

ENGINE DYNAMOMETERS

... used at all levels of engine research, design,
development, tuning, and rebuilding.



SF-902 NSCR ■ SF-902 ENGINE DYNAMOMETERS

SuperFlow Engine Dynamometers:

Most versatile testing and tuning systems on the market with the highest level of accuracy, repeatability and test throughput.

- **Simple to use.**
Initiate automated tests with the touch of a button.
- **Expandable.**
Add features and options as your needs grow.
- **Ultra-fast data acquisition.**
Handle extensive sensor input data at highest sampling rates.
- **Separate data acquisition and control in sensor box.**
Not just a card slipped into a personal computer.
- **World-class support team.**

Accuracy, repeatability and rapid test throughput.

SuperFlow NSCR and SF-902 systems are designed for professional engine builders who want the highest level of accuracy, repeatability and test throughput. SuperFlow customers report repeatability within two-tenths of one percent on identical systems in different test cells. SuperFlow systems help builders achieve this level of repeatability with precise control of

all engine temperatures and pressures, fully automated test cycles and WinDyn ProFilter technology.

Docking cart and rail systems.

NSCR XCards are used to pre-stage and dress engines before they're installed in the test cell. The dynamometer stays in the test cell, connected to all its supply lines and support systems. Just roll the engine into the cell, dock the cart to the dynamometer and attach the fuel supply,



airflow turbine, oil and coolant lines and sensors. The customizable C-channel rail system keeps all accessories and engine support lines organized and out of the way.

Controlled oil and coolant systems.

Changes in coolant and oil temperatures can add or subtract horsepower from a dynamometer pull on identical engines under otherwise identical conditions. SuperFlow oil and coolant temperature control systems hold these temperatures within $\pm 3^\circ\text{F}$ ($\pm 1.7^\circ\text{C}$) to help keep tests VERY repeatable. These control systems help you replicate what

you would expect on the track. They maintain them to create more realistic conditions. And because they preheat the block, you have shorter warm-up periods and can drain the system for faster engine changes after the test series is completed.

Three choices of throttle-actuators.

Choose your method! Hydraulic for smooth manual operation to 'feel' what's going on at the engine ... or CABLE for better control of dual carburetor setups. And add the electronic rotary actuator for precise control of automated tests and part-throttle tests.



On NSCR systems, the sensor box can be mounted on the rail system. Sensor cables and pressure lines run through protected channels and exit near the sensor connections or near the sensor input panels. Color-coded and instrument-grade connectors simplify installation and help prevent connection errors.



Built-in tests simplify the dynamometer testing process.

Push a button to select Step, Acceleration or Cycle test. Turn knobs to set Start, End and Cool Down speeds. Increase to full throttle and push the Start Test button to automatically Run and Save the test. While the test is running, you can monitor 76 sensors and 35 calculated channels, sampled at 100 times a second, in real time, on the console's built-in panel meters, gauges, and touch-screen monitors or on the WinDyn software screen. Repeat by pushing the Start Test button again.

Run automated tests for consistent results.

SuperFlow engine dynamometer systems can perform automated tests to ensure consistent results and help eliminate operator-induced

variances. You can run standard acceleration tests, step tests, constant speed tests or simulate entire races. Automated load and electronic throttle control help provide repeatable test sequences and free you up to monitor live test data. Built-in, sophisticated safety limits help protect the engine.

Take control of your test cell.

Control room fans, oil heaters and dynamometer water supply pumps manually or via automated test profiles. Regulate oil or coolant temperature from the console, or automatically during warm-up, testing and cool down cycles. Manual controls include knobs, buttons, switches, meters, digital touch-screens and throttle control lever.

Exclusive WinDyn software: Powerful. Easy to use.

