DAHL®
BALDWIN

TANK 500 SERIES

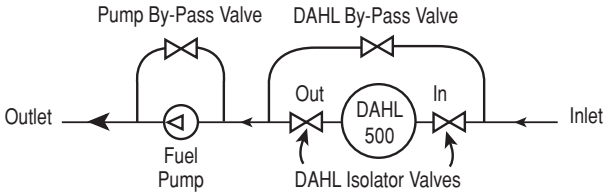
- Installation
- Operation
- Parts
- Service Information

INSTALLATION

A. Location & Shut-off Systems

For maximum efficiency, the unit should be installed on the vacuum (suction) side of the fuel system between the main tank and the fuel pump.
Select a stable horizontal location that will provide ease of operation, maintenance, safety and suitability for electrical and plumbing restrictions.
The fuel flow through the DAHL 500 Series unit must be stopped to service the unit. A tank by-pass valve system is recommended for continuous flow operations. For best fuel flow control through the unit, a by-pass system on the pump is also suggested. See Figure 1. (Also see Figure 3.)

FIGURE 1



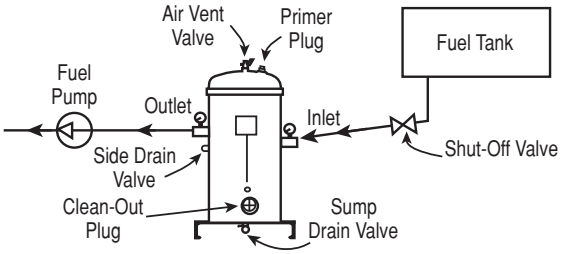
B. Filter Mounted Below Fuel Storage Tank

If possible, install the DAHL 500 Series unit at a point where the top of the unit is below the bottom of the storage tank. A shut-off valve MUST be installed prior to the DAHL INLET to stop fuel flow while changing filter elements. See Figure 2A.

1. Select a location in the fuel line between the fuel tank and the fuel pump.
2. Install the DAHL unit on the vacuum (suction) side of all fuel pumps in a convenient location for servicing
3. Install the fuel line with a shut-off valve from the fuel tank to the DAHL unit INLET using appropriate non-galvanized fittings.
4. Install the fuel line from the DAHL unit OUTLET to the INLET of the transfer or fuel pump.

NOTE: Head pressure must not exceed 15 psi.

FIGURE 2A

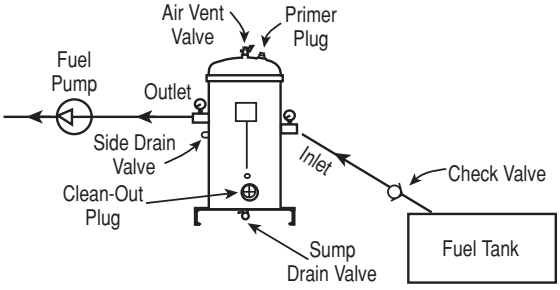


C. Filter Mounted Above Fuel Storage Tank

A non-restrictive check valve should be installed on the DAHL INLET to prevent loss of prime. See Figure 2B.

1. Select a location in the fuel line between the fuel tank and the fuel pump.
2. Install the DAHL unit on the vacuum (suction) side of all fuel pumps in a convenient location for servicing
3. Install the fuel line with a check valve from the fuel tank to the DAHL unit INLET using appropriate non-galvanized fittings.
4. Install the fuel line from the DAHL unit OUTLET to the INLET of the transfer or fuel pump.

FIGURE 2B



D. Electrical Requirements for 500-BP

The warning light in the instrument panel box on the 500-BP operates on standard 110 volt electricity. The warning light in the instrument panel box on the 500-BP22 operates on 220 volt electricity. An optional warning buzzer on 500-BP (EC-005 OBS) is available.

