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proceq

Proceq OS8000 Concrete Durability Testing

Operating Instructions

Concrete Durability Testing

Safety and Liability

Safety and Usage Precautions

This manual contains important information on the safety, use and maintenance of the Resipod. Read through the manual carefully before the first use of the instrument. Keep the manual in a safe place for future reference.

Liability

Our "General Terms and Conditions of Sale and Delivery" apply in all cases. Warranty and liability claims arising from personal injury and damage to property cannot be upheld if they are due to one or more of the following causes:

- Failure to use the instrument in accordance with its designated use as described in this manual.
- Incorrect performance check for operation and maintenance of the instrument and its components.
- Failure to adhere to the sections of the manual dealing with the performance check, operation and maintenance of the instrument and its components.
- Unauthorized structural modifications to the instrument and its components.
- Serious damage resulting from the effects of foreign bodies, accidents, vandalism and force majeure.

All information contained in this documentation is presented in good faith and believed to

be correct. Proceq SA makes no warranties and excludes all liability as to the completeness and/or accuracy of the information.

Safety Instructions

The instrument is not allowed to be operated by children or anyone under the influence of alcohol, drugs or pharmaceutical preparations. Anyone who is not familiar with this manual must be supervised when using the instrument.

Getting started

Note: When shipped, battery packs are not fully charged. Prior to use, please charge the battery completely. To prevent the battery from damage, avoid deep-discharging or storing it long-term when empty. Store the instrument at room temperature and charge the battery fully at least once a year.

Resipod Basics

Charging the Resipod

The battery status symbol will be displayed when the accumulator is at 10% of its capacity. In this case it is still possible to make a large number of measurements, but it is advisable to recharge the battery by connecting the unit to a wall adaptor or a PC via the USB port. A complete charging cycle will last approximately 6 hours. Autonomy is > 50 hours.

Operation – Power ON / OFF

Press the "Hold" button on the side of the Resipod to power on. Press and hold the button for >2 s to shut the unit off (auto shutdown after 10 min. of stand-by)

Hold

Save

Functional Check

Perform a functional check as described in chapter 8.

Performing a reset

A small reset button is located beneath the watertight cover for the USB port. If the instrument has locked up or does not respond, pressing this button with a paper clip will perform a reset.


RESET

The Resipod Measurement Principle

The Resipod is an evolution of the industry standard CNS Farnell RM MKII resistivity meter, operating on the principle of the Wenner probe.

The Resipod is designed to measure the electrical resistivity of concrete. A current is applied to the two outer probes and the potential difference is measured between the

two inner probes. The current is carried by ions in the pore liquid. The calculated resistivity depends on the spacing of the probes.
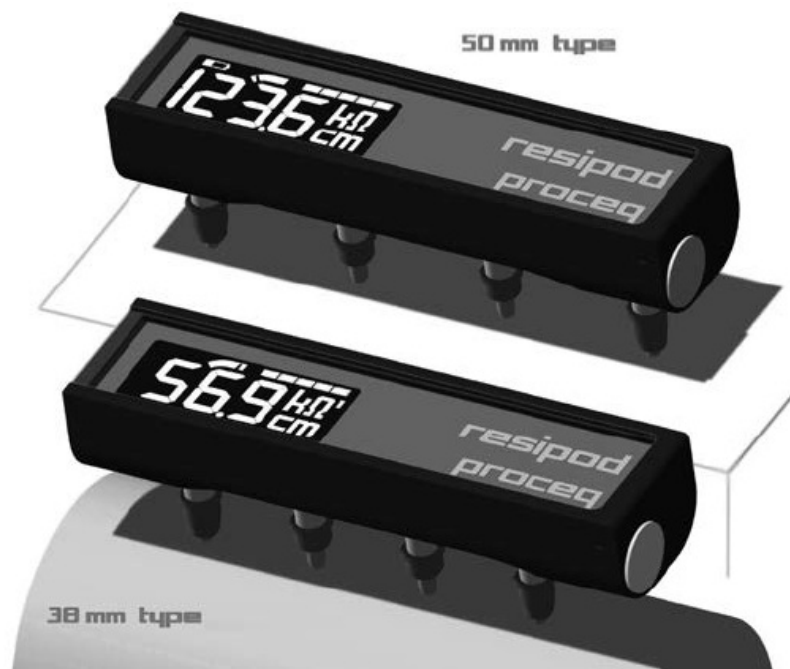
Resistivity $\rho = 2\pi a V/l$ [kΩcm]
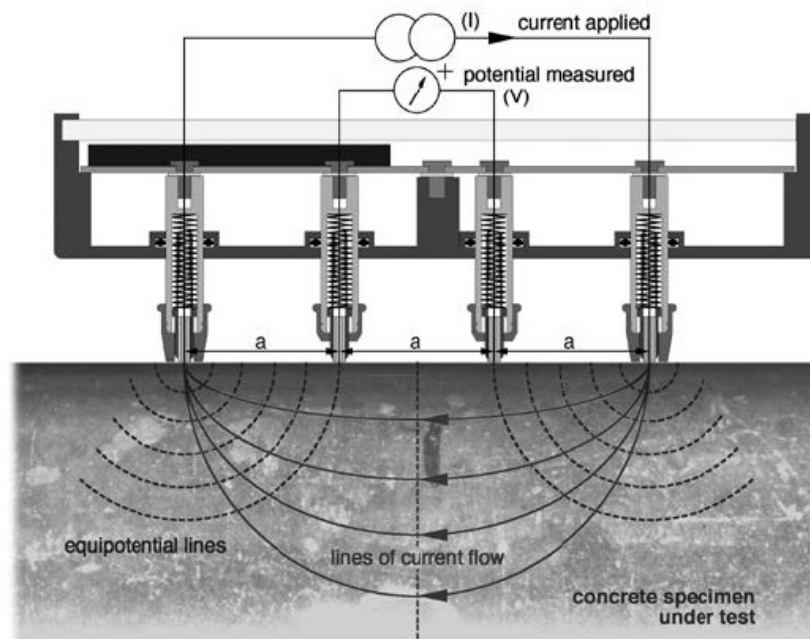
Resipod models

Two versions of Resipod are available:

- The 50 mm probe spacing model conforms to the accepted industry standard.
- The 38 mm (1.5") probe spacing model conforms to the specification of the AASHTO T 358 surface resistivity test method.


Due to the inhomogeneous nature of concrete, a wider probe spacing is preferred as it

allows a more homogeneous flow of the measuring current. However, this usually has to be offset against the need to avoid the influence of reinforcing steel (see chapter 3). 50 mm spacing is typically considered a good compromise. Both units operate with a digitally generated 40 Hz alternating current at 38 V max.

