OUR PLEDGE TO YOU:

When you buy Webster products, you buy total service. Webster is the unique, single-source supplier of an extensive line of heating products. We manufacture fuel units, supply and transfer pumps, valves and oil heat accessories. And we constantly seek better solutions and set higher standards for the oil heat industry.

Webster is committed to reliable servicing of its products. As always, our field service people provide professional schooling and make training materials and demonstration units available for training.

We are ready to work with you to help solve your specific heating problems.
This Webster® Service Technician's Handbook is supplied as a service to our customers, dealers and installers. It represents our efforts to share with them our experiences of many years with our products in the field, and to also provide condensed catalog information to you on Webster products.

This booklet is not intended to be all-inclusive, or to be directly applicable to products manufactured by any other company.

It remains the complete responsibility of all parties involved in the design and installation of any system involving Webster products to insure that the design and installation of the system is correct for the individual circumstances, and that the system is installed in compliance with all applicable codes, standards, regulations or other restrictions.

Neither Webster, nor any of its authorized representatives, assume any responsibility, obligation or liability relating to the design and/or installation of any systems utilizing Webster component parts, and nothing contained in this Service Technician’s Handbook should be construed as constituting any extension of its standard Warranty Policy as stated in this booklet.
Warranty Policy

Webster warrants that Products shall be free from defects in materials and workmanship for a period of three (3) years from the date of manufacture or two (2) years from the date of installation, whichever period expires first. Webster will rebuild or replace, at its option, all Products proven to its satisfaction to be defective within such warranty period and returned to the Webster factory transportation charges prepaid. Webster’s sole obligation and buyer’s exclusive remedy hereunder is limited to such rebuilding or replacement.

No products may be returned to Webster unless the prior written consent for said return shall have been obtained from the Customer Service Department in Frankfort, Kentucky. This Limited Warranty does not cover shipping costs to and from the Webster factory, any costs for labor or otherwise related to product removal or replacement, or any other costs of any nature without prior written consent by Webster.

Parts, products and accessories made by others are warranted only to the extent of the original manufacturer’s warranty to Webster.

This warranty shall not apply to acts of God, war or civil insurrection, nor shall it apply to products which, in the sole judgement of Webster, have been subject to negligence, abuse, accident, misapplication, tampering, alteration; nor due to other than normal application, use or service, including but not limited to, operational failures caused by corrosion, rust or other foreign materials in the system, or operation at pressures in excess of recommended maximums.

Purchaser shall be solely responsible for determining suitability for use of Webster Products. Webster shall not in any event whatsoever, have any liability with respect to such determination.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. WEBSTER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL OR CONTINGENT DAMAGES WHATSOEVER.

NOTE TO CONSUMERS: THIS LIMITED WARRANTY IS EXTENDED TO THE COMMERCIAL CUSTOMERS, DEALERS AND INSTALLERS OF WEBSTER ONLY. THE SUPPLIER / INSTALLER WILL EXTEND WARRANTY COVERAGE TO YOU WHICH COVERS WEBSTER’S PRODUCTS. WEBSTER’S WARRANTY TO SUCH CUSTOMERS, DEALERS AND INSTALLERS WILL BACK UP THE WARRANTY EXTENDED TO THE CONSUMER.
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FUEL UNITS

GENERAL INFORMATION

OIL HEATING TERMINOLOGY

As with most major industries, oil heating has developed a language of its own which contains a number of terms not encountered elsewhere. The following list includes the terms which are most common to the oil heating industry.

Single-stage fuel unit: unit with one set of gears for both suction and pressure.

Two-stage fuel unit: unit with two sets of gears, one for suction and one for pressure.

One-pipe system: one line, an inlet line, from tank to fuel unit.

Two-pipe system: two lines, one inlet and one return line, from tank to fuel unit.

Bypass plug: small hex socket head pipe plug used to close internal port and convert unit from one pipe to two pipe operation.

Bleed: to remove air from system.

Lift: oil drawn from a level below pump expressed in feet of lift or inches of mercury.

Head of oil: column of oil over fuel unit expressed in psi or feet.

Inlet port: port which receives oil from tank.

Bypass port: port which discharges surplus oil back to tank in two-pipe system.

Return line port: same as by-pass port.

Valve differential: number of pounds per square inch the pump pressure must drop from operating pressure to close nozzle valve.

Delivery: gallons per hour pumped from the nozzle outlet assembly of the fuel unit.

Gear Set Capacity: Total amount of oil being displaced by the pump's gear set(s).

HOW A FUEL UNIT WORKS

The fuel unit performs three basic functions:

1. Supply the Oil. The pumping action of the fuel unit is accomplished by the gearset. In a single-stage fuel unit there is only one set of gears. Their function is to draw oil from the tank and deliver the oil to the nozzle under sufficient pressure to ensure the oil is properly atomized for combustion. A single-stage fuel unit is generally
used where the fuel supply tank is above the burner or where the inlet vacuum is limited to 10” Hg or less when measured at an unused inlet port.

A two-stage fuel unit has two sets of gears. The suction gearset creates a vacuum within the fuel unit which draws oil from a submerged tank or a tank located below the oil burner and discharges it into an intermediate chamber or reservoir which supplies the pressure gears. The pressure gearset delivers oil under pressure to the burner nozzle. Thus, the pressure gears do none of the lifting.

2. **Clean the Oil.** Clean oil is essential for the efficient operation of any oil burner. The purpose of the filter is to protect the nozzle from foreign particles or any other matter that might clog the minute nozzle opening. Webster fuel units utilize our exclusive rotary filter which reduces the need for troublesome periodic cleaning. The rotary filter’s blades rotate at motor speed with constant cleaning action to minimize clogging, compared to strainer type filters. For maximum protection, an additional line filter should be used, in accordance with recommended standard practice.

3. **Build Pressure and Provide Clean Fuel Cutoff**
Probably the most important functions of the fuel unit are to build pressure to properly atomize the fuel oil and to provide clean cutoff of oil when the burner shuts down. These functions are primarily performed by the valve assembly consisting of a pressure regulating spring, pressure adjusting screw, valve and valve seat, working in conjunction to the gearsets.

The pressure regulating spring and the pressure adjusting screw determine the pressure at which oil is delivered to the nozzle. For example, when the spring in a valve assembly is set for 100 pounds per square inch pressure the valve will not open until the pressure gears have built up enough pressure in the valve chamber to raise the piston from its seat. This prevents oil from reaching the nozzle while under too low a pressure for correct atomization. The valve and valve seat control the flow of oil. They also are responsible for a sharp clean cutoff when the pressure within the fuel unit drops below the setting of the valve spring. Webster’s M34DK-3 fuel unit has exceptionally fast fuel cutoff through the additional use of an internal flow control device.
BASIC SYSTEM INSTALLATIONS

There are two basic types of installation for fuel units: one-pipe systems or two-pipe systems.

The first of these, a one-pipe system, should not be confused with a single-stage fuel unit. A one-pipe system can be installed employing either a single-stage or a two stage fuel unit. It is used where a gravity flow of oil is available.

In a one pipe (single- or two-stage) system, the internal pumping capacity exceeds nozzle requirements. The excess flow is bypassed by the internal regulating valve and is recirculated within the pump. In the one-pipe connection, inlet line flow equals nozzle flow rate.

The second basic type is known as a two-pipe system and should always be used wherever the oil supply level is below the fuel unit, whether it be a single or two-stage fuel unit.

On a two-pipe system there is a second pipe, called a return line, between the fuel unit and the tank. The excess oil over and above that required by the nozzle is bypassed at the valve and returned to the tank.

A single-stage unit on a two-pipe system can be used on lifts up to 10" HG. On the other hand, a two-stage with a two-pipe system may be used on lifts up to 15" HG.

Existing Inside Tank Installation- One Pipe System Tank Above Burner Level

With the conventional one pipe gravity feed installation both furnace and water heater can be operated off the same suction line. Merely tee off the present line to water heater as shown in drawing below making sure oil supply is above burner level at all times.

Existing Outside Tank Installation— Tank Above Burner Level

The water heater may be added to the system by connecting the suction line to the furnace suction line as
shown in drawing below. No return line is necessary from the water heater as the system is flooded due to the siphoning action when the tank is above burner level.

Existing Outside Tank Installation — Tank Below Burner Level

The water heater may be added to the system by installing a check valve in the suction line at both fuel units as shown in drawing below. Both units must be set for (2) two-pipe operation. This method should only be used when it’s impossible to add an independent suction line to the water heater as shown in bottom drawing.

New Outside Tank Installation — Tank Below Burner Level

Individual suction lines should be used on all new installations. Return lines may be manifolded as shown in drawing below.
INSTALLATION AND SERVICE TIPS

When installing and servicing oil heating fuel units, several key points including service tools, use of proper tubing sizes, fuel supply cut-off, and possible causes of seal failure should be understood.

Effective Gauge Use

There are valuable tools needed in servicing any fuel unit, the two most essential are the pressure gauge and the vacuum gauge. It is factually known that if these gauges were used consistently, 75% of the fuel units sent in for repair would never need to be removed from the burners. With the correct use of these two gauges, it is possible to check vacuum, lift, air leaks, delivery, pressure and cut-off.

Vacuum Gauge

The vacuum gauge can determine the existence of air leaks in the suction line. For example, if checking a system in which the tank is buried below the burner level and the oil passes through a line filter, the vacuum gauge must show a reading. If the gauge does not show a reading, an air leak is present.


Vacuum Data

Before removing a fuel unit from an oil burner, a check should be made with vacuum and pressure gauges if you suspect fuel unit trouble.

The vacuum gauge should be applied to the inlet port (“IN”) opposite the inlet port being used, or inserted in the inlet line with a “TEE”.

![Diagram of gauge use](image-url)
On installations where the oil tank is below the fuel unit, the gauge reading should show the amount of vacuum (approximately 1" vacuum per 16" of vertical lift, plus the tube loss of total run).