E. Recycling & Blending

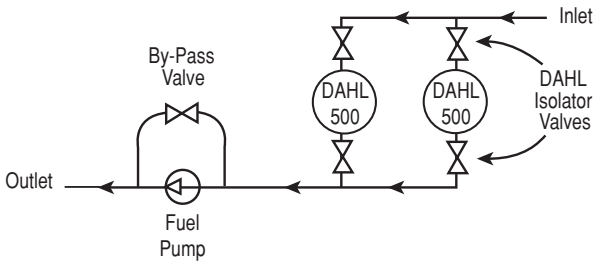
The DAHL 500 Series unit can also be used for fuel recycling to maintain high fuel purity for stored fuels and for blending of diesel fuel with used crankcase oil from diesel equipment. If these functions are desired, they may be incorporated into the system through the addition of valves. See Figure 4 and the OPERATION section for recycling and blending instructions.

F. Marine & Continuous Operation

Figure 3 shows how two or more units may be installed in parallel so that one unit may be serviced while the other unit is in operation.

NOTE: The maximum flow rate should not exceed the recommended flow of the unit(s) in operation. See the PARTS & SPECIFICATIONS section.

FIGURE 3



OPERATION

START-UP

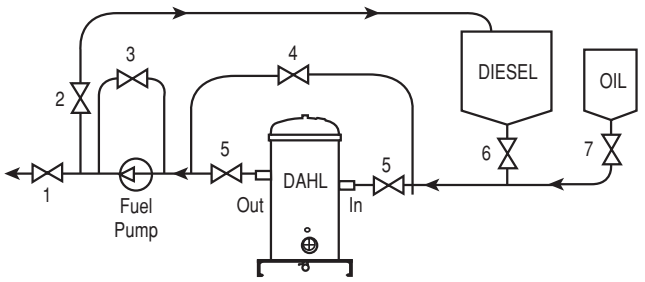
1. Plug the water sensor probe models into an appropriate power source.
2. Start the fuel flow through the DAHL unit by starting the pump or closing the DAHL unit by-pass valve. (See Figure 1.)
3. Check the system for leaks. If any problems develop, see the TROUBLESHOOTING section.

RECYCLING

Periodically recycle the fuel through the DAHL 500 Series unit to purge water and contaminants from the storage tank.

1. If your unit is equipped with a water sensor probe, plug it in.
2. Close valves marked 1, 3, 4 and 7 in Figure 4.
3. Open valves marked 2, 5 and 6.
4. Start the fuel flow through the DAHL 500 Series unit. Start the pump motor and adjust the pump by-pass valve (number 3 on Figure 4) to the desired flow. Opening the valve decreases the flow.
5. Check the water level occasionally. See the SERVICE section for instructions on draining water.
6. Recycling time may be determined by fuel quantity. The maximum flow through a DAHL 500 Series unit is 1800 gph or 30 gpm with valve number 4 closed. Estimate the recycling time in minutes by dividing gallons of fuel by 30.

FIGURE 4



USE OF BLENDED FUEL

Most diesel engine manufacturers have tested and approved the blending of diesel fuel with used crankcase oil on a 20:1 ratio. (Do not exceed 5% oil in blend.)

Once blended, the mixture is filtered and contaminants are removed. The blended fuel is then recycled back to the fuel storage tank for use. The used crankcase oil has now become valuable diesel fuel.

Caution: NEVER use crankcase oil from gasoline engines for blending. Use diesel equipment waste oil only.

Caution: The maximum ratio for blending used oil is one part oil to twenty parts of diesel fuel. NEVER EXCEED THIS RATIO.

To calculate:

1. If the quantity of used oil is known, multiply by 20 to find the minimum quantity of diesel fuel to be used.
2. If the quantity of diesel fuel is known, divide by 20 to find the maximum quantity of crankcase oil to add.

DOUBLE-CHECK ALL CALCULATIONS FOR ACCURACY.

NOTE: Cold oil is viscous, difficult to blend and shortens filter element life. Consider warming it. If the vacuum gauge reading exceeds 20 inches, do not operate the DAHL unit. See the TROUBLESHOOTING section.

BLENDING

To operate the DAHL 500 Series unit as a blender:

1. If your unit is equipped with a water sensor probe, plug it in.
2. Close valves marked 1, 3, 4 and 7 in Figure 4.
3. Open valves marked 2, 5 and 6.
4. Start the fuel flow through the DAHL 500 Series unit. Start the pump motor and adjust the pump by-pass valve (number 3 on Figure 4) to the desired flow. Opening the valve decreases the flow.
5. Open the oil valve (number 7 on Figure 4) to begin mixing.
6. Blending is complete when the calculated quantities are blended (approximately 7-8 minutes per gallon of oil.) A more efficient mixture, which will prolong filter element life, is obtained by injecting the oil slower and allowing a longer recycling period of time.

