PORTALEVEL® MAX

USER MANUAL

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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® do?

The Portalevel® Max is designed to be a portable way to non-invasively locate the liquid level inside any single skinned cylinder. Portalevel®s are capable of detecting the presence of any liquid externally; from water and liquid pressurised gases to firefighting clean agents. Portalevel®s 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.

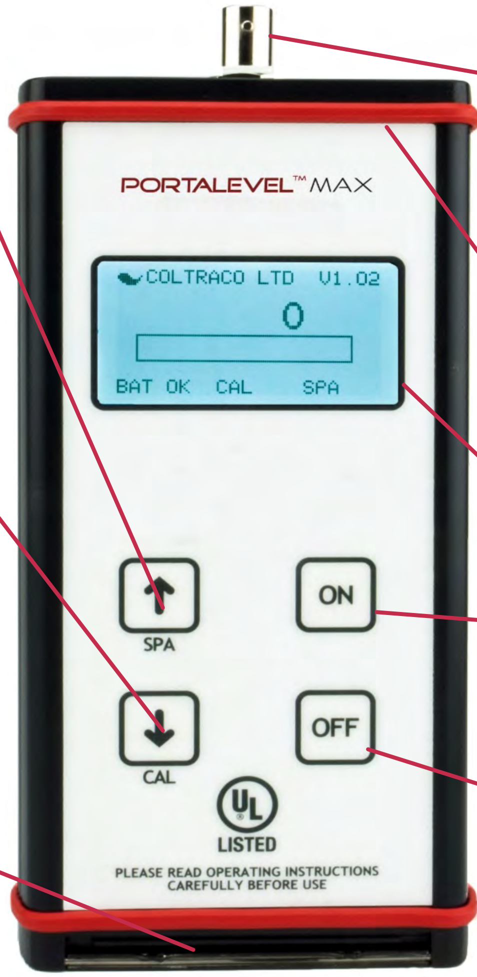
Many applications exist for our technology, but it is most widely used as a replacement to both weighing fire suppression cylinders during installation and servicing, or the fitting of internal and invasive liquid level 'float' devices. Once the liquid height inside a container has been found, the contained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

Portalevel® Max

With an intelligent calibration feature and four separate power settings, the Portalevel® Max is versatile and our most user friendly unit. It 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® Max

The Portalevel® Max also includes; sensor, and ultrasonic gel (couplant).



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.

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.

Battery Compartment: The battery compartment is on the bottom of the unit and has a double gateway to be waterproof. It must be opened by a flat head tool, e.g. a screwdriver in order to change the battery.

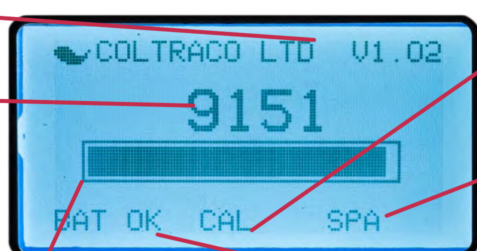
Gromit: The gromit at the top of the unit is the ultra secure simple fastening for the sensor

Sealing: Red sealing ring for watertight integrity

Display: 'Go/No-Go' readings for quick and easy use

On: Simple power ON button – powered by 1 x 9V battery providing approximately 8 hours battery life

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



V1.02: Version 1.02

Digital display: Numerical readings for experienced users to gauge a better interpretation of the ultrasound behaviour

Bar graph display: Easy to interpret visual reading

CAL: Highlights when CAL in use

SPA: Checks SPA feature is working

BAT OK: Checks battery level

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 27.

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

1. Preparation: Function Tests and cylinder preparations. These tests ensure that the Portalevel® 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® Max in the sun for long periods of time. Excessive UV exposure can lead to damage of the LCD screen.

1. Preparation

Preparation for testing is simple, quick and ensures you get the most reliable and accurate results from your testing. The FUNCTION Test and DIP Test both ensure the main unit and sensor are working correctly. CYLINDER PREPARATIONS ensure that you test on the best possible area of the cylinder wall.

