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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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1.1 Pictographs Used in This Manual

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.



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 operating the comparison pump.

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 comparison pump corresponds with the state of engineering at the time of printing. This concerns the operating mode and the safe operation of the device. 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, operation and maintenance of the comparison pump 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.
- Use the comparison pump in its perfect technical condition only. Damaged or defective instruments need to be checked immediately and replaced if necessary.
- Only use appropriate tools for mounting, connecting and dismantling the comparison pump.
- Nameplates or other information on the device shall neither be removed nor obliterated, since otherwise any warranty and manufacturer responsibility expires.



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.

Operating Instructions

Comparison Pumps PS 600-G / PS 1000-G

3. Device Description

The comparison pump models PS 600-G and PS 1000-G are pressure generators and used for comparative measurements. They are suitable for testing and adjusting pressure measuring devices.

Model PS 600-G is applicable for pressure ranges from 0 to 600 bar and model PS 1000-G is applicable for pressure ranges from 0 to 1,000 bar. For testing, acid-free, thin oil or distilled water (for the special versions) is used as medium.

The spindle pump serves to generate the pressure. The test item is compared to a pressure measuring device with higher accuracy (e.g. Overview 2000 Test Gauges, Overview 10000 Calibration Technology).

Comparison pumps in a case are suited for continuous operations, e.g. in test shops. Additionally, the instrument connections are provided with filters to avoid contamination of the pump pipe system (see schematic drawing, page 5).

Components:

- ① Spindle pump with cylinder, piston, spindle and star handle
- ② Stop valve "Reference device/Vergleichsgerät"
- ③ Stop valve "Test item/Prüfling"
- ④ Valve "Pressure compensation/Druckausgleich"
- ⑦ Connection for reference device
- ⑧ Connection for test item
- ⑨ Reservoir for the medium
- ⑩ Change-over valve for external admission pressure (functions: "Admission pressure/Vordruck", "Closed/Zu", "Vent/Entlüften")
- ⑪ "Connection admission pressure/Anschluss Vordruck"
- ⑫ "Ventilation admission pressure/Entlüftung Vordruck"

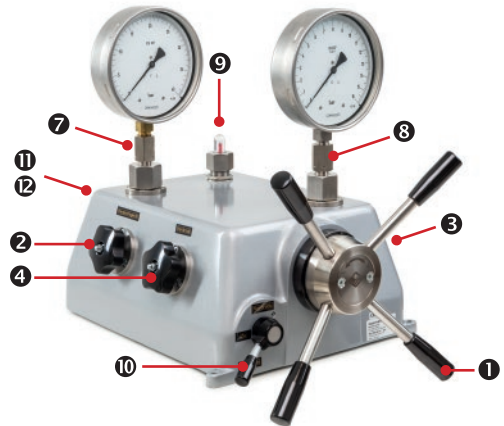
Nameplate and label:

The nameplate is placed on the back of the comparison pump. It contains the most important technical data and information.

Scope of delivery:

The delivery includes – in addition to the comparison pump:

- 1 operating instruction
- 1 l special oil or
 - 1 l distilled water (for the special versions)
- 2 special gaskets for connections, with 2 encased O-rings (mounted)
- 4 O-rings as spare parts
- 2 clamping sleeves M20x1.5 (mounted)
- 2 adapters for N6x1 (admission pressure connection)



Operating Instructions

Comparison Pumps PS 600-G / PS 1000-G

3.1 Intended Use

The comparison pump shall only be used for generating pressure in order to carry out comparative measurements for testing and adjusting pressure measuring devices.

Do not use the comparison pump beyond its specification or contrary to the operating instructions.

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. This particularly applies for the adherence to the permissible full scale value and the permissible temperature range.



IMPORTANT! Risk of injury or material damage due to overpressure!

Exceeding the maximum overload values may lead to material failure of the comparison pump. This may also cause serious damage to health.

→ Ensure that the overload values are never exceeded.

Please check if the comparison pump is suitable for your application before ordering and installation.

