



**WATER
WIND
SOLAR
INSTRUMENTS**





ABOUT US

Our goal at Dynamax is to maintain our position and recognition as a global leader in the production and integration of plant-environmental monitoring instrumentation. We are continuously building on that reputation by supplying only the highest grade sensors and monitoring systems for the professional, educational, industrial, governmental and commercial industries.

Our work at Dynamax is in the design and manufacture of unique and beneficial systems for assisting in understanding, regulating and managing plant, soil, water, solar, and wind resources. We offer complete solutions and provide the vital link between the plant and its environment. Our customer base includes researchers, universities, agronomists, farmers, horticulturists, the forest science community, and sports field managers.

The health and well-being of mankind depends on the water cycle and limited water resources. Accordingly, urban growth, agricultural productivity and our everyday environment depend on water, water quality, and water-efficient plant production. In that effort, Dynamax is

solely focused on plant bio-sensors, plant transpiration measurement, plant bio-productivity and environmental conditions.

Within our wide range of products, our Dynagage Sap Flow Sensors record plant activity and water uptake for commercial production and for research. Sap flow sensing methods are key techniques in water management, nutrient uptake, plant-water status and food product quality. Transpiration, plant growth and biomass production are analyzed with Dynamax sensors.

At Dynamax, scientific excellence is our foundation for unique instruments and systems based on proven, sound, scientific principles.

A handwritten signature in black ink that reads "Mike van Bavel". The signature is written in a cursive, flowing style.

Mike van Bavel, President

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TRANSPIRATION SAP FLOW

FLOW32-1K SAP FLOW SYSTEM



FEATURES

- Real-time Sap flow
- Automatic power down
- Modular and expandable system
- Auto Ksh zero stability algorithm - built in
- Easy to use support software
- Noninvasive sensors
- Direct transpiration readings
- No calibration

The Dynagage Flow32-1K Sap Flow system has been servicing research Plant Scientists throughout the world for over 10 years. New powerful functions include auto zero and sensor status built into the data logger program. Sap flow data recalculation and automatic charting with an Excel™ Macro link makes the system a superior water relations measurement system. Sap Flow has never been this easy and powerful.

Below are examples of research and commercial industries where the Flow32-1K Sap Flow System is actively applied:

- | | | | |
|----------------|-----------------------|-----------------|------------------|
| Agriculture | Agroforestry | Crop Physiology | Environmental |
| Forestry | Genetic Engineering | Horticulture | Hydrology |
| Irrigation | Mining Rehabilitation | Orchards | Phytoremediation |
| Urban Forestry | Viticulture | | |

FEATURES

- Absolute measurement and no calibration required
- Reusable and portable
- Harmless and conforms to plant size
- Reliable and proven method
- Measures absolute mass-flow
- Helps correct decision making

The Dynagage Sap Flow Sensors are used for measuring the sap flow, and thus the water consumption of plants. These energy balance sensors measure the amount of heat carried by the sap which is converted into real-time sap flow in grams or kilograms per hour.

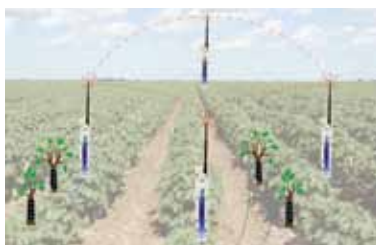
The sensors are non-intrusive and not harmful since the plants are heated up 1° C to 5° C typically. The principles of heat balance sensors are scientifically proven and references exist for most major crops and many tree species. Unlike other methods, Dynagages require no calibration since sap flux is directly determined by the energy balance and rates of heat convection by the sap flow.

Dynamax introduced the first sap flow sensor prototypes in 1988 and today offers a full range of sensors from 2 mm up to 150 mm.

DYNAGAGE SAP FLOW SENSOR



SAPIP WIRELESS NETWORK



TRANSPIRATION SAP FLOW

FEATURES

- Available with soil moisture, sap flow, and weather
- Gateway collects and forwards all radio data to Agrisensors.NET servers
- Data can be transmitted with local area network (LAN) if on-site internet accessible
- Fully integrated wireless sensor mesh networking platform
- Self-Healing Network
- 25 SapIP Nodes per Gateway Network
- GPRS Cellular Data Retrieval for remote sites

The SapIP system from Dynamax, Inc., with EXO or Dynagage sap flow sensors, can be used to measure plant water use in “real-time” with no calibration. The SapIP gateway can monitor up to (25) SapIP nodes, that may be located up to 1000 meters away, and up to (5) hops are possible. This gives a total distance of 5 km or about 2.5 miles radius from the gateway. SapIP nodes for plant water use, soil moisture, or weather may be connected altogether in one wireless network system. Data is either collected directly from the SapIP nodes or accessed through the Dynamax Agrisensors.NET website for easy monitoring, graphing, and data download.

