Operating Instructions
Hand Test Pump BHP 40

B10-111
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1. Information on This Operating Instruction

- The manual is aimed at specialists and semi-skilled personnel.
- Please read the instructions carefully before carrying out any operation and keep the specified order.
- Thoroughly read and understand the information in chapter 2 “Safety Instructions”.

If you have any problems or questions, please contact your supplier or contact us directly at:

ARMANO Messtechnik GmbH
Location Beierfeld
Am Gewerbepark 9 • 08344 Grünhain-Beierfeld
Tel.: +49 3774 58 – 0 • Fax: +49 3774 58 – 545
mail@armano-beierfeld.com

Location Wesel
Manometerstraße 5 • 46487 Wesel-Ginderich
Tel.: +49 2803 9130 – 0 • Fax: +49 2803 1035
mail@armano-wesel.com

1.1 Pictographs Used

In this manual, pictographs are used as hazard warnings.

Particular information, instructions and restrictions designed for the prevention of personal or substantial property damage:

WARNING! Is used to warn you against an imminent danger that may result in personal injury or death.

CAUTION! Is used to draw your attention to important recommendations to be observed. Disregarding them may result in property damage.

Passages in the text containing **explanations, information or advice** are highlighted with this pictograph.

The following symbol highlights
actions you have to conduct
or
instructions that have to be strictly observed.

1.2 Exclusion of Liability

We accept no liability for any damage or malfunction resulting from incorrect installation, inappropriate use of the device or failure to follow the instructions in this manual.

2. Safety Instructions

Please read this operating instruction thoroughly before installing the BHP 40.
Disregarding the containing warnings, especially the safety instructions, may result in danger for people, the environment, and the device and the system it is connected to.
The BHP 40 corresponds with the state of engineering at the time of printing. This concerns the operating mode and the safe operation of the devices.
In order to guarantee that the device operates safely, the operator must act competently and be conscious of safety issues.
The ARMANO Messtechnik GmbH provides support for the use of its products either personally or via relevant literature. The customer verifies that our product is fit for purpose based on our technical information. The customer performs customer and application specific tests to ensure that the product is suitable for the intended use. With this verification, all hazards and risks are transferred to our customers. Our warranty expires in case of inappropriate use.

Qualified personnel:
The personnel that is charged for the installation and operation of the BHP 40 must hold a relevant qualification. This can be based on training or relevant tuition. The personnel must be aware of this manual and have access to it at all times.

General safety instructions:
- In all work, the existing national regulations for accident prevention and safety at the workplace must be complied with. Any internal regulations of the operator must also be complied with, even if these are not mentioned in this manual.
- Never use the hand test pump with an external pressure source. Do not connect any external pressure generators to the hand test pump.
- Do not remove any attached components (test item, pressure hose, reference gauge) if the hand test pump is under pressure:
  → Open the pressure relief valve before removing any of the components.
- Do not use Teflon tape to seal the pressure connections. Remains of the Teflon tape may infiltrate the hand test pump and damage it.
  → Only use adapters and seals that are available as accessory.

- Non-pressurised storage: Only store the hand test pump with opened pressure relief valve. This ensures that no pressure can be generated by unintentional pumping movements.
- Avoid any undue force towards the hand test pump and its operating elements.
- Do not use the hand test pump if it is damaged or defective.

Special safety instructions:
Warnings, which are specifically relevant to individual operating procedures or activities, are to be found at the beginning of the relevant sections of this operating instruction.

3. Device Description

The hand test pump generates overpressure or vacuum for testing and adjusting pressure measuring instruments of all kinds.
Due to its low weight and compact design, the hand test pump can be used directly at the test item site.
When using the hand test pump, the connection to a reference gauge and to the test item is necessary.

Nameplate and label:
The nameplate is placed on the lower pump body. It contains the most important technical data and information. An additional information on the maximum permissible pressure of the hand test pump is located on the upper pump body.

Scope of delivery and accessory:
Check the delivered items and ordered accessories:
- Hand test pump
- Pressure hose:
  The pressure hose is supplied screwed onto the hand test pump pressure-resistant. The pressure hose should remain attached to the hand test pump during operation, storage and transport. Dismounting the pressure hose should be avoided.
- Operating instruction
- Accessory (optional):
  Transportation cases, adapter and seal sets and reference gauges can be ordered as accessories.

