signature |

| **Managing operator or service technician** |
| --- |
| |
| Surname, first name (block letters) |
| Position in the company |
| Place, date and signature |

# 3 The Horizontal Sieve Shaker AS 400 control

The AS 400 control performs a planar sieving, in which the sample material tolls over the sieve mesh fabric by the horizontal circular movement of the sieve bottom. Thereby, the sample material is subjected to a planar circular movement with a radius of 15 mm in accordance with the DIN 53477 standard. Hence, the sample material is spread uniformly across the entire surface of the sieve bottom, whereas the particles are subjected to an acceleration in horizontal direction. In this process, spherical particles perform free rotations and are compared with the mesh sizes when rolling, while elongated particles are conveyed horizontally oriented over the sieve mesh fabric. In the Horizontal Sieve Shaker of the Retsch GmbH, a gear motor drives an eccentric and transfers these movements to the sieve stack. The electronically controlled speed is infinitely adjustable between 50 and 300 revolutions per minute (rpm).

## 3.1 Technical data

| **General specifications** | |
|---|---|
| Applications | Separation, fractionation, particle size determination |
| Area of use | Agriculture, building materials, biology, chemistry, geology, glass, ceramics, plastics, food, mechanical engineering, medicine, metallurgy, pharmacy, environment / recycling |
| Compound | Powder, bulk material |

| **Specifications** | |
|---|---|
| Effective range | 45 µm – 63 mm |
| Sieving movement | Circling horizontally |
| Max. batch / sieving mass | 5 kg |
| Max. sieve tower mass | 15 kg |
| Usable sieve diameters | 100 mm / 200 mm / 203 mm (8”) / 305 mm / 315 mm / 400 mm |
| Max. screen tower height | 510 mm (height of analysis sieves and collection tray) |
| Sieve tension units | Standard, comfort (each for dry sieving) |
| Number of revolutions | Digital, 50 - 300 $min^{-1}$ |
| Time display | Digital, 1 – 99 min |
| Interval operation | 1 – 10 min |
| Storable SOPs (Standard Operating Procedures) | 9 |
| Suitable for dry sieving | Yes |
| Suitable for wet sieving | No |
| Dimensions W x H x D opened | 540 x 260 x 510 mm |
| Weight, net | ~ 70 kg |
| With test certificate / can be calibrated | Yes |
| Conformity | CE |

| Electrical specifications | |
|---|---|
| Serial interface | Yes |
| Power connection | 1 phase, 100 – 240 V, 50/60 Hz |
| Rated capacity | 140 VA |
| Degree of protection | IP20 |
| Electromagnetic compatibility | EMC class according to DIN EN 55011:A<br>This device contains a safety device that may lead to a shutdown in case of certain adverse network events. Such an occurrence does not pose a safety risk to the device. Restart the device by turning the main switch off and on again. |

## 3.2 Receptacle Volume

The maximum receptacle volume (the maximum feed quantity) depends on various factors such as number and aperture size of the test sieves, maximum grain size and width of distribution of the sample material.

Examples for the maximum feed quantity according to DIN 66165 for test sieves of 400 mm in diameter are listed in the following table:

| Mesh size | Max. feed quantity | Max. permitted oversize material according to DIN 66165 |
|---|---|---|
| 25 µm | 50 $cm^3$ | 25 $cm^3$ |
| 45 µm | 75 $cm^3$ | 38 $cm^3$ |
| 63 µm | 101 $cm^3$ | 50 $cm^3$ |
| 125 µm | 151 $cm^3$ | 75 $cm^3$ |
| 250 µm | 226 $cm^3$ | 113 $cm^3$ |
| 500 µm | 352 $cm^3$ | 176 $cm^3$ |
| 1 mm | 503 $cm^3$ | 251 $cm^3$ |
| 2 mm | 880 $cm^3$ | 440 $cm^3$ |
| 4 mm | 1 382 $cm^3$ | 691 $cm^3$ |
| 8 mm | 2 262 $cm^3$ | 1 131 $cm^3$ |

## 3.3 Feed Grain Size

Traditional dry sieving is performed in the particle size range of 40 µm to 125 mm. By means of sieving aids or with wet sieving the measurement range can be extended to 20 µm. The maximum feed grain size depends on the sample material, the number and aperture size of the test sieves and the type of the sieving machine.

Examples for the maximum feed grain size according to DIN 66165 are listed in the following table:

| Mesh size | Max. feed grain size according to DIN 66165 |
|---|---|
| 22 µm | 710 µm |
| 45 µm | 1 mm |
| 63 µm | 1.4 mm |
| 125 µm | 2.5 mm |
| 250 µm | 4 mm |

| Mesh size | Max. feed grain size according to DIN 66165 |
|---|---|
| 4 mm | 25 mm |
| 8 mm | 45 mm |
| 16 mm | 71 mm |
| 22.4 mm | 90 mm |
| 45 mm | 150 mm |

| | | | |
|---|---|---|---|
| 500 µm | 6 mm | 63 mm | 180 mm |
| 1 mm | 10 mm | 90 mm | 230 mm |
| 2 mm | 16 mm | 125 mm | 300 mm |

The Horizontal Sieve Shaker AS 400 control is designed for dry sieving with a measuring range of 45 µm to 63 mm.

## 3.4 Emissions

**⚠ CAUTION** C3.0011

**Possibility of acoustic signals not being heard**
Loud sieving noises

- Possible acoustic alarms and voice communication might not be heard.
- **Consider the volume of the sieving noise in relation to other acoustic signals in the work environment. Additional visual signals may be used.**

**⚠ CAUTION** C4.0017

**Hearing damage**
A high sound level may be generated depending on the type of material, the number of sieves, the sieving aid used, the amplitude set and the duration of the sieving

- Excessive noise in terms of level and duration can cause impairments or permanent damage to hearing.
- **Ensure suitable noise protection measures are taken or wear ear protection.**

**Sound parameters:**
The sound parameters are also influenced by the set speed, the number of test sieves and the properties of the sample material.

Example:

| | |
|---|---|
| Number of test sieves: | 5 |
| Speed: | 150 rpm |
| Feed material: | Quartz sand (< 1 mm) |

At these operating conditions, the workplace related equivalent continuous sound level $L_{eq}$ = 58.4 dB(A).

## 3.5 Views of the device

### 3.5.1 Front

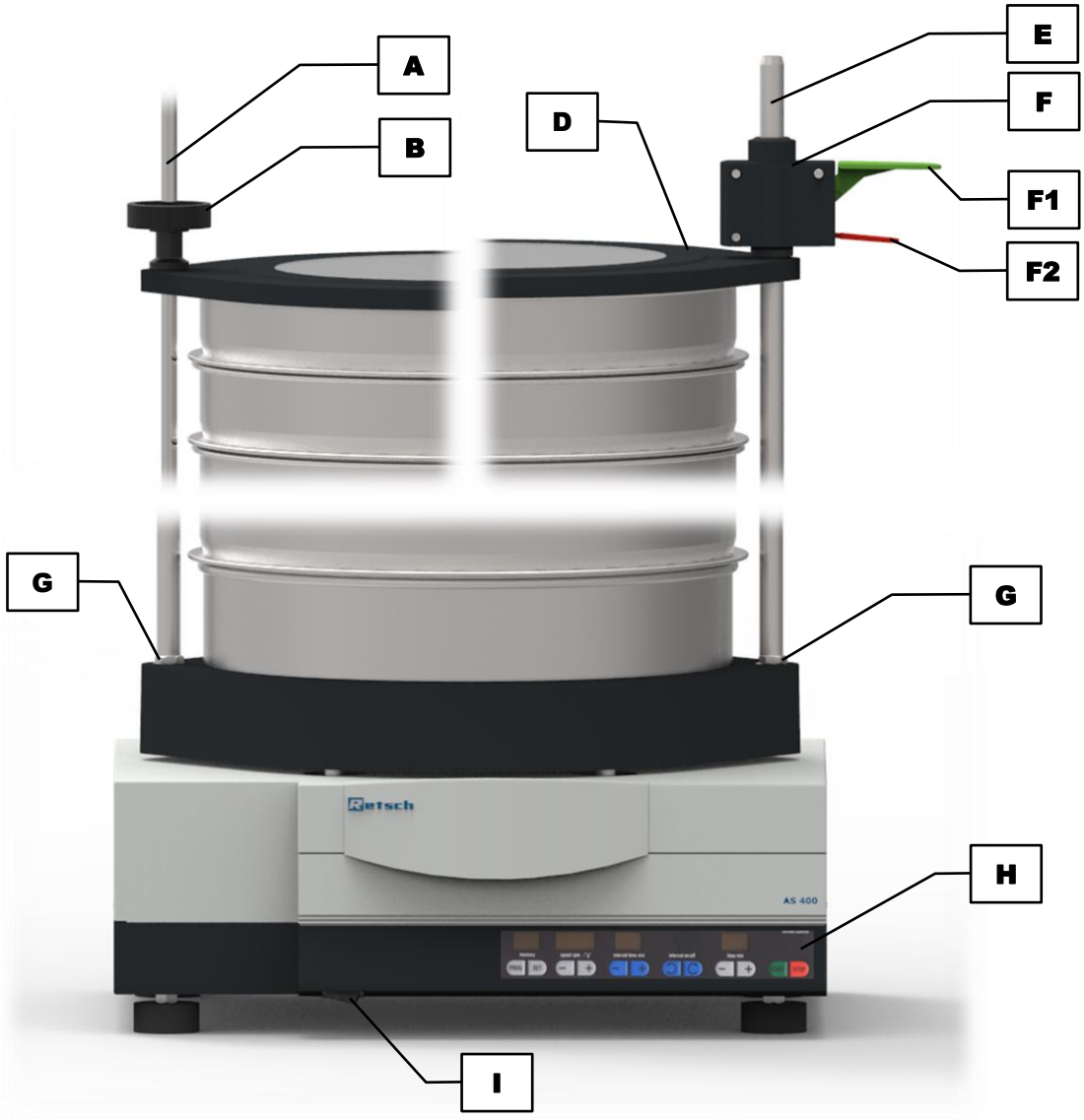



**Fig. 1:** Front view of the device with different sieve clamping units

| Element | Description | Function |
|---|---|---|
| **A** | Threaded rod "standard" | Fixes the sieve stack together with the clamping lid (**D**) and the fixing nut (**B**) |
| **B** | Fixing nut "standard" | Fixes the sieve stack together with the clamping lid (**D**) and the threaded rod (**A**) |
| **D** | Clamping lid | Covers the top test sieve and fixes the sieve stack together with the fixing nut (**B**) in combination with the threaded rod (**A**), or the quick clamping unit (**F**) in combination with the support rod (**E**) |
| **E** | Support rod "comfort" | Fixes the sieve stack together with the clamping lid (**D**) and the quick clamping unit (**F**) |

