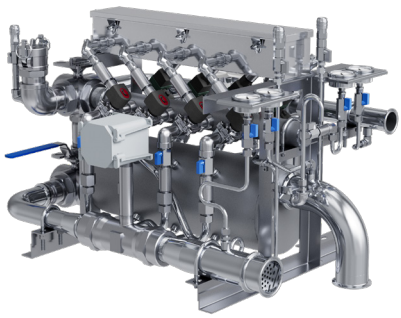
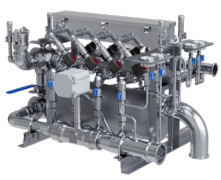
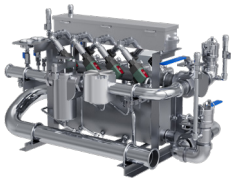
Biofuel Blending System

Product Description	An automatic Biofuel Blending System (BBS) that provides consistent blending of biofuel during the entire fuel dispensing transaction (B5 – B20). The integrated flow meters and control valves allow the BBS to continuously calculate and blend directly into the flow stream, resulting in a homogeneous biofuel mixture. The BBS continuously monitors for fuel movement. When a fuel transaction is detected, the BBS Controller will instantly initiate the blending process and monitor throughout the transaction at a programmed ratio with a high degree of accuracy. The BBS is always active and provides 24/7 coverage for automatic blending needs during fueling transactions.	

System Features	**System Description**	
	The BBS optimizes the conventional biofuel blending procedure applied to conventional fuels by using a combination of mechanical and electrical components and software. These refinements automate the blending procedure, saving significant amounts of money, time and most importantly, improving the quality of blended fuel for customers.	
	BBS Controller	**Flow Meters**
	The BBS Controller monitors the flow of fuel and proportionally blends the required amount of biofuels during the transaction. It utilizes precision flow meters to determine the blend accuracy, making corrections if necessary. Integration with the Veeder-Root Automatic Tank Gauge (ATG) is achieved to effectively manage hook signals and leak detection. Alarms and reports from the BBS Controller can be printed through the ATG for diagnostics support.	The Diesel Flow Meter and the Biodiesel Flow Meter measure the volumes and flow rates of respective products during the blending process. Data collected by the Flow Meters is sent to the BBS Controller, which enables real time blending flow rate calculations. Additionally, the BBS Flow Meters will identify unexpected flow/no flow conditions, enabling the BBS to activate warnings and shut down the system as required.
	Biodiesel Strainer	**Blend Control Valves**
	The Biodiesel Strainer is used to filter impurities from the biofuel, improving reliability and extending the durability of the system.	The 8 Blend Control Valves, managed by the BBS Controller, open and close, enabling precise volumes of biofuel to be injected into product stream. The BBS utilizes two different size valves to ensure blend accuracy. The four 3/4" valves provide course adjustment of target blend ratio, the four 3/8" valves provide fine adjustment.
	Static Blender	
	The biodiesel and diesel are combined in the Static Blender. The Static Blender incorporates a series of baffles and mixing chambers that promote turbulent flow to maximize the interaction between the fuel components. This helps to break up any concentration gradients, ensuring that the fuel components are thoroughly mixed and evenly distributed through the blend.	
	Automatic Tank Gauge	**Biofuel Submersible Turbine Pump**
	The Veeder-Root ATG (TLS-450PLUS or TLS4 with a TLS-XB Expansion Box) controls the diesel and biodiesel pumps. Alarms and warnings can be printed through the ATG for diagnostic purposes as needed.	The pump in the biofuel tank is used to deliver biofuel into the blending manifold.

System Configuration & Components	**BBS Configuration / Location**	**Aboveground**	**Underground**
	Images		
	Typical Application	Retrofit & New Builds	Retrofit & New Builds
	Blender Orientation	Horizontal	Horizontal
	Install Location	Tank Pad	Sump
	Enclosure	55" L x 37" W x 31" H Part Number: 34001	66" L x 66" W x 60" H Sump Bravo P/N C-B85.5-D-60-03 or equivalent
	Cold Climate Package Option	Yes	No
	2" BBS: 5 – 180 GPM	Part Number: 31801	Part Number: 31802
	3" BBS: 30 – 350 GPM	Part Number: 33501	Part Number: 33502