3.1 Intended Use

The hand test pump BHP 40 shall only be used for pressure or vacuum generation in air. The use of other media, in particular hydraulic oil, will result in damage to the hand test pump.
The hand test pump must not be attached to external pressure sources.
The operational safety of the device supplied is only guaranteed by intended use. The specified limit values (⇨ chapter 4 “Technical Data”) must not be exceeded.
Please check if the hand test pump is suitable for your applications before ordering and installation.

4. Technical Data (Pump with Hose)

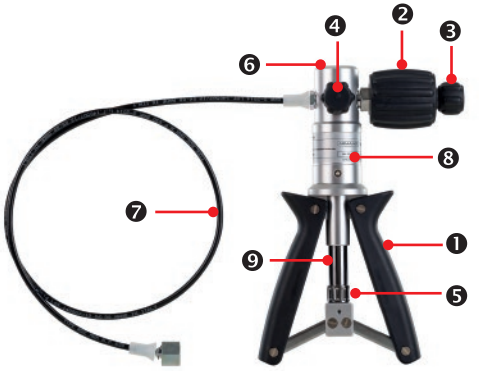
Pressure range • overpressure • vacuum	 40 bar 0.95 bar
Medium	air
Connection • reference • pressure hose	 G ¼ 1 m (39.37") with union fitting G ¼
Dimensions	~ 240 x 170 x 50 mm (~ 9.45 x 6.69 x 1.97")
Weight	~ 1.1 kg (2.43 lb)

5. Design and Function

Controls:
❶ Handles
❷ Fine adjustment valve (handwheel)
❸ Pressure relief valve (adjustment knob)
❹ Change-over valve “Pressure / Vacuum” (adjustment knob)
❺ Knurled nut (two-part with counter nut)

Connections:
❻ Connection for reference gauge
❼ Pressure hose with union fitting (connection for test item)

Main components:
❽ Pump body
❾ Piston rod with internal spring



Function:
The reference and the test item are connected to the hand test pump.
The pumping process is carried out by repeatedly pushing together the handles ❶ (vacuum: pulling apart). Due to an internal spring, the handles return to their initial position.
The pumping movement is transferred to the piston in the pump body ❽ via the push rod.
According to the position of the change-over valve ❹, either pressure or vacuum is generated there. The construction of the hand test pump ensures that the same pressure or vacuum is generated for the test item as well as for the reference gauge.
The pressure or the vacuum is set to the required value via fine adjustment valve ❷. With the pressure relief valve ❸, the pressure or the vacuum can be reduced as required or relieved completely.

The generated pressure or vacuum is indicated on the reference gauge and compared with the measured value of the test item.
With the knurled nut ❺, the spring preload can be adjusted and the pump stroke can be limited.

6. Commissioning

Essential for the use of the hand test pump is the pressure-resistant connection of the reference gauge and the test item. The pressure hose ❼ is supplied screwed onto the pump body ❽ of the hand test pump pressure-resistant and should not be dismounted.

CAUTION! Material damage!
The test item must be free from any kind of adhesion (oil, grease, water, etc.).
Contaminations entering through the pressure hose may damage the hand test pump.

Maximum torque of the pressure connections!
Reference: 15 Nm
Test item: 15 Nm

Carry out the following steps prior to operation:
→ Screw the reference gauge with suitable seal tightly onto the upper part of the hand test pump ❻.
→ Clean the connection of the test item and ensure that no oil or other substances might enter the pressure hose.
→ Select suitable adapters and seals for the connection of the test item.
→ Connect the adapters and seals with the test item and the union fitting of the pressure hose. Ensure that the O-ring is correctly fitted in the union fitting.

First pumping process
The first pumping process might require a higher effort due to adhesive forces.
→ Carry out the first pumping process with the pressure relief valve ❸ open.

7. Operation

The generation of pressure and the generation of vacuum do not only differ concerning operation procedure and setting ranges, but also concerning the effort required to operate the controls.
Adhere to the following safety instructions when operating the hand test pump:

WARNING! Crushing hazard!
Make sure that neither fingers nor other body parts are between handles and piston rod during the pumping process.

