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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:

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Operating Instructions

Hand Test Pump BHP 700

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.

IMPORTANT! Is used to warn you against a possibly hazardous situation that may result in personal, property or environmental damage.

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 700.

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 700 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 700 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 use any brake fluid or other aggressive media.
- Hydraulic oils may cause irritations in case of skin contact.
 - Take appropriate safety measures to avoid skin contact.
 - Note the operating instruction or safety data sheet of the manufacturer.

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- 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 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. The hand test pump and the pressure hose are equipped with MINIMESS® connections.

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
- Operating instruction
- Accessory (optional):
Transportation cases, MINIMESS® adapters, adapter and seal sets, filling bottles, pressure hoses with seals as replacement, and reference gauges can be ordered as accessories.

3.1 Intended Use

The hand test pump BHP 700 shall only be used for pressure generation in small-volume measuring devices. The instrument is designed for use with hydraulic oil or purified water only, the use of other media will result in damage to the hand test pump. The hand test pump must not be attached to external pressure sources.



WARNING! No safety component!

The hand test pump of the type series BHP 700 is no safety component in compliance with the directive 2006/42/EC (Machinery Directive).

→ Never use the BHP 700 as safety component.

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.



CAUTION! No pressurisation if viscosity is too high!

If the viscosity of the hydraulic oil (type, temperature) is too high, the functioning of the hand test pump cannot be guaranteed. A pressurisation is no longer possible.

→ Pay attention to the recommended viscosity of 11 cSt (max. 22 cSt at 15 to 60 °C (59 to 140 °F)).



IMPORTANT! Risk of injury or material damage!

By attaching the BHP 700, the measuring device is hydraulically connected to the hand test pump. If the pressure relief valve is opened, the compressed medium might flow through the pressure hose into the hand test pump's storage tank. Depending on the capacity, the reservoir might overflow.

→ Never connect the BHP 700 directly to a hydraulic system with large volumes (e.g. construction machinery) or aggressive media (e.g. brake fluid).

Please check if the hand test pump is suitable for your applications before ordering and installation.

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4. Technical Data (Pump with Hose)

Pressure range	700 bar	
overpressure		
Medium	Hydraulic oil	Purified water
temperature range	-10 to +60 °C (14 to 140 °F) non-freezing	0 to 60 °C (32 to 140 °F) non-freezing
viscosity	11 cSt recommended 22 cSt maximum (10 to 60 °C (50 to 140 °F))	–
Connection		
• reference	G ¼	
• pressure hose	MINIMESS® adapter 1620 to G ¼	
Dimensions	~255 x 225 x 85 mm (~ 10 x 8.86 x 3.35")	
Weight	~ 1.7 kg (~ 3.75 lb)	

5. Design and Function

Connections:

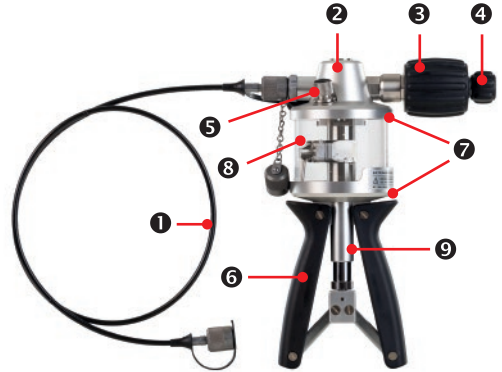
- 1 Pressure hose with MINIMESS® connection (for test item)
- 2 Connection for reference gauge

Controls:

- 3 Fine adjustment valve (handwheel)
- 4 Pressure relief valve (adjustment knob)
- 5 Storage tank cap with safety valve
- 6 Handles

Main components:

- 7 Upper and lower pump body
- 8 Storage tank with aspiration and draining port
- 9 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 **6**. Due to an internal spring, the handles return to their initial position.

The pumping movement is transferred to the piston in the pump body **7** via the push rod. The hydraulic liquid is then aspirated from the storage tank **8** and pressed to the test item.

In the case of correct ventilation, this quickly leads to an increase in pressure. The construction of the hand test pump ensures that the same pressure is generated for the test item as well as for the reference gauge.