4. Technical Data

Model	PS 600-G	PS 1000-G
Construction type	case version	
Medium Standard Special versions	acid-free, thin oil distilled water ¹⁾	
p_{\min} (operating volume ≤ 0.1 litre)	0 bar	0 bar
p_{\max} (operating volume ≤ 0.1 litre)	600 bar	1,000 bar
Required admission pressure	6 bar	6 bar
Standard connection	2 connections male G ½ LH, each with 2 clamping sleeves on G ½ right or M20x1.5 right, incl. double sealing	
Connection for external compressed air supply	plug connection (Prestolock) for PA hose N4x1 and an adapter for hose N6x1	
Case	all parts mounted in an aluminum case, grey enamelled (self-supporting cover), 3 mounting orifices Ø 8.5 mm (0.33")	
Case dimensions (L x W x H)	350 x 550 x 270 mm (13.78 x 21.65 x 10.63")	
Piston	brass	hardened steel stainless steel ²⁾
Cylinder	brass	
Weight	approx. 26 kg (57.32 lb)	
Temperature range	15 °C to 35 °C (59 °F to 95 °F)	

¹⁾ for the special version for oxygen:
wetted parts are free of grease and oil

²⁾ for all special versions

Operating Instructions

Comparison Pumps PS 600-G / PS 1000-G

5. Preparation, Functions and Measuring Process

Preparation and functions:

The admission pressure can be connected to the comparison pump either by a PA hose N4x1 or by adapter for N6x1 to plug connection (Prestolock).

To protect the comparison pump from contamination, a maintenance unit consisting of pressure regulator and filter (pore size 10–20 µm with oil and water separator) is to be placed into the line of the admission pressure to the comparison pump. (The filter is not part of the scope of delivery.)

With the pressure regulator, the pressure needs to be limited to max. 10 bar.

Please open the valves ② and ③ and press the medium up to the sealing edge of connection ⑦ and ⑧ with the spindle pump before screwing in the pressure measuring devices. Then, tightly screw the pressure measuring devices into the connections.



IMPORTANT! Attention must be paid to thorough sealing! Please use an appropriate wrench and the designated wrench flat. During screwing in, the pressure measuring devices should never be held at the case!

Measuring process:

All valves are closed.

In order to fill the system, turn the change-over valve ⑩ to “Admission pressure/Vordruck” and open valve ④. Afterwards, valve ④ must be closed again.

Build up the pressure via spindle pump ① until the required pressure has been reached. The fine adjustment of the pressure is likewise ensued via the spindle pump ①.



CAUTION! The total travel of the spindle pump is approximately 16 revolutions. At the lower and the upper end a distinct stop is noticeable. Do not attempt to turn beyond those points forcibly! Otherwise, the spindle pump will be damaged!

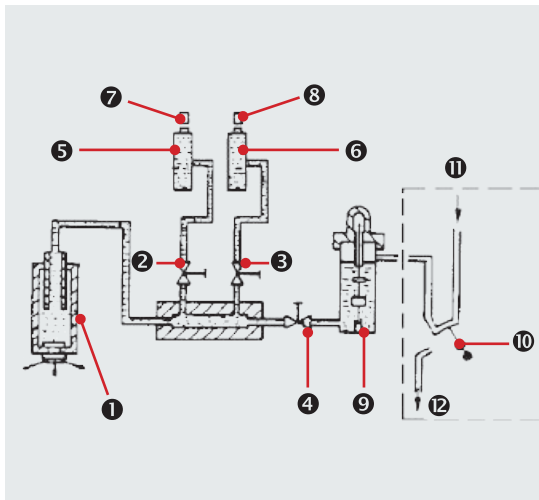
When opening valve ④, the pressure is relieved.

To reduce the pressure to 0 bar, the admission pressure must be relieved as well by turning the valve ⑩ to “Vent/Entlüften”.



IMPORTANT! Never open any pressure-bearing connection as long as there is any pressure left in the system!

In particular, do not screw out the test item. Please vent the entire system always completely until no pressure is left in the system!



- ① Spindle pump with cylinder, piston, spindle and star handle
- ② Stop valve “Reference device/ Vergleichsgerät”
- ③ Stop valve “Test item/Prüfling”
- ④ Valve “Pressure compensation/ Druckausgleich”
- ⑤ Filter
- ⑥ Filter
- ⑦ Connection for reference device
- ⑧ Connection for test item
- ⑨ Reservoir for the medium
- ⑩ Change-over valve for external admission pressure (functions: “Admission pressure/Vordruck”, “Closed/Zu”, “Vent/Entlüften”)
- ⑪ “Connection admission pressure/ Anschluss Vordruck”
- ⑫ “Ventilation admission pressure/ Entlüftung Vordruck”

Fig. schematic drawing

Operating Instructions

Comparison Pumps PS 600-G / PS 1000-G

When actuating the change-over valve ⑩, please make sure that it notably snaps into place at the lever position right above the tags.

