PORTALEVEL® MINI

USER MANUAL

Contents

Note: For information on converting liquid levels to approximate agent weights, see the separate guide 'liquid level to Weight Conversion,' also on sdifire.com/support

1. Introduction and key features

What does the Portalevel® MINI do?

The Portalevel® MINI® is designed to be a portable way to non-invasively locate the liquid level inside any single skinned cylinder. Portalevel® MINIs are capable of detecting the presence of any liquid externally; from water and liquid pressurized gases to firefighting clean agents. Portalevel® MINIs can be used on a huge variety of container types, composed of different materials and of different shapes and sizes, but are typically most used on steel compressed gas cylinders.

Many applications exist for our technology, but it is most widely used as a replacement to both weighing fire suppression cylinders during installation and servicing, or the fitting of internal and invasive liquid level 'float' devices. Once the liquid height inside a container has been found, the contained weight of liquid can be determined, after taking into consideration other environmental factors such as the size of the cylinder and type of liquid.

The . Portalevel® MINI is capable of testing a wide variety of fire suppressant agents; CO2, FM200™, NOVEC 1230™, old Halon agents, FE-13™, FE-25™, NAF S III™ and all core Clean Agent Systems.

Portalevel® MINI

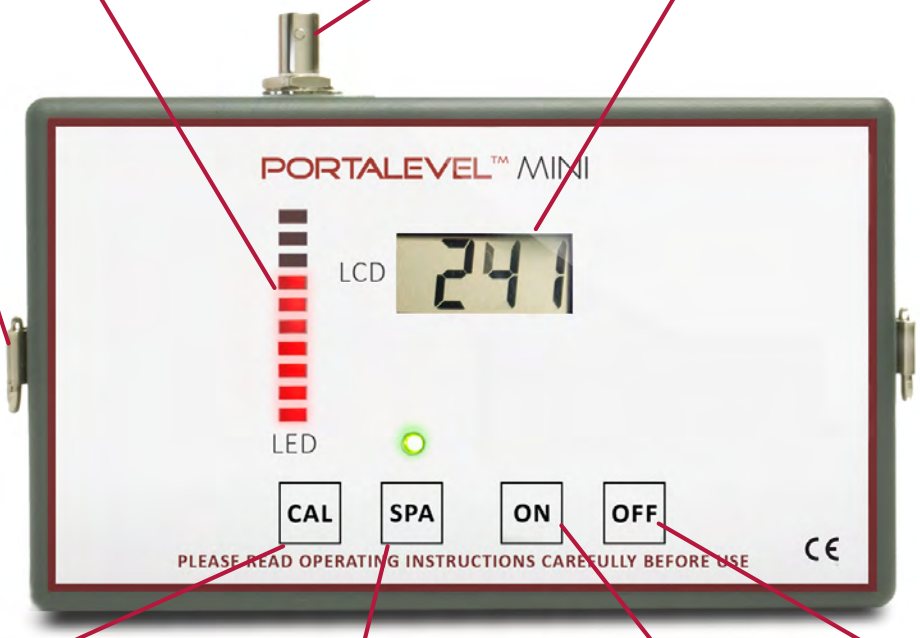
The Portalevel® MINI is specifically designed for use in environments which are hard to access or in dark environments where hands-free use is beneficial. With a calibration feature, two power settings, LED liquid level display and connectors for a neck strap, the Portalevel® MINI is ideally suited for the challenging environments, such as aboard vessels, where mobility is essential. Portalevel® MINI also includes a sensor and ultrasonic gel (couplant).

Neck strap clip: For hands free use

LED Bar: Easy to interpret visual reading

Gromit: The gromit at the bottom of the unit is the ultra secure simple fastening for the Sensor

LCD display: Numerical readings for experienced users to gauge a better interpretation of the ultrasound behavior



CAL: The CAL button is the standard procedure feature enabling self-calibration prior to testing on each individual cylinder, to ensure accurate and reliable readings.

SPA: The SPA capability enables an increased strength of signal output to achieve better readings for poor condition cylinders, more challenging applications and large volume uses.

On: Simple power ON button – powered by 4 x AA battery providing approximately 12 hours battery life

Off: Simple power OFF button – keep turned off to save battery life

How does a Portalevel® MINI **work?**

All sound is physical vibrations which move through a material, and in the case of the sound we are used to, the vibrations move through air. Ultrasound is the same as the sound we experience, but its frequency is beyond that which humans are capable of hearing. Whilst the highest frequency a human can hear is around 20,000 Hz, . Portalevel® MINI units use sound at a frequency of 1,000,000 Hz or 1 MHz.