VEEDER-ROOT TMS

Biofuel Blending System

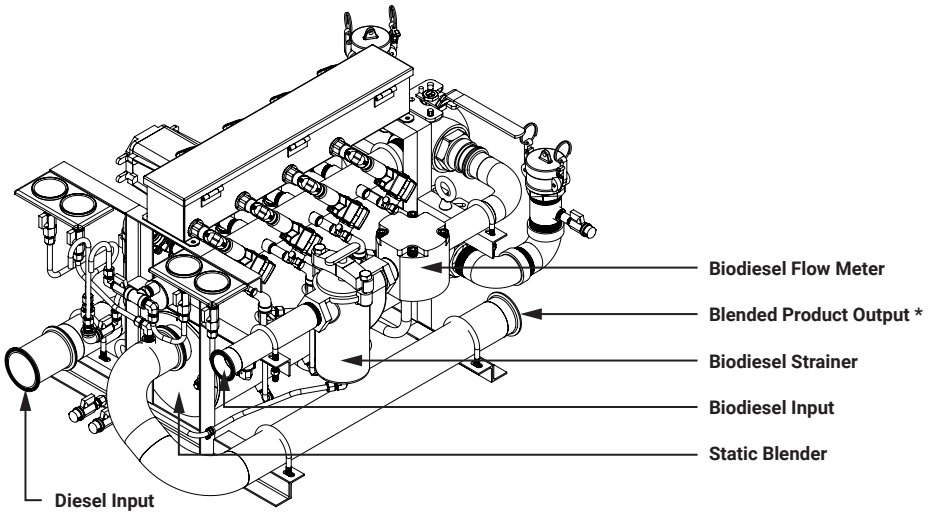
Specifications	**System Specifications**			
	Biodiesel Filtration	40 mesh, reusable strainer	**Fuel Compatibility**	100% Diesel, Biodiesel (B100), Renewable Diesel
	Blend Range	B5 – B20	**Blend Throughput**	**2" BBS:** 5 – 180 GPM **3" BBS:** 30 – 350 GPM
	Power Requirements	100 – 240 VAC @ 50/60 Hz; Single phase supply; Maximum 3-Amp		
	Network Connection to BBS Controller	CAT5E or CAT6		
	Status Indicators	LED lights		
	Alarm Features	Pump Status, Relay Fault, System Status, Tank Status		
	Blending Manifold Environmental Specifications		**Controller Environmental Specifications**	
	Blender Operating Temperature	32°F to 104°F (0°C to 40°C)	**Controller Operating Temperature**	32°F to 104°F (0°C to 40°C)
	Blender Storage Temperature	32°F to 104°F (0°C to 40°C)	**Controller Storage Temperature**	32°F to 104°F (0°C to 40°C)
	Blender Relative Humidity	0 – 100% (Condensing)	**Controller Relative Humidity**	0 – 75%
	Blender Installation Location	Zone 0, Div. 1 hazardous environment; Indoor or outdoor installation	**Controller Installation Location**	Office environment, temperature controlled
		Blending Manifold	**BBS Controller**	**BBS Aboveground Enclosure**
	BBS External Dimensions	44" L x 27" W x 24.5" H	7" L x 10" W x 16" H	55" L x 37" W x 31" H
	Weight	200 lbs	19 lbs	230 lbs
System Construction	**Static Blender**	Stainless Steel	Intrinsically Safe Cable Trough	Stainless Steel
	Blending Manifold		Flow Meters	
	Product Inlet / Outlet Piping		Blend Control Valves (Internals)	
	Biodiesel Strainer		Check Valves	
	Quick Connect Drain Fittings		3-Way Ball Valves	
	Elastomers (Seals, O-Rings)	Flourocarbon, Teflon		
Approvals & Manuals	**Component Approvals**	Controller	CAN/CSA Std. C22.2 No.61010-1 and Conforms to UL Std. 6101-1 and 698A	
		Blend Control Valves	UL Listed: Class 1, Division 1, Group A, B, C & D; Class 2, Division 1, Group E, F & G	
		Flow Meter	Intrinsically Safe, Class I, II, III, Division 1, Group A, B, C, D, E, F, G, T6 to T5	
	Manuals	Installation	577014-495	
		Service & Troubleshooting	577014-496	

