ePG

Electric Pressure Pump and Controller

Dear user,

We have made every effort to ensure the accuracy of the contents of this manual. Should any errors be detected, we would greatly appreciate to receive suggestions to improve the quality of the contents of this manual.

For more detailed technical data about Beamex ePG Electric Pressure Pump and Controller, please contact the manufacturer.

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8805000 / ePGuEng / Version 3.0a

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Prologue

Thank you for buying Beamex ePG Electric Pressure Pump and Controller.

Beamex ePG is a portable, hand-held, battery-powered device that is used to generate reference pressure in pressure calibration applications. With ePG you can generate pressure between -0.85 to 20 bar / -12.4 to 300 psi. Since the device does not have a display to indicate the generated pressure reading, it must be connected to an external pressure device with an appropriate display, e.g. Beamex pressure calibrator or a pressure indicator. ePG contains a lithium-ion Battery Pack that can be charged using a USB Type-C charger either separately or while attached to the device (see chapter Battery Pack).

Typographical Conventions

The following typographical conventions apply to the ePG User Manual:

Bold text is used in following situations:

- References to User Manual topics and parts
- ePG keywords, i.e. terms shown in the User Interface

Note: This is a note. Notes typically inform you of something useful concerning the current topic.

Caution: This is a caution. Whenever you see a caution, read it carefully and take it seriously. By not observing cautions, you may damage the pump.

Warning: This is a warning. Whenever you see a warning, read it carefully and take it seriously. By not observing warnings, you may -at worst- damage the pump and/or get personal injury.

Unpacking and Inspection

At the factory, each new ePG passes a careful inspection. It should be free of scrapes and scratches and in proper operating condition upon receipt. The receiver should, however, inspect the unit for any damage that may have occurred during transportation. If there are signs of obvious mechanical damage, the package contents are incomplete, or ePG does not operate

according to the specifications, contact the purchasing sales office as soon as possible.

If you have to return the device to the factory for any reason, use the original packing whenever possible (see chapter Service and transportation instructions). Include a detailed description of the reason for the return.

The standard delivery includes:

- ePG Electric Pressure Pump and Controller, with hand and shoulder straps installed
- Battery pack, Li-ion, installed
- USB Type-C charger with a country-specific mains plug
- USB Type-A to Type-C communication cable
- 40 bar / 580 psi pressure T-hose set 1.5 m / 59"
- Pressure plug set Bx G1/8" male and female for 40 bar / 580 psi hoses
- USB Type-C dust covers (5 pcs)
- User manual
- all items are packed in a hard case

Options, Accessories and Spare Parts

All accessories and spare parts are available at https://shop.beamex.com/.

Feedback

We want to improve our products and services constantly. Therefore we'd like to know your opinion of the product you use. Please spend a moment of your valuable time by giving us feedback about the product.

Address:	**Beamex Oy Ab**
	Quality Feedback
	Ristisuonraitti 10
	FIN-68600 Pietarsaari
	FINLAND
E-mail:	support@beamex.com
Website:	https://www.beamex.com

Safety

Approvals

All available approvals and the Declaration of Conformity can be downloaded from https://www.beamex.com.

Symbols Used on the device

	Caution! Please read the manual for further information

Safety Precautions and Warnings

Caution: Read and fully understand this manual and all other safety instructions before operating this Electric Pressure Pump and Controller.

Warning: Only personnel with good experience and knowledge of pressure media, pressure instruments and connections are allowed to work with ePG. Incorrect use may result in damage to the device, the instrument connected to it and/or personal injury.

Warning: Only use the device for purposes and only in environments specified in the user manual.

Caution: Do not exceed the maximum operating pressure of the device and the hose.

Warning: Use only the pressure measurement T-hose delivered by Beamex, marked with "Max. 40 bar / 580 psi". Other hoses may not withstand the pressure generated by ePG.

Warning: Wear protective glasses.

Warning: Do not connect the device to an external pressure source.

Warning: Process instruments may contain moisture and dirt which may enter the ePG and block the pressure channels or cause serious corrosion problem inside the ePG. Therefore, it is extremely important to vent the external systems (and flush them if needed) before connecting them to the ePG. Beamex Vent valve for 40 bar / 580 psi pressure hoses can be used to vent the system.

Warning: Ensure that all connections are made correctly and the hose and the connectors are not damaged. Do not use faulty hoses or connectors.

Warning: Use only the connector provided with ePG. Impurities from wrong materials may block the device.

Warning: Do not use Teflon (PTFE) tape to seal anything in the device.

Warning: Do not use the ePG in any other way than as described in this manual.

General Warnings Concerning Pressure Measurement

Warning: Always depressurize the system before opening or connecting any pressure fittings or connectors. Use proper valves for venting the system. Ensure that all connections are made correctly and that the hose and the connectors are intact.

Warning: Never exceed the maximum pressure of the connected devices. The maximum pressure of Beamex modules is stated on the module's sticker.

Warning: Never block a hose opening with your hands or put hands in front of a gas spray coming from a leakage. A gas bubble in the blood circulation can cause death.

Warning: Do not use the same tubing with different liquids or gases.

Specifications

Table 1: Specifications

SPECIFICATION	ePG
Pressure Range[1]	-0.85 to 20 bar / -12.4 to 300 psi [1] Valid at nominal barometric pressure of 1,013 mbar abs /14.7 psi abs
Pressure Generation Time[2] from 0 to 20 bar / 300 psi from 0 to -0.85 bar / -12.33 psi	 < 110 s < 45 s [2] into a volume max. 20 ml / 0.68 fl.oz.
Setpoint Adjustability[3] from 0 to 20 bar / 300 psi from 0 to -0.85 bar / -12.33 psi	 < 10 mbar / < 0.15 psi < 5 mbar / < 0.07 psi [3] into a volume 20 ml / 0.68 fl.oz.
Wetted Parts	Aluminum, brass, stainless steel, NBR, FKM, PEEK, PA, MS, TPE, food grade lubricants
Dimensions	See technical drawing: Figure 1: Technical drawing.
Weight	~ 2.3 kg / ~ 5 lb
Pressure Connection	The ePG output connection consist of a pressure port with a standard G1/8" (ISO228/1) female thread and a pre-installed Bx G1/8" male fitting for Beamex 40 bar (580 psi) hoses

SPECIFICATION	ePG
Filter Elements	A filter element (36 micron) included in the pressure port
Pressure Media	Clean, dry, non-corrosive gases
Battery Pack	Li-ion battery pack with a USB Type-C connector, 14.4V, at least 2,600 mAh
Charger (minimum requirements)	USB Type-C charger PD 2.0/3.0 Profile 4 20V / 2.25A / 45W
Storage Temperature	-20 to 60 °C / -4 to 140 °F
Operating Temperature	0 to 50 °C / 32 to 122 °F
Humidity from 0 to 40 °C / 32 to 104 °F from 40 °C to 50 °C / 104 to 122 °F	 ≤ 90 %RH ≤ 50 %RH[4] [4] ePG will work at higher humidity, but its performance may drop

All specifications are subject to change without notice. For the updated technical information, please check Beamex website.

Note: If the device has been stored in a different environment it should be stabilized to the new environment before use.

Note: Please notice that these specifications apply at sea-level.

Note: Please notice that the generated pressure is limited to 20.7 bar / 300.2 psi.

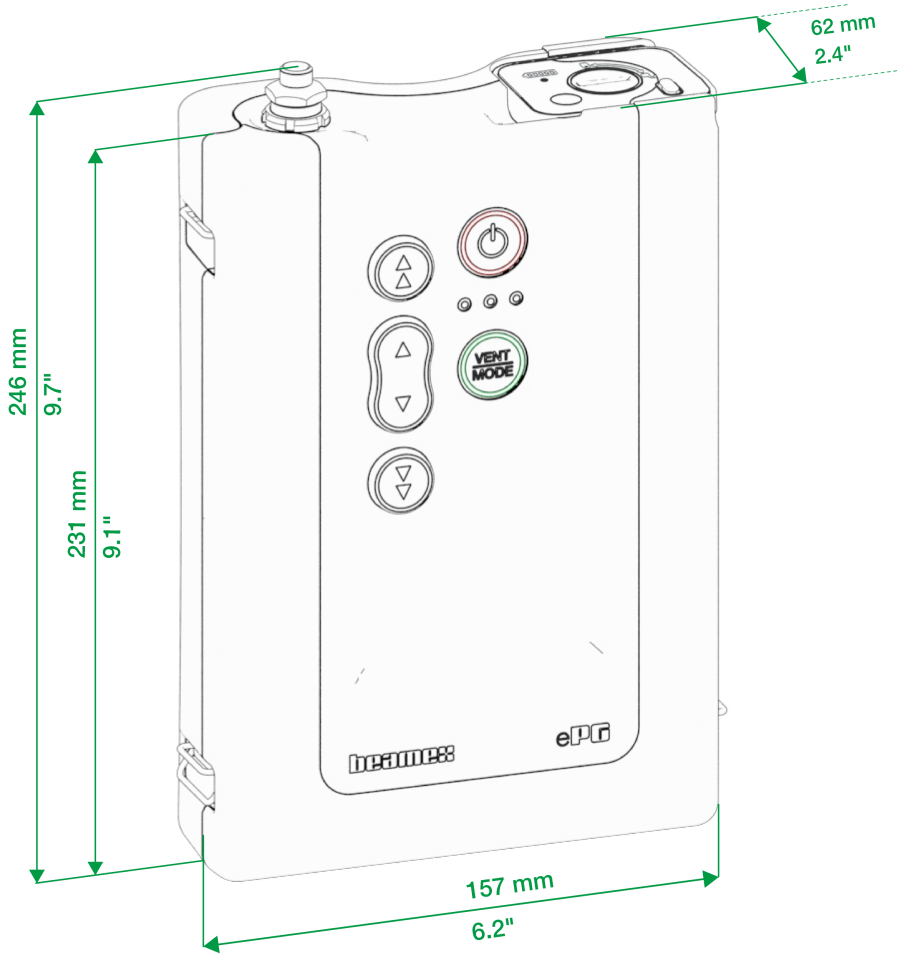


Figure 1: Technical drawing

About ePG

General description

Figure 2: Overview presents a general view of the ePG, its parts and its buttons' functionality.

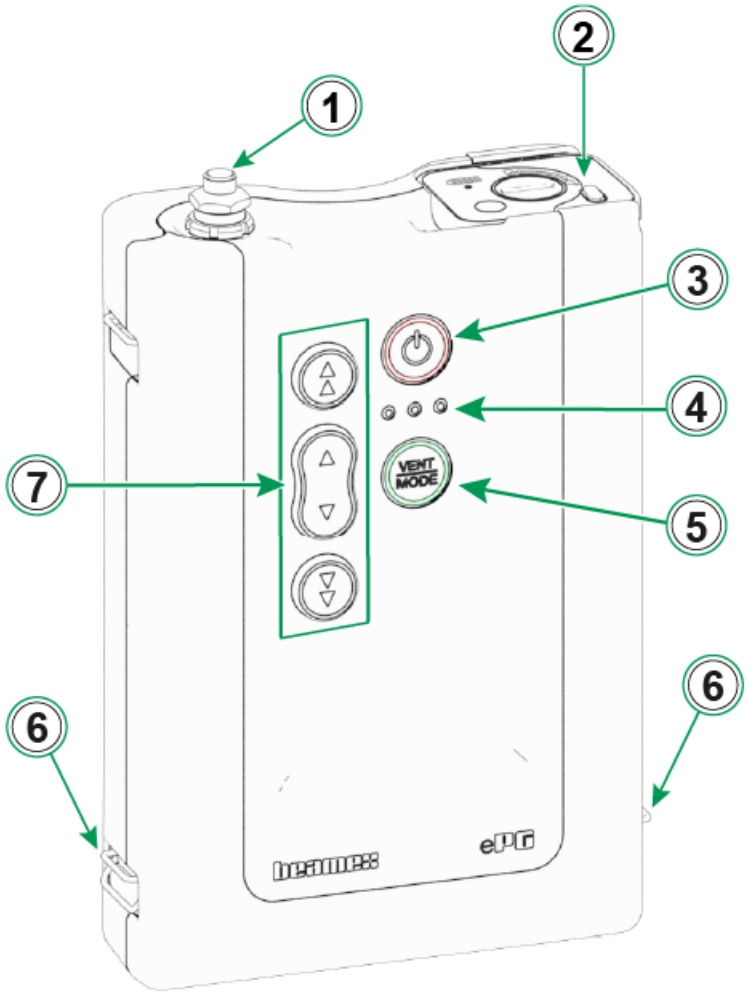


Figure 2: Overview

Legend:

1. Pressure Output Connection
2. Lithium-ion Battery Pack

3. Power button
4. LED indicators:
   - Yellow blinking / On = Warning
   - Green blinking = Busy/Wait
   - Green On = Ready
   - Blue reserved for future expansion
5. Vent/Mode button
6. Shoulder Strap hook
7. Operation buttons for pressure/vacuum generation

Top view

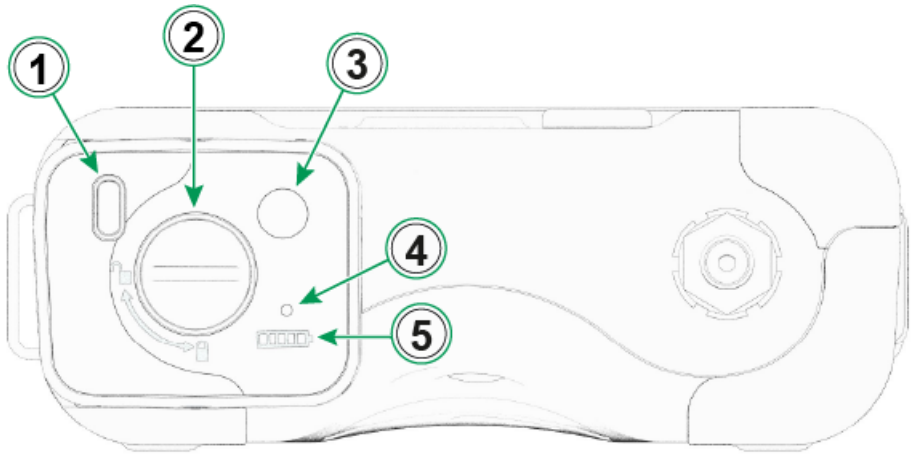


Figure 3: ePG, top view

Legend:

1. USB-C port, for charging the Battery Pack and for firmware updates
2. Locking mechanism, when locked, prevents the Battery Pack from falling out
3. When pressed, the number of LEDs in the Battery indicator shows the battery status
4. The green LED lits when the Battery Pack is connected to a suitable charger
5. Battery indicator

Battery Pack

The battery provides a long operation time and can be quickly charged. You can also charge a spare battery separately, and replace in the field when needed.

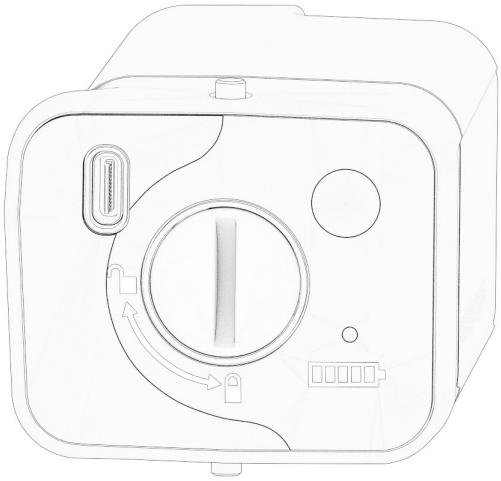


Figure 4: Battery Pack locked

When the slot is in a vertical position the Battery Pack is locked.

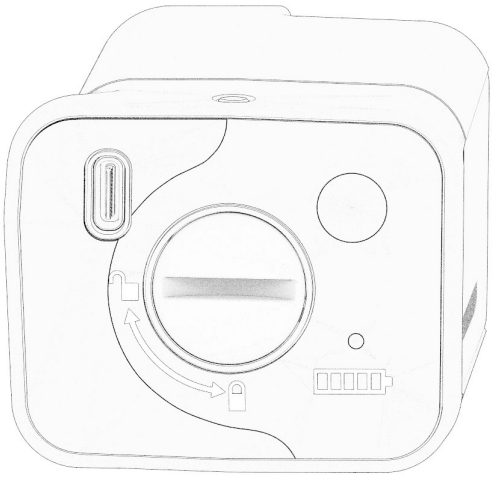


Figure 5: Battery Pack unlocked

To unlock the Battery Pack, turn the slot right (in horizontal position).

Note: You can use a screwdriver, a washer or even a coin to lock/unlock the Battery Pack. Push the Battery Pack gently inside to make the locking mechanism move easily.

Note: Always lock the Battery Pack to prevent it from falling out when it is installed in the device.

When the temperature is under or over the limits (other than 0 °C to 45 °C / 32 °F to 113 °F) the Battery Pack cannot be charged. Additionally, if the internal temperature is over 60 °C / 140 °F, the ePG stops working automatically as a precaution until the temperature is within the limits again.

Note: Please notice that upon the delivery the battery might not be fully charged. In that case, charge the battery before the first use for at least 4 hours.

Note: Please notice that the ePG vents and turns itself automatically off when in has been unused for 60 min or when there is only a few percent charge remaining in the Battery Pack.

Operating instructions

Setting Up

1. Connect one of the three ends of the T-pressure hose to the ePG's output connection.
2. Connect one of the remaining open ends to the calibrator's/pressure measuring device's input connection.
3. Connect the last open end to DUT's* input connector.

   *DUT = Device Under Test
4. Start generating pressure/vacuum with your ePG.

