

# Dendrometers for Fruit and Stem Growth



## Ordering information

### DEX20

Dendrometer for stems or fruits 20 mm,  
3 m cable length.

### DEX70

Dendrometer for stems or fruits 10 - 70 mm,  
3 m cable length.

### DEX100

Dendrometer for stems or fruits 25 - 100 mm,  
3 m cable length.

### DEXCC

Calibration kit for DEX70 or DEX100

### ECWD-25

Cable for dendrometer, 8 m, water proof connector

### ECWD-Lxx

Extra length, (XX) added to cable ECWD-25

## DEX Construction

- Milled Alloy - Caliper Body
- Stainless steel adjuster & locking nuts
- Stainless Steel Flex Band
- Four balanced, temperature compensated Strain Gages
- Electronics sealed and weatherproofed
- Four Stem clamping blocks provided
- Optional spherical clamping blocks
- 0-13 mm expansion range
- Calibration Kit available

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 datalogger or computer in real time. The millivolt sensor output shows both the diurnal and long term growth 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.

## Features

- **Nondestructive**
- **Real-Time measurements**
- **Adaptable to computer systems**
- **Long-term measurements possible**
- **Adaptors for woody stemmed, herbaceous plants, and fruits**
- **Weatherproof and rugged for field study**

## Installation

The device is connected to a datalogger, clamped onto a stem and suspended with mounting monofilament guides on the center of gravity of each caliper arm which are then attached to the tree or a staked plant. Velcro straps are provided for easy installation on trees or woody plants. The screw adjuster is tightened to adjust the clamping blocks on opposite sides of the dendrometer. Thereafter the change in stem size increases the output, which directly converts to the diameter increase past the point one recorded as the device's zero point. A calibration multiplier may be loaded directly into a logger multiplier command, as well as the zero offset, and thus giving readings directly in mm or inches instead of millivolts. Users may install optional shading and shielding to minimize heating and radiation effects.

## Application

A field test was done in an apple orchard in Mattawa, Washington in September 1995. Data was collected over a 15 day period. After the data was acquired, the information was transferred to a personal computer for analysis. Millivolt signals were converted to millimeter units of movement. The initial value of the Dendrometer was then subtracted from subsequent values so that the Dendrometers were zeroed. The effect of temperature was removed by predicting the effect of temperature, then subtracting this value from the data points.

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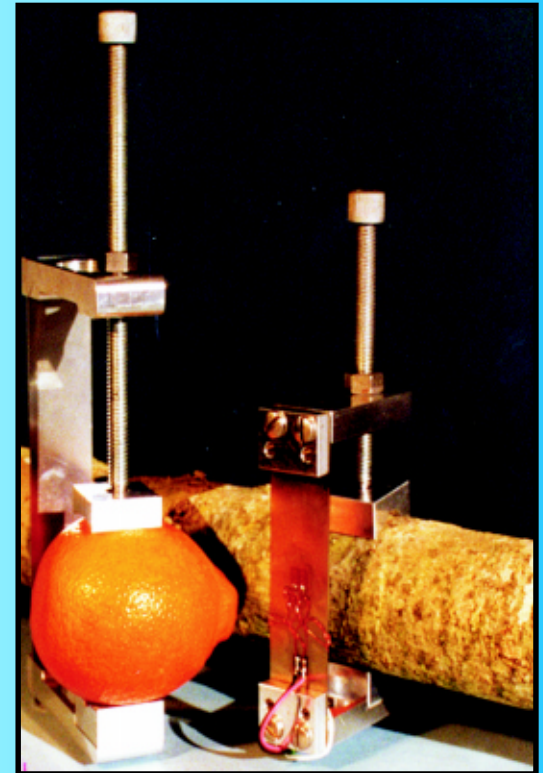
# Dendrometer Specifications

## Specifications

Units (mm)	DEX20	DEX70	DEX100	DEX200
<b>MECHANICAL</b>				
<b>Measurement Range</b>	5 - 25	0 - 70	25 - 100	95 - 200
<b>Expansion Range</b>	0 - 5	0 - 13	0 - 13	3 - 13
<b>Dimensions</b>				
Length	65	102	155	263
Width	19	25.4	25.4	38
Height	38	51	76	153
<b>Weight</b>	55g	180g	230g	572g
<b>Standard Clamping Blocks</b>				
Dimensions Set 1	19x19x6	25x25x9.5	25x25x9.5	25x25x905
Face Radius	5 mm	70 mm	108mm	200mm
Dimensions Set 2	19x19x6	25x25x13	25x25x13	
Face Radius	25 mm	5 mm /50	25mm/ 75	
<b>Optional Clamping Blocks</b>				
Dimensions	19x19x6	25x25x9.5	25x25x13	38x38x7
Spherical Radius	25 mm	70 mm	105mm	500mm
<b>ENVIRONMENTAL</b>				
<b>Operating Range</b>			-10 to 50° C	
<b>Temperature Stability</b>			.0025 mm/° C	
<b>Accuracy over 20°C range</b>			.050 mm	
<b>ELECTRICAL</b>				
<b>Signal Output Range</b>	±5 mV	±5 mV	±2.5 mV	±2.5 mV
<b>Output Sensitivity<sup>Note1</sup></b>	.5 mV/mm	.22 mV/mm	.13 mV/mm	.05 mV/mm
<b>Conversion Mult.<sup>Note1</sup></b>	2.0 mm/mV	4.5 mm/mV	7.7 mm/mV	20 mm/mV
<b>Output Linearity</b>	±.01 mV/mm	±.006 mV/mm	±.004 mV/mm	±.004 mV/mm
<b>Electrical Noise Limit</b>	±0.01 mV	±0.01 mV	±0.01 mV	±0.01 mV

### Note 1

Output sensitivity and multiplier are determined by a 10 point calibration curve from 0-3 mm and 5 points from 3.5 to 13 mm. Each sensor is provided with a factory calibration certificate for precise figures.



## Logger Operation

- Sensitivity Range  $\pm 0.005\text{mm}$
- Wires directly to datalogger
- One differential channel per sensor
- Typical excitation 500 mV
- Excitation Input Impedance 350 Ohms
- Single command for Campbell Scientific and Delta-T loggers per sensor
- 3m cable standard, 8 m (-L25) to 33 m cable optional w/sealed connectors



DEX20 Dendrometer measuring the growth of a navel orange.