All Portalevel® MINI devices use ultrasound in order to detect the presence of a liquid. In order to do this, the main unit sends a strong electrical signal to the sensor which then emits a high energy pulse of ultrasound into the container wall (Figure 1). The ultrasound is conducted through the solid walls of the container and then interacts with the contents. After the sensor stops emitting ultrasound, it starts listening for the returning echoes of the signal (Figure 2). It sends these back to the main unit, which then analyzes the returning signal in comparison to the calibration signal taken for each cylinder. This allows the Portalevel® MINI device to detect the presence or absence of liquid behind the area of the container wall where the sensor is placed.

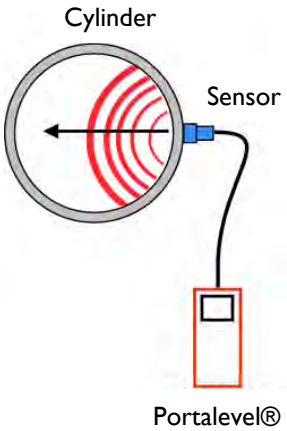


Figure 1

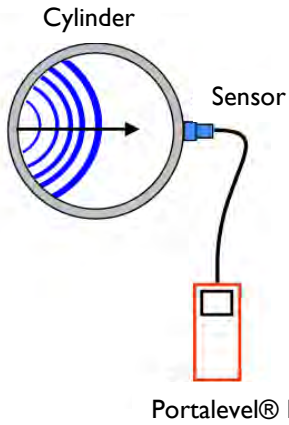


Figure 2

2. Operating Instructions

POINTS TO CONSIDER BEFORE PROCEEDING:

Do not proceed before reading section 1.

Do not proceed before familiarising yourself with the Training section on page 26.

Introduction

There are three basic procedures which must be carried out when using the . Portalevel® MINI :

1. Preparation: Function Tests and cylinder preparations. These tests ensure that the Portalevel® MINI equipment is functioning properly and that the cylinder(s) are prepared in a way to give the most accurate readings.

2. Calibration Procedure Identification (CPI): This test allows you to determine which method of testing should be used on the cylinders you wish to measure. Once you know the appropriate method of testing for that type of cylinder, you do not need to perform this again for that testing session.

3. Testing: After step two, you can follow the appropriate testing procedure (1 or 2) for that set of cylinders.

Note: If you move on to testing a different type of cylinder, which is a different size, weight or filled with a different agent, you must repeat step 2 on the new cylinder type to confirm which testing procedure is required.

As with all electronics, do to leave the Portalevel® MINI in the sun for long periods of time. Excessive UV exposure can lead to damage of the LCD screen.

DIP Test:
The DIP Test checks whether the sensor you are using is working correctly and is communicating with the Portalevel® MINI® main unit.

Step 1: Connect extension rod to unit and turn on.

Step 2: Lightly dip the tip of sensor into cup of water vertically. The amount of water in the cup is not important, as long as there is enough to dip the end of the sensor so the black central patch on the end of the senor is submerged, without it touching the bottom of the cup.

Step 3: When dipping the sensor, you should see the readings of the Portalevel® MINI spike to high values and the bar graph rise also. If you do observe this, then the DIP Test is complete and you know the sensor is working well.

CYLINDER PREPARATIONS:
It is important to prepare the cylinders well to attain accurate and reliable readings. To perform CYLINDER PREPARATIONS:

Step 1: Find on the cylinder the side which has the least damage, rust or chipped paint. For accurate testing you must find a vertical strip down the side of the cylinder which is as smooth as possible. You will be placing the sensor or extension rod and testing along this strip.

Step 2: Wipe down the chosen side of cylinder with damp cloth to remove dirt and debris. This completes the CYLINDER PREPARATIONS.

IF YOUR UNIT FAILS THE FUNCTION OR DIP TEST, PLEASE CONTACT SUPPORT AT 732-751-9266
SERVICE@SDIFIRE.COM

Temperature:
The surface temperature of the cylinders stored must be measured before the liquid levels are checked. This should be measured around half way up the cylinder.

IF THE TEMPERATURE EXCEEDS 86°F DO NOT TEST CO_2 or FE-13 CYLINDERS.

Further information regarding this issue can be found on page 21 under Frequently Asked Questions.

2. Calibration Procedure Identification (CPI)

The Purpose of this test is to identify whether method 1 or 2 should be used for the cylinder being tested. The details and differences between methods 1 and 2 are explained in the next section.

To perform CPI:

Step 1: Place a strip of gel or water down the vertical strip on the cylinder you chose during CYLINDER PREPARATIONS.

Step 2: Place sensor at top of cylinder (below top weld seam or curve). Take note of digital reading.

Step 3: Place sensor 5cm below. (Take note of digital reading).

Step 4: Repeat Step 3 down the full vertical length of the cylinder.

Step 5: Analyze the results using the guide below.

Compare your results to the guide below to decide whether Procedure 1 or Procedure 2 should be used when testing the cylinders you wish to measure.

INSTANCE 1: "Higher readings were found in the upper portion (gas area) of the cylinder compared with the lower portion (liquid area)." – Carry out Procedure 1.