CAUTION! Material damage change-over valve!
Only operate the change-over valve ❹ with the pressure relief valve ❸ open.
Using the change-over valve ❹ under pressure causes damage to the hand test pump components.

CAUTION! Material damage valve stop!
The stop and the hand test pump will be damaged if put under too much stress.
→ Once the stop has been reached, tighten the valves ❷ and ❸ by hand only.

Note before the pressure or vacuum generation:
Check for the following requirements before generating pressure with the hand test pump:
- The reference gauge is connected to the hand test pump.
- The test item is connected to the pressure hose with suitable adapters and seals.
- All pressure connections are correctly fitted to resist pressure.

7.1 Generating Pressure

With increasing counterpressure at the test item, the pumping movement of the handles ❶ requires more force.

CAUTION! Material damage test item!
Observe the maximum pressure of the test item! Only generate an initial pressure with the handles ❶, which is lower than the required test pressure. Then carefully increase the pressure by using the fine adjustment valve ❷.

The following operational methods have proven effective in practice:

One-handed operation:

20 bar can thus be generated safely and well regulated. From 20 bar onwards, pressure generation becomes increasingly difficult.

Two-handed operation:

35 – 40 bar can thus be generated quite quickly. From 40 bar onwards, pressure should be increased via fine adjustment valve ❷.

Pumping against a base:

50 – 55 bar can thus be generated. Here, it is important that the lower handle is positioned on a non-slip base.

Operation steps pressure generation:
→ If necessary, switch on the reference gauge and the test item.
→ Close the pressure relief valve:
- Turn the knob of the valve ❸ clockwise until the stop is reached.

→ Set the change-over valve to “Pressure”:
- Turn the knob of the valve ❹ clockwise until the stop is reached.

→ Generate pressure:
- Push the handles ❶ together: The pressure is generated.
- Repeat the pumping movement until the required test pressure is approximately reached.

→ Adjust the test pressure:
The required test pressure is precisely adjusted by using the fine adjustment valve:
- Turn the handwheel of the valve ❷ clockwise to increase the pressure.
- Turn the handwheel of the valve ❷ counterclockwise to decrease the pressure.
- Set the required test pressure by turning the handwheel of the valve ❷ accordingly.

Pressure increase with the fine adjustment valve:
Alternatively, you can increase the pressure with the fine adjustment valve from ~20–30 bar onwards.
→ Turn the handwheel of the valve clockwise towards the stop of the pump body.
Depending on the pressure of the test item and the position of the handwheel, pressure can be increased quite easily to max. 15–30 bar.

Fine adjustment valve
In an unpressurised state, the fine adjustment valve is running very smooth. The wide handwheel of the fine adjustment valve can be moved into the required position very easily by using the palm of the hand.

7.2 Generating Vacuum

Operation steps vacuum generation:
→ If necessary, switch on the reference gauge and the test item.
→ Close the pressure relief valve:
- Turn the knob of the valve ❸ clockwise until the stop is reached.

→ Set the change-over valve to “Vacuum”:
- Turn the knob of the valve ❹ counterclockwise until the stop is reached.

→ Generate vacuum:
- Push the handles ❶ together:
  The spring generates the first negative pressure, but cannot open the handles completely.
- Now, pull the handles ❶ apart until the stop is reached.
- Push the handles ❶ together again: The negative pressure is increased.
- Repeat this process several times (depending on the capacity of the test item) until the required vacuum is generated.

→ Adjust the test pressure:
The required test pressure is precisely adjusted by using the fine adjustment valve:
- Turn the handwheel of the valve ❷ clockwise to decrease the vacuum.
- Turn the handwheel of the valve ❷ counterclockwise to increase the vacuum.
- Set the required test vacuum by turning the handwheel of the valve ❷ accordingly.

7.3 Pressure / Vacuum Measurements

Essential for adjusting or testing the accuracy is the same pressure or vacuum in test item and reference. With the hand test pump, the pressure or vacuum for the required test points is generated and adjusted (⇨ chapters 7.1 and 7.2).
The pressure relief valve ❸ allows for a precisely regulated, smooth decrease in pressure, which enables precise and easily carried out measurements even if the pressure is decreasing.