| | | |
|---|---|---|
| **F** | Quick clamping unit "comfort" | Fixes the sieve stack together with the clamping lid (**D**) and the support rod (**E**) |
| **F1** | Quick clamping lever green | Moves the clamping lid (**D**) downwards when being pressed down and thus, fixes the sieve stack |
| **F2** | Quick clamping lever red | Releases the clamping lid (**D**) when being pressed up and thus, the sieve stack |
| **G** | Hexagonal nut | Serves as lock nut for the screwed threaded rod (**A**) or support rod (**E**) |
| **H** | Operating controls | Operation of the device |
| **I** | Mains switch | Switches the device on and off, disconnects the device from the mains |

### 3.5.2 Back

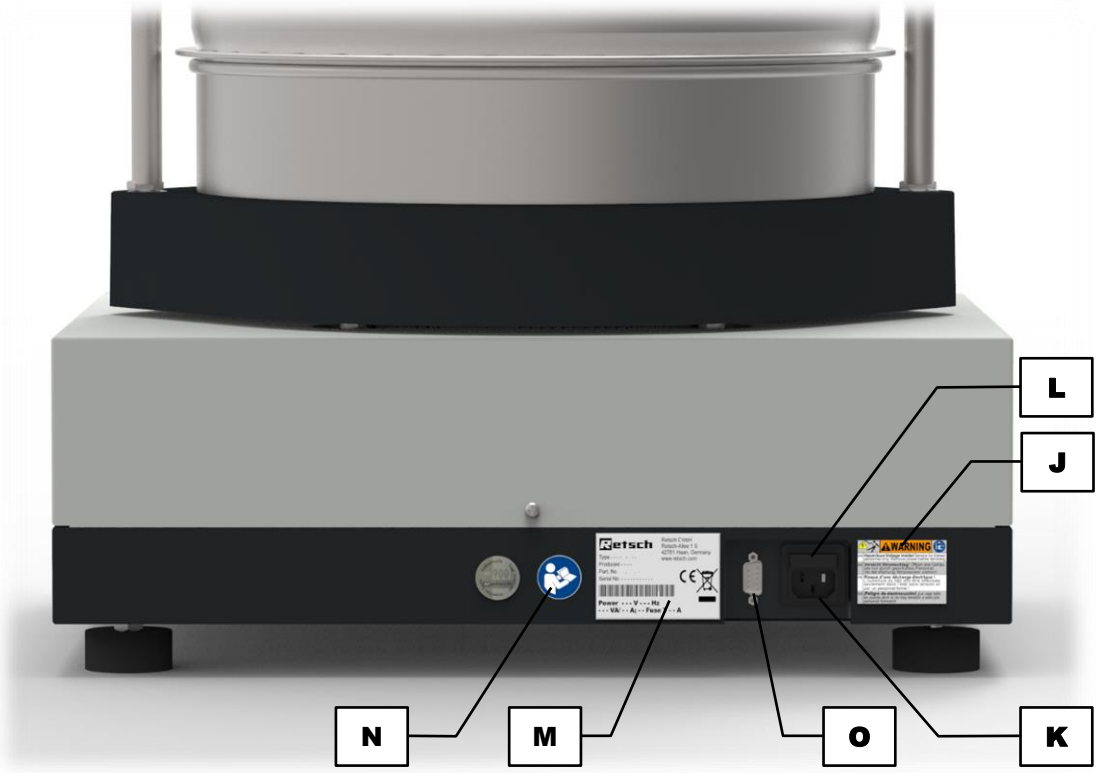



**Fig. 2:** Back view of the device

| Element | Description | Function |
|---|---|---|
| **J** | Warning sign "Disconnect from the mains" | Warning of electric shock |
| **K** | Mains connection | Connection for the power cable |
| **L** | Fuse drawer | Contains the fuses protecting against overvoltage (fuse: 6.3 A delay-action at 100 – 240 V) |
| **M** | Type plate | Lists, among others, the voltage type, the serial number and the type of the device |
| **N** | Sticker "Manual" | Reminds to read the manual |

| | | |
|---|---|---|
| **O** | RS232 interface | Data transfer between device and PC |

## 3.6 Operating Controls, Displays and Functions

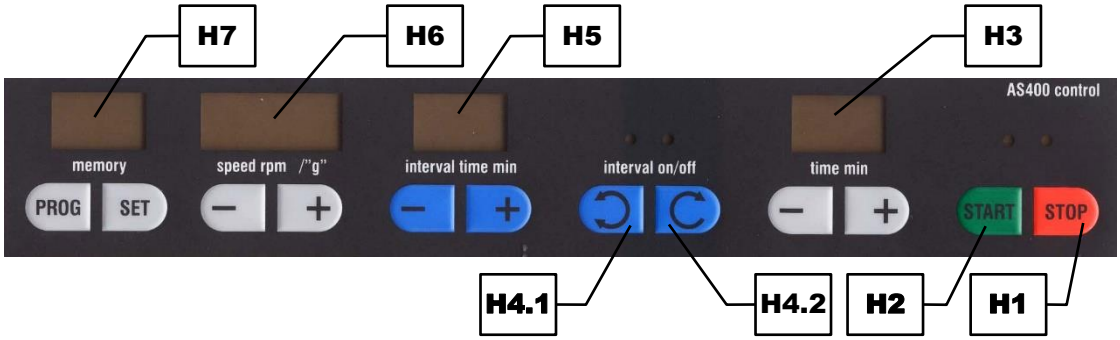



**Fig. 3:** Operating controls and functions

| Element | Description | Function |
|---|---|---|
| **H1** | STOP | Stops the sieving process. In standby or setting mode, the red LED is lit |
| **H2** | START | Starts the sieving process. During operation, the green LED is lit |
| **H3** | Time setting | Reduces or extends the sieving time by pressing the "-" or "+" button, respectively in the range of 1 to 99 minutes |
| **H4.1** | Interval on | Switches the device into interval operation. During the interval operation, the green LED is lit |
| **H4.2** | Interval off | Switches the device into continuous operation. During the continuous operation, the green LED is lit |
| **H5** | Interval setting | Reduces or extends the sieving time between the interval pauses by pressing the "-" or "+" button, respectively in the range of 1 to 10 minutes |
| **H6** | Speed setting | Decreases or increases the speed by pressing the "-" or "+" button, respectively in the range of 50 to 300 rpm or 0.04 to 1.51 g |
| **H7** | Programme setting | Allows for the saving, editing and selection of up to 9 programmes |

## 3.7 Type Plate Description

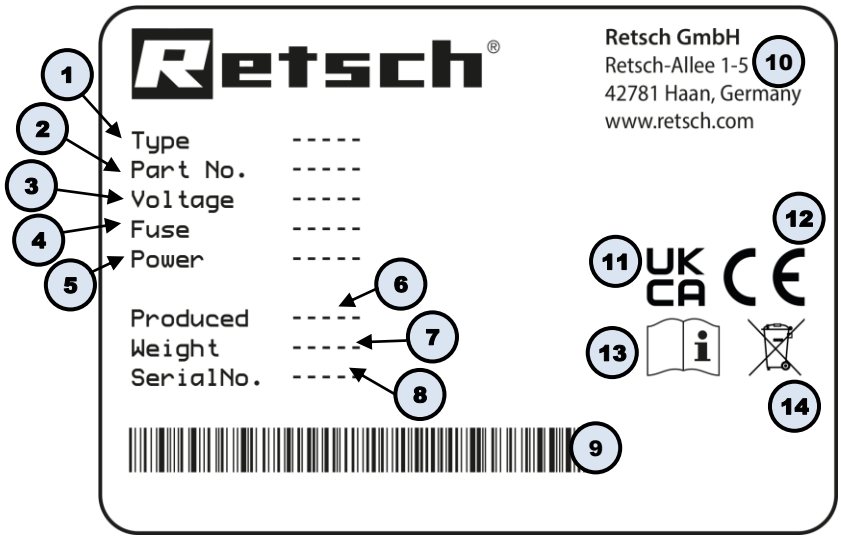



**Fig. 4:** Type plate

1 Device designation
2 Part number
3 Power version, Mains frequency
4 Fuse type and fuse strength
5 Capacity, Amperage
6 Year of production
7 Weight
8 Serial number
9 Bar code
10 Manufacturer's address
11 UKCA marking
12 CE marking
13 Safety warning: Read the manual
14 Disposal label

ⓘ In the case of queries please provide the device designation (**1**) or part number (**2**), as well as the serial number (**8**) of the device.

# 4 Packaging, Transport and Installation

## 4.1 Packaging

The packaging has been adapted to the mode of transport. It complies with the generally applicable packaging guidelines.

**NOTICE** N2.0001

**Complaint or return**
Keeping the packaging

- Inadequate packaging and insufficient securing of the device can jeopardise the warranty claim in the event of a complaint or return.
- **Keep the packaging for the duration of the warranty period.**

## 4.2 Transport

**NOTICE** N3.0017

**Damage to components**
Transport

- Mechanical or electronic components may be damaged during transport. The device must not be knocked, shaken or thrown during transport.
- **Move the device gently during transport**.