NOTE:

1. The viscosity chosen for the above figures is 50 SSU. The above losses will be reduced at lower viscosities.

2. The gravity chosen is 40° API (60°F) at 68°F, which gives a specific gravity of 0.822. Gravity of No. 2 oils varies from 30° to 45° API.

3. Even though a fuel unit is capable of a very high vacuum, this has very little to do with the maximum advisable lift because of the volatility of the oil under vacuum, which varies with different oils. Under certain conditions, installations as high as 28 feet have operated satisfactorily with a two-stage unit, but generally high lifts should be avoided on any liquid having volatile fractions. When the combined vertical lift and the equivalent losses through the tubing add up to 10" vacuum or more for single-stage pumps, 15" vacuum or more for two-stage pumps, use of a Webster supply pump unit is advisable.

If the vacuum gauge reads higher than the calculated vacuum, look for restriction in the suction line ... a closed tank valve, kinked copper tubing, plugged filter, sticking foot or check valve, frozen oil line, undersized oil line, or excessive oil lift. On the other hand, if the gauge reading is below the calculated vacuum, look for air leaks in the lines, valve, fittings, or fuel unit.

On gravity fed jobs where the oil tank is above the fuel unit, vacuum should read zero except when restrictions are apparent such as closed shut-off valve, clogged filter, kinked line, etc. Any of these restrictions should be eliminated.

Relation between vacuum and vertical lift
40° API all at 68°F

<table>
<thead>
<tr>
<th>Ins. of Vacuum</th>
<th>Lift</th>
<th>Ins. of Vacuum</th>
<th>Lift</th>
<th>Ins. of Vacuum</th>
<th>Lift</th>
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<tbody>
<tr>
<td>1</td>
<td>1'4&quot;</td>
<td>2</td>
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<td>3</td>
<td>4'1&quot;</td>
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<td>4</td>
<td>5'6&quot;</td>
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<td>6'10&quot;</td>
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<td>8'3&quot;</td>
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<td>13</td>
<td>17'10&quot;</td>
<td>14</td>
<td>19'3&quot;</td>
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</tbody>
</table>
Pressure Gauge

The pressure gauge, on the other hand, shows whether the gears are pumping and building up a steady even pressure to deliver oil to the nozzle. It also shows whether the shut-off valve in the nozzle line is giving a positive cut-off of the oil flow.

Pressure Data

A pressure gauge applied to the pressure gauge port reveals the pressure to which the fuel unit has been regulated. An adjustment can be made to suit the firing conditions (usually 100 psi). Also the pressure gauge, when applied to the pressure gauge port, can be used to check fuel unit efficiency. A unit in satisfactory operating condition should be able to support a nozzle at full spray, up to several psi above the rated burner pressure. Fuel unit manufacturers typically rate domestic units for maximum burning rate at a nominal 100 psi. Collapse of nozzle spray below specified limits indicates either excess bypass, missing or damaged valve gasket, worn valve piston or sleeve, worn gear set, or pump RFS less than nozzle rating. Pumping capacity also decreases under correspondingly higher lift (or vacuum).

A pressure gauge applied directly to nozzle outlet port for cut-off check should hold differential pressure on shutdown. For example, with operating pressure of 100 psi, the cut-off should be approximately 80 psi. If the pressure gauge drops below the cut-off point, this would indicate a leak at cut-off, therefore the valve assembly should be disassembled, cleaned or replaced if necessary. Cut-off pressure must never be more than 20% below set operating pressure.

To determine what pressures should be provided by each pump, refer to the selection charts in the desired model sections.

Correct System Tubing Sizing

Many people both in engineering and in service make the mistake of laying out and installing jobs with tubing which is too small in diameter and too long in length. If
a fuel unit with a pumping capacity of not more than 30 gallons per hour is used, tubing of 1/2" OD can be used with safety.

The tubing size can vary widely depending upon flow rate. See the pipe sizing charts for help in determining which tubing size is best suited for each application.

**To Determine Suction Line Size in Installations Using Webster Fuel Units on Two-Pipe Systems**

1. Check suction gear capacity (see table of pumps).
2. Measure total tube length (horizontal and vertical).
3. Refer to “Friction Tube Loss Chart” for desired tubing size. Read up from line “total feet of copper tube” to “suction capacity” in gph.
4. Read left to column “inches of vacuum at fuel unit”. (This is vacuum required to draw oil through tube listed of given length.)
5. If installation has lift add .75” of vacuum for every foot of lift.

**Rule of Thumb:**

A quick rule to check an installation is to figure 1” of vacuum for every foot of vertical lift, and 1” of vacuum for every 10’ of horizontal run. Refer to Frictional Tube Loss charts for actual installation data.

6. Total inches of vacuum (frictional tube loss plus lift if any).
7. If total is over 10” when single stage is employed on two-pipe system, check on next larger tube size chart for proper tube size.
8. If total is over 15” when two-stage unit is employed on a two-pipe system, check on next larger tube size chart.
9. The above does not allow for any added restrictions such as line filter, elbows, sharp bends, check valves, etc.

On high lifts and long runs, too small tubing will cause the oil to separate and have a milky appearance. This is not air, it is actually light, volatile portion of the oil separating from the heavy portion. This is likely to occur any time the vacuum gauge shows a reading of 15” or more, and may occur at a lower vacuum with some oils. When vacuums of 20” to 22” are reached, the pressure gauge will start to bounce and delivery at the nozzle will begin to fall off. To correct these conditions, check the tubing. If the tubing size is correct and there are no kinks or other restrictions, a supply or booster pump may be
required to assure the fuel unit of a solid column of oil. This is especially desirable where a series of suspended furnaces are included in the system with high lifts and long horizontal runs.

FRICCTION TUBE LOSS CHARTS —

#2 FUEL OIL

Suction Capacity in GPH

Inches of Vacuum of Fuel Unit

Total Feet of 3/8" O.D. Copper Tube (.035 Wall); For 1/4" IPS, Multiply "Hg x .5"

Suction Capacity in GPH

Inches of Vacuum of Fuel Unit

Total Feet of 1/2" O.D. Copper Tube (.049 Wall), #2 Fuel Oil For 3/8" IPS, Multiply "Hg x .5"

Suction Capacity in GPH

Inches of Vacuum of Fuel Unit

Total Feet of 5/8" O.D. Copper Tube (.049 Wall), #2 Fuel Oil For 1/2" IPS, Multiply "Hg x .5"

Suction Capacity in GPH

Inches of Vacuum of Fuel Unit

Total Feet of 3/4" O.D. Copper Tube (.049 Wall), #2 Fuel Oil For 3/4" IPS, Multiply "Hg x .4"
Checking Fuel Cut-Off

Another error made by some is to say the valve is faulty or the unit has a poor shut-off when the real trouble is air trapped in the nozzle line between the fuel unit valve and the nozzle itself.

This condition is generally found when a new installation is made or when air enters the suction line due to poor joints. This is particularly true on high vacuum installations. When air is mixed with oil and pumped through the fuel unit into the combustion chamber, a good fire can result while the burner is in operation. However, on shut-down the valve closes and the air becomes trapped between the valve and the nozzle itself. This air is no longer under pressure and the bubble expands forcing the oil through the nozzle orifice into the combustion chamber. This is not poor cut-off but trapped air causing the oil to squirt. It is necessary to have a tight installation and to purge all air in order to have clean sharp cut-off.

REMEMBER: A squirt out of the nozzle after the burner stops means that air is trapped. Get rid of the air and the problem will be gone.

This condition is found less often in a two-pipe system because air is picked up in the suction line, is discharged into the by-pass chamber of the fuel unit and returned to the tank if the leak is not too large. However, air can be trapped in the nozzle line of the two-pipe system. Several hours of burner running may be necessary before the air is absorbed by the oil and passed through the nozzle.

Fast Cut-Off Required

Unlike heating equipment of the past, compact boilers, furnaces, domestic water heaters, and burners made today require substantially faster shut-off to eliminate pulsation on starts and stops. The valve must open and close while the fan speed is high to provide enough oxygen for complete combustion. This may be accom-
plished by using a solenoid valve which cuts off the flow of oil instantly on shut-down.

Since the use of a solenoid is often costly for some installations, Webster offers the M34DK-3 as a fast shut-off alternative. In this unit the valve opens and closes at approximately 2, 400 rpm fan speed. At this speed the air pattern is well established, both in the tube and in the chamber, and the burner operates without a smoke plume, eliminating pulsation on starts and stops. The volume of air delivered by the fan at such a speed provides the oxygen necessary for complete combustion insuring clean, quiet operation when the burner is set at maximum efficiency.

Checking Seal Leaks

Seal leaks generally do not occur; they are caused. It must be remembered that a seal can be operated under conditions ranging from high vacuum to pressure (psi). Where there is a head of oil over the fuel unit, a pressure gauge can be installed in the suction port of the unit to check head pressure. If the head pressure is over 3 psi an oil safety valve (OSV) should be installed in the suction line between the oil tank and the unit.

This also holds true where there are pressurized lines leading to the fuel unit, such as a series of suspended furnaces being served by a supply pump.

REMEMBER: To comply with NFPA standards, fuel unit inlet pressures must be limited to 3 psi.

If Pump Doesn't Work, Check for Air Leaks

90% of start-up problems are due to air leaks in the suction line. Be sure to double check for air leaks if there are problems with poor cutoff, noisy operation, or erratic fire.

To inspect for air leaks, check to be sure return line is submerged. Also, check all fittings, all joints, and the optional inlet plugs for tightness.

Check for air leaks:
- Return line must be submerged
- Check all fittings
- Check all joints
- Check optional inlet plugs
- DO NOT use compression fittings

90% of start-up problems are due to air leaks in the suction line . . . So check ✔ and doubt check ✔ for air leaks.
Filter Use

Both the Webster M and R Series contain an internal rotary filter. In addition to this filter, it is recommended that an external filter be used. The self cleaning rotary filter is designed to prolong fuel unit life and reduce fuel unit maintenance. It is not intended to be a replacement for the external filter.

