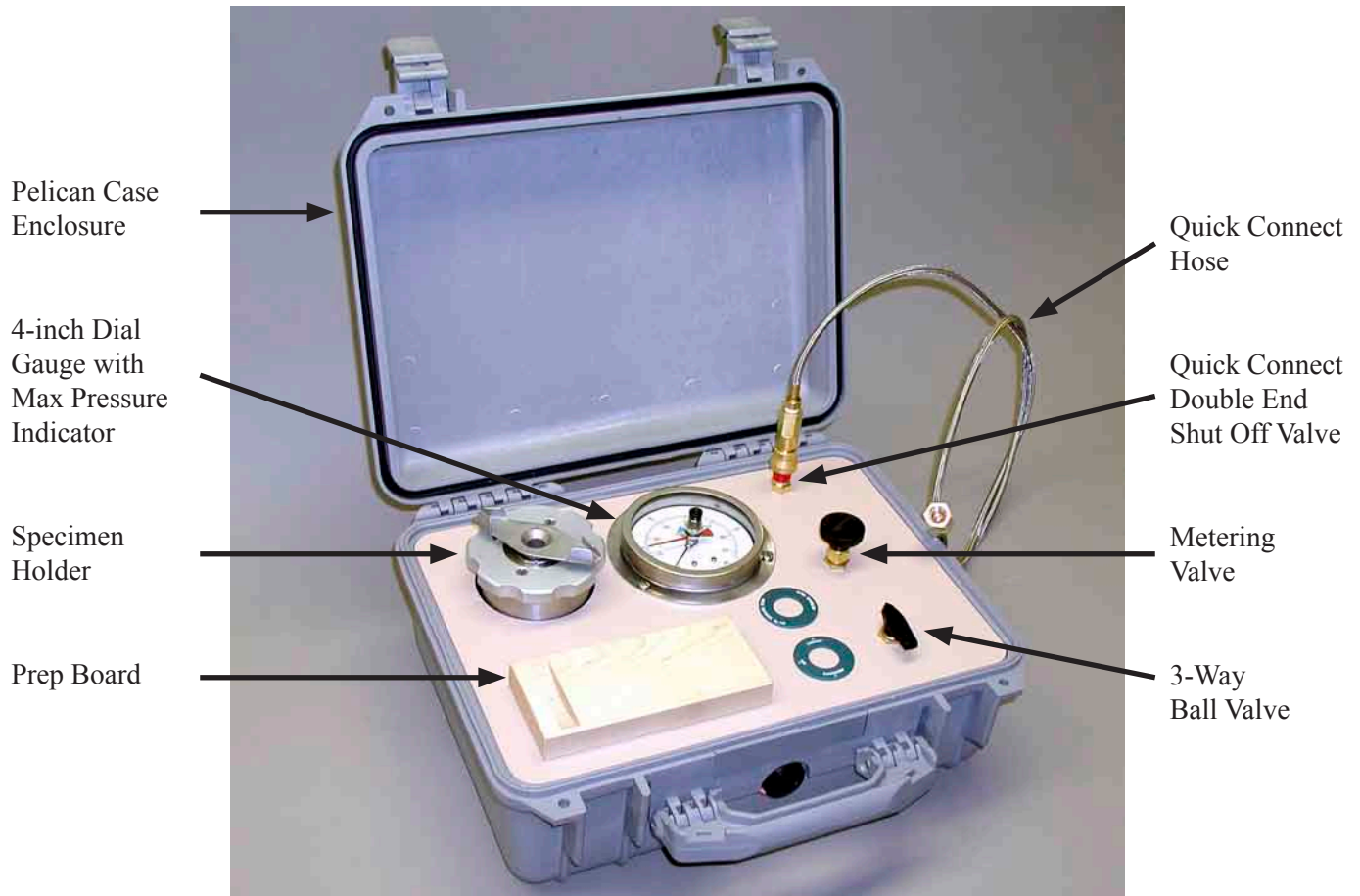


MODEL 3115

Portable Plant Water Status Console



The 3115 is our newest model for measuring Plant Water Potential. Its 25 Bar operational range is perfect for the majority of readings.

- Schedule irrigation based on total plant stress conditions from above and below ground. See the effects of wind, rain, and heat on plant physiology.
- Early indications of infestations and disease that rob water uptake and damage the health of the plant. These can be build-ups of salinity, poor soil conditions, root diseases, etc.
- Monitor induced stress to plant growth to obtain specific fruit characteristics. Calculate and watch as you bring science to the practice of deficit irrigation.
- Determine the extent to which one can produce optimum crops with the least amount of water.
- Use the plant water stress readings to validate the composite effects of separate instrumentation that monitor other environmental factors.
- Get data that reflect the plant's physiology and eliminates subjective observations, providing a way to ensure consistent practices.