**NOTICE** N4.0014

**Complaints**
Incomplete delivery or transport damage

- The forwarding agent and Retsch GmbH must be notified immediately in the event of transport damage. It is otherwise possible that subsequent complaints will not be recognised.
- **Please check the delivery on receipt of the device for its completeness and intactness.**
- **Notify your forwarding agent and Retsch GmbH within 24 hours.**

## 4.3 Temperature Fluctuations and Condensation

**NOTICE** N5.0016

**Damaged components due to condensation**
Temperature fluctuations

- The device may be exposed to substantial fluctuations in temperature during transport. The ensuing condensation can damage electronic components.
- **Wait until the device has acclimatised before putting it into service.**

**Temporary storage:**
Also in case of an interim storage the device must be stored dry and within the specified ambient temperature range.

## 4.4 Conditions for the Installation Site

**CAUTION** C5.0047

**Risk of injury caused by the device falling**
Incorrect installation of the device

- Due to its weight, the device can cause injuries if it falls.
- **Only operate the device on a sufficiently large, strong and stable workstation.**
- **Ensure that all of the device feet are securely supported.**

**NOTICE** N6.0024

**Location requirements**
The movement of the sample material causes severe unbalance during operation

- Due to the movement of the sample material, the AS 400 control causes very strong unbalance during operation.
- **The installation must be carried out on a stable, anti-slip, vibration-free base, which is suitable for both, the weight of the device and the resulting unbalance during operation.**
- **At speeds > 200 U/min, when using test sieves with a diameter of 400 mm and/or with high sieve stacks, the device must be firmly bolted to the base by means of the transport plates!**
- **In order to always ensure safe operation, it is recommended to firmly screw the AS 400 control to the base regardless of the speed, the test sieves used and the payload.**

**NOTICE** N7.0002

**Setting up the device**
Disconnecting the device from the mains

- A separation of the device from the mains must be possible at any time.
- **Set up the device in such a way, that the connection for the power cable is always easily accessible.**

**NOTICE** N8.0021

**Ambient temperature**
Temperatures outside the permitted range

- Electronic and mechanical components may be damaged.
- The performance data alters to an unknown extent.
- **Do not exceed or fall below the permitted temperature range (5 °C to 40 °C ambient temperature) of the device.**

- Installation height: max. 2 000 m above sea level
- Ambient temperature: 5 °C – 40 °C
- Width of the base: 570 mm
- Depth of the base: 570 mm
- No safety clearances required

**Location requirements:**
The device must be placed on a vibration-free, plane, stable and free surface to avoid transmission of vibrations. A level base ensures the uniform distribution of the sample over the sieve mesh fabric, as well as the stability of the device.

- Maximum relative humidity < 80 % (at ambient temperatures ≤ 31 °C)

For ambient temperatures $U_T$ between 31 °C and 40 °C, the maximum relative humidity value $L_F$ linearly decreases according to $L_F = -(U_T - 55) / 0.3$:

| Ambient temperature | Max. rel. humidity |
|---|---|
| ≤ 31 °C | 80 % |
| 33 °C | 73.3 % |
| 35 °C | 66.7 % |
| 37 °C | 60 % |
| 39 °C | 53.3 % |
| 40 °C | 50 % |

**NOTICE** N9.0015

**Humidity**
High relative humidity

- Electronic and mechanical components may be damaged.
- The performance data alters to an unknown extent.
- **The relative humidity in the vicinity of the device should be kept as low as possible.**

## 4.5 Removing the Transportation Lock

**⚠ WARNING** W2.0005

**Risk of injury due to the device falling down**
Lifting the device above head height

– The device can fall causing serious injuries when lifted above head height.

- **Never lift the device above head height!**

***NOTICE*** N10.0018

**Transportation lock**
Transport without transportation lock, or operation with transportation lock

– Mechanical components may be damaged.

- **Only transport the device with mounted transportation lock.**
- **Do not operate the device with built-in transportation lock.**

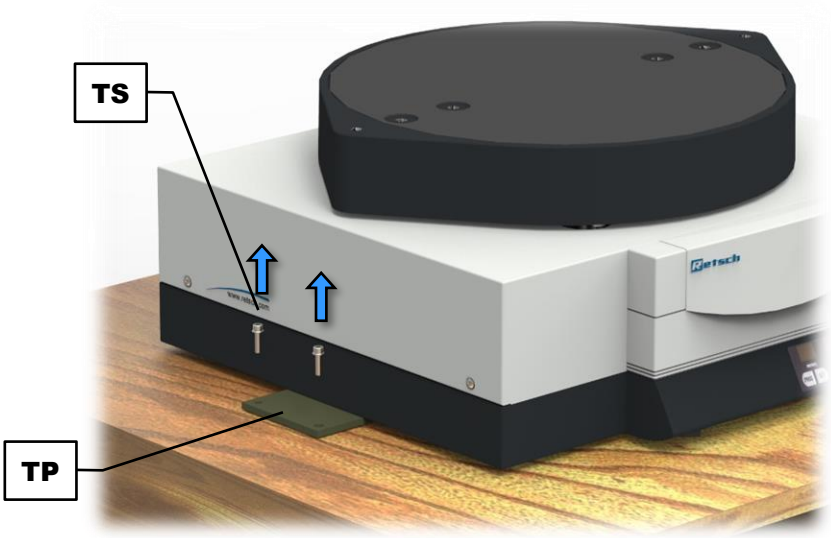



**Fig. 5:** Unscrewing the transportation lock

⇨ Unscrew the screws on either side of the device (**TS**).

⇨ Grasp the device by the lower lateral housing and lift the AS 400 control to its intended location. Be careful not to lift the device by the plastic front panel as it is not designed for the weight.

**⚠ CAUTION** The weight without sieve stack and sieve clamping unit amounts approx. 70 kg. The device may only be lifted by three people.

ⓘ The two transportation plates (**TP**) do not necessarily have to be removed. They can be used to individually mount the AS 400 control, i.e. to firmly screw the device to the laboratory bench, if necessary.

## 4.6 Orientation at the site of installation

**CAUTION** C6.0012

**Contusions and bruises**
Overturning of the sieve stack

- The sieve stack can overturn and cause personal injury.
- **Only operate the device with securely clamped sieve stack.**

Before first commissioning the device must be aligned and the sieve clamping unit must be installed.

**Alignment of the device:**

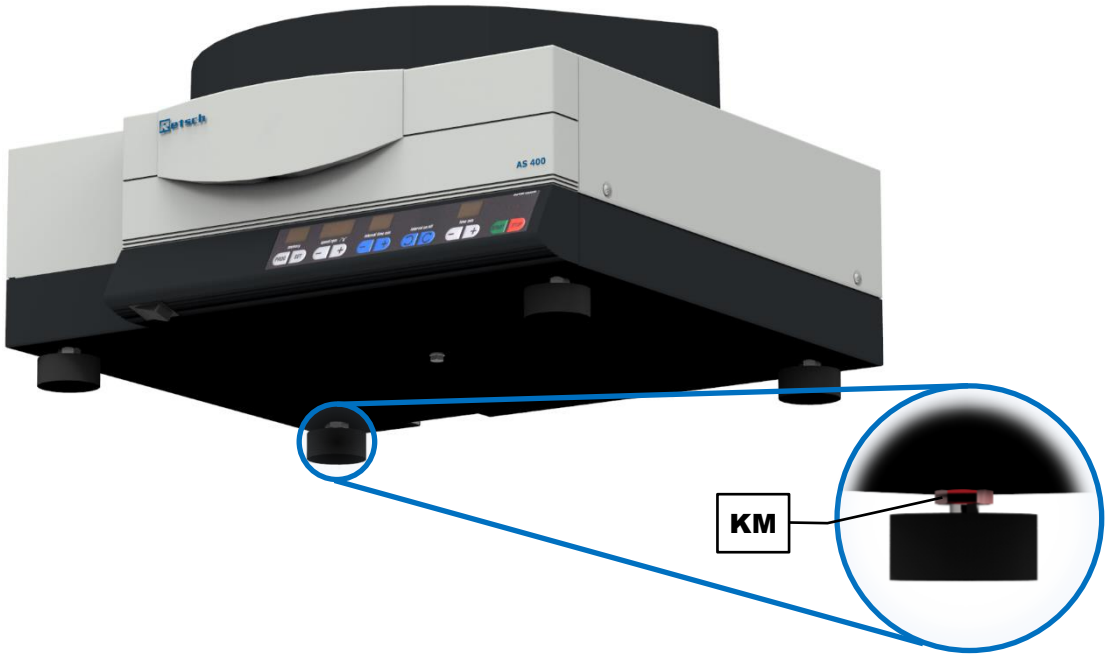



**Fig. 6:** Aligning the device

For the device to have a secure footing, all four feet must be in contact with the installation surface. To align the device accordingly, the left, rear foot is adjustable in height.

⇨ Loosen the lock nut (**KM**) by means of a 17 mm open-end wrench.
⇨ Screw the foot out or in until the device is horizontally aligned and stands securely on the installation surface with all four feet.
⇨ Retighten the lock nut (**KM**) again.

## 4.7 Installation of Sieve Clamping Unit

The AS 400 control is suitable for test sieves with an outer diameter of 100 mm to 400 mm. For test sieves with a diameter of 100 – 203 mm, the two internal threaded holes are used for the stand or threaded rods, for test sieves with a diameter of 305 mm both middle, and for test sieves with a diameter of 400 mm, the stand or threaded rods are screwed into the two external threaded holes.