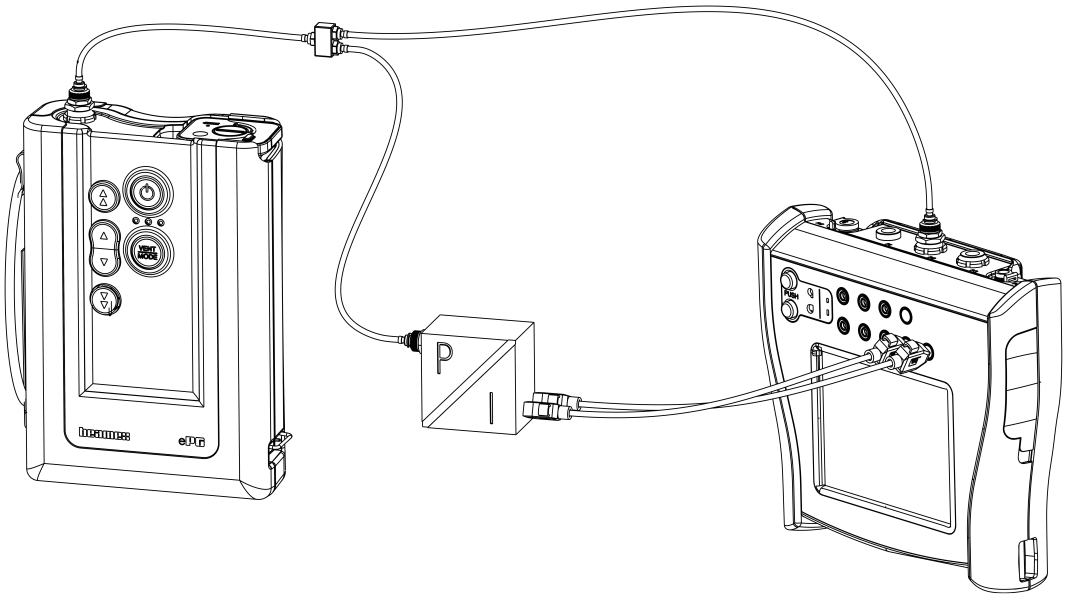


Figure 6: ePG connected to the MC6 and DUT

User Interface and Functionality

You can operate the ePG by pressing the buttons on the device.

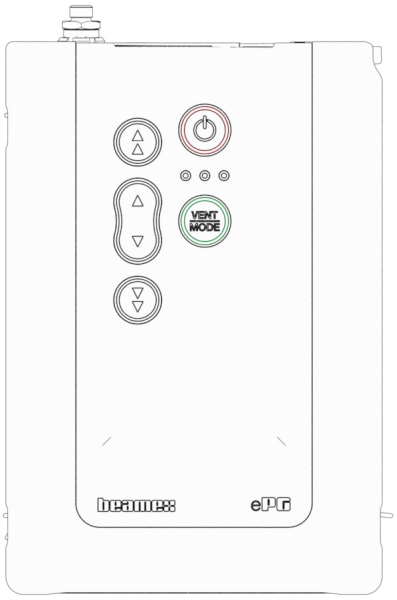


Figure 7: Buttons on the device

Figure 8: Power button

The ePG is powered-on by pressing the Power button. This is indicated by Power button lighting up.

When powered-on, the device goes automatically into the vent mode. This is indicated by green LED blinking. After ca. 30 seconds the green LED lights up and ePG is ready to generate pressure or vacuum. During venting, the calibrator's pressure module can be zeroed.

Venting can also be interrupted after minimum ~3 seconds venting time by pressing the Vent/Mode button again (or any other button) during the vent mode.

ePG is powered-off by pressing the Power button. The device automatically vents before switching itself off.

Figure 9: Vent/Mode button

Vent/Mode button is used to vent the ePG or change the mode from pressure to vacuum and vice versa. When pressed, the ePG goes into the vent mode which is indicated by the green LED blinking.

If needed, venting can be interrupted by pressing the Vent/Mode button again. Otherwise after ca. 30 seconds the venting ends and the green LED lights up to indicate that the ePG is ready to generate pressure or vacuum.

Figure 10: Coarse Adjustment Up button

Coarse Adjustment Up button is used to generate pressure in bigger steps or at maximum speed. The button can be either clicked or pressed and held.

When it is clicked, the ePG generates pressure in bigger steps (~ 100 to 200 mbar / 1.45 to 2.90 psi per step). When it is pressed and held, the output pressure increases as fast as possible. Notice, that when the generated pressure is < 2 bar / 29 psi, the pumping speed is limited to prevent possible overshoots. When the pressure reaches 2 bar / 29 psi, the pump accelerates to the maximum speed.

When desired setpoint is getting closer, release the button ~ 0.1 to 0.2 bar / 1.45 to 2.90 psi before the setpoint is reached. After releasing, the output pressure stabilizes after a short waiting time.

Coarse Adjustment Up button can also be locked by pressing and holding it and pressing the Fine Adjustment Up button at the same time. Locking is indicated by the Coarse Adjustment Up button lighting up. After locking you can lift your fingers off the buttons.

Locking can be released by pressing any of the operation (arrow) buttons. The ePG then holds the generated pressure and waits for further instructions. Please notice, that if the Power or Vent/Mode button is pressed, the device either switches itself off or vents itself.

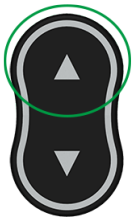


Figure 11: Fine Adjustment Up button

Fine Adjustment Up button is used to generate pressure slowly, so that it can be fine adjusted to the desired setpoint. This button can be either clicked or pressed and held. When you click the button, the output pressure changes in small steps. After releasing the button, the output pressure stabilizes after a short waiting time.

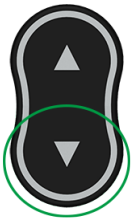


Figure 12: Fine Adjustment Down button

Fine Adjustment Down button is used to decrease pressure slowly, so that it can be fine adjusted to the desired setpoint. This button can be either clicked or pressed and held. When you click the button, the output pressure changes in small steps. After releasing the button, the output pressure stabilizes after a short waiting time.

Figure 13: Coarse Adjustment Down button

Coarse Adjustment Down button is used to decrease pressure in bigger steps or at maximum speed. The button can be either clicked or pressed and held.

When it is clicked, the ePG decreases pressure in bigger steps (~ 100 to 200 mbar / 1.45 to 2.90 psi per step). When it is pressed and held, the output pressure decreases as fast as possible.

When desired setpoint is getting closer, release the button before the setpoint is reached. After releasing, the output pressure stabilizes after a short waiting time.

Coarse Adjustment Down button can also be locked by pressing and holding it and pressing the Fine Adjustment Down button at the same time. Locking is indicated by the Coarse Adjustment Down button lighting up. After locking you can lift your fingers off the buttons.

Locking can be released by pressing any of the the arrow buttons. The ePG then holds the generated pressure and waits for further instructions. Please notice, that if the Power or Vent/Mode button is pressed to release the lock, the device either switches itself off or vents itself.

Using the ePG as a pressure controller together with an MC6 family calibrator

The ePG can communicate with Beamex MC6 family calibrators, making it possible to perform fully automatic pressure calibrations. Use the calibrator to provide a setpoint, and ePG can automatically control the pressure.

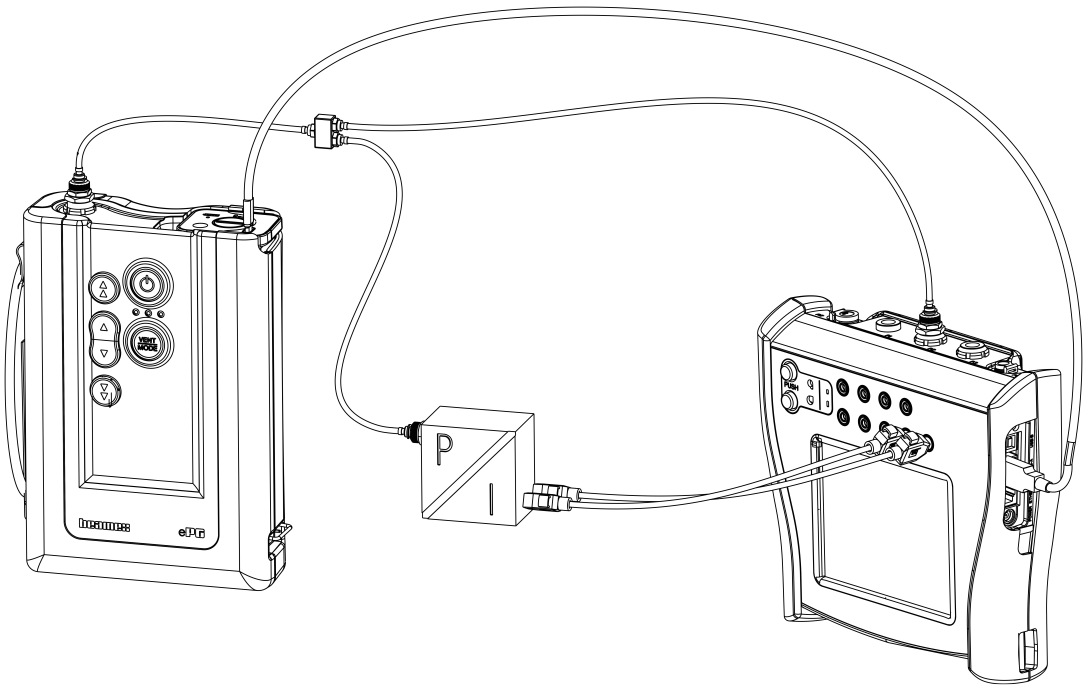


Figure 14: ePG and MC6 connected

Requirements for using the ePG as a pressure controller:

- MC6 family calibrator firmware version 4.30 or later
- *Pressure controller communication, ePG* option installed on MC6 family calibrator

> **Note:** Both the firmware version and installed options for the MC6 family calibrators can be checked in the calibrator's **Settings** > **About** window.

- ePG firmware version 2.00 or later. More info about the ePG firmware update can be found in the subchapter Firmware update instructions.

Enabling communication between an MC6 family calibrator and the ePG

The MC6 family calibrator does not automatically recognize your ePG. You need to configure the controller communication to pair the devices.

> **Note:** If you have more than one ePG, you can assign each ePG to a separate Controller Presets channel (maximum 4).

1. Connect an MC6 family calibrator to your ePG using a USB Type-A to Type-C communication cable.
2. Power both devices on (ePG will power itself on automatically when the USB cable is connected to the calibrator).
3. From MC6 **Home View**, open **Settings** > **Controller Presets**.
4. Set the following:
   - **Connection Inferface**: shows the connected ePGs with their serial numbers. Select the one you want to communicate with.
   - **Controller Type**: Beamex ePG
   - **Control Mode**: according to your needs (Shut off or Continuous, more info in chapter Settings/Controller Presets: Shut off vs. Continuous)
   - **Reference Module**: select the pressure module of the MC6 family calibrator that you want to use as a reference (can be any internal or external pressure module that is available). The ePG will not operate if there is no reference pressure module available.

Working with an MC6 family calibrator and the ePG

When an MC6 family calibrator is used to control the ePG, the reference pressure readings are taken from one of the MC6 family calibrator's internal or external pressure modules.

The selected reference pressure module range sets the available setpoint range for the ePG, however not in a way, that the setpoint range would become larger than the normal ePG range. Examples:

- With P6C, the ePG provides the lower setpoint limit (-0.85 bar / -12.4 psi) and the pressure module provides the upper limit (6 bar / 87 psi)
- With P60, the pressure module limits the lower setpoint limit to 0 bar and the ePG provides the upper limit (20 bar / 300 psi)

The selected reference pressure module will be used in all MC6 operational modes, with one exception: the selected Input Port/Function in Documenting Calibrator in *Controlled* mode will permanently override the setting in Controller Presets.

The selected reference pressure module along with the controller's name are visible on all the buttons and in all the dialogues, where the controller can be selected (see examples below).

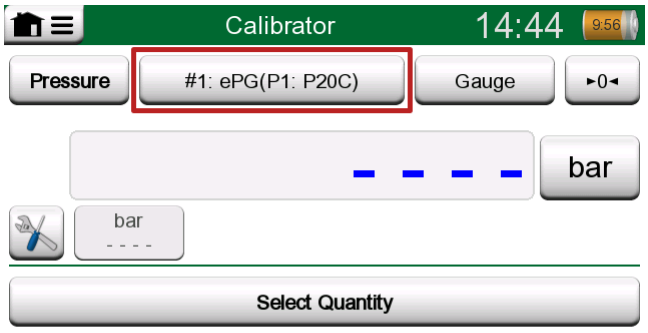


Figure 15: Example 1

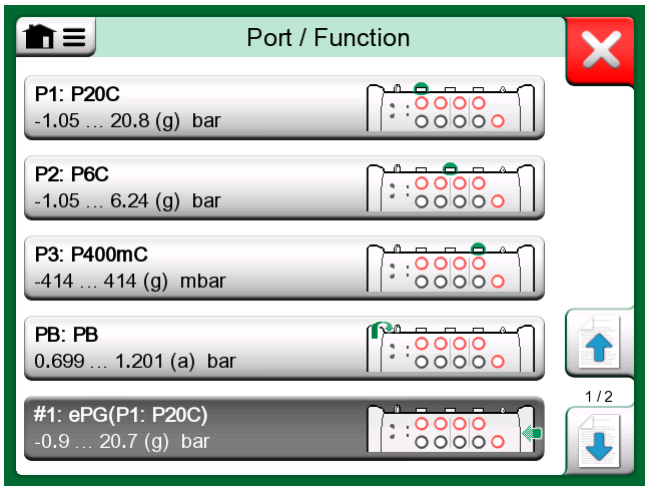


Figure 16: Example 2

Settings/Controller Presets: Shut off vs. Continuous

Global setting that is not available in Documenting Calibrator. If needed, change the settings before calibration.

Shut off

Shut off means that once the setpoint is reached, pressure adjustment stops. The ePG will not try to adjust the pressure even in case of an overshoot and the hysteresis will be preserved.

Continuous

Continuous means that pressure adjustment continues even after the setpoint is reached. This is useful for compensating small leaks and temperature expansion over a longer period.

When an MC6 family calibrator is controlling the ePG, all the push buttons on the ePG, except for the Power button, are disabled. When entering the **Home View**, the control is released and manual operation is possible (alternatively by removing the ePG from the measurement channel through selecting another function, e.g. other quantity or port, etc.).

Note: When the user returns to the **Home View**, the ePG will keep the pressure in the system by closing all the valves.

Venting and Zeroing

There are two different ways to vent the ePG with MC6 family calibrator. The ePG vents when you enter value 0 in the Gauge pressure mode. If no other setpoint is given, **Vent** leaves the valves open for 1 minute. This gives the user some time to zero the reference pressure module.

Warning: Process instruments may contain moisture and dirt which may enter the ePG and block the pressure channels or cause serious corrosion problem inside the ePG. Therefore, it is extremely important to vent the external systems (and flush them if needed) before connecting them to the ePG. Beamex Vent valve for 40 bar / 580 psi pressure hoses can be used to vent the system.

The other way of venting requires you to select and press the **Vent** button/menu (depending on the operational mode in use - see the examples below).

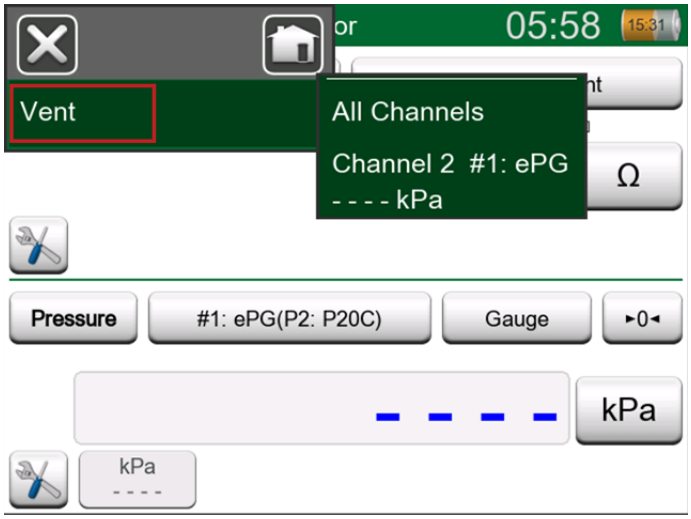


Figure 17: Vent menu - Calibrator mode

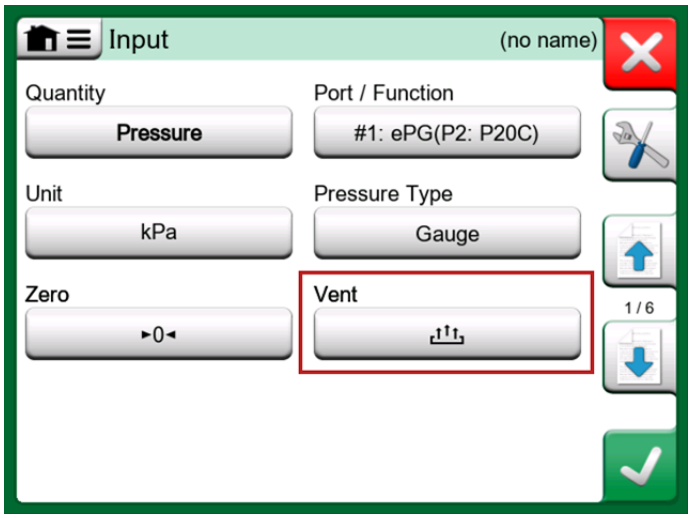


Figure 18: Vent button - Documenting Calibrator mode

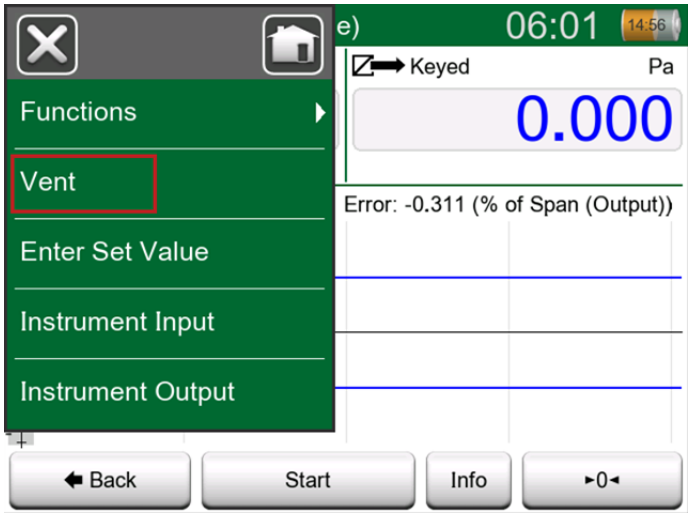


Figure 19: Vent menu - Documenting Calibrator mode

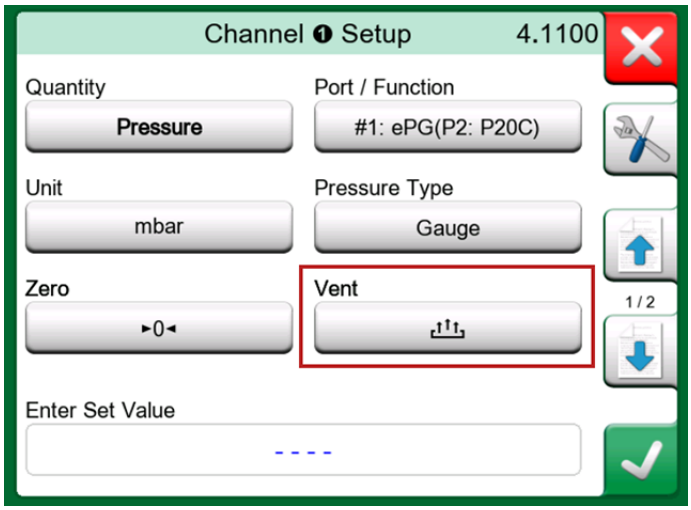


Figure 20: Vent button - Data Logger

Tip: Zeroing is important – a possible offset in the reference module can confuse the ePG controlling the pressure.