Refilling the medium reservoir:

The instrument is supplied filled and thus ready for operation.

During operation, the red float pin must always be visible in the clear cap.

If the red float pin is no longer visible, medium must be refilled. For refilling, turn the change-over valve ⑩ to "Vent/Entlüften", open the valve ④ and then turn the change-over valve ⑩ to intermediate position between "Admission pressure/Vordruck" and "Vent/Entlüften". Remove the union nut and the cap from the medium reservoir ⑨. Fill in the medium while pressing down the float pin. Please use only the medium included in the delivery or the re-ordered medium. Turn the control valve ⑩ to "Vent/Entlüften". Then, close the reservoir again with cap and union nut.

6. 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 lubrication with instrument grease (for the special version for oxygen with special grease) after approximately 50 hours of operation (grease fitting on the bottom only for PS 1000-G).

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 comparison pump with a dry or slightly dampened lint-free cloth.
- Do not use any sharp objects or aggressive agents for cleaning.

Storage and transport:

- Use the original packaging or comparable packaging for transport.
- Avoid impacts or strong vibrations.
- Protect the device against moisture.

Operating Instructions

Comparison Pumps PS 600-G / PS 1000-G

7. Dismounting and Disposal

Before dismounting:

The test item must be unpressurised before dismounting! For this purpose, the valves should be opened.

Disposal:



NO DOMESTIC WASTE!

The comparison pump comprises various materials. It shall not be disposed together with domestic waste.

→ Bring the comparison pump to your local recycling plant

or

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

8. Declaration of Manufacturer

Herstellereklärung

Declaration of Manufacturer

Für die nachfolgend bezeichneten Erzeugnisse

We hereby declare for the following named goods

VERGLEICHS-PRÜFPUMPEN

Typ PH 60-P gemäß Datenblatt 10151
Typ PS 60-P/PS 600-P gemäß Datenblatt 10155
Typ PS 60-G/PS 600-G gemäß Datenblatt 10156

COMPARISON PUMPS

Model PH 60-P according to data sheet 10151
Model PS 60-P/PS 600-P according to data sheet 10155
Model PS 60-G/PS 600-G according to data sheet 10156

und

and

KOLBEN-MANOMETER

Typ PD 1 gemäß Datenblatt 10311
Typ PD 6 gemäß Datenblatt 10312
Typ PD 10/PD 25 gemäß Datenblatt 10313
Typ PD 60/PD 100 gemäß Datenblatt 10315
Typ PD 600/PD 1000 gemäß Datenblatt 10316

DEAD WEIGHT TESTERS

Model PD 1 according to data sheet 10311
Model PD 6 according to data sheet 10312
Model PD 10/PD 25 according to data sheet 10313
Model PD 60/PD 100 according to data sheet 10315
Model PD 600/PD 1000 according to data sheet 10316

Gemäß den Bestimmungen der Richtlinie

According to the regulations of the directive

2014/68/EU (Druckgeräte-Richtlinie)

2014/68/EU (Pressure Equipment Directive)

fallen diese Geräte nicht unter diese Richtlinie und werden weder einem Konformitätsbewertungsverfahren unterzogen noch mit einer CE-Kennzeichnung versehen.

these instruments are not subject to this directive and neither do undergo a conformity assessment procedure nor do they bear the CE mark.

Die Geräte werden nach geltender guter Ingenieurpraxis ausgelegt und gefertigt.

The instruments are designed and manufactured according to sound engineering practice.

124_Herstellereklärung_Vergleichs-Prüfpumpen_Kolben-Manometer_Ausg. 09/18

Diese Erklärung wird verantwortlich für den Hersteller:

This declaration is issued under the sole responsibility of the manufacturer.

ARMANO Messtechnik GmbH

abgegeben durch / by
Grünhain-Beierfeld, 2018-09-21



Bernd Vetter
Geschäftsführender Gesellschafter / Managing Director

ARMANO

ARMANO Messtechnik GmbH

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