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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

Digital Pressure Gauge DPG 400

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.



DANGER OF EXPLOSION! Indicates a potentially hazardous situation, which may result from existing explosive gases and dusts. Disregarding the safety instructions may result in explosions.



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 operating the digital pressure gauge.

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 digital pressure gauge corresponds with the state of engineering at the time of printing. This concerns the accuracy, 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 instrument 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.
- The electrical connection shall be carried out by a fully qualified electrician only.



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.
- Degree of protection according to DIN EN 60529: Ensure that the ambient conditions at the installation location do not exceed the requirements of the specified degree of protection (⇒ chapter 4 "Technical Data").
- Use the instrument 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 instrument.
- Nameplates or other information on the device shall neither be removed nor obliterated, since otherwise any warranty and manufacturer responsibility expires.
- In order to ensure measurement accuracy and durability of the instrument and to avoid damage, the limit values indicated in the technical data have to be observed.
- In case of visible damage or malfunctions, the instrument must be put out of operation immediately.
- Handle this highly sensitive electronic measuring device carefully, both in its packaged and unpackaged condition!
- Any changes or modifications to the device are not permissible.
- Do not throw the device!
- To avoid damaging the membrane, please remove the packaging and, if applicable, the protection cap not until installation of the device! If a protection cap was supplied, it must be stored!
- After disassembly, this protection cap must be re-attached on the membrane.
- Handle an unprotected membrane with extreme care; it can easily be damaged.

- Do not exert any force when installing the devices to prevent damage to the device and the system!
- The display and the plastic housing are provided with a rotational limiter. Do not try to overtighten the display or housing by using force.
- Ensure that no mechanical stresses occur at the pressure connection during installation, as these could lead to a shift in the characteristic curve.
- For hydraulic systems, position the device in a way that the pressure connection points upwards (venting).
- Provide a cooling extension when used in steam pipes.



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

Digital Pressure Gauge DPG 400

3. Device Description

The battery-operated digital pressure gauge DPG 400 is suitable for measuring and monitoring vacuum, positive pressures and absolute pressures of liquid and gaseous media for pressure ranges from 0 – 400 mbar to 0 – 600 bar.

A ceramic sensor serves as measuring element. The rotatable case is made of polycarbonate and has the degree of protection IP65.

The digital pressure gauge is equipped with an integrated rotatable 4½ digit display with main and additional indication. A unit conversion for widespread units has been integrated into the DPG 400.

Additional functions are calibration of zero point and upper range value, min./max. value with reset function, battery status and an automatic switchoff.

Nameplate and sticker:

The nameplate is located on the device. It contains the most important technical data and information.

ARMANO		ARMANO
		Messtechnik GmbH
DPG 400		Prod.-No.: 23456789
Instr.-No.:	202051234	
Input:	0...100 bar	
Supply:	3,6 V Battery 1/2 AA Li Cell	
		CE

Figure 1: nameplate

Scope of delivery:

- 1 digital pressure gauge DPG 400
- 1 operating instruction

3.1 Intended Use

The battery-operated digital pressure gauge DPG 400 was designed for applications in hydraulics and pneumatics as well as in machinery and plant engineering. It can be easily and quickly installed on site.

The user must check whether the device is suitable for the selected application. In case of doubt, please contact our sales department for clarification. The ARMANO Messtechnik GmbH accepts no liability for incorrect selection and its consequences!

Gases or liquids can be used as medium. In addition, it must be ensured that the medium is compatible with the wetted parts.

The technical data specified in the current data sheet are binding and must be adhered to. If you do not have the data sheet, please request it or download it from our website (www.armano-messtechnik.com).

Applications that are not explicitly listed as according to regulations, are improper to intended purpose!

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.

Operating Instructions

Digital Pressure Gauge DPG 400

4. Technical Data

Process connection	stainless steel 316 (1.4401) G½ B (DIN EN 837)
• material	
• connection thread	
Measuring cell / sensor	ceramic sensor made of Al ₂ O ₃ 96 %
Sensor sealing	FKM
Case	PA 6.6, polycarbonate, NCS 80 (3"), degree of protection IP65, rotatable
Indication / LC display	main indication (measured value): 4½ digit, 7 segment indication, digit height 11 mm (0.43"), additional indication (unit): 6 digit, 14 segment indication, digit height 7.5 mm (0.3")
Pressure units	bar, mbar, psi, inHg, cmHg, mmHg, hPa, kPa, MPa, mH ₂ O, inH ₂ O
Indicating range	±19999
Supply voltage	2x3.6 V lithium battery (½ AA)
Automatic switchoff	configurable 0 – 5 min
Measurement accuracy	≤ ±0.25 % FS
Temperature influence	0.2 % FS / 10 K
Operating temperature	-20 / +70 °C (-4 / +158 °F)
Medium temperature	-20 / +85 °C (-4 / +185 °F)
Storage temperature	-30 / +80 °C (-22 / +176 °F)
Reference temperature	+25 °C (+77 °F)
Sample rate	5 measurements / s