The Resipod Display

1. Measured resistivity
2. Battery status
3. Range indication
4. Current indication 20%, 40%, 60%, 80%, 100%
5. Indication of scaled reading
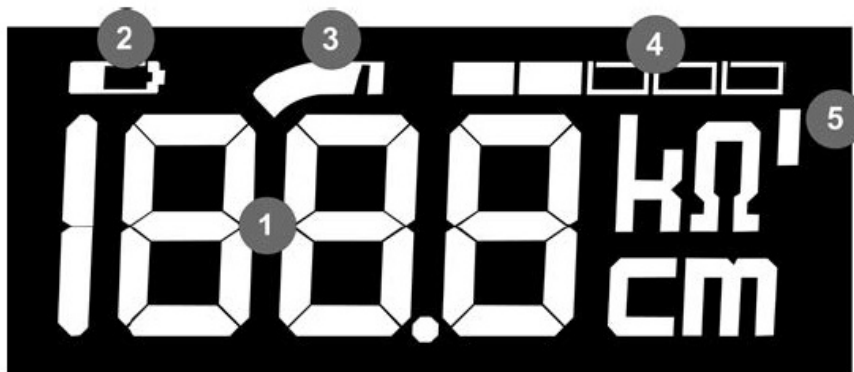
Measured resistivity

Display resolution depends on the measured resistivity and the nominal current flowing. See technical data.

Battery status

The battery status symbol will be displayed when the accumulator is at 10% of its capacity. Otherwise it is blanked out.

Range indication

Resipod has two current ranges.

- Range indicator to the right: 200 µA range
- Provided the external resistance (contact resistance of the two outer probes plus resistance of the specimen) is not too high, Resipod will drive the maximum current

(200 µA) through the specimen.

- Range indicator to the left: 10 – 50 µA range
- When the external resistance is too high, Resipod automatically switches to supply 50 µA.

- For even higher resistances, the unit applies the maximum voltage across the outer electrodes and senses the resulting current through the specimen. In this case, the displayed resistivity is a calculated value (voltage across inner probes divided by current sensed in outer probes), and the reading is rounded to the nearest kΩcm. This mode works down to a current of 10µA (1 segment lit). Below this range "OL" is indicated. (See "Indication of poor connection" below).

Current indication

All five segments lit indicate that the full 200 µA or 50 µA are being driven into the test object. When this is not possible, (see above), The display indicates this current to the nearest multiple of 10 µA.

Indication of scaled reading

The Resipod Link software allows the user to introduce a correction to the displayed reading. This is typically used together with a non-standard probe spacing, in which case the probe spacing value used to calculate the resistivity must be changed. It may also be used to introduce a correction based on a form factor if desired. Whenever the

apostrophe to the right of the kΩ symbol is lit, it indicates that a correction factor has been applied.

Measuring Resistivity with Resipod

Preparing the concrete surface

The concrete surface must not be coated with any electrically insulating coating, and it should be clean. The rebar grid beneath the surface should be marked out with the help of a rebar locator (e.g. Profoscope). If the concrete is completely dry it will not be possible to make a measurement as the current is carried by ions in the pore liquid, (See 2.2). Therefore it may be necessary to wet the surface.

Making a Measurement

A good connection between the instrument and the concrete surface is the most important factor for obtaining a reliable measurement. Dip the contacts in water several times before making a measurement – use a shallow container so you can press against its bottom

- this will fill the reservoirs. Press the Resipod firmly down until the outer two rubber caps rest on the surface to be tested.

Indication of poor connection

In the case of a poor connection, the Resipod will display one of the following alerts.

- **"Open Line" indication**

  Bad connection of the two outer probes to the concrete surface. No measurement possible.

  Inner two probes are not making contact. (check for holes or dry spots on the specimen)

- **Or Sample resistivity <1kΩcm**

  Material resistivity is extremely low.

- **Overflow**

  The measured resistivity is out of range. This limit is dependent on the spacing, but it is typically a resistivity of

Contact selection

The steel probe tips are rugged and may be used to scratch away a thin layer of plaque on the surface in order to make a better connection. The size of the contact however, means it is not always possible to drive the full 200µA into the concrete to obtain the maximum measurement resolution.

In order to enable this, the Resipod is also supplied with large surface area foam contact

pads. Simply snap out the steel contacts and replace with the foam pads. They should likewise be moistened before measurements.

Hold and Save function

Once a stable reading has been achieved, click the hold button on the side of the Resipod to freeze the actual measurement on the screen.
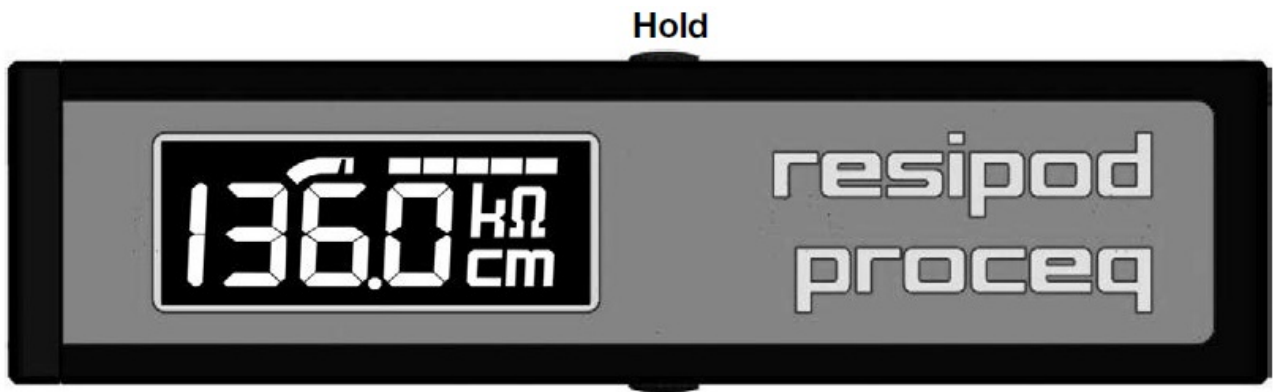
Hold

- The display flashes to indicate the "hold" status.
- Click the hold button again to return to "live" mode or:

Save

- Click the save button to record the measurement. An "m" appears to indicate that a new reading has been stored in this memory location. (In the example, the reading is the first reading stored in memory object 2.)

 Memory function

The Resipod can store up to 512 measurements. The memory is arranged so that the readings are stored in objects from 1 to 19. Each object can contain up to 99 readings.