INSTANCE 2: "Higher readings were found in the lower portion (liquid area) of the cylinder compared with the upper portion (gas area)." – Carry out Procedure 2.

INSTANCE 3: "There was no difference in readings between the upper portion and lower portion of the cylinder" – Carry out Procedure 2.

Both Procedure 1 and 2 are fully explained in the next section.

3. Testing

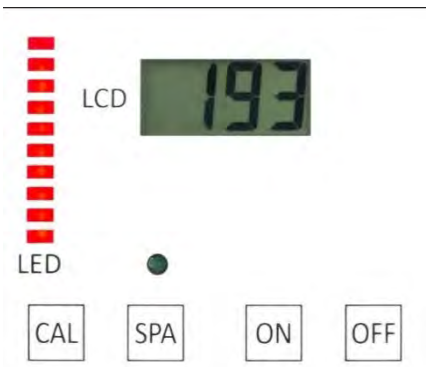
PROCEDURE 1: TO BE USED WHERE HIGHER READINGS ARE FOUND IN THE GAS PHASE COMPARED TO THE LIQUID PHASE.

Step 1: Place a strip of gel or water down the vertical strip on the cylinder you chose during CYLINDER PREPARATIONS.

Step 2: Place the sensor on the area covered with gel or water and on the UPPER portion of the cylinder, where you are certain the sensor will be above the liquid level. DO NOT place the sensor close to the upper weld or start of the dome, as anomalous readings will be found.

Note: The sensor must always be positioned with the 'TOP' marking positioned pointing exactly upwards. On some sensors the 'TOP' is marked by a simple dot. If the sensor is not accurately placed the right way up, then anomalous readings will be found.

Step 3: Once location has been found, press CAL. Readings must exceed a value of 100 in order for CAL to be engaged. A full bar graph will appear on the Portalevel®MINI screen, example below:



Above liquid level

Step 4: Move sensor 5cm down, observing the bar graph

Note: When moving the sensor, it is important NOT to slide it, as this will damage the sensor pad, rendering the sensor inefficient and inaccurate. Remove the sensor fully and replace in steps each time you move the sensor.

Step 5: Repeat Step 4 until the bar graph reduces and disappears (example below). In some areas the bar graph may 'bounce' up and down for a few seconds. If this occurs, simply wait for the bar graph to settle.

Below liquid level

Note: Some cylinders are prone to giving 'false levels', that is the bar graph may disappear after moving the sensor even though the liquid level has not been passed. If you think you may have found a false liquid level, simply move the sensor slightly to the left or right to check if the bar graph returns, as false levels can usually be caused by irregularities in a specific part of the steel wall.

Step 6: Move sensor back up the cylinder in smaller steps until the bar graph rises again. The position of the sensor on the wall of the cylinder at this point is the liquid level position inside the cylinder. **You have found the liquid level.**

Note: For increased accuracy, it is possible to move the sensor in very small steps further up or down to find the position where the bar graph settles in the middle of its range (neither full or empty). At this point, the liquid level can be identified at the position of the exact middle of the sensor with an uncertainty of ±1.5mm.

IF YOU ENCOUNTERED DIFFICULTY USING PROCEDURES 1 or 2 PLEASE MOVE ONTO TROUBLE SHOOTING ON PAGE 15.

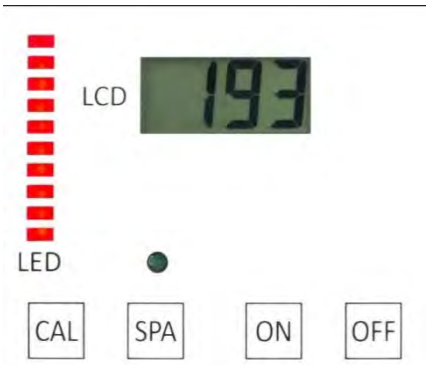
PROCEDURE 2: TO BE USED WHERE HIGHER READINGS ARE FOUND IN THE LIQUID PHASE COMPARED TO THE GAS PHASE.

Step 1: Place a strip of gel or water down the vertical strip on the cylinder you chose during CYLINDER PREPARATIONS.

Step 2: Place the sensor on the area covered with gel or water and on the LOWER portion of the cylinder, where you are certain the sensor will be below the liquid level. DO NOT place the sensor close to the weld or very close to the bottom of the cylinder, as anomalous readings will be found.

Note: The sensor must always be positioned with the 'TOP' marking positioned pointing exactly upwards. On some sensors the 'TOP' is marked by a simple dot. If the sensor is not accurately placed the right way up, then anomalous readings will be found.

Step 3: Once location has been found, press CAL. Readings must exceed a value of 100 in order for CAL to be engaged. A full bar graph will appear on the Portalevel® MINI screen, example below:



Below liquid level

Step 4: Move sensor 5cm up, observing the bar graph

Note:When moving the sensor, it is important NOT to slide it, as this will damage the sensor pad, rendering the sensor inefficient and inaccurate. Remove the sensor fully and replace in steps each time you move the sensor.