Pressure ranges and overload capability in bar:

Vacuum	Positive pressure	Absolute pressure	Overload	Burst pressure
-1 / 0	-	-	4	7
-	0 – 0.4	-	1	2
-	0 – 0.6	0 – 0.6	2	4
-	0 – 1.0	0 – 1.0	2	4
-	0 – 1.6	0 – 1.6	4	5
-	0 – 2.5	0 – 2.5	4	5
-	0 – 4	0 – 4	10	12
-	0 – 6	0 – 6	10	12
-	0 – 10	0 – 10	20	25
-	0 – 16	0 – 16	40	50
-	0 – 25	0 – 25	40	50
-	0 – 40	0 – 40	100	120
-	0 – 60	0 – 60	100	120
-	0 – 100	0 – 100	200	250
-	0 – 160	0 – 160	400	500
-	0 – 250	0 – 250	400	500
-	0 – 400	0 – 400	600	650
-	0 – 600	0 – 600	600	880

PN ≥ 1 bar: vacuum resistance unrestricted

5. Mounting

Please check whether all listed parts are included in the scope of delivery (⇒ chapter 3 "Device Description") without damage and have been delivered according to your order.

5.1 General Installation Steps

Carefully remove the device from its packaging and dispose of it properly.

Proceed as described in the following installation steps according to the connection variant.



WARNING! Mount the device in an unpressurised state only!

5.2 Mounting Steps for Connections According to DIN 3852



IMPORTANT! Do **not** use any additional sealing material such as tow, hemp or Teflon tape!

- Make sure that the O-ring is seated undamaged in the designated groove.
- Ensure that the sealing face of the mating part has a flawless surface (R_z 3.2).
- Screw the device into the mounting thread by hand.
- If you have a device with a knurled ring, it has to be screwed in by hand only.
- Devices with a wrench flat have to be tightened with a spanner
(G 1/4": approx. 5 Nm; G 1/2": approx. 10 Nm;
G 3/4": approx. 15 Nm; G 1": approx. 20 Nm;
G 1 1/2": approx. 25 Nm).
- **The specified tightening torques must not be exceeded!**

5.3 Mounting Steps for Connections According to DIN EN 837

- Use a suitable sealing, depending on the medium and the pressure to be measured (e.g. a copper seal).
- Ensure that the sealing face of the mating part has a flawless surface (R_z 6.3).
- Screw the device into the mounting thread by hand.
- Then, tighten the device with a spanner (for G 1/4": approx. 20 Nm; for G 1/2": approx. 50 Nm).
- **The specified tightening torques must not be exceeded!**

5.4 Mounting Steps for NPT Connections

- An additional sealant, e.g. PTFE tape, can be used for sealing.
- Screw the device into the mounting thread by hand.
- Then, tighten the device with a spanner (for 1/4" NPT: approx. 30 Nm; for 1/2" NPT: approx. 70 Nm).
- **The specified tightening torques must not be exceeded!**

5.5 Positioning of the Display Module

The display is rotatable, ensuring perfect readability even in unusual installation positions.

6. Commissioning

Before commissioning, check for proper installation and for any visible defects of the device.

Commissioning shall only be carried out by qualified personnel, who read and understood this manual!

The device has to be operated within the specifications only! (Please refer to the technical data in the data sheet.)

The program version of the firmware is indicated in the display for about 1 second after switching on the device. Please have these ready in case of queries.