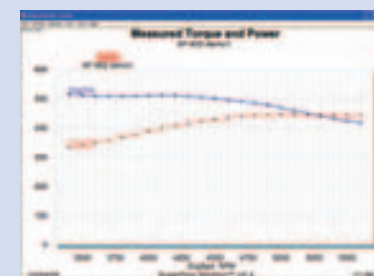
IT'S EASY. WinDyn software, runs on a PC and lets you to analyze tests live as you collect data. And it's easy! Simply select one of the built-in tests for acceleration, step, steady-state tests, lifecycle tests and break-in tests. WinDyn displays

live data with panel meters, bar graphs, X-Y plots and digital displays.

AND IT'S POWERFUL. WinDyn ProFilter technology provides superior test repeatability for acceleration test data ... automatically saves data in even-increment RPM points ... every 25, 50, or 87 RPM — your choice — with no filter offset or delay. Want to change default screens or test profiles? No problem. WinDyn is user-configurable. You can look at raw or filtered data, and view or edit calculated channels, to see or change exactly how your data is standardized. Powerful editors let you write your own complex test profiles and take control of every part of your test. Nothing is hidden, unless you want it to be, with built-in password protected features.

Take the data with you.

Create customer data packs, self-contained packages customers or supervisors can view and replay without having to install WinDyn on their computers. The data packs can be saved on compact disc, USB drives or other media.



WinDyn real-time and data plot screens provide data you need to improve engines.



Test operator monitors automated test on WinDyn on-screen panel meters and digital readouts. WinDyn prints and graphs over one hundred measurements. Multiple monitors with different screens available.



SF-902

The Quick-Change Engine Dynamometer

- Roll-around, wall-mount or optional boom-mounted sensor and control box; close for testing; out-of-the-way when you need room to work.
- Absorbers work over a wide range of engine speeds and outputs; offer precise control for any acceleration rate.
- State-of-the-art data acquisition and control system.
- Select docking cart or mobile dyno configuration.
- Optional computer-controlled oil and coolant temperature systems.
- Optional dual starter.

With the SuperFlow SF-902, you can test all the critical power characteristics of your engines and not only measure power, but also characterize it across the entire engine speed range. When performing research and development, you can evaluate modifications one at a time, or as a complete system. When fine-tuning race engines, you can ensure the engine is "right" before it hits the track. Develop on the dyno. Race at the track. Quantify your engine development efforts! Maximize engine power!

The SF-902 is also ideal for testing high-output engines using nitrous, alcohol, superchargers and turbos making up to 2,500 horsepower (1,864 kW).

The SF-902 Console

Large LCD screens show live data, lighted rocker switches control engine and test cell equipment, and panel meters display torque, speed, power, or any other important data. The SF-902 console can be outfitted with a variety of gauges to suit your needs. SuperFlow includes cut-outs for standard Autometer™ gauges.