Object 1 - Reading 1

Object 19 – Reading 99

You may check the last entry "Object – Reading" number simply by pressing the "Save" button when the instrument is not in hold modus.

Moving to the next Object

To move to the next object simply switch the Resipod off and then on again.

Note: The Resipod will always move to the next object when you switch it on and off. If you wish to carry on measuring in the previous object, simply delete the current reading as described below and you will be returned to the previous object.

Deleting a reading

- The last reading has been stored in Object 4 – Reading 3.
- To delete this reading, press the hold button to set the display blinking. (If the Resipod is held in the air for this the "open line" screen will be displayed and will blink.)
- Press the "Save" button for 2 seconds to delete the reading.
- Object 4 – Reading 3 has been deleted. The display shows a small "c" to indicate the last reading has been cancelled. Subse-quent readings can be cancelled this way, but only sequentially. It is not possible to scroll back and delete an earlier reading.

Memory status indications

A number of special screens provide information about the status of the memory.
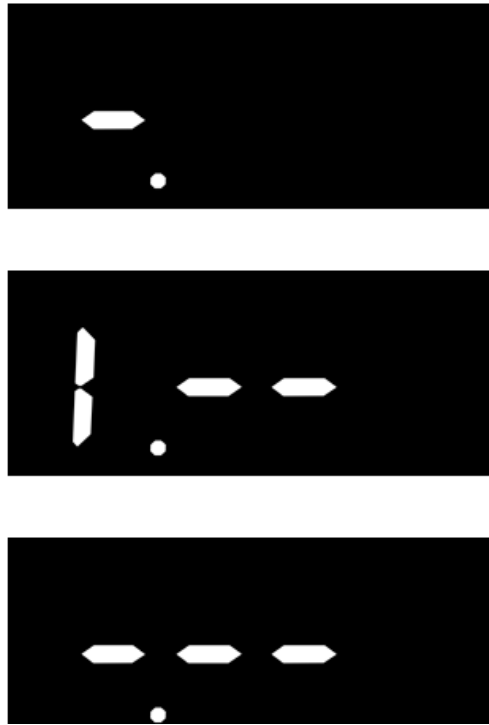
- **Object number is >19.**

  All 19 objects have been used. It is necessary to delete readings before using the memory further (see above).

- **Reading number is >99**

  The current object is full. Move to the next object to store further readings (see above).

- Memory is empty.

Resistivity Measurements on Site

Influences

Influence of rebars on electrical resistivity measurements

The presence of rebars disturbs electrical resistivity measurements as they conduct current much better than the surrounding concrete. This is particularly the case when the cover depth is less than 30 mm. As far as possible, reinforcement bars should not be directly beneath the probe and should not run parallel to the probe. The recommended measurement orientation is determined by the spacing of the rebars compared with the probe spacing.

The optimum orientation is to measure diagonally to the rebars as shown. This is possible if the probe span is less than the rebar grid spacing.

- For the Resipod 38 mm, the probe span is 38×3 = 114 mm (4.5")
- For the Resipod 50 mm, the probe span is 50×3 = 150 mm (5.9")
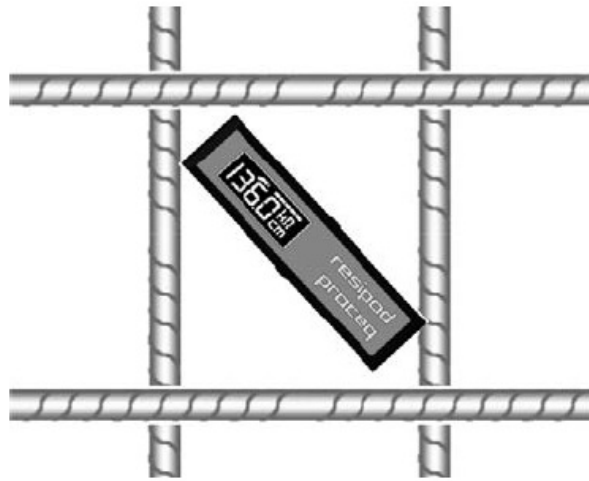
If the rebar spacing is so close that it cannot be avoided, the influence of the steel can be minimized by measuring perpendicular to the rebars as shown. RILEM TC154-EMC: ELECTROCHEMICAL TECH-NIQUES FOR MEASURING METALLIC CORROSION recommends making 5 readings from the same location moving the probe a few mm between each measurement and taking a median from the 5 values.
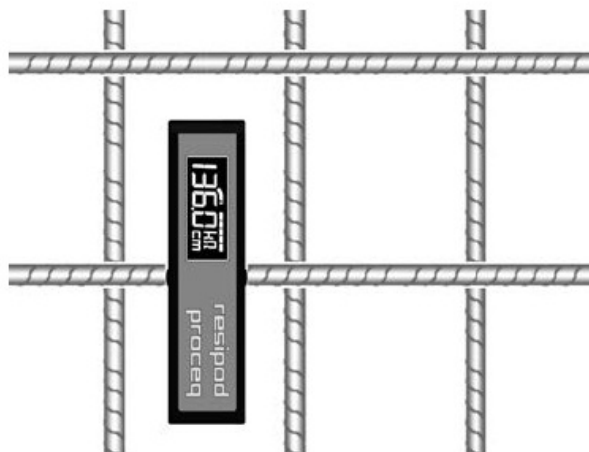
Influence of aggregate size

As explained in 2.2, the current flows in the pore liquid of concrete. Ideally the probe spacing should be larger than the maximum aggregate size as aggregate material is typically non-conduct-ing. The variable spacing probe supplied with Resipod Geometric should be used for aggregate sizes larger than the standard probe spacing.

Influence of temperature

The temperature of the concrete should be measured and recorded with resistivity

measurements. Resistivity decreases as the temperature increases. Reference values for resistivity measurements are typically quoted for 20°C (68°F). Empirical studies have shown that a one degree increase in temperature can reduce the resistivity by 3% for saturated concrete and 5% for dry concrete.

Influence of moisture content

A higher moisture content lowers the resistivity. This can be due to saturation or due to a change in the water/cement ratio.

Influence of carbonation

Carbonated concrete has a higher resistivity than concrete without carbonation, however pro-vided the depth of the carbonated layer is significantly smaller than the probe spacing, the effect of this layer is small. Consequently if the carbonated layer is thick, it may be necessary to increase the probe spacing to obtain good results.

Applications

Empirical tests and theory have shown that resistivity is directly linked to both the likelihood of corrosion due to chloride diffusion and to the corrosion rate once depassivation of the steel has taken place.