<u>FUNCTION Test</u>:

A FUNCTION Test should be performed every time you wish to use the unit. To perform the test, simply connect the sensor to the main unit and turn on the Portalevel®. After a couple of seconds, the readout should reset itself to zero. Then press the CAL button. The CAL symbol should become blacked out like this:

Then disengage CAL by pressing the CAL button again and turn the unit off. This completes the Function Test.

<u>DIP Test:</u>

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

Step 1: Connect sensor 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® 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 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 OR 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 86ºF (30°C) DO NOT TEST CO_2 or FE-13 CYLINDERS.

Further information regarding this issue can be found on page 20 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 wield 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: Analyse 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 <u>GAS PHASE</u> 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. A full bar graph will appear on the Portalevel® screen, example below:

<u>Above</u> liquid level

Calibration must be carried out for each individual cylinder tested.

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 14.

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. A full bar graph will appear on the Portalevel® screen, example below:

Below liquid level

Calibration must be carried out for each individual cylinder tested.

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 TROUBLE SHOOTING ON PAGE 13

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 2.2, page 7. If the sensor fails the DIP Test or the main unit fails the FUNCTION Test then contact service@sdfire.com as the equipment is likely malfunctioning.

ISSUE 2: "The readings fluctuate greatly even with the sensor repeatedly placed on the same side of the Liquid Level." / "Readings on the main unit increase the longer the sensor is left on the cylinder."

Some fluctuation in the reading is normal when working with this and any other ultrasonic equipment. If the variation is extreme, ensure the end of the sensor and the area of the cylinder you are testing are clean and free of debris and chipped paint.

You can expect the readings to rise once you have placed the sensor on cylinder, especially when using the gel couplant. This rising of the reading values is caused by a few separate factors, but does not prevent accurate Liquid Level detection. To reduce the impact of this effect, try to keep the sensor on the cylinder for roughly the same amount of time for every step up or down the cylinder you take with the sensor.

If the readings fluctuate more than ±100% when the sensor is left in one location then please contact service@sdifire.com

ISSUE 3: "Readings are rarely/never greater than 1000 on the side of the level where the highest readings are found."

SOLUTION: The Portalevel® Max should, in most scenarios, be able to attain readings of more than 1000 on a cylinder. Achieving readings less than 1000 **DOES NOT** always prevent measurement, but in some cases may cause problems. If you are having problems making a measurement:

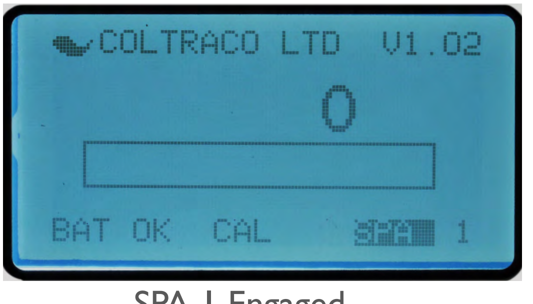
Step 1: Clean surface of cylinder with damp cloth to remove dirt, debris, flaking paint and rust. Choose a vertical strip on the cylinder which has the most consistently smooth surface, top to bottom. Use this strip to place the sensor on for testing.

Step 2: Ensure you are 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 26). Low power can often significantly reduce the measurement readings seen on the unit.

Step 4: Engage SPA by pressing the SPA button. 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. There are four SPA settings, each of greater power than the last. Use the lowest SPA setting which gives you values of at least 1000, and then continue with testing.



SPA 1 Engaged

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

ISSUE 4: "The bar graph does not fill up, even with CAL engaged"

SOLUTION: The bar graph will only fill up if very high readings are found without CAL engaged, or once CAL is engaged and the current reading is significantly larger than the value displayed when CAL was pressed. If you cannot get the bar graph to fill up:

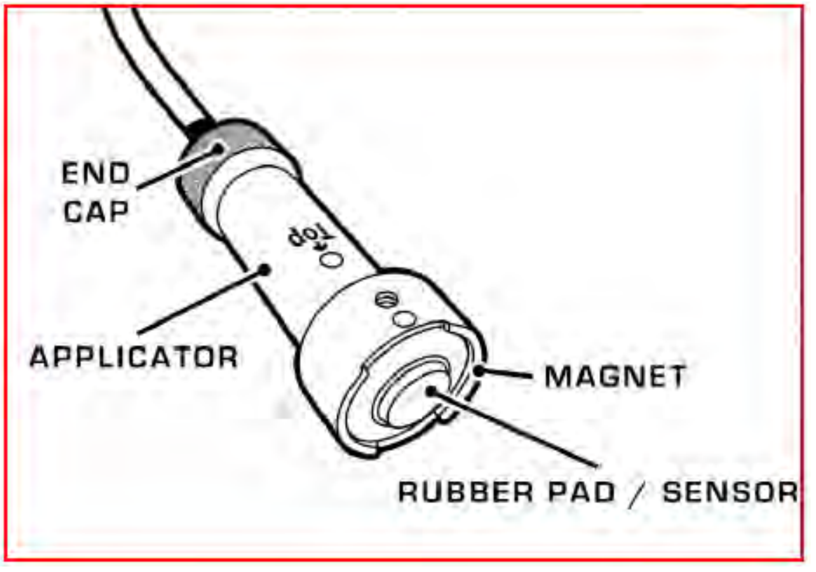
Step 1: Use the DIP Test (Section 2.2, page 7) to check the sensor and main unit is working correctly. During the DIP Test the bar graph should light up entirely.

Step 2: Replace the battery on the main unit (see page 26). 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: Hold sensor in left hand with dot/top facing up. With right hand, unscrew rear cap completely by twisting anticlockwise.

Step 2: Once the rear cap is unscrewed, gently pull out the sensor and spring by pulling on the cable.

Step 3: 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 4: To reassemble, slide sensor back into the applicator housing whilst twisting gently so the sensor seats itself into the guide rail inside the housing. This rail ensures the sensor remains the right way up inside the housing. Then push in the sensor until it stops and screw the rear cap back on.

Step 5: If these steps do not rectify the issue then please contact service@sdifire.com

ISSUE 6: "There is not a significant difference between above and below level readings"

Step 1: Carry out a 'Calibration Procedure Identification' (CPI) explained in Section 2.3, page 9.

Step 2: Upon completing Step 1 press CAL on the exact location where the highest readings are found.

Step 3: Continue to test as normal.

Step 4: If this still does not rectify the problem, engage SPA 1 and retest. If the Liquid Level still cannot be found, proceed to SP A 2 and SPA 3 and retest.

Step 5: If this does not rectify the problem, please contact 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® 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® 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?

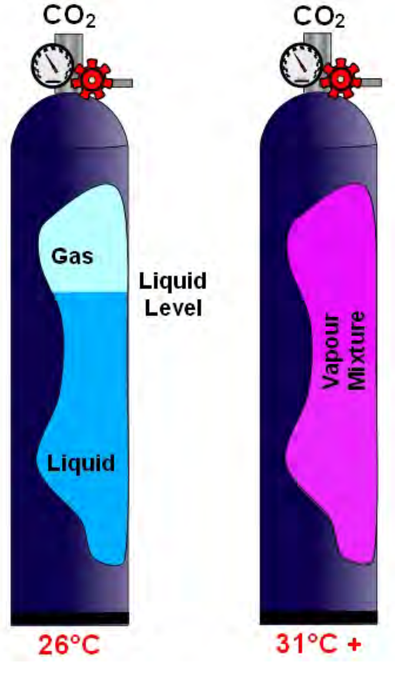
The digital display on the Portalevel® units represents the strength of the returning echoes and once the Portalevel® is calibrated to an area of the cylinder where high readings are found, the sensor can be moved up and down the container in order to find the exact location where the transition from liquid to gas contents is found. The exact operating procedure to be used is explained in detail in Chapter 2.