Zeroing is performed as follows:

- enter value 0 in the Gauge pressure mode to vent the ePG (the ePG keeps the valves open for 1 minute)
- allow the pressure to stabilize
- press the zeroing button on the MC6 display

Note: MC6 does not accept zeroing if there is pressure in the system.

Documenting Calibrator mode

In order for the references to be properly displayed on the calibration certificates, Documenting Calibrator mode settings have to be configured properly. When you create instruments in the MC6 family calibrator and plan to send the results to either CMX or LOGiCAL, create the instrument **Input** by following the example instruction below:

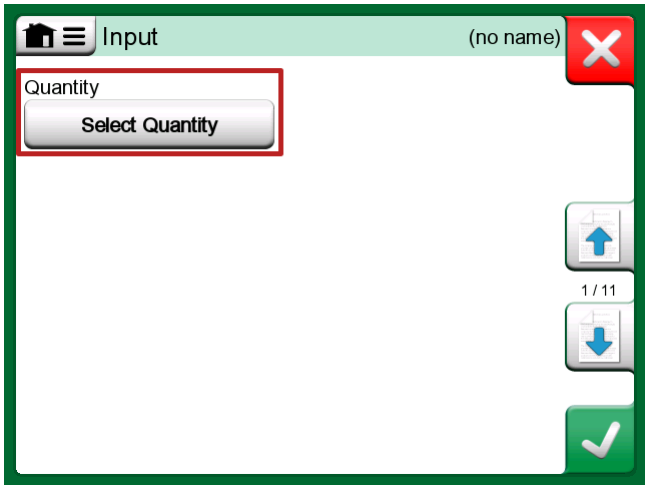


Figure 21: Step 1: Select the Quantity for the instrument Input

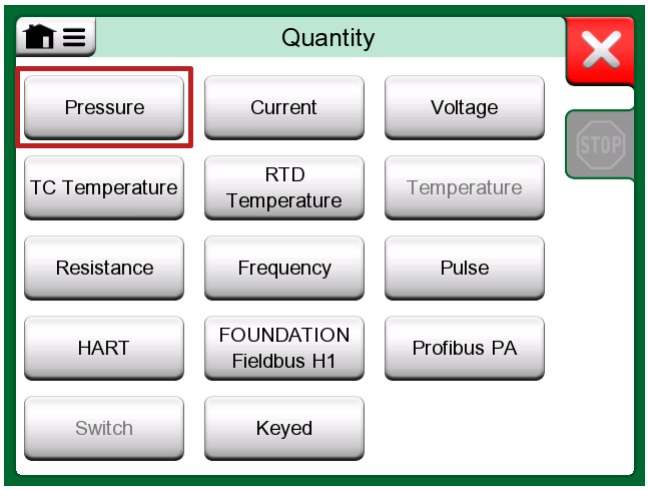


Figure 22: Step 2: Select the Pressure

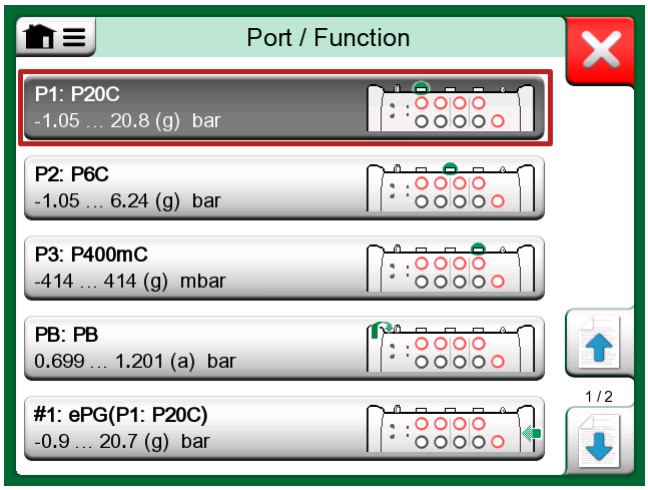


Figure 23: Step 3: Select an INT or EXT pressure module as a Port/ Function

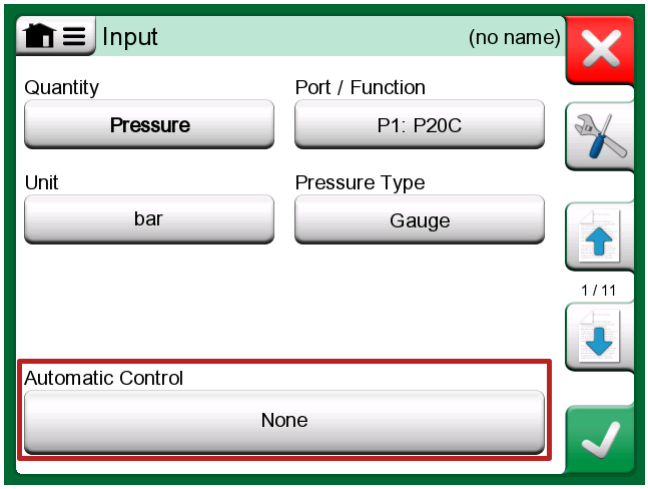


Figure 24: Step 4: Select the controller via Automatic Control

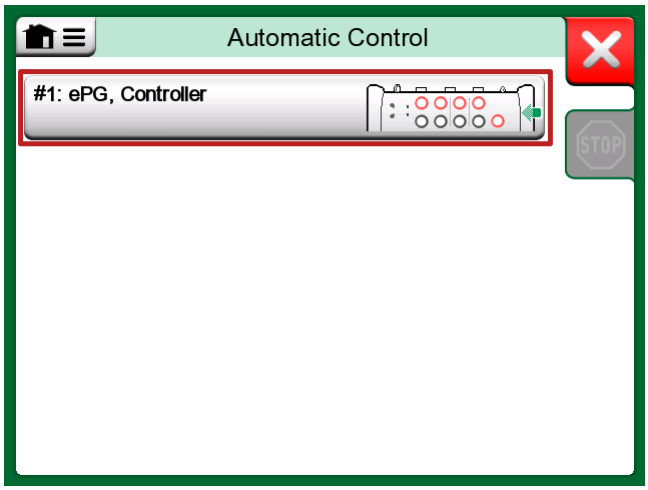


Figure 25: Step 5: Select the ePG

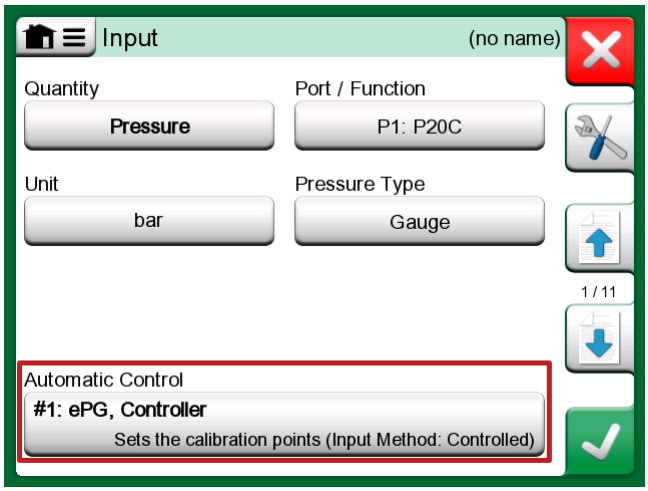


Figure 26: Step 6: The pressure module selected for Port/Function is the reference. This pressure module will override and change the Reference Pressure selection in the Controller Presets

Calibrating Analog gauges

When calibrating pressure gauges (analog indicators), it can be challenging to interpret the readings between the marks on the pressure gauge. That is why a cardinal point calibration is usually performed.

This means that you adjust the pressure so that the gauge dial is aligned with a cardinal point, which makes it easier for you to interpret the reading. You can do this in the Documenting Calibrator mode as shown in the example below:

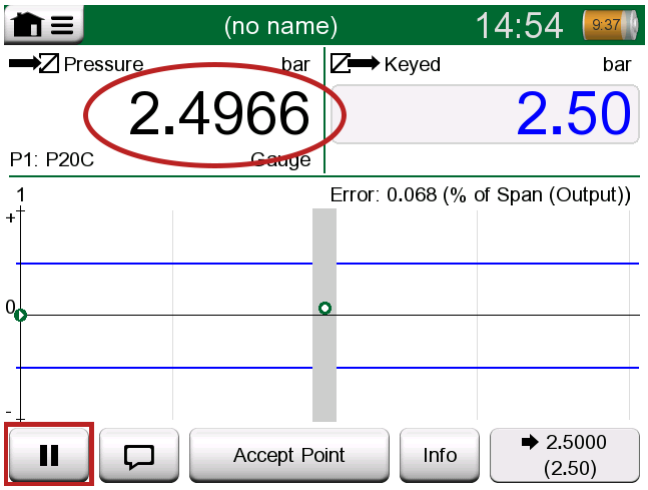


Figure 27: Cardinal point calibration

If you want to fine-tune the setpoint, press the Pause button and change the setpoint through the menu (see figure below).

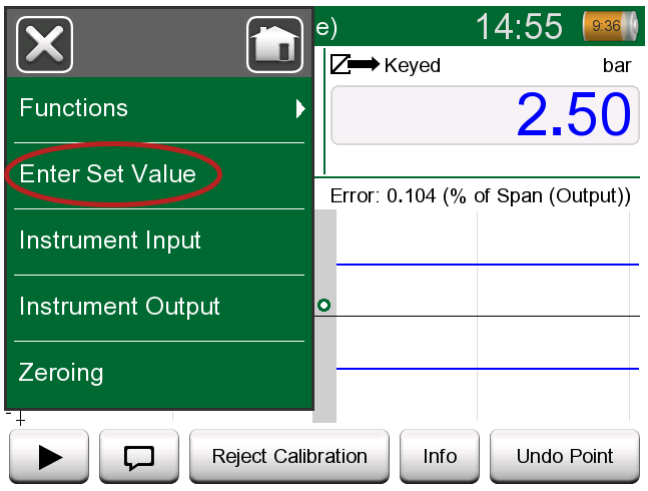


Figure 28: Menu dialog to change the setpoint value

It is possible to go back and forth between the Pause and Play buttons at the same setpoint.

Opening an instrument while the ePG is not connected

If you open an instrument, where controller communication is needed and the controller is not available, the calibrator will prompt you about a missing controller. You are still able to access and edit the instrument and when you connect the pressure controller, calibration can start.

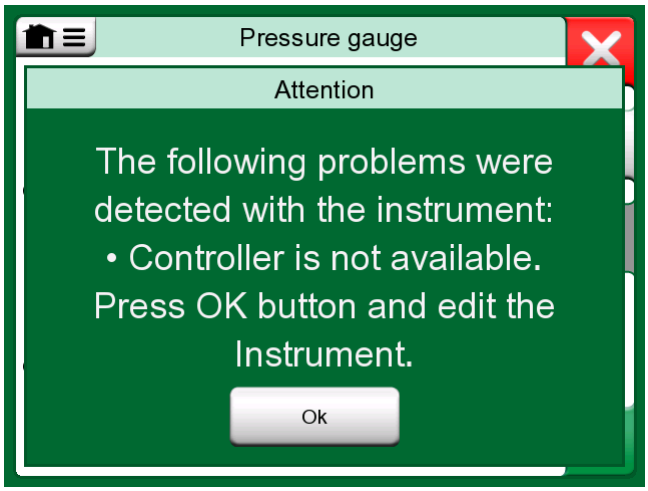


Figure 29: Missing controller notification

Working with the Calibration Management Software

The following chapter describes the ePG settings to be taken into consideration for the Calibration Management Software configuration (CMX or LOGiCAL).

Working with CMX

Requirements

There is no need to upgrade the CMX version in order to start using the ePG. The only requirement is that your MC6 family calibrator is able to communicate with your CMX version.

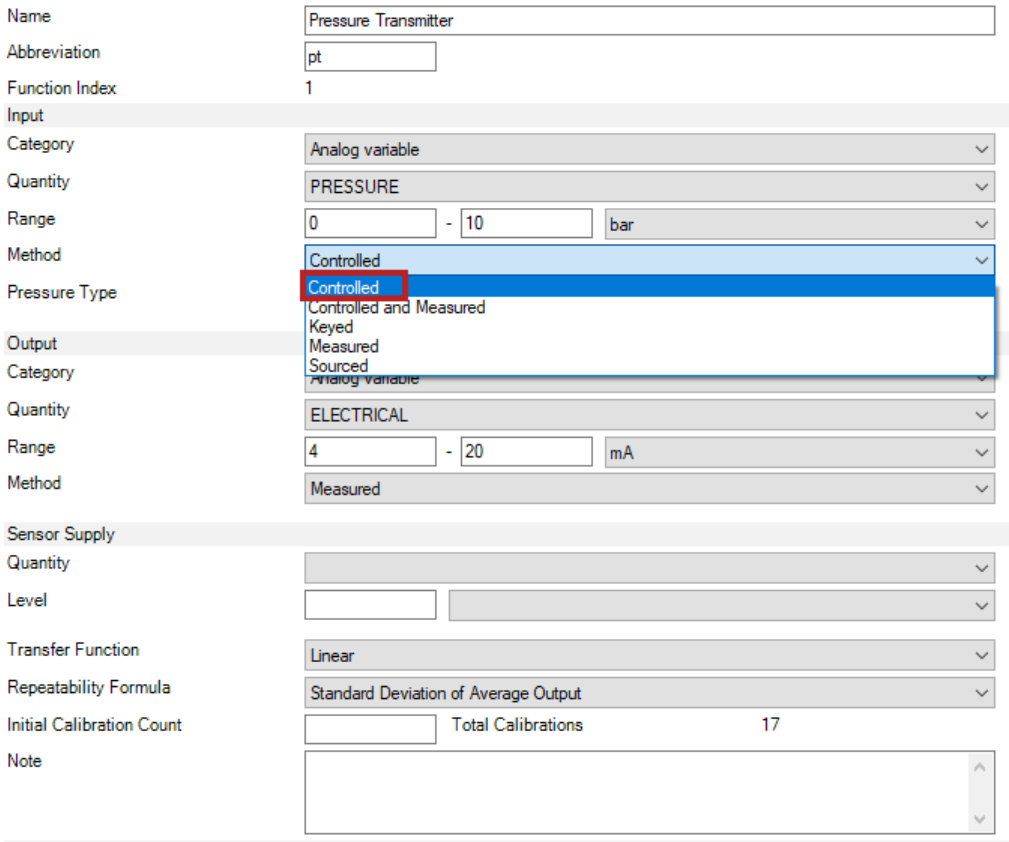
Table 2: MC6 family calibrator and CMX version compatibility

MC6 family calibrator (with firmware version 4.30 or later)	CMX version from which calibrator communication is supported
MC6	2.7
MC6-WS	2.7
MC6-Ex	2.11.2
MC6-T150	2.12.2
MC6-T660	2.12.1

Configuration

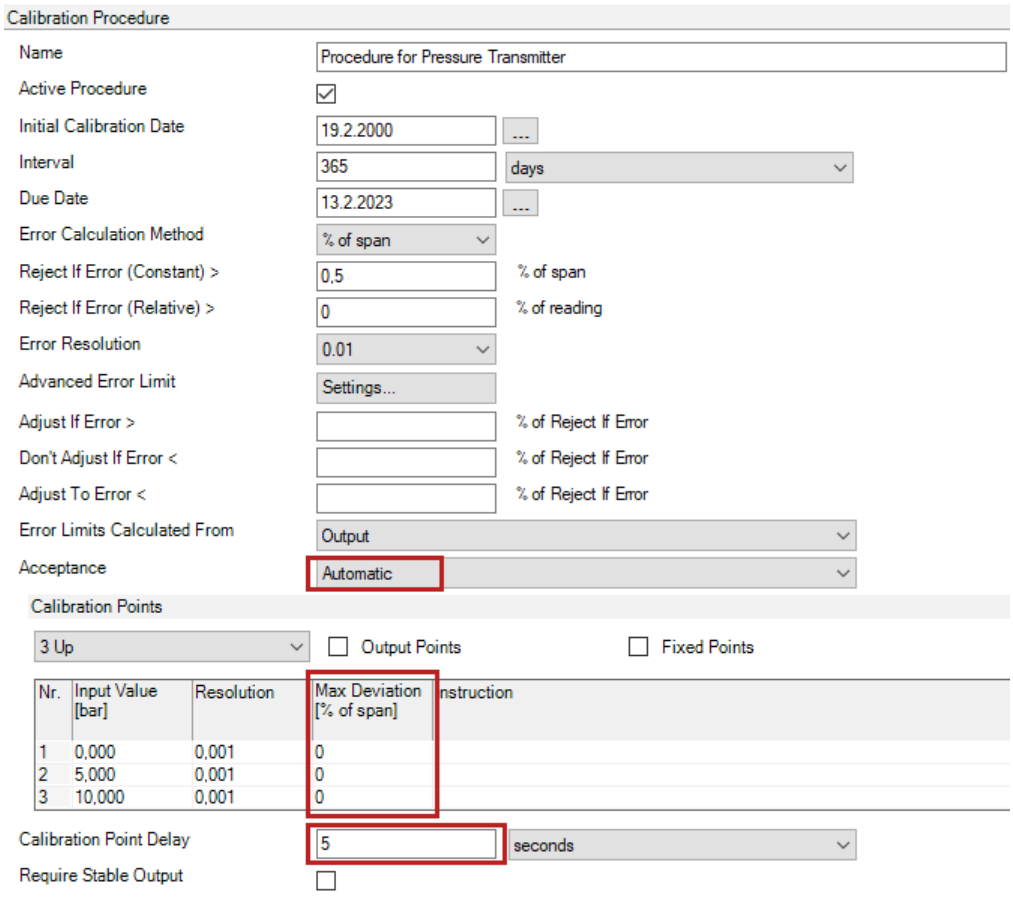
A minor configuration change is needed for the pressure instruments, when you want to use the MC6 to control the ePG to generate the pressure. If you have previously been using hand pumps to generate the input pressure, you have set the Input method in the function window as *Measured*.