IMPORTANT: Use of non-hardening oil pipe dope is recommended on threads of all fittings. Do not loosen or try to tighten any pump plugs not to be used in the installation. Do not use Teflon Tape. Evidence of teflon tape use will be cause to void all warranties.

SERVICE CALL CHECKLIST

The following procedure has been established to help save on service time and needless work when checking a “no heat” service call. This procedure is intended to be used by qualified heating service technicians only.

1. Check the thermostat to make sure that corrosion, dust or other foreign matter are not causing faulty contact and switches are properly set.

2. Check both the main fuses and the oil burner circuit fuses. Replace if required.

3. Check the oil supply and the shut-off valve in the oil line. Adequate oil and open valve are required.

4. Open the door of the heating plant and see if there is raw oil on the walls of the combustion chamber.

5. Leave the inspection door open and press the burner oil reset button.

6. Check the oil burner controls in accordance with the oil burner manufacturer’s instructions.

7. If at any point on the foregoing checks the burner operates, observe it for two or three complete cycles to determine whether the stoppage may occur.

8. If the burner does not operate, check to see if motor, fan and pump shaft are all rotating.

9. If there is oil spray but no ignition, check all electrical connections and the transformer.

10. If the electrical connections and transformer are operating properly, remove the firing assembly and check the electrodes for coking, spading, and cracked porcelains.

11. While the firing assembly is out of the heating plant, clean or replace nozzle.

12. If no oil spray appears, check the line filter and the fuel unit, using vacuum and pressure gauges.
Vacuum gauge check usually covers the suction side of the system.

Pressure gauge determines efficiency of pumping gears and valve. The valve can be serviced in the field. Worn pumping elements require the removal of the fuel unit.

Though these instructions may seem obvious, strict adherence to the sequence given can save valuable service time when time is of importance.

METERING PUMP

MODEL # M17DN-M

Metering Pump for the air atomized waste oil burner market. Variable flow rates vs. RPM. Clockwise rotation looking at shaft V iton seal. This unit is comparable to the Suntec A2RA-7710 Pump.
M SERIES FUEL UNITS
SINGLE- AND TWO-STAGE

Light and extremely compact, the Webster M Series fuel units have earned a reputation for reliability and efficiency. All units include the Webster internal rotary filter. The rotary filter reduces the need for troublesome periodic cleaning. Because the filter blades rotate at motor speed with constant cleaning action, clogging is minimal compared to units that use internal filter screen. For maximum protection, an additional line filter is recommended in accordance with standard practice. Another popular feature is the easy-to-bleed valve assembly located on the side. A “D” drive reduces the harmful effects low-lubricity fuels had on previous key-drive designs. Simple flange mounting and side-located nozzle ports make the M Series ideal for fuel unit servicing. M Series fuel units are available in single- or two-stage, 1725 and 3450 rpm models with capacities to 15 gph.

M34DK-3 SERIES FUEL UNITS
SINGLE STAGE UNITS

To meet the needs of today’s fuel-efficient, downsized and space efficient burners, Webster’s popular M34DK-3 incorporates improved access to both the bleed valve and bypass plug. Locating the bleed port plug assembly on the side of the fuel unit provides the service technician with one visible and accessible location to either bleed the fuel unit or change the bypass plug without removing the burner. The M34DK-3 retains all of the industry accepted, state-of-the-art features of the M34DJ-3 fuel unit. These include faster fuel cut-off, improved priming on one-pipe installations, and reduced inlet line flow on two-pipe systems which results in reduced line noise. Webster’s M34DK-3 fuel unit is available in a single stage, 3450 RPM model rated at 3 GPH. Operating pressure is factory set at 100 psi and is adjustable to 150 psi. The M34DK-3 is capable of maintaining its 3 gallon per hour fire size at up to 150 psi throughout its service life.
FUEL UNIT SPECIFICATIONS

M Series
  Single- and Two-Stage Units
M34DK-3 Fuel Units
  Single-Stage Unit

Capacities:
M Series rated 3 gph @ 100 psi with #1, #2 fuel oil or kerosene.
M34DK-3 unit rated 3 gph fire size for pressure from 100 to 150 psi with #1, #2 fuel oil or kerosene.

Pressure:
Built in pressure regulator.
M Series factory set at 100 psi
M34DK-3 unit factory set at 100 psi, adjustable to 150 psi.

Speeds:
M Series—1725 and 3450 rpm
M34DK-3—3450 rpm.

Rotation:
Clockwise (D Style) or counterclockwise (C Style) when viewed from shaft end.

Porting:
1/8” NPTF: side location nozzle port, top located gauge port
1/4” NPTF: 2 inlets, and bottom return.

Shaft:
5/16” dia. x 1.65” extension from mounting face with keyless “D” drive.

Seal:
Double lip type Buna N.

Mounting:
Two bolt flange.

Filter:
Self cleaning rotary type internal

NOTE: External filter recommended with each installation

Weight: (shipped oil filled)
M17 models—4 lbs, 4 oz
M34 models—4 lbs, 2 oz
2M17 models—4 lbs, 12 oz
2M34 models—4 lbs, 9 oz

Maximum Inlet Vacuum:
M models—10” Hg
2M models—15” Hg

Refer to Table “Total Allowable Feet of Line” in this section.

U.L. Listed.
To assure compliance with National Fire Protection Association's Bulletin 31, "Installation of Oil Burning Equipment," fuel unit inlet pressure should not exceed 3 psig.

Refer to the section on Oil Safety Valves (page 119) for additional information.
M-SERIES FUEL UNIT-CODE ANALYSIS

A— M = Single Stage
   2M = Two Stage

B— 17 = 1725 RPM
     34 = 3450 RPM

C— C = CCW rotation, outlet left
     D = CW rotation, outlet right
     (as viewed from shaft end)

D— A = Key drive, face seal, old style porting
     B = Std., face seal, old style porting
     C = Special, face seal, old style porting
     D = Std. lip seal, old style porting
     E = Special, lip seal, old style porting
     F = Same as D except revised porting
     G = Same as E except revised porting
     H = Same as F except o-ring on pressure adjusting screw
     J = Same as H except revised internal porting
     K = Same as J except revised porting and bleed valve location
     L = Same as K except revised porting and bleed valve location
     M = BIO Pump
     N = Waste Oil Pump

E— 3 = 3gph max. recommended fire size
     6 = 6gph max. recommended fire size
     15 = 15gph max. recommended fire size
     M = Metering Pump

F— No *=unit set 1 pipe
     (bypass plug not installed)
     *=Unit set 2 pipe
     (bypass plug installed)
### SELECTION TABLES & DIMENSIONS

**M Model Unit—Single-Stage**

<table>
<thead>
<tr>
<th>Models</th>
<th>Speed (rpm)</th>
<th>Rotation*</th>
<th>Style</th>
<th>Max. Nozzle Fire Gear Location*</th>
<th>Max. Size Cap.**</th>
<th>Suction Cap.** (gph at 100 psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M17CL-6</td>
<td>1725</td>
<td>CCW</td>
<td>C</td>
<td>Lett</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>M17DL-6</td>
<td>1725</td>
<td>CW</td>
<td>D</td>
<td>Right</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>M34CL-3</td>
<td>3450</td>
<td>CCW</td>
<td>C</td>
<td>Left</td>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td>M34DK-3</td>
<td>3450</td>
<td>CW</td>
<td>D</td>
<td>Right</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>M34CL-6</td>
<td>3450</td>
<td>CCW</td>
<td>C</td>
<td>Left</td>
<td>6</td>
<td>29</td>
</tr>
<tr>
<td>M34DL-6</td>
<td>3450</td>
<td>CW</td>
<td>D</td>
<td>Right</td>
<td>6</td>
<td>29</td>
</tr>
</tbody>
</table>

*As viewed from shaft end  
** Based on two-pipe installation

**2M Model Unit—Two-Stage**

<table>
<thead>
<tr>
<th>Models</th>
<th>Speed (rpm)</th>
<th>Rotation*</th>
<th>Style</th>
<th>Max. Nozzle Fire Gear Location*</th>
<th>Max. Size Cap.**</th>
<th>Suction Cap.** (gph at 100 psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2M17CL-6</td>
<td>1725</td>
<td>CCW</td>
<td>C</td>
<td>Left</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>2M17DL-6</td>
<td>1725</td>
<td>CW</td>
<td>D</td>
<td>Right</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>2M34CL-3</td>
<td>3450</td>
<td>CCW</td>
<td>C</td>
<td>Left</td>
<td>3</td>
<td>35</td>
</tr>
<tr>
<td>2M34DL-3</td>
<td>3450</td>
<td>CW</td>
<td>D</td>
<td>Right</td>
<td>3</td>
<td>35</td>
</tr>
<tr>
<td>2M34CL-6</td>
<td>3450</td>
<td>CCW</td>
<td>C</td>
<td>Left</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>2M34DL-6</td>
<td>3450</td>
<td>CW</td>
<td>D</td>
<td>Right</td>
<td>6</td>
<td>35</td>
</tr>
</tbody>
</table>

*As viewed from shaft end  
** Based on two-pipe installation

### FUEL UNITS (CROSS REFERENCE)

<table>
<thead>
<tr>
<th>Webster Model No.</th>
<th>Suntec Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M17DL-6</td>
<td>A1VA-7112</td>
</tr>
<tr>
<td>M17DL-6</td>
<td>A1VB-7113</td>
</tr>
<tr>
<td>M17CL-6</td>
<td>A1VC-7114</td>
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<tr>
<td>M34DK-3</td>
<td>A2VA-7116</td>
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<tr>
<td>M34DK-3</td>
<td>A2VB-7117</td>
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<tr>
<td>M34DK-3</td>
<td>A2VA-7142</td>
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<td>M17CL-6</td>
<td>A1VD-7741</td>
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<td>M17DL-6</td>
<td>A1YA-7912</td>
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<td>M17CL-6</td>
<td>A1YD-7915</td>
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<td>A2YA-7916</td>
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<tr>
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<td>B1VA-8212</td>
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<td>2M34DL-3</td>
<td>B2VA-8216</td>
</tr>
<tr>
<td>2M34DL-6</td>
<td>B2YA-8916</td>
</tr>
</tbody>
</table>

### Dimensions

The dimensions indicated apply to both M Model, single-stage units, and 2M Model, two-stage units. Refer to table for variable dimension X.