Step 5: Repeat Step 4 until the bar graph reduces and disappears (example below). In some areas the bar graph may 'bounce' up and down for a few seconds. If this occurs, simply wait for the bar graph to settle.

Above liquid level

Note: Some cylinders are prone to giving 'false levels', that is the bar graph may disappear after moving the sensor even though the liquid level has not been passed. If you think you may have found a false liquid level, simply move the sensor slightly to the left or right to check if the bar graph returns, as false levels can usually be caused by irregularities in a specific part of the steel wall.

Step 6: Move sensor back down the cylinder in smaller steps until the bar graph rises again. The position of the sensor on the wall of the cylinder at this point is the liquid level position inside the cylinder. **You have found the liquid level.**

Note: For increased accuracy, it is possible to move the sensor in very small steps further up or down to find the position where the bar graph settles in the middle of its range (neither full or empty). At this point, the liquid level can be identified at the position of the exact middle of the sensor with an uncertainty of ±1.5mm.

IF YOU ENCOUNTERED DIFFICULTY USING PROCEDURES 1 or 2 PLEASE MOVE ONTO TROUBLESHOOTING ON PAGE 15.

Troubleshooting

ISSUE 1: "The readings on the main unit did not change when the sensor was placed anywhere on the cylinder"

SOLUTION: Firstly, ensure you are using an adequate quantity of water or gel to couple the sensor to the cylinder and also ensure that the rubber pad of the sensor is clean and undamaged.

If this does not solve the problem, carry out the DIP Test and the FUNCTION Test found in section 2, page 8 and page 9. If the sensor fails the DIP Test or the main unit fails the FUNCTION Test then contact service@sdifire.com as the equipment is likely malfunctioning.

ISSUE 2: "The readings I see vary greatly on the side of the level where the highest readings are found – I can't tell where exactly to calibrate."

SOLUTION: With cylinders which present large fluctuations in readings, even when not crossing the liquid level, it may be correct to use a *'Reverse Calibration Mode'*. Some cylinders are more prone to naturally giving large variations in readings than others, but the *'Reverse Calibration Method'* can help minimize the possibility of detecting false liquid levels.

Step 1: Place a strip of gel or water down the vertical strip on the cylinder you chose during CYLINDER PREPARATIONS.

Step 2: Carry out CALIBRATION PROCEDURE IDENTIFCATION (Section 2, page 10), to identify which side of the liquid level you should *traditionally* calibrate on.

Step 3: Now, opposite to the normal method, place sensor on the side of the level where the **LOWEST** readings are found.

Step 4: Now engage SPA on the main unit (green indicator light will turn on).

Step 6: Now press CAL, followed by pressing SPA again to disengage (green indicator light should now be off again).

Step 7: Now move the sensor to the side of the level where the **HIGHEST** readings are found (full LED bar graph should appear) and work towards the opposing side in steps until the LED bar graph reduces and disappears.

Step 8: Move sensor back along cylinder in smaller steps until the bar graph rises again. The position of the sensor on the wall of the cylinder at this point is the liquid level position inside the cylinder. **You have found the liquid level.**

ISSUE 3: "Readings are rarely/never greater than 100 on the side of the level where the highest readings are found – The unit cannot be calibrated (CAL)."

SOLUTION: The Portalevel® MINI has a reading threshold of 100, below which they cannot be calibrated. This is to prevent the unit being operated incorrectly and giving false liquid levels.

Step 1: Clean surface of cylinder with damp cloth to remove dirt, debris, flaking paint and rust. Choose a vertical strip on the cylinder which has the most consistently smooth surface, top to bottom. Use this strip to place the sensor on for testing.

Step 2: Ensure you ae using either gel or water to couple the sensor to the cylinder. Be aware that especially in hot environments, water quickly evaporates from the surface of a cylinder, so in this case use gel. Also check the end of the sensor for damage to the rubber sensor pad, and clean lightly with a damp cloth if necessary.

If the above steps still do not fix the problem, try some of the additional solutions below.

Step 3: Replace the batteries on the main unit (See page 19). Low power can often significantly reduce the measurement readings seen on the unit.

Step 4: Engage SPA. This will boost power to the sensor and is useful for dealing with dirty, rusty or damaged cylinders. SPA will not correct the problem however if the battery power is already low.

Step 5: Trial 'Reverse Calibration Procedure' explained in the solution of ISSUE 3 above.