Now, when working with the ePG, the Input method needs to be changed to *Controlled*, which means that the external controller (ePG) only generates the setpoints. The pressure generated by the ePG is measured by the MC6 using a separate internal or external pressure module.

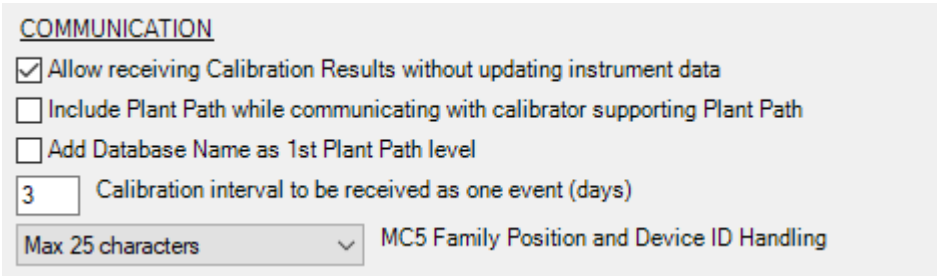


If you want the calibrator to automatically accept the calibration points, make sure you have the following configurations in the procedure window:

- *Acceptance* set to automatic;
- *Max Deviation* sets a range around the setpoint (in % of span). When the Input is within the set range, the calibration point can be automatically accepted, even though the exact setpoint has not been reached;
- *Calibration Point Delay* defines the time (in seconds) the calibrator waits after the Input is stable before the readings are accepted.



If you occasionally need to use a hand pump to calibrate the instrument, it is possible to configure CMX so that the user can change the Input method in the calibrator and perform the calibration. When transferring the results from the calibrator to CMX, the user will be notified that the instrument differs, but it is possible to transfer the results without affecting the instrument. This setting can be found in CMX settings/Calibration tab:



Working with LOGiCAL

LOGiCAL links each instrument with a corresponding instrument type, based on the instrument's function details. Calibration methods are associated with the instrument type and because of that they don't need to be specified for each instrument separately. Calibration method defines Beamex calibrator or application to be used for documenting the calibration, and how the input and

output signals are captured. LOGiCAL knows which methods can be used for each instrument type. Additionally, each instrument type can have multiple alternative calibration methods enabled.

To put this into practice: For calibrating pressure instruments, you have the flexibility to set up various calibration methods. For instance, one method might involve using a hand pump to produce the required pressure, while another method might use the MC6 to control the ePG pressure generation.

Using the MC6 to control the ePG pressure generation

Figure 30: Example of the configuration presents the sample setup for an instrument type “Pressure Transmitter with current output (analog)”. Click the *Instrument type* field in LOGICAL’s **Instrument view** (or alternatively *Instrument type* from the **Lists**) to open a sidebar revealing the following data:

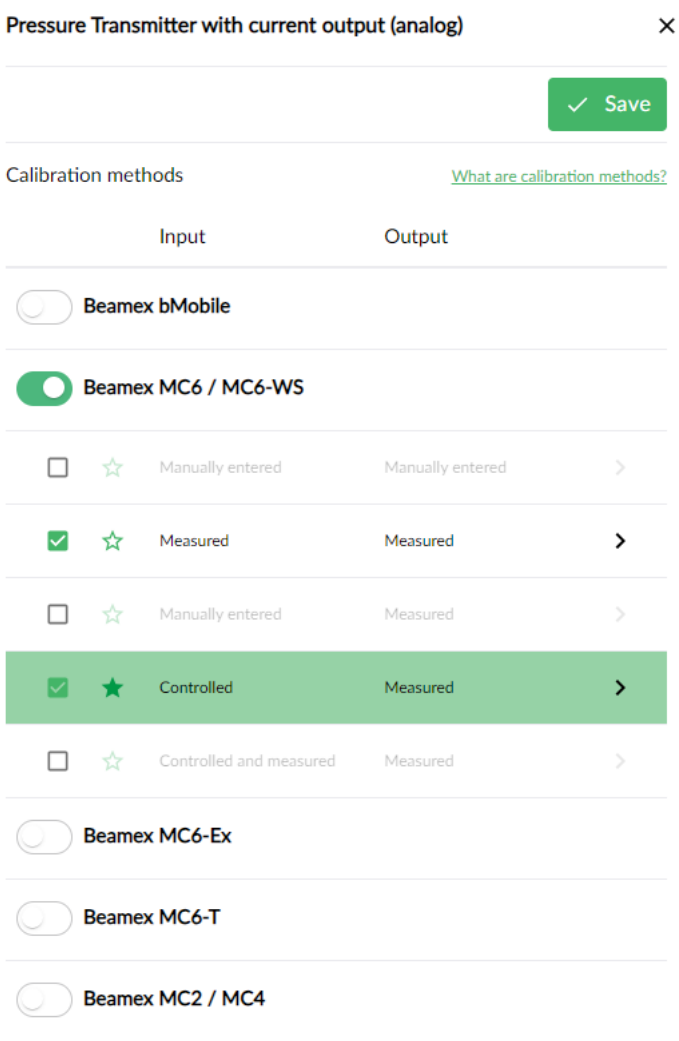


Figure 30: Example of the configuration

Choose the calibrator being used and select the row where **Input** method is set to *Controlled* and **Output** method is set to *Measured*. This means that

MC6 will control the ePG to generate the pressure and measure current from the transmitter. By activating the star (☆) next to the selection, you can set the selected row to be the preferred method. This calibration method will be selected by default when assigning the calibration tasks from LOGiCAL.

Clicking the arrow (›) in the end of the row will open a new configuration page with an additional settings for the calibration method.

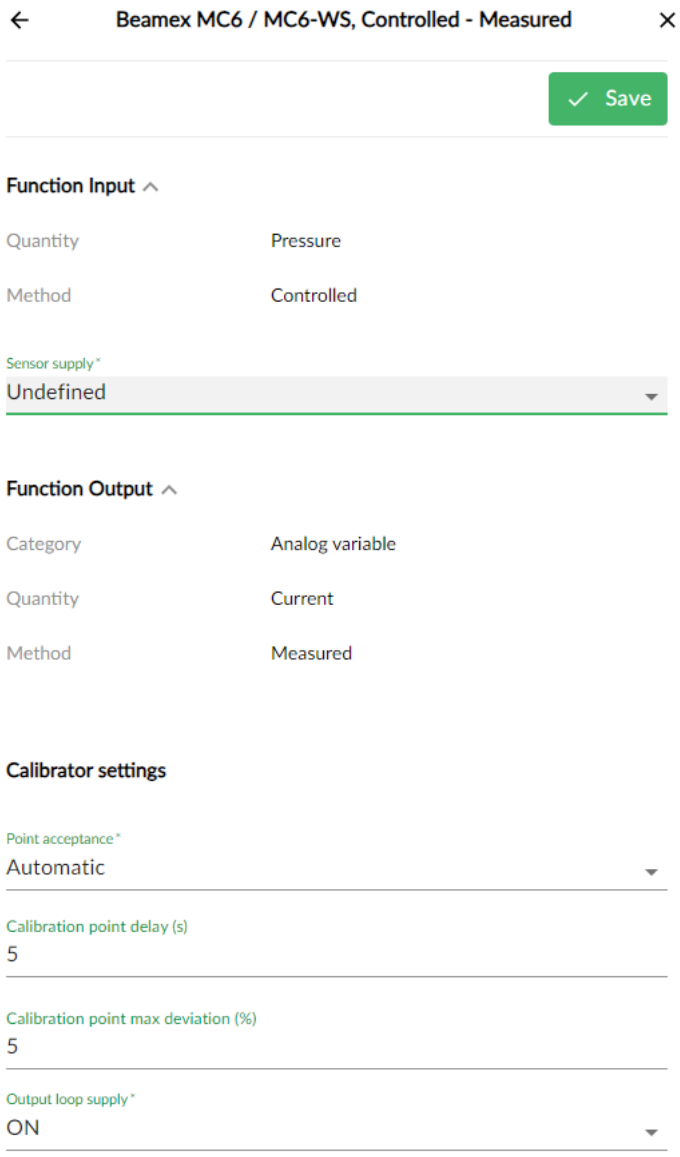


Figure 31: Calibration method - additional settings

You can configure the following settings to make the calibration points automatically accepted:

- *Point acceptance*: set to automatic;

- *Calibration Point Delay*: defines the time (in seconds) the calibrator waits after the Input is stable before the readings are accepted;
- *Max Deviation*: sets a range around the setpoint (in % of span). When the Input is within the set range, the calibration point can be automatically accepted, even though the exact setpoint has not been reached.

The selected method can also be changed in the calibrator.

ePG Communication Protocol

The ePG communication protocol allows other equipment to control the ePG device. The protocol uses a human readable text format, carried over the USB Communication Device Class (CDC) between the host device (an MC6 Family device or e.g., a Windows PC) and the ePG. USB CDC means that the ePG is seen as a virtual serial port by the host (virtual COM-port in Windows).

The ePG should be considered a slave device that acts on commands sent by the host device. The ePG doesn't send queries or data to the host device on its own initiative. Instead, the host device must send the required commands to the ePG and provide the necessary information for it to function. Additionally, the host device must request the measurement readings and other information from the ePG, using the available commands.

General

The ePG Command protocol communicates in plain text format using basic US-ASCII table.

All commands consist of a command character followed by the separator character '/' (ASCII character 47). Multiple parameters are separated with a space character ' ' (ASCII character 32).

All commands and error codes are written in lower case letters.

End of line indication

All commands sent to the ePG must end with <CR> '\r', 0x0D (ASCII character 13) or <LF> '\n', 0x0A (ASCII character 10) or both. This is indicated with <EOL> (end-of-line) in the following paragraphs.

All responses received from the ePG end with <*CR*><*LF*>.

Integer values

Integer values can be in base-10 (decimal) or base-16 (hexadecimal). Base-16 numbers are indicated with a leading "0x". See the following examples of valid integer numbers:

0

127

+200

-75

0xF2

Decimal values

Decimal values can be given in normal or scientific notation with an exponent (‘E’ or ‘e’). The decimal point is always ‘.’ (dot). See the following examples of valid decimal numbers:

0.04

+19.200

-0.56

4.76E-1 (same as 4.76×10^{-1} which is same as 0.476)

-0.34e+02 (same as -0.34×10^{2} which is same as -34.0)

Text strings

When a text string is an input or output parameter for a command, it is always the last parameter on the line, terminated with the normal end-of-line termination: <*EOL*> or <*CR*><*LF*>.

Error codes

An error code is returned by the ePG for each command. Valid error codes are presented in the table below:

`e0`	No error, command executed successfully
`e1`	Command is not recognized
`e2`	Command parameter is invalid
`e3`	Command and parameters are valid, but command execution failed

Command, error code and additional response data sequence

Sends one command to the ePG and waits for its response.

All commands return an error code, see Error codes. Some commands return additional response data after the error code if the returned error code was `e0` (No error). In this case, the separator character between the error code and the response data is '/'. The additional response data uses a space character ' ' as a separator between multiple items on the same line.

Some commands return the response data on multiple lines, in which case end-of-data is indicated with an empty line containing only the <*CR*><*LF*> characters.

Examples are presented in the tables below:

Vent the system:	
(send command)	`v/`
(receive error code)	`e0`

Get the active setpoint when the ePG is in Idle mode	
(send command)	`t/`
(receive error code)	`e3`

Get the active setpoint when the ePG is regulating:	
(send command)	`t/`
(receive error code)	`e0/s g 10.000`

Commands

Display short help-text for each command

Displays a list of available commands and a short description.

Command:	`h/<EOL>`	

Response:	`Commands:<CR><LF>`
	`Command1 Description1<CR><LF>`
	`Command2 Description2<CR><LF>`
	`...`
	`CommandN DescriptionN<CR><LF>`
	`<CR><LF>`	

Where:	`Commandx`	Command character including the '/' separator
	`Descriptionx`	Text string, short description help text

Get the device info

Gets the ePG device information.

Command:	`i/<EOL>`	
Response:	`DeviceType SerialNumber Version Revision<CR><LF>`	
Where:	`DeviceType`	Device type name: ePG
	`SerialNumber`	Integer value, ePG's serial number
	`Version`	ePG firmware version in the format: *X.YY*
	`Revision`	ePG's mainboard hardware revision letter: A, B, C, etc.

Note: The ePG firmware versions 2.00 and older do not display the revision.

Set the reference pressure

The host device must send the reference pressure measurement readings to the ePG at the rate of about 3 readings per second using this command, at least when the ePG is actively regulating a setpoint (see Set the setpoint).

Command:	`r/Sensor Pressure<EOL>`	
Where:	`Sensor`	Reference pressure sensor: ‘p’ stands for Gauge pressure, ‘b’ stands for Barometric pressure
	`Pressure`	Decimal value, pressure setpoint in bar

Set the pressure type

Sets the pressure type. This command prepares the ePG for a certain pressure type, while the setpoint is not yet known. The pressure type affects the Feedback measurement in the command Get the status. The pressure type is also a parameter for each Set the setpoint command.

Set the pressure type command will interrupt any ongoing activity in the ePG and set it to Idle (see Set Idle mode).

Command:	`2/PressureType<EOL>`	
Where:	`PressureType`	Pressure type: ‘g’ stands for Gauge pressure, ‘a’ stands for Absolute pressure

Set the setpoint

Sets a pressure setpoint. The ePG will change the output pressure to the requested setpoint. If the `ControlMode` is set to Shut off, the ePG will switch to Idle mode when the setpoint is reached. If the `ControlMode` is set to Continuous, the ePG will keep regulating at the setpoint to compensate for leaks, thermal expansion, etc. Use the command Get the status to check the progress of the regulator.

For Gauge pressure, the ePG regulator needs pressure measurements from a Gauge reference pressure sensor. For Absolute pressure, the ePG regulator needs pressure measurements from both Gauge reference pressure sensor and a barometric reference pressure sensor. See Set the reference pressure.

Both Coarse and Fine Adjustment Up and Down buttons are not responsive while the ePG is actively regulating. If loss of communication is detected (see

Detect loss of communication), the ePG stops regulating and enters Idle mode (see Set Idle mode).

Command:	`s/ControlMode PressureType Pressure<EOL>`	
Where:	`ControlMode`	Control mode: ‘s’ stands for Shut off, ‘c’ stands for Continuous
	`PressureType`	Pressure type: ‘g’ stands for Gauge pressure, ‘a’ stands for Absolute pressure
	`Pressure`	Decimal value, pressure setpoint in bar

Get the setpoint

Gets the currently active setpoint. If the ePG is not actively regulating (it could be in Vent or Idle mode), error code `e3` (command execution failed) is returned.

Command:	`t/<EOL>`	
Response:	`ControlMode PressureType Pressure<CR><LF>`	
Where:	`ControlMode`	Control mode: ‘s’ stands for Shut off, ‘c’ stands for Continuous
	`PressureType`	Pressure type: ‘g’ stands for Gauge pressure, ‘a’ stands for Absolute pressure
	`Pressure`	Decimal value, pressure setpoint in bar

Get the status

Gets the ePG status. When regulating the pressure (see Set the setpoint) in Shut off mode, the state will change to Idle when the setpoint has been reached. In Continuous mode, the state will change to “Regulating pressure steady-state” when the setpoint has been reached, and back to “Regulating pressure” when actively compensating for leaks or thermal expansion, etc.

Command:	q/<*EOL*>	
Response:	Feedback State StatusBits<*CR*><*LF*>	
Where:	Feedback	Decimal value, feedback measurement in bars, in Gauge or Absolute pressure depending on the current pressure type
	State	Integer value, the current state of the ePG: 0 stands for Idle, 1 stands for Venting, 2 stands for the Manual control with keypad, 3 stands for Internal (e.g. sensor alignment), 4 stands for Regulating pressure, 5 stands for Regulating pressure steady-state
	StatusBits	Integer value, status and error bits: bit-0 (LSB) stands for Overheat error (or the temperature is too low), bit-1 stands for Motor error, bit-2 stands for Pressure measurement error, bit-3 stands for Battery almost empty

Get the internal pressure

Gets the pressure of the internal pressure sensors PM1, PM2 and PM3.