SERVICE

As water is separated from the fuel, it accumulates in the sump. DAHL 500-BP is equipped with an electronic water sensor system. When water reaches the level of the sensing probe, the warning light (and optional buzzer) will activate. This indicates that approximately 11 gallons of water has collected. These electronic alarms turn themselves off when the sump is drained.

NOTE: The probe should be cleaned monthly to remove coatings which can interfere with sensing dependability. See PROBE CLEANING.

Check the water and contaminant level in the sump daily — particularly if no water sensor probes are installed.

DRAINING WATER

1. Shut the pump off or set the valves to by-pass the DAHL unit.
2. If no pressure is indicated on the inlet vacuum gauge, open the top air vent valve.
3. Open the sump drain valve and drain all of the water.
4. Close the sump drain valve.
5. Prime the DAHL unit as instructed in the PRIMING METHODS section.

SERVICE (Cont'd.)

CLEANING THE SUMP

Sump cleaning is required when too many large contaminants have accumulated for the sump drain valve to handle.

1. Shut the pump off or set the valves to by-pass the DAHL unit.
2. Open the top air vent valve.
3. Drain the unit completely (approximately 55 gallons). A sump assist is a time-saver — attach it to the 3/4 inch sump drain valve.
4. Remove the sump clean-out plug and flush the sump out with a small pump.
5. Clean the probe as discussed in the PROBE CLEANING section.
6. Replace clean-out plug using a thread sealer.
7. Prime the DAHL unit as instructed in the PRIMING METHODS section.

FILTER ELEMENT REPLACEMENT

DAHL filter elements should be changed when the OUTLET vacuum gauge reads 20 inches of mercury while operating, or at the pump manufacturer's specification, whichever is lower.
The INLET gauge will indicate pressure during operation and should not exceed 15 psi on a typical installation with the fuel tank above the DAHL unit. See Figure 2.

1. Shut the pump off or set the valves to by-pass the DAHL unit.
2. Open the side drain valve. Drain off approximately 14 gallons of diesel fuel so that the fuel level is at the bottom of the filter elements. (Open the top air vent to assist in draining.)
3. Remove the lid clamp and the lid. Tap with a rubber mallet if necessary.
4. Unscrew the filter element retainers and remove contaminated elements with a turning motion.
5. Replace the filter element and retainers. Make priming easier by partially filling the housing with clean fuel at this time.
6. Coat the O-ring with a heavy lubricant and re-install.
7. Install the lid and the clamp. Be sure arrows on the lid and the housing are aligned for best fit.

NOTE: Make sure both flanges are inside the clamp lids. Tap the clamp with a rubber mallet while tightening fasteners until the clamp begins to tighten equally around the housing. Do not over-tighten.

8. Prime the DAHL unit as instructed in the PRIMING METHODS section.

PROBE CLEANING

Clean the probe with a dry cloth monthly to get dependable service.

1. Unplug the DAHL unit and stop the fuel flow through the unit.
2. Remove the probe nut and wire.
3. Drain the tank, if needed.
4. Remove the probe. (If the tank is not drained, plug the 1/4 inch NPT hole immediately.)
5. Clean the probe tip with a clean dry cloth and replace.
6. Prime the DAHL unit as instructed in the PRIMING METHODS section.
7. Replace the wire. Plug in the DAHL unit and turn the fuel flow on.
8. Test the light bulb. See the PROBE AND LIGHT FUNCTION section.

PRIMING METHODS

A. Head Pressure — If the storage tank is higher than the DAHL unit, head pressure (not to exceed 15 psi) can be used to prime the filter.
   1. Open the top air vent valve.
   2. Make sure the side and bottom drain valves are closed.
   3. Open the fuel supply shut-off valve.
   4. When diesel fuel comes out at the air vent valve, close the valve. The unit is now primed and ready.

