Operating Instructions
Digital Precision Pressure Gauge DPG 1030 – LILLYpress PLUS

B09-643
10/24

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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, 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! Indicates a potentially hazardous situation, which may result from hot surfaces. Disregarding the safety instructions may result in severe burns.

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

IMPORTANT! Disregarding the respective regulations may result in severe personal injuries and / or property damage.

Please read this operating instruction thoroughly before installing the device.
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 instrument 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.
- Please ensure that the process is unpressurised before installing or removing the device. Otherwise, there is a risk that hot, corrosive, toxic or explosive substances leak.

IMPORTANT! Risk of burns, chemical burns, poisoning or explosion!

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

- Exceeding the maximum permissible overload values may lead to material failure of the digital pressure gauge. This may also cause serious damage to health.
- Ensure that the overload values are never exceeded.
- Please check if the instrument model is suitable for your application before ordering and installation.
- 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 dismounting 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.

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.

- The operating pressures of the digital pressure gauge have to be within the specifications of the device.
- Ensure that construction type and materials of the digital pressure gauge are resistant regarding application conditions and medium.
- Minimise external mechanical influences, such as oscillations, vibrations and shocks, by an appropriate installation.
- Reduce the influence of vapour, abrasive / aggressive media, dust and soot or others by selecting a suitable installation location.
- Avoid direct sunlight and immediate vicinity to hot objects as far as possible.
- Avoid strong electromagnetic fields.
- Modifications or other technical changes of the instrument by the customer are not permitted. Otherwise, you will lose your warranty.

IMPORTANT! The instrument models DPG 1030 contain a lithium battery.

- 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

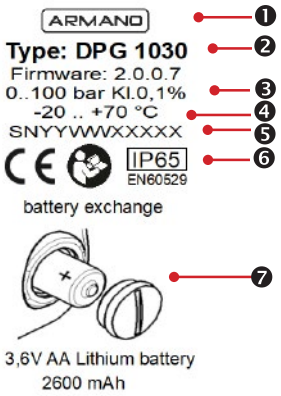
Please observe the following warnings for safe operations:

- 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.
- Dispose of the batteries properly (⇨ chapter 12 “Dismounting and Disposal”).

3. Device Description

The present document describes the standard version. For the application in environments with increased safety requirements (e.g. potentially explosive areas), special devices might be necessary. Our digital pressure gauges are used for standard industrial pressure measurement.
Further information on the instruments can be found in the data sheet 9643.

Nameplate:
The nameplate is placed on the case of the instrument. It contains the most important technical data and information.



❶ Manufacturer
❷ Model
❸ Pressure range and accuracy class
❹ Operating temperature range
❺ Serial number (YY = year of manufacture; WW = week of manufacture)
❻ Symbols “CE” and “Please regard manual”, degree of protection (DIN EN 60529)
❼ Information on battery type and replacement

3.1 Scope of Application

The manual is valid for digital pressure gauges of the type series LILLYpress PLUS. Information, which is not given in this manual, can be found in the respective product data sheets if necessary.

3.2 Intended Use

Digital pressure gauge models DPG 1030 are used for measuring, checking, adjusting and calibrating pressures and pressure measuring equipment in the specified measuring range.
Do not use the devices 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.

3.3 Configuration and Function

Due to their advanced technology, the digital pressure gauges of the LILLYpress PLUS series are electronic pressure measuring instruments designed to supersede the classic mechanical pressure gauges and to open up new areas of application.

The advantages of the electronic devices are:
- simple switching of the pressure unit (alternative unit)
- increased measurement accuracy
- longer service life
- better long-term stability (especially in high-pressure ranges)
- higher vibration and shock resistance (robustness)
- indication of the device temperature close to the sensor (°C or °F)

The instruments can fully replace the mechanical pressure gauge models RCh 100 – 3.
For the digital pressure gauge, all dimensions relevant to the user (case diameter and distance from the centre of the device to the sealing surface) have been designed identically.
In addition to the 5-digit indication for the measured value, the large, high-contrast graphic display also has a temperature and a bargraph indication.
The digital pressure gauge LILLYpress21 is also equipped with a MIN / MAX peak memory.
The high accuracy and the portability of the battery-powered devices makes them suitable for use as reference gauge for checking, adjusting and calibrating other pressure measuring equipment.

