

# Probe12™ Sap Flow Logger-Irrigation Control

US Patent No 7280892



Probe12 contains a datalogger with 12 input channels, two pulse inputs, a soil sensor input, voltage regulator and communications in single instrument.

## Ordering Information

**PROBE12-DL** Sap flow datalogger. For logging real-time sap flow, soil moisture and rainfall. Monitors (up to 12) TDP Sap velocity sensors, weatherproof enclosure, RS-232 cable (15 ft), setup/data retrieval software, 5 Ah battery and 120/220V charger, pole mounting kit, U bolts.

**PROBE12-IS** Automatic irrigation, water balance System. All the features of Probe12-DL with irrigation alarm-valve control output, 24 Vac relay, and external sensor cables.

### TDP Sap Velocity Sensors

TDP-10 TDP Sensor 10mm, 12 max.

TDP-30 TDP Sensor 30mm, 12 max.

TDP-50 TDP Sensor 50mm, 12 max.

TDP-80 TDP Sensor 80mm, 4 max.

TDP-100 TDP Sensor 100mm, 4 max.

Sensors may not be mixed during operation. One cable configuration and one voltage setting is supported in one Probe12 system at a time. Sensors supplied with: 8' cables (Installed on the system) Reflective bubble shield, Installation kit and how-to manual.

EXTP-XX Extra length sensor cables in addition to standard 8', xx-ft. Maximum 150 ft.

TE525-L25 Tipping bucket rain gage

ML2-4 Theta Soil Moisture sensor

### Digital Flow Meters with Calibration

FL4-FLM2 Flow Meter, 2" pipe

FL4-FLM6 Flow Meter, 6" with saddle mount

### Irrigation Valves - Schedule 80 PVC

FL4-V1 Relay operated valve 1" PVC pipe

FL4-V2 Relay operated valve 2" PVC pipe

### Communication Options

DNX9600 - 9600 Baud MODEM

SHM115-Short-haul RS232modem 2miles@9600 bps

RFXM09-MK, RFXM24-MK 900 MHz/ 2.4 GHz

RF modem kit. 20 miles (LOS).

**Probe12-IS**, Irrigation Scheduler, is a stand alone water balance measurement system for irrigation automation based on plant transpiration. A maximum of 12 TDP Sap velocity sensors can be installed to read crop water consumption. These measurements are compared to rainfall, soil moisture and irrigation water supplied. The calculator water balance or water deficit then determines the amount of water to be replenished at a predetermined interval. System informs the grower to manually apply a specific volume for the area intended, or the Probe12 may automatically open irrigation valves if connected until the water balance is replenished.

The internal logger collects the sap flow rates, rainfall, and irrigation history retrieval by PC or remote radio link. Probe12 makes water-efficient crop management easy and precise.

## Features

- Based on Successful Flow4 technology
- High performance irrigation and water balance logging
- Real-time sensor status
- Measures: Plant transpiration, rainfall, soil moisture
- Monitors water applied to crop irrigation zones
- 12 TDP sensors - expert weighted averages
- History data accessed easily by friendly menu software
- Number of plants per field, plant size automatically factored
- Irrigation adjusted for system inefficiency and evaporation
- Communication interface to any Windows based PC

## Setup and Control Software

Software to install and configure your Probe12 system is as easy as pointing and clicking on the icon for that function. Each plant-sensor has automatic diagnostics, with check marks to indicate all is well. Click on "setup" and the menu choices are clearly indicated graphically.

After setup is complete, the PC may be disconnected and Probe12 does the rest. By direct communication to Probe12 in greenhouses and with remote radio MODEM, PC software displays plant sap flow rates, rain, total irrigation, and the water balance on graphs as well as bar charts. Separate menus adjust the crop-field description, logger settings, and show overall system status. No other system has these unique features.

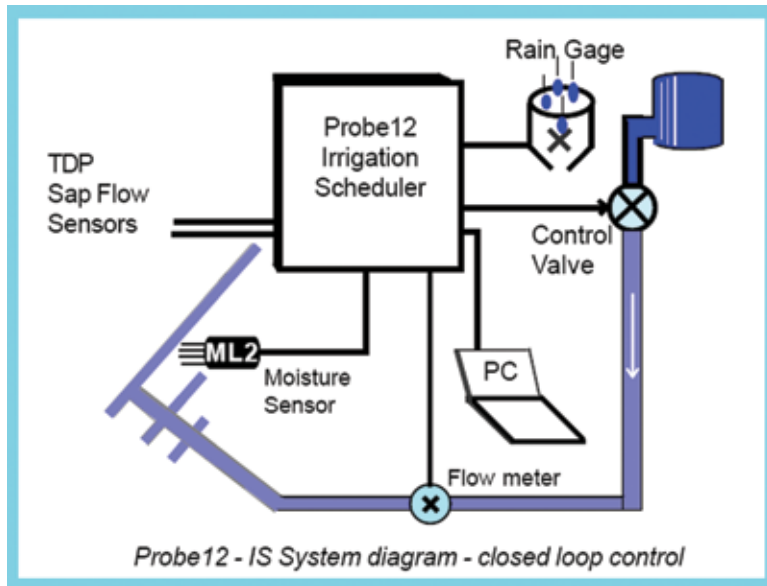
**Probe12-DL** Datalogger is a stand alone water balance measurement system. Up to 12 TDP sap velocity sensors are recorded with all sensor signals, sap flow, and the weighted average for all plants.

Optional sensors for rainfall, soil moisture or solar radiation are recorded at each logging interval. The Probe12-DL stores the irrigation and watering history for direct or remote retrieval. When a PC connects to the Probe12-DL, the detailed log of sensor results may be transferred to spreadsheet files for analysis.