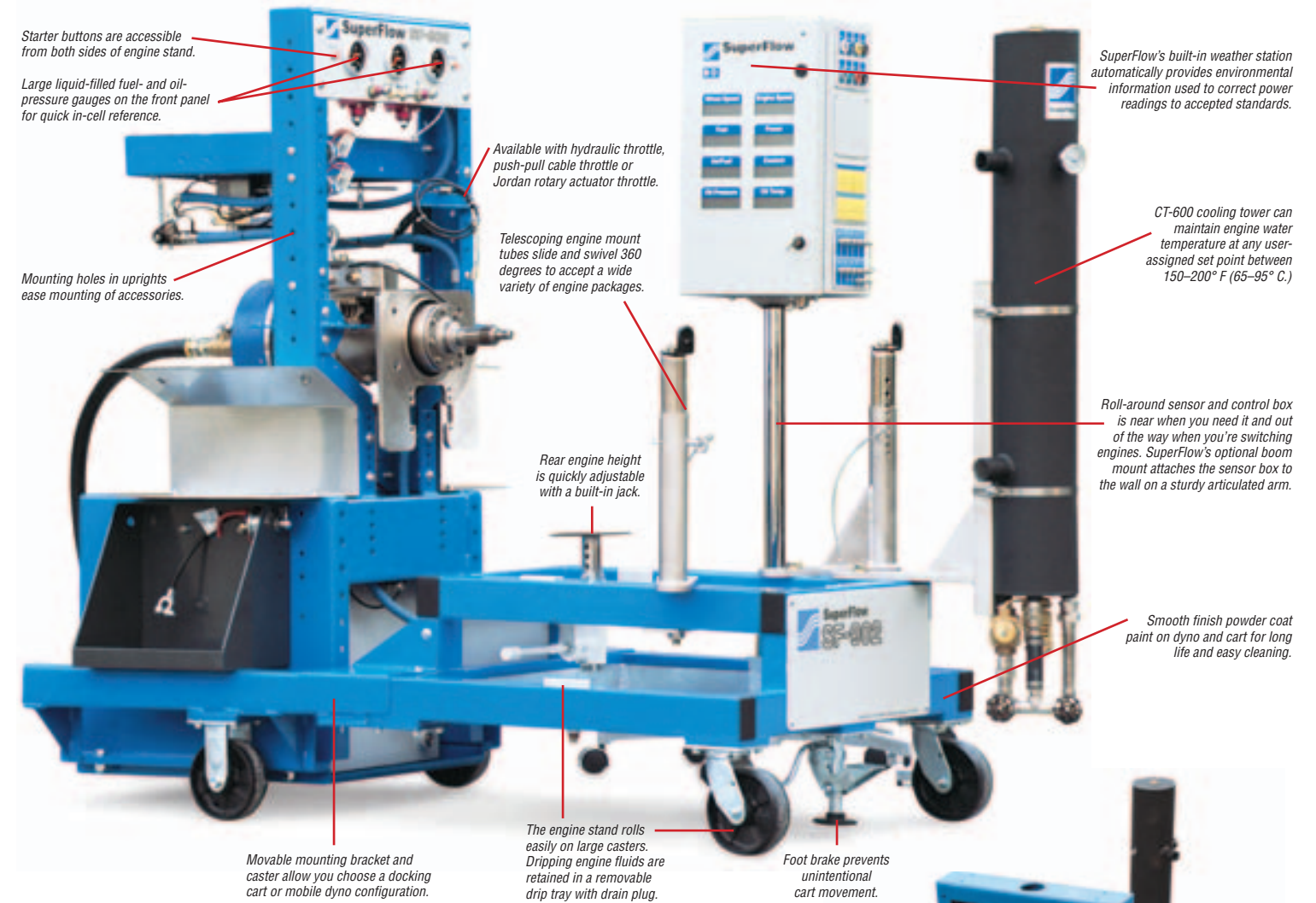
Test engines quickly and easily.

All the controls are at your fingertips. Once the engine is mounted, even novices can be testing in a matter of minutes. Warm the engine, dial in the starting and ending test speed, select the type of test, go to full throttle and push the start-test button to start the run. The engine automatically accelerates, at your selected rate, to the end test speed and returns to the beginning test speed. And when the test is done, WinDyn software helps you print graphs and reports with over 100 measured and calculated items at each test point.

The SF-902's power absorber allows you to perform tests with the absorber running at a constant speed or constant torque. You can also test while accelerating or decelerating at controlled rates (up to 2,000 RPM) per second.