The device is encased EMC-safe in a proven bayonet ring case made of stainless steel (IP65) with atmospheric pressure compensation.

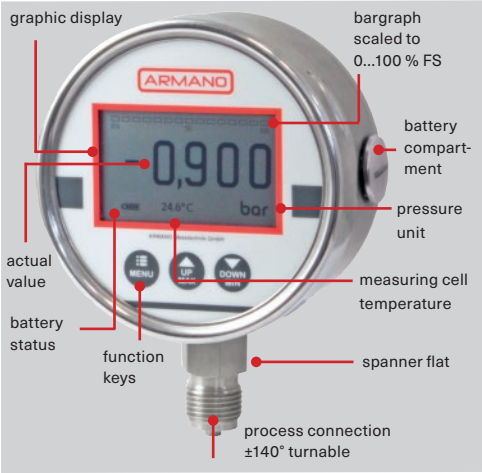


Figure 3.3-1: components

The device can be combined with installation options typical for pressure gauges, i.e.

option
–Fr: front flange for panel mounting
–Rh: back flange for surface mounting
–Mgh: gauge holder bracket acc. to DIN 16281

4. Technical Data

The technical data of the particular instrument models can be found in the data sheets. The data sheets contain all relevant information such as the assignment of the permissible overload and burst pressure to the nominal pressure range, available process connection threads, dimensional data, etc.

Model	DPG 1030
Supply	battery
Measuring ranges: accuracy	2.5 to 1000 bar: 0.1 % FS (optional 0.05 % FS) 1600 to 3000 bar: 0.25 % FS (optional 0.1 % FS)
Type of pressure	gauge / absolute
Wetted parts	1.4542, 1.4548
Bargraph indication	✓
Sensor temp. indication	✓
Pressure units	32 (⇨ chapter 8.7.1)
Temperature units	°C, °F
Degree of protection (DIN EN 60529)	IP65
Adjustable damping	✓
Data sheet	9643

5. Installation

Prior to mounting, please check the following aspects:
- Are the goods undamaged and complete?
- Do the goods match the shipping documents?
- Is the instrument suitable for the case of application?
- Is the maximum possible process pressure within the measuring range of the device to be installed?
- Does the process connection comply with the requirements?
- Pay attention to adequate protection against weather.
- Avoid direct sunlight.
- Avoid proximity to heat sources.
- Note the degree of protection according to DIN EN 60529 (⇨ chapter 4 “Technical Data”)
- Operation and control shall only be carried out by authorised personnel.
- Take appropriate precautions to protect the device from damage.

IMPORTANT! Mounting and dismounting of the device shall only be carried out in an unpressurised state!

5.1 Mechanical Connection

The mechanical connection of the digital pressure gauge is carried out according to the general technical rules for the selected connection type.
The process connection for digital pressure gauges of the LILLYpress21 type series can be selected from a wide range of optionally available connections. This variety is limited by the maximum permissible pressure load capability of the threads in accordance with DIN EN 837 and DIN 16001.

Please regard the maximum permissible pressure load capability when selecting the process connection!

For gauge pressure measurement, please tare the device according to chapter 8.3 before installation.
When screwing in the digital pressure gauge, do not exert any force on the case, plug connector, etc.! Apply the required tightening torque only via the spanner flat of the process connection provided for this purpose!
The sealing surfaces and threads of the process connections have to be clean and undamaged!

For sealing the process with cylindrical screw fittings (e.g. G½"), gaskets made of appropriate material must be used. Conical screw fittings (e.g. ½" NPT) seal in the thread due to their cone-shaped geometry – if necessary by using additional appropriate sealants, e.g. PTFE tape.
Sealing material has to be replaced after being dismounted.

5.2 Alignment

After mounting, carefully align the front panel by rotating the housing relative to the process connection. If you encounter a noticeable, hard resistance when turning the device, align it in the opposite direction. The process connection can be rotated approx. 280° relative to the device.

5.3 Before Commissioning

The instruments are supplied with an insulating disc in the battery compartment. Please remove it prior to commissioning!