- 14 days of hourly logs
- Daily water balance log-1 year
- Hourly rate of sapflow
- Non-volatile memory for all data
- Automatic zero - No calibration
- Easily portable
- Solar power optional
- Sensor range 10-100 mm needle for monitoring a wide range of tree sizes
- Battery backup, fail-safe memory
- Automatic data retrieval
- Optional remote communications



# Probe12 Sap Flow Logger-Irrigation Control



## Specifications

**Datalogger** Proprietary embedded microprocessor at 8MHz clock, 9600 baud data. Based on successful Dynamax's Flow4 technology. 14 days of hourly logged data and water balance history for 100 days stored in Non-volatile memory. Automatic data retrieval features. 27 kb of Non-volatile data logger memory, 4 kb of history, 27 kb program memory.

### Sensor Inputs

**TDP sap velocity sensors** (12) 12 differential inputs: range +/- 2.5 mV, 0.1 uV res.; input voltage monitor 0-10 V.

**Auxiliary sensor** range 0-2.5V, 0.1mV resolution

**Rain gage** dry contact closure.

**Flow meter** dry contact or solid state 0-12 V.

Irrigation Valve 24VAC, 60Hz / 50 Hz.

**Control Output - Probe12-IS only** Valve control relay, 15 A @28 Vac maximum.

**Sensor Cables** Screw terminals with sensor type and channel label for TDP sensors. Quick connect external sensor inputs for Rain gage, Flow Meter, Auxiliary sensor and Irrigation valve.

**Communications** RS-232, 9600 Baud, 15 ft. cable (5 m).

### Optional Communications

**USB Compatible** Flow4 is compatible with PCs with USB connector using Dynamax supplied USB adapter.

**RF Modems** 900 MHz/ 2.4GHz, up to 40 miles (LOS), point-to-point, point-to-multi-point configurations and repeater option

**Short-haul Modems** Up to 1.3 miles Point-to-Point, Point-to-multi-point configuration. DIP switch selectable address.

**Power: AC Outlet Adapter** Switching regulator, 3.6 A @ 15V dc; 120/240 Vac, 50-60 Hz., 6 ft. extension (1.8 m)

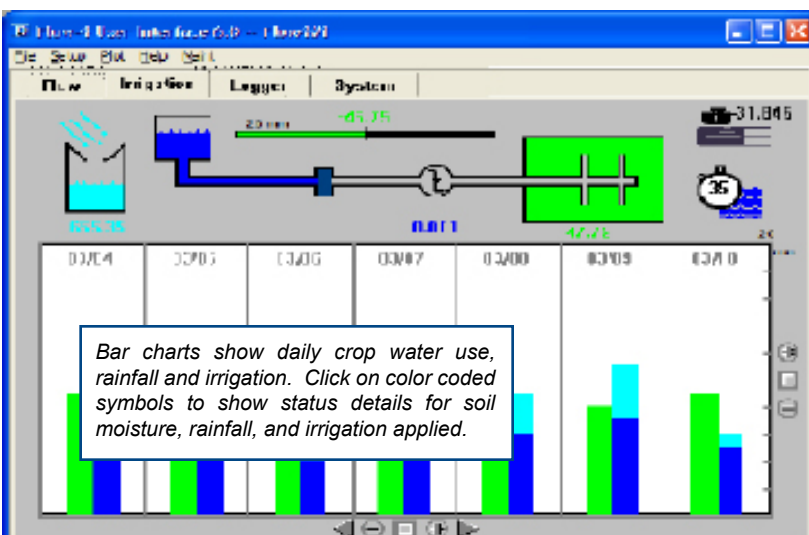
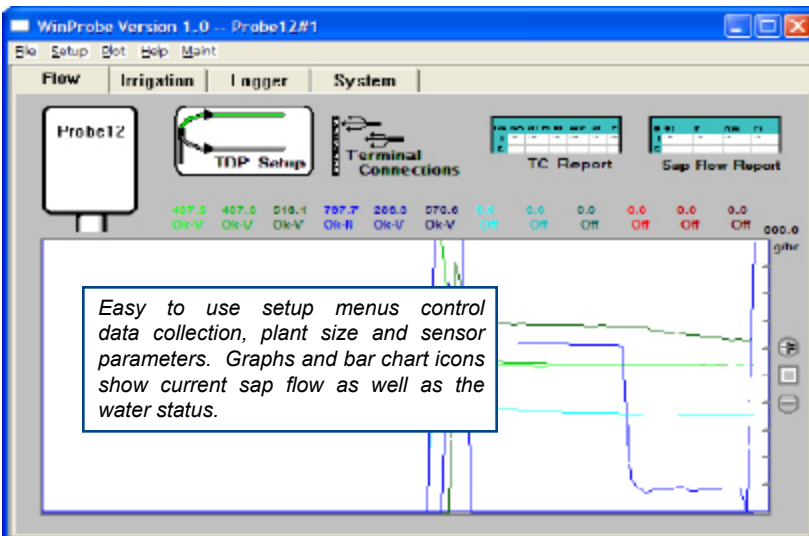
**Battery Power - Voltage Requirements** Sealed lead-acid, 12V, 5 Ah. Working range 10-15 V. At least - 6 V. for processor.

**System Current** 50 mA without sensors maximum fuse current 3.15 A, 250V, (5x20 mm).

**Enclosure Dimensions** 6.5" x 11.75" X 13.5" (16.5 x 30 x 34.3 cm)

**Weight** 15 lb (7 kg)

**Ratings** NEMA 1, 2, 3 rain tight. CSA, UL listed.



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