Estimation of the likelihood of corrosion

Resistivity measurements can be used to estimate the likelihood of corrosion. When the electrical resistivity (ρ) of the concrete is low, the likelihood of corrosion increases. When the electrical resis-tivity is high (e.g. in case of dry and carbonated concrete), the likelihood of corrosion decreases. Empirical tests have arrived at the following typical values for the measured resistivity which can be used to determine the likelihood of corrosion. These figures are for Ordinary Portland Cement at 20°C.

- When $\geq$ 100 kΩcm Negligible risk of corrosion
- When = 50 to 100 kΩcm Low risk of corrosion
- When = 10 to 50 kΩcm Moderate risk of corrosion
- When $\leq$ 10 kΩcm High risk of corrosion

Indication of corrosion rate

The following interpretation of resistivity measurements from the Wenner four-probe

system has been cited when referring to depassivated steel (Langford and Broomfield, 1987).

- \>20 kΩ cm Low corrosion rate
- 10-20 kΩ cm Low to moderate corrosion rate
- 5-10 kΩ cm High corrosion rate
- < 5 kΩ cm Very high corrosion rate

Empirical reference values

A large body of empirical resistivity data has been collected by many studies over a number of years. The data presented here is taken from "Test methods for on-site measurement of resistiv-ity of concrete – a RILEM TC-154 technical recommendation" by Rob B. Polder. The values have been converted to kΩcm to match the display of the Resipod. More details on the interpretation of results may be found in that document.

Global reference values at 20°C for the electrical resistivity of concrete of mature structures (age > 10 years).

Environment	Concrete resistivity r kW cm	
	Ordinary Portland Cement (CEM I)	Blast furnace slag cement (>65% slag) or fly ash (>25 %) or silica fume (5%)
Very wet, submerged, splash zone, fog room	5-20	30-100
Outside, exposed	10-40	50-200
Outside, sheltered, coated, hydrophobised (not carbonated) (20°C / 80% RH)	20-50	100-400
Outside sheltered as above (Carbonated)	100 and higher	200-600 and higher

Indoor climate (carbonated) 20°C / 50%RH	300 and higher	400-1000 and higher

- **Resistivity mapping**

  Mapping out the resistivity of a structure enables useful interpretations to be made by comparing the values against those in the above table. Please note that the temperature correction described earlier should be taken into consideration. If exposure conditions are the same, varying resistivity values may indicate local variations of the water/cement ratio. If it is known that the concrete is homogenous throughout the structure, then the resistivity measurements can be used to determine how relatively wet and dry the various areas are.

- **Correlation to permeability**

  Studies have shown that resistivity can be directly correlated to chloride diffusion rate. On site mapping of the resistivity of a concrete structure will identify the most permeable areas. Such areas are more likely to be susceptible to chloride penetration. The Resipod model with 38 mm spacing conforms to the AASHTO T 358 Surface Resistivity Test Method which uses surface resistivity as an indication of the permeability of concrete. Details of the test can be found on the official AASHTO website http://tig.transportation.org/Pages/SurfaceResistivityTest.aspx.

- **On site assessment of curing efficiency**

  Resistivity measurements may be used on site to determine premature drying of concrete. This is a particularly important application in hot countries where premature drying out can lead to structural weakening due to non-completion of the hydration reaction. The method uses the strong dependence of resistivity on the humidity of the concrete. Site measurements are compared with measurements made on a saturated reference cylinder to define a relative resistivity which can be used to isolate the effects of humidity and thereby determine premature drying. Please refer to "Electrical resistivity as a tool to on site assessment of curing efficiency – by L. Fernandez Luco, C. Andrade and M.A. Climent (June 2009)".

- **Resistivity measurements and cathodic protection systems**

  The effectiveness of a cathodic protection system depends very much on the resistivity of the concrete. Mapping out the resistivity prior to installation allows the structure to be divided into separate zones requiring different levels of current flow.

Quality Control Applications

The Resipod model with 38 mm spacing conforms to the AASHTO T 358 Surface Resistivity Test Method which uses surface resistivity as an indication of the perme-ability of concrete. Details of the test can be found on the official AASHTO website: http://tig.transportation.org/Pages/SurfaceResistivityTest.aspx

The Resipod family is completed by two further instruments differentiated by application as can be seen in the table:

| Application	Resipod	Resipod Geometric	Resipod Bulk Resistivity
Surface resistivity test on standard cylinders (4" x 8", 100 x 200mm) or (6" x 12", 150 x 300mm) with a maximum aggregate size (1 .5", 38mm) . Fixed probe spacing (1 .5", 38mm)	●	●	●
Bulk resistivity test on cylinders up to 100mm (4") diameter			●
Surface resistivity test on non-standard cylinders with aggregate sizes that may exceed > 1 .5", 38mm		●	
Correction factor for probe spacing	●	●	●
Correction factor for sample geometry		●	
User definable correction factor		●	
Variable probe spacing		●	
Surface resistivity mapping on site for: estimation of likeli- hood of corrosion, corrosion rate and implementation of cathodic protection systems	●	●	

Resipod Bulk Resistivity

The accessory comprises of a stand that allows the instrument to be conveniently mounted, cables that are easily inserted into the rear connectors and the measurement plates with conductive foam inserts suitable for 4"x8" cylinders.

The stand accommodates both Resipod versions (38 mm and 50 mm).

38 mm Resipod in stand
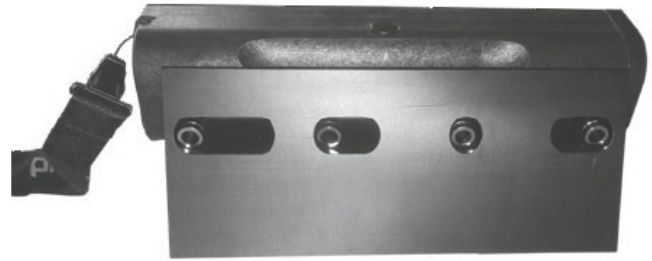
50 mm Resipod in stand

Cable Connection

The cables are simply attached as shown here.