Dimension drawing shows nozzle, inlet and gage port locations for D Style units. C Style units are the opposite of that pictured.
The model number and rating information (gph/psi/rpm) are stamped into the machined surface on top of the pump body. Check to confirm pump is correct for the application.
INSTALLATION DATA

M Series units may be used in one- or two-pipe installations. They have vacuum capability up to 10" Hg on single-stage units, 15" Hg on two-stage units including piping and lift losses. They are rated for use with #1 and #2 fuel oil or kerosene.

IMPORTANT: Do not loosen or try to tighten any pump plugs not to be used in the installation. NON HARDENING OIL PIPE DOPE IS RECOMMENDED for use on the threads of all fittings. Teflon tapes or paste must be used with care to prevent depositing tape pieces or fibers into critical internal areas of the pump. Reduced torque must be used with teflon materials to avoid thread or casting damage. EVIDENCE OF TEFLON MATERIAL IN INTERNAL AREAS OF THE FUEL UNIT WILL BE CAUSE TO VOID WARRANTY.

Installation Notes:

Nozzle port pressure at cutoff is not less than 80% of set pressure on all except -15 models. -15 models do not have internal cutoff.

“Fuel unit inlet pressure should not exceed 3 psig in order to comply with National Fire Protection Association’s Bulletin 31.”

M Series fuel units are available in standard C Style (counterclockwise rotation, nozzle port on left, as viewed from shaft end) or D Style models (clockwise rotation, nozzle port on right, as viewed from shaft end).

Important Rating Information

Recommended fire size (RFS) of pump decreases as pump operating pressure is increased above 100 psi nominal rated pressure, except M34DK-3, which is rated to 150 psi. For adequate service life, nozzle flow at set pressure must not exceed RFS figures in table below.

Max. UL listed operating press. = 135 psi (“K”-150 psi)

<table>
<thead>
<tr>
<th>Pump Model</th>
<th>RFS at 100 psi</th>
<th>RFS at 135 psi</th>
<th>RFS at 150 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>M34-3, 2M34-3</td>
<td>3 gph</td>
<td>1 gph</td>
<td>—</td>
</tr>
<tr>
<td>M34-6, 2M34-6</td>
<td>6 gph</td>
<td>3 gph</td>
<td>—</td>
</tr>
<tr>
<td>M34-15, 2M34-15</td>
<td>15 gph</td>
<td>13 gph</td>
<td>—</td>
</tr>
<tr>
<td>M17-6, 2M17-6</td>
<td>6 gph</td>
<td>3 gph</td>
<td>—</td>
</tr>
<tr>
<td>M17-15</td>
<td>15 gph</td>
<td>13 gph</td>
<td>—</td>
</tr>
<tr>
<td>M34DK-3</td>
<td>3 gph</td>
<td>3 gph</td>
<td>3 gph</td>
</tr>
</tbody>
</table>
Body Style C
Counterclockwise Rotation (CCW)

To adjust pressure:
Insert standard screw
driver. Turn counterclockwise
to set below desired pressure.
Then turn clockwise to set
desired pressure.

Cover Inlet Port:
1/4" pipe thread

Bleed Valve:
3/8" wrench
Flats

Bleed Port Plug
Assembly: 11/16"
thread (access to
bypass plug)

Return Port: 1/4"
pipe thread

Bypass Plug: 1/16"
pipe thread, 5/32"
Allen P/N 29533-21

Color Of Printed Label Denotes Operating Speed:
Blue Background - 1725 rpm
Silver Background - 3450 rpm

Body Style D
Clockwise Rotation (CW)

To adjust pressure:
Insert standard screw
driver. Turn counterclockwise
to set below desired pressure.
Then turn clockwise to set
desired pressure.

Cover Inlet Port:
1/4" pipe thread

Bleed Valve:
3/8" wrench
Flats

Bleed Port Plug
Assembly: 11/16"
thread (access to
bypass plug)

Return Port: 1/4"
pipe thread

Bypass Plug: 1/16"
pipe thread, 5/32"
Allen

To adjust pressure:
Insert standard screw
driver. Turn counterclockwise
to set below desired pressure.
Then turn clockwise to set
desired pressure.

Cover Inlet Port:
1/4" pipe thread

Bleed Valve:
3/8" wrench
Flats

Bleed Port Plug
Assembly: 11/16"
thread (access to
bypass plug)

Return Port: 1/4"
pipe thread
## Total Allowable Feet of Tubing

Figures in body of table are total allowable feet of line length (vertical + horizontal) given feet of vertical lift for M pumps set 2 pipe.

<table>
<thead>
<tr>
<th>Feet Vertical Lift</th>
<th>1-Stage All Models</th>
<th>1-Stage &quot;K&quot; Only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tubing 3/8” OD</td>
<td>Tubing 1/2” OD</td>
</tr>
<tr>
<td>0</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>1</td>
<td>46</td>
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<td>18</td>
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<table>
<thead>
<tr>
<th>Feet Vertical Lift</th>
<th>2-Stage All Models Except - 15</th>
<th>2M34-15 Only</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3/8” OD Tubing</td>
<td>3/8” OD Tubing</td>
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<td>14</td>
</tr>
<tr>
<td>18</td>
<td>23</td>
<td>14</td>
</tr>
</tbody>
</table>
One-Pipe Installation

Normally recommended for gravity feed only. Lift up to 8 feet max. is allowable if system is absolutely airtight. Even slight air leak can cause loss of prime with 1 pipe lift.

1. Remove BYP ASS PLUG (if installed) through side INLET PORT in pump body.
2. Connect inlet line to preferred INLET PORT.
3. Connect nozzle outlet to nozzle line.
4. Plug all unused ports securely.
5. Start burner and bleed all air from the system by opening VENT PLUG. Close VENT securely when oil flow in tube is clear.
Two-Pipe Installation

Normally required when lifting oil from below pump. 2 pipe systems are self-venting. See table below for permissible line lengths.

*Maximum Inlet Vacuum:*

- Single-stage M units—10" Hg
- Two-stage 2M units—15" Hg

1. Insert BYPASS PLUG, if not installed, through side INLET PORT in pump body.
2. Connect supply line to preferred INLET PORT.
3. Connect return line to preferred RETURN PORT.
4. Connect nozzle outlet to nozzle line.
5. Plug all unused ports securely
**M34DM-3 Bio Pump**

**Features**
To meet the needs of today’s fuel-efficient, downsized and space efficient burners, Webster’s M34DM-3 incorporates improved access to both the bleed valve and bypass plug. Locating the bleed port plug assembly on the side of the fuel unit provides the service technician with one visible and accessible location to either bleed the fuel unit or change the bypass plug without removing the burner.

In addition to improved access the M34DM-3 cleaner blade has been thickened to provide a more robust cleaning action. For maximum protection, an additional line filter should be used in accordance with recommended standard practice. All of the BUNA-N elastomers have been replaced with VITON to provide extended life at critical locations within the fuel unit.

The M34DM-3 retains all the industry accepted, state-of-the-art features of the M34DK-3 fuel unit. These include faster fuel cut-off, improved priming on single pipe installations. This unit can easily replace your standard M34D or A2VA residential pump.

The M34DM-3 is capable of maintaining a three gallon per hour fire size at up to 150 PSI throughout its design life. The M34DM-3 is factory preset to 100 PSI and is adjustable to 150 PSI.

**General Operation and Fuel Unit Oil Flow**
The compact M34DM-3 Fuel Unit is engineered for efficient pumping of Bio fuel. The cut-away view illustrates the oil flow through an M34DM-3 operating in a one pipe system, with a suction line and no return to the storage tank.

A one pipe system is frequently used when the storage tank is located above the fuel unit, or when automatic venting is not necessary. Vacuum at the pump inlet should not exceed 10” Hg. For this type of installation to be reliable, the total system must be completely airtight. During installation or servicing of the fuel unit, air may be manually bled from the system through the side-located bleed valve.

The M34DM-3 will provide up to 10” Hg of inlet vacuum. The two pipe system (shown below), with both a suction and return line is self-venting. This allows any air in the system to escape and be returned to the storage tank through the return line.
One Pipe System
Fuel enters the fuel unit through the inlet port and is drawn into the front cover chamber. A vacuum, created by an inner and outer rotating gear set, pulls oil through the rotary filter and into the gears. As oil moves around the gears, it is compressed, creating a higher pressure. Oil leaving the gear set branches into two paths. One path leads to the pressure regulating chamber. A second path directs oil to the bleed valve. Oil flowing into the pressure regulating chamber branches into two paths. Up to three gallons per hour can flow out the nozzle port, and the remaining oil bypasses the pressure regulator, returning to the front cover chamber.

Two Pipe System
The by-pass plug, inserted through the bleed valve port, blocks the surplus oil return to the front chamber. This oil is directed to the return port and back to the storage tank.

- Fuel subject to vacuum
- Fuel at atomization pressure
- Fuel at return pressure
Specifications

**Firing Capacity:**
Recommended to 3 GPH fire size for pressures from 100 to 150 PSI with #1, #2 fuel oil, Kerosene, or Bio Fuel B100-B5 Bio Diesel

**Gear Capacity:**
25 GPH @ 100-150 PSI with #1, #2 fuel oil, Kerosene, or Bio Fuel. B100-B5 Bio Diesel.

**Pressure:**
Factory set at 100 PSI.
Adjustable to 150 PSI.

**Inlet Requirements:**
10” Hg maximum vacuum (approx. 10’ vertical lift - exact distance will vary with tubing diameter and length). 3 psig maximum inlet pressure.