The necessary procedures for the pressure or vacuum measurements are configured by the operator.

Carrying out pressure or vacuum measurements:
- Carry out the required tests and measurements.
- Document your results.

7.4 Relieving Pressure / Balancing Vacuum

Once the pressure or vacuum measurements have been completed, the positive or the negative pressure in the hand test pump, the test item and in the pressure hose need to be balanced.

WARNING! Risk of injury due to overpressure!
Do not dismount any connected components (test item, pressure hose, reference gauge) if the hand test pump is pressurised.
→ First, open the pressure relief valve ❸ before removing any of the components.

→ Relief the pressure or balance the vacuum:
Turn the knob of the pressure relief valve ❸ counterclockwise by 2 – 3 rotations and wait until there is no longer any overpressure or negative pressure.
→ Dismount the test item with adapters and seals from the pressure hose.
→ Stow the hand test pump and the used accessory (⇨ chapter 9 “Maintenance / Cleaning, Storage and Transport”).

Reference gauge + pressure hose
The common reference models fit into the spaces of the portable case and thus do not need to be dismounted. The pressure hose may remain attached to the hand test pump as well. Generally, it should not be dismounted.

8. Practical / Useful Advices

Spring preload / stroke limitation:
The spring preload changes the restoring force of the handles. The stroke limitation changes the volume of the pump stroke and thus changes the pump volume of the hand test pump.
Spring preload and stroke limitation are set with the knurled nut ❺.

Knurled nut
The knurled nut is made up of two parts. With the upper part, spring preload and pump stroke are adjusted. The lower part is the counter nut and used to fasten the setting.

Setting of spring preload / stroke limitation:
→ Loosen the counter nut of the knurled nut ❺.
→ Set the required spring preload / pump stroke with the knurled nut ❺.
Turning to the upper stop:
- the spring preload is increased.
- the pump stroke is decreased.

Turning to the lower stop:
- the spring preload is decreased.
- the pump stroke is increased.

→ Fasten the setting with the counter nut of the knurled nut ❺.

Pressure curve:
The pressure increase per pump stroke can be set via stroke limitation and position of the fine adjustment valve ❷.
Furthermore, the generated pressure increase depends on the current counterpressure, the total volume of the test item and the dynamics of the pumping movement.

9. Maintenance / Cleaning, Storage and Transport

CAUTION! Material damage and loss of warranty!
Any modifications or interventions in the device, made by the customer, might damage important parts or components. Such intervention leads to the loss of any warranty and manufacturer's responsibility!
→ Never modify the device or perform any repairs yourself.

Maintenance:
The maintenance is limited to:
- Checking of the seals and O-rings for wear and tear before use
- Replacement of defective or worn seals and O-rings

The instrument cannot be repaired by the operator. In case of faults, which cannot be eliminated without interference in the device, please return the instrument to the manufacturer for repair. Any arising repairs may only be executed by the manufacturer.

Cleaning:
- Clean the hand test pump with a dry or slightly dampened lint-free cloth.
- Do not use any sharp objects or aggressive agents for cleaning.

Storage and transport:
For storage and transport, we recommend our portable case, which is available as accessory.
The tight-fitting rigid foam inlay provides optimal protection for the hand test pump with pressure hose and its accessories. Reference gauges with suitable size can be transported and stored in the case without being dismounted.

Before storing, we recommend to observe the following points:
→ Clean the hand test pump and the accessories.
→ Turn the fine adjustment valve ❷ clockwise until the thread is no longer visible.
→ Check, whether the change-over valve ❹ is at its usual setting (pressure / vacuum).
→ Open the pressure relief valve ❸.

☞ **Non-pressurised storage!**
Only store the hand test pump with opened pressure relief valve ❸. This ensures that no pressure can be generated by unintentional pumping movements.

10. Disposal

NO DOMESTIC WASTE!
The hand test pump comprises various materials. It shall not be disposed of together with domestic waste.

→ Bring the hand test pump to your local recycling plant

or

→ send the hand test pump back to your supplier or to the ARMANO Messtechnik GmbH.