<table>
<tr><td rowspan="9">Submersible Turbine Pump (STP) Specifications</td><td>Desired Site Throughput (B20)</td><td>Diesel STP</td><td>Approximate Diesel STP Flow</td><td>Biofuel STP</td><td>BBS Configuration Throughput</td></tr>
<tr><td rowspan="3">100 GPM</td><td>4" – 1.5 HP</td><td>80 GPM</td><td>4" – 1.5 HP X3</td><td rowspan="4">2" BBS: 5 – 180 GPM</td></tr>
<tr><td>4" – 2 HP Low Pressure</td><td>80 GPM</td><td>4" – 1.5 HP X3</td></tr>
<tr><td>4" – 2 HP</td><td>85 GPM</td><td>4" – 1.5 HP X3</td></tr>
<tr><td>150 GPM</td><td>4" – 2 + 1.5 HP Manifolded</td><td>160 GPM</td><td>4" – 1.5 HP X3</td></tr>
<tr><td rowspan="2">200 GPM</td><td>4" – 2 + 2 HP Manifolded</td><td>170 GPM</td><td>4" – 1.5 HP X3</td><td rowspan="5">3" BBS: 30 – 350 GPM</td></tr>
<tr><td>6" – 3 HP Maxxum</td><td>170 GPM</td><td>4" – 1.5 HP X3</td></tr>
<tr><td>250 GPM</td><td>6" – 5 HP Maxxum</td><td>260 GPM</td><td>4" – 1.5 HP X3</td></tr>
<tr><td>300 GPM</td><td>6" – 5 HP Maxxum</td><td>260 GPM</td><td>4" – 1.5 HP X3</td></tr>
<tr><td>350 GPM</td><td>6" – 2 + 3 HP Maxxum Manifolded</td><td>350 GPM</td><td>4" – 2 + 1.5 HP X3 Manifolded</td></tr>
<tr><td rowspan="6">Site Requirements</td><td colspan="5">Equipment Requirements</td></tr>
<tr><td colspan="5">- STPs shall be sized and manifolded as needed to deliver sufficient throughput for the site.
- Biodiesel STP shall have a higher pressure to ensure proper injection. Recommended minimum pressure differential is 5 PSI.
- Ensure STPs are compatible with biofuels that will be used (e.g., The Red Jacket® Alcohol Gas or Red Armor® Pump for Biodiesel).
- Use of Trapper Intake Screens are recommended for 4" diesel and biodiesel STPs.
- BBS is compatible with Digital Pressurized Line Leak Detection (DPLLD) and Mechanical Line Leak Detection (MLLD).
- Network connection to the BBS is recommended for remote diagnostics.</td></tr>
<tr><td colspan="5">Sump Requirements</td></tr>
<tr><td colspan="5">- For underground installations, use Bravo 66" L x 66" W x 60" H high sump or equivalent.
- Mounting struts on the floor of the sump should be compatible with BBS mounting locations.
- Use sump sensor (e.g., Mag Sump Sensor) for monitoring.</td></tr>
<tr><td colspan="5">Site Layout Recommendations</td></tr>
<tr><td colspan="5">- Install underground blending sump or aboveground enclosure for BBS near the tank pad for optimized piping layout.
- Ensure minimum line lengths are compatibility with electronic line leak detection.</td></tr>
<tr><td rowspan="4">Wiring Requirements</td><td colspan="5">System Requirements</td></tr>
<tr><td colspan="2">Blend Control Valves</td><td colspan="3">Power Requirement: 24 VDC
Wire Gauge & Length: For installations up to 250 feet, wire size shall be 14 AWG. For installations over 250 feet – 1,000 feet, shall be 12 AWG.
10 Wires Total: 8 power wires and two common wires</td></tr>
<tr><td colspan="2">Flow Meters</td><td colspan="3">Wire Gauge: 16 AWG, 2 pair shielded cable per flow meter
Wire Length: Up to 1,000 feet
Wire Type: Belden 8780 or equivalent</td></tr>
<tr><td colspan="2">Controller</td><td colspan="3">Power Requirement: 120 VAC, Minimum 3-Amp
Wire Gauge: 14 AWG THHN</td></tr>
</table>