**Speed:**
3450 RPM.

**Rotation:** (As viewed from shaft end): Clockwise (D Style).

**Porting:**
- 1/8” NPTF, side located nozzle port.
- 1/8” NPTF, top located gauge port.
- 1/4” NPTF, bottom and cover located inlet ports and bottom located return port.
- Bypass plug accessible through the side located bleed port plug assembly.
- 3/8” flow through bleed valve.

**Nozzle Location:**
(As viewed from shaft end):
Clockwise (D Style) - Right side.

**Shaft:**
5/16” dia., 1.65” extension from mounting face, with keyless “D” drive.

**Filter:**
Self-cleaning rotary type.

**Elastomers:**
VITON shaft seal.
All other seals are VITON.

**Mounting:**
2 bolt flange - see interface dimensions.
Weight:
4 lbs., 2 oz., shipped oil-filled.


Dimensions  Dimensions in inches, ( ) = cm
Webster now has available a Mini waste oil pump. Webster’s waste oil pumps are available in single stage models, rated at 15 gph for the SK41906 (3450rpm) and 20 gph for the SK41982 (1725rpm). Operating pressure is factory set at 100 psi. These waste oil pumps are able to maintain their recommended flow rates throughout the 100 to 150 psi pressure range.

**1RR SERIES**

<table>
<thead>
<tr>
<th>RPM</th>
<th>Rotation</th>
<th>GPH</th>
<th>Rated PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1RR140D-4EK13</td>
<td>1725</td>
<td>CW</td>
<td>10</td>
</tr>
<tr>
<td>1RR243D-4EK13</td>
<td>1725</td>
<td>CW</td>
<td>20</td>
</tr>
<tr>
<td>1RR244D-4EK13</td>
<td>1725</td>
<td>CW</td>
<td>40</td>
</tr>
</tbody>
</table>

This single stage waste oil pump operates at 1725 rpm. The operating pressure range is 30-50 psi. Maximum inlet vacuum 10” Hg. Viscosity range is 34-7000 SUS (2.5 Centistokes), temperature range 40 F (min) - 160 F (max). This unit can be hub or flange mounted. The pump can be used on one or two pipe installations. Double lip type Viton seals assure low starting torque and provide positive protection from leaks. For waste oil and #4 or lighter fuel oils.
### General Specifications

- Single Stage
- Single pipe operation only when used with thick oil.
- 1725 R.P.M.
- Operating pressure range 30-50 P.S.I.
- Viscosity range 34–7000 SUS (2.5-1500 Centistokes).
- Shaft seal and piston valve are Viton® material.
- Bypassing nozzle type.
- Power Requirements:
  - 1/4 H.P. for viscosity less than 1000 centistokes
  - 1/3 H.P. for viscosity greater than 1000 centistokes
- 3/8” Inlet Port
- 1/4” Discharge Port
- Shaft Length is 3 1/8” long from mounting face to shaft end.
- Pump body has a flange and a hub.
- Maximum flow is 10-40 G.P.H. depending on model.

### Chart

<table>
<thead>
<tr>
<th>Model</th>
<th>H.P.</th>
<th>Voltage</th>
<th>RPM</th>
<th>Rotation</th>
<th>GPH</th>
<th>Rated PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPM-25AT1RR140</td>
<td>¼</td>
<td>120</td>
<td>1725</td>
<td>CW</td>
<td>10</td>
<td>45</td>
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<tr>
<td>SPM-25AT1RR243</td>
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<td>120</td>
<td>1725</td>
<td>CW</td>
<td>20</td>
<td>45</td>
</tr>
<tr>
<td>SPM-25AT1RR244</td>
<td>¼</td>
<td>120</td>
<td>1725</td>
<td>CW</td>
<td>40</td>
<td>45</td>
</tr>
</tbody>
</table>

These units have the same characteristics as the 1RR models but incorporates a 120 volt, single phase, 1/4 hp motor.
R SERIES SERVICE SAVER FUEL UNITS

Available in both single-and two-stage models, Webster’s service saver fuel units are rated to capacities of 80 gph. Featuring the unique Webster rotary filter, simple flange mounting, and an extended shaft length, the R Series is adaptable to virtually every replacement need.

FUEL UNIT SPECIFICATIONS
R Series Fuel Units
Capacities to 80 gph
Single- and Two-Stage Models

Capacities:
R Series models are rated to 80 gph at 100 psi with #2 fuel oil.

Pressure:
Built in pressure regulator.
Factory set at 100 psi (supply pumps set at 20 psi).

Speed:
1425, 1725, 2850 or 3450rpm.

Rotation:
Clockwise (D Style) or counterclockwise (C Style) when viewed from shaft end.

Porting:
1/8” NPTF: side location nozzle port if pump code ends in 3 or 4.
1/4” NPTF: side location nozzle port if pump code ends in 13 or 14.
1/4” NPTF: 2 inlets, gauge port and top and bottom returns.

Shaft:
7/16” x up to 3.69” extension from mounting face, key drive.
Stepped shafts turned to 5/16” at coupling end.

Seal:
Double lip type.

Mounting:
Two bolt flange.

Filter:
Self cleaning rotary type - internal.
NOTE: External filter recommended with each installation.

Maximum Inlet Vacuum:
Single-stage units - 10” Hg
Two-stage units - 15” Hg

U.L. Listed to 72 gph:
### SELECTION TABLE — SINGLE STAGE

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Dim “X”</th>
<th>Nozzle &amp; Slotting Code</th>
<th>Nozzle Cutoff</th>
<th>@Rated psi</th>
<th>@100 psi</th>
<th>Recommended Max. Fire Size</th>
<th>Rated Pressure</th>
<th>Maximum Wattage Requirement @Rated psi</th>
<th>Suction Gear Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1R Models: Single Stage 1725 RPM</td>
<td>1R111</td>
<td>3.13”</td>
<td>1, 2, 3</td>
<td>Yes</td>
<td>5 GPH</td>
<td>8 GPH</td>
<td>10 GPH</td>
<td>12 GPH</td>
<td>150 PSI</td>
<td>60 Watts</td>
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<tr>
<td></td>
<td>1R151</td>
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*To Convert to horsepower, multiply watts x 0.0013410*
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<th>Model</th>
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<th>Nozzle &amp; Slotting Code</th>
<th>Nozzle Cutoff</th>
<th>Recommended Max. Fire Size</th>
<th>Rated Pressure</th>
<th>Maximum Wattage Requirement @Rated psi</th>
<th>Suction Gear Capacity</th>
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<td>125 Watts</td>
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<td>27 GPH</td>
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<td>No.</td>
<td>Flow Rate</td>
<td>Pressure</td>
<td>Watts</td>
<td>GPM</td>
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<td>175</td>
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<td>535</td>
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*To Convert to horsepower, multiply watts $\times 0.0013410$*
<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Dim “X” Slotting Code</th>
<th>Nozzle &amp; Slotted Nozzle Cutoff</th>
<th>Recommended Max. Fire Size @Rated psi</th>
<th>@100 psi</th>
<th>Rated Pressure @Rated psi</th>
<th>Maximum Wattage Requirement @Rated psi</th>
<th>Suction Gear Capacity</th>
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<td>45 GPH</td>
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<td>3,14</td>
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<td>21 GPH, 26 GPH</td>
<td>23 GPH</td>
<td>300 PSI</td>
<td>220 Watts</td>
<td>70 GPH</td>
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<tr>
<td>22R322</td>
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Recommended Max. Fire Size

22R Models: Two Stage

3450 RPM
### 32R Models:

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<th>Yes</th>
<th>GPH</th>
<th>GPH</th>
<th>PSI</th>
<th>Watts</th>
<th>GPH</th>
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### 42R Models:

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<th>Yes</th>
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<th>GPH</th>
<th>PSI</th>
<th>Watts</th>
<th>GPH</th>
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### NOTES:

Oil burner nozzles are rated at 100 psi. Any increase in fuel unit pressure over 100 psi will increase the fire size above nozzle rating. To assure compliance with NFPA's Bulletin 31, "Installation of Oil Burning Equipment," fuel unit pressure should not exceed 3 psig.

*To Convert to horsepower, multiply watts X 0.0013410*
A SERIES FUEL UNITS — CODE ANALYSIS

TYPICAL CODE — IR I I I I D — I A 3

A 1R - Single Stage -1725 RPM
21R - Single Stage -3450 RPM
2R - Two Stage -1725 RPM
22R - Two Stage -3450 RPM
31R - Single Stage -1425 RPM
41R - Single Stage -2850 RPM
32R - Two Stage -1425 RPM
42R - Two Stage -2850 RPM

B Number of Filter Sections
1 thru 6

C Max Rated Pressure (PSI)

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<th>Max. Pres.</th>
<th>Factory Set At</th>
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<tr>
<td>2</td>
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D Pressure Gear Size 0 thru 8

E Rotation and Porting -
As viewed from Shaft End
A Clockwise Nozzle Port Left
B CCW Nozzle Port Right
C CCW Nozzle Port Left
D CW Nozzle Port Right

F Bypass Plug Access
- Left hand inlet (from front)

G Design Series
Shaft Seal Type
Face Lip

H Special Customer Modifications

J Nozzle Outlet Type and Bypass Condition. Final digit even - Factory set for 2-pipe operation. Final digit odd - Factory set for one pipe operation.

- Pumps ending in 3 internal cut-off
- Pumps ending in 14 no internal cut-off

Rotation and Nozzle Location

R Series Fuel Units are available in standard C Style models (counterclockwise rotation, nozzle port on left, as viewed from shaft end) or D Style models (clockwise rotation, nozzle port on right, as viewed from shaft end).

Some special models are available with A Style porting (clockwise rotation, nozzle port on left) and B Style porting (counterclockwise rotation, nozzle port on right) Consult Sales Department for availability.

FUEL UNITS (CROSS REFERENCE)

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<td>JJ2BB-300</td>
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<tr>
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</table>
Dimensions
The general dimensions indicated apply to both 1 R Models (single-stage) and 2R Models (two-stage). Refer to Selection Table for variable dimension X.