SapIP wireless monitoring systems will help you schedule irrigation and manage plant stress. With Dynamax SapIP, irrigation scheduling has never been easier and more maintenance free. You will have accurate data you can depend on to let you know the water status of your crops.

EXO-SKIN SAP FLOW SENSOR

FEATURES

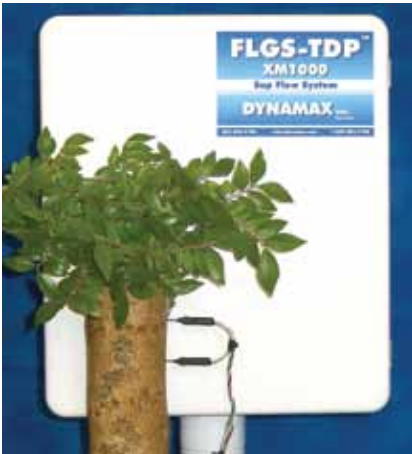
- Low cost
- Low maintenance
- Same accuracy as Dynagage sensors
- Flexible sensor for odd shaped plant stems and growth
- Water shielding layer provided

The EXO heat balance sap flow sensors offer more flexibility for stems 9 to 25 mm in diameter, and the stretchable Velcro insulation makes installation on uneven or branchy stems very easy. EXO sensors may be used on most crops or trees, in the greenhouse or in the field, and are excellent for determining plant transpiration, for irrigation scheduling, or for monitoring plant stress.



TRANSPIRATION SAP FLOW

FLGS-TDP SAP VELOCITY SYSTEM



FEATURES

- **Built-in program computes sap flow for specific trees**
- **2 MB data memory, for up to 500,000 data values, or 200 days of hourly records**
- **Automatic night time zero set, saves processing time**
- **High-efficiency, 90%+, voltage regulators for sensor heater power**

FLGS-TDP XM1000 is a completely integrated measurement system for TDP sap velocity sensors. The XM1000 version of our TDP Sap Flow System includes the latest Expanded Memory Data Logger platform and extended features such as real-time sap flow calculations and auto zero. Each FLGS-TDP system can read up to 32 TDP10, 30, or 50 sensors.

This basic system can be expanded with additional multiplexer subsystems to read up to 128 TDP sensors. Each TDP thermocouple is connected to a differential channel on the logger. All the necessary electronics, software and sensors are assembled into a complete solution.

TDP SAP VELOCITY PROBE

FEATURES

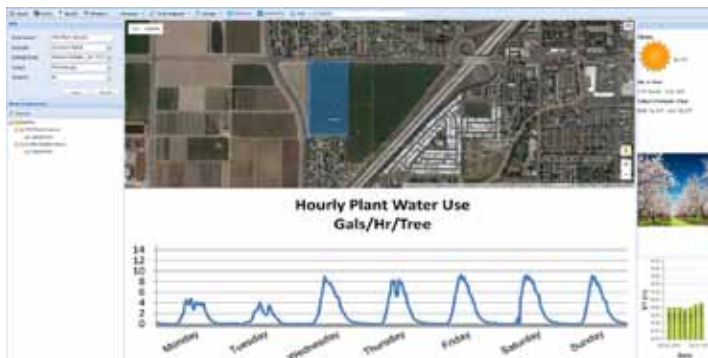
- **Easy to install**
- **Continuous sap velocity measurement**
- **No heat pulses**
- **Compatible with most data loggers**
- **Teflon coated probes for easier removal**
- **Proven Granier heat dissipation method**

The newest method of transpiration measurement is now available from Dynamax for large trees and plants. The Thermal Dissipation Probe (TDP) transpiration sensor measures sap velocity which is converted to volumetric flow rate. TDP is a simple and affordable device originally proposed by Granier. The basic TDP probe has two thermocouple needles inserted in the sapwood, the upper one containing an electric heater. The probe needles measure the temperature difference (dT) between the heated needle and the sapwood ambient temperature below. The dT variable and the maximum dT_m at zero flow provide a direct conversion to sap velocity.



For uniform trees in a closed canopy, only one sensor per tree is needed. For irregular canopies or with mixed species, sap flow may vary around the circumference of the trees. Thus multiple probes are recommended in a single tree to make flow calculations accurately. Normally, install two probe sets per tree for trees 3" to 6" (75 to 150 mm) in diameter, and four probe sets per tree for trees 6" to 18" in diameter (>150 mm). Calibration is recommended for new species.