5.4 Indication of the Battery Status, Battery Status LOW_BATT and Battery Replacement

The digital pressure gauge models LILLYpress21 are maintenance-free. The DPG 1030 is powered by a lithium battery type AA with 3.6 V / 2600 mAh. The battery level can be read from the bars in the battery symbol. As soon as `Error: Low Battery` appears in the display, it is absolutely necessary to replace the battery.

Observe polarity according to nameplate!

To change the battery, unscrew the lid of the battery compartment, replace the battery and screw on the lid again (+ pole pointing towards the screw plug).
Please follow the disposal guidelines for lithium batteries (⇨ chapter 12 “Dismounting and Disposal”).

When you remove the battery, date and time settings will be reset to 01.01.2020 00:00.

5.5 Battery Life

The battery life depends primarily on the set measuring rate `Samplerate`. Furthermore, the set `Damping` and the duty cycle of the device have an effect on it. If the device is in standby mode (no indication) and is never switched on, the battery life is approx. 7.5 years.

The following table shows how the measuring rate affects the battery life at a duty cycle of 100 % (`Sleeptimer=off`) and at a duty cycle of 8 h a day (all values apply when damping is switched-off `Damping=Off`):

Sample rate	Battery life [1]	
	Duty cycle 100 %	Duty cycle 33 % (8 h a day)
125 ms	1600 h / 67 days	4800 h / 200 days
200 ms	2350 h / 98 days	7050 h / 294 days
250 ms	2800 h / 116 days	8400 h / 350 days
⅓ s	3450 h / 143 days	10350 h / 431 days
0.5 s	4450 h / 185 days	13350 h / 556 days
1 s	6300 h / 262 days	18900 h / 788 days

Table 1: measuring rate and battery life

With the damping set, the following values must be subtracted from the battery life specified in table 1:

Damping	Reduction of the battery life
Low	–0.5 days
Medium	–1.5 days
High	–3.5 days
Maximum	–7.5 days

Table 2: influence of the damping on the battery life

6. Measured Value Display

The standard mode of the device is the measured value display. The device starts in this mode and automatically returns to this mode from all states (menus, memory displays, error messages, etc.) after 30 sec.

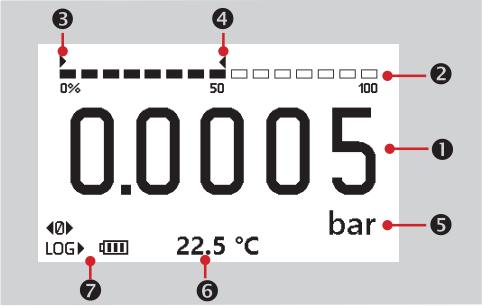


Figure 6.1: elements of the measuring mode

❶ Pressure indication
shows the applied pressure with up to 5 digits

❷ Bargraph pressure (0 – 100 %)
shows the applied pressure as bars

❸ Minimum drag indicator ▶
shows the position of the lowest measured pressure on the bargraph
can be reset with the function `Reset Min / Max Mem.` (⇨ chapter 8.2.1)

❹ Maximum drag indicator ◀
shows the position of the highest measured pressure on the bargraph
can be reset with the function `Reset Min / Max Mem.` (⇨ chapter 8.2.1)

❺ Pressure unit
shows the selected pressure unit
can be set in the menu `Measurement Unit ⇨ Pressure` (⇨ chapter 8.7.1)

❻ Temperature indication
shows the temperature in the measuring cell
the unit can be set in the menu `Measurement Unit ⇨ Temperature` (⇨ chapter 8.7.2)

[1] All battery life specifications are approximate and refer to a lithium battery (Li-$SOCl_2$) with a capacity of 2600 mA/h (e.g. Saft LS14500). The actual service life depends on other factors such as ambient temperature or storage time (self-discharge) of the battery prior to its use.

❼ Status indicators
symbols representing various operating states are displayed here

1 Battery status
the symbol shows the battery status

2 Zero
the symbol `Zero` shows, whether the device was tared
if the symbol is visible in the status area, the device has been tared (⇨ chapter 8.3)

3 Absolute pressure
if the device operates with an absolute pressure sensor, the symbol abs is shown in the status area (⇨ chapter 8.3)

4 Data logger status
if the data logger is active and is recording data, the following symbol appears in the status area:
LOG ▶

if the data logger is inactive, the following symbol appears in the status area:
LOG ❚❚

7. Min. / Max. Peak Indication

The device always stores the highest measured value in the maximum peak memory and the lowest measured value in the minimum peak memory.