B. Manual and Pump Filling - If no head pressure is available, filling with a funnel or a pump is recommended.
   1. Open the top air vent valve.
   2. Make sure the side and bottom drain valves are closed.
   3. a) Funnel Filling: Remove the primer plug and fill.
      b) Pump Filling: Attach a pump line to the 1/2 inch side drain valve. Pump slowly. Do not exceed 15 psi.
   4. Fill the unit with approximately 55 gallons or until the fuel comes out the air vent valve.
   5. a) If Filled by Funnel: Replace the primer plug. Use a thread sealer.
      b) If Filled by Pump: Close the 1/2 inch side drain valve.
   6. Close the top air vent.

TROUBLESHOOTING

DAHL UNIT WILL NOT PRIME

1. DAHL unit not full of fuel — Prime the DAHL unit as instructed in the PRIMING METHODS section.
2. Vent or drain valve is open.
3. By-pass system is still open.
4. Fuel supply shut-off valve is still closed.
5. Fittings are loose. Check and tighten.
6. O-ring is defective. Apply grease to o-ring before installing.
7. Pump operation is in wrong rotation. Change rotation if necessary.

INSUFFICIENT FUEL FLOW

1. Refer to DAHL UNIT WILL NOT PRIME section.
2. Inlet or outlet valve is closed.
3. Filter elements are plugged. Check vacuum gauge reading and replace elements if needed.
4. Viscosity is too high. Warm the fuel.
5. Plumbing is undersized or restricted.

TROUBLESHOOTING (Cont'd.)

PROBE AND LIGHT FUNCTION

The sensing probe should be cleaned monthly for dependable service. Refer to the PROBE CLEANING section.

1. Check the power supply.
2. Check the light bulb activation.
   a) If the probe is already removed, attach the probe wire and touch the probe tip to an unpainted surface on the DAHL unit.
   b) If the probe is installed, take a piece of wire and touch the wire to the probe nut and to an unpainted surface on the DAHL unit.
3. If warning light does not activate:
   a) Turn off the electrical power.
   b) Check for a burned out bulb. Replace with an EC-112 OBS light bulb if needed.
   c) Check, tighten or replace loose or broken wires.
   d) Check the optional warning buzzer. Replace if defective.
   e) Check to assure the transformer is functioning properly.

PARTS & SPECIFICATIONS

MODEL 500 SPECIFICATIONS

Recommended Flow Rate:
- **Single Model 500 Series** ..... 1,800 GPH (U.S.) (6,813 LPH)
- **Double Model 500 Series** ..... 3,600 GPH (U.S.) (13,626 LPH)
- **Multiple Unit:** ..... Multiply Flow Rate and Sump Capacity by Number of Units

Maximum Flow Rate:
- **Single Model 500 Series** ..... 1,920 GPH (U.S.) (7,268 LPH)
- **Double Model 500 Series** ..... 3,840 GPH (U.S.) (14,536 LPH)

Flow Resistance: ..... 1.0 In. Mercury
Maximum Working Pressure: ..... 15 PSI (103 kPa)
Temperature Range: ..... -60° to +250°F (-50° to +121°C)
Port Thread: ..... 2 In. NPT
Overall Height: ..... 47 In. (1,194 mm)
Width: ..... 28 1/2 In. (724 mm)
Depth: ..... 22 In. (559 mm)
Platform Base: ..... 24 x 22 In. (609.6 x 558.8 mm)
Tank Diameter: ..... 20 In. (508 mm)
Shipping Weight: ..... 287-289 lbs. (130-131 kg)
Element Removal Clearance: ..... 10 In. (254 mm)
Sump Capacity: ..... 11 U.S. Gallons (41.6 Liters)
Vacuum: ..... 28 1/2 In. Mercury
Seal Material: ..... Buna N
Element Number:
- 501 ..... 2 Micron Element
- 501-W* ..... 10 Micron Element
- 501-30 ..... 30 Micron Element

* Standard with Unit Unless Stated.