If these steps do not rectify the issue then please contact service@sdifire.com

ISSUE 4: "The LED bar graph does not light up"

SOLUTION: The LED bar graph will only light up if very high readings are found without CAL engaged, or once CAL is engaged whilst the unit reads a value greater than 100 (See ISSUE 3 if you cannot find readings greater than 100). If the LED bar graph does not light up even after CAL is engaged at a reading value greater than 100:

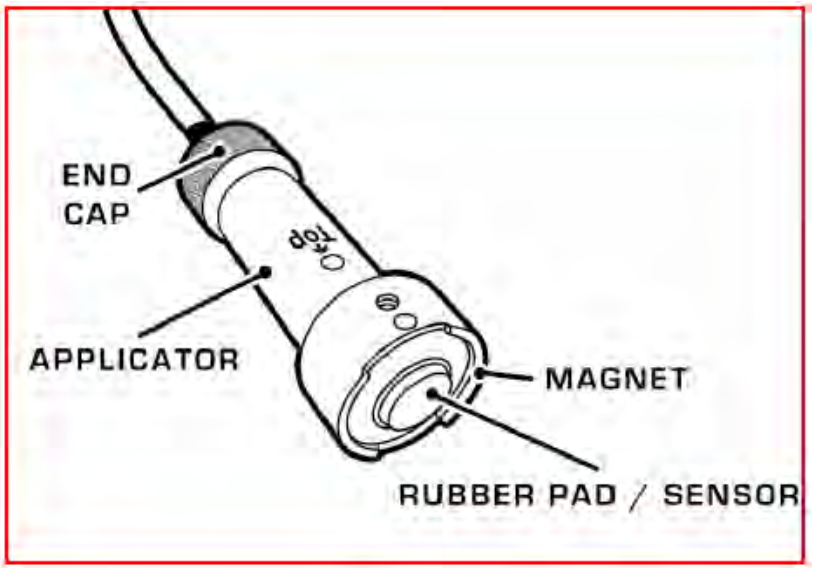
Step 1: Use the DIP Test (page 9) to check the sensor and main unit is working correctly. During the DIP Test the LED bar graph should light up entirely.

Step 2: Replace the batteries on the main unit (page 18). Low power can often significantly reduce the measurement readings seen on the unit.

Step 3: If neither of the above steps solves the problem, contact service@sdifire.com as it is likely a technical fault.

ISSUE 5: "Debris/gel in sensor housing has caused the sensor mechanism to stick making it hard to use."

SOLUTION: The sensor can be removed from its housing and cleaned following the below steps.



Step 1: With a damp cloth, clean the various parts, taking extra care on the sensor itself, the spring, and the inside of the housing/around the magnet**. Ensure all components are dried before continuing, as rusting can occur.**

Step 2: If these steps do not rectify the issue then please contact service@sdifire.com

ISSUE 6: "The display values do not rest at or close to 0 (a value of 5 or more) after the unit it turned on, with the sensor connected but not placed on a cylinder."

SOLUTION: This is a technical fault with the sensor, please contact technical support at service@sdifire.com

Frequently Asked Questions

Why do I have to use water or gel with the sensor?

The use of water or ultrasonic couplant gel is *essential* to the operation of a Portalevel® MINI unit. When the sensor both emits a high energy pulse and listens for the retuning echoes, excellent mechanical contact must be maintained between the senor and the container in order for the ultrasonic signals to pass into and out of the container efficiently and without interference. This is done by placing a thin layer of gel or water between the sensor and container wall, which omits all air from the contact area, ensuring good operating conditions. If no water or gel is used then the ultrasonic signal can be broken up or even destroyed when traveling between the container and the sensor, making taking measurements impossible.

What does SPA stand for and what does it do?

Under some conditions, even if you are using gel or water between the sensor and the container wall, some of the ultrasonic signal can still be lost. This may be because the internal or external walls are heavily rusted or corroded or maybe some part of the cylinder or liquid inside is especially good at absorbing ultrasound. To overcome this Signal Power Amplification (S.P.A) can be engaged which boosts the output power of the Portalevel® MINI allowing stronger ultrasonic pulses to be emitted and stronger pulses to be received allowing a measurement to be made.

What does the digital reading mean?

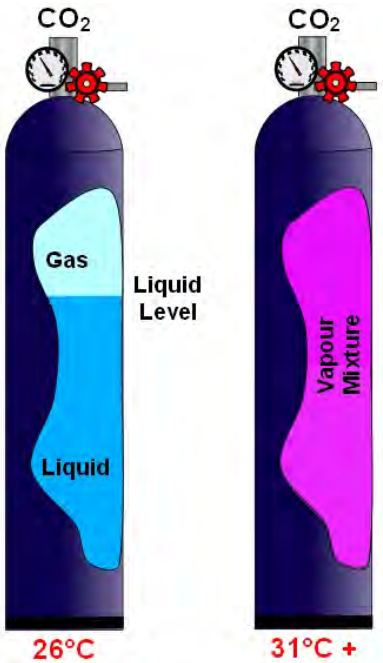
The digital display on the Portalevel® MINI units represents the strength of the returning echoes, and once the Portalevel® MINI is calibrated to an area of the cylinder where high readings are found, the sensor can be moved up and down the container in order to find the exact location where the transition from liquid to gas contents is found.