Measuring the offset

The foam inserts provide the electrical contact to the cylinder, but they also have a resistance which must be measured and compensated for to determine the true bulk resistivity of the cylinder under test. The resistance of the foam inserts varies with the pressure applied.
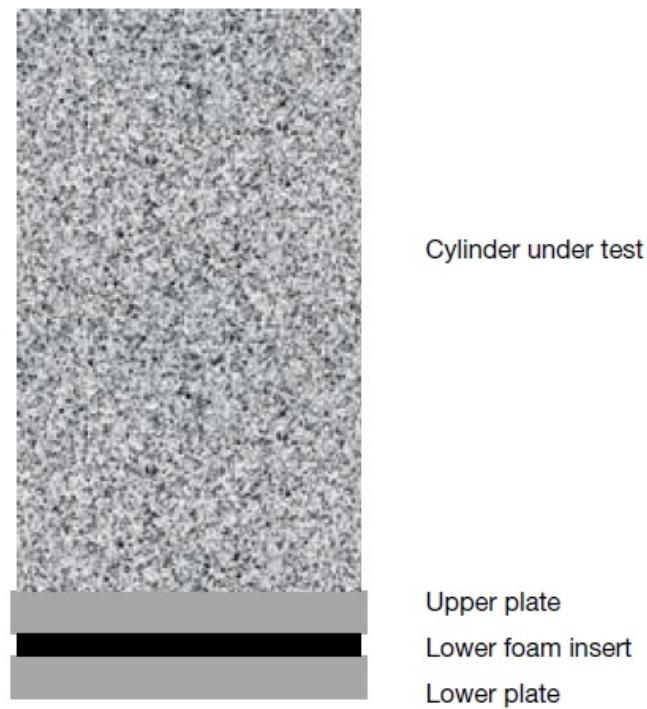
The resistances of the top and bottom inserts can be measured as follows:

Upper plate Upper foam insert Lower plate(Rupper)

- Upper plate
- Upper foam insert
- Lower plate

Test set-up to measure the resistance of the lower foam insert(Rlower):

Cylinder under test

Upper plate

Lower foam insert

Lower plate

Test set-up to measure the bulk resistivity of the cylinder(Rmeasured):

Upper plate

Upper foam insert

Cylinder under test

Lower foam insert

Lower plate
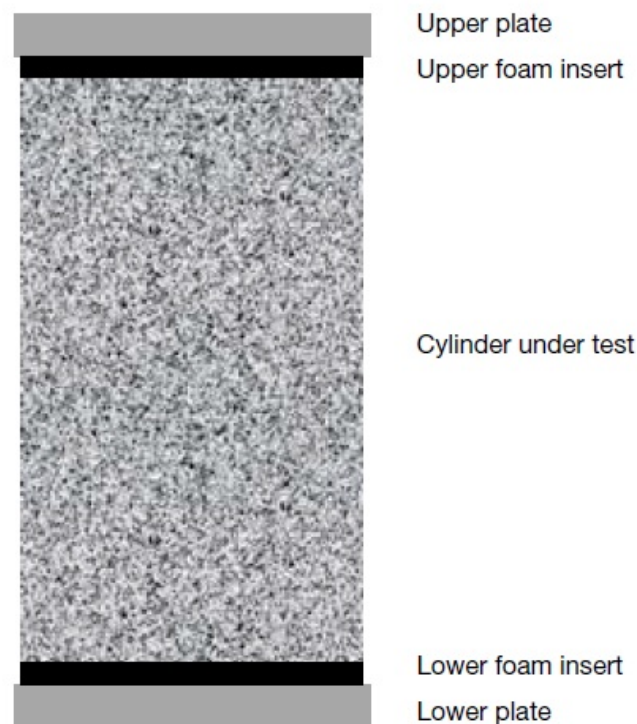
The measured resistance is the sum of the resistance of the cylinder plus the two inserts, therefore:

Rcylindercylinder = Rmeasured measured– Rupper – Rlower

Calculation of the Bulk Resistivity

Resipod displays a number in kΩcm. The number obtained from the Resipod display should be divided by 2πa (where "a" is the probe spacing, i.e. either 3.8 cm or 5.0 cm). For a Resipod with 38mm probe spacing:

Cylinder size	2pa	A (cm2)	L (cm)	A/L (cm)
4×8	23 .88	81 .07	20 .32	3 .99

The bulk resistivity ρ = K x Rcylinder, where K = A/L

Example

- Rcylinder cylinder= 52 kΩcm
- Rcylinder (corrected) cylinder= 52 / 23.88 = 2.18 kΩ
- Bulk resistivity ρ = K x R cylinder = 2.18 x 3.99 = 8.69 kΩcm

Bulk Resistivity in ResipodLink
ResipodLink offers the possibility to calculate K automatically and download it onto the Resipod instrument, so that the display shows directly the correct value in kΩcm. See Chapter 9.

Resipod Geometric

- Resipod Geometric is supplied with a stand for mounting the Resipod and a variable spacing probe that allows probe spacing to be varied between 40mm and 70mm. This allows it to accom-modate larger aggregate sizes.
- The ResipodLink software (Chapter 9) allows the user to enter the correct probe spacing and also a geometric correction factor to give the correct resistivity reading directly on the instrument.
- The geometric correction factor for cylinders is designed to comply with the latest research in-tended to extend the current AASHTO surface resistivity method to other sample geometries.
- In addition to this the user also has the possibility to enter a self-determined correction factor.
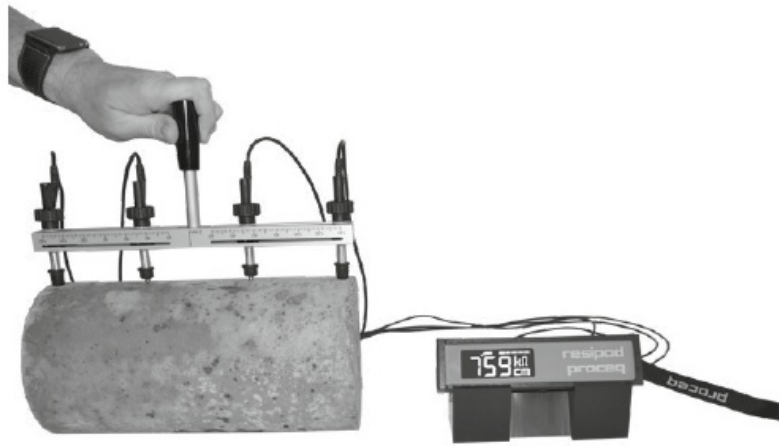
Units, Parts and Accessories

Part No.	Description
381 10 000	Resipod, 50mm probe spacing, test strip, foam contact pads, charger with USB- cable, software, carrying strap, documentation and case .
381 20 000	Resipod, 38mm (1 .5") probe spacing, test strip, foam contact pads, charger with USB-cable, software, carrying strap, documentation and case .
381 30 000	Resipod Bulk Resistivity, 50mm probe spacing, test strip, foam contact pads, charger with USB-cable, software, carrying strap, documentation and case, Bulk Resistivity Accessory .
381 40 000	Resipod Bulk Resistivity, 38mm (1 .5") probe spacing, test strip, foam contact pads, charger with USB-cable, software, carrying strap, documentation and case, Bulk Resistivity Accessory .
381 50 000	Resipod Geometric, 50mm probe spacing, test strip, foam contact pads, charger with USB-cable, software, carrying strap, documentation and case, Resipod Geometric Accessory .
381 60 000	Resipod Geometric, 38mm probe spacing, test strip, foam contact pads, charger with USB-cable, software, carrying strap, documentation and case, Resipod Geometric Accessory .