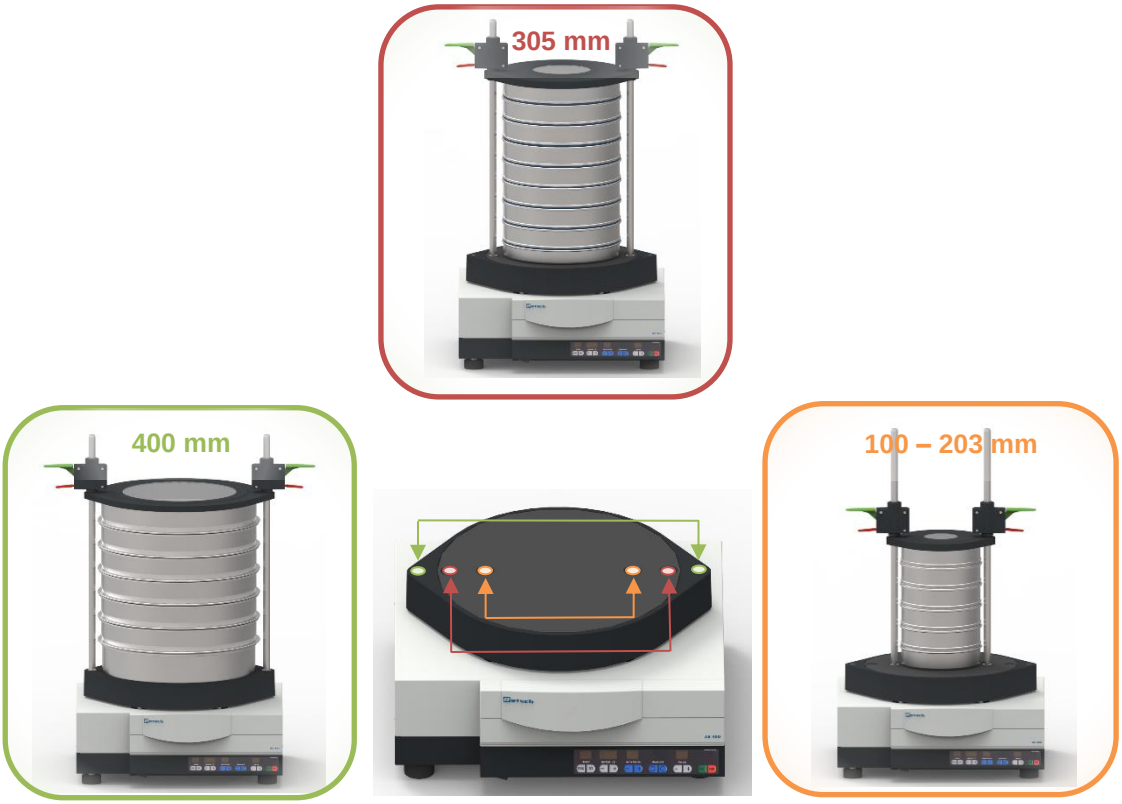


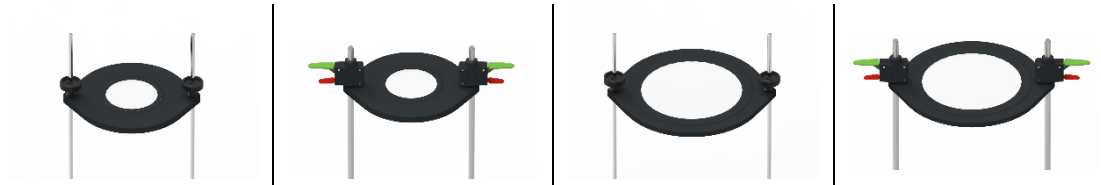

**Fig 7:** Positions of the stand and threaded rods

Up to 17 fractions (16 test sieves plus collecting tray with a height of 25 mm), 9 fractions (8 test sieves plus collecting tray with a height of 40 mm or 50 mm), or 7 fractions (6 test sieves plus collecting tray with a height of 65 mm) can be clamped.

***NOTE*** Severe imbalances may occur with increased loads and high speeds. The speed must be adapted to the load on the device.

Different sieve clamping units and lids are available for the test sieves.

The following sieve clamping units are available for test sieves with an outer diameter of 305 mm (12") and 400 mm:



| "standard" Ø 305 mm | "comfort" Ø 305 mm | "standard" Ø 400 mm | "comfort" Ø 400 mm |
|---|---|---|---|

**Fig. 8:** Types of the sieve clamping unit

For test sieves with outer diameters of 100 – 203 mm smaller clamping lids must be used. For further information please contact your supplier or get in touch with Retsch GmbH directly.

## 4.8 Sieve Clamping Unit "standard"

⇨ Screw one hexagonal nut (**G**) on the lower end of each of the threaded rods (**A**).
⇨ Screw both threaded rods (**A**) into the designated threaded holes (**SB**) in the sieve plate (**ST**) and lock them with the hexagonal nuts (**G**).

- ⇨ Firmly tighten the hexagonal nuts (**G**) by means of a 19 mm open-end wrench.
- ⇨ Place the desired sieve stack including the sample material centrally on the sieve plate (**ST**).
- ⇨ Lay the clamping lid "standard" (**D**) over the threaded rods (**A**) onto the top test sieve. The clamping lid "standard" is orientated so that the peripheral edge surrounds the test sieves.
- ⇨ Slide the fixing nut (**B**) in an inclined position of 10° down the threaded rod (**A**) onto the clamping lid.
- ⇨ Align the fixing nuts (**B**) vertically so that the thread engages and tighten the fixing nuts hand-tight.

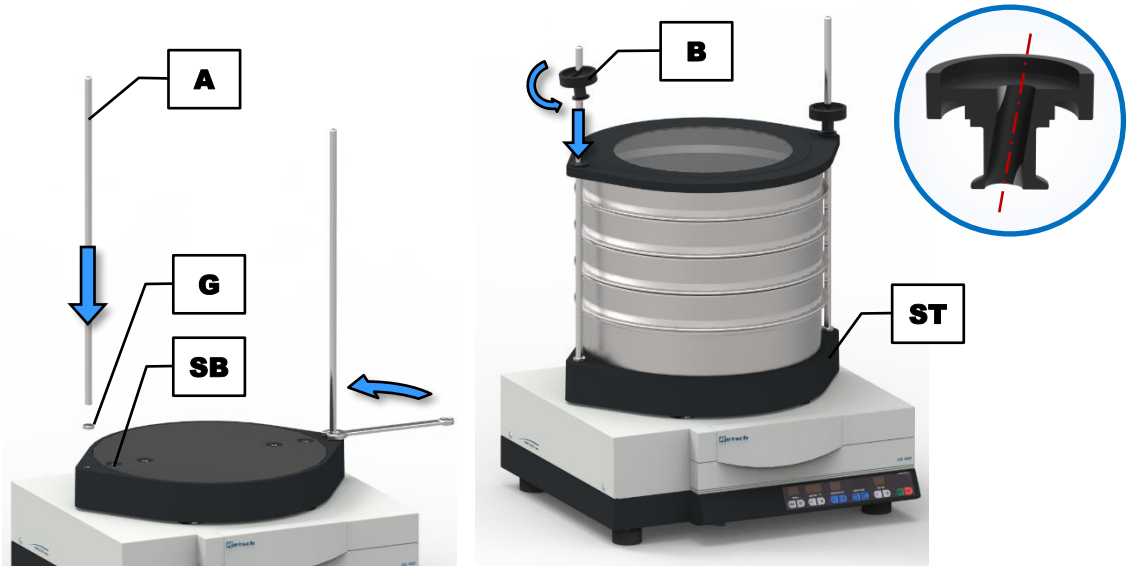



**Fig. 9:** Installation of the sieve clamping unit "standard"

***NOTICE*** To clamp a maximum of five test sieves and a collecting pan, shorter threaded rods are available for the sieve clamping unit "standard". For sieving processes with only one to three test sieves, the shorter threaded rods should be used. Long, projecting threaded rods disturb the spreading of the sample material due to their natural vibration behaviour.

## 4.9 Sieve Clamping Unit "comfort"

- ⇨ Put both quick clamping units (**F**) on a flat surface with the green quick clamping lever (**F1**) facing down.
- ⇨ Place the clamping lid (**D**) with the top side (plane side) face down on the quick clamping units (**F**).
- ⇨ Place the O-ring (**OR**) on the cone shaped assembly aid (**MH2**) and slide it down into the designated groove.
- ⇨ Put the assembly aid (**MH2**) in the opening of the clamping lid (**D**) in such a way that the cone shaped tip is sticking out.
- ⇨ Place the assembly aid ring (**MH1**) on the assembly aid (**MH2**) and slide it down. This presses the O-ring on the quick clamping unit and fixes the clamping lid.
- ⇨ Repeat this procedure for the other side.

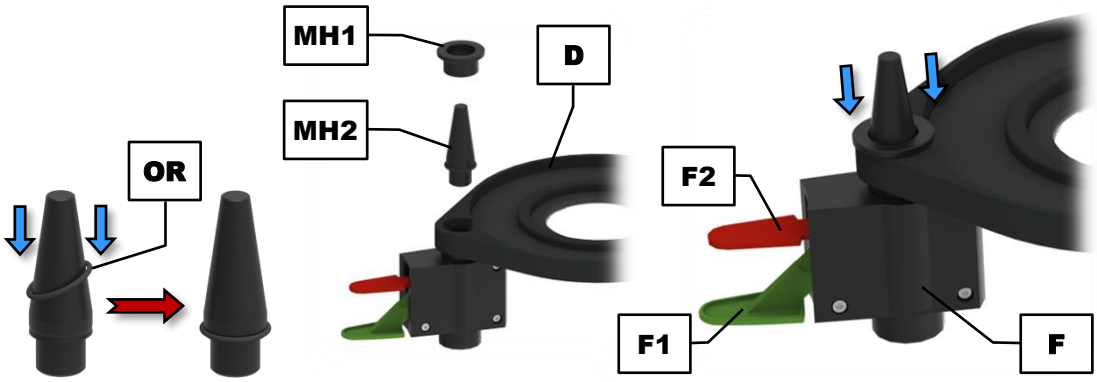



**Fig. 10:** Assembly of the clamping lid

⇨ Screw one hexagonal nut (**G**) on the thread of each of the support rods (**E**).
⇨ Screw both support rods (**E**) into the designated threaded holes (**SB**) in the sieve plate (**ST**) and lock them with the hexagonal nuts (**G**).
⇨ Firmly tighten the hexagonal nuts (**G**) by means of a 19 mm open-end wrench.

