

# CMRV-4500 Mini-Rotary Viscometer



**CANNON**  
INSTRUMENT COMPANY

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# INNOVATIONS IN VISCOSITY MEASUREMENT

## CANNON® CMRV-4500 Mini-Rotary Viscometer



- Thermoelectrically-cooled with enhanced temperature control and test precision
- Measures yield stress and viscosity for drive line lubricants and engine oils
- Meets latest SAE J300 specifications for low-temperature pumpability
- High-performance rotors with carbon fibre shafts
- Meets requirements of ASTM D 4684, ASTM D 3829, and ASTM D 6896
- ASTM D 6821 compatibility with optional Drive Line Rotor Kit

The CANNON CMRV-4500 Mini-Rotary Viscometer is designed to measure yield stress and viscosity of drive line lubricants and new and used automotive engine oils over a temperature range of  $-5^{\circ}\text{C}$  to  $-40^{\circ}\text{C}$ , meeting ASTM D 4684, D 3829, D 6821 and D 6896 requirements. The CMRV instrument determines pumping viscosity in accordance with the latest SAE J300 specifications.

### Instrument Description

The CANNON CMRV-4500 Mini-Rotary Viscometer stands about 5 inches taller than its immediate predecessor, raising the test cells to a more convenient working height. The unit is slightly deeper and wider than previous models. The extra space is filled by additional insulation (enhancing temperature control and stability) and an integrated drawer unit for convenient storage of CMRV accessories including rotors, weights, and cell caps. High-performance rotors are now manufactured with carbon fibre shafts, minimizing heat transfer in and out of the test cells.

The CMRV-4500 contains nine small rotary viscometers within a thermostated aluminum block. A built-in microprocessor controls temperature during a precisely controlled cooling cycle. At the conclusion of the cycle, an electronic timing mechanism coupled to a pulley wheel assembly measures rotor rotation as constant torque is applied.

Data from yield stress and viscosity tests is saved to a computerized database by the VISCPRO® software for Windows® XP®. VISCPRO® is pre-programmed to enable temperature cycles for each SAE-specified oil grade, including 0W, 5W, 10W, 15W, 20W, and 25W (ASTM D 4684), as well as temperature calibration options at either  $-20$  or  $-25^{\circ}\text{C}$ . VISCPRO also has the temperature programs preconfigured for all the ASTM methods mentioned above.

The Profile Designer feature permits custom configuration of unique cooling profiles (temperature over time). The VISCPRO® software downloads test information to the CMRV microprocessor and calculates and displays yield stress and viscosity values calculated from information returned by the instrument. Optional RS-485 network connections permit control of up to four CMRV-4500 instruments from a single PC.

A Plexiglas cover includes a molded inlet port for a dry gas purge; the purge regulator assists in maintaining a frost-free environment around the cells during the cooling phase of the test.

### Thermoelectric Cooling

The CMRV-4500 is cooled with built-in thermoelectric modules, eliminating the need for methanol-based external refrigeration devices. Instead, the CMRV-4500 uses a compact air/water heat exchanger that circulates a mixture of coolant water and antifreeze through the instrument to cool the hot side of the thermoelectric cells. The result is a quiet, low-maintenance system without potentially hazardous refrigerants. Solid-state thermoelectric cooling provides superb temperature uniformity for all nine test cells, removing temperature gradients not only from the left to the right side of the block, but also from front to back and top to bottom. This important enhancement significantly improves the instrument's precision.

# CANNON® CMRV-4500 Mini-Rotary Viscometer Accessories

## Multi-Unit Interface Kit

The CMRV-4000 Series Multi-Unit Interface Kit enables a single PC to control up to four different CMRV-4000 Series instruments. With this kit an operator can simultaneously run and monitor completely different cooling profiles on each instrument, track and display data for each instrument, and perform yield stress and viscosity tests on samples in as many as 36 viscometric cells. The Interface Kit comes with an RS-232/485 Converter, AC Power Adaptor, Interconnect wires, and Configuration instructions.

Note that firmware upgrades are required for earlier 4000 Series instruments that will operate in tandem with the CMRV-4500 and the VISCPRO® controlling software for Windows® XP®.

## Other CMRV Accessories

Thermometers appropriate for ASTM D 4684 and ASTM D 3829 tests are available from CANNON® (see Order Information below).

Cell caps for enhanced temperature control are included with each instrument. Replacement caps may also be ordered.



The CMRV-4000 Series Multi-Unit Interface Kit

## CMRV-4200/4300 Upgrade Kit Available

A new High Performance Rotor Upgrade set for CMRV-4200/4300 instruments is now available from CANNON®. The upgrade kit includes nine carbon fibre rotors, a set of bearing pins, and cell caps. Order part number P51.1025.