If you press the button UP MAX during the measuring mode, the current value of the maximum peak memory is displayed. If you press the button DOWN MIN, the current value of the minimum peak memory is displayed.

If you press the entry `Reset Min/Max Mem.` in the menu `Memory`, both values are overwritten with the current measured value (⇨ chapter 8.2.1).

8. Menu

8.1 General Information

8.1.2 Main Menu

Press the button MENU in the measuring mode to access the main menu. It contains the following entries:

`Memory`	(⇨ chapter 8.2)
`Zero`	(⇨ chapter 8.3)
`Samplerate`	(⇨ chapter 8.4)
`Damping`	(⇨ chapter 8.5)
`Sleeptimer`	(⇨ chapter 8.6)
`Measurement Unit`	(⇨ chapter 8.7)
`Decimal Place`	(⇨ chapter 8.8)
`Miscellaneous`	(⇨ chapter 8.9)
`Info`	(⇨ chapter 8.10)
`Exit`	(return to measuring mode)

The functions are described below (⇨ chapter 8.2ff.)

8.1.2 Operating the Menus

You can scroll through the menu items with the buttons UP MAX and DOWN MIN.
The currently selected menu item is highlighted by an arrow ▶.
By pressing the button MENU, you access the corresponding submenu or you select a preset.

In menus where a preset can be made, e.g. in the menu `Samplerate`, the currently set value is highlighted by a checkmark ✓.

The last entry in each menu is `Exit`, which can be used to return to the measuring mode. If no button is pressed in the menu for 30 sec, the programme automatically returns to the measuring mode.

The menus are scrollable, i.e. when you have reached the last entry of the menu and press the button DOWN MIN again, you will return to the first entry of the menu. If you are on the first entry of the menu and press the button UP MAX, you return to `Exit`, the last entry of the menu.

8.1.3 Operating the Editors

When creating a password, setting the time or configuring the user-specific unit, you must enter freely definable numerical values, character strings or times. For this purpose, the program contains editors that are all used in the same way.

When selecting one of the editors, the first digit of the value is selected (⇨ fig. 8.1). The selected digit is highlighted by inverted characters and can be changed with the buttons UP MAX and DOWN MIN, as described in the instructions for user guidance in the display. Press the button MENU to select the next digit. If the editor is at the last position and you press the button MENU again, no digit is selected any more and the instructions for user guidance have changed (⇨ fig. 8.2). At this point, the editor jumps back to the first digit when you press the `return` button MENU, the editor saves the value when you press the `save` button UP MAX, or the editor cancels the action when you press the `Exit` button DOWN MIN. If you accidentally call up the editor, you first have to scroll through all the digits in order to cancel the action.

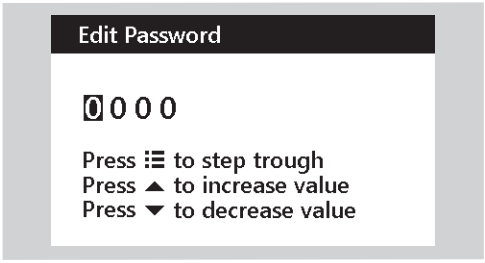


Figure 8.1: password editor after call up (digit 1 selected)

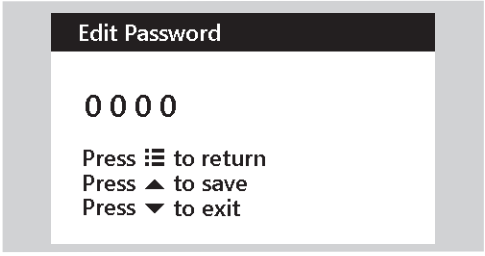


Figure 8.2: password editor after scrolling through all digits

8.2 `Memory`

8.2.1 `Reset Min/Max Mem.`

If you press the button MENU while the menu item is selected, the minimum and maximum value memory is set to the current measured value. At the same time, the drag indicator is reset.

If you want to get a quick overview of the range in which the pressure has moved in a certain period of time, use this function to reset the drag indicator at the beginning. At the end of the time frame, you can see the range in which the pressure has moved at a glance by looking at the positions of the minimum and maximum drag indicators.