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

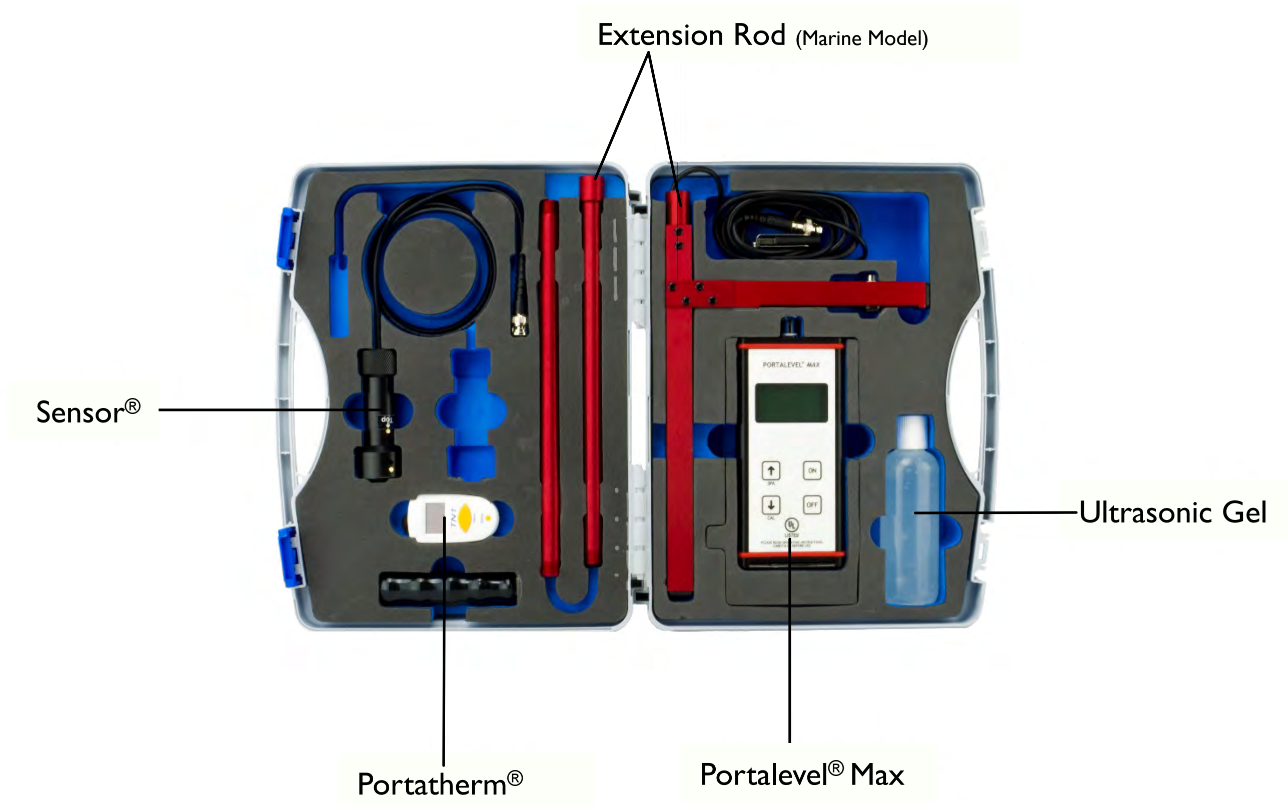
When testing some liquids, it is vital that testing is done under atmospheric temperatures lower than their *critical temperature*. At the critical temperature of a liquid, it transforms into a vapourous state in which a liquid level no longer exists inside the container to be measured. NOVEC 1230 has 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 vapour 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



Portalevel® Max in carry case with accessories

Extension rod (Extra)
The Portalevel® extension rods are primarily developed for use in the marine industry and as such come as standard with the Portalevel® Max Marine (not with the Portalevel® Max). However practically, they can be used in any environment with multiple banked rows of cylinders to allow easy liquid level detection two or even three rows back.

We manufacture and supply two models of extension rod, but both are assembled and used in the same way (see overleaf).

