

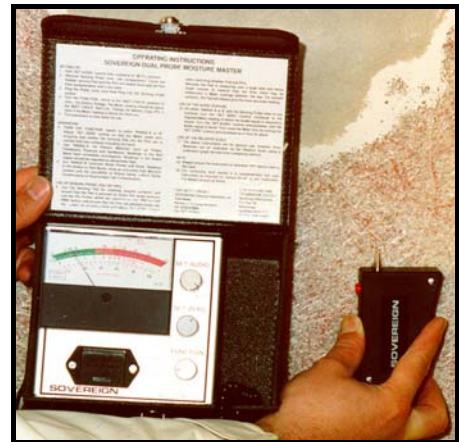
# Short Guide to using the Sovereign Moisture Meter on GRP

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## Introduction:

Most people think of electronic moisture meters as a specialist tool used only by boatyards and yacht surveyors, but increasing numbers of private boat owners are finding them invaluable for examining their own boats. Contrary to popular belief, moisture meters are very easy to operate, and with regular use, owners can chart the condition of their boats from one season to the next, thereby avoiding nasty surprises. A moisture meter is also a good investment when buying a second-hand boat, and can be used to check over potential vessels before splashing out on survey fees.

However, moisture meters must be used in appropriate conditions if readings are to be reliable, as all too often, readings are excessively high because they're taken too quickly after lifting out, or because of bilge water or internal condensation. In this respect, private owners often have the advantage over surveyors, as they're able to take readings when it suits them, having first ensured that their boats are dry inside and out.



The purpose of this document, therefore, is to provide practical guidance on how to use the Sovereign moisture meter on conventional glass reinforced polyester (GRP) boat hulls. For a more detailed explanation please refer to the authors [Short Guide to Osmosis and its Treatment](#).

## Why Use a Moisture Meter?

The object of taking moisture meter readings is to determine whether moisture is being absorbed and retained by the GRP laminate. Persistently high moisture readings (i.e. over a period of several weeks) may indicate the presence of 'free' hygroscopic solutes such as propylene glycol within the laminate; and accordingly may indicate an 'Osmotic' condition. The application of epoxy or polyurethane coatings is **not** recommended where moisture readings are high owing to the high risk of blistering.

Moisture meters provide a quick, accurate and non-destructive check for retained moisture. Nevertheless, these instruments are not foolproof, and they cannot discriminate between different types of water, so it will be seen that extraneous moisture **must** be eliminated if readings are to be valid.

However, like many guidelines in the marine industry, currently accepted moisture readings are based on many years of practical experience in the field. There is no direct link between moisture readings and the mechanical condition of laminates; but industry experience shows that the incidence of 'Osmotic' failures is much reduced if moisture meter readings are kept low. Nevertheless, the figures suggested here are not cast in stone, and some circumstances may require higher or lower readings.

## Preparation:

Salt, marine fouling and slime will retain moisture, so the hull must be thoroughly pressure washed with plenty of fresh water, and allowed to become completely dry before any readings are taken. Ensure that the yacht is safely propped before working underneath her. The yachts bilges must be completely dry and well ventilated, as the Tramex meters will easily read through the hull.

Avoid taking readings in damp, misty or humid conditions; and do not take readings at sub-zero temperatures as the conductivity of water drops rapidly as it freezes.

Most boats built since the early 1990's have *Isophthalic* gel-coats and/or lay-up resins. These often show low readings after just a few hours out of water; but this cannot be guaranteed. Older boats will usually be built with *Orthophthalic* resins, which can take



several weeks to dry. Similarly, epoxy coatings such as *International Gelshield Plus* and *Blakes GelProtect* can retain moisture for several weeks after lifting, and may result in high moisture readings during this time, (even if the laminate is perfectly dry underneath).

Contrary to popular belief, antifouling paints **do not** usually need to be removed before taking moisture readings. The only exceptions are electrically conductive coatings such Copperbott and Graphspeed, and those boats with very heavy accumulations of antifouling. However, a surveyor will usually want to remove a few small ‘coupons’ of antifouling to examine the gel coat closely for signs of wicking, blistering or fibre swelling.

#### **Sovereign Marine Moisture Meter:**

The Sovereign has two concentric electrodes, separated by an annular gap of 3 millimetres. This narrow gap restricts the Sovereign’s depth of field to approximately 1.5 millimetres, although secondary coupling increases this somewhat.

The Sovereign should be set to ‘**Scale A**’ regardless of whether the vessel is kept in salt or fresh water. If possible, switch the instrument on a few minutes before it is required to allow stabilization.

If an osmosis prevention or treatment is to be carried out, readings must be lower than 5% H<sub>2</sub>O on the **top** scale before any epoxy materials are applied. The same readings are required when applying polyurethane finishes to topsides and superstructures, or when carrying out laminate repairs.

For pre purchase surveys, (i.e. boats currently in service), readings up to 10% H<sub>2</sub>O on the top scale are usually acceptable. Higher readings indicate an increased risk of blistering, but these should be investigated to see whether they are caused by bilge water or internal fittings before suspecting an osmotic condition. **If in doubt, fresh readings should be taken after a period ashore, having first ensured that the boat is internally dry and well ventilated.**

On single skinned hulls, readings may also be taken from inside the yacht to help establish whether high readings are caused by internal or external moisture, or by moisture in protective coatings. However, please note that the Sovereign is highly sensitive to surface moisture, and may be misled by condensation or moisture in coatings. Similarly, excessively thick gel coat layers may mislead the instrument to give inaccurately low readings.

#### **General Notes:**

Moisture meter readings should always be taken from the ‘% H<sub>2</sub>O’ scale, and not the ‘Relative Scale’. The Relative Scale is designed for use with conversion tables supplied by the moisture meter manufacturer; therefore readings from this scale are meaningless and misleading without these tables.

By convention, electronic moisture meters are calibrated for timber (usually Douglas Fir), so moisture readings are not directly applicable to GRP. The true moisture content of GRP is very approximately 10% of the value shown on the Sovereign when set to Range A.

Ribs, stringers, and bulkheads will often show locally high moisture readings on moisture meters, as moisture passing the hull tends to become trapped in these structures, and may cause localised breakdown. Moisture meters cannot be used on metals, encapsulated metal keels or on carbon fibre as these materials are electrically conductive.

**As a general rule, if readings are unexpectedly high, fresh readings should be taken after a period ashore. Unusually low readings must be checked against a recently calibrated instrument.**

Finally, Osmosis is a very slow process, and high moisture readings do not always mean that blistering will occur within the next few months: indeed, many boats show high readings for ten years or more before the first blisters are seen.

**A companion guide is also available for the Tramex marine moisture meter.**

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**Important Notice:** Please note that whilst every effort has been taken to ensure the accuracy of information contained in this leaflet, no responsibility can be accepted for any errors or omissions that it may contain. Readers are therefore urged to seek advice from the manufacturer(s) concerned before proceeding with any treatment.

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