Command:	e/<*EOL*>	
Response:	PM1 PM2 PM3<*CR*><*LF*>	
Where:	PM1	Decimal value, pressure of the PM1 in bar (internal pressure)
	PM2	Decimal value, pressure of the PM2 in bar (internal vacuum)
	PM3	Decimal value, pressure of the PM3 in bar (output)

Get the temperature

Gets the temperature of the internal pressure sensors (PM1, PM2 and PM3) and the temperature of the ePG circuit board (PCB).

Command:	c/<*EOL*>	
Response:	PM1 PM2 PM3 PCB<*CR*><*LF*>	
Where:	PM1	Decimal value, temperature of the PM1 in °C (internal pressure)
	PM2	Decimal value, temperature of the PM2 in °C (internal vacuum)
	PM3	Decimal value, temperature of the PM3 in °C (output)
	PCB	Decimal value, temperature of the PCB in °C

Vent the system

Stops the motor, opens the valves and vents the system. At the end of the venting sequence, the ePG internal pressure sensors PM1, PM2 and PM3 are zeroed. After venting, the ePG enters the Idle mode.

Note: The valves will be kept open for about 1 minute after transitioning into the Idle mode (this is slightly different behavior compared to the issuing command Set Idle mode), to provide the time for zeroing the external pressure sensors at true 0 bar Gauge pressure.

Command:	v/<*EOL*>

Set Idle mode

Stops the motor, closes the valves and enters Idle (inactive) mode. If venting is ongoing, the Set Idle mode command will be delayed until the minimum vent time has passed.

Command:	n/<*EOL*>

Sensor alignment

Starts the internal pressure sensor alignment procedure. The procedure takes several minutes to complete. Use the command Get the status to check when the state turns to Idle, which is an indication that the alignment is complete. The output pressure connector should be plugged during alignment. If loss of communication is detected (see Detect loss of communication), the ePG stops the sensor alignment procedure and enters Idle mode (see Set Idle mode).

Command:	`1/<EOL>`

Dryout

Starts the dryout procedure to remove liquids from the pump. The procedure takes two minutes to complete. Use the command Get the status to check when State turns to Idle, which is an indication that the dryout is complete. The output pressure connector should be open during dryout. If loss of communication is detected (see Detect loss of communication), the ePG stops the dryout procedure and enters Idle mode (see Set Idle mode).

Command:	`d/<EOL>`

Detect loss of communication

Enables detection of the communication loss with the host device. When enabled and the ePG has detected communication loss (no communication activity seen for the specified timeout), the ePG will automatically enter Idle mode (see Set Idle mode) and remove all key locks (see Local lockout). The ePG will also release all simulated keys (see Simulate key press or release).

Command:	`0/Timeout<EOL>`	
Where:	`Timeout`	Integer value, detection timeout [500 … 60000] in ms. Set the Timeout to 0 to disable the detection

Local lockout

Selected physical keys can be locked to prevent the user interaction. Local lockout does not prevent simulating key-presses or -releases with the command Simulate key press or release. If a loss of communication is detected (see Detect loss of communication), all keys are automatically unlocked.

Command:	`x/KeyBits<EOL>`	
Where:	`KeyBits`	Integer value, key bits: bit-0 (LSB) is Power, bit-1 stands for Vent/ Mode, bit-2 stands for Coarse Adjustment Up, bit-3 stands for Fine Adjustment Up, bit-4 stands for Coarse Adjustment Down, bit-5 stands for Fine Adjustment Down. Set bit to 1 to lock a key and set bit to 0 to unlock a key. E.g. `0x3E` will lock all keys except for Power.

Simulate key press or release

Simulates key press or release. The simulated key presses are combined (logical OR operation) with the physical key presses, if the physical keys have not been earlier locked with the command Local lockout. If loss of communication is detected (see the command Detect loss of communication), all simulated keys are automatically released.

Command:	`k/Action KeyBits<EOL>`	
Where:	`Action`	Integer value, key bits: bit-0 (LSB) is Power, bit-1 stands for Vent/ Mode, bit-2 stands for Coarse Adjustment Up, bit-3 stands for Fine Adjustment Up, bit-4 stands for Coarse Adjustment Down, bit-5 stands for Fine Adjustment Down. Multiple bits can be set simultaneously.

Enable the firmware update mode

Enables the firmware update mode. The ePG will perform a normal power-down sequence after which it will enter the firmware update mode. The USB port will switch to the bootloader protocol.

Command:	`f/<EOL>`

Power-down

Performs a short vent and then powers-down the ePG. After the power-down, the ePG can be powered-on with the Power button or by disconnecting and reconnecting the USB cable.

Command:	`p/<EOL>`

Get the battery info

Gets the Battery Pack info.

Command:	`b/<EOL>`	
Response:	`SerialNumber Temp Volt Current Charge FullCapacity<CR><LF>`	
Where:	`SerialNumber`	48-bit serial number in hexadecimal format: XXXXXXXXXXXX
	`Temp`	Decimal value, battery's temperature in °C
	`Volt`	Decimal value, battery's voltage in V
	`Current`	Decimal value, battery's current in mA
	`Charge`	Integer value, battery's charge in %. This corresponds to the estimated charge currently available in the battery
	`FullCapacity`	Decimal value, battery's full capacity charge in %. This corresponds to the estimated charge available when the battery is fully charged.

Get the usage data

Gets the usage data.

Command:	`u/Device Index<EOL>`	
Response:	`Index DataType Name Value<CR><LF>`	
Where:	`Device`	Device type: ‘e’ stands for the ePG, ‘b’ stands for the Battery Pack
	`Index`	The index of the usage data item [0 …]. When index is set to ALL, then a heading and all available usage data items for the selected device are listed, one per line. The list is terminated with an empty line containing only <*CR*><*LF*>
	`Name`	Usage data parameter name
	`DataType`	Data type: ‘u’ stands for an unsigned integer, ‘d’ stands for the decimal value, ‘t’ stands for the text string
	`Value`	Usage data value

Trying out the ePG communication protocol in Windows

When the ePG is powered-on and connected to a Windows PC with a USB cable, it is seen as a virtual COM-port in the Device Manager in “Ports (COM & LPT)” category. An application connecting to this ePG COM-port should have the following communication settings:

COM-port:	(check Device Manager)
Speed:	115200
Data bits:	8
Stop bits:	1
Parity:	None
Flow control:	None

Because the protocol is in human readable text format, a simple text terminal application, such as **puTTY**, can be used for manually typing in the ePG commands and for viewing the response.

It can be downloaded at http://www.putty.org.

Details of the puTTY configuration can be seen in the following figures:

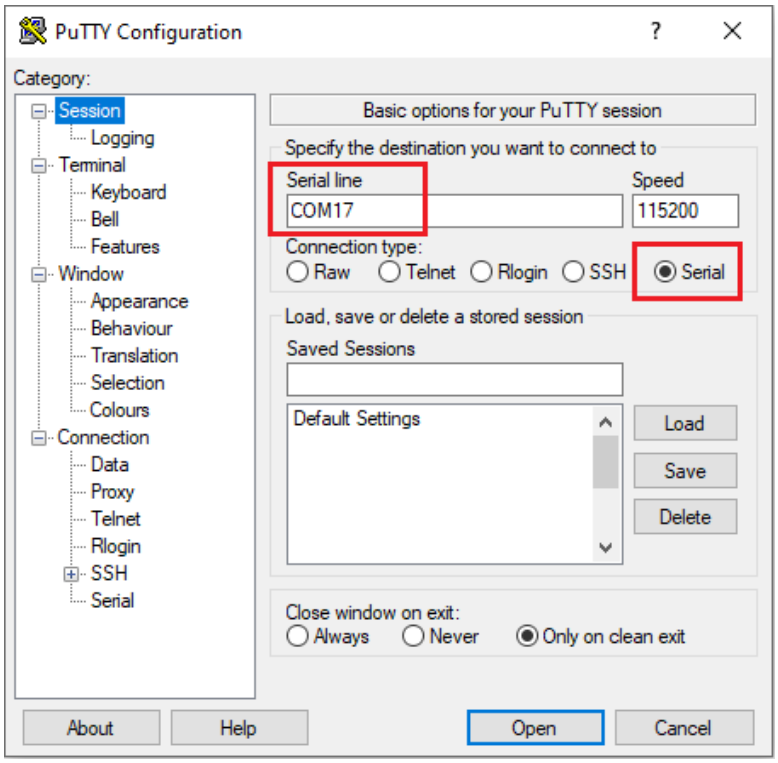


Figure 32: puTTY configuration - Session tab

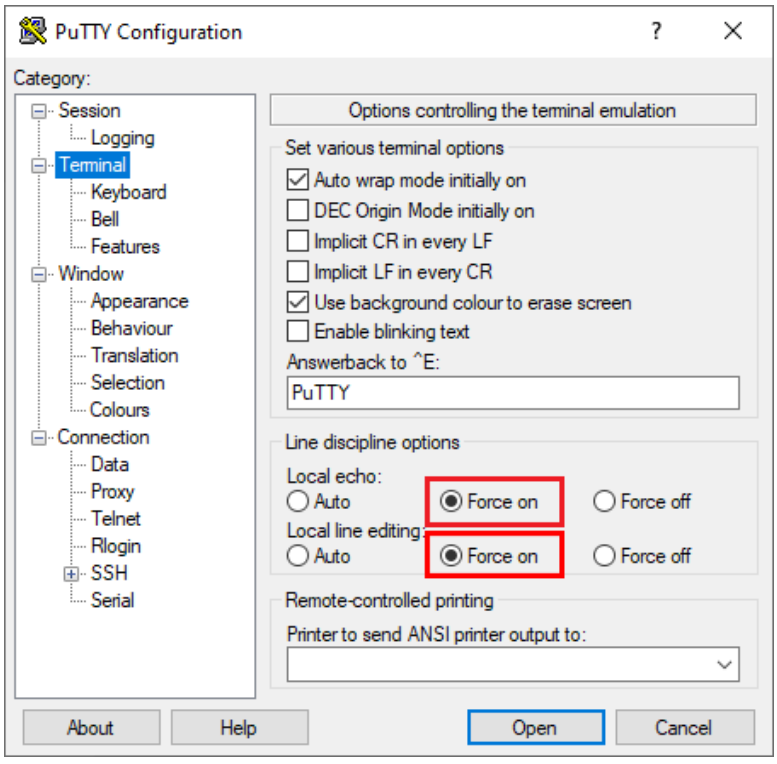


Figure 33: puTTY configuration - Terminal tab

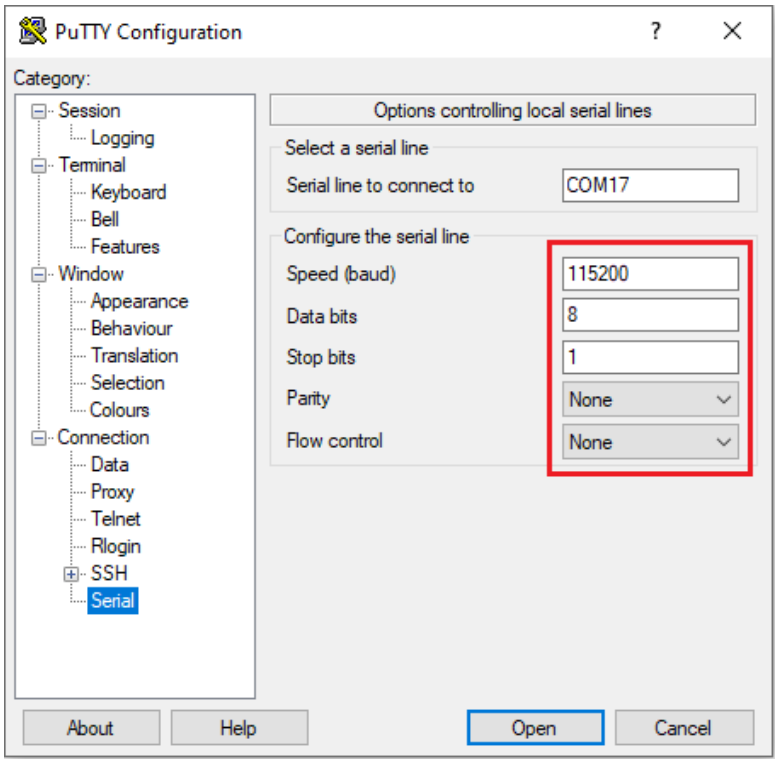


Figure 34: puTTY configuration - Serial tab

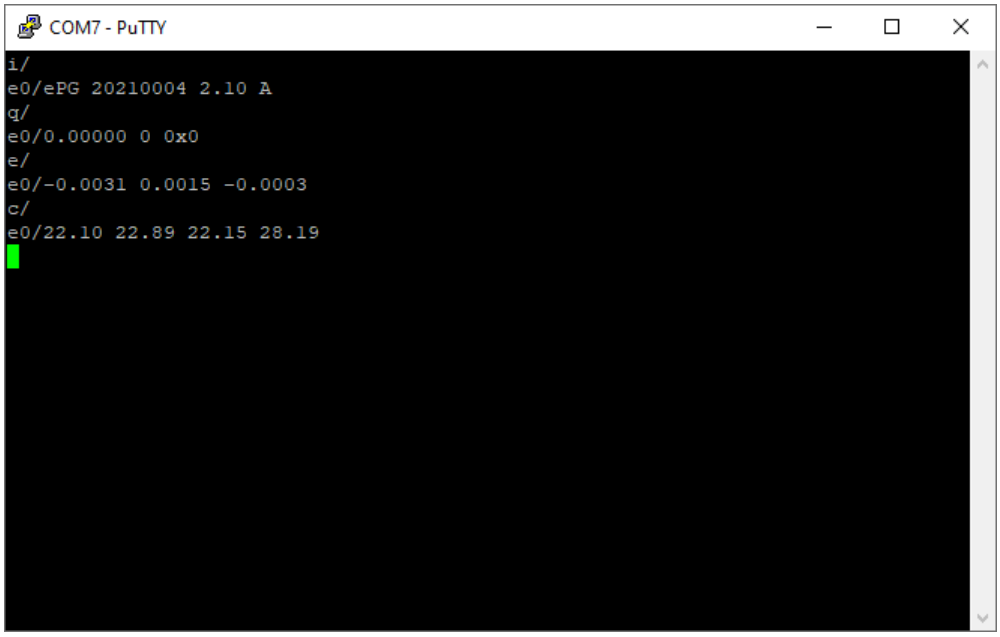


Figure 35: A sample manual communication

Troubleshooting

System is not holding the set pressure.	
INDICATION	SOLUTION
Calibrator or external pressure measuring device indicates that there is a leak in the system.	Check that all pressure connections are tight enough and they are not leaking.

Pressure/Vacuum can not be generated.	
INDICATION	SOLUTION
1. Power button and the yellow LED flashing alternatively. The green LED is off.	**1.** ePG's internal temperature is under or over the limits. All functions to change the pressure towards 0 bar / 0 psi are available. Let the ePG temperature return to normal (only green LED lights up).
2. The yellow LED is blinking and the Power button is very bright.	**2.** There might be a major fault in ePG. Power the ePG off and on to check if the fault disappears. If the fault indication reappears, send your ePG to Beamex for service.

Output pressure changes in the wrong direction.	
INDICATION	SOLUTION
	Internal pressure sensor readjustment is needed. First connect the ePG to a pressure calibrator or a pressure indicator with a pressure hose or just plug the output connector. The internal pressure readjustment procedure is started by pressing and holding Vent/ Mode button  while powering the ePG on. During the process, Green LED is blinking and it lights up when ePG is ready to use again. Please notice that this takes several minutes.

Battery Pack is not charged.	
INDICATION	SOLUTION
Green LED in the Battery Pack is off.	Wrong type of charger is connected. Use the charger that came with the ePG or make sure your charger meets the minimum requirements (see Table 1: Specifications)

ePG does not start even when the battery is full.	
INDICATION	SOLUTION
ePG feels very warm.	Let the ePG temperature return to normal. When the internal temperature rises > 60 °C / 140 °F, the ePG stops working.

Issues related to the controller functionality	
INDICATION	SOLUTION
I cannot choose ePG from the Controller Presets.	Check that the Requirements to communicate with the ePG are fulfilled (see chapter Using the ePG as a pressure controller together with an MC6 family calibrator).
I cannot generate 20 bar / 300 psi pressure with MC6 family calibrator.	Make sure you have selected a reference pressure module that is capable of measuring 20 bar / 300 psi.
I don’t see the pressure rising in my MC6 family calibrator even though the pump is running.	Check your connections. Make sure you are connected to the correct pressure module (the one that is selected as the Reference Module in Controller Presets).
Pressure generation stops in the middle of the calibration but pressure is not vented.	Check that your cables are connected. The ePG stops generation if the USB communication cable is removed.

Maintenance

Warning: If you have to open the Back Cover for maintenance, remove the Battery Pack first.

Note: Tools needed for service: TX8, TX9 and TX10 screwdrivers, flat-head screwdriver, 16 mm / 5/8" wrench, and 6 mm / 7/32" hex key.

It is recommended that after heavy use*, the ePG should be dried by pressing and holding the Coarse Adjustment Up button for 1-2 minutes without the hose connected. By doing so you can remove possible condensation from the ePG and dry the system/device.

Note: Please notice that the ePG must be in the Pressure mode during the dryout procedure.

If any parts of the ePG require cleaning, use a cloth damped with a water-based or alcohol-based solvent. Alternatively, use low concentration of hydrogen peroxide or mild solution of mild soap water. Never use any strong detergents. If the ePG does not increase pressure fast enough, you can open the device and the valve cover and blow some compressed air into the device. You can also clean the Non-return Valves with paper. Detailed instructions of basic maintenance are described in the following subchapters.