The extension rod (Figure 3) sections simply screw together, with the sensor at one end (F) and the handle at the other (D). The cable connecting the sensor to the main unit (B) threads through the hollow sections and out of the handle to avoid tangling. Using the adjustment nut and an Alan key, the sensor (F) can be loosened and slid horizontally along the adjustment rail (G). This allows the sensor to be positioned so it contacts the cylinder flatly when being used. A printed ruler guide on the adjustment rail allows accurate positioning of the sensor, and it should be positioned at a value which is equal to the radius (half the diameter) of the cylinders to be measured.
Once this setup is complete, the BNC connector (A) can be connected to the Portalevel® main unit and can be used using the same procedure as a normal sensor.

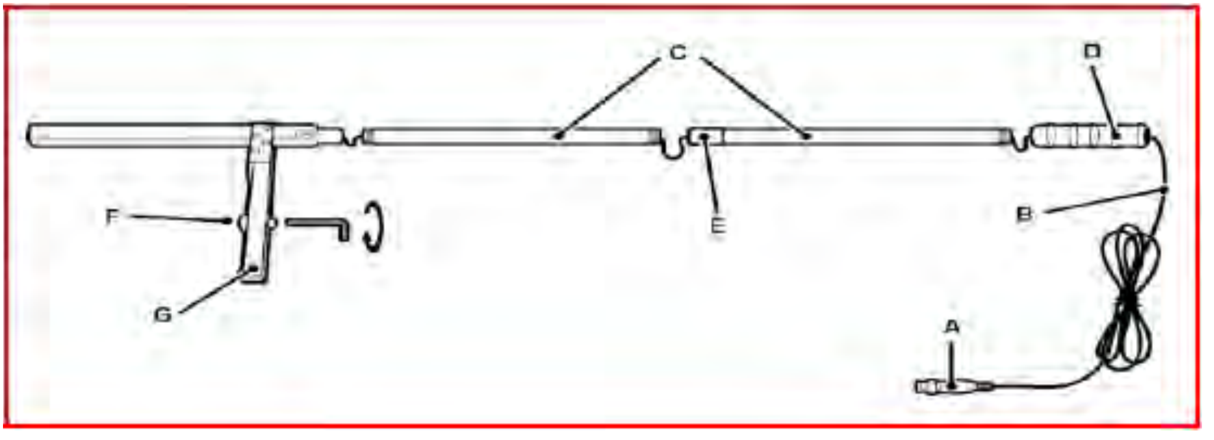
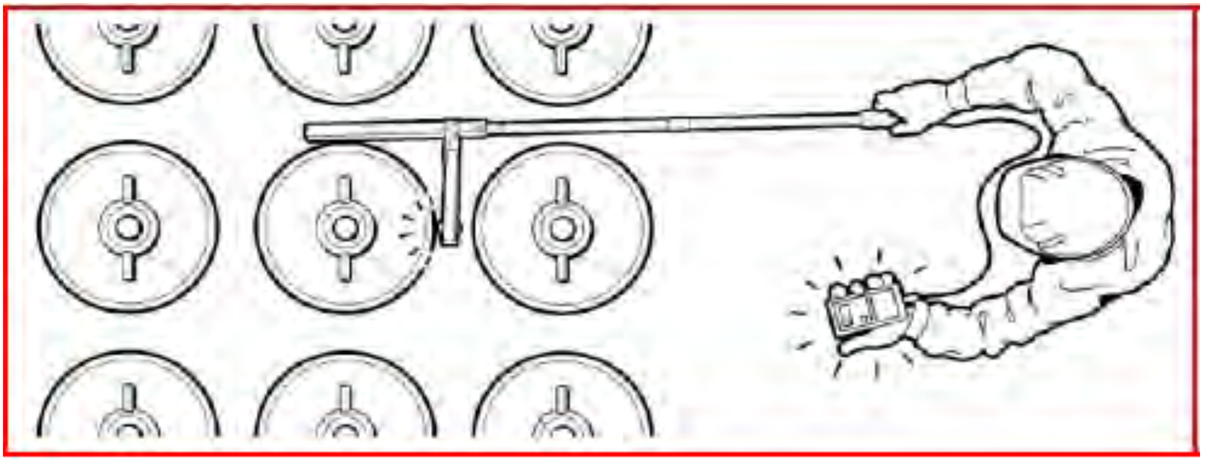