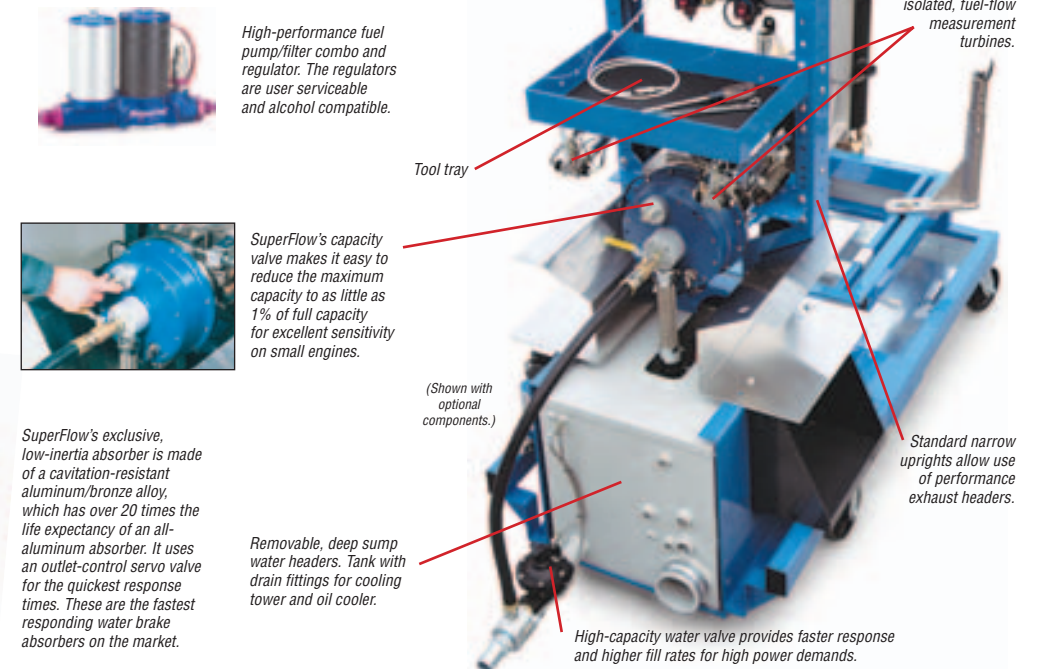
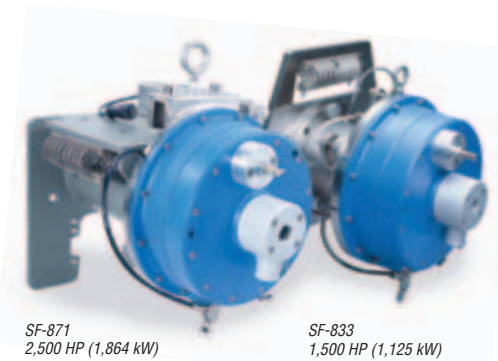
Automated tests step the engine speed in any increment you wish. Acceleration tests record data on the fly as your engine accelerates, exactly as it would in the vehicle. Break-in and life-cycle tests proceed automatically under computer command.

Engine testing for OEM and high-performance automotive, motorcycle and snowmobile engines in production-oriented environments.



Please see SuperFlow console brochure for more information.

The 902 console has all the features you need to run manual and automatic tests, collect appropriate information, and display or print color graphs and columnar data. You control manually with knobs, buttons, switches, meters, digital readouts and a throttle control lever. WinDyn comes with many preconfigured tests and screen layouts.