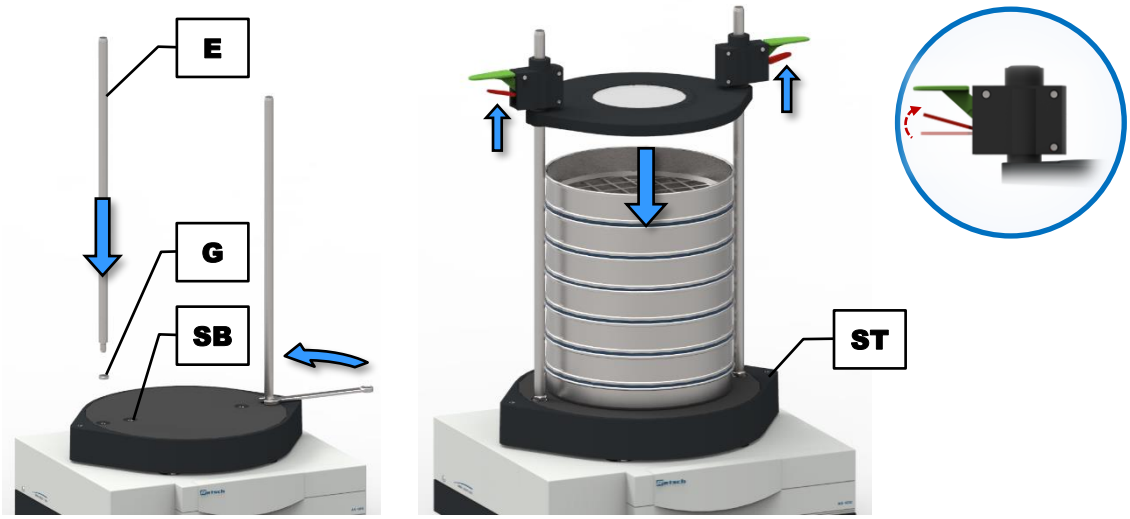



**Fig. 11:** Installation of the sieve clamping unit "comfort"

⇨ Place the desired sieve stack including the sample material centrally on the sieve plate (**ST**).
⇨ Place the assembled clamping lid on the support rods (**E**) with the quick clamping units facing upwards.
⇨ Lift the red quick clamping levers (**F2**) of both quick clamping units (**F**) for freely sliding the clamping lid up and down the support rods. Be sure not to push down the green quick clamping levers when doing so.
⇨ Slide the quick clamping units with the clamping lid down the support rods (**E**) onto the top test sieve.
⇨ When the clamping lid is correctly positioned on the sieve stack, press down the green quick clamping levers (**F1**) 1 – 2 times in order to fix the clamping lid tightly on the sieve stack.

***NOTICE*** Always use both quick clamping units simultaneously! Do not activate both quick clamping levers (red and green) of one quick clamping unit at the same time.

⇨ To loosen the clamping lid after the sieving process, lift the red quick clamping levers (**F2**). Keep them lifted and slide the clamping lid upwards until the sieve stack can be removed. There is no need to take off the clamping lid completely from the support rods.

# 5 First Commissioning

## 5.1 Electrical Connection

**⚠ WARNING** W3.0015

**Risk to life caused by an electric shock**
Connection to socket without a protective earth conductor

- Connecting the device to sockets without a protective earth conductor can lead to life-threatening injuries caused by an electric shock.
- **Always operate the device using sockets with a protective earth conductor (PE).**

**⚠ WARNING** W4.0002

**Danger to life through electric shock**
Damaged power cable

- Operating the device with a damaged power cable or plug can lead to life-threatening injuries caused by an electric shock.
- **Before operating the device, check the power cable and plug for damage.**
- **Never operate the device with damaged power cable or plug!**

***NOTICE*** N11.0022

**Electrical connection**
Failure to observe the values on the type plate

- Electronic and mechanical components may be damaged.
- **Connect the device only to a mains supply matching the values on the type plate.**

**⚠ WARNING** When connecting the power cable to the mains supply, use an external fuse that complies with the regulations applicable to the place of installation.

- Check the type plate for details on the necessary voltage**,** frequency, and maximum external current source fuse for the device.
- The listed values must agree with the existing mains supply.
- Only use the supplied power cable to connect the device to the mains supply.

The AS 400 control must be connected to the power supply on site for initial commissioning.

Ensure the following before connecting the device to the power supply:

- The application site complies with the installation requirements;
- The device is securely and firmly in place;
- The power values for the device (type plate) correspond to the values of the power supply at the site.

## 5.2 Connecting the device to the power supply

Connect the device to the power supply as described below:

⇨ Match the voltage and frequency on the nameplate (**M**) of the device with the values on site.

⇨ Plug the enclosed mains lead into the mains plug connection (**K**).

⇨ Plug the other end of the mains lead into a socket at the installation site.

⇨ Provide external fuse protection in accordance with the regulations of the installation site.

# 6 Operating the Device

**⚠ CAUTION** C7.0005

**Risk of injury**
Potentially explosive atmosphere

– The device is not suitable for use in potentially explosive atmospheres. Operating the device in a potentially explosive atmosphere can lead to injuries caused by an explosion or fire.
- **Never operate the device in a potentially explosive atmosphere!**

**⚠ CAUTION** C8.0006

**Risk of injury**
Sample material that is harmful to health

– Sample material that is harmful to health can injure people (illness, contamination).
- **Use suitable extraction systems with sample material that is harmful to health.**
- **Use suitable personal protective equipment with sample material that is harmful to health.**
- **Take note of the safety data sheets for the sample material.**

**⚠ CAUTION** C9.0003

**Risk of explosion or fire**
Changing sample properties

– The properties and therefore also the hazardousness of the sample can alter during the sieving process.
- **Do not use any substances in this device which carry the risk of explosion or fire.**
- **Observe the material safety data sheets of the sample material.**

***NOTICE*** N12.0000

**Handling of food, pharmaceutical and cosmetic products**
Analysed products

– Food, pharmaceutical and cosmetic products, which were analysed with the device must not be consumed, used or circulated.
- **Dispose these substances in accordance with the applicable regulations.**

***NOTICE*** N13.0007

**Range of application of the device**
Long-term operation

– This laboratory device is designed for eight-hour single-shift operation with a duty cycle of 30 %.
- **This device may not be used as a production machine nor is it intended for continuous operation.**

## 6.1 Switching On / Off

⇨ Turn on the AS 400 control with the mains switch (**I**) on the front side of the device.

When the device is switched off, it is completely disconnected from the mains.

## 6.2 Selection of the Test Sieves

The selection of the test sieves depends on the sample quantity as well as the particle size distribution. The gradation of mesh sizes and accordingly the measurement points should be selected in such a way that the complete particle size range of the sample is covered at regular intervals. The wider the particle size range, the more test sieves should be used.

## 6.3 Performing a Sieving

***NOTICE*** Please note that despite the built-in counterweight, the device cannot be operated without restrictions at the full speed of 300 rpm. When using more than 5 test sieves with a diameter of 400 mm and/or a sieve stack mass > 10 kg, a maximum speed of 200 rpm should not be exceeded. The resulting, very strong unbalance can otherwise lead to unwanted movements of the device.

⇨ Determine the empty weights of the test sieves and the collecting pan.
⇨ Place the sieve stack with **increasing** mesh size on the collecting pan.

ⓘ Each test sieve is provided with an O-ring, which serves as a seal to prevent dust emission during the sieving.

⇨ Weigh the sample and put it on the uppermost test sieve (biggest mesh size). Make sure not to exceed the maximum feed quantity.
⇨ Place the complete sieve stack centrally on the device and clamp the sieve stack (→ Chapter "Sieve Clamping Unit "standard"" or "Sieve Clamping Unit "comfort"").
⇨ Set the optimum speed and sieving time (→ Chapter "Controlling the Device").
⇨ Start the sieving process.
⇨ After the end of the sieving process, weigh the individual test sieves and the collecting pan including the particle size fractions present therein.
⇨ Determine the mass of the particle size fractions (weight after the sieving less the respective empty weight).

ⓘ The evaluation software "EasySieve®" automatically records the weights and allows for a quick and simple evaluation of the sieve analysis. When the device is controlled via EasySieve®, "ES" is indicated in the display "memory" (**H7**). A detailed description can be found in the separate manual of the software.