7. Operation

7.1 Operating and Indicating Elements

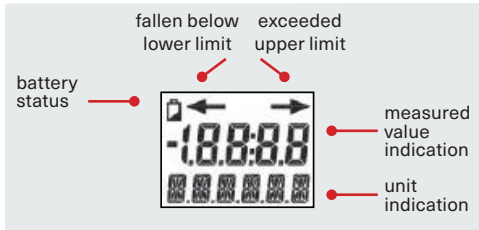


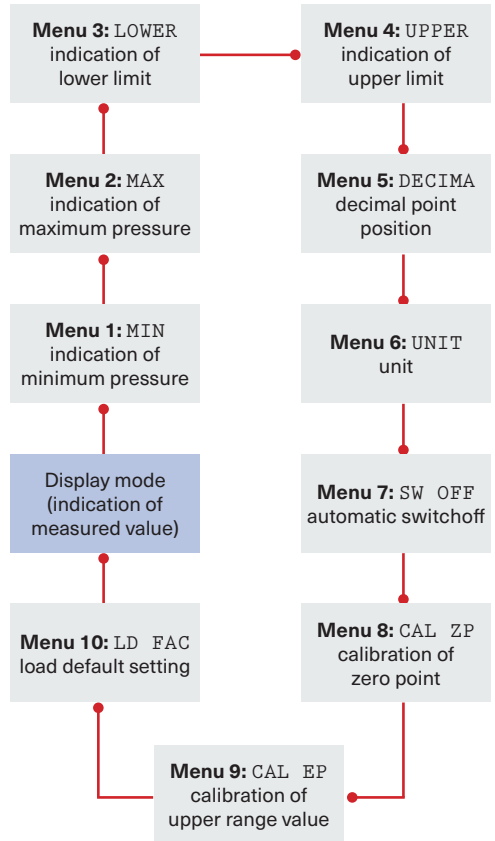
Figure 2: LC display

The indication of the measured value as well as the configuration of the individual parameters is menu-driven via an LC display. The individual functions can be set using three miniature pushbuttons on the front panel.

The menu system is self-contained allowing you to scroll both forward and backward through the individual set-up menus to access the desired setting point.

All settings are permanently stored in a Flash-EPROM and are therefore still available even after a battery replacement.

7.2 Structure of the Menu System



switching on the device
move forward in the menu system
increase display value



switching off the device
move backwards in the menu system
decrease display value



activation of the operating mode and the individual menu options
confirmation of the set values

Operating Instructions

Digital Pressure Gauge DPG 400

7.3 Menu List

Menu 1 MIN	Indication of minimum pressure	sets the currently applied pressure as the minimum value sets the value to zero
Menu 2 MAX	Indication of maximum pressure	sets the currently applied pressure as the maximum value sets the value to zero
Menu 3 LOWER	Indication of lower limit	This value was selected when ordering and cannot be changed.
Menu 4 UPPER	Indication of upper limit	This value was selected when ordering and cannot be changed.
Menu 5 DECIMA	Setting of decimal point position	Depending on the pressure range and set unit, only a limited number of decimal places can be displayed.
Menu 6 UNIT	Setting of pressure unit	selectable units: bar, mbar, psi, inHg, cmHg, mmHg, hPa, kPa, Mpa, mH ₂ O, inH ₂ O. When changing the unit, in some cases the decimal point position has to be changed as well for the correct indication of the applied pressure. Depending on the pressure range, perhaps not all units can be used.
Menu 7 SW OFF	Configuration of automatic switchoff	allocation of the adjustable numbers: "0": automatic switchoff function is turned off "1" – "5": automatic switchoff after 1 to 5 minutes
Menu 8 CAL ZP	Calibration of zero point	<p>If you notice deviations in the output value with respect to the zero point, the indication can be recalibrated. This requires a pressure reference if the zero point deviates from the ambient pressure. The applied pressure of the reference must correspond to the lower range value. For reading the pressure, press .</p> <p>Please note the following:</p> <p><u>-1 to x bar:</u> The offset is calibrated at -0.9 bar. During the calibration it was ensured that the instrument is within the tolerance even at -1 bar (in theory). When recalibrating the zero point, a pressure reference of -0.9 bar must be applied.</p> <p><u>0 to x bar abs.:</u> The offset is calibrated at 0.1 bar abs. During the calibration it was checked that the instrument is within the tolerance even at 0 bar abs. When recalibrating the zero point, a pressure reference of 0.1 bar must be applied.</p> <p>If the configuration led to a deterioration of the original calibration, e.g. due to an insufficient pressure reference, use the menu "LD FAC" for restoring the default setting of the device according to the order.</p>
Menu 9 CAL EP	Calibration of upper range value	<p>If you notice deviations in the output value with respect to the upper range value, the indication can be recalibrated. This requires a pressure reference. The applied pressure of the reference must correspond to the upper range value. For reading the pressure, press .</p> <p>If the configuration led to a deterioration of the original calibration, e.g. due to an insufficient pressure reference, use the menu "LD FAC" for restoring the default setting of the device according to the order.</p>
Menu 10 LD FAC	Load default settings	For loading the default setting, press . After the loading process, "LOADED" and then "OK" appears briefly in the display. The configuration mode is exited automatically.

