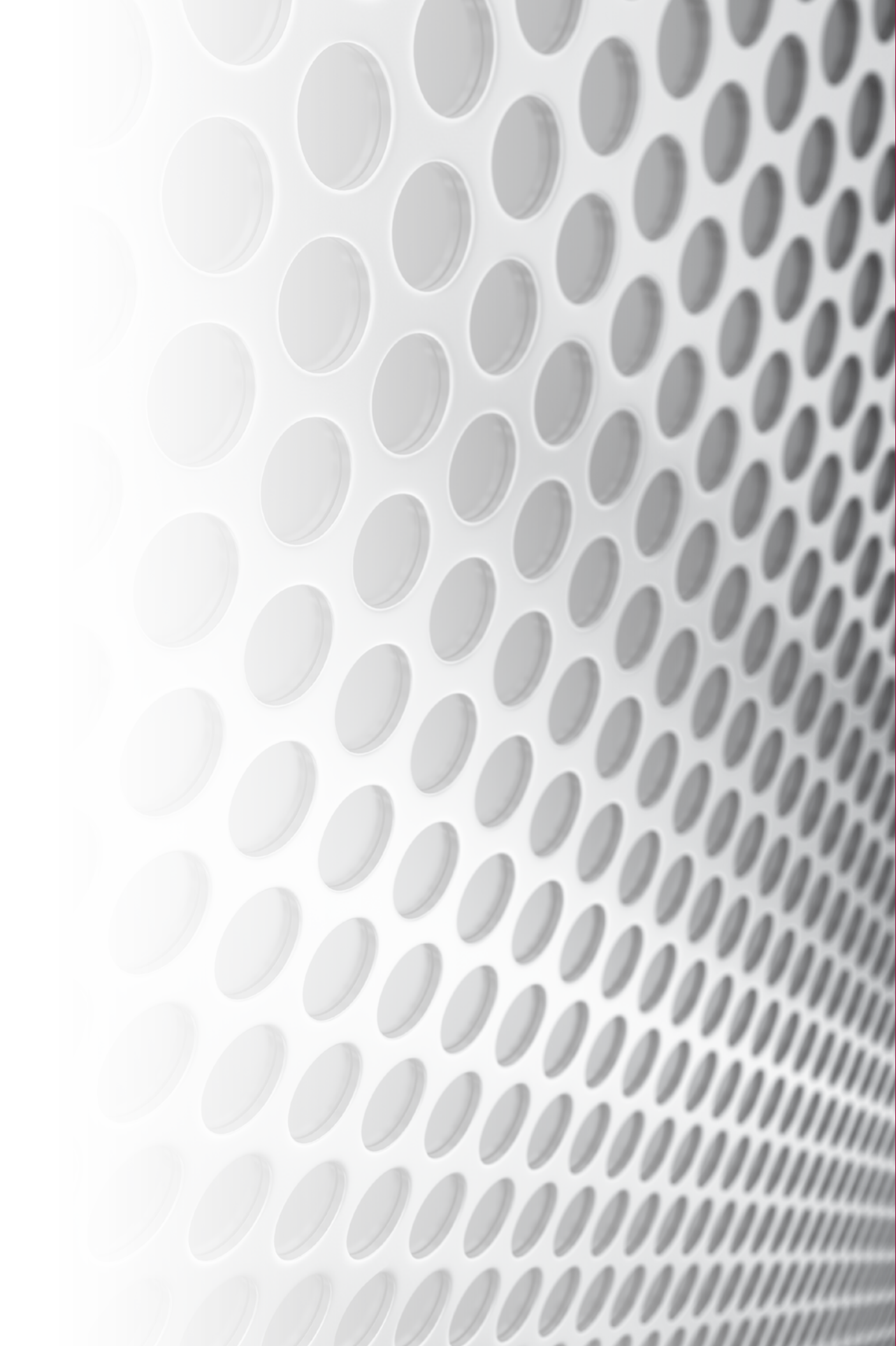


Section 6: ***FILTRATION CARTRIDGES, SHRODS & FUEL DIAGNOSTIC TOOLS***



Conditioning Specialists | Online Monitoring Systems

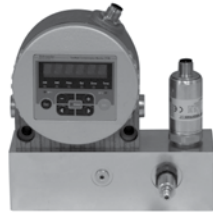
Advantages of Online Monitoring

There are advantages to using online monitoring in replacement of bottle sampling when testing for cleanliness requirements.