# 7 Controlling the Device

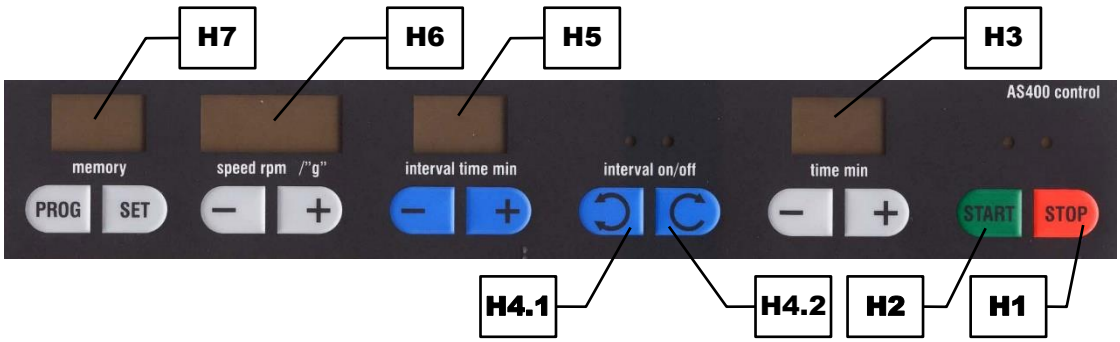



**Fig. 12:** Operating controls and functions

| Element | Description | Function |
|---|---|---|
| **H1** | STOP | Stops the sieving process. In standby or setting mode, the red LED is lit |
| **H2** | START | Starts the sieving process. During operation, the green LED is lit |
| **H3** | Time setting | Reduces or extends the sieving time by pressing the "-" or "+" button, respectively in the range of 1 to 99 minutes |
| **H4.1** | Interval on | Switches the device into interval operation. During the interval operation, the green LED is lit |
| **H4.2** | Interval off | Switches the device into continuous operation. During the continuous operation, the green LED is lit |
| **H5** | Interval setting | Reduces or extends the sieving time between the interval pauses by pressing the "-" or "+" button, respectively in the range of 1 to 10 minutes |
| **H6** | Speed setting | Decreases or increases the speed by pressing the "-" or "+" button, respectively in the range of 50 to 300 rpm or 0.04 to 1.51 g |
| **H7** | Programme setting | Allows for the saving, editing and selection of up to 9 programmes |

**Setting mode:**
After switching on, the device is in the setting mode. The displays "time" (**H3**) and "speed" (**H6**) show the last used values. The display "memory" (**H7**) indicates "on".

**Standby mode:**
By pressing the STOP button (**H1**) after power on, the device can be put into standby mode. In this mode, only the LED of the STOP button (**H1**) is lit and the display "memory" (**H7**) indicates "on". All other displays are off. Except for the START button (**H2**), all buttons are inoperable.

### 7.1.1 Start Process

⇨ To start the sieving process in the setting mode, press the START button (**H2**).

⇨ If the device is in standby mode, press the START button (**H2**) **twice** to start the sieving process.

The green LED lights up and the sieving process is started. If a process time has been set beforehand, the time in the display "time" (**H3**) starts to count down on pressing the START button.

### 7.1.2 Stop Process

The sieving process will stop automatically after the set process time has elapsed. However, the sieving process can be stopped manually at any time.

⇨ Press the STOP button (**H1**) to stop the sieving process.

By pressing the STOP button, the sieving process stops, the red LED lights up and the green LED of the START button (**H2**) turns off.

⇨ Press the STOP button (**H1**) a second time to put the device into standby mode.

## 7.2 Pause Process

The sieving process will stop automatically after the set process time has elapsed. However, the sieving process can be interrupted manually at any time.

⇨ Press the STOP button (**H1**) **once** to interrupt the sieving process.

The process time is stopped.

**Continue the process:**

⇨ Press the START button (**H2**) to continue with the sieving process.

**End the process:**

⇨ Press the STOP button (**H1**) to end the sieving process.

## 7.3 Speed

The speed display (**H6**) shows the set speed value depending on the setting either in mm or g (acceleration of gravity). The speed is adjustable between 50 rpm (0.04 g) and 300 rpm (1.51 g). When the device is switched on, the last used speed is preset.

⇨ Press the "+" or "-" button to set the desired speed.

⇨ Press and hold the "-" or "+" button to increased or decreased the speed in fast steps, respectively.

The speed can also be changed during operation by pressing the "+" or "-" button. An exceeding or falling below of 300 rpm or 50 rpm respectively is not possible.
The speed can either be displayed as frequency in rpm or as a multiple of gravity g (9.81 $m/s^2$), the so called gravitational acceleration.

⇨ Simultaneously press the "+" and "-" button to toggle the display between "rpm" and "g".

During the sieving process, the speed is kept constant within a predetermined tolerance of 0.5 %.

### 7.3.1 Automatic Unbalance Detection

The AS 400 control is equipped with an automatic unbalance detection. During operation, the movement of the sieve plate is permanently monitored by sensors. If an unbalance is registered, i.e. if the sieve plate experiences an excessive acceleration, the sensors automatically switch off the drive of the AS 400 control.

If an unbalance is detected, the device stops immediately and the display "speed" (**H6**) flashes. The green LED of the START button (**H2**) extinguishes and the red LED of the STOP button (**H1**) lights up. A restart of the AS 400 control is only possible again when the speed has been reduced.

**Recommissioning after an unbalance:**

⇨ Reduce the speed using the "-" button of the display "speed" (**H6**) until the display stops flashing.

⇨ Restart the sieving process by pressing the START button (**H2**).

The necessary speed reductions are summarised in the following table:

| Speed at unbalance detection | Speed for recommissioning |
|---|---|
| 201 – 300 rpm | reduce to 200 rpm |
| 151 – 200 rpm | reduce to 150 rpm |
| 101 – 150 rpm | reduce to 100 rpm |
| 76 – 100 rpm | reduce to 75 rpm |
| 51 – 75 rpm | reduce by1 rpm* |

* a speed < 50 rpm is not possible

## 7.4 Time

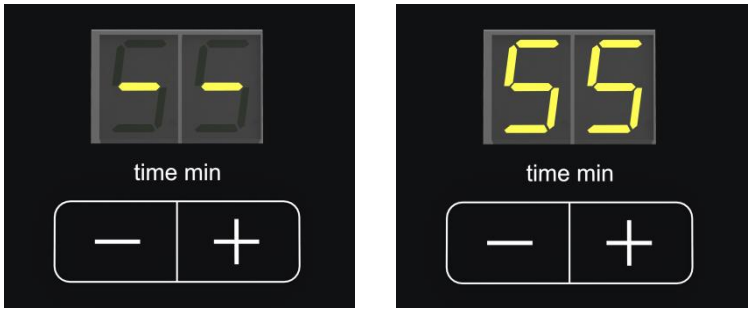



**Fig. 13:** Time setting for continuous operation (left) or with a process time (right)

The AS 400 control can be operated either in continuous operation or for a certain time between 1 and 99 minutes. When the device is switched on, the last used setting is displayed.

⇨ Press the "+" or "-" button of the time display (**H5**) to set the desired process time.

⇨ Press and hold the "+" or "-" button to extend or reduce the process time in steps of ten minutes, respectively.

⇨ To change to the continuous operation, fall below the duration of 1 min by pressing the "-" button, or exceed the duration of 99 min by pressing the "+" button. The time display (**H5**) now indicates "– –".

The process time can also be changed during operation by pressing the "+" or "-" button.

## 7.5 Interval

⇨ Press the "Interval on" button (**H4.1**) to switch to interval mode. The green LED lights up.
⇨ Press the "Interval off" button (**H4.2**) to switch back to continuous operation. The green LED for intermittent operation no longer lights up and the LED for continuous operation lights up.

During the interval operation, the screening process is periodically interrupted for around three seconds. During interval operation, the interval times (**H5**) and the pause times are included in the displayed process time (**H3**). The interval operation can be switched on and off as required during the sieving process.

### 7.5.1 Interval Time

With the interval time (**H5**), the time of the screening process between the interval breaks can be freely selected between 1 and 10 minutes. The pause time of around three seconds cannot be changed. The display of the interval settings is only active when the interval function (**H4.1**) is activated.

⇨ Press the "+" or "-" button of the Interval Time (**H5**) to set the desired sieving time between interval pauses.
⇨ Press and hold the "+" or "-" button to increase or decrease the interval time in ten second increments.

When 10 minutes is exceeded, the display starts again at 1 minute. If the time falls below 1 minute, the display changes to 10 minutes. The interval time can also be changed during operation by pressing the "+" or "-" button.

## 7.6 Programme Mode

The AS 400 control allows for the saving and recalling of up to 9 parameter sets. The programme settings can only be edited in the setting mode.

The currently selected programme is displayed in the display "memory" (**H7**). If the display indicates "on", no programme is selected and the device is in the manual mode.

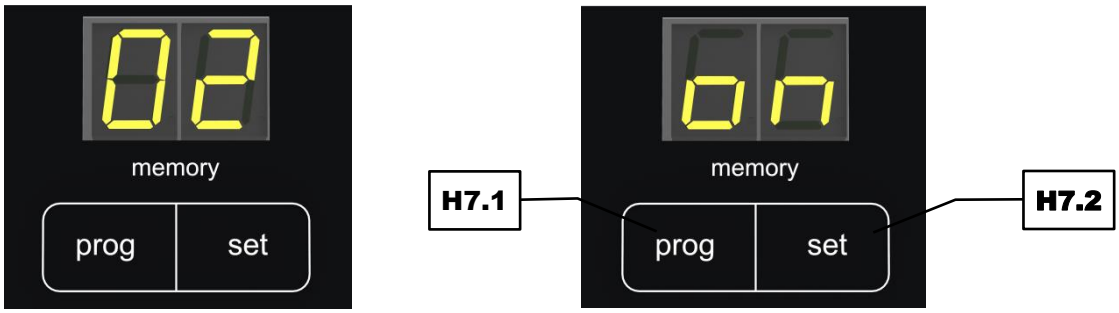



**Fig. 14:** Programme mode (left), manual mode (right)

### 7.6.1 Select a Program

⇨ Press the prog button (**H7.1**) to navigate through the programme memory slots in ascending order and to select the desired programme.

⇨ Press the START button (**H2**) to start the sieving process in programme mode. All buttons, except for the STOP (**H1**) button, are now locked.

Following the programme memory slot 9, "on" is again displayed in the display "memory" (**H7**) and the device is in manual mode. When a programme is selected, all buttons except for the prog (**H7.1**), set (**H7.2**), START (**H2**) and STOP (**H1**) button are locked.

### 7.6.2 Edit a Program

⇨ Press the prog button (**H7.1**) until the desired programme memory slot is displayed.
⇨ Press the set button (**H7.2**). All displays are now flashing.
⇨ Set the desired sieving parameters (speed, time, interval).

The programming can be cancelled by pressing the prog button. All settings are discarded.