The pressure is set to the required value via fine adjustment valve **3**. With the pressure relief valve **4**, the pressure can be relieved towards the storage tank **8**. For the assessment of the test item, the pressure displayed on the reference gauge is compared with the measured value of the test item.

5.1 Important Information Concerning Pressure Fluctuations

It is completely normal that the pressure is not constant from the very beginning.

If the pressure in the measuring device changes, it always takes a few minutes for the pressure to stabilise. This is affected by numerous factors.

The most important influencing factors are:

- Poor ventilation:
If there is still air in the measuring device, pressurisation takes considerably longer. Moreover, diffusion processes lead to pressure drops for a limited period of time.

Operating Instructions

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- Mechanical characteristics of the pressure hose:
Bending or rolling up the pressure hose causes a volume reduction and thus leads to an increase in pressure. The pressure hose expands at high pressure. Furthermore, enclosed air may diffuse through the pressure hose. Both cases result in a pressure drop.
- Temperature influence:
Temperature changes lead to a volume change in the measuring device and therefore to pressure changes. The smaller the present volume, the larger the pressure change.
- Settling time of reference and test item:
Observe the required waiting time after switching on reference and test item. Further information on this can be found in the corresponding operating instructions.

6. Commissioning with Ventilation



WARNING! Risk of injury in case of damage!

Visual inspection necessary before commissioning!

Damage on the device and its mounting parts may result in component failures and injuries if the equipment is under pressure.

- Check the BHP 700 carefully for any damage.
- Never put the BHP 700 into operation if you found any damage. Immediately return the device to the manufacturer for repair.

Essential for the use of the hand test pump is the pressure-resistant connection of the reference gauge and the test item. Additionally, sufficient and proper ventilation of the measuring device is necessary for best possible measuring processes. This is the only way to minimise pressure fluctuations.



CAUTION! Material damage!

Test item, adapter and seal must be free from contamination.

Contaminations entering through the pressure hose may damage the hand test pump.




Maximum torque of the pressure connections!

Reference: 25 Nm


Test item: 25 Nm

Carry out the following steps for the commissioning and ventilation of the hand test pump. Please pay attention to the information in chapter 7.1 “Generating Pressure” as well.

- Fill the storage tank **8** approximately two-thirds with the required hydraulic liquid.
- Open the pressure relief valve **4** by turning counterclockwise.
- Turn the reference gauge with suitable seal into the connection **2** of the hand test pump.
 **NOTICE!** Do not tighten the reference yet!
- Carefully pump until hydraulic liquid discharges at the connection and the piston system has been ventilated.
- Now, tighten the reference.



The previous steps are only required for the initial commissioning or the dismantling of the reference.

- Pump 5 to 10 times for ventilation of the valve channels.
- Turn the pressure relief valve **4** clockwise until it is firmly closed.
- Connect the pressure hose **1** with the MINIMESS® connection of the hand test pump and tighten the connection.
- Tightly screw the MINIMESS® adapter onto the pressure hose.
- Select suitable adapters and seals for the connection of the test item.
- Tightly screw the adapter for the test item onto the MINIMESS® adapter.
- Turn the test item with seal into the adapter.
 **NOTICE!** Do not tighten the test item yet!
- Now, pump until the hydraulic liquid discharges at the connection of the test item. The pressure hose **1** and the connection of the test item are ventilated now.
- Now, tighten the test item.



CAUTION! Purified water!

The quality control of the BHP 700 comprises a performance test with purified water. Therefore, the storage tank might contain residues of this liquid.

- Check the compatibility with your application and remove the residues by appropriate measures (e.g. rinsing with your hydraulic liquid).

7. Operation

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 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 **3** and **4** by hand only.

Note before the pressure 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.
- The hand test pump, the pressure hose and the test item were ventilated properly (⇒ chapter 6).

7.1 Generating Pressure

After the commissioning with ventilation, pressure can be generated with the hand test pump.

With increasing counterpressure in the system, the pumping process will become harder.



WARNING! Risk of injury if the maximum pressure is exceeded!

Observe the maximum permissible pressures of each component in the measuring device. It may lead to material failures and injuries if the limit values are exceeded.

→ Do not continue to pump if the maximum permissible pressure is reached or an exceedance of the pressure range is displayed.



CAUTION! Material damage test item!