8.2.2 `Start/Stop Logger`

(Only included for instruments with data logger!)

This function starts or stops (toggle function) the internal data logger (data recording).

If data logging is not active, the menu item is `Start Logger` and if data logging is active, the menu item is `Stop Logger`. Each time you stop a data recording and start it again, the device asks whether you want to append the new measurement data or whether the old measurement data should be overwritten (`Erase old data or append?`).
If you select `append`, a new file will be created in the memory. You can create a total of 16 files, i.e. you can interrupt the data recording 16 times before old data must necessarily be overwritten.

If you adjust parameters crucial for data logging, such as the time or the storage rate `Log Interval`, you have to interrupt the data logging.
If you try to adjust these parameters during a data logging process, you will receive the error message `Logging in progress`.

The device can record a total of 86400 measured values. This number is equivalent to the number of seconds per day. This makes it possible to quickly determine over what time period you can run a data logging session. With a set storage rate of 1 second you can log for 24 hours, with ½ second for 12 hours, with ⅓ second for 8 hours, etc. (⇨ chapter 9).

8.2.3 Show Log History

(Only included for instruments with data logger!)

With this function, you can display the stored measurement data as curve chart. Use the buttons UP MAX and DOWN MIN to choose between the available files.

For technical reasons, it is not possible to record data during the computationally intensive curve display of the measurement data. Therefore, you will receive the error message `Logging in progress` if you try to call up this function during data recording. Stop the data recording before calling up this function.

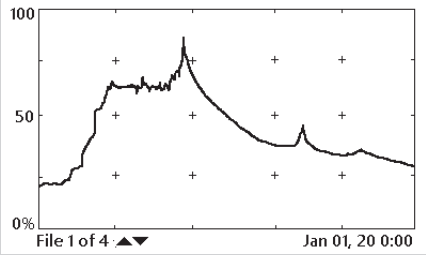


Figure 8.3: example of a data recording display

8.2.4 HiSpeed Logging

(Only included for instruments with data logger!)

If you want to record particularly fast pressure curves that require logging rates faster than 125 ms, you can use the high-speed logging function.
This functions in the same way as the normal data logging, with the exception that measurement data can no longer be displayed in this mode and the menus are also no longer accessible. The only action the unit will allow in this mode is pressing the button MENU to stop the high-speed logging function. The following screen appears in this mode:

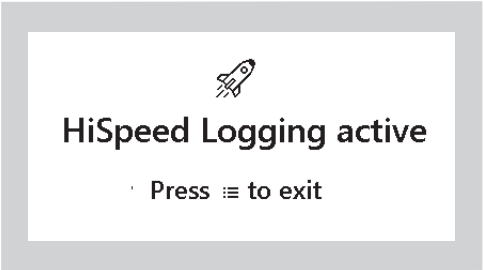


Figure 8.4: screen `HiSpeed Logging`

Start the high-speed logging by selecting the menu item `Start Speedlogging` in the menu `HiSpeed Logging`.

You can select the storage rate for high-speed logging in the same menu with the function `Speed Interval`. The following storage rates are available:
`10 ms`
`25 ms`
`50 ms`
`75 ms`
`100 ms`

(⇨ chapter 9 “Operating Modes, Maximum Logging Time and Damping").

The logged data can be viewed just like the normal data recordings with `Show Log History` or read with the PC software.

8.2.5 Log Interval

(Only included for instruments with data logger!)

In this menu, you can select the storage rate for the data logger. The following settings are available:

```
Use Samplerate
1 s
2 s
3 s
4 s
5 s
10 s
15 s
20 s
30 s
45 s
1 min
1,5 min
2 min
2,5 min
```

If you select the entry `Use Samplerate`, the set measuring rate is used for logging (⇨ chapters 8.4 and 9).

8.2.6 Erase Log Mem.

(Only included for instruments with data logger!)

In this menu, you can delete the entire data memory if you confirm the query `Erase logger memory?` with the button UP MAX. By pressing the button DOWN MIN, you can cancel the action.

8.3 Zero

With the zeroing function, the currently measured value is subtracted as a permanent offset from future measured values. Typically, this function is used when the device does not indicate zero in the unpressurised state, but a low pressure value, e.g. due to fixing effects. The zeroing function can only be triggered if the indication is within ±10 % of the measuring span around the zero point. Otherwise, you will receive the error message `Zero out of range`.