Drawing shows nozzle and gauge port locations for D Style units. C Style units are the opposite of that pictured.
INSTALLATION DATA

R Series units may be used in one- or two-pipe installations. Two-pipe operation is recommended for all high capacity units. A yellow tag is attached to units that are factory set for two-pipe installation.

NOTE: Inlet ports #1 and #2, and return port #2 are 3/8" pipe thread on high capacity units. (2R6-8 Series.)

Unit shown at the right has a left side by-pass plug access, (-) in the sales code. (*) in the code designates right hand access as shown below.

To Vent Pump: Attach 1/4" ID plastic tube. Use 3/8" wrench to open vent 1/8 turn maximum.

For Use as Gauge Port: Remove insert to install 1/8" pipe threaded gage.

Remove plug to install 1/4" pipe threaded gage.

Nozzle Port: 1/8" pipe thread (1/4" pipe thread if pump code ends in 13 or 14)

Inlet Port #2
1/4" Pipe Thread
"Insert - (Bypass Plug 1/8 pipe thread)"
P/N 29533-35

Return Port #2
1/4" Pipe Thread,
use as return on two pipe installation

BODY STYLE D
CLOCKWISE ROTATION

BODY STYLE C
COUNTERCLOCKWISE ROTATION (CCW)
OPPOSITE OF THAT PICTURED
One-Pipe Installation

Recommended only when bottom of tank is above fuel unit, unless pump code ends in 15.

1. Remove BYPASS PLUG if installed, through applicable INLET PORT.

2. Connect inlet line to preferred INLET PORT and NOZZLE PORT to NOZZLE SYSTEM.

3. Plug all unused ports securely.

4. Start burner and bleed all air from the system by opening VENT PLUG. Close VENT securely when oil flow in tube is clear, if pump is equipped with special vent plug. Secure GAUGE PORT PLUG on units not so equipped when oil appears leaking out.

Two-Pipe Installation

1. Insert BYPASS PLUG if not installed, through applicable INLET PORT.

2. Connect inlet line to preferred INLET PORT and NOZZLE PORT to NOZZLE SYSTEM.

3. Connect return line to preferred RETURN PORT.

4. Plug all unused ports securely.

5. Start burner. Two-stage pumps will self-vent. If single stage and code ends in 3 or 4, bleed all air from system by opening VENT PLUG. Close VENT securely when oil flow in tube is clear, if pump is equipped with special vent plug. Secure GAUGE PORT PLUG on units not so equipped when oil appears leaking out.

Mounting for One-Pipe Systems

Gravity Feed Systems (Diagram A)—Fuel-units may be mounted in any position including shaft up and shaft down. See Positions 1 through 4.

Non-Gravity Feed Systems (Diagram B)—R Series Fuel Units may only be mounted upright, Position 1; or rotated 90° with nozzle down, Position 2. Other mounting positions are not recommended.
Mounting for Two-Pipe Systems

Fuel units may be mounted in any position including shaft up and shaft down. See Positions 1 through 4. Illustrations show port locations for C Style units (counterclockwise rotation); D Style units (clockwise rotation) are the opposite of that pictured.

Installation diagrams shown for reference only. Compliance to applicable codes is the responsibility of installer.

POSITION 1
Upright, Nozzle Right:

All One pipe or Two Pipe Systems

POSITION 2
Rotated 90° Nozzle Down:

All One Pipe or Two Pipe Systems

POSITION 3
Rotated 180° Nozzle Left:

All Two Pipe Systems, or One Pipe Gravity Feed Systems Only
Replacing A Style and B Style Units

Discontinued A Style and B Style R Series fuel units can be replaced with minimal changes in most installations. Fuel unit model code numbers and rotation arrows are stamped on the top of the body casting.

In two-pipe systems and in one-pipe, gravity feed systems, current C Style and D Style units can be mounted in any position to facilitate easiest piping.

In one-pipe, non-gravity feed systems (where the mounting positions are limited), an extra length of pipe or tubing must be connected to the nozzle line to reach the fuel unit nozzle port. See previous page for permitted mounting positions.

Preferred installation calls for use of flare tube fittings on all connections. Be certain all plugs and connections are secure and leak-tight.
Typical Replacement Installations

Replace A Style units (clockwise rotation, nozzle port on left, as viewed from shaft end) with D Style units (clockwise rotation, nozzle port on right, as viewed from shaft end).

Standard A Style Installation:
One or Two Pipe System

Replacement with D style,
Rotated 180°: One Pipe, Gravity Feed System: or Two Pipe System

Replacement with D style,
Nozzle Line Extended: One Pipe, Non-Gravity Feed System
Replace B Style units (counterclockwise rotation, nozzle port on right, as viewed from shaft end) with C Style units (counterclockwise rotation, nozzle port on left, as viewed from shaft end).

Standard B Style Installation:
One or Two Pipe System

Replacement with C style,
Rotated 180°: One Pipe, Gravity Feed System: or Two Pipe System

Replacement with C style,
Nozzle Line Extended: One Pipe, Non-Gravity Feed System
IMPORTANT: Do not loosen or try to tighten any pump plugs not to be used in the installation. NON-HARDENING OIL PIPE DOPE IS RECOMMENDED for use on the threads of all fittings. Paste must be used with care to prevent deposits on critical internal areas of the pump damage. Do not use teflon tape. EVIDENCE OF Teflon Tape USE WILL BE CAUSE TO VOID WARRANTY.

Installation Notes:
If the pump doesn't work, check for air leaks.
If you're experiencing the following problems; poor cutoff, noisy operation, erratic fire, check for air leaks.

- Return line must be submerged
- Check all fittings
- Check all joints
- Check optional inlet plugs
- DO NOT use compression fittings

90% of start-up problems are due to air leaks in the suction line . . . so check ✔ and double check ✔ ✔ for air leaks.

“Fuel unit inlet pressures should not exceed 3 psig in order to comply with National Fire Protection Association's Bulletin 31.”

Nozzle port pressure at cutoff is not less than 80% of set pressure unless unit has blank nozzle or pump code ends in 13 or 14 (no cutoff).

To assure maximum performance, INLET VACUUM, measured at unused INLET PORT, should not exceed 10" Hg on single-stage pumps or 15" Hg on two-stage pumps.
1R00 SERIES SINGLE-STAGE TRANSFER PUMPS

BODY STYLE C & D

Rated at capacities up to 66 gph at 100 psi, the 1R00 Series features the versatility of the R Series design. With 2 inlet ports, 4 discharge ports, and 1 gauge/vent port, the 1R00 Series can fit virtually all installations.

FUEL UNIT SPECIFICATIONS

Single-Stage Transfer Pumps
1R00 Series Pumps

**Capacities:**
- 1R003-4EH—31 gph at 100 psi
- 1R004-4EH, 4EG—43 gph at 100 psi
- 1R006-4EH—66 gph at 100 psi.

**Pressure:**
- No internal pressure regulator.

**Speed:**
- Rated at 1725 rpm.

**Rotation:**
- D Style—Clockwise when viewed from shaft end.
- C Style—Counterclockwise when viewed from shaft end.

**Porting:**
- 1/4” NPTF: gauge/vent port, 2 inlets and 4 discharge ports.

**Shaft:**
- 7/16” diameter, key drive.
- EH units have 1-7/8” shaft extension from mounting face. EG unit has 3-1/8” shaft extension from mounting face with outboard ball bearing.

**Seal:**
- Double lip type.

**Mounting:**
- Hub or two bolt flange mount.

**Filter:**
- No internal filter. External filter recommended.

**Maximum Inlet Vacuum:**
- 10” Hg.

**U.L. Listed:**

**Operation**

The 1R00 Series pumps do not incorporate an internal regulating valve or filter. They are intended for transfer use up to 100 psi and must not be operated with blocked outlet. Use one-pipe installation only and do not remove bypass plug.

For maximum performance inlet vacuum, when measured at unused inlet port, should not exceed 10” Hg.
Do not use less than 3/8” OD tubing for lines. Size per gearset capacity shown below:

**SELECTION TABLE**

<table>
<thead>
<tr>
<th>Model</th>
<th>No. 2 Fuel Oil</th>
<th>Ratings for 100 psi Gearset Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>R003-4EH</td>
<td>31 gph</td>
<td>48 gph</td>
</tr>
<tr>
<td>R004-4EH, 4EG</td>
<td>43 gph</td>
<td>66 gph</td>
</tr>
<tr>
<td>R006-4EH</td>
<td>66 gph</td>
<td>95 gph</td>
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</tbody>
</table>

R SERIES FUEL UNITS — CODE ANALYSIS

**TYPICAL CODE—** IR I I I D • I A 3

**A**
1R - Single Stage -1725 RPM
2R - Single Stage -3450 RPM
2R - Two Stage -1725 RPM
22R - Two Stage -3450 RPM
31R - Single Stage -1425 RPM
41R - Single Stage -2850 RPM
32R - Two Stage -1425 RPM
42R - Two Stage -2850 RPM

**B**
Number of Filter Sections
1 thru 6

**C**
Max Rated Pressure (PSI)

<table>
<thead>
<tr>
<th>Code</th>
<th>Max Pres</th>
<th>Factory Set At</th>
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<tbody>
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<td>6</td>
<td>125 PSI</td>
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<td>8</td>
<td>80 PSI</td>
<td>20 PSI</td>
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</tbody>
</table>

**D**
Pressure Gear Size 0 thru 8

**E**
Rotation and Porting-
As viewed from Shaft End
A Clockwise Nozzle Port Left
B CCW Nozzle Port Right
C CCW Nozzle Port Left
D CW Nozzle Port Right

**F**
Bypass Plug Access
* Right hand inlet (from front cover)
-Left hand inlet (from front)

**G**
Design Series
Shaft Seal Type
Face Lip

**H**
Special Customer Modifications

**J**
Nozzle Outlet Type and Bypass Condition. Final digit even - Factory set for 2-pipe operation. Final digit odd - Factory set for one pipe operation.