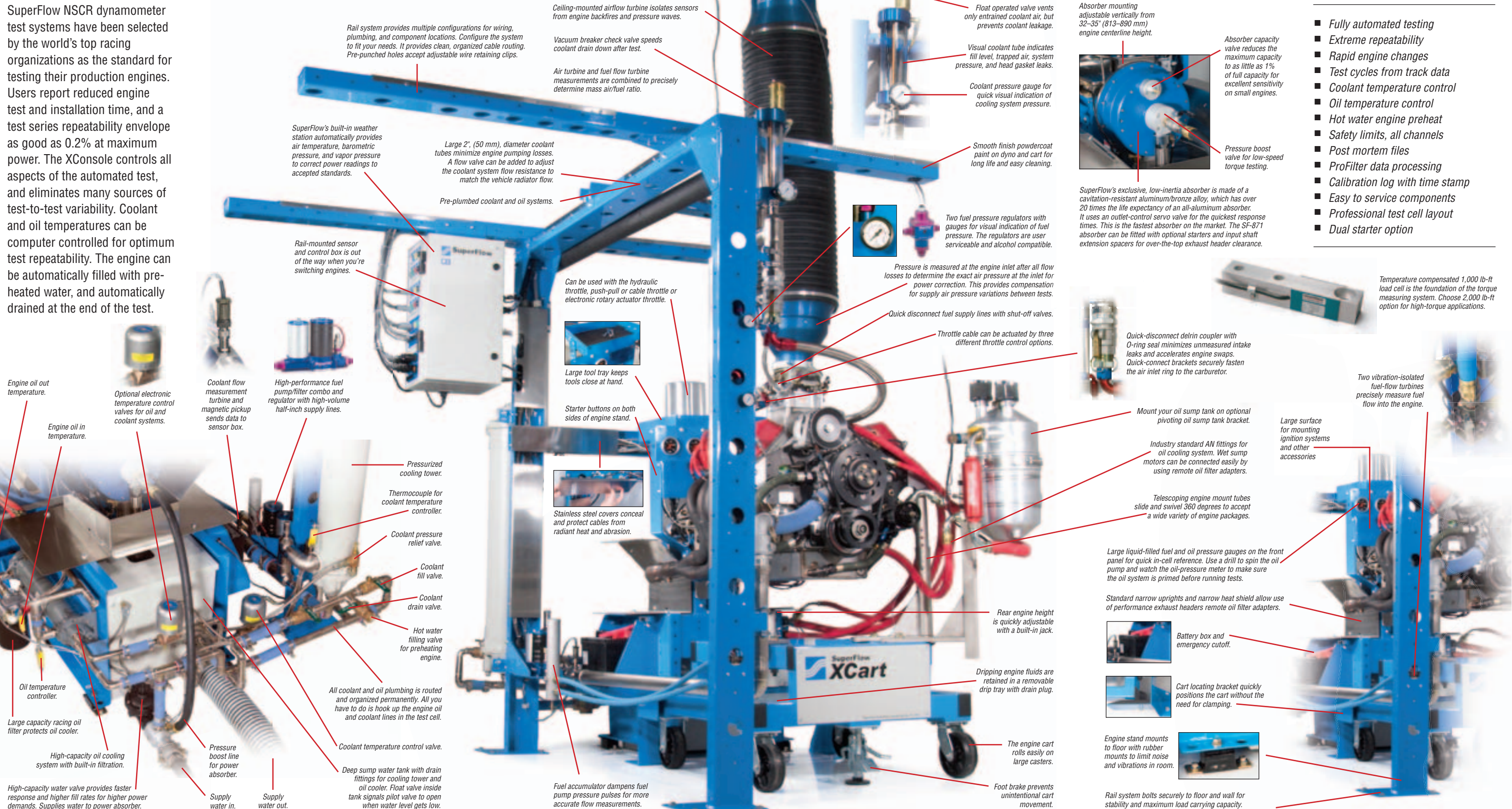


SF-902 NSCR

The Choice of Top Engine Builders Around The World.

SuperFlow NSCR dynamometer test systems have been selected by the world's top racing organizations as the standard for testing their production engines. Users report reduced engine test and installation time, and a test series repeatability envelope as good as 0.2% at maximum power. The XConsole controls all aspects of the automated test, and eliminates many sources of test-to-test variability. Coolant and oil temperatures can be computer controlled for optimum test repeatability. The engine can be automatically filled with pre-heated water, and automatically drained at the end of the test.

Perform extremely repeatable, automated engine tests with rapid testing throughput and precision oil and coolant management.



Engine oil out temperature.
 Engine oil in temperature.
 Oil temperature controller.
 Large capacity racing oil filter protects oil cooler.
 High-capacity oil cooling system with built-in filtration.
 High-capacity water valve provides faster response and higher fill rates for higher power demands. Supplies water to power absorber.
 Supply water in.
 Supply water out.
 Pressurized cooling tower.
 Thermocouple for coolant temperature controller.
 Coolant pressure relief valve.
 Coolant fill valve.
 Coolant drain valve.
 Hot water filling valve for preheating engine.
 All coolant and oil plumbing is routed and organized permanently. All you have to do is hook up the engine oil and coolant lines in the test cell.
 Coolant temperature control valve.
 Deep sump water tank with drain fittings for cooling tower and oil cooler. Float valve inside tank signals pilot valve to open when water level gets low.

