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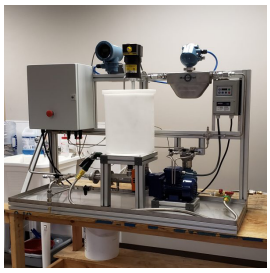
M9350 FRICTION FLOW LOOP

- Easy setup, cleanup, and maintenance.
- Compact benchtop unit.
- Operator safety controls—overpressure relief valve.
- Progressive cavity pump (intelligent metering pump) for minimal shearing of fluids.
- Coriolis mass flow meter.
- Real-time display of Reynolds number, flow rate, temperature, and differential pressure.
- 3 ft. measurement test section (⅜" outer diameter).
- Optional additional testing sections with different diameters. *(May affect benchtop size.)*
- Flow rate of up to 4 gallons per minute at 90 psi (value based upon water at 68°F).
- Durable mixing tank holds up to 5 gallons.
- Compatible with crude oil or water base fluid.



M9350 (Front Diagonal View)

M9350 (Top Left View)

M9350 Mixing Tank (Top View)

PRODUCT DESCRIPTION

Innovative, Compact Straight-Tube Flow Design

The *Grace Instrument M9350 Friction Flow Loop* system's innovative straight-tube flow design evaluates the performance of friction reducers used in oilfields. This conveniently computer-controlled system circulates test fluid through a single tube section to test flow rate vs. differential pressure. The *M9350* is very compact in size compared to other friction flow loop testers, maximizing laboratory space. It can even be placed on a benchtop and easily moved from lab to lab.

Robust Mixer, Precise, Software-Controlled Flow Rate, and Real-Time Testing Results

The *M9350* features a low shear, progressive cavity pump for fluid circulation. It also includes a durable 5-gallon polymer tank with paddle stirrer to fully mix friction reducing agents into the base fluid. The test fluid is circulated through the straight tube. The desired flow rate can easily be set using the software and displays in the software in real-time. Flow rate can also be displayed in real-time on the mass flow meter. A differential pressure transducer and thermocouple measure the pressure drop and temperature across the test section. Measuring results are directly logged into the friction flow loop analysis software, conveniently preinstalled on an included Windows PC *(sold separately)* connected to the unit.

Advanced, Easy-to-Use Software

The *M9350*'s interactive software is easy-to-use and intuitive. This advanced software allows users to automatically control and operate the loop system at target flow rates and record data for pressure, flow rate, and temperature at the same time. Furthermore, detailed data, including graphs and a data table, can be autogenerated and opened in spreadsheet format to further analyze the effectiveness and performance of tested friction reducers.

Hydraulic Fracking and Oilfield Applications

The *M9350* is a powerful testing tool, accurately measuring the performance of friction reducers which can be applied to hydraulic fracking operations and other real-life oilfield applications.

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GENERAL SPECIFICATIONS

Maximum Pump Pressure:	90 psi (0.62 MPa)
Flow Rate Range:	0-4 gal./min. @ 90 psi (Value based upon water at 68°F.)
Fluid Temperature Range:	50-110°F
Differential Pressure Range:	0-60 psi (0.41 MPa)
Differential Pressure Accuracy:	±0.025%
Primary Wetted Material:	Stainless Steel Grade 316 (Standard) or Hastelloy C276 (Optional)
Test Section Length:	3 ft.*
Test Section Outer Diameter:	Single ⅜" (Standard)*
Mixing Tank Capacity:	5 Gallons
Motor Control Voltage Range:	0-10 V (For **motor**, not unit. For unit voltage, refer to **Electrical Specifications** table on this page.)
Compatible Base Fluids:	Crude Oil or Water

Optional additional testing sections with different diameters. (May affect benchtop size.)

MECHANICAL SPECIFICATIONS

Dimensions:	54.26" W x 18.11" D. x 37.76" H
Weight:	200 lbs. (~90.72 kg.)

ELECTRICAL SPECIFICATIONS

➤ M9350 UNIT

Voltage:	Varies per unit. **Either** a 120V AC **OR** 230V AC configuration (**not** both). Please check electrical labeling on your unit to verify which configuration applies.**
Frequency:	Varies per unit. **Either** a 60 Hz (standard) **OR** 50 Hz (optional) configuration (**not** both). Please check electrical labeling on your unit to verify which configuration applies.**
Power:	1,000 W
Amperage:	8 A (For 120V AC) or 5 A (For 230V AC)

If unsure if your power supply setup is appropriate, or if there are any doubts, contact Grace Instrument before plugging anything in.

➤ MIXER

Voltage:	Varies per unit. **Either** a 120V AC **OR** 230V AC configuration (**not** both). Please check electrical labeling on your unit to verify which configuration applies.**
Frequency:	Varies per unit. **Either** a 60 Hz (standard) **OR** 50 Hz (optional) configuration (**not** both). Please check electrical labeling on your unit to verify which configuration applies.**
Power:	170 W
Amperage:	1.4 A (For 120V AC) or 0.8 A (For 230V AC)

If unsure if your power supply setup is appropriate, or if there are any doubts, contact Grace Instrument before plugging anything in.

➤ PC

Voltage:	100-240V AC
Frequency:	50-60 Hz
Power:	Please refer to PC manufacturer documentation for power requirements.

IMPORTANT: *Grace Instrument* is not responsible for accuracy of documentation maintained by third parties. Contact third party directly if unsure if specifications are up-to-date.

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UTILITY REQUIREMENTS

Water Supply:	Dedicated Tap Water Supply
Water Supply Pressure (For System Cleanup):	20-80 psi
Electrical Specifications:	Refer to **Electrical Specifications** table on previous page.

➤ Rear Panel Connections and Setup

Water Supply Tube Fitting:	½" Female NPT

MINIMUM PC REQUIREMENTS

For your convenience, the *M9350* software is preinstalled on the included PC *(sold separately)*. There is no need to install or configure any programs to run the software. If the PC ever requires support, contact *Grace Instrument* at (713) 783-1560.

WHAT'S INCLUDED

- *M9350* Unit
  - Coriolis Mass Flow Meter (With Display)
  - Coriolis Mass Flow Sensor
  - 5-Gallon Mixing Tank
  - Tank Lid with Slotted Mixer Hole
  - Progressive Cavity Pump/Intelligent Metering Pump System (Inverter and Pump with Electric Motor)
  - Mixer
  - 3 ft. Test Section (⅜" Outer Diameter)
  - DP Transmitter
  - Water Spray Nozzle
- Line Conditioner for *M9350*
- PC with *M9350* Software *(Included, but Sold Separately)*
- *M9350* Operation Manual

For all else, refer to packing checklist (included with unit).
Repair, replacements, and/or additional spare parts sold separately. To order, contact Grace Instrument at (713) 783-1560.

ACCESSORIES

- Plug Adapter(s) *(Sold Separately)* — May be required, depending on destination country. Used to adapt plug shape to specific country's electrical outlet shape. If required, ensure adapter meets all required electrical specifications, including proper amperage. To order from *Grace Instrument*, contact (713) 783-1560.
- Uninterruptible Power Supply (UPS) *(Optional)* — *(Sold separately by other vendors. Grace Instrument does not supply UPSs.)*