** heavy use equals more than 10 up-down calibrations per day*

Warning: Be careful not to get any liquid into the connectors of the battery compartment. Without battery, the device is not water resistant and any liquid may damage the PCB boards or the Battery Pack. Please notice also that the Battery Pack is not water resistant when it is removed from the device.

Regular inspections

Cleaning or changing the Mesh Filter

ePG mesh filters for output connection (8006160, 5 pcs).

Check the condition of the Mesh Filter at least every 3 months.

A Mesh Filter prevents impurities from getting into the ePG during venting.

The Mesh Filter might require cleaning or changing from time to time. The Mesh Filter can be found under the output fitting. Remove it (with a 16 mm / 5/8" wrench) and disconnect the Mesh Filter with a flat-head screwdriver. The Mesh Filter must be immediately replaced with a new one if you see any rust on it. Otherwise you can clean it by blowing compressed air through it.

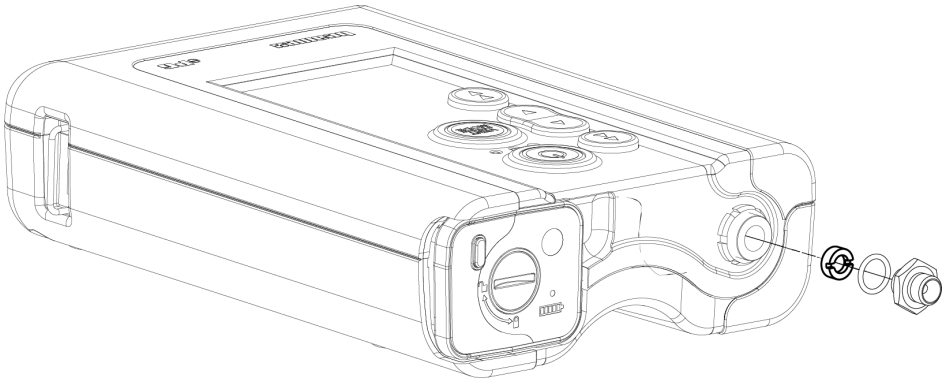


Figure 36: Cleaning or changing the Mesh Filter

Checking the amount of condensation and removing it

Check the amount of condensation at least every 3 months or more often if you notice a drop in performance.

It is possible that condensation may form inside the pump when pressure is generated.

There are two different ways of removing condensation from the pump.

Choose the correct method depending on the serial number of the device:

- Method A (removing condensation) - valid for the devices with a serial number 20240054 and higher;
- Method B (removing condensation) - valid for all devices with firmware version 2.20 or later, however method A is a **preferred** and reliable method of removing condensation for newer devices.

Method A (removing condensation)

Take the following steps to check and remove possible condensation:

1. Remove the Back Cover (see steps 1-2 in chapter Cleaning the Out Valve).
2. Remove the left plug (1) from the Body Bar (see 1 in Figure 37: Removing plugs from the Body Bar).

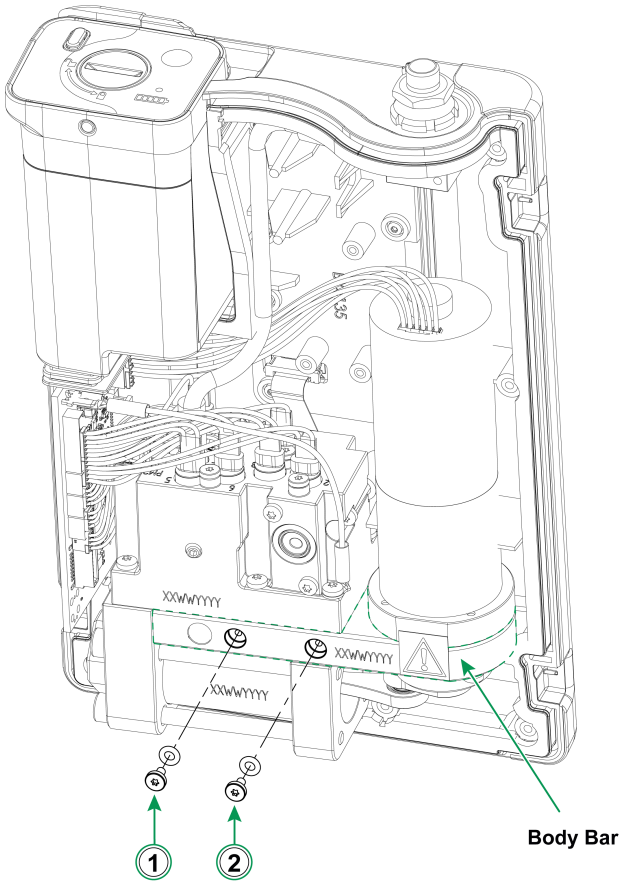


Figure 37: Removing plugs from the Body Bar

3. Lift the device to a vertical position and turn it so that you can see the inside of the device.
4. Install the Battery Pack in place.
5. Press the Power button .

6. When the ePG is powered-on, press the Coarse Adjustment Up button and hold it for 1-2 minutes. During this time the possible condensation is pumped out from the Pressure Block.

> **Warning:** Be extra careful not to put your fingers between the Piston Assembly when the ePG is powered-on and it starts generating pressure (when the motor is running). The motor is powerful enough to cut your finger off.

7. When all condensation is pumped out, release the Coarse Adjustment Up button and press the Power button to power off the ePG.
8. Remove the Battery Pack and reattach the plug.
9. Remove the right plug (2) from the Body Bar (2 in Figure 37: Removing plugs from the Body Bar) and repeat the steps 3 - 8 of this instruction.
10. Assemble the Back Cover and the Battery Pack.

Method B (removing condensation)

Take the following steps to check and remove possible condensation:

1. Update the firmware to version 2.20 or later (see Firmware update instructions).
2. Remember to leave the pressure port open - do not connect any pressure hoses.
3. To start the device hold the Coarse Adjustment Up button and at the same time press the Power button. This activates the dryout mode, in which ePG will be pumping for about 2 minutes and after that it will stop automatically (this can be stopped by pressing the Vent/Mode button or Power button).

   Hold the device in each of the positions (see pictures below) for about 15s to remove the condensation throught the bottom holes.

> **Note:** Change between the positions slowly to allow correct flow of water between the compartments.