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History

50 years ago, plant scientists searched for an independent method for measuring the overall health of a plant. External measurements were an accepted practice: measuring the rain levels, rooting depths, gravimetric water contents, air and soil temperatures. How could one measure the direct effects of these exterior influences on plant physiology, and most importantly, how was it affecting the delivery of nutrients and water from roots to leaves?

In the mid-1960s, Dr. Schollander and others surmised that similar to checking ones' blood pressure, wouldn't it be possible to measure a living plant's sap pressure/tensions? The concept worked and sap measurements using a "pressure bomb", with the rather long name of Plant Water Status Measurements, took hold. As a constant innovator, Soilmoisture Equipment developed the first commercial Plant Water Status (pressure) Consoles for research in 1974. In the intervening years, sap pressure measurements using Soilmoisture's Plant Water Status Consoles have been used in research to help increase the yields of cotton, sorghum, and other crops while minimizing water usage. More recently, vineyards are purposefully inducing a regulated stress to enhance specific fruit colours, tanins, flavours, etc.

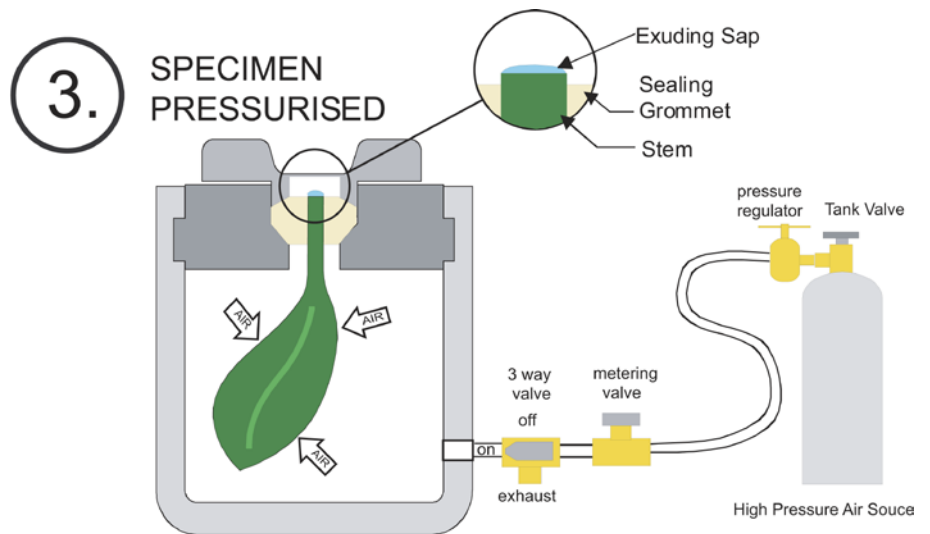
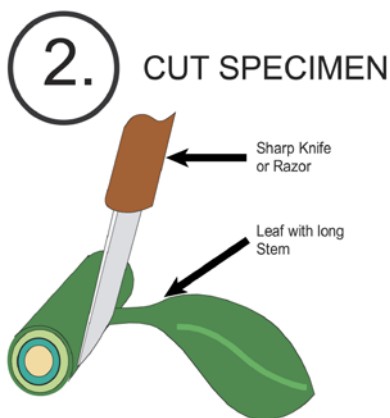
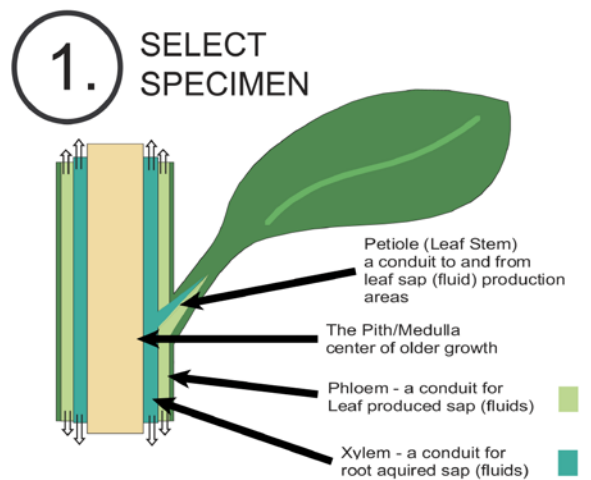
How it Works

Making Plant Water Measurements is easy and relatively simple:

Step 1: Select a representative sample specimen of the plant with sufficient length to fit into the pressure vessel.