Rail system provides multiple configurations for wiring, plumbing, and component locations. Configure the system to fit your needs. It provides clean, organized cable routing. Pre-punched holes accept adjustable wire retaining clips.
 SuperFlow's built-in weather station automatically provides air temperature, barometric pressure, and vapor pressure to correct power readings to accepted standards.
 Rail-mounted sensor and control box is out of the way when you're switching engines.
 Large 2" (50 mm), diameter coolant tubes minimize engine pumping losses. A flow valve can be added to adjust the coolant system flow resistance to match the vehicle radiator flow.
 Pre-plumbed coolant and oil systems.

Ceiling-mounted airflow turbine isolates sensors from engine backfires and pressure waves.
 Vacuum breaker check valve speeds coolant drain down after test.
 Air turbine and fuel flow turbine measurements are combined to precisely determine mass air/fuel ratio.
 Can be used with the hydraulic throttle, push-pull or cable throttle or electronic rotary actuator throttle.
 Large tool tray keeps tools close at hand.
 Starter buttons on both sides of engine stand.
 Stainless steel covers conceal and protect cables from radiant heat and abrasion.

Float operated valve vents only entrained coolant air, but prevents coolant leakage.
 Visual coolant tube indicates fill level, trapped air, system pressure, and head gasket leaks.
 Coolant pressure gauge for quick visual indication of cooling system pressure.
 Smooth finish powdercoat paint on dyno and cart for long life and easy cleaning.
 Two fuel pressure regulators with gauges for visual indication of fuel pressure. The regulators are user serviceable and alcohol compatible.
 Pressure is measured at the engine inlet after all flow losses to determine the exact air pressure at the inlet for power correction. This provides compensation for supply air pressure variations between tests.
 Quick disconnect fuel supply lines with shut-off valves.
 Throttle cable can be actuated by three different throttle control options.

Absorber mounting adjustable vertically from 32-35" (813-890 mm) engine centerline height.
 Absorber capacity valve reduces the maximum capacity to as little as 1% of full capacity for excellent sensitivity on small engines.
 Pressure boost valve for low-speed torque testing.
 SuperFlow's exclusive, low-inertia absorber is made of a cavitation-resistant aluminum/bronze alloy, which has over 20 times the life expectancy of an all-aluminum absorber. It uses an outlet-control servo valve for the quickest response times. This is the fastest absorber on the market. The SF-871 absorber can be fitted with optional starters and input shaft extension spacers for over-the-top exhaust header clearance.
 Quick-disconnect delrin coupler with O-ring seal minimizes unmeasured intake leaks and accelerates engine swaps. Quick-connect brackets securely fasten the air inlet ring to the carburetor.

Fully automated testing
 Extreme repeatability
 Rapid engine changes
 Test cycles from track data
 Coolant temperature control
 Oil temperature control
 Hot water engine preheat
 Safety limits, all channels
 Post mortem files
 ProFilter data processing
 Calibration log with time stamp
 Easy to service components
 Professional test cell layout
 Dual starter option
 Temperature compensated 1,000 lb-ft load cell is the foundation of the torque measuring system. Choose 2,000 lb-ft option for high-torque applications.
 Two vibration-isolated fuel-flow turbines precisely measure fuel flow into the engine.
 Large surface for mounting ignition systems and other accessories
 Mount your oil sump tank on optional pivoting oil sump tank bracket.
 Industry standard AN fittings for oil cooling system. Wet sump motors can be connected easily by using remote oil filter adapters.
 Telescoping engine mount tubes slide and swivel 360 degrees to accept a wide variety of engine packages.
 Large liquid-filled fuel and oil pressure gauges on the front panel for quick in-cell reference. Use a drill to spin the oil pump and watch the oil-pressure meter to make sure the oil system is primed before running tests.
 Standard narrow uprights and narrow heat shield allow use of performance exhaust headers remote oil filter adapters.
 Battery box and emergency cutoff.
 Cart locating bracket quickly positions the cart without the need for clamping.
 Engine stand mounts to floor with rubber mounts to limit noise and vibrations in room.
 Rail system bolts securely to floor and wall for stability and maximum load carrying capacity.