Parts and Accessories	Description
381 01 088	Bulk Resistivity Accessory
381 01 098	Resipod Geometric Accessory
381 01 094	Variable Spacing Probe
381 01 089	Resipod Stand
381 01 043 S	Set of replacement foam contact pads (5×4)
381 01 092 S	Bulk resistivity contact pads . Set of 10 pieces
381 01 038	Test strip
381 01 031	Inner contact cap (See note below)
381 01 041	Outer contact cap (See note below)
381 01 033	Contact complete (See note below)
381 01 036	Contact spring
381 01 014	USB cover
381 01 070	Key for USB port
391 80 110	Carrying strap

To replace one of the inner contacts requires parts 381 01 031, 381 01 033 and 381 01 036. To replace one of the outer contacts requires parts 381 01 041, 381 01 033 and 381 01 036.

Technical Specifications

Measurement range:	1kWcm – ca . 1000 kWcm (dependent on probe spacing)

Resistance measurement accuracy:	
Nominal current 200µA	±0 .2 kWcm or ±1% (whichever is greater)
Nominal current 50µA	±0 .3 kWcm or ±2% (whichever is greater)
Nominal current <50µA	±2 kWcm or ±5% (whichever is greater)
Frequency	40 Hz
Memory	Non volatile, ca . 500 measured values
Power Supply	>50 hours autonomy
Charger connection	USB type B, (5V, 100mA)
Dimensions	197 x 53 x 69 .7 mm (7 .8 x 2 .1 x 2 .7 inch)
Weight	318 g (11 .2 oz)
Operating temperature	0° to 50°C (32° to 122°F)
Storage temperature	-10° to 70°C (14° to 158°F)

Maintenance and Support

Functional Check

Correct functioning of the Resipod can be checked with the test strip provided. The test strip is intended to be used by both Resipod models (38 mm,1.5" and 50 mm spacing).
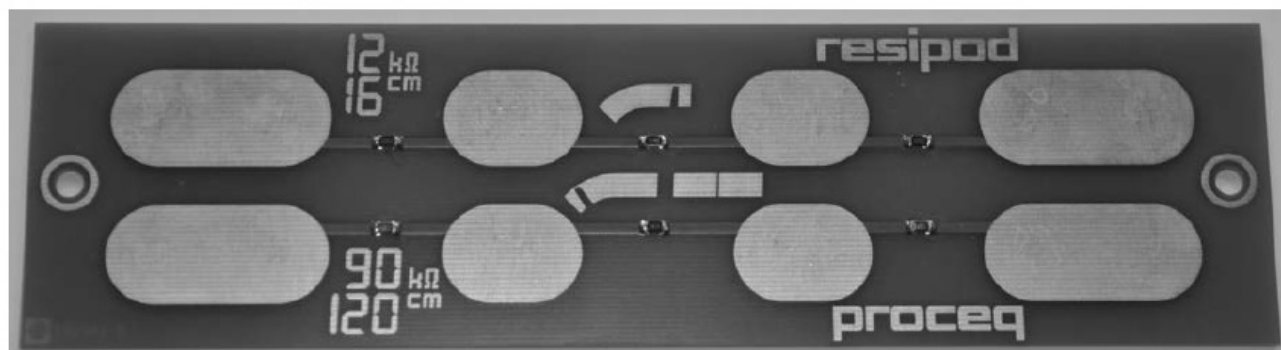
The upper row allows the functional check using the full 200 µA range. The lower row

allows the functional check using the reduced 50 µA range. Resistors to the outer pads limit the maximum current to approx. 20 µA, (only two segments in the current indicator strip are active).

The expected test results are summarized in the table below:

Current range	Expected test result 38 mm (1.5") spacing	Expected test result 50 mm spacing
200µA (upper row)	12 (±0 .2) kWcm	16 (±0 .2) kWcm
50 µA (lower row)	90 (±1 .8) kWcm	120 (±2 .4) kWcm

Cleaning of the probes and the body

The probes can be removed for cleaning, replacement or for fitting test accessories, such as the variable spacing probe. They're snap fit, so simply pull them off. Be careful not to lose the spring. After cleaning, replace the probes by inserting them into the shafts and snapping them firmly into place. Ensure the fit by pressing on the rubber cap as shown in the figure. Long caps go on outer probes.
Probes need not be kept moist when the unit is not in use.

The unit can be rinsed with water (make sure USB cover is firmly in place). Since the instrument has an extremely high input impedance, check that the underside of the case is clean (dirt or salt deposits might create leakage currents and yield faulty readings).

Note! The springs are intentionally long to ensure a constant pressure on all four probes, while allowing a ± 4 mm displacement on the inner tips to accommodate uneven or curved surfaces.

Support Concept

Proceq is committed to providing a complete support service for this instrument by means of our global service and support facilities. It is recommended that the user register the product on www.proceq.com to obtain the latest on available updates and other valuable information.

Standard Warranty and Extended Warranty

The standard warranty covers the electronic portion of the instrument for 24 months and the mechanical portion of the instrument for 6 months. An extended warranty for one, two or three years for the electronic portion of the instrument may be purchased up to 90 days of date of purchase.

ResipodLink Software

Installing ResipodLink

 Locate the file "ResipodLink Setup.exe" on your computer or on the CD and click on it. Follow the instructions you see on the screen. Make sure that the "Launch USB Driver install" tick is selected.

Starting ResipodLink and viewing data stored on Resipod

ResipodLink Double click on the ResipodLink icon on your desktop or start the ResipodLink via the start menu. The Resipodlink starts with a blank list.

Application settings

The menu item "File – Application settings" allows the user to select the language and the date and time format to be used.

Connect the Resipod to a USB port, then click on this icon to download all data from the Resipod.

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- An "Id" number identifies the measurement object.
- The "Name" column allows the user to assign a name for the measurement object.
  The "Date and time" when the data is downloaded onto the PC.
- The "Mean Value".
- The "Total" number of measurements in this series.
- The "Standard Deviation" of the measurements in this series.