Consider the following factors when comparing bottling sampling to online sampling:

- What is the cost of a bottle sample (downtime, manpower, etc)?
- How hard is it to take a proper bottle sample?
- Three samples taken at the same time and all come back with different ISO codes
- What does the bottle sample really tell you?
- Can you relate the information from the bottle sample to the machine?

TestMate® Contamination Monitor | TCM



- Measures particles in four (4) sizes: >4, >6, >14, >21 microns
- In-line or manifold mounting
- ISO or SAE codes can be output in 4-20 mA analog signal
- Compatible with standard mineral fluids & phosphate esters
- Display and keypad can be rotated (up to 270°)
- Inlet and outlet ports are interchangeable (bi-directional, *without manifold only)

HY-TRAX® Manually Controlled Fluid Sampling System



- Provides local visibility to the fluid condition of critical systems while integrating micro VSD (Variable Speed Drive)
- Manual rheostat VSD pump controller allows user to adjust pump flow for optimal sensor readings in variable conditions
- L-ported (QLF) or Inline (QF) allows for installation flexibility
- It allows a user to retrieve ISO cleanliness levels from a reservoir tank or a low pressure line (50 psi max).

HY-TRAX® Telematics Communications Module with Remote Controlled Sampling System



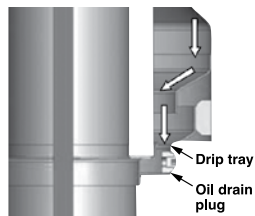
- Provides remote visibility to the fluid condition of critical systems.
- The HY-TRAX® Remote Oil Contamination Communications Module allows remote access via the Internet and smart devices to fluid particle counts, temperature and percent water saturation levels (optional) displayed on a customizable dashboard. The system collects data from any existing TestMate® Contamination Monitor (TCM) and/or TestMate® Water Sensor (TSM) and the communications module transmits this data via GSM cellular at scheduled intervals or on demand. Users can receive alerts via email when a fluid's ISO contamination code or water saturation level (optional) reaches user defined critical levels.
- The HY-TRAX® Communications Module will provide maintenance managers with the visibility and vital information necessary to pro-actively schedule preventative maintenance on local and remote equipment. Maintenance decisions can now be based on accurate and real-time data.
- The communications module components are mounted and housed in a rugged IP 40 enclosure.
- Can be utilized when the hydraulic system provides proper flow and pressure to TCM.

Other Fuel Conditioning Solutions



Features and Benefits

- Ideal for large reservoir with high return flow
- Durable steel housing
- Replaceable element
- Unique Oil Mist Trap design
- Optional pressure indicator

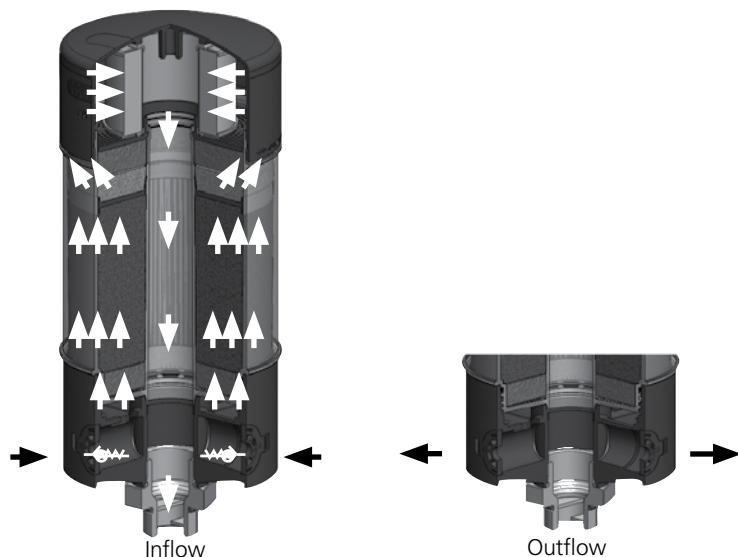


**SAB70
Breather**



- Unique air flow design with suction tube as splash protection and protection against absorbent getting into the tank
- 2 stages of absorbent provide optimal combination of drying efficiency and water retention
- Pleated air filter with 2 μ m filtration rating
- Reusable base with check (intake) and bypass (outflow) valves
- Check valves prevent absorbents being saturated during system downtime
- Bypass valves divert out flow away from water removal media to preserve its life
- Robust Zinc die-casting connection piece with integrated anti-splash baffles
- Replacement cartridge available in 3 different sizes

DBE



Final Polishing | High Efficiency Particulate Filtration for Bio & Diesel Fuel

The Importance of Final Polishing

Irrespective of the wash process you choose for your production facility, final polishing of biodiesel is essential to ensure that fuel, once washed, is free of solid contaminants, moisture, production and wash residues. As the final step in the production process, it gives the producer total peace of mind that the fuel produced is clean and dry. Final polishing is a fundamental part of the overall production process and one that is far too frequently overlooked. It is also overlooked in dry wash purification using ion exchange resin as small particles can migrate downstream.