Two fuel pressure regulators with gauges for visual indication of fuel pressure. The regulators are user serviceable and alcohol compatible.
 Pressure is measured at the engine inlet after all flow losses to determine the exact air pressure at the inlet for power correction. This provides compensation for supply air pressure variations between tests.
 Quick disconnect fuel supply lines with shut-off valves.
 Throttle cable can be actuated by three different throttle control options.
 Mount your oil sump tank on optional pivoting oil sump tank bracket.
 Industry standard AN fittings for oil cooling system. Wet sump motors can be connected easily by using remote oil filter adapters.
 Telescoping engine mount tubes slide and swivel 360 degrees to accept a wide variety of engine packages.
 Large liquid-filled fuel and oil pressure gauges on the front panel for quick in-cell reference. Use a drill to spin the oil pump and watch the oil-pressure meter to make sure the oil system is primed before running tests.
 Standard narrow uprights and narrow heat shield allow use of performance exhaust headers remote oil filter adapters.
 Battery box and emergency cutoff.
 Cart locating bracket quickly positions the cart without the need for clamping.
 Engine stand mounts to floor with rubber mounts to limit noise and vibrations in room.
 Rail system bolts securely to floor and wall for stability and maximum load carrying capacity.

Eddy-Current Engine Dynamometers

SuperFlow EC engine dynamometer systems are designed for precise and instantaneous control for demanding research, development and product engineering.



SuperFlow offers a broad selection of technologically advanced dry gap eddy current absorbers, which are ideal for your exacting testing requirements. Their low minimum load capabilities allow testing of very small engines or larger engines running at slow speeds and any application where absolute control precision is needed. Absorbers are available in a wide range of torque and speed specifications.

Load cells measure reaction torque for either direction of rotation. The double-ended main shaft may be fitted with a starter motor or used for dual engine connection. Heat is dissipated by cooling water flowing through the stationary portion of the absorber. Absorbers can be mounted on rubber feet for engine-cart docking. No permanent floor plates are required.

All Eddy-Current Engine Dynamometer Systems are equipped with SuperFlow data acquisition and control systems and WinDyn software. These systems provide for complete engine, dynamometer and throttle control, data storage and reporting. SuperFlow offers complete turn-key system solutions with engine cooling heat exchangers, a variety of fuel systems, temperature and pressure sensors. Engine carts and dynamometer docking bases are optional.

Ask your Sales Engineer for Data Sheets and Comparison Charts.

SF-902 and SF-902 NSCR

Maximum Absorber Speed:

Standard bearings
(SF-833 and SF-871) 10,000 RPM

High-speed bearings
(SF-833 and SF-871) 4,000 RPM

Tachometer:

(Magnetic pickup on 60-tooth gear)
Range 0-22,000 RPM (1/min) x 1

Torque:

(Temperature-compensated strain gauge)

Standard:
0-1,000 lb-ft (0-1350 Nm) x 0.3 ± 0.2% fs

Optional high-torque:
0-2,000 lb-ft (0-2700 Nm) x 0.3 ± 0.2% fs

Calibration arm included.
Other ranges available as options.

Compensated Temperature Range:

0-150° F (-15° to 65° C)

Fuel Flow:

NSCR/SF-902 PRO/SF-902 EXPERT:

Filter, pump, accumulator,
2 pressure regulators,
2 gauges and
2 radial-flow turbine meters.

SF-902 SPORT:

Filter, pump, accumulator,
1 pressure regulator,
1 gauge and
1 radial-flow turbine meter.