Why can't I test CO_2 and FE-13 in high temperatures?

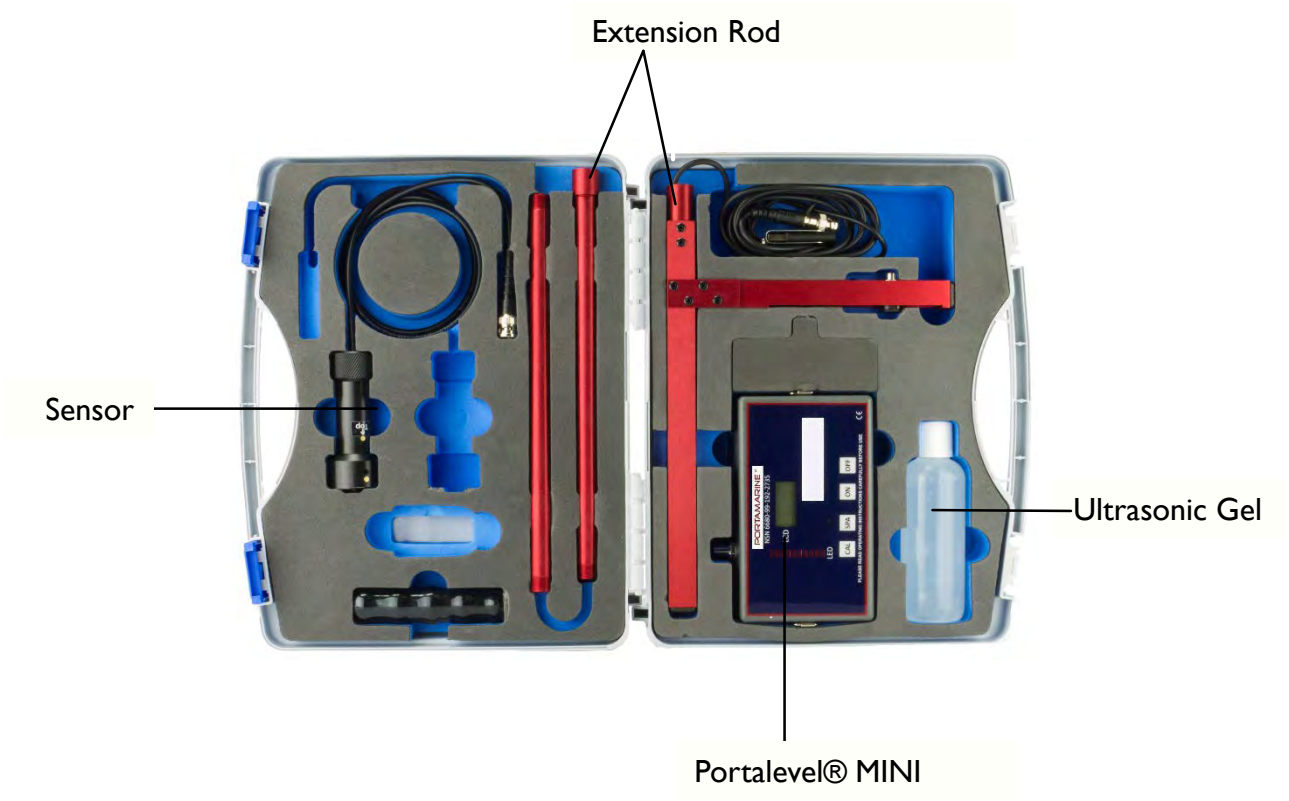
When testing some liquids, it is vital that testing is done under atmospheric temperatures lower than their *critical temperature*. At the critical temperature of a liquid, it transforms into a vaporous state in which a liquid level no longer exists inside the container to be measured. NOVEC 1230 has a critical temperature of 168.7 °C and as such testing is never practically limited by this, but some commonly tested liquids have low critical temperatures. CO_2, carbon dioxide, has a critical temperature of 31 °C and FE-13 has a critical temperature of 26 °C. Whilst this can prove problematic in especially hot climates, there are several methods in which this can be overcome:

- Running fresh water lines across cylinders to act as a heat exchanger
- Use of portable AC units
- Use of bagged ice around cylinders to cool them
- Testing both early and late in the day.

Testing these gases at the coolest temperature achievable will allow for the most accurate and efficient results.
It is also important to note that agitating cylinders of FE-13 can also cause a change in the liquid level due to the physical properties of FE-13. It is possible that agitating cylinders can cause more FE-13 to be in the vapor phase than expected at a given temperature, this results in a lower liquid level reading than is the case. It is recommended that FE-13 cylinders are left at rest for a few hours before testing to avoid inaccurate liquid level measurement.