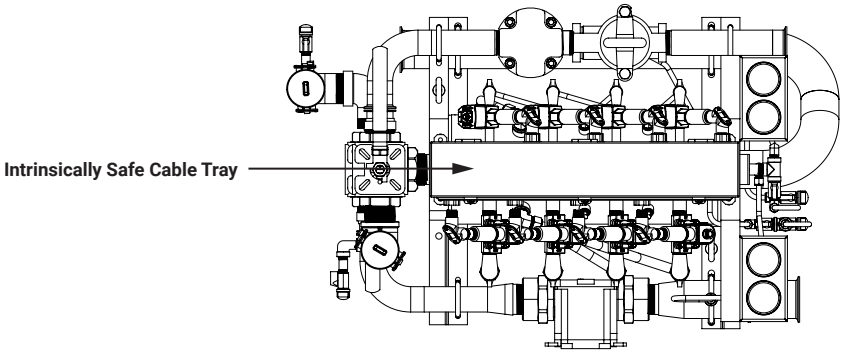
	Part Number	Description	Comments
System Accessory & Replacement Parts	30401	Aboveground Horizontal Enclosure	Accessory
	30402	Cold Climate Packet	Accessory
	30403	Drain Kit	Accessory
	30531	3/4" Blend Control Valve	Replacement
	30532	3/8" Blend Control Valve	Replacement
	30533	Diesel Flow Meter, Standard	Replacement
	30534	Diesel Flow Meter, High Flow	Replacement
	30535	Diesel Flow Meter Encoder	Replacement
	30536	Biodiesel Flow Meter	Replacement
	30537	Biodiesel Flow Meter Encoder	Replacement
	30538	Check Valve, 3/4"	Replacement
	30539	Check Valve, 3/8"	Replacement
	30540	Solenoid Isolation Ball Valve, 3/8"	Replacement
	30541	Solenoid Isolation Ball Valve, 3/4"	Replacement
	30542	3-Way Ball Valve, Diesel	Replacement
	30543	3-Way Ball Valve, Biodiesel	Replacement
	30544	Bio Strainer O-Ring	Replacement
	30545	Bio Strainer Basket	Replacement
	30546	Pressure Gauge	Replacement
	30506	Relay Board	Replacement
	30507	Pulser Board	Replacement
	30508	BBS Computer	Replacement
	30509	LED Board	Replacement
	30510	Wire Harness	Replacement
	30511	Power Supply, 24V	Replacement
	30512	Power Supply, 12V	Replacement
	30518	Intrinsically Safe Barrier Board, Pulse	Replacement
	30519	Intrinsically Safe Barrier Board, Power	Replacement
	30517	System Diagnostic Bracket Assembly	Replacement
	30520	USB Relay Board Cable	Replacement
	30521	Pump Relay Terminal	Replacement

System Overview

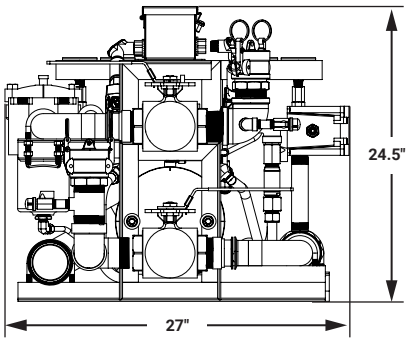
CAD Drawings



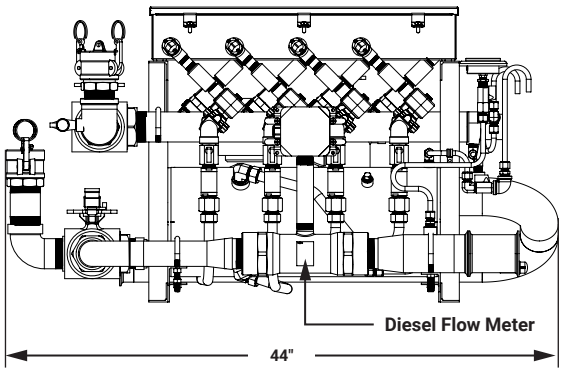
ISOMETRIC VIEW



TOP VIEW



BACK VIEW



RIGHT VIEW

* Underground BBS Configuration shown. Blended Product Output for the Aboveground BBS Configuration terminates on the same side as the product inputs.

Notice

Veeder-Root makes no warranty of any kind with regard to this publication, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Veeder-Root shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this publication.

Veeder-Root reserves the right to change system options or features, or the information contained in this publication.