Step 2: Cut the stem close to the plant stalk with a sharp knife or razor.

Step 3: Put the cut leaf into the pressure vessel as quickly as possible to prevent changes from to dehydration, evaporation, etc. Pressurize the vessel and look for exudation of sap from the petiole. At the first indication of exuding sap, stop pressurization and note the pressure at which sap appeared on the cut surface.



The Theory Behind the Plant Water Status Console

The pressure bomb is used to measure the energy status (water potential) that water is held by the plant. Water moves in the soil-plant-atmosphere continuum by gradients (low potential to high potential) and in various states (liquid, vapour or solid). Water usually enters the soil under positive head pressure, and is held in the soil under negative head (vacuum). Plants adsorb water from the soil under positive to negative head conditions (most normally under negative head for land plants; the aquatic varieties apply different strategies). In every soil there is a moisture content vs. negative pressure relationship - the moisture-tension curve that is normally expressed simplistically as Field Capacity (0.1 bar) and Permanent Wilt (15.0 bar) while in reality there are an infinite number of points on the curve between these values. Once water is adsorbed by plants it is normally held under negative pressures, although some plants exhibit 'guttation' or positive exudation of water at the leaf margin. However, this occurs only when there is very high moisture content in the soil. Plants hold water under low negative pressure when non-stressed, and hold water under moderate to high negative pressures when they are under moderate to high water stress. There is a unique relationship between the plant water status and soil water status under a given climatic condition (i.e. the plant will experience a greater negative water status on a given soil at a given soil water status on clear hot days than on cool humid days). Plant water status will increase (water held at more negative pressures) from pre-dawn minimum to mid-day maximum. Typical measurements made with the pressure bomb are conducted at these times of day.

The Pressure Bomb measures leaf water status or stem water status (each give a different relationship to water status) by the following method:

- 1) A leaf or stem is removed from the plant that is experiencing the given climatic, soil moisture content and associated soil medium;
- 2) The leaf petiole or stem is placed in the pressure chamber with the cut stem or petiole sealed and protruding from the chamber at atmospheric pressure;
- 3) The pressure vessel is sealed and pressure is applied;
- 4) Observations are made of the cut petiole or stem that protrudes from the chamber at atmospheric pressure;
- 5) Pressure in the chamber is increased until liquid water exudes from the cut petiole or stem;
- 6) Record the observed positive pressure (supplied to the pressure chamber) to force liquid water from the leaf or stem. This value is equal the negative pressure water was held by the leaf or stem when it was attached to the plant.

Important Features on the 3115 Console

With over 30 years of experience in the design and fabrication of quality Plant Water Status Consoles, only Soilmoisture's consoles have these unique features on all our Plant Water Status Consoles.

Unique CAM-LOCK Sealing

Making a quick measurement is key to accurate readings. Only Soilmoisture's consoles are designed with a unique cam-lock sealing. Just slip the Specimen Holder into the pressure vessel, make a ¼ turn and you're ready to make a reading! This can only be accomplished because of the strong stainless steel materials used in both the Specimen Holder and the Pressure Vessel.



Wide Selection of Grommets

Only Soilmoisture has the widest variety of sealing grommets used to gently hold specimens under pressure. There's a grommet to fit almost any size stem. Use one-piece grommets for optimum speed or two-piece grommets for working with a wide selection of stem sizes. We can also provide special grommets for unusual stems such as sorghum. In addition to the widest selection of grommets available, you can choose from two or more Specimen Holders for specific plant types such as round-stemmed plants or thin-bladed grasses (3015G4 or the 3015G2 Specimen Holder).

Model Specifications

Maximum Operating Pressure: 25 bars

Read-out: Bourdon-Style Gauge, 4¾" diameter

Size: 16" × 13" × 7", 8.2 kg gross weight.

Instrument Comes Standard with the Following

Pressure Vessel, 5"

Specimen Holder (3015G4)

Standard Grommet Set for G4 Specimen Holder (3018G4K1)

which includes:

1 each of all 3018G4 Sealing Sleeves, plus

1 3019G4-011 Grommet, and

1 each of the Brass Support Washers (3020G4-000, 3020G4-001, 3020G4-006).

DocRef: Ver1.0

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