Operating Instructions

Digital Pressure Gauge DPG 400

8. Power Supply / Battery Replacement



IMPORTANT! The instrument contains lithium batteries.

When handled properly, lithium batteries are safe. If, however, used incorrectly or misused, the following consequences may arise:

- Leaking of battery fluid
- Escaping of gas
- Fire
- Explosion

☞ Please observe the following warnings for safe operations:

- Ensure that the battery terminals are in the correct position.
- Do never short-circuit the batteries.
- Do never cause the batteries to overheat.
- Do not use batteries that show signs of damage.
- Do never attempt to recharge the batteries.
- Do never deeply discharge the batteries.
- Do never attempt to open the batteries.
- Do never combine batteries of different types or used batteries with new ones.
- Dispose of the batteries properly (⇒ chapter 11 “Dismounting and Disposal”).

The digital pressure gauge is powered by two 3.6 V lithium batteries (type ½ AA). Stored data are retained even in a currentless state of the instrument.

If the battery status appears on the display, switch off the device and replace the battery with a new one of the same type as soon as possible. This ensures good readability of the values.

The battery compartment is located under the black round plastic cover on the upper part of the housing. To change the batteries, proceed as follows:

- Turn the plastic cover counterclockwise by 45° until stop, using a coin (e.g. 2 € coin).
- Hold the coin firmly and use it to lift the plastic cover upwards from the side.
- Remove the cover and replace the batteries.
- Then close the device properly again.



Figure 3: battery compartment

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:

In principle, the device is maintenance-free. If necessary, the housing of the device can be cleaned with a damp cloth and a non-aggressive cleaning solution when switched off.

Cleaning:

Depending on the medium, deposits or contamination may occur on the membrane. If such a tendency of the medium is known, the operator has to specify appropriate cleaning intervals.

After professionally decommissioning the instrument, the membrane can usually be cleaned carefully with a non-aggressive cleaning solution and a soft brush or sponge. If the membrane is calcified, it is recommended to have the decalcification carried out by the ARMANO Messtechnik GmbH. Please also refer to chapter 10 “Return”.



CAUTION! Incorrect cleaning may cause irreparable damage of the measuring cell. Therefore, never use any sharp objects or compressed air for cleaning the membrane.



IMPORTANT! Improper transport can destroy the device and cause considerable personal and property damage.

Please inspect the transport packaging and the delivered items immediately upon their receipt to determine their integrity, completeness and conformity with the delivery documents.

The permissible ambient conditions for storage and transport can be found in the data sheet.

Storage:

- If possible, store the instrument in its original packaging.
- If possible, remove the packaging not until installation of the device.
- Store the instruments in a dry place, not exposed to direct sunlight.
- The storage temperature of the instruments should not fall below or exceed the permissible temperature limitations specified in the data sheets.

Transport:



Electronic components!

The device is equipped with sensitive electronic components and has to be handled with due care.



IMPORTANT! Please regard the legal requirements for the transport of lithium metal batteries.

Please send the instruments only with installed lithium metal battery.

Place the supplied insulating disc in front of the positive pole of the lithium metal battery.



Remove batteries!

If the device is not in use for extended periods, the batteries should be removed from the device to preclude any leaking damage.

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

10. Return

Prior to any return, whether for recalibration, decalcification, for modification or for repair, the instrument has to be cleaned thoroughly and packaged carefully. Please enclose a notice of return with a detailed description of the faults when returning a defective device. If your instrument came into contact with harmful substances, a declaration of contamination is required additionally. A corresponding template can be found on our website www.armano-messtechnik.com. If you send in your device without a declaration of contamination and our service department has doubts regarding the medium used, the repair will only be started once a corresponding declaration has been submitted.



If the device came into contact with harmful substances, appropriate precautions are to be taken during cleaning!

11. Dismounting and Disposal

**WARNING! Risk of injury!**

Never remove the device from a system in operation.

Make sure that the system is switched off professionally.