### 7.6.3 Save a Programme

⇨ Press the set button (**H7.2**) to save the set sieving parameters in the selected programme memory slot. The displays stop flashing.

### 7.6.4 Operating Hours

⇨ Simultaneously press the set button (**H7.2**) and the "+" button of the interval setting (**H5**).

"bS" (operating hours) now appears in the programme setting display (**H7**) and the total running time (corresponds to the total sieving time) of the device is displayed in the time setting display (**H3**) in the format hhh. All keys except the STOP key (**H1**) are now locked.

⇨ Press the STOP button (**H1**) to exit the hours of operation display.

### 7.6.5 Software Version

⇨ Simultaneously press the set button (**H7.2**) and the "-" button of the interval setting (**H5**).

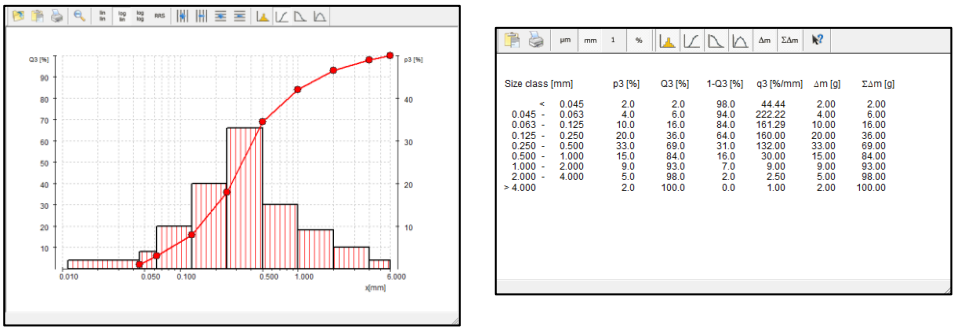
The program setting display (**H7**) will show "S" (software) and the speed setting display (**H6**) will show the current software version number. All keys except the STOP key (**H1**) are now locked.

⇨ Press the STOP button (**H1**) to exit the software version display.

# 8 EasySieve®

EasySieve® is a software for particle size analysis and simplifies the manual evaluation in many respects. The software is able to automatically perform the required measuring and weighing processes – from determining the weights of the test sieves to evaluating the data.

The software is structured in a self-explanatory way and follows the logical chain of events involved in a particle size analysis. Therefore, the training period will be very short. The abundance of evaluation options provides absolute flexibility in adapting to demanding, individual tasks.



| Size class [mm] | | | p3 [%] | Q3 [%] | 1-Q3 [%] | q3 [%/mm] | Δm [g] | ΣΔm [g] |
|---|---|---|---|---|---|---|---|---|
| | < | 0.045 | 2.0 | 2.0 | 98.0 | 44.44 | 2.00 | 2.00 |
| 0.045 | - | 0.063 | 4.0 | 6.0 | 94.0 | 222.22 | 4.00 | 6.00 |
| 0.063 | - | 0.125 | 10.0 | 16.0 | 84.0 | 161.29 | 10.00 | 16.00 |
| 0.125 | - | 0.250 | 20.0 | 36.0 | 64.0 | 160.00 | 20.00 | 36.00 |
| 0.250 | - | 0.500 | 33.0 | 69.0 | 31.0 | 132.00 | 33.00 | 69.00 |
| 0.500 | - | 1.000 | 15.0 | 84.0 | 16.0 | 30.00 | 15.00 | 84.00 |
| 1.000 | - | 2.000 | 9.0 | 93.0 | 7.0 | 9.00 | 9.00 | 93.00 |
| 2.000 | - | 4.000 | 5.0 | 98.0 | 2.0 | 2.50 | 5.00 | 98.00 |
| > 4.000 | | | 2.0 | 100.0 | 0.0 | 1.00 | 2.00 | 100.00 |

**Fig. 15:** Graphic and tabular presentation of the particle size analysis with EasySieve®

The software communicates with the scale and the AS 400 control and guides the user through the respective steps. Available parameters, as well as the characteristics to be calculated can be entered in various edit boxes. Routine parameters can be edited, saved and recalled at any time.

If a scale is connected, the corresponding data (empty weights of test sieves, back weights of loaded test sieves) can be transferred directly to EasySieve®. If no scale is connected, the input can also be entered manually.

The software calculates all standard particle distributions, as well as the representative characteristics of the particle size, and allows for the tabular and graphical presentation of results in a measurement report conforming to standards. Furthermore, the data can be exported to other software products (e.g. Microsoft Excel).

EasySieve® is also available as AuditTrail enabled version in compliance with 21CFR Part 11.

ⓘ In case the sieve shaker is controlled via the software "EasySieve CFR", warning messages may appear in the Audit Trail stating that no serial number, no software version and no calibration date is received. Moreover, it may indicate, that no error number can be received. This is correct because the sieving machine does not support the provision of this data. Therefore, these warning messages in the Audit Trail do not constitute a reason for corrective measures.

ⓘ A detailed description can be found in the separate manual of the software.

# 9 Error Messages and Information Notes

## 9.1 Error Messages

Error messages inform the user about detected device or programme errors. In the event of an error message, a fault has occurred, in which the operation of the device or the programme is automatically interrupted. Such faults must be resolved before next startup.

| Error code | Description | Measures |
|---|---|---|
| **E10** | Drive overload | ⇨ Switch off the main switch and wait for 30 s before switching on again.<br>⇨ If the error persists, contact service. |
| **E26** | Failure frequency converter | ⇨ Switch off the main switch and wait for 30 s before switching on again.<br>⇨ If the error persists, contact service. |
| **E45** | Failure acceleration sensor | ⇨ Switch off the main switch and wait for 30 s before switching on again.<br>⇨ If the error persists, contact service. |

## 9.2 Information Notes

Notices inform the user on specific device or programme processes. The operation of the device or programme may be interrupted briefly, but there is no fault. The information notice must be acknowledged by the user to continue the process. Information notices provide additional information for the user as an aid, but do not represent any device or programme errors.

| Notice code | Description | Measures |
|---|---|---|
| **bS** | Display of the complete runtime in hhh | ⇨ Press the STOP button to exit the display. |
| **CAL** | Calibration required | ⇨ Press the STOP button to exit the display.<br>⇨ Contact the service to arrange an appointment for the calibration. |
| **dA** | Current date required | The device was not connected to the mains or off for more than 30 days, whereby the battery is discharged and the current date has been deleted.<br>⇨ Press the set button. The time display shows the month "01". The amplitude display shows the year "-00".<br>⇨ Use the respective "+" and "-" buttons to set the current month (e.g. "04" for April) and the current year (e.g. "-16" for 2016).<br>⇨ Press the STOP button to save the current date and to exit the display.<br>⇨ Leave the device connected to the mains and powered on for at least two hours, in order to fully charge the battery. |

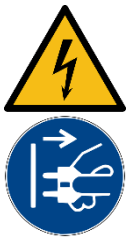
| | | |
|---|---|---|
| **ES** | External control by EasySieve® | The device is controlled by the EasySieve® software installed on a PC.<br>⇨ Close the software to restore the manual control. |
| **S** | Display of the software version | ⇨ Press the STOP button to exit the display. |

# 10 Cleaning, Wear and Maintenance

## 10.1 Cleaning

**⚠ WARNING** W5.0003

**Risk to life caused by an electric shock**
Cleaning live parts with water



- Cleaning the device with water can lead to life-threatening injuries caused by an electric shock if the device has not been disconnected from the power supply.
- **Only carry out cleaning work on the device when it has been disconnected from the power supply.**
- **Use a cloth moistened with water for cleaning.**
- **Do not clean the device under running water!**

***NOTICE*** N14.0009

**Damage to the housing and device**
Use of organic solvents

- Organic solvents may damage plastic parts and the coating.
- **The use of organic solvents is not permitted.**

⇨ Clean the housing of the device with a damp cloth and, if necessary, a household cleaning agent. Make sure that no water or cleaning agent gets into the interior of the device.

⇨ Only use neutral cleaning agents. Do not use solvent-based cleaners! Acetone is not permitted!
Test cleaning products on an inconspicuous spot.

### 10.1.1 Cleaning of Test Sieves

Test sieves are measuring instruments and should be treated with due care before, during and after the sieving process. It is recommended to clean new test sieves before the first use from possible preservative residues with ethanol or isopropanol and to store them in a dry, dust-free place when unused.

Before cleaning or drying the test sieves, the O-rings have to be removed. Before using and after the cleaning the test sieves should be visibly inspected for possible damages and impurities.

Near-mesh or clamped particles can be often removed dry after the sieving process by slightly tapping the test sieve upside down with the sieve frame on a table. For test sieves with mesh sizes > 500 µm a fine hair brush can be used to sweep over the outer side of the mesh fabric.

#### 10.1.1.1 Cleaning of Test Sieves with Mesh Sizes > 500 µm

Coarse mesh fabrics with mesh sizes > 500 µm can be cleaned dry or wet easily and effectively with a hand brush with plastic bristles (at not too high applied pressure).

#### 10.1.1.2 Cleaning of Test Sieves with Mesh Sizes < 500 µm

Test sieves with mesh sizes < 500 µm should generally only be cleaned in an ultrasonic cleaning-bath. As cleaning agent, water together with a standard surfactant is recommended. The cleaning in the ultrasonic bath usually takes two to three minutes. After that the test sieves are thoroughly rinsed with water and dried. The cleaning with strong bases or acids is generally not recommended.

#### 10.1.1.3 Drying of Test Sieves

Drying ovens of various sizes can be used for drying test sieves (drying temperature < 80 °C).

Additional information concerning ultrasonic cleaning-baths and drying ovens can be found on the Retsch GmbH homepage (https://www.retsch.com). Also ask for the free expert guide *Sieve Analysis – Taking a close look at quality*.