Example:
With a measuring range from −1 to +1 bar (i.e. a span of 2 bar), the device can only be zeroed if the indication is in a range from −0.2 to +0.2 bar. If the device is tared at +0.03 bar, for example, the value 0.03 is subtracted from all subsequent measured values.

Zeroing is triggered when you select the menu item `Set Zero` in the menu `Zero`. A reset (i.e. the zeroing value is set to 0) is done by pressing the menu item `Reset Zero`. If the zeroing value is not 0, the zero symbol ◀0▶ appears in the measuring mode.

The currently set zeroing value can be displayed on page two of the information menu `Info`, under the entry `Tare Value` (⇨ chapter 8.10).

Zeroing in the absolute pressure mode
If you zero an absolute pressure gauge, the absolute pressure symbol abs disappears from the status indication and is replaced by the zero symbol ◀0▶.

The device then operates as a gauge pressure measuring device, based on the atmospheric pressure that was present at the device during zeroing.

Zeroing of absolute pressure measuring instruments can only be carried out at atmospheric pressures between 1070 mbar (approx. −450 m ASL) and 600 mbar (approx. 4000 m ASL).

8.4 Samplerate

In this menu, you can set how often the device shall measure and update the indication. If you have set the data logger storage rate `Log Interval` to the value `Use Samplerate` (⇨ chapter 8.2.5), then this setting also applies to the data logger storage rate. You can choose between the following settings:

```
125 ms
200 ms
250 ms
1/3 s
0,5 s
1 s
```

(⇨ chapter 9 “Operating Modes, Maximum Logging Time and Damping").

8.5 Damping

In case of highly fluctuating pressure values, it may be useful to activate the damping function. Here, the indication is calmed down by averaging an adjustable number of measured values:

`Off`	no damping
`Low`	mean of 2 measured values
`Medium`	mean of 4 measured values
`High`	mean of 8 measured values
`Maximum`	mean of 16 measured values

(⇨ chapter 9 “Operating Modes, Maximum Logging Time and Damping").

8.6 Sleeptimer

Here, you can set the time after which the device switches into the power-saving standby mode if there is no interaction (keystroke or interface activity). In this mode, the device typically consumes only approx. 28 µA.

You can choose between the following values:

```
Off
15 s
30 s
1 Min
2 Min
5 Min
10 Min
15 Min
30 Min
60 Min
2 h
4 h
8 h
12 h
```

8.7 Measurement Unit

In this menu, you can set the units for pressure and temperature measurement, configure a user-defined unit, or configure a force measurement using the piston force assistant. The menu contains the following entries:

```
Pressure
Temperature
Setup User Unit
Piston Force Assistant
```

8.7.1 Pressure

The pressure unit menu contains the following entries:
bar
mbar
psi
kgf/cm²
Pa
hPa
kPa
MPa
mmH_2O
$mmH_2O(4°C)$
cmH_2O
$cmH_2O(4°C)$
mH_2O
$mH_2O(4°C)$
mmHg
mmHg(0°C)
cmHg
cmHg(0°C)
inH_2O
$inH_2O(39,2°F)$
$inH_2O(60°F)$
ftH_2O
$ftH_2O(39,2°F)$
inHg
inHg(32°F)
inHg(60°F)
ftHg
kp/cm²
lbf/ft²
lbf/in²
torr
atm
Userunit
Setup Userunit

Select one of the pressure units or select Userunit to choose a customised unit for the pressure indication. The customised unit can be configured under Setup Userunit.

If you select a unit, with which the measuring range of the device cannot be displayed, you will receive the message Unit unsuitable.

8.7.2 Temperature

The temperature unit menu contains the following entries:
Celsius
Fahrenheit
Off

Select Celsius or Fahrenheit as temperature unit, or select Off to deactivated the temperature indication.

8.7.3 Setup Userunit

This menu contains the following entries:
Symbol
Factor

With the function Symbol, you can set an 8-digit alphanumeric value that is displayed as unit in the measuring mode.

With the function Factor, you can enter a floating-point number, which is used as factor to calculate the displayed measured value in relation to the unit bar.