Range Per Channel:

@7 psi 0-400 lb/hr (100 g/s) x 0.1 ± 0.5% fs

Specific Gravity Range:

0.40-1.40

Air flow:

Choose from the following turbines:

4" (10 cm) diameter turbine (SF-902)

4-150 cfm (2-70 l/s),
3-100 HP (2-75 kW)

6½" (16.5 cm) diameter turbine (SF-902)

10-800 cfm (5-380 l/s),
5-600 HP (3.75-450 kW)

9" (23 cm) diameter turbine
(SF-902 & NSCR)

20-1,200 cfm (10-566 l/s),
30-1,000 HP (22-750 kW)

Accuracy:

± 0.5% fs

Temperatures:

(Type K thermocouple inputs, 16 input channels)
Range 0-2,000° F (-18°-1100° C) x 1, linearized

Pressures:

Oil
0-150 psi (0-1034 kPa) x 0.1, ± 0.5% fs

Manifold
30-30 psi (207-207 kPa) x 0.1, ± 0.5% fs

Barometric
0-32" Hg (0-108 kPa) x 0.01, ± 0.1% fs

Four additional channels, plus two flows
and eight lambdas may be added.

Power requirement:

Console, no computer system 105-130 VAC or
207-260 VAC, 47-63 Hz, 600W, 10A

Shipping Dimensions and Weights:

NSCR:
Console and computer on pallet
87" x 36" x 42" (221 x 91 x 107 cm)
600 lbs (272 kg)

Engine stand with tower
57" x 48" x 77" (145 x 122 x 196 cm)
655 lbs (297 kg)

Carts (x 2)
35" x 34" x 36" (89 x 86 x 91 cm)
190 lbs (86 kg)

Rails
87" x 36" x 42" (221 x 91 x 107 cm)
800 lbs (363 kg)

SF-902:
Console and computer on pallet
42" x 33" x 55" (107 x 84 x 140 cm)
350 lbs (159 kg)

Engine stand with tower (SF-902 Expert)
88" x 39" x 78" (224 x 99 x 198 cm)
675 lbs (306 kg)

Dynamometers Measure:

- Engine speed
- Torque
- Acceleration
- Fuel flows
- Air flows
- Liquid flows
- Air temperatures
- Exhaust gas temperatures
- Liquid temperatures
- Oil pressure
- Manifold pressure
- Barometric pressure
- Humidity
- Analog voltages
- And more

Dynamometers Calculate:

- Power
- Corrected power
- Air-fuel ratio
- Brake specific fuel consumption
- Brake specific air consumption
- Volumetric efficiency
- Mechanical efficiency
- And more

Room Plans:

Call SuperFlow for room plan drawings
and documents to maximize utilization of
your test facility.

SuperFlow warrants SuperFlow products will perform as described in brochure for a period of one year from ship date. To request a copy of the limited warranty, call SuperFlow, 8am-5pm (Mountain Time) at 719.471.1746



AXILINE • HICKLIN • SUPERFLOW • TCRS

www.superflow.com

For information on TRANSMISSION OR BRAKE DYNAMOMETERS, TRANSMISSION TEST SYSTEMS AND TORQUE CONVERTER OR DRIVELINE REBUILDING SYSTEMS, contact:

4060 Dixon Street | Des Moines IA 50313
ph: 515.254.1654 or 888.442.5546 | fax: 515.254.1656

For information on ENGINE DYNAMOMETERS, CHASSIS DYNAMOMETERS AND FLOWBENCHES, contact:

3512 North Tejon | Colorado Springs CO 80907
ph: 719.417.1746 800.471.7701 | fax: 719.471.1490

Europe NV: Grensstraat 41A | 2243 Pulle, Belgium | ph: +32 3 4846510 | fax: +32 3 4846520

SPECIFICATIONS

SF-902 NSCR ■ SF-902 ENGINE DYNAMOMETERS