500 SERIES SINGLE UNITS

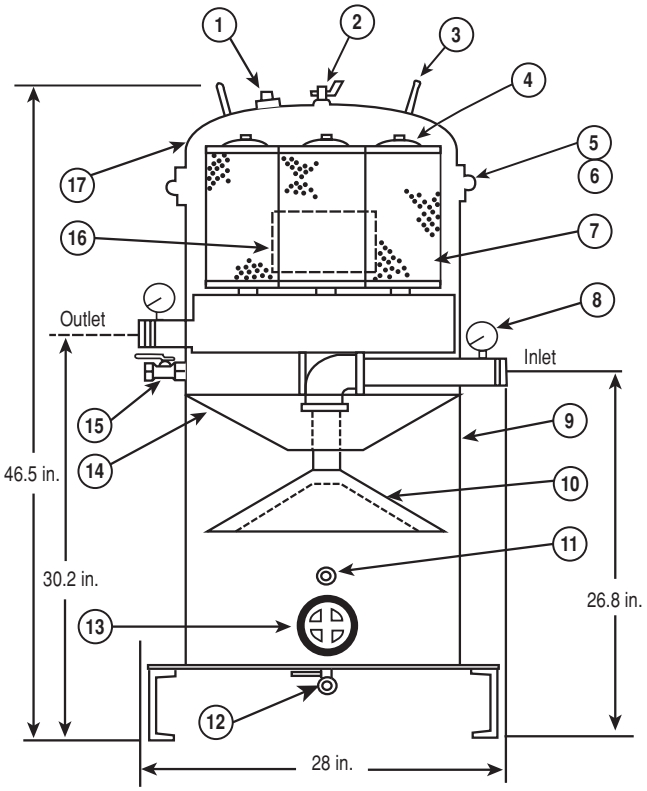
500 Diesel Fuel Filter/Water Separator

500-BP Diesel Fuel Filter/Water Separator with Water Sensor Warning Light Kit — Equipped with a 110 Volt Electrical Connector.

500-BP22 Diesel Fuel Filter/Water Separator with Water Sensor Warning Light Kit — Equipped with a 220 Volt Electrical Connector. (For Overseas Operation)

500 SERIES DOUBLE MANIFOLD UNIT

500-MFVBP22 Double Manifold Diesel Fuel Filter/Water Separator with Shut-Off Valves — Allows for continuous operation and Water Sensor Warning Light Kit — Equipped with a 220 Volt Electrical Connector. (For Overseas Operation)



Item	Order #	Qty.	Description
1		1	1 In. Primer Plug
2	100-30	1	Air Bleed Valve
3		2	Attached Handle
4		7	Element Retainer
5	500-15	1	20 In. O.D. O-Ring
6	500-12	1	20 In. Seal Clamp
7	501,-W*,-30	7	Filter Element (7 Req.)
8	85-P, 85-V	2	Vacuum/Pressure Gauge (2 Req.)
9		1	20 In. Body
10		1	Depressurizer Cone
11		1	Water Sensor Probe
12		1	3/4 In. Drain Valve
13		1	4 In. Clean-Out Plug
14		1	Conical Baffle
15		1	1/2 In. Drain Valve
16		1	Water Sensor Probe
		1	Replacement Light Bulb
17		1	20 In. Lid

If no number appears in the Order Number column, the item is not available separately.

DAHL FUEL/WATER SEPARATORS

WHY DAHL?

Filters are a compromise wherever located. As a one-step strainer, a filter must be porous enough to allow sufficient flow volume. This means the filters which came with the equipment are usually in the 10-30 micron range.

However, if a more efficient media were used, the filter would become clogged very quickly, restricting the flow and resulting in frequent, costly element changes.

Not only that, many fuel filters are not designed to remove significant amounts of water, even though water is a primary cause of injector pump and nozzle damage.

Water and solid contaminants displace the diesel fuels lubricative coating on precision injection components. The loss of this protection results in wear, erosion, surface pitting and eventual fuel pressure loss.

THE SOLUTION

DAHL's functional dual chamber, 3-stage diesel fuel filter/water separators provide efficient suction side water separation and contaminant filtration. The key is the unique DAHL patented depressurizer cone, which spreads the flow of the fuel. The fact is, the more area to flow over, the slower the flow and the greater the separation of water and dirt from the fuel. DAHL diesel fuel filter/water separators have less mechanical flow resistance because the fuel changes direction only once.