AGRISENSORS.NET DATA PLATFORM



configure your SapIP sensors, locate them on a map, download and upload data remotely and get status reports from each unit. The data accumulated allows you to see daily sap flow rates, see how much water your plants are actually using each day. Also using your soil moisture data you can set your weekly irrigation schedule.

With the Dynamax SapIP wireless systems and Agrisensors.NET, graphical data is presented on the internet and accessible anytime by computer, cellphone or tablet, and system locations in your fields are displayed in Google maps. All data is password protected and accessible only by you, and those designated by you the end user.

WEBSITE DATA SERVICES

FEATURES

- **Maps show sensor locations**
- **Account management with password access to field specific data**
- **Data history saved for a full year or growing season**
- **Interactive data graphics defined by the customer to show desired date ranges**
- **Plant water use with soil moisture and field weather data displayed**

Using Agrisensors.NET you will have access to control and

WIRELESS IR TEMPERATURE

SAPIP-IRT LOGGER WIRELESS IR TEMPERATURE



FEATURES

- **Very narrow 10° (1:6) field of view**
- **Excellent for Pivot or drip irrigation**
- **Rechargeable batteries (solar- 2 W sold separately)**
- **Up to 30 units per network on a coordinator**
- **10 sec to 60 min output timing**
- **± 0.3 C accuracy over wide range of ambient (0 to 60 C)**
- **300 – 500 ft range based on antennas distance**
- **Analog output versions available**

The SapIP-IRT wireless infrared (IR) temperature sensor is the latest development in IR leaf temperature sensing for use in irrigation scheduling and plant stress detection. This new system allows for up to (24) IRT sensors to be distributed throughout a field, and data to be collected with a single XBIB coordinator or gateway. Using the "Watcher" software, all data can be collected from the XBIB coordinator and stored on your computer. The data can easily be imported into a spreadsheet for analysis and graphing. Plant stress models are available and can be used to determine if, and when, your crops need irrigation, and flags are used when irrigation is required. IRT Stress Accumulator Data Loggers can be used when remote IR sensor networks are required. Up to (24) IR sensors can be monitored simultaneously, and REP repeaters can be used to add distance and expand the system by adding more IRT sensors. Data is collected using a WiFi connection up to 50 ft away. Webpage data access and mapping is included.

PLANT HYDRAULIC CONDUCTANCE

HIGH PRESSURE FLOW METERS



HPFM FEATURES

- **High resolution generation 3**
- **Works on roots or shoots, stems or petioles**
- **Stem ranges - 1 mm to 55 mm**
- **Measures conductivity of the entire root system**
- **USB powered data acquisition**
- **High speed sensor conversion module**

The HPFM-Gen3 measures how water movement relates to the pressure differences required to draw water from the soil or through a plant. The hydraulic conductivity relationship is a quantitative analysis for roots and stems. The measurement is performed in the field, where in-situ root system can be measured in its natural environment. In the HPFM method, the resistance of the root and shoot are measured separately by pressure perfusion and added together. The HPFM will help plant physiologists and agronomists look forward to those seasonal studies of root and shoot progression, water potential, or soil treatment effects.

HCFM-XP GEN FLOW METERS

HCFM-XP FEATURES

- **Very portable briefcase design**
- **In-situ analysis of hydraulic conductance**
- **Stem Ranges - 1 mm to 36 mm**
- **Works on roots or shoots, stems or petioles**
- **Intelligent regression**
- **Flow Rates 0.01 to 100 ml/hr**

The HCFM-XP-Gen3 Hydraulic Conductance Flow Meter, is designed to perform quantitative root and stem analysis without having to dig up roots or drag limbs back to the lab. In most cases, the analysis of a sample root or shoot is completed in as little as 10 minutes. You can quickly measure the major components of the hydraulic conductance in the soil-plant atmosphere continuum. One can measure the values of the individual hydraulic resistances, then compute the pattern of water flow and water potentials in the resistance network.



WEATHER STATIONS

SAPIP-MICRO WIRELESS WEATHER STATION



FEATURES

- Complete packages available
- Wide variety of environmental sensors possible
- RH & Air Temperature
- Wind Speed & Direction
- Solar Radiation
- Rainfall
- Calculate ETp at your location
- Uses 12 Volt battery & solar panel
- Pre-configured before shipping

The SapIP-MICRO can be used as a stand-alone weather station, or as an add-on to an existing SapIP wireless network. When monitoring plant water use using the Dynagage or EXO sap flow sensors, it is useful to compare transpiration results with ET from a weather station.