Final fuel quality and in-house quality control are key aspects in successful biodiesel production. Batch consistency and traceability is the main difference between successful and unsuccessful producers.

Final polishing is the last production stage in order to achieve stringent industry quality standards. Irrespective of the wash method used, final polishing is required to remove microscopic contaminants invisible to the naked eye, that could result in serious engine damage.

K9 Medium Pressure Filter



- Base-ported in-line filter available in three different lengths
- Extremely versatile multiple inlet and outlet porting possibilities
- Stacked K-size elements require less than 9" clearance to change elements
- Available with cleanable metal mesh or high efficiency synthetic Excel-ZPlus® elements
- Please note Viton® seals required for this application

QF5 In-Line Filter



- Element changeout from the top minimizes oil spillage
- Available with optional core assembly to accommodate coreless elements
- Offered with standard Q, QPML deep-plated and QCLQF coreless elements in 16" and 39" lengths with standard Viton® seals
- Offered in pipe, SAE straight thread, and flange porting
- Integral inlet and outlet test points are standard in all models
- WQF5 model for water service also available
- Various Dirt Alarm® options

Note:

1. Please see our Hydraulics and Lube Catalog (L-2520C) for drawings and complete sizing information.

Final Polishing | Off-line or Kidney Loop for Bio and Diesel Fuels



- Modular base eliminates hoses between components and minimizes leakage
- Base-ported filter provides easy element service from the top cap
- Single, double and triple bowl length option allows the flexibility of additional dirt-holding capacity
- D5 Dirt Alarm® indicates when filter element needs changed
- Cleans up oil faster – 7 gpm and 14 gpm models available
- Hoses and connection tubes included
- Drip pan catches oil before it falls to the ground
- Integral suction strainer protects pump
- Off-line stationary system available
- Two 7/16 – 20 UNF sampling ports included on all models
- Please note Viton® seals required for this application



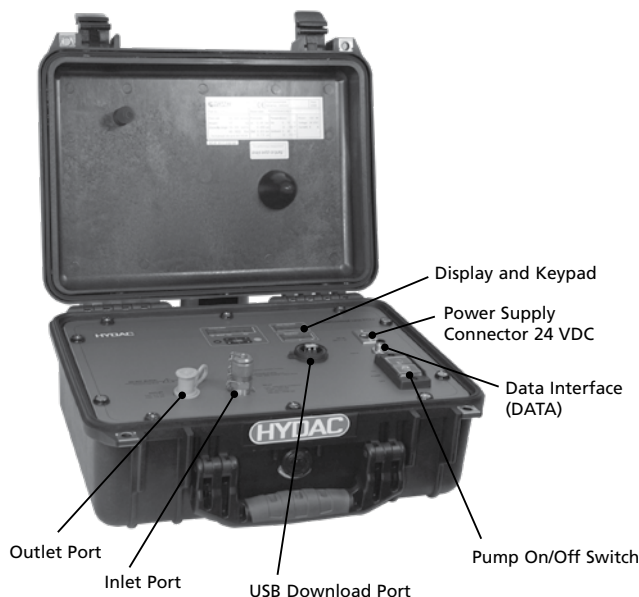
- Protects and extends the life of expensive components Features
- Minimizes downtime and maintenance costs
- Designed to handle high viscosity oils up to 25,000 SUS (see Skid Selection; previous page)
- Many component combinations and variable starter options allow the flexibility to match specific user needs
- Four wheel cart option provides product portability
- Integral drip pan with drain plug protects oil from spilling on ground
- Sample valves provided at filter base for fluid sampling
- Market leading Schroeder Excel-ZPlus® synthetic filtering media provides for quick, efficient clean up with maximum element life
- Availability of all plastic, environmentally friendly, coreless elements for QF15 housings (X1-X6 only)
- Please note Viton® seals required for this application

MFS / MFD Mobile Filtration Systems

X Series Skids

Notes:

1. Please see our Filter Systems Catalog (L-2681C) for drawings and complete sizing information.



Features and Benefits

- Particulate contamination is detected with an optical measurement cell
- Automatic measurement and display of cleanliness ratings as ISO 4406:1999; SAE AS 4059, and NAS 1638
- Measurement Accuracy +/- 1/2 ISO code
- Supply voltage 24 VDC
- Integrated pump for automatic control of oil flow
- Viscosity range: 33 to 1622 SUS (2 to 350 cSt)
- Water saturation (0 - 100%)

Description

The FluidControl Unit FCU 1315 series combines the advantages of the portable contamination measurement units with the measurement technology of the TestMate® Contamination Monitor (TCM) and TWS (TestMate® Water Sensor), in a portable, field-ready package for diesel fuel applications.

The FCU 1315 is a portable service unit and is designed for temporary measurement of solid particle contamination and water saturation in diesel storage, diesel transfer and diesel filling applications.

The FCU 1315 will measure contamination levels of diesel fuel, as well as mineral based hydraulic oils compatible with Viton® seals. The FCU 1315 is not compatible with water glycol fluids.

The integrated pump and the hoses with test point connections, which are included with the FCU 1315, allow operation on diesel fuel storage tanks and transfer circuits, as well as on hydraulic reservoirs, control circuits, and pressure circuits.

To ensure safe operation with diesel fuel, the FCU 1315 is equipped with a grounding wire, along with an integral temperature monitoring system to ensure the device switches off when operated above the critical temperature of diesel fuel (113°F, 45°C).

Applications

- Diesel Storage
- Diesel Transfer and Filling
- Diesel Service and Maintenance

Specifications

General Data:	Self-Diagnosis:	Continuously with error indication via status LED and display
	Measured Value:	ISO code / SAE Class / NAS Class / Saturation Level / Temperature
	Measuring Range:	Display from ISO code 9/8/7 (MIN) to ISO code 25/24/23 (MAX) Calibrated within the range ISO 13/11/10 to 23/21/18 Saturation level 0 to 100 % / Temperature -13°F to 212°F (-25°C to 100°C)
	Accuracy:	± 1/2 ISO class in the calibrated range / ± 2 % Full scale max for Water Sat. and Temp.
	Material of Sealings:	FPM seals
	Ambient Temperature Range:	32°F to 113°F (0°C to 45°C)
	Storage Temperature Range:	-40°F to 176°F (-40°C to +80°C)
	Dimensions (cover closed):	9.06" H x 16.14" L x 13"D
	IP Class:	IP50 in operation, IP67 when closed
	Weight:	Approx. 29 lbs (13 kg) without accessories
	With Diesel According to ASTM D975 4-D or DIN EN 590:	IN: 0 psi (0 bar) OUT: 0 psi (0 bar)

Hydraulic Data:

Hydraulic Fluid IN: -7.25 to 650 psi (-0.5 to 45 bar)
 Operating Pressure: OUT: 0 to 7.5 psi (0 to 0.5 bar)

with Adapter for Pressure Lines: IN: 217 to 5000 psi (15 to 345 bar)
 OUT: 0 to 7.5 psi (0 to 0.5 bar)

Pressure Max.: 5000 psi (345 bar)

Permissible Viscosity Range: 33 to 1622 SUS (1.5 to 350 cSt)

Fluid Temperature Range: 32°F to 158°F (0°C to +70°C), or up to 113°F (45°C) for diesel fuel

Electrical Data:

Power Supply Voltage: 24 VDC \pm 20%, residual ripple < 10%

Max. Power / Current Consumption: 100 Watt / 4 A

Interface: Plug connection, 5-pole, male, M12x1 and USB

Specifications

How to Build a Valid Model Number for a Schroeder FCU:

BOX 1	BOX 2	BOX 3	BOX 4	BOX 5	BOX 6
FCU	1315				

Example: NOTE: One option per box

BOX 1	BOX 2	BOX 3	BOX 4	BOX 5	BOX 6
FCU	1315	4	U	AS	1

= FCU 1315-4-U-AS-1

BOX 1	BOX 2	BOX 3	BOX 4
Model	Series	Pump Option	Supply Voltage
FCU	1315 = ISO 4406:1999; SAE AS 4059 / > 4 μ m(c) > 6 μ m(c) > 14 μ m(c) > 21 μ m(c), For Use With Diesel According to ASTM D975 4-D and DIN EN 590, as well as Hydraulic and Lubrication Fluids Based on Mineral Oils	4 = with Integral Pump	U = 24 V DC

BOX 5	BOX 6
Integral Sensor	Options
AS = TestMate® Water Sensor	Omit = None 1 = 100-240 V AC, 50/60 Hz, 1 Phase, 5 A Power Supply Adapter

Model Number Selection

We do not guarantee the accuracy or completeness of this information. The information is based on average working conditions. For exceptional operating conditions, please contact our technical department. All details are subject to technical changes.