BALDWIN LIMITED WARRANTY

Baldwin Filters, Inc. ("Baldwin") warrants that each new DAHL product manufactured by Baldwin will be made free of defects in workmanship and material and will perform in accordance with its specifications as follows:

1. Housings one year from date of user's purchase.
2. Replaceable Elements during equipment manufacturer's recommended filter service interval, if properly installed.

Baldwin will replace any product found to be defective when you return it to Baldwin or to your Baldwin distributor where you purchased the product.

Return Process
You should first contact your salesperson at Baldwin or at your Baldwin distributor if you purchased a product that you believe does not meet the warranty stated above. The salesperson will help you complete the necessary paperwork, and will also help you return the suspected defective product to Baldwin for analysis.

Warranty Fulfillment
If Baldwin finds that a returned product does not meet the warranty stated above, Baldwin will promptly replace the defective product. If the defective product directly caused damage to the machine on which it was installed, Baldwin will promptly reimburse the machine owner for that portion of the repair costs that were necessary to restore the machine to its condition immediately prior to the damage caused by the defective product.

Conditions
Baldwin's warranty fulfillment obligations above do not apply if: **a)** the product is not returned to Baldwin for analysis, **b)** Baldwin finds that the product was not defective, **c)** the product was improperly installed or used, **d)** the product was reused or not replaced inside a normal service interval, or **e)** the product is tampered with or damaged in a manner that may inhibit Baldwin's ability to conduct a warranty investigation. Baldwin does not warrant any products that it does not manufacture (e.g., electronics, pumps, motors, etc.). You must look exclusively to the manufacturer of those products for warranty coverage.

The above warranty and warranty fulfillment obligations are exclusive and in lieu of all other warranties or related remedies. Baldwin is not liable for indirect, incidental, punitive or consequential damages arising in any way from the products it manufactures or sells.

COMPLETE EFFICIENCY

DAHL removes virtually 100% of the water and solid contaminants.

PROVEN PERFORMANCE

DAHL diesel fuel/water separators have been tested and proven over millions of miles and hours under all sorts of conditions. Ask anyone who has used DAHL, or any Baldwin user, as Baldwin Filters makes DAHL products.

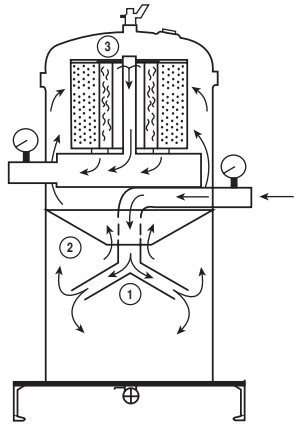
MARINE DURABILITY

Marine units 75, 100-M, 150-M, 200-M, 200-MMV, 300-M and 300-MMV have passed severe U.L. testing. Tests include fire endurance, vibration fatigue, impact and thermal shock. These filters have also met U.S. Coast Guard requirements for Marine Applications.

HOW DAHL'S FUNCTIONAL DUAL-CHAMBER 3-STAGE FUEL/WATER SEPARATORS WORK

1. SEPARATION

The unique DAHL patented depressurizer cone spreads the fuel in the "quiet zone" where most of the water and solid contaminants are separated. Since the contaminants are heavier than the fuel, the pull of gravity and momentum cause them to settle to the bottom of the bowl.



2. COALESCING

The balance of suspended water bubbles will bead to the surfaces of the bowl, depressurizer cone and coalescent baffles. Through coalescing action, the water beads accumulate into larger sizes until they become heavy enough to settle to the bottom of the bowl sump.

3. FILTRATION

The fuel is cleaned as it is filtered through the DAHL replacement filter element. Solid contaminants down to 2 microns may be removed based on the element used.

WARNING: These products can expose you to chemicals, including Diisononyl Phthalate, Carbon black extracts, Nickel, 1,3 Butadiene, Ethylene Oxide, Epichlorohydrin, which are known to the State of California to cause cancer, and Bisphenol-A, Ethylene Glycol, Ethylene Oxide, 1,3 Butadiene, Epichlorohydrin, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to **www.P65Warnings.ca.gov.**