3. Accessories



A Portalevel® MINI shown in its carry case. Ultrasonic gel, sensor and extension rod extension rod sold separately

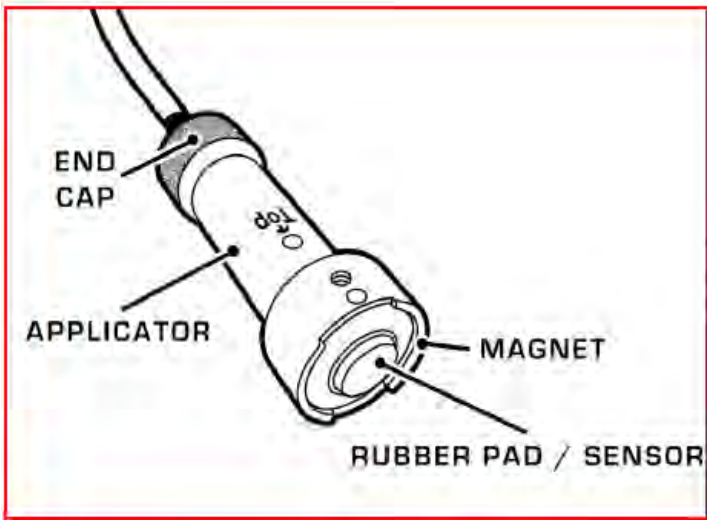
Ultrasonic Gel

The ultrasonic gel or couplant can be used instead of water if the user intends to test a cylinder for a reasonably long period of time, if the ambient temperature is very hot, or if the site does simply not allow open containers of water (data server rooms for example).

The couplant dries out much more slowly than water alone and is more viscous, allowing continuous testing in hot environments and little mess as it sticks to the container only.

Portalevel® MINI Sensor

Portalevel® MINI sensors are single crystal piezoelectric sensors which both emit and receive the ultrasound that the Portalevel® MINI uses to detect a liquid level. Whilst the sensors are designed to be rugged, they must be properly maintained in order to maximise their lifetime. The two most critical points are to <u>always</u> dry the end of the sensor after use to prevent rusting and to treat the rubber pad with care as damage or scratches can significantly reduce the sensor's effectiveness.



Portatherm® (Optional Extra)

Portatherm® is an easy to use infrared thermometer which allows easy checking of a cylinders temperature prior to testing. This is useful when testing agents such as Carbon Dioxide or FE 13 in hot climates, which cannot be tested above their critical temperature.
See page 21 in Frequently Asked Questions for more information about this.

Operation

Aim the thermometer at the target and press the 'measure' button. The instrument should be as close to the target as possible to achieve an accurate measurement (within 2.50 cm if possible).

Mode Button
The instrument must first be turned on by pressing the 'measure' button before the mode can be changed.
1 Press - Minimum temperature: Pressing the mode button once, confirmed by then pressing the measure button will measure the minimum temperature when the measure button is pressed again.
2 Presses – Maximum temperature: Pressing the mode button twice, confirmed by then pressing the measure button will measure the maximum temperature when the measure button is pressed again.
3 Presses - Lock: Pressing the mode button three times, confirmed by then pressing the measure button again, will continually measure the temperature for 60 minutes when the measure button is pressed. This can be shortened by pressing the measure button again.
4 Presses – °C/°F: Pressing the mode button four times, confirmed by then pressing the measure button, will change the device between measuring in Celsius and Fahrenheit.

Errors
Er2: This message is displayed when the device is exposed to rapid changes in temperature – the thermometer needs approximately 30 minutes to stabilise to a certain room temperature.
Er3: This message is displayed when the thermometer is outside it's specified measuring range of 14°F to 122°F – the thermometer will not be able to measure the temperature in these environments.
Er5-9: Reset the thermometer – turn it off, remove the batteries, wait 1 minute, reinsert batteries and turn the thermometer back on.

Low Battery: This is represented by an icon. Turn the unit off and replace the batteries with 2 x AAA batteries. **Ensure the unit is turned off before replacing batteries.**

Cleaning: Clean the thermometer lens with a soft cloth or cotton swab and water/ medical alcohol. Never submerge the thermometer and allow it to fully dry before using it again. The thermometer should not be stored outside its measurement range of 14°F to 122°F.

4. Maintenance

This section contains instructions on how to maintain the equipment to extend its lifetime as long as possible. Maintenance of the equipment is simple and only requires the cleaning of the sensor. For any major works or re-calibrations the unit can be returned to SDi for repairs.

Sensor Care

The ultrasonic sensor is the most delicate part of a Portalevel® MINI®, and care must be taken when using it. The sensor is robust, but damage may occur if it is dropped, or if the sensor is dragged across the surface of the steel rather than being removed and replaced in steps. The rubber pad on the end of the sensor is designed to protect the face of the transducer inside, so care must be taken to avoid scratching or damaging this pad to allow the sensor to work efficiently.