COMPLETE WEATHER STATIONS



INTELMET ADVANTAGE FEATURES

- Complete ET Weather Station
- Compact and light weight
- Fast simple installation
- Integrated ETo reporting
- Solar radiation with leveling base
- Accurate and stable measurements
- Low power consumption
- Low maintenance

Dynamax offers the most efficient weather station ever produced for low cost and accurate commercial applications. Growers asked us to produce a compact, light and rugged low cost system that is maintenance free and great quality. This automatic ET weather station includes features offered only by the leaders in weather instrument technology. Simple one-pipe, and one-crossbar construction installs in under 30 minutes.

DYNAMET FEATURES

- Scientific grade weather sensors
- ETp Software: Penman/van Bavel and RCM

The Dynamet is a high quality weather station with a complete set of sensors for measuring key environmental parameters and calculating ETp evapotranspiration. A solar panel and 12 volt battery allow the weather station to operate continuously unattended. Data can be retrieved by a PC using RS-232 interface and cables. Modem, cellphone and RF radio data retrieval options are also available. Growers can schedule irrigation, pest control applications and other crop maintenance programs to optimize harvests using this approach.

Both models now available with the MaxiMet.



DEX ELECTRONIC DENDROMETERS



FEATURES

- **Non-destructive**
- **Measure plant growth or stress level**
- **Long-term measurements possible**
- **Weatherproof and rugged for field study**
- **Woody stemmed, herbaceous plants, & fruits**
- **Real-Time measurements**

The DEX20, DEX70, DEX100 and DEX200 are highly precise electronic dendrometers that measure the growth and size of plant stems and fruits. The effects of environmental factors on the water balance of plants and stem size variations over time are easily monitored with a temperature compensated dendrometer. The DEX is a caliper-style device with a full bridge strain gage attached to a flexible arm. The output signal is then recorded by a data logger or computer in real time. The millivolt sensor output shows both the diurnal and

long term growth or stress level of the plant. The device has been used to test plants under conditions of water stress, elevated ozone and other atmospheric pollutants. Applications for screening plants for growth rate and stress tolerance are also common.

DEX-LOG DEX LOGGER SYSTEM



FEATURES

- **Complete DEX logging kit**
- **Measure growth or stress**
- **Long term monitoring possible**

The DEX-Log dendrometer data logging system is comprised of a GP1 data logger and (2) DEX electronic dendrometers and can be used to monitor plant growth rate or stress levels over long periods of time, and can operate completely unattended. The GP1 data logger offers a self-contained solution for monitoring DEX electronic dendrometers, soil moisture and weather sensors. Data can be monitored and displayed in real-time or output to a PC using the supplied RS-232 serial data cable.

The DEX Electronic Dendrometers can be clamped on stems or fruits (citrus, apples, plums, etc.) and can measure very tiny changes in stem or fruit diameter (~0.004 mm). A trend upward represents the growth rate of the plant, whereas a leveling off or trend downward indicates plant stress. This way, growers know when, and how much stress the plants are under. This information can then be used to schedule irrigation or fertilizer applications as well as keeping track of growth rates over time.

SM150-KIT SOIL MOISTURE KIT

FEATURES

- **New cost effective sensor**
- **Easy data logger connection (0 - 1 V DC)**
- **±3% accuracy**
- **Good temperature and salinity stability**

The SM150 Kit is a simple, convenient, low cost option for making soil moisture measurements on the move. The kit comprises an SM150 Sensor, a dedicated HH150 Moisture Meter and a handy carry case. The HH150 Meter is very easy to use, being a readout-only device (no PC connectivity). Calibrations for a typical mineral and typical organic soils are included.



PORTABLE SOIL MOISTURE SENSORS

FEATURES

- **Easy to use**
- **Plug and read**
- **Accurate and reliable**
- **Completely portable**
- **Soil moisture display**
- **Soils • Media • Sand • Clay • Peat**
- **Durable and rugged**
- **Fast & accurate moisture monitoring**
- **Golf, sports turf, greenhouses, farms**



The TH150 portable soil moisture probe is fast, accurate, and easy to use. It consists of an SM150 soil moisture sensor and an HH150 Readout, mounted on a handle for ease of use. This is the perfect tool for golf course and sports turf maintenance and irrigation scheduling.



The TH300 portable soil moisture probe consists of a SM150 soil moisture sensor and a HH2 Readout with data storage and memory. The HH2 readout contains standard calibrations for mineral and organic soils, but also has (5) open slots for additional soil calibrations. Golf course and sports turf management professionals appreciate the advantages offered by the TH300.



The TH₂O gives fast and accurate soil moisture readings in seconds using the Theta probe technology. The ML3 Theta probe and the HH2 Hand Held Readout are combined to make the TH₂O. Taking soil moisture readings "on the fly" is now easier than ever. The HH2 Readout can store up to 1100 time stamped soil moisture readings, which can later be downloaded to a PC.

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