The operation of Factor and Symbol is described in chapter 8.1.3 “Operating the Editors”.

Example:
You want to create the user unit psi (pounds per square inch). 1 bar corresponds to 14.503774 psi. Enter this value under Factor. Then, enter the letters psi under Symbol. You would now have created the user unit psi (which is one of the pre-configured units and only serves as an example here).

8.7.4 Piston Force Assistant

With the piston force assistant, you can use the device to display the force that a circular piston exerts on a closed system. According to the formula $p = F / A$, the device determines the resulting force based on the pressure. For this, just enter the diameter of the piston or piston bore and select a unit of force. The device then calculates the piston area, configures the user-specific unit accordingly (⇨ chapter 8.7.3 “Setup User Unit”), and activates it automatically so that the device immediately displays the force after the assistant has finished. If you want to stop this display mode, select the desired pressure unit in the menu `Measurement Unit / Pressure` and the device will display the pressure as usual. If you want to change the force unit or the piston diameter subsequently, you have to rerun the assistant. In the menu `Setup User-unit`, you can check and adjust the determined factor and the unit.

8.7.4.1 Entering the Piston Diameter

The piston diameter **must be entered in mm**. Enter it using the same editor that is available for the factor of the user-defined unit (usage ⇨ chapter 8.1.3 “Operating the Editors”). After closing the editor with `Save`, the assistant automatically jumps to the menu for selecting a unit of force.

8.7.4.2 Selecting the Unit of Force

In the menu for the units of force, you can choose from the following units:

newtons	(N)
decinewtons	(daN)
kilonewtons	(kN)
tons	(t)
short tons	(tn)
pounds	(lb)
kilograms	(kg)
kiloponds	(kp)

8.8 Decimal Place

In this menu, you can set the number of decimal places, which are used for the indication of the measured value. The following settings are available:

00000	no decimal place
0000.0	1 decimal place
000.00	2 decimal places
00.000	3 decimal places
0.0000	4 decimal places

If measured values cannot be displayed on the 5-digit indication including all set decimal places, the device automatically shortens the number of decimal places. If the measured values return to displayable values, the device automatically increases the number of decimal places up to the set value.

Example:
Your measuring range is 0 – 1600 bar and you set three decimal places. In this case, the device will display the three decimal places up to 99.999 bar, only two decimal places up to 999.99 bar and only one above that. If the value falls below 10 bar, so that an indication with four decimal places would be possible, the device will still only display the set three decimal places.

8.9 Miscellaneous

8.9.1 Set Date/Time

(Only included for instruments with data logger!)

The device has an integrated real-time clock, which is used to assign the recorded measured values of the data logger to specific times.
In the menu Set Date/Time, you can set the date and time. The operation of the time editor is described in chapter 8.1.3 “Operating the Editors”.

It is not possible to set the time during a data logging process. Therefore, you will receive the error message Logging in progress if you try to call up Set Date/Time.

There is no automatic change between standard time and daylight saving time, since the times for the changes are stipulated differently all over the world.

IMPORTANT! If you remove the battery, the settings for time and date are lost and return to 01.01.2020 00:00.

The currently set time can be displayed on page one of the information menu Info (⇨ chapter 8.10 “Info”).

8.9.2 Set Password

In this menu, you can create a 4-digit numeric password that locks the access to the menus. If you do not want a password prompt, set 0000 as password (default setting ex works). As soon as you define a password other than 0000, a password prompt will appear after pressing the button MENU. If you have forgotten the password, define the password 0000 via PC software.

The operation of the password editor is described in chapter 8.1.3 “Operating the Editors”.

8.10 Info

In this menu, you can display various device information. The menu has up to three pages between which you can scroll using buttons UP MAX and DOWN MIN.