Click on the double arrow icon in the "Id" column to see more details:

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**Note**: Click on "Add" to attach a comment to the object.

Summary window

In addition to the "Series" view described above, ResipodLink also provides the user with a "Summary" window. This is useful for uniformity testing to quickly identify areas or objects of inferior quality. Click on the respective tab to switch between views.

To include or exclude a series from the summary, click on the summary symbol in the impact counter column. This symbol is either "black" or "greyed out", which shows whether or not the series is included in the summary.

Adjusting the date and time

- Right click in the "Date & Time" column.
- The time will be adjusted for the selected series only.
- Please note, the Resipod does not have an internal clock, so the date and time displayed for downloaded data, is the time at which it was downloaded.
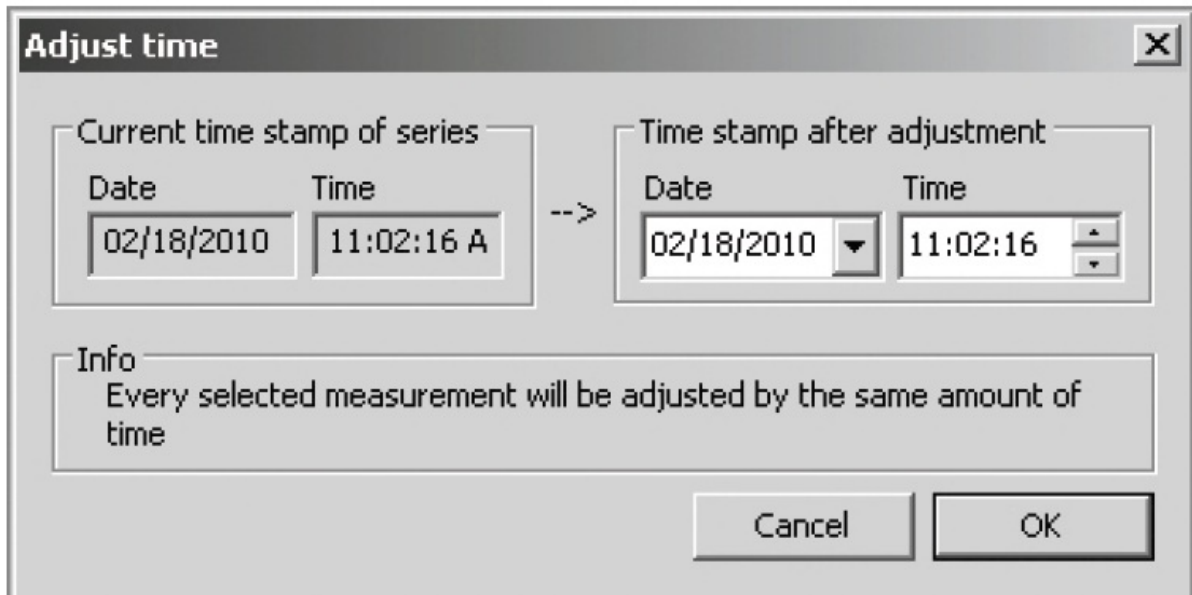
Exporting data

ResipodLink allows you to export selected objects or the entire project for use in third party pro-grams. Click on the measurement object(s) you wish to export.

- Click on the "Export as CSV file(s)" icon. The data for this measurement object(s) is exported as a Microsoft Office Excel comma separated file or files. The export op-tions may be chosen in the following window.
- Click on the "Export as graphic" icon to open the window which allows the various export options to be chosen.
- In both cases, a preview window shows the effects of the current output selection.
- Finish by clicking on export to select the file location, name the file and in the case of a graphical output to set the output graphic format: .png, .bmp or .jpg

Deleting and restoring data

The menu item "Edit – Delete" allows you to delete one or more selected series from the down-loaded data.

Note: This does not delete data from the Resipod, only data in the current project.

Restoring original downloaded data

Select the menu item "File – Restore all original data" to restore the data to the original format as it was downloaded. This is a useful feature if you have been manipulating the data, but wish to go back to the raw data once again. A warning will be given to say that the original data is about to be restored. Confirm to restore.

Note: Any names or comments that have been added to series will be lost.

Deleting data stored on the Resipod

Select the menu item "Device – Delete all measurements object on Resipod" to delete all data stored on the Resipod. A warning will be given to say that all of the data is about to be deleted. Confirm to delete. It is not possible to delete individual series.

Further Functions

The following menu items are available via the icons at the top of the screen:

- "PQUpgrade" icon – Allows you to upgrade your firmware via the internet or from local files.

- "Open project" icon – Allows you to open a previously saved .pqr project.
- "Save project" icon – Allows you to save the current project.

- "Print" icon – Allows you to print out the project. You may select in the printer dialog, if you want to print out all of the data or selected readings only.

Setting a correction factor

See Chapter 2.2. The standard reading on the Resipod display indicates: Resistivityρ= $2\pi aV/l$ [kΩcm], where "a" is the default probe spacing of the instrument, (either 38mm or 50mm).
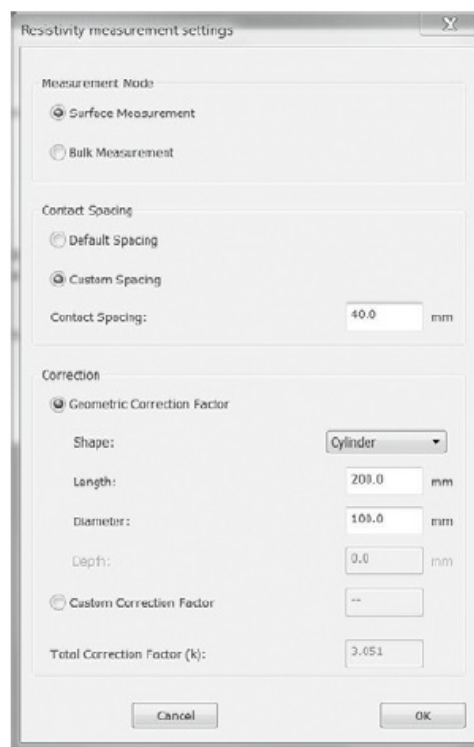
The menu item "Device – Set measurement settings" allows a correction factor to be

downloaded onto the instrument, so that it gives a direct readout of the resistivity when being used with:

- The Variable Spacing Probe (381 01 094)
- The Bulk Resistivity Accessory (381 01 088)
- A different sample geometry

Note: When working with the AASHTO TP95-11 standard using the 38mm ver-sion of the Resipod, no correction is required as this is already considered in the figures given in the standard.