Before dismounting:

Check before dismounting, whether the system

- is switched off,
- is in a safe and currentless state,
- is unpressurised and cooled down.

Dismounting:

→ Pay attention to potentially leaking media. Take appropriate precautions to collect them.

Disposal:

In compliance with the directives 2011/65/EU (RoHS) and 2012/19/EU (WEEE), the device must be disposed of separately as electrical and electronic waste. Please regard legal regulations of the country of distribution.

**NO DOMESTIC WASTE!**

The instrument comprises various materials. It shall not be disposed of together with domestic waste.

→ Bring the device to your local recycling plant

or

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

Disposal of used batteries:

- Cover the poles with tape during storage and disposal to avoid short circuits.
- Dispose of used batteries properly in commercial collection boxes or at municipal collection points.



WARNING! Depending on the medium used, residues on the device may cause a risk for the user and the environment.

Therefore, take appropriate precautions and dispose of the device properly.

12. Warranty Conditions

The warranty conditions are subject to the statutory warranty period of 24 months, valid from the date of delivery.

Any warranty claims are excluded in case of improper use, modification of or damage to the device. Damaged membranes are not accepted as warranty claim. Furthermore, defects resulting from normal wear are not subject to warranty services.

13. CE Conformity



The CE marking of the instruments certifies the conformity with prevailing EU directives for placing products on the market within the European Union. The following directives apply:

2014/30/EU (EMC)

2014/68/EU (PED)

The corresponding declaration of conformity is enclosed or available upon request.

14. Declaration of Conformity

EU-Konformitätserklärung

EU Declaration of Conformity

Für die nachfolgend bezeichneten Erzeugnisse

DIGITALMANOMETER
Typ DPG 300 gemäß Datenblatt 9661

DIGITALMANOMETER
Typ DPG 400 gemäß Datenblatt 9662

PRÄZISIONS-DIGITALMANOMETER
Typ DPG 1030 gemäß Datenblatt 9643

HOCHDRUCK-DIGITALMANOMETER 4...20 mA
Typ DPG 1500 gemäß Datenblatt 9651

PRÄZISIONS-DIGITALMANOMETER 4...20 mA
Typ DPG 1510 gemäß Datenblatt 9652

wird hiermit bestätigt, dass sie den wesentlichen Schutzanforderungen entsprechen, die in der Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (2014/30/EU) festgelegt sind.

Zur Beurteilung der Erzeugnisse hinsichtlich elektromagnetischer Verträglichkeit wurde folgende Norm herangezogen:

DIN EN 61326-1:2022-11

Des Weiteren fallen diese Geräte mit einem Druckmessbereich > 0,5 bar als „druckhaltende Ausrüstungsteile“ unter die

Druckgeräterichtlinie (2014/68/EU).

Diese Geräte werden nach geltender guter Ingenieurpraxis ausgelegt und gefertigt.

Mit Messbereichen ab 0 – 200 bar wurden sie folgendem Konformitätsbewertungsverfahren unterzogen:

Modul A „Interne Fertigungskontrolle“

Soweit zutreffend erstreckt sich die CE-Kennzeichnung dann auch auf diese Richtlinie.

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, 2023-06-12

Bernd Vetter
Geschäftsführender Gesellschafter / Managing Director

We hereby declare for the following named goods

DIGITAL PRESSURE GAUGE
Model DPG 300 according to data sheet 9661

DIGITAL PRESSURE GAUGE
Model DPG 400 according to data sheet 9662

DIGITAL PRECISION PRESSURE GAUGE
Model DPG 1030 according to data sheet 9643

DIGITAL HIGH-PRESSURE GAUGE 4...20 mA
Model DPG 1500 according to data sheet 9651

DIGITAL PRECISION PRESSURE GAUGE 4...20 mA
Model DPG 1510 according to data sheet 9652

that they meet the essential protective requirements, which have been fixed in the Directive of the European Parliament and the Council on the approximation of the laws of the Member States relating to the electromagnetic compatibility (2014/30/EU).

The following standard has been used to assess the goods regarding their electromagnetic compatibility:

Moreover, these instruments with a pressure range > 0.5 bar are, as pressure equipment parts, subject to

Pressure Equipment Directive (2014/68/EU).

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

Versions with pressure ranges from 0 – 200 bar are subjected to the following conformity assessment procedure:

Module A "Internal Production Control"

As far as they are concerned, the CE-marking then also applies to this directive.

ARMANO

ARMANO Messtechnik GmbH

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