Observe the maximum pressure of the test item! Only generate an initial pressure with the handles **6**, which is lower than the required test pressure. Then carefully increase the pressure by using the fine adjustment valve **3**.

Notes on the operation:

Please pay attention to the following notes concerning the operation of the hand test pump:

- Ensure that no air is aspirated during the pumping process.
 - Hold the hand test pump slightly inclined so that the aspiration port is always surrounded by the hydraulic liquid.
- Ensure that there is a fair amount of hydraulic liquid in the storage tank.
 - If necessary, refill the hydraulic liquid. This must also be ensured during pressure relief (⇒ chapter 7.3).
- For small hydraulic volumes and sufficiently ventilated systems, only few pumping movements are required to generate a high pressure.
 - Ensure that the maximum permissible pressure is not exceeded.
- From ~400–500 bar onwards, pumping from the initial position of the handles requires a lot of strength.
 - Increase the pressure by using the fine adjustment valve **3** and note the following advice.



Open the handles at high pressures only slightly.

The handles can be pushed together more easily the further they are closed. In this way, high pressures can be generated more easily and regulated better.

→ The higher the pressure, the less you should open the handles **6**. Avoid the initial position of the handles for high pressures.

Operation steps of the hand test pump:

- If necessary, switch on the reference gauge and the test item.
- Close the pressure relief valve:
 - Turn the knob of the valve **4** clockwise until the stop is reached.
- Generate pressure:
 - Push the handles **6** 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 **3** clockwise to increase the pressure.
 - Turn the handwheel of the valve **3** counter-clockwise to decrease the pressure.
 - Set the required test pressure by turning the handwheel of the valve **3** accordingly.

Pressure increase with the fine adjustment valve:
Alternatively, you can increase the pressure with the fine adjustment valve.

→ 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.



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 Pressure Measurements

Essential for adjusting or testing the accuracy is the same pressure in the test item and the reference. With the hand test pump, the pressure for the required test points is generated and adjusted (⇒ chapter 7.1).



Wait for pressure stabilisation!

After changing the pressure with the hand test pump, it takes a few minutes for the pressure to stabilise in the measuring device (⇒ chapter 5.1).

→ Wait approximately 3–5 minutes before taking the measurements.

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

Carrying out pressure measurements:

→ Carry out the required tests and measurements.

→ Document your results.

7.3 Relief the Pressure

Once the pressure measurements have been completed, the overpressure in the hand test pump, in the test item and in the pressure hose needs 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 ④ before removing any of the components.

→ Hold the hand test pump in a way that there is no liquid at the cap of the storage tank ⑤. Otherwise, liquid may be pushed out through the safety valve in the cap.

→ Relieve the pressure:

Turn the knob of the pressure relief valve ④ counterclockwise by 1–2 rotations and wait until there is no longer any overpressure.

→ Dismount the test item with adapters and seals from the pressure hose.

→ Stow the hand test pump and the used accessory (⇒ chapter 8 "Maintenance / Cleaning, Storage and Transport").



Reference gauge

The common reference models fit into the spaces of the portable case and thus do not need to be dismounted.



Do not relieve the pressure without supervision!

When relieving the pressure, hydraulic liquid flows from the measuring device into the storage tank ⑧. Pressure equalisation in the storage tank is ensued via the safety valve in the cap ⑤. For large-volume measuring devices or if hydraulic liquid was refilled during pressure generation, liquid may leak through the safety valve ⑤.

→ Carefully relieve the pressure and pay attention to the filling level in the storage tank ⑧.

Operating Instructions

Hand Test Pump BHP 700

8. 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
- Visual inspection of the BHP 700 and its components for damage (the inspection interval depends on the frequency of use, but at least once a year)



Do not use seals and hydraulic hoses made of rubber, silicone or plastic for more than 6 years.

→ Pay attention to the corresponding instructions in the manufacturer's product documents.

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.
- Avoid contact with liquid or aggressive media.

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 **3** clockwise until the thread is no longer visible.
- Open the pressure relief valve **4**.



Non-pressurised storage!

Only store the hand test pump with opened pressure relief valve **4**. This ensures that no pressure can be generated by unintentional pumping movements.



Openings facing upwards!

Ensure that the caps of storage tank **5** and filling bottle are properly closed and facing upwards when stored.

9. 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.