### CMRV- 4500 Mini-Rotary Viscometer Specifications

Dimensions:	317 mm wide x 260 mm deep x 489 mm high, including thermometer (12.5 x 10.25 x 19.25 inches)
Weight:	18.6 kg (41 lbs)
Shipping Weight:	27 kg (60 lbs)
Electrical:	CMRV- 4500, 115 volts, 50/60 Hz, 400 watts (1500 watts incl. heat exchanger), CMRV- 4500F, 230 volts, 50/60 Hz, 400 watts (1500 watts incl. heat exchanger)
Operating Conditions:	10%-90% RH non-condensing. Installation category II; Pollution degree 2
Compliance:	CE Mark: EMC directive (89/336/EEC); Low voltage directive (73/23/EEC); HI-POT (1900 VDC, 60 sec.)
Computer Requirements:	Computer not included. Please contact CANNON for specifications.

### Heat Exchanger Specifications

Dimensions:	470 mm wide x 348 mm deep x 340 mm high (18.5 x 13.7 x 13.4 inches)
Weight:	31.8 kg (70 lbs)
Shipping Weight:	36.3 kg (80 lbs)
Electrical:	CMRV-4500, 115 volts, 50/60 Hz, CMRV-4500F, 230 volts, 50/60 Hz

### Order Information

Catalog #	Item Description
9728-R22	CMRV-4500 Mini-Rotary Viscometer*, 115V/60Hz, 400 watts
9728-R23	CMRV-4500F Mini-Rotary Viscometer*, 230V/50Hz, 400 watts
9728-R65	CMRV Thermometer, -45 to +30°C, ± 0.2°
9728-R70	CMRV Thermometer, 0 to +105°C, ± 1°
9728-R40	CMRV Multi-Unit Interface Kit (Domestic), 120V, 60 Hz
9728-R45	CMRV Multi-Unit Interface Kit (Foreign), 240V, 60 Hz

\* Please specify exact voltage and frequency when ordering



**CANNON® CMRV-4500 Mini-Rotary Viscometer Accessories**



Drive line rotors for testing per ASTM D 6821

**Drive Line Rotor Kit for testing per ASTM D 6821**

Drive Line rotors specifically designed for the ASTM D 6821 test method are available from CANNON® (see Order Information below). The Drive Line Rotor Kit includes nine DL-type rotors with specially designed geometries appropriate for drive line fluid testing. The Kit also includes a copy of ASTM D 6821 (Standard Test Method for Low Temperature Viscosity of Drive Line Lubricants in a Constant Shear Stress Viscometer). A weight set with mass increments of 2.5 grams is also required for the Method (see Drive Line Rotor Order Information, below).

The temperature profile for this method consists of a 1.5-hour soak at 50°C ± 1°C, a 2-hour nonlinear cool-down to the test temperature, and a 14-hour soak ± 0.02°C at the test temperature. The entire temperature profile, up to the point of measuring yield stress and viscosity, requires 17.5 hours.

**Drive Line Rotor Order Information**

Catalog #	Item Description
P51.1018	High-performance Drive Line Rotor for CMRV-2/3/4, 4200/4300 (carbon, 1)
P51.1028	High-performance Drive Line Rotor Kit for CMRV-2/3/4, 4200/4300 (carbon, set of 9)
P52.4536	High-performance Drive Line Rotor for CMRV 4500 (carbon, 1)

Catalog #	Item Description
P52.4537	High-performance Drive Line Rotor Kit for CMRV 4500 (carbon, set of 9)
P50.1020	Weight Set (2.5g increments, incl. weight cage) for Drive Line Rotor standard ASTM D 6821

\* Please specify exact voltage and frequency when ordering

**Other SAE J300 test equipment from CANNON...**



**CCS-2100**

The CANNON Cold-Cracking Simulator (CCS-2100) is a solid-state, thermoelectrically-cooled, fully-automatic test instrument for the determination of cold-cracking viscosity of engine lubricants.

The CCS automatically measures apparent viscosity for 30 samples over a viscosity range of 1400 to 45,000 mPa·s per ASTM D 5293 specifications.

**HTHS Series II**

The new HTHS Series II High-Temperature High-Shear Capillary Viscometer determines the viscosity of engine oils and other oils under conditions of high shear at high temperatures. The HTHS Series II instrument measures the time required for evacuation of a known quantity of sample from a viscometric cell at a shear rate of  $1.4 \times 10^6 \text{ s}^{-1}$  at 150°C, per ASTM D 5481. Other shear rates are attainable.



CANNON Instrument Company manufactures other equipment specifically designed for SAE J300 testing, including glass capillary viscometers, constant temperature baths, and automatic viscometers for kinematic viscosity measurement in accord with ASTM D445/446. Contact CANNON for more information.



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