**R SERIES FUEL UNITS** are available in standard C Style models (counterclockwise rotation, nozzle port on left, as viewed from shaft end) or D Style models (clockwise rotation, nozzle port on right, as viewed from shaft end).
Dimensions
Drawing shows gauge port location for D Style units. C Style units are the opposite of that pictured.
INSTALLATION DATA

1. Connect preferred inlet to tank through suitable line filter.

2. Connect preferred discharge port to external regulator or distribution system.

3. For initial priming it is desirable to loosen the gauge port plug or any unused discharge port to bleed air from the supply line and pump. Tighten the plug securely when oil flows clear.

Failure to prime pump may be due to “dry pump” conditions. Remove vent plug and fill pressure cavity slowly to allow oil to “wet” the gears.

4. Be certain all plugs and connections are secure and leak-tight

Checking for Air Leaks

Be certain all plugs, fittings and joints are secure and airtight. Many problems in fuel unit installations result from air leaks in the suction line.

Measure inlet vacuum during operation at an unused inlet port. An abnormally low vacuum reading may indicate an air leak. Generally, assume 0.75 inch of vacuum for every foot of vertical lift, plus frictional tubing losses and other in-line restrictions.
V SERIES HIGH DELIVERY FUEL PUMPS

The V Series is designed to meet the high delivery requirements of commercial, industrial, and institutional systems with a minimum of mechanical and hydraulic noise. Single-stage models can provide a firing rate up to 270 gph at up to 10" Hg inlet vacuum. Two-stage firing rates are as high as 205 gph up to 15" Hg inlet vacuum. Field adjustable integral regulating valves factory pre-set for 100 and 150 psi operation are offered as an option to meet specific system requirements.
FUEL UNIT INSPECTIONS
Single- and Two-Stage Fuel-Units
V Series
High Capacity Fuel and Transfer Pumps

Capacities:
Single-stage units: up to 180 gph with #2 oil, to 270 gph with 1000 SSU oil.
Two-stage units: up to 145 gph with #2 oil, to 205 gph with 1000 SSU oil

NOTE: See rating table for capacity at specific pressure and rpm

Pressure:
V02: Rated pressure 300 psi—factory set at 150 psi.
V05: Rated pressure 100 psi—factory set at 100 psi.
V08: Rated pressure 80 psi—factory set at 20 psi.
V00: No internal regulation.

Speeds:
1725 or 3450 rpm.

Rotation:
D Style—clockwise when viewed from shaft end.
C Style—counter clockwise when viewed from shaft end.

Porting:
1/4” NPTF: gauge/optional nozzle port, nozzle port.
3/8” NPTF: return port, 2 optional inlets.
1/2” NPTF: inlet in cover

Shaft:
DM Style—7/16” x 3 5” extension from mounting face.
DO Style—7/16” x 1.88” extension from mounting face.

Seal:
Double lip type.

Mounting:
Hub or two bolt flange mount.

Filter:
No internal filter.
External Line filter recommended.

Maximum Inlet Vacuum:
Single-stage units: 10” Hg
Two-stage units: 15” Hg

U.L. Listed
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<th>V08 Series Single-Stage Transfer Pumps (with Internal Regulation)</th>
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<td><strong>80 psi Ratings</strong></td>
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<th>2V00 Series Two-Stage Transfer Pumps (with no Internal Regulation)</th>
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<td><strong>20 psi Ratings</strong></td>
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<th>2V08 Series Supply Pumps (with Internal Regulation)</th>
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<tbody>
<tr>
<td><strong>80 psi Ratings</strong></td>
</tr>
</tbody>
</table>

* Operating pressure to 300 psi permissible (using external regulating valve)
V00 Series gph and hp ratings at 100 psi same as V05 ratings above.
V00 Series gph and hp ratings at 300 psi same as V02 ratings above.

** Operating pressure to 300 psi permissible (using external regulating valve)
2V00 Series gph and hp ratings at 300 psi same as V02 ratings above.

*Available in CW and CCW rotation.*
V SERIES CODE ANALYSIS

HARDENED GEARS — H

J71 — MFG. DATE CODE

ROTATION

A
Pump Series
VO — Single-Stage
2VO — Two-Stage

B
Pressure Code

Rated Pressure (psi)

Typ. Adj. Range (psi)

0  No Valve —
5  100  85-120
2  300  125-330
8  80  15-85

C
Gear Size Code
Nom. Thickness

2
3
4
6
8
1/4
3/8
1/2
3/4
1

D
Body Style
Rotation
Nozzle

C  CCW  Left
D  CW  Right

NOTE: Nozzle location and shaft rotation determined viewing unit from shaft end.

E.
No. Design Series

1  Initial Design
3  2-Stage, Inlet Gear One Size Larger than Pressure Gear
4  Single-Stage, Seal Pressed in Body
5  Same as 3 Ex. Seal Pressed/Body

F.
Cust. Code
Shaft Ext.

DM  3-1/2
DO  1-7/8

G
Pump Operation

V-Guide, One Slot, No Cutoff
No Number for Transfer Pumps

Rotation and Nozzle Location

V Series Fuel-Units are available in standard C Style Models (counterclockwise rotation, nozzle port on left, as viewed from shaft end) or D Style Models (clockwise rotation, nozzle port on right, as viewed from shaft end.)
INSTALLATION DATA

V Series pumps are shipped from the factory set for two-pipe operation. They are not recommended for use in one-pipe systems (except series V00, see Note 1).

IMPORTANT: Do not loosen or try to tighten any pump plugs not to be used in the installation. NON-HARDENING OIL PIPE DOPE IS RECOMMENDED for use on the threads of all fittings. Teflon tapes or paste must be used with care to prevent depositing tape pieces or fibers into critical internal areas of the pump. Reduced torques must be used with teflon materials to avoid thread or casting damage. EVIDENCE OF TEFLON MATERIAL IN INTERNAL AREAS OF THE FUEL-UNIT WILL BE CAUSE TO VOID WARRANTY.

Installation

1. Connect inlet line to preferred INLET PORT. Use of inlet in cover is recommended for minimum inlet vacuum loss. Connect nozzle line to nozzle port.

2. Connect return line to preferred RETURN PORT except on V00 pumps. Use of bottom return is recommended to minimize back pressure. Top return port not recommended for oil heavier than #2.

3. Plug all unused ports securely.

4. Start burner. Two-stage and most one-stage pumps will self-vent. V00 with shut-off valve in nozzle line may have to be vented manually by loosening GAGE PORT plug. Tighten plug securely when oil flows clear.

Installation Notes:

“Fuel unit inlet pressures should not exceed 3 psig in order to comply with National Fire Protection Association’s Bulletin 31.”

To assure maximum performance, INLET VACUUM, measured at unused INLET PORT, should not exceed 10” Hg on single-stage pumps or 15” Hg on two-stage pumps.

NOTE: Max Recommended Firing Rates apply to 10” Hg for single-stage units and 15” Hg for two-stage units.
Body Style D
Clockwise Rotation (CW from Shaft End)

- Gage Port, 1/4" Pipe Thread
- Optional Return Port, 1/4" Pipe Thread
- Port Nearest Pressure Adjust Plug is Not Used
- To Adjust Pressure: (Except 2V00 & V00 Series. See Note 1.)
  - Remove cover screw. Insert 1/8" Allen wrench. Turn counterclockwise to below pressure desired. Turn clockwise to set desired pressure. Keep cover screw tight except when adjusting pressure.
- Cover Inlet Port, 1/2-14 Pipe Thread
- Inlet Port #2, 3/8" Thread
- Return Port, 3/8" Pipe Thread
  - Connect as Shown Below

Body Style C
Counterclockwise Rotation (CCW from Shaft End)

- Nozzle Port, 1/4" Pipe Thread
- Inlet Port #1, 3/8" Pipe Thread

NOTE 1: Do not connect return line to V00 Series pump. Keep both return ports plugged. V00 and 2V00 do not have internal regulation. Use external regulation if required. Return line must be connected to 2V00 models.
B SERIES FUEL OIL TRANSFER PUMPS

B Series transfer pumps are designed to provide efficient pumping of #1 to #6 fuel oils in capacities from 80 to 290 gallons per hour, at pressures up to 500 psi (#1 to 300 psi). With high-density gray iron body construction, heat-treated alloy steel gears and shafts, and heavy-duty needle bearings, B Series transfer pumps offer superior durability and high mechanical efficiency. Double lip Viton seals, are standard. B Series pumps are available in—clockwise (right hand) or counterclockwise (left hand) rotations. All B Series transfer pumps are U.L. listed.
SPECIFICATIONS

B Series
Fuel Oil Transfer Pumps

Capacity:
80 to 290 gph at 1725 rpm and 100 psi (#1 to #6 fuel oil). 160 to 520 gph at 3600 rpm and 100 psi (#1 to #6 fuel oil).

Pressure:
#4 to #6 fuel oils up to 500 psi, #2 fuel to 350 psi.

Speed:
For direct or belt drive application up to 3600 rpm.

Rotation:
Clockwise rotation viewed from shaft end.

Porting:
1/2” NPTF: side inlet and side outlet ports. (18B, 37B, 47B)
3/4” NPTF: Side inlet and side outlet ports (59B)

Shaft:
Standard: .50 OD, 1.00 flat length, 1.88” extension from mounting face.

Seal:
Standard—double lip type, Viton

Mounting:
Hub, 2-1/8”, with 8 standard hub spots.

Filter:
No internal filter. External filter recommended.

Maximum Inlet Vacuum:
10” Hg

U.L. Listed

SELECTION TABLE
Pump Capacity at 100 psi
with #2 Fuel Oil at 75°F.

1750 rpm

<table>
<thead>
<tr>
<th>Pump</th>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model*</td>
<td>hp</td>
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<tr>
<td>18B</td>
<td>.14</td>
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<tr>
<td>37B</td>
<td>.21</td>
</tr>
<tr>
<td>47B</td>
<td>.30</td>
</tr>
<tr>
<td>59B</td>
<td>.45</td>
</tr>
</tbody>
</table>
INSTALLATION AND DIMENSIONAL DATA
Single-Rotation Models

Connect discharge and suction lines to NPTF ports depending on desired direction of shaft rotation. Direction of shaft rotation is always toward discharge port.