**NOTICE** N15.0028

**Damage of the sieve mesh fabric**
Drying temperature > 80 °C

- At higher temperatures, especially fine metal wire meshes can become warped, leading to a reduced tension of the mesh fabric inside the sieve frame and hence, makes the test sieve less efficient during the sieving process.

- **The drying temperature for test sieves must not exceed 80 °C!**

## 10.2 Wear

Even with the proper handling of the test sieves, a wearing of the sieve mesh fabric depending on the frequency of the sieving operation and on the sample material is unavoidable. The test sieves should be regularly checked for wear and damage and be replaced if necessary.

Likewise, all existing sealing gaskets should be checked for wear on a regular basis and replaced if necessary.

**⚠ CAUTION** C10.0013

**Risk of injury**
Improper repairs

- Unauthorised and improper repairs can cause injuries.

- **Repairs to the device may only be carried out by the Retsch GmbH , an authorised representative or by qualified service technicians.**
- **Do not carry out any unauthorised or improper repairs to the device!**

## 10.3 Maintenance

The AS 400 control is largely maintenance-free.

When using the sieve clamping unit "comfort" it is recommended to clean the support rods from time to time. Furthermore, after a certain time the sieve clamping unit "comfort" produces unavoidable, function-related clamping grooves on the support rods, which may impede secure clamping. Therefore, it is necessary to examine the support rods in regularly intervals for clamping grooves in the clamping area and, if required, to turn them by 90°.

⇨ Loosen the hexagonal nut (**G**) by means of a 19 mm open-end wrench.
⇨ Turn the support rod by 90°.
⇨ Then, tighten the hexagonal nut again.

If the rotation of the support rods does not expose a clamping groove free area, the support rods should be replaced.

If the AS 400 control is used in quality control, it should be regularly calibrated in accordance with DIN EN ISO 9000 ff. For this purpose please contact your local distributor or get in touch with Retsch GmbH directly.

### 10.3.1 Replacing the Fuses

**WARNING**

W6.0014

**Risk to life caused by an electric shock**
Exposed contacts

– Replacing the fuses without pulling out the mains plug can lead to life threatening injuries caused by an electric shock on contact with the fuse holder or the live contacts on the fuse.
- **Pull out the mains plug before replacing the fuses.**

| Voltage | Fuse |
|---|---|
| 100 – 240 V | 6.3 A delay-action |

Two fuses are located in the fuse drawer (**L**) on the backside of the device. Fuses can be replaced by trained qualified personnel.

⇨ Remove the fuse drawer by pressing the latch on the bottom side of the fuse drawer.
⇨ Replace the defective fuse in the fuse drawer.
⇨ Slide the fuse drawer back in again, until is audibly locks in place.

## 10.4 Returning for repair and maintenance


**Fig. 1:** Return form

The acceptance of devices and accessories of the Retsch GmbH for repair, maintenance or calibration can only be effected, if the return form including the decontamination declaration service has been correctly and fully completed.

⇨ Download the return form located in the download section "Miscellaneous" on the Retsch GmbH homepage (http://www.retsch.com/downloads/miscellaneous/).

⇨ When returning a device, attach the return form to the outside of the packaging.

In order to eliminate any health risk to the service technicians, Retsch GmbH reserves the right to refuse the acceptance and to return the respective delivery at the expense of the sender.

# 11 Accessories

Information on available accessories as well as the respective manuals are accessible directly on the Retsch GmbH homepage (https://www.retsch.com) under the heading "Downloads" of the device.

Information on wear parts and small accessories can be found in the Retsch GmbH general catalogue also available on the homepage.

In case of any questions concerning spare parts please contact the Retsch GmbH representative in your country, or Retsch GmbH directly.

## 11.1 Test Sieves

Decisive for the accuracy and reliability of the measurement result is, in addition to the reproducible operating Horizontal Sieve Shaker the quality of the test sieve. Test sieves of Retsch GmbH are high quality measuring instruments for which only mesh fabrics and perforated sheets of the corresponding standards are used. Each test sieve is tested five times and is given a serial number, as well as a quality certificate after the final check.

**Fig. 16:** Test sieves

The different versions of the test sieves of Retsch GmbH are supplied in accordance with all current national and international standards:

- available standards: DIN, ISO, ASTM, BS, NF, CGSB
- available diameters: 100 mm / 150 mm / 200 mm / 203 mm (8") / 305 mm (12") / 400 mm / 450 mm (18")
- available sieve surfaces: sieve mesh fabric (20 µm to 125 mm) and perforated screens (round, elongated or square holes) of stainless steel
- on request with an individual test certificate for the inspection of measuring and testing equipment monitoring according to ISO 9000 ff.

Among the various test sieves matching collecting pans, collecting pans with outlet, intermediate pans, intermediate rings, venting rings and sieve lids are available.

### 11.1.1 Certificate

Before delivery, each test sieve is optically surveyed according to the standards DIN ISO 3310-1 and ASTM E 11, and provided a certificate of compliance with the order.

On request, an additional acceptance test certificate with a calibration protocol can be provided, documenting the measurement results in tabular and graphical form, hence representing a calibration certificate with more detailed statistics.

### 11.1.2 Calibration Service

As a special service Retsch GmbH offers the calibration of the test sieves. All relevant information are recorded during the standard measuring process of the test sieve and confirmed in the required certificate.

## 11.2 Sieving Aids

**NOTICE** N16.0027

**Damage of the sieve mesh fabric**
Use of mechanical sieving aids

- When using mechanical sieving aids, there is a danger that fine sieve mesh fabrics might be damaged.
- **Ensure that no overstretching of the sieve mesh fabric occurs due to overloading with sieving aids.**
- **If in doubt, please contact your local distributor or Retsch GmbH directly.**

By electrostatic and Van-der-Waals forces, as well as by fluid bridges, single particles can combine to form agglomerates. Since in this case not the individual primary particles, but particle collectives are measured, there is a distortion of the particle size distribution (a higher coarse fraction results). In order to prevent the formation of agglomerates or dissolve them, sieving aids can be used.

**Mechanical sieving aids:**
Mechanical sieving aids cause a destruction of agglomerates and dislodge wedged particles from the sieve meshes. Depending on the mesh size of the test sieve and the preselected amplitude, balls of agate, rubber, steatite or cubes of polyester urethane rubber, and nylon brushes or stainless steel chain rings can be used for this purpose.

**NOTICE** For very soft sample material, an undesired crushing of primary particles might occur.

**Solid additives:**
Solid additives, such as talcum or Aerosil® can be admixed to fatty, moist, sticky or oily sample materials. They attach themselves to the particle surface and counteract the formation of agglomerates. Their particle size is so small that they have no sustainable influence to the actual particle size analysis of the sample material. However, the measurement results will be distorted depending on the added amount of additive.

**Liquid sieving aids:**
Antistatic spray, benzine, alcohol and surfactants can be used as liquid sieving aids, though benzine and alcohol are only to be used during sample preparation. They reduce the electrostatic charges, wash out fatty or oily components of the sample material, or diminish the surface tension in the wet sieving.

# 12 Disposal

In the case of a disposal, the respective statutory requirements must be observed. In the following, information on the disposal of electrical and electronic devices in the European Community are given.

Within the European Community the disposal of electrically operated devices is regulated by national provisions that are based on the EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE).

Accordingly, all devices supplied after August 13th 2005 in the business-to-business area, to which this product is classified, may no longer be disposed of with municipal or household waste. To document this, the devices are provided with the disposal label.

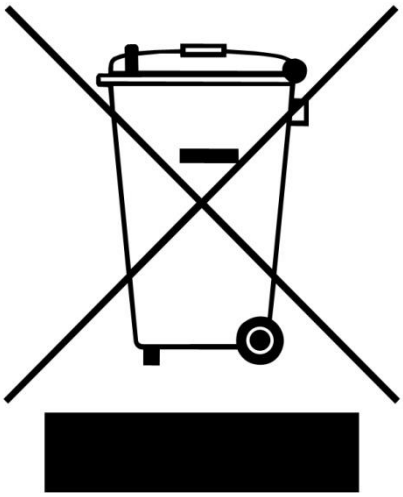


**Fig. 17:** Disposal label

Since the disposal regulations worldwide and also within the EU may differ from country to country, the supplier of the device should be consulted directly in case of need.

This labelling obligation is applied in Germany since March 23rd 2006. From this date on, the manufacturer must provide an adequate possibility of returning all devices delivered since August 13th 2005. For all devices delivered before August 13th 2005 the end user is responsible for the proper disposal.

# 13 Index

# EU Declaration of Conformity

**Translation**

# VIBRATORY SIEVE SHAKER

**AS 400 control | 30.022.xxxx**

**EU DECLARATION OF CONFORMITY**

We, represented by the undersigned, hereby declare that the above device complies with the following directives and harmonised standards:

**Machinery Directive 2006/42/EC**

Applied standards, in particular:

| | |
|---|---|
| DIN EN ISO 12100 | Machine Safety - General Design Principles |
| DIN EN 61010-1 | Safety Regulations for Electrical Measurement, Control, Regulation and Laboratory Devices |

**Electromagnetic compatibility 2014/30/EU (tested at 230 V, 50 Hz)**

Applied standards, in particular:

| | |
|---|---|
| EN 55011 | Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement |
| DIN EN 61326-1 | Electrical equipment for measurement, control and laboratory use - EMC requirements |

**Restriction of hazardous substances (RoHS) 2011/65/EU**

**Authorised person for compilation of the technical documentation:**
Julia Kürten (Technical Documentation)

Furthermore, we declare that the relevant technical documentation for the above device has been prepared in accordance with Annex VII Part A of the Machinery Directive and we undertake to submit the documentation to the market surveillance authorities on request.

**In the event of a modification of the device not agreed on by Retsch GmbH, as well as the use of non-approved spare parts or accessories, this declaration loses its validity.**

Retsch GmbH

Haan, 09/2023

Dr. Frank Janetta, Head of Development

CE