• Principle of Measurement
• Specifications
• System overview
• Features & Benefits
• Operation Procedure
• Calibration
• Applications
The HPFM is an instrument designed to perfuse water into an object while slowly changing the delivery of pressure and simultaneously measuring flow.
The HCFM is an Extra Portable version of our HPFM system, which is designed for Hydraulic Conductance tests that requires constant traveling.
The HPFM can acquire data on the Flow of clean water as well as Pressure at which the water was delivered.

The gradient or slope of the flow plotted versus pressure equals the hydraulic conductance of the object.

Measurements:
- Transient Regression
- Quasi-steady state conductance
HPFM - How It works

• Inlet side connects to the 8-way manifold and a pressure transducer (PT1).

• Outlet side another Transducer (PT2) is connected to a second manifold

• Water flow across the CT causes a differential pressure drop (dP).

• Calibration curves for the CT relate the Flow to dP in the range of 0 – 100 kPa
HPFM - System Overview

- Major Components include:
  - Captive Air Tank
  - Water Filter
  - (2) Manifolds
  - (2) Pressure Transducers
  - (8) unique pieces of tubing of known length and inner diameter
  - Data Acquisition Electronics
  - PC & Software
HPFM - Features

- New High Res Generation 3 HPFM
- Reading Sensors direct in parts per million
- NIST calibration standard feature
- Instant data regression, and auto-saver aged results
- USB powered data acquisition
- New High speed sensor conversion module
- Flow ranges increased by 50%
- Vista, XP, supported
- Windows 7 compatible
- Upgrade packages available to previous version
- HPFM systems, with new factory calibration
HCFM-XP - Features

- HPFM Compatible Portable Suitcase version
- Stem Ranges - 1 mm to 36 mm
- Flow Rates 0.01 to 100 grams/hr in 5 ranges
- Conductance 7.7E-08 to 6.5E-04 Kg s-1 MPa-1
- Upgraded Windows Software
- Data Interface - Parallel Cable to printer port
- Faster bleeding results time saving between refills
- Easier setup suitable for short-stop field testing
- Traveling portable, no more packing and shipping
- Light Overall Weight 37 lb. (16.8 Kg)
HPFM - Accessories

Water Refill Kit

Coupling Set

Pressure Supply Kit
HCFM - Accessories

DYNAMAX

www.dynamax.com
Tel 281-564-5100
Fax 281-564-5100
HCFM-CF SN 002

Pressure
Regulator

Pressure
Set to 4.5 MPa (650 PSI)

Outlet

Flow Range
1-Green MIN
2-Orange MAX
3-Red
4-Yellow MAX

PT1
PT2

Operating Pressure
Max 850 KPa
(124 PSI)

Nupro Tank

Delivery Pressure
Max 5.1 MPa (750 PSI)

Supplying Pressure
Max 20.6 MPa (3000 PSI)

DOW CORNING®
Electrical Insulating Compound

Electrical Insulating Compound

DOW CORNING®
Benefits of using the HPFM

• Quantitative root and stem analysis - 10 minutes.
• No need to dig up root systems, wash them or try to estimate the area of the root system
• Can help build the total conductance of a plant/soil/atmosphere relationship
• Software accurately and intelligently measures conductance
Stem Preparation & Coupling Installation

• Excise the root or stem with a clean perpendicular cut

• Prep the stem by removing bark

• Do not restrict the flow with the rubber grommet

• Lubricate the Coupling Thread with G4 compound.

• Remove any air from the internal areas of the coupling using a hypodermic needle.
• Wounding Response of the Plant
• Osmotic (mineral) plugging Response in Root Systems
• Microscopic Air Bubbles
• Compression of the cross section face of the root or stem by the compression coupling
•Leaks in fluid carrying lines and fittings
• Temperature Compensation of Readings
Acceptable Air Bubbles

- Microscopic air bubbles compressed initially as pressure increased
- Then flow/pressure flattens out to record a linear response
Unacceptable Air Bubbles

- Large air bubbles compressed initially as pressure increased (flow goes up and then down)
- Then rapidly drop off as pressure continues to increase forming a non linear response.
- There are not very many good data points
Transient regression
This is a transient because the pressure increased as the flow was recorded.

The user picks the begin (1) and end (2) points, then “Perform Regress” (3).

A steady state mode is also available.
Quasi-Steady State Flow Meter

- Constant flow with constant applied pressure
New Graphic Features

Interactive Graphics

• Zoom
• Un-zoom
• Print
• View Real-time Data
Factory Calibration

- Ensure Most Accurate Data Collection
Project Manager

Manage Project Made Easy

- Create new projects
- Add project notes
- Search previous projects by date
Applications

• Root conductance in the lab or field.
• Conductance of shoots and petioles with or without leaves.
• Root Stress Analysis on trees or crops.
• Modeling root to shoot communications.
• Transpiration models.
• Root water status studies.
• Absolute varietal comparison statistics.
• Micorrhizae nutrient/water enhancement studies.
• Soil to root conductance statistics.
• Crop conductance studies.