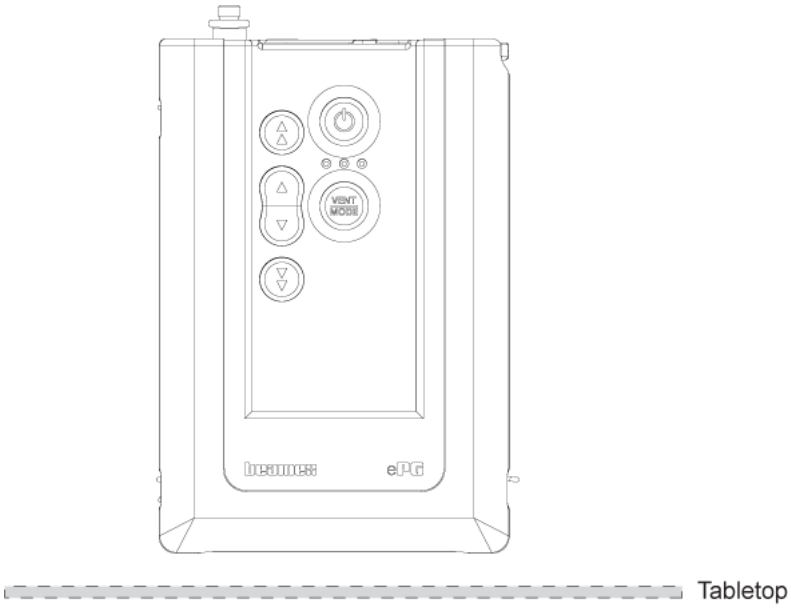


Figure 38: Position 1

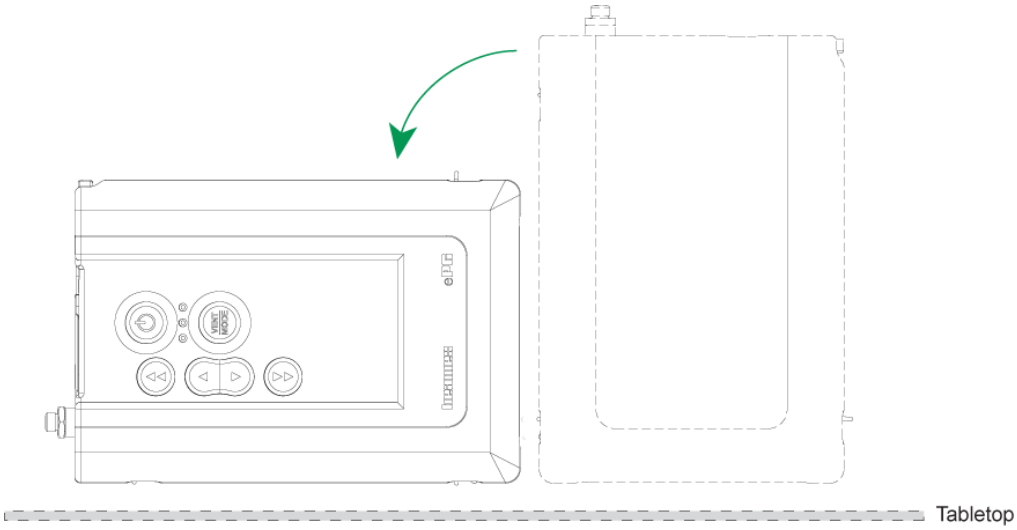


Figure 39: Position 2

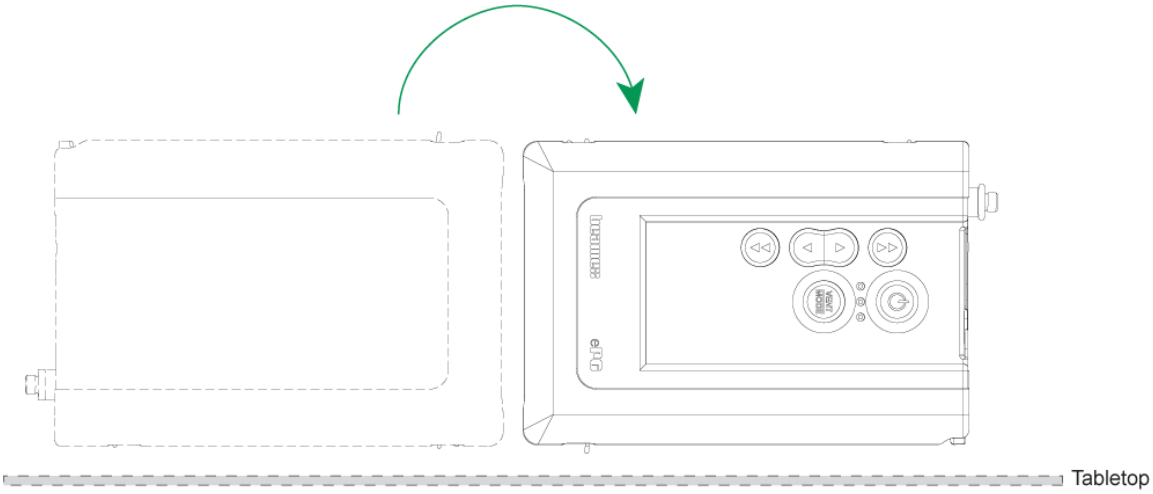


Figure 40: Position 3

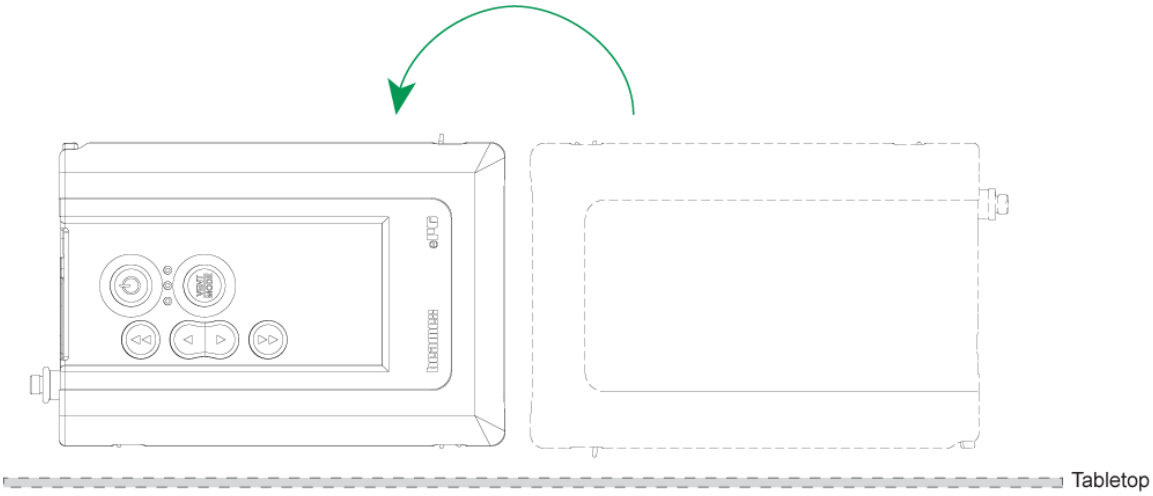


Figure 41: Position 4

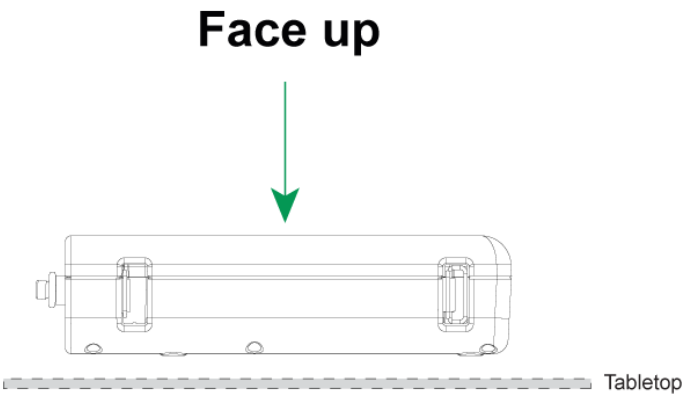


Figure 42: Position 5

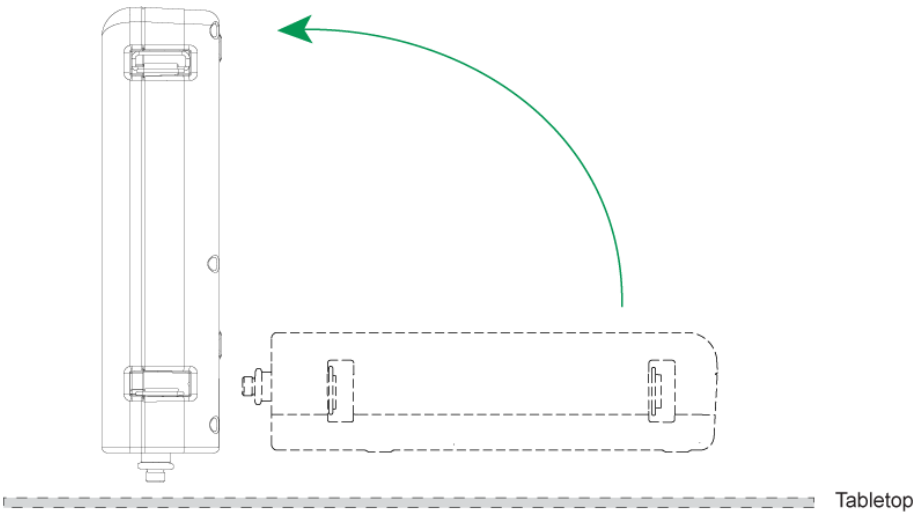


Figure 43: Position 6

Cleaning the Out Valve

1. Unscrew all the screws from the Back Cover. Be aware of the one screw located in battery compartment (1).

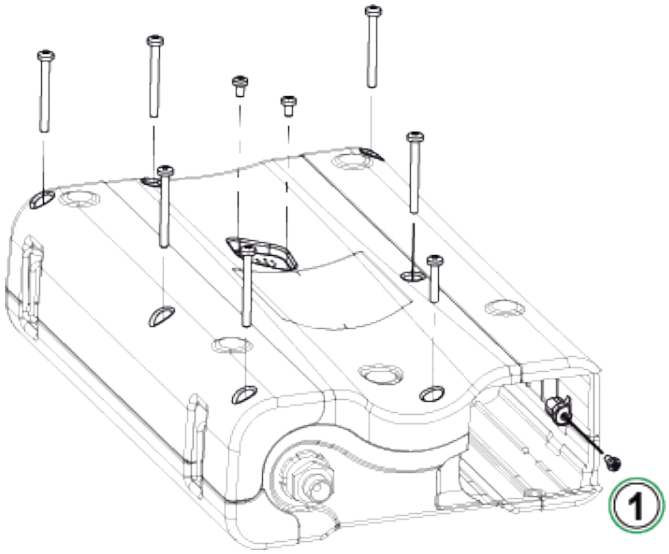


Figure 44: Step 1

2. Gently lift the Back Cover and make sure that the main PCB stays in its place in the Front Cover.

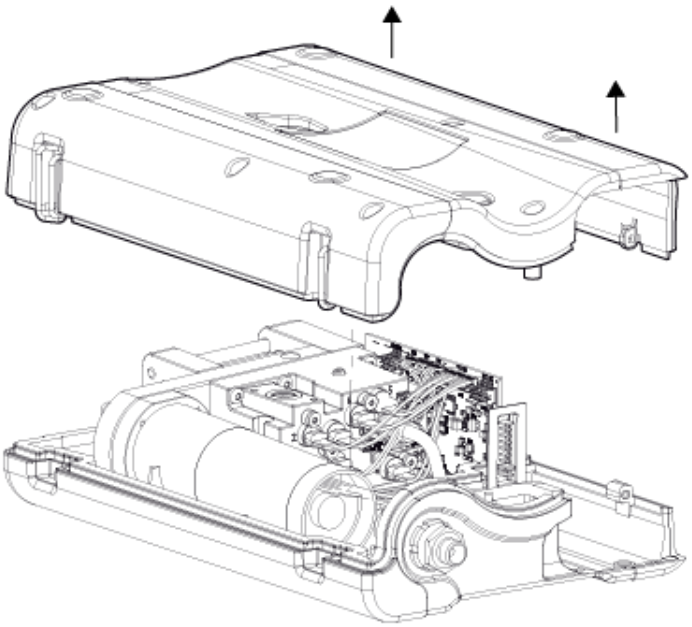


Figure 45: Step 2

3. Unscrew the two screws (1) from the valve cover (2).

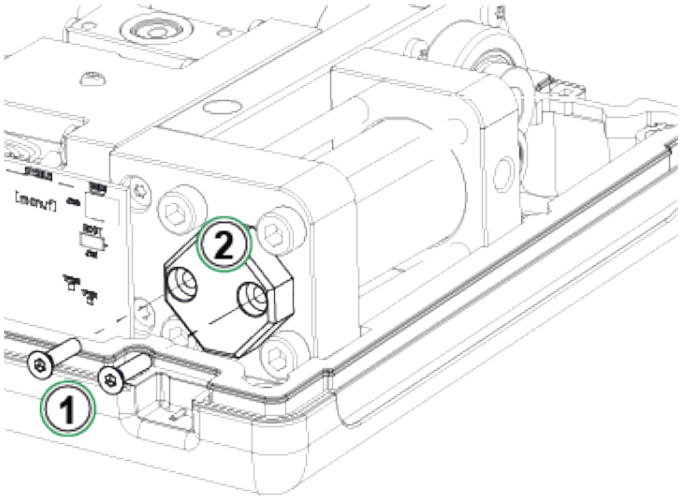


Figure 46: Step 3

4. Remove the Valve Cover.

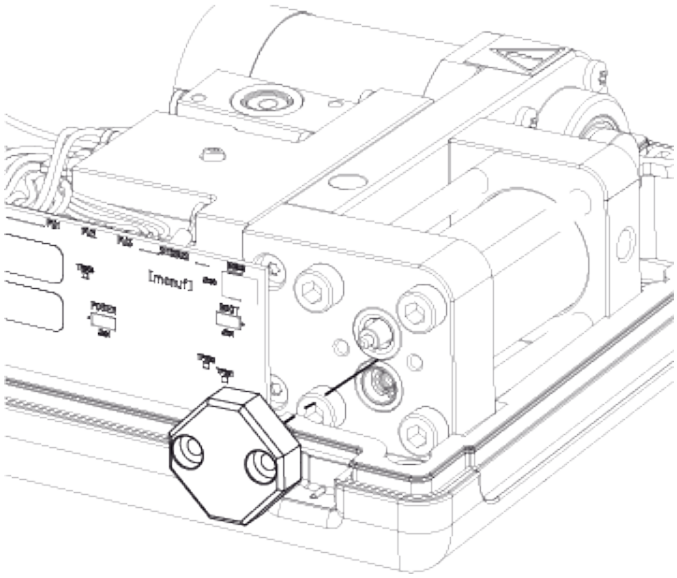


Figure 47: Step 4

5. Remove and clean the spring (1) and Out Valve (2). You can blow some compressed air in the In Valve (3). Before doing so you should manually turn the Piston Assembly in up position (piston as near the Non-return Valve package as possible) to prevent the In Valve from sliding inside the cylinder.

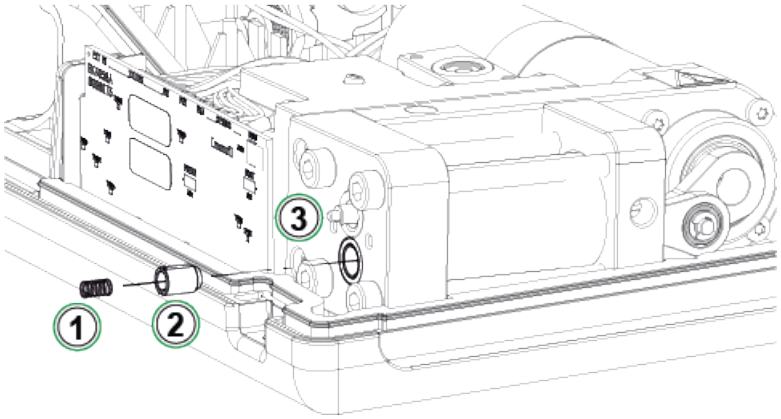


Figure 48: Step 5

Changing the Non-return Valves

ePG Non-return valve kit (8006145).

1. Remove the Back Cover (see steps 1-2 in chapter Cleaning the Out Valve).
2. Manually turn the Piston Assembly in lower position so that you can see the screw (1) behind the Cylinder Guiding End (2) and unscrew it.

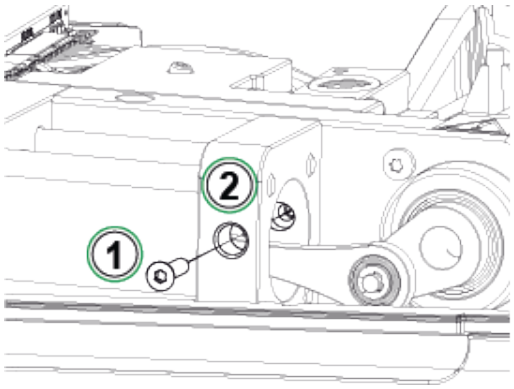


Figure 49: Step 2

3. Unscrew the following two screws (1) from the pump mechanism and lift the whole mechanism slightly up.

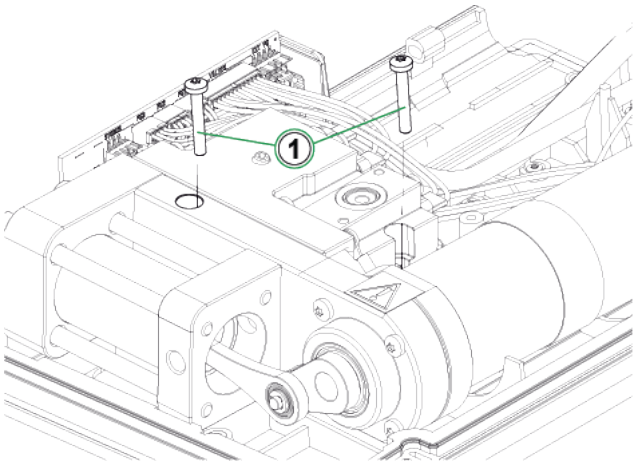


Figure 50: Step 3

4. Unscrew the four screws holding the cylinder ends together. When reassembling, tighten the screws with 2.5 Nm of torque.

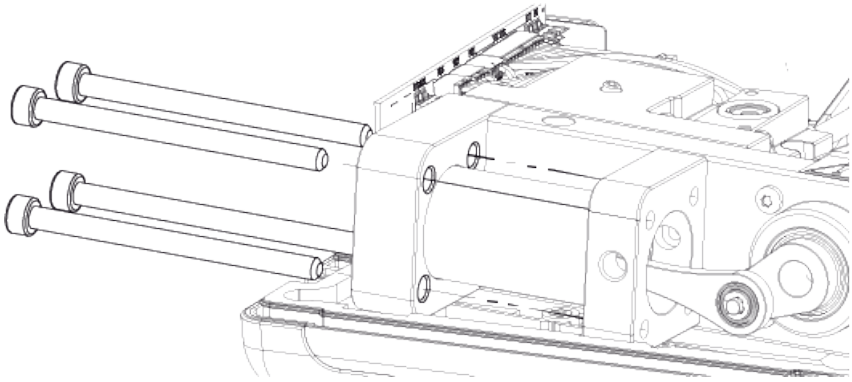


Figure 51: Step 4

5. When the screws are unscrewed, lift the Cylinder Guiding End and the Cylinder (1). Before lifting the cylinder, push it slightly backwards and turn it a bit to the right so it can be easily lifted up. Be careful not to slide the cylinder downwards in a way that the Piston Seal comes visible from the top of the cylinder. If it happens, you first have to remove the Piston Seal (Figure 56: Step 4) and then remove the cylinder to get the piston back into the cylinder.

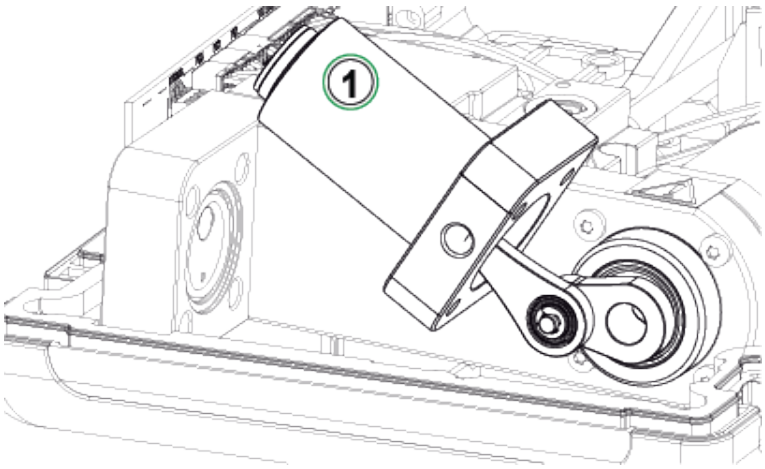


Figure 52: Step 5

6. Place the device sideways so that the In Valve (1) is facing upwards. Move the Valve Sleeve (2) aside so valve can come out from the cleft.

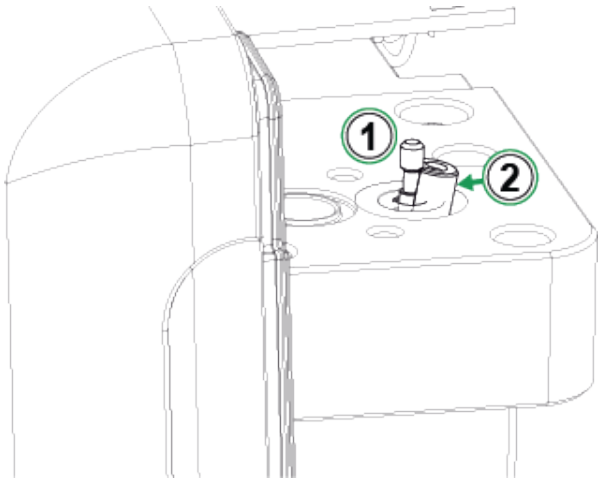


Figure 53: Step 6

7. Clean and change the In Valve Sleeve (1), spring (2) and In Valve (3). You can also clean and change the cylinder o-rings.

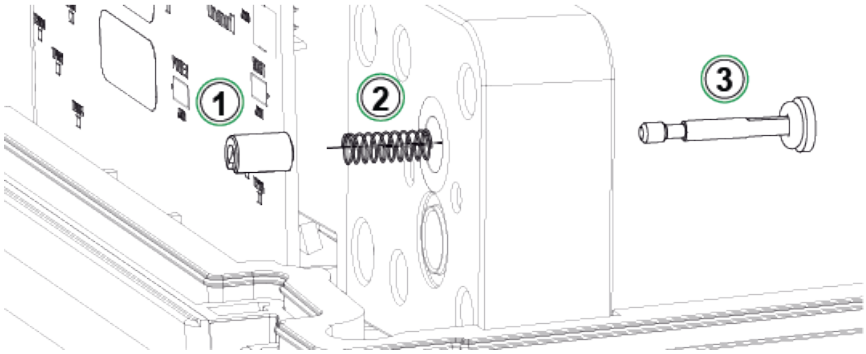


Figure 54: Step 7

8. For instructions on how to change the Out Valve, please see Step 5 in chapter Cleaning the Out Valve.
9. Assemble the device in the opposite order.

Changing the Piston Seals

ePG Piston Seal Service kit is available (8006130).

1. Remove the Back Cover (see instructions in chapter Cleaning the Out Valve).
2. Follow the steps 2 - 5 described in chapter Changing the Non-return Valves.

3. Remove the Guiding End and the Cylinder.

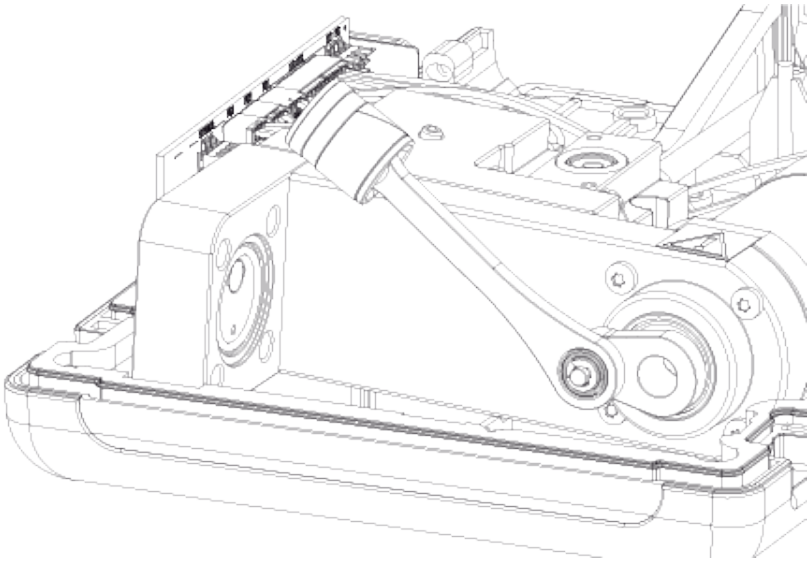


Figure 55: Step 3

4. Unscrew the M3x6 screw (1), remove the Piston Top, Piston Seal (2) and Guiding Ring (3). Open up or break the Guiding Ring for example with a screwdriver so that the Guiding Ring can be changed.

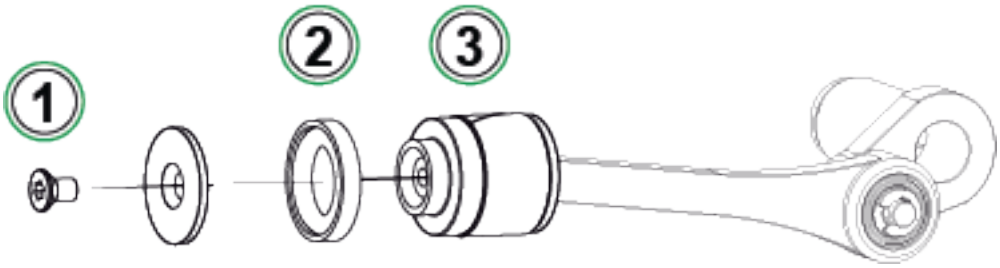


Figure 56: Step 4

5. All the parts removed.

Figure 57: Step 5

6. Push and slide the new Guiding Ring (1) over the replacement tool (2). The Guiding Ring is tight and because of that you need to use a tool to get it in place.

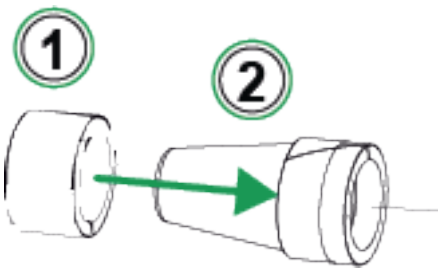


Figure 58: Step 6

7. Push the Guiding Ring and the replacement tool against the piston. Then push the Guiding Ring over the piston into place.

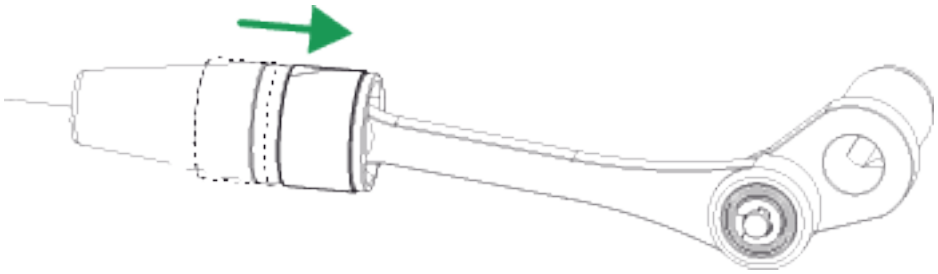


Figure 59: Step 7

8. Take a new o-ring and a new Piston Seal (see part (2) in Figure 56: Step 4). Slide them into place and tighten with Piston Top and new M3x6 screw.

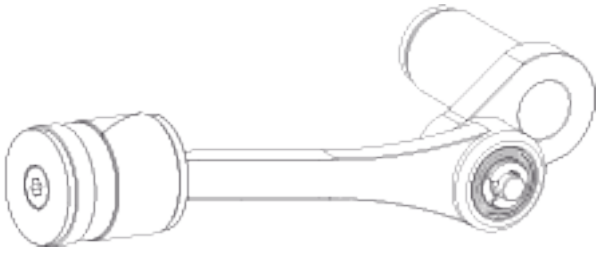


Figure 60: Step 8

Firmware update instructions

Check for the ePG firmware updates at the Download Center (https://www.beamex.com/download-center). To update the firmware version follow the instructions below.

Note: It is not recommended to use the ePG update application with a Windows version older than Windows 10.

If Beamex ePG Electric Pressure Pump and Controller firmware is updated from a PC for the first time, correct Windows driver needs to be installed:

1. Connect the USB cable between the ePG and PC.
2. Switch the ePG off.
3. Hold the Coarse Up and Coarse Down buttons and at the same time press the Power button (this activates firmware update mode and device is visible to the PC).

   Note: Mind that no LEDs lights up during this operation. The ePG will however be visible to the PC.

4. Update the drivers (for details check the Updating the USB driver). You need to have **Admin rights** to be able to update the driver.

   I. Open the Windows Device Manager.

   II. Find the USB device and manually update the drivers. They are included in the update folder: **ePG_Update\Driver**.

5. Run the ePG update software (*ePG_Update.exe* in the installation package).
6. Current ePG firmware version can be seen in the device selection, for example “ePG V1.00”.