After using a Portalevel® MINI®, it is essential that the end of the sensor is dried off, regardless if water or gel is used. If not dried after use, the magnet is likely to rust and the spring mechanism may jam if gel dries internally. If the spring mechanism does jam, it can be cleared by unscrewing the endcap of the sensor, removing the mechanism from inside, and carefully cleaning the transducer and sensor. When replacing the internal mechanism, the groove along the top of the transducer must be aligned with the groove on the inside of the sensor housing, otherwise it will not reassemble correctly.

Battery Care

The Portalevel® MINI® low battery icon which shows on the screen when the battery need replacing.

When the battery low icon is displayed, the battery must be replaced before the unit is used further.

Battery Replacement

You will need a Philips screwdriver and 4x AA 1.5V Batteries.

Step 1: Turn unit onto its front, gently slide off battery hatch.

Step 2: Replace batteries with 4x AA 1.5V batteries, taking care to match the correct orientation/polarities of the batteries into the slots.

Step 3: Place battery hatch back into housing and gently slide into place.

Step 5: If Steps 1-4 do not rectify the issue then please contact service@sdifire.com

Storage

When a Portalevel® MINI® unit is going to be stored, or not used for a long period of time, remove the battery from the main unit to prevent corrosion damage to the unit. This will also prolong battery life.

5. Training

This section is for new or untrained users, or for users who may need to remind themselves of how to operate a Portalevel® MINI®.

The positions of the particular controls for the Portalevel® MINI® are shown at the beginning of the manual in section 1.2, page 4, and the names and functions of Portalevel® MINI® accessories are shown in section 4, page 22.

The main purpose of this short guide is to explain the BENCH Test and also to direct users towards the resources in section 6, which includes further help and videos showing how to use the Portalevel® MINI® on different cylinders.

The BENCH Test:
The purpose of the BENCH Test it to familiarise users with the Portalevel® MINI® in a simple testing environment, before moving onto testing real cylinders which can be more challenging.

To perform the BENCH Test, you will need:

- The Portalevel® MINI® unit on which you are to be trained.
- The included ultrasonic gel or a container of water to use as couplant.
- A large container, half full of water, to simulate a pressurised cylinder
    - A metal (ideally magnetic) container works best, though a hard plastic container will still work. The shape of the container is not particularly important, as long as its outside surface is smooth enough for the sensor to be cleanly pressed against it, and it is tall enough for the sensor moved up and down in steps of a few centimetres.

The BENCH Test is very easy to perform. Simply follow the steps on the following pages, where you will use the Portalevel® MINI® to detect the water liquid level in your chosen large container, and in the process you will familiarise yourself with the basic procedure of using a Portalevel® MINI®.

The BENCH Test:

Step 1: Connect the extension rod to the Portalevel® MINI® unit and turn the unit on.

Step 2: Choose a vertical strip of your large container which is as continuously smooth as possible, free of chips, rust or any other kind of damage. Apply water or the ultrasonic gel along the length of this chosen vertical strip.

Step 3: With all Portalevel® MINI® testing, you must first find where on the cylinder you find, in general, the highest digital readings: above the liquid level or below the liquid level. To do this, place the sensor at the top of the chosen vertical strip (see note below), and take note of the reading the Portalevel® MINI® main unit displays. Then move the sensor down in a step roughly 5cm (2 inches), and make another note of the value the main unit reads. Once you have reached the bottom of the vertical strip, ask yourself: In general, where did I find the highest readings?

Note: The sensor must always be positioned with the 'TOP' marking positioned pointing exactly upwards. On some sensors the 'TOP' is marked by a simple dot. If the sensor is not accurately placed the right way up, then anomalous readings will be found.

Step 4: You should have found the highest readings when the sensor was placed on an area of the large container which was **below** the water liquid level. When testing real cylinders, this test must be performed for each new type of cylinders, and you may find the highest readings above or below the liquid level. However, when testing water you should always find the highest readings below liquid level.

Step 5: Place the sensor on an area of the large container which is below the liquid level (You should see high readings on the display). Now press the CAL button on the unit to *calibrate* it to this particular container. **You should now see a full bar graph on the display of the unit.** When testing on any container or cylinder, you always calibrate the Portalevel® MINI® on the side of the liquid level which gives you the highest readings.

Step 6: Move the sensor back up the vertical strip of the cylinder, again in steps of roughly 5cm (2 inches), observing the bar graph each time you place the sensor onto the container wall. Be sure the vertical strip of wall you chose of the container is still well covered by whatever couplant (water or gel) you have chosen.

Step 7: As you progress up the wall of the container, the numerical readout on the Portalevel® MINI® unit will change, and the bar graph might fluctuate slightly. However, the bar graph will only disappear entirely once you place the sensor on the container wall above the liquid level. Once you observe this, move the sensor back down the container in smaller steps, until the bar graph reappears. You have found the liquid level.

Note: For increased accuracy, it is possible to move the sensor in very small steps further up or down to find the position where the bar graph settles in the middle of its range (neither full or empty). At this point, the liquid level can be identified at the position of the exact middle of the sensor with an uncertainty of ±1.5mm.