Items supplied with FCU 1315-4-U-AS-1 include:

- FluidControl Unit (FCU 1315)
- Power supply AC adapter with connecting cables to supply voltage for Europe, USA/Canada, UK, Australia, and Japan
- Adapter for pressure lines
- Adapter for clear suction hose
- Inlet pressure hose with screw connection for 1620 test point, length = 2 meters (approx. 79 inches)
- Inlet suction pipe (metallic) for bottle sampling
- 2x suction/return hoses, clear, quick couple terminations, 1 meter (approx. 39 inches)
- Operation Manual & Calibration Certificate
- CD Rom of FluMoS Light Software
- USB Flash Drive (which includes Operation and Maintenance Instructions in other languages)
- Grounding Terminal

Accessories:

- Battery Pack (approx. 5 hours of use) Part No. 3504605
- Field Verification Startup Kit - Part No. 3443253
- Field Verification Kit (fluid only) - Part No. 3443249

Diesel Fuel Quality Analysis Kits

Fuel analysis can identify potential causes for fuel filter plugging, smoking, loss of power, poor injector performance, malfunctioning throttle position sensors and sticking valves. Testing also confirms a diesel fuel's sulfur content, biodiesel content and compliance with manufacturer specifications and standards for cleanliness that could affect equipment warranty requirements.

Schroeder Industries offers Troubleshooting and Diesel fuel quality test packages. All packages include pre-paid testing and the required number of fuel containers for sample.

***Total sample volume 32 oz required for all tests listed below**

Complete Fuel Quality and fuel filter ability | Fuel Stability Bio Content Test

Complete Diesel Fuel Analysis	Schroeder P/N: 02098012	Includes	
<ul style="list-style-type: none"> Complete fuel quality, fuel filter-ability, fuel stability and bio content test (8 critical ASTM tests with a single comprehensive relational summary) <p>NOTE: Test 0209812 only can be run with as little as 14 oz. (402 mL) sample</p>		Filter Plugging Free Contamination	Computability Loss of Power
		Filter Plugging Injector Scoring Corrosion	Flowability Filterability Di or Tri Glyceride Fall Out
		All Cultures of Microbes	Microscopic Composition
		Filter Plugging Injector Scoring Microbial Promoting Cause of Water	Biodiesel Content

Contamination Tests	Schroeder P/N: 02098006	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies contamination from external sources - oil, biological growth, water, sediment 		ICP	2mL
		Flash Point	200mL
<ul style="list-style-type: none"> Identifies contamination to be the result of a change in the fuel's physical properties - low thermal stability may require use of an asphaltene conditioner 		Thermal Stability	120mL
		Water and Sediment	200mL
		Bacteria, Fungi, Mold	120mL

Smoking Tests	Schroeder P/N: 02098007	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies low cetane index or water contamination - loss of power, white smoke 		Sulfur	50mL
		Cetane Index	100mL
<ul style="list-style-type: none"> Identifies excessive sulfur content - black smoke 		API Gravity	400mL
		Distillation	200mL
		Water and Sediment	200mL

Filter Plugging Tests	Schroeder P/N: 02093395	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies contamination from external sources specific to filter plugging - high particle count, biological growth 		Thermal Stability	120mL
		Bacteria, Fungi, Mold	120mL
<ul style="list-style-type: none"> Identifies contamination due to a change in the fuel's physical properties - low thermal stability or insufficient cold weather capability for operating environment 		Pour Point	100mL
		Cloud Point	100mL
		Cold Filter Plug Point	100mL
		Particle Count	80mL

Cleanliness Tests	Schroeder P/N: 02098008	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies water contamination - can lead to smoking, biological growth and corrosion 		Karl Fischer	10mL
		Particle Count	80mL
<ul style="list-style-type: none"> Identifies particulate contamination - can result in extreme wear in high pressure fuel systems which may cause premature injector failure 			

Wear Prevention Tests	Schroeder P/N: 02098009	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies cause of wear - water contamination, excessive particles or insufficient lubricity 		Karl Fischer	10mL
		Particle Count	80mL
		Lubricity	20mL

Troubleshooting Test Packages

Highlighted product eligible for QuickDelivery

Notes: All fuel samples must be shipped via UPS Ground.