**CAUTION:** Do not attempt to operate pump with discharge port blocked.

Correct shaft rotation is shown by arrow stamped on back of pump. Do not attempt to operate pump in opposite direction.

Use an external regulating valve in discharge line if pressure regulation is necessary.

**Installation Notes:**

“Fuel unit inlet pressure should not exceed 3 psig in order to comply with National Fire Protection Association's Bulletin 31”

To assure maximum performance, INLET VACUUM, measured at unused INLET PORT, should not exceed 10” Hg on single-stage pumps.

<table>
<thead>
<tr>
<th>CODE</th>
<th>DIM “A”</th>
<th>DIM “B”</th>
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</thead>
<tbody>
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<td>3.71</td>
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<td>59B</td>
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<td>2.30</td>
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</table>

![Diagram showing dimensions A and B with various measurements and annotations.]
Webster can offer pump sets in a variety of combinations. Webster will mount any of our low speed pump heads to any motor type. Available in simplex, duplex manual and duplex automatic configurations. See the code breakdown below.

### Supply Pump and Motor Code Breakdown

<table>
<thead>
<tr>
<th>Basic Prefix</th>
<th>Supply Pump &amp; Motor</th>
<th>Series</th>
<th>No Letter or Blank = Simplex</th>
<th>Dash</th>
<th>Pump Head</th>
<th>No Letter-Standard</th>
<th>P/N Prefix</th>
<th>Pump #</th>
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<tbody>
<tr>
<td>SPM</td>
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**Examples:** SPM-50AT2R13 or SPMB-50AT59BR or SPMV-100BT086K-DA

<table>
<thead>
<tr>
<th>Motor HP</th>
<th>25 = 1/4 hp</th>
<th>250 = 5 hp</th>
<th>500 = 5 hp</th>
<th>50 or 60 cy.</th>
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</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>A = 1 phase</td>
<td>B = 3 phase</td>
<td>X = Special Voltage</td>
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<tr>
<td>Motor Phase</td>
<td>A</td>
<td>B</td>
<td>X</td>
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<tr>
<td>Voltage</td>
<td>50 or 60 cy.</td>
<td>A, B, or X</td>
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<td></td>
</tr>
<tr>
<td>Motor Enclosure</td>
<td>TEFC, OPDP</td>
<td>E Explosion Proof</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T, O or E</td>
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</table>

<table>
<thead>
<tr>
<th>Pump Head</th>
<th>DA - Duplex Automatic</th>
<th>DM - Duplex Manual</th>
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</thead>
<tbody>
<tr>
<td>Blank, DA or DM</td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor Enclosure</th>
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<th>E Explosion Proof</th>
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<td>A, B, or X</td>
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<tr>
<td>Motor Phase</td>
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<td>B</td>
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<tr>
<td>Voltage</td>
<td>50 or 60 cy.</td>
<td>A, B, or X</td>
</tr>
<tr>
<td>Motor Enclosure</td>
<td>TEFC, OPDP</td>
<td>E Explosion Proof</td>
</tr>
<tr>
<td>Voltage</td>
<td>50 or 60 cy.</td>
<td>A, B, or X</td>
</tr>
</tbody>
</table>
SPM with a “V” or “R” Series Pump Head
SINGLE SUPPLY UNIT using a 56C Frame Motor

C = Motor Length
D = Overall Dimension
A or E = V or R Pump Dimension
SUPPLY PUMP UNITS

GENERAL INFORMATION

Locating Units
Install transfer/supply units in a clean, dry, well-ventilated location as close to the storage tank as possible. Close installation will minimize required vacuum and will allow smallest diameter piping to be used while assuring an adequate supply of oil.

The units can be mounted in any position. Preferred position for convenient line connections is horizontal with foot mounts down.

Filter or Strainer
A reliable in-line filter or strainer is recommended between the tank and the supply pump. Filter or strainer capacity must at least equal the suction gear capacity of the pump to minimize restriction in the suction line.

Oil Safety Valves
Oil safety valves, mounted close to the burner assembly, isolate burner fuel pumps from supply line pressures. The oil safety valve relieves pressure strain on burner pump seals, and prevents tank siphoning and spilling caused by accidental line breaks. To assure compliance with National Fire Protection Association’s Bulletin 31, “Installation of Oil Burning Equipment,” burner fuel pump inlet pressure should not exceed 3 psig. The Webster OSV Series valves satisfy this requirement when properly installed.

An optional mesh strainer, rated for maintained system pressure, can be installed before each OSV near the burner assembly to protect the OSV from harmful scale which may occur in black iron pipe.

Tee fittings should also be inserted on the supply side of each OSV in the system. This will allow a pressure reading to be taken when setting system pressure.

Measuring Inlet Vacuum
When installation is complete, the compound gauge should be used to measure inlet vacuum. For maximum performance, vacuum when measured at unused inlet port during operation should not exceed 15” Hg on the two-stage SPM supply pumps.

A vacuum reading greater than 15” Hg indicates inadequate oil supply, which could be a result of excessive vertical lift, undersized tubing, a plugged or undersized filter or strainer, sticking check valves, or a frozen, kinked or otherwise restricted suction line.
An abnormally low vacuum reading may indicate an air leak in the suction line, valves, or fittings. Generally, assume 0.75" of vacuum for every foot of vertical lift, plus frictional tubing losses, and other in-line restrictions.

When installing fuel units, to assure compliance with National Fire Protection Association's Bulletin 31, "Installation of Oil Burning Equipment," fuel unit inlet pressures should not exceed 3 psig.

**SPM SERIES**

**FEATURES**

SPM Series pump/motor units consist of a fuel pump direct coupled to a motor, an integral check valve and combination vacuum/pressure gauge. They are designed to supply fuel oil from a central storage tank to remote heating units or auxiliary tanks.

SPM pumping units were developed to supply fuel oil to one or more overhead furnaces, day tanks, or for underground central distribution. Four pump/motor sizes are available, with capacities of 15, 30, 65 and 135 gph (57, 114, 245 and 510 l/hr). 1/6 hp, 1/4 hp and 1/3 hp (124 W, 186 W and 248 W) motors are split phase available for either 115 or 230 volt operation. 1/2 hp (373 W) motors are capacitor start—induction run, totally enclosed with dual 115/230 volt windings. The units are shipped completely assembled and include a gauge and check valve. All are 60 cycle, 1750 rpm, continuous duty.
DUPLEX PUMP UNITS
SPM SERIES

FEATURES
The SPM duplex models consist of two pump/motor assemblies with a pre-piped, common discharge manifold. One pump/motor unit operates continuously, with the second providing backup service if the main pump fails. Either automatic (SPM-DA models) or manual (SPM-DM models) controls are available.

The duplex automatic series are designed specifically for buildings where a constant supply of oil must be assured...hospitals, apartment buildings, schools and other commercial/industrial buildings.

The DA Series is equipped with a pressure sensing device which detects a loss in pressure of the primary pump. If the standby pump is brought into service, an alarm sounds which indicates a malfunction in the primary pump.

The electric control circuit on the duplex automatic pump set is equipped with a lead-lag switch to permit manual alternation of pump to provide even wear on each pump.

The manually operated duplex pump sets offer the same protection as an automatic except the standby pump must be turned on manually which requires that maintenance personnel always be available.
SUPPLY UNIT SPECIFICATIONS

SPM Series Supply Units

Single and Duplex

*Capacities:*
15, 30, 65, and 135 gph

*Pressure:*
Maximum operating pressure to 80 psi or 200’ of head.

*Motors:*
All motors are 60 cycle, 1750 rpm, continuous duty 48N frame, 1/6, 1/4, 1/3 hp: split phase, 115 or 230 volt operation, 1/2 hp: capacitor start/induction run, TEFC, dual 115/230 volt.

*Pumps:*
SPM 15, 30, and 65: uses Webster “2R” Series pump units.
SPM 135: uses the Webster “2V” Series pump unit.
Webster 2R and 2V are UL listed

*Porting:*
SPM 15, 30, 65:
1/4” NPTF—2 inlets, outlet port and top and bottom returns
SPM 135:
1/4” NPTF—outlet port
3/8” NPTF—return port, 2 optional inlets.
1/2” NPTF—inlet.

*Seal:*
All models—double lip type.

*Mounting:*
All models — four bolt foot mount

*Filter:*
Rotary self cleaning type, except in SPM 135. Use of external line filter recommended.

*Valves:*
Pressure regulating assembly in pump maintains set pressure.
Check valve maintains oil in feeder lines for instant starts.

*Gauge:*
2-1/2" dia., calibrated from 30” vacuum to 100 psi.

*Controls:*
Two Types for Duplex Units Only Duplex automatic with lead-lag switch and alarm. Manual with selector switch.

Maximum Inlet Vacuum:
All units—15” Hg

National Fire Protection Association compliance requires fuel inlet pressure not to exceed 3 psig.
<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Motor Voltage</th>
<th>Motor hp</th>
<th>Max. Head ft*</th>
<th>Valve Adj. Range</th>
<th>Watts @ 80 psi</th>
<th>Max Flow @ min. psi gph</th>
<th>Max Flow @ 80 psi gph</th>
<th>Suction Cap.</th>
<th>Pump Model No.</th>
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</thead>
<tbody>
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<tr>
<td>SPM-15-2</td>
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<td>Duplex-Auto.</td>
<td>115</td>
<td>1/6</td>
<td>200'</td>
<td>10 to 100 psi</td>
<td>65</td>
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<td>Type</td>
<td>Pressure</td>
<td>Flow (gpm)</td>
<td>Head (ft)</td>
<td>Capacity (gal/min)</td>
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<td>200'</td>
<td>10 to 100 psi</td>
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</tbody>
</table>

SPM Pumps are set at