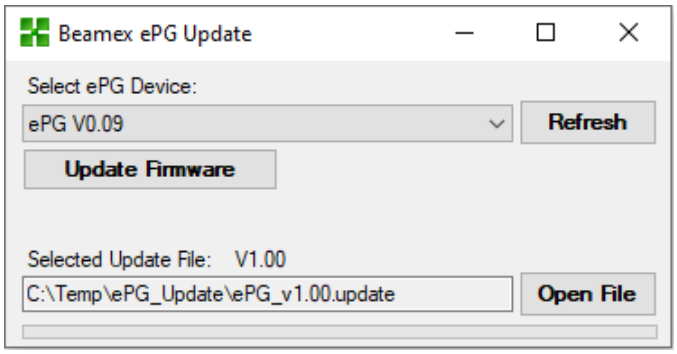
Tip: If you don't want to change the current ePG firmware version, follow these steps:

I. Disconnect the USB cable.

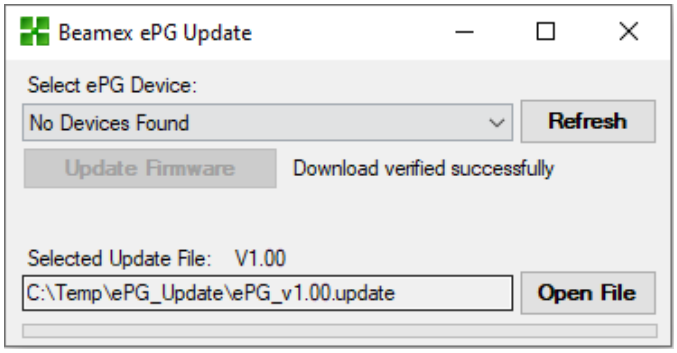
II. Press and hold ePG's Power button for at least 10 seconds. This will stop firmware update mode by doing a forced power down of the ePG. Alternatively, disconnect the ePG's battery to power down the ePG.

III. After powering down, the ePG will no longer be in firmware update mode and will start normally after pressing Power button again.

7. Select the update file (if it isn't selected automatically) and press **Update Firmware**.



8. After successful update, program will prompt a message: “Download verified successfully”.

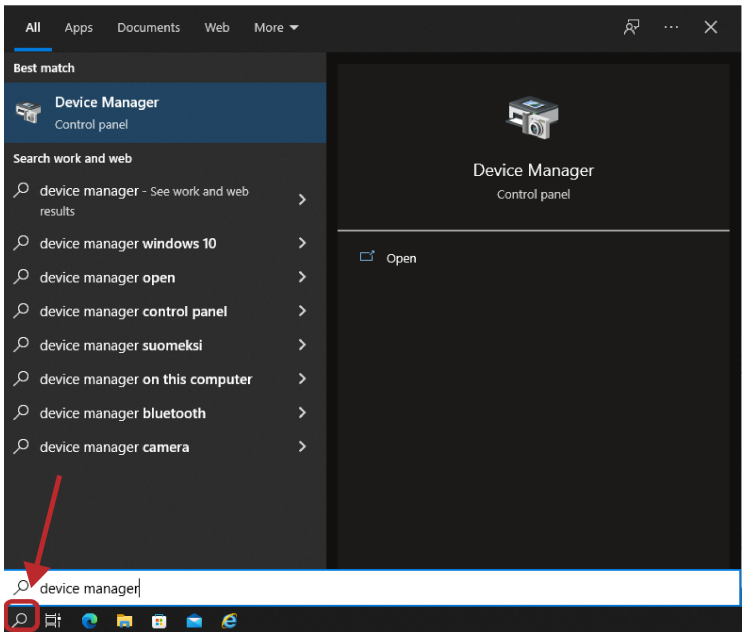


9. Device will restart.
10. Disconnect the USB cable between the ePG and PC.

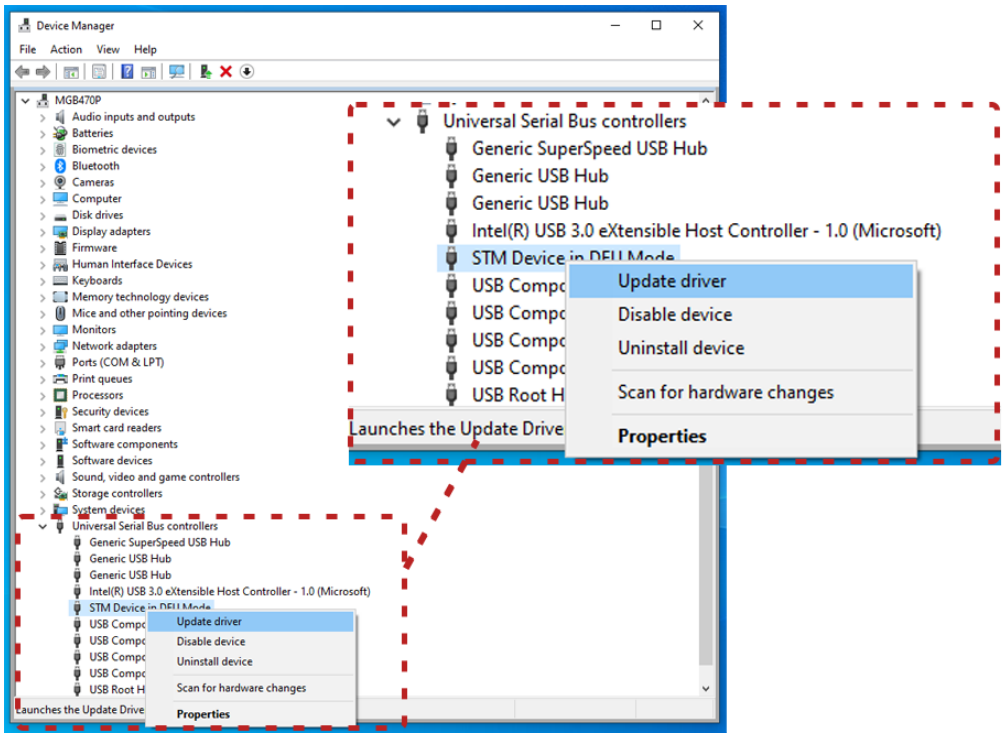
Updating the USB driver

To manually update the driver:

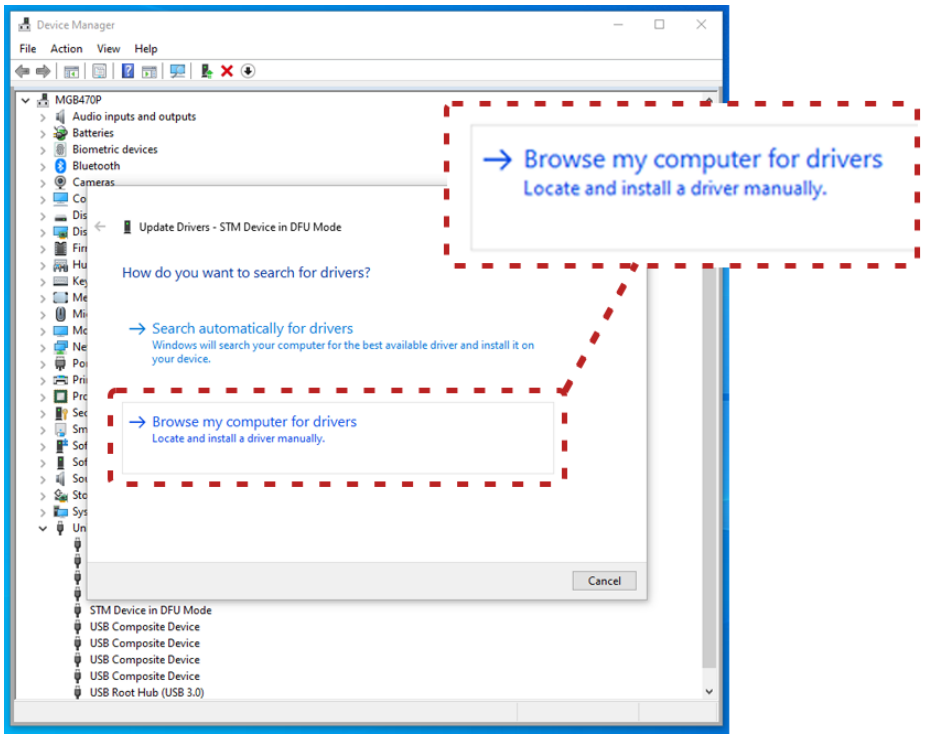
1. Open the Windows Device Manager. You can use the Search tool found on the Windows taskbar.



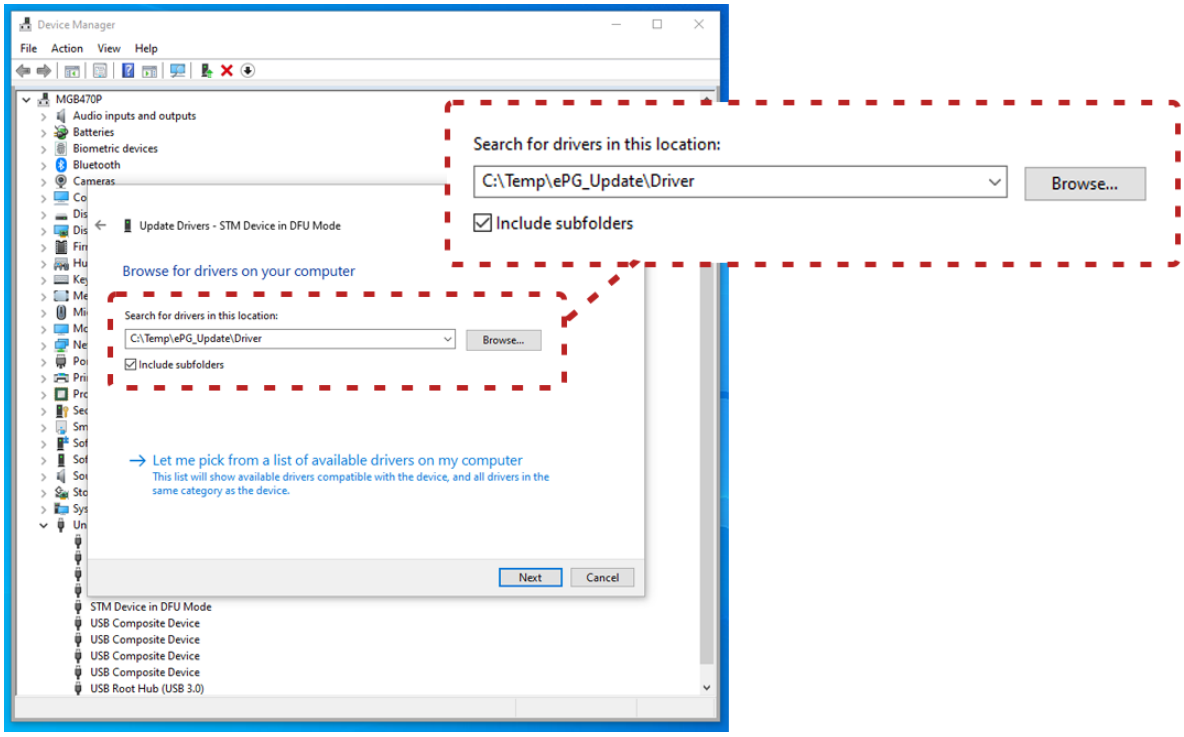
2. Right-click the **STM Device in DFU Mode** (found under Universal Serial Bus controllers) and select **Update driver**.



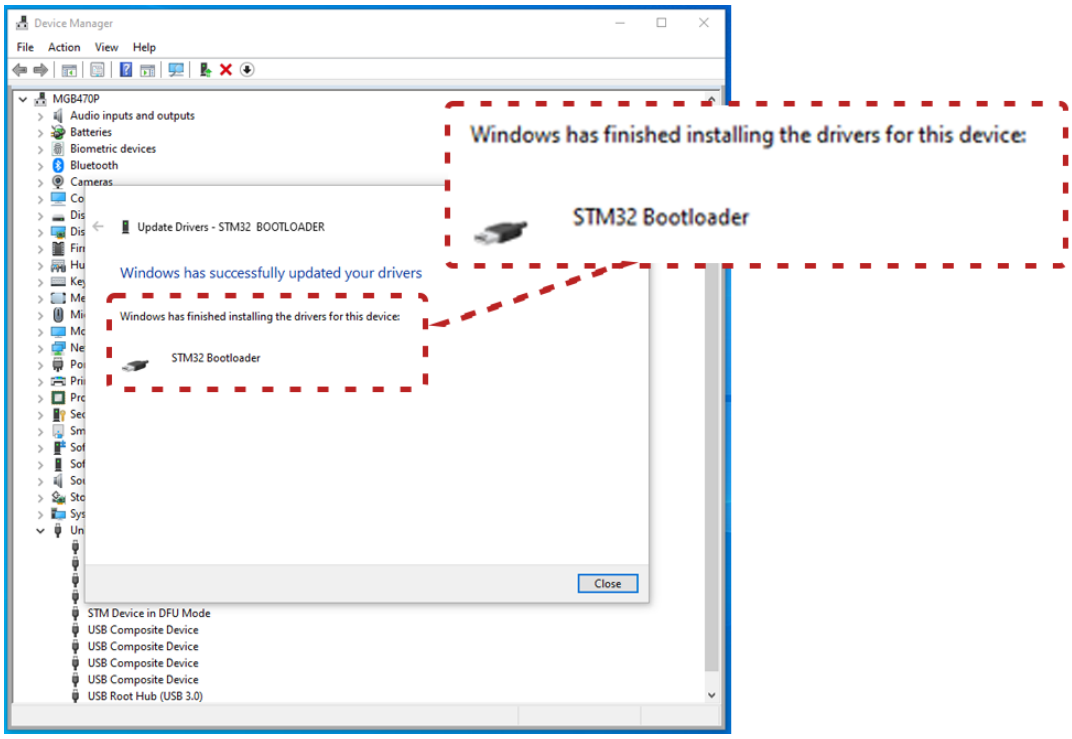
3. Select **Browse my computer for drivers**.



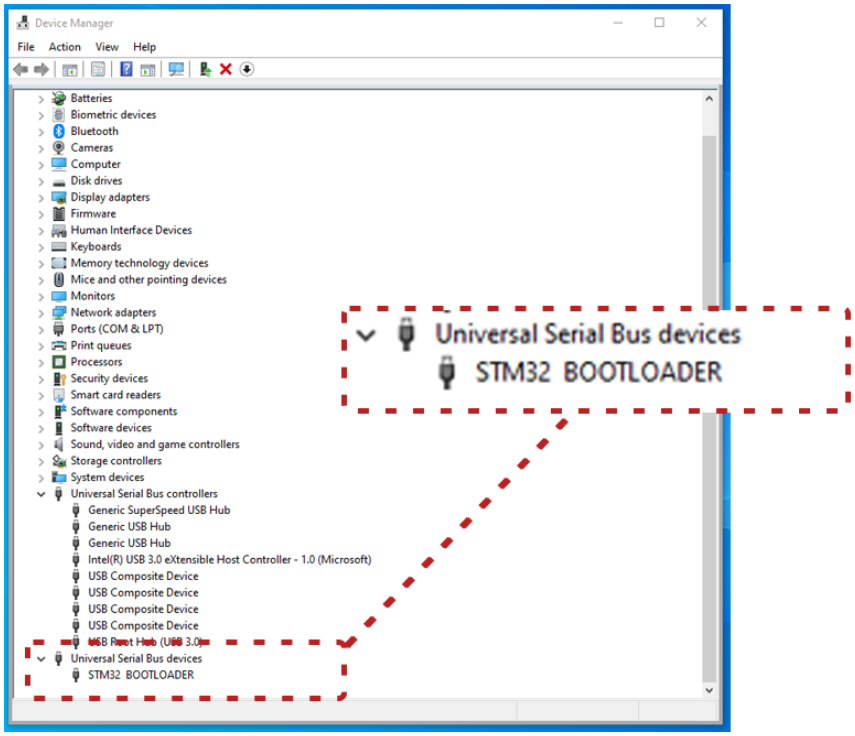
4. Browse for the correct location (**ePG_Update\Driver** folder found in the installation package) and press **Next**.



5. Driver will be installed.



6. Newly updated driver is now visible in the Windows Device Manager.



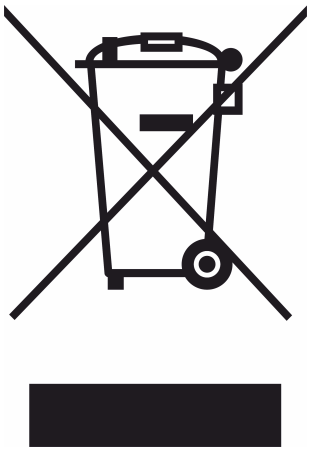
Disposal of Waste Electrical and Electronic Equipment

Beamex and WEEE

Beamex is an environmentally conscious company developing products with a view to ensure that they are easy to recycle and do not introduce hazardous materials into the environment.

In the European Union (EU) and other countries with separate collection systems, waste from electrical and electronic equipment (WEEE) is subject to regulations.

EU WEEE Directive 2012/19/EU (the WEEE Directive) requires that producers of electronic equipment are responsible for the collection, reuse, recycling and treatment of WEEE which the Producer places on the EU market after August 13, 2005. The objective of this regulation is to preserve, protect and improve the quality of the environment, protect human health, and conserve natural resources.



The symbol visible above is printed on the product's rear cover sticker. It indicates that this product should be handed over to applicable collection point for the recycling of electrical and electronic equipment.

For more detailed information about recycling of this product, please contact your local representative or your waste disposal service.

Service and transportation instructions

You can perform basic maintenance (e.g. changing the seals and non-return valves) by yourself. More complex maintenance and repairs must only be performed by Beamex's service team or an authorized representative.

When sending the ePG for service, place it in its original package, as received upon the delivery from Beamex.