Includes prepaid testing and one fuel can per product sample

Diesel Fuel Quality Analysis Kits

*Total sample volume 64 oz required for all tests listed below

Fuel Quality Test Packages

Summer Tests	Schroeder P/N: 02098010	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies contamination from external sources - oil, biological growth, water, sediment Identifies contamination to be the result of a change in the fuel's physical properties - low thermal stability may require use of an asphaltene conditioner 		Flash Point	200mL
		Water and Sediment	200mL
		Kinematic Viscosity	2mL
		Sulfur	50mL
		Cetane Index	100mL
		API Gravity	400mL
		Distillation	200mL
		Thermal Stability	120mL
		Bacteria, Fungi, Mold	120mL
		ICP	2mL
Winter Tests	Schroeder P/N: 02098011	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies low cetane index or water contamination - loss of power, white smoke Identifies excessive sulfur content - black smoke 		Flash Point	200mL
		Water and Sediment	200mL
		Kinematic Viscosity	2mL
		Sulfur	50mL
		Cetane Index	100mL
		API Gravity	400mL
		Distillation	200mL
		Thermal Stability	120mL
		Pour Point	100mL
		Cloud Point	100mL
		Bacteria, Fungi, Mold	120mL
		ICP	2mL

Notes: All fuel samples must be shipped via UPS Ground.

Includes prepaid testing and two fuel cans per product sample

Biofuel Quality Measurement Tools

Online Quality Control

If you are a high volume producer, minutes count. Finding that you have produced dirty fuel an hour late can leave you with thousands of gallons of problem fuel. Online sensors can help you catch the problem before your customer does. While particle and moisture sensors will not tell you if your centane number is correct or if your flash point is acceptable; they will tell you how much particulate or moisture is in your biofuel. As the fuel passes the sensor, it can display a problem with a filter upstream and if the dry washing chemical (or any other particulate that could clog a fuel filter) is not being removed to standard.

Offline Quality Control

Taking and examining samples during various stages of your production process can provide a priceless level of visibility to troubleshooting or even just understanding your current biodiesel production processes.

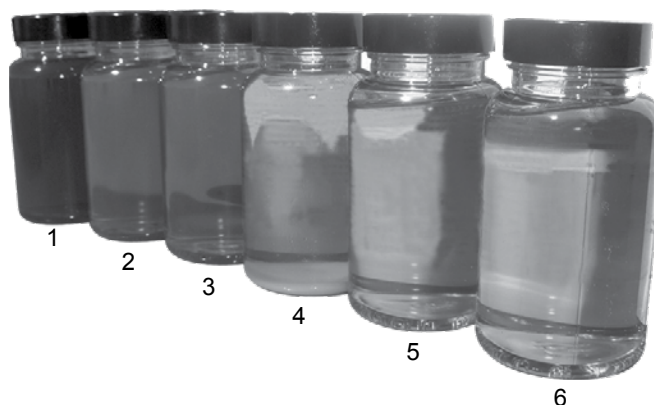
The samples below show how much the appearance of biodiesel changes as it progresses through the various stages of production. These samples were taken at key stages in the production process and clearly demonstrate the importance of effective filtration throughout.

1. WVO (Waste Vegetable Oil):
Pre-filtered

2. Biodiesel after reaction and
initial glycerin drain

3. After 8-hour settling-final
glycerin drain

4. Dry washing using Magnesol.
Sample taken from wash tank.
Significant improvement in clarity
and excellent pH neutralization
at this stage. Magnesium silicate
powder still clearly visible at base
of sample bottle



5. Sample taken after the Biodiesel Wash Tower showing great clarity and further reduction in pH value

6. After final polishing using the K9. Final effective contaminant and moisture removal and yet further reduction in pH values. Cleanliness in accordance with ISO 4406: 16/14/11

Simple Water Test

The line of sample bottles below shows the difference between freshly produced, “dirty” biodiesel still highly contaminated with production chemicals (i.e. Methanol and NaOH left) through to the washed and polished clean samples (right). By adding a small amount of water to a sample bottle containing biodiesel, the water will collect at the base of the bottle, and the clarity of the water is a very good indicator of the level of impurities present. This in effect is a mini “wet wash.”

