

**FRIZZELL LTD**

# Soil Moisture Probe



**Owners Manual  
And Reference**

**Model SMP3A**

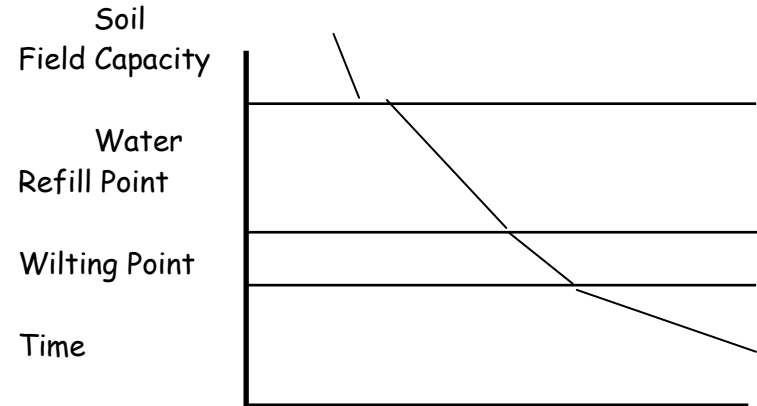
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**Contents:**

	Pg.
Introduction	1
Key Features	2
Operation	3
Calibration	3
Hints and Help	4
Care of the Probe	5
Fault Finding	6
Technical Details	6
Irrigation Overview	7
Irrigation Practice	8

Holding capacity and soil moisture readings can be affected.



Graph shows rapid drop in soil water when over watering occurs.

Typical Soil Moisture Characteristics.

Soil Type:	Field Capacity	Wilting Point	Availalable Water*
Sandy Soil	15% water	7% water	21mm
Sandy Loam	21%	10%	30mm
Loam	31%	14%	42mm
Clay Loam	36%	18%	54mm
Silty Clay	40%	20%	60mm
Clay	44%	22%	66mm

\*mm in top 300mm of soil

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## Irrigation Practice

### The need for soil moisture measurement:

Many years of research work have shown the advantages of maintaining appropriate levels of moisture in the soil. Correct control of soil moisture increases plant growth, reduces loss of fertiliser and nutrients from the soil, and will decrease disease challenges

**Good irrigation practice:** Good irrigation aims to maximise the net returns from a crop. During vegetative growth the aim is to apply water before crops come under water stress and to apply sufficient water so that soil moisture does not exceed field capacity. It may be advantageous at times to allow some stress to plants to encourage a change from vegetative production to a reproductive phase.

## Factors Affecting Soil Water Holding Capacity.

1) **Soil Density:** Soil density can vary widely over small distances. Differences in density eg. air gaps at the bottom of furrows or wheel compacted areas, not only affect the amount of water held in the areas but also cause variation in soil moisture status. Not enough or too much compaction can reduce soil water holding capacity of a soil.

2) **Organic Matter:** Because organic matter holds water differently from inorganic soil particles, both soil water

## Introduction:

The **FRIZZELL** Soil Moisture Probe (SMP2A) is a precision electronic instrument designed to provide accurate readings of soil moisture.

The instrument is particularly suited to the measurement of soil moisture in both pastoral and cropping

The SMP2A has been designed to be easy to operate, maintenance free and cost effective in operation.

To get the best from your **FRIZZELL** moisture probe it is important to understand the principles of irrigation. Please read the section of this manual entitled **Irrigation Overview**. Understanding the principles in this section are essential to get the best returns from the use of the probe.

**Before operating the Probe** read the section on Setting Up the probe so that it operates most effectively on your property.

## Key Features:

The soil moisture sensor is a portable, compact, easy to use and the moisture resistance and has automatic temperature compensation. Measurement readings are instant.

2) **Improved accuracy:** The **FRIZZELL** Soil Moisture Probe allows many readings to be taken to ensure greater accuracy. Reading show the percentage moisture in the soil. The unit has automatic temperature compensation and digital display. A backlight allows readings to be made in low light conditions.

3) **Portable:** The unit weighs less than 500 grams. and packs in the supplied bag for easy transport.



4) **Maintenance free:** Strong construction and few moving parts ensures many years of trouble free operation.

5) **Power Saving:** The unit can be turned off at any time. It also automatically turns off after 5 minutes of inactivity. The Low battery symbol will appear on the screen when the battery level is low.

6) **Multimeasurement:** Most soil moisture sensors rely on limited numbers of measurements which can only be taken from a limited number of sites. Because of the ease of soil moisture measurement with the **FRIZZELL** Soil Moisture Probe many soil moisture "samples" can be easily and quickly taken.