The following information is available:

Device Serial No.	serial number for the device
Sensor Serial No.	serial number for the sensor module
P_{min}	lower measuring range limit
P_{max}	upper measuring range limit
Date/Time	date and time
Memory used	used space of the data logger memory as percentage (⇨ chapter 8.2)
Fileslots used	number of data logger files used (⇨ chapter 8.2)
Samplerate	set sample rate (⇨ chapter 8.4)
Damping	set damping (⇨ chapter 8.5)
Tare Value	tare value, non-tared devices show 0 here (⇨ chapter 8.3)
Firmware Rev.	revision status of the device software
Hardware Rev.	revision status of the electronic system

9. Operating Modes, Maximum Logging Time and Damping

Operating mode	Sample rate, log interval	Measurements per time interval	Damping		Max. logging time	
			Device setting	Mean value from n measured values	Pressure	Pressure + temperature
High-speed logging only	10 ms	100 / s	OFF	–	14.4 min	7.2 min
	25 ms	40 / s			36 min	18 min
	50 ms	20 / s			1.2 h	36 min
	75 ms	13.3 / s			1.8 h	54 min
	100 ms	10 / s			2.4 h	1.2 h
Measuring and standard logging	125 ms	8 / s	OFF	–	3 h	1.5 h
	200 ms	5 / s	OFF LOW	– 2	4.8 h	2.4 h
	250 ms	4 / s	OFF LOW MEDIUM HIGH	– 2 4 8 16	6 h	3 h
	333 ms	3 / s	OFF LOW MEDIUM HIGH MAXIMUM	– 2 4 8 16	8 h	4 h
	0.5 s	2 / s			12 h	6 h
	1 s	1 / s			1 d	12 h
Standard logging only	2 s	30 / min			2 d	1 d
	3 s	20 / min			3 d	2 d
	4 s	15 / min			4 d	3 d
	5 s	12 / min			5 d	4 d
	10 s	6 / min			10 d	5 d
	15 s	4 / min			15 d	10 d
	20 s	3 / min			20 d	15 d
	30 s	2 / min			30 d	20 d
	45 s	1.33 / min			45 d	30 d
	1 min	1 / min			60 d	45 d
	1.5 min	40 / h			90 d	60 d
	2 min	30 / h			120 d	90 d
	2.5 min	24 / h			150 d	120 d

10. Software LillyLogg

Download the latest software version:

www.armano-messtechnik.de/software

Unpack the ZIP file and execute “LillyLoggSetup.exe”. If you want to install the interface drivers required for operation, tick the option “Install FTDI-USB Drivers” during the setup.

An operating manual for the software is available as a help file. Select “Help” in the main menu of the software.

11. 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:
- Our digital pressure gauges are maintenance-free, only the battery has to be replaced if necessary. To do so, unscrew the lid of the battery compartment, replace the battery and screw on the lid again.
- To assure the accuracy of measurement, we recommend checking and, if necessary, recalibrating the digital pressure gauges biennially. This can be carried out by the manufacturer or by qualified personnel.

Cleaning:
- Clean the device with suitable agents. Only use cleaning agents and cleaning tools that do not corrode or damage the components of the device (this especially applies to the nameplate).
- Devices that are cleaned with high pressure-, water- or steam jets require the degree of protection IP69K.

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 of the respective product.

Storage:
- If possible, store the instrument in its original packaging.
- 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:

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.

- Please use a suitable packaging for the transport (if possible, the original packaging) with adequate padding material.
- Do not throw the instruments even when packed.
- Protect the packed instruments from moisture.
- Provide relevant transportation instructions on the packaging.

12. 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.

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.

13. CE Conformity

CE

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 directive applies:

EMC directive 2014/30/EU

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

We hereby declare for the following named goods

DIGITALMANOMETER
Typ DPG 300 **gemäß Datenblatt 9661**

DIGITAL PRESSURE GAUGE
Model DPG 300 ***according to data sheet 9661***

DIGITALMANOMETER
Typ DPG 400 **gemäß Datenblatt 9662**

DIGITAL PRESSURE GAUGE
Model DPG 400 ***according to data sheet 9662***

PRÄZISIONS-DIGITALMANOMETER
Typ DPG 1030 **gemäß Datenblatt 9643**

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

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

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

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

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

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).

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

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

DIN EN 61326-1:2022-11

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

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

Druckgeräterichtlinie (2014/68/EU).

Pressure Equipment Directive (2014/68/EU).

Diese Geräte werden nach geltender guter Ingenieurpraxis ausgelegt und gefertigt.
Mit Messbereichen ab 0 – 200 bar wurden sie folgendem Konformitätsbewertungsverfahren unterzogen:

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:

Modul A „Interne Fertigungskontrolle"

Module A "Internal Production Control"

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

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

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*

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