Figure 3



Example of an extension rod being used

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 20 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 off before replacing batteries.**

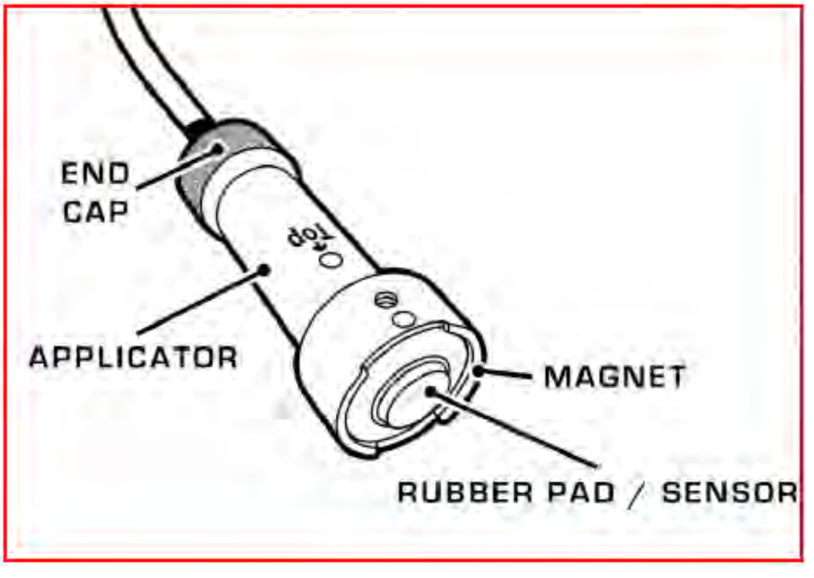
Cleaning: Clean the thermometer lens with a soft cloth or cotton swab and water/ medical alcohol. Never submerge the thermometer and allow it to fully dry before using it again. The thermometer should not be stored outside its measurement range of 14 °F to 122 °F.

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® Sensors



Portalevel® sensors are single crystal piezoelectric sensors which both emit and receive the ultrasound that the Portalevel® 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 always 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.

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 the manufacturer for repairs.

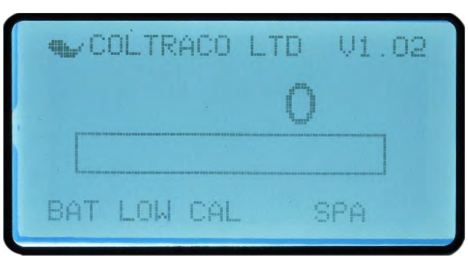
Sensor Care

The ultrasonic sensor is the most delicate part of a Portalevel® 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®, 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 (p)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® Max has an indicator bottom left of the LCD screen, which shows up black when the battery is low.



When the battery low indicator is displayed, the battery must be replaced before it is used further, or the unit may provide anomalous results. To replace the battery follow the instructions overleaf.

Battery Replacement
You will need a small flathead screwdriver and a 9V alkaline type 6LR61 Battery.

Step 1: Ensure the unit is off and turn the unit so that the front fascia faces downwards.

Step 2: Take a small, flat head screwdriver and insert it into the slit at the bottom of the back side of the unit.

Step 3: Lever the screwdriver gently until the battery hatch pops open.

Step 4: Use screwdriver to open the internal battery compartment.

Step 5: Remove old battery and replace with new, taking care to connect + and – correctly.

Step 6: Close battery cover, ensuring that the wires are not trapped.

Step 7: Press Battery hatch until it clicks into place.

Storage
When a Portalevel® 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®.

The positions of the particular controls for the Portalevel® Max are shown at the beginning of the manual in section 1.2, page 4, and the names and functions of Portalevel® Max accessories are shown in section 4, page 21.

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® Max on different cylinders.

The BENCH Test:

The purpose of the BENCH Test it to familiarise users with the Portalevel® 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® 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® Max 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®.

The BENCH Test:

Step 1: Connect the sensor to the Portalevel® 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® 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® 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® 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® 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.