## Irrigation Overview.

Definition of terms:

**Soil Moisture:** The water content of the soil. Acts as a carrier to supply plants with nutrients.

**Saturation:** Soil will only hold a maximum amount of water. The amount varies for different soil types but is typically from twenty to fifty percent of the soil by volume. In a soil at saturation excess water will drain through the soil, being wasted and taking valuable plant nutrients with it. At saturation there is little air in the soil. This can cause damage to roots, prevent uptake of oxygen to the plant and encourage the development of soil born diseases.

**Evapotranspiration (ET):** Soil moisture is lost from the top of the soil by evaporation from the surface of the soil and by transpiration from the leaves of plants growing in the soil. Evapotranspiration is the measure of the total loss of moisture by the plant and soil system.

**Refill Point:** The minimum soil moisture level at which irrigation is applied. The refill point is likely to vary in irrigation systems depending on such factors as water availability, soil type and crop being grown. Often the refill point is set at 50% of the field capacity.

**Wilting Point:** The soil moisture level at which plants are unable to extract sufficient water to maintain normal moisture levels in the plant tissues. The reduced moisture in the plant cells causes the cells to become "limp" and the plant to wilt. Wilting point typically occurs at 10 to 30% of field capacity.

**Field Capacity:** The maximum amount of water a soil can hold without significant amounts being lost by drainage. Sufficient water is normally applied during irrigation to bring the soil to field capacity.

## The **FRIZZELL** Soil Moisture Probe. (Fig 1)



### Technical Details:

Display Digital, LCD, Measuring range :0-50%  
Operation condition: Temperature :0-60°C Humidity:<85%  
RH  
Resolution:0.1 Accuracy:± 2% (Non-saturation condition)

Power supply: 4x1.5AAA size (UM-4)  
Sensor length: 280mm

## How the **FRIZZELL** Soil Moisture Probe Works.

In the **FRIZZELL** Soil Moisture Probe many pulses of electricity are sent into the soil, the returning modified signal is sensed and the information contained in the signal used to predict the percentage of water in the soil. The unit has automatic temperature compensation

### OPERATION PROCEDURE

Turn on the power key, the symbol "0" will be shown on display, (and the testing symbol will also show at the same time). *If "0" does not appear the unit may need zeroing . to zero, with the unit switch on and press the "HOLD" key with the probe in the air. ( ensure that the bottom 2cm of the probe is clean and dry before zeroing.)*

### Reading Soil Moisture:

To obtain a soil moisture reading hold the instrument and probe with your hands, insert the probe into the soil being careful not to damage the probe.

Depress the "Hold" Key to obtain the reading. For accurate reading the probe should be inserted into the soil the same amount for each reading.

Please note high levels of soil elements such as salts and minerals can have an effect on readings. High electronic ion densities will increase the testing values.

Maximum soil moisture readings will occur at field capacity and then soil moisture will slowly decline. To gain further information on field capacity and plant stress consult the section titled "Irrigation Overview" at the end of this manual.

### **Sensitivity:**

The unit has a range of sensitivities that can be used to adjust reading sensitivity depending on soil type.

If the indicated percentage varies from the absolute soil moisture sensitivity can be changed by selecting one of six settings. To change setting hold down the [FUN] key until ( Adj ) appears on the display. Use the up and down arrow keys to move through the 6 sensitivities.

### **Power Off.**

The simple way is depress the power key .The unit can also be turned off by depressing the ' FUN" key until OFF shown on the Display (it will take 3s for this operation). The unit will also Auto power off after about 5 minutes from the last key operation.

### **Hints and Help:**

- 1) **Do not use excessive force** to insert the probe into the ground.
- 2) To obtain representative sampling at least six readings should be taken from each area. "Extreme" readings where loose soil or other anomalies are incurred, should be ignored.
- 3) **Do not** take a reading when the probe is in water, or the probe will be damaged.
- 4) **Remove the batteries** if the instruments is not used for an extended period of time.

### **Care of the Probe:**

The WTL Soil Moisture Probe is designed to be a rugged reliable instrument to give many years of operation. **Do not subject the instrument to impact forces** as this may damage the components.

**Water:** The instrument is designed to be splash proof. Do not immerse the instrument in water.

**Cleaning:** The instrument, including the measuring probe should be kept clean. Excess dirt should be removed from the probe after each moisture reading. The probe should be well cleaned using a brush or cloth especially when moving from paddock to paddock. This not only ensures accurate measurements occurring but also avoids the transfer of soil contaminants from one area to another.

**Changing Battery:** Access to the battery is gained from the back and bottom of the meter unit. The unit uses three AAA type batteries.

### **Fault Finding:**

If the unit does not operate:

- a) In very dry soils the moisture may be too low for a reading. Push probe into wet soil to check the unit.
- b) Check to ensure that no external components have been damaged.
- c) If the unit is not working check the battery.

If the unit still fails to operate contact our free support service on 03 318 1333