Note: Whenever a non-standard contact spacing, or a geometric correction fac-tor is set, then all measurements on the Resipod are deleted. Therefore it is im-portant to save any measurements stored on the Resipod before commencing.

Measurement mode

- Surface measurement for the 4-point Wenner probe measurement.
- Bulk measurement for working with the bulk resistivity accessory.

Contact Spacing

- Default spacing – either 38mm or 50mm depending on Resipod model.
- Custom spacing – with the variable spacing probe accessory this may be anywhere between 40mm and 70mm. It is also possible to set a spacing beyond this range, for use with customized extension cables.

Geometric Correction Factor

- Flat – Default setting, used for measuring on site and also for use with the AASHTO T 358 standard.
- Cylinder – Set the length and diameter of the cylinder under test.

The surface measurement correction factor (k) is calculated according to the latest research for surface resistivity of hardened cylinders.

$$k \cong \frac{2\pi}{1.09 - \dfrac{0.527}{d/a} + \dfrac{7.34}{(d/a)^2}}$$

- d = diameter of the cylinder (mm), a = probe spacing (mm), L = length of the cylinder (mm)
- Formula valid for: $d/a \leq 4$ and $L/a \geq 5$ (e.g. for a 200mm cylinder, the maximum probe spacing allowed is 40mm)
- The bulk measurement correction factor is calculated according to the method described in chapter 5.1.: e.g. $k = A/L = (\pi \times 52) / 20 = 3.927$
- Prism – Used for cubes and prisms. No correction factor is implemented to date for the surface measurement. The bulk measurement is calculated according to the method described in chap-ter 5.1.
- Custom Correction Factor – For user defined correction factors, select this option and enter the correction value directly. If not selected, the value shown here shows the calculated correction factor (k) based on the options selected above.

**Downloading loading the Correction Factor to Resipod**

- Complete the action by pressing OK. A warning will be shown to indicate that all measurements currently saved on the Resipod will be deleted.

- An apostrophe will appear to the right of the kΩ symbol to indicate that a correction factor has been set.
- Applied correction = 2πa/k ("a" in cm).

Display of corrected resistivity values in ResipodLink

The correction settings are recorded with the measurement data and displayed in ResipodLink as this example of a bulk resistivity measurement shows
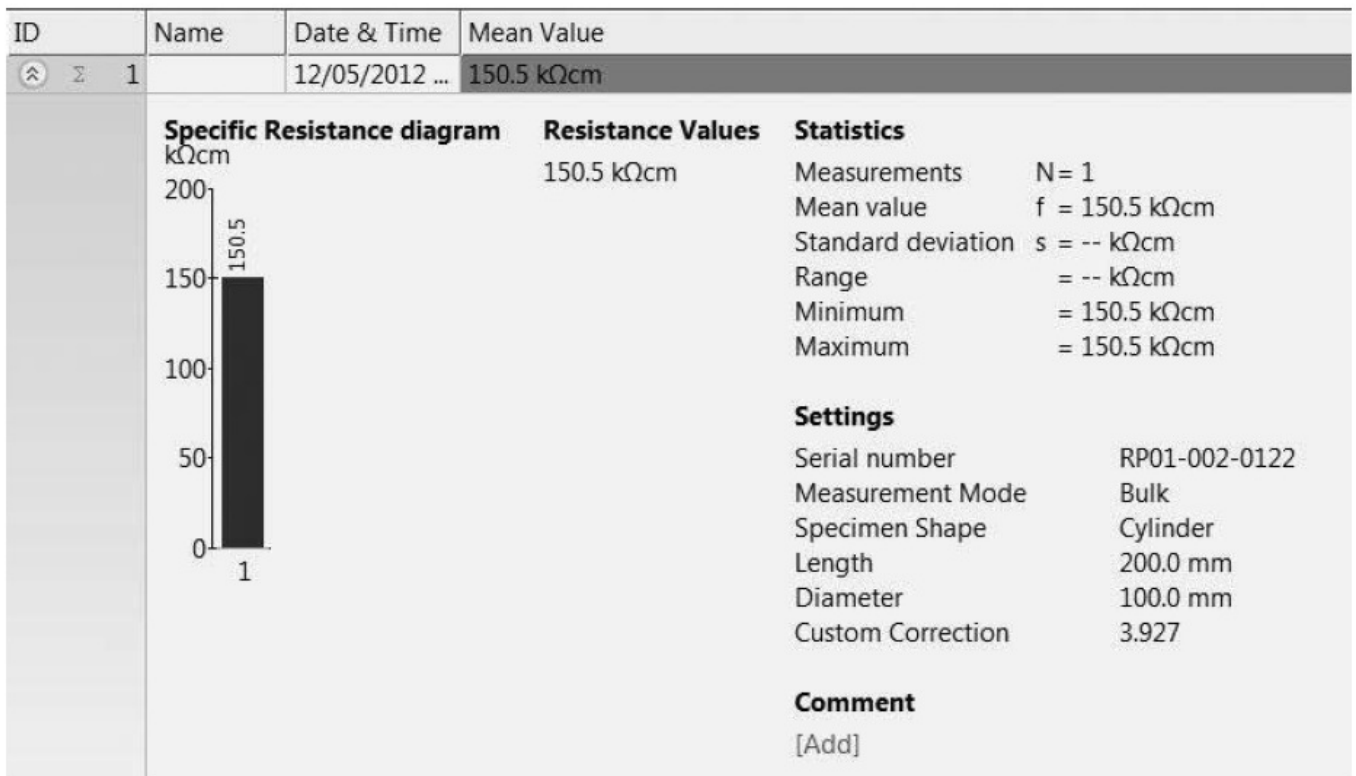
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FAQ

- **Q: How do I calibrate the Resipod for accurate measurements?**

  A: Calibration instructions can be found in the manual under the calibration section.

  Follow the step-by-step guide to calibrate the instrument correctly.
- **Q: Can the Resipod be used for outdoor concrete testing?**

  A: Yes, the Resipod is suitable for on-site resistivity measurements, including outdoor

concrete surfaces. Ensure proper precautions are taken for outdoor use.

Documents / Resources

	[Proceq OS8000 Concrete Durability Testing](#) [[pdf](#)] User Manual OS8000 Concrete Durability Testing, OS8000, Concrete Durability Testing , Durability Testing, Testing

References

- [User Manual](#)

🏷 Concrete Durability Testing, Durability Testing, OS8000, OS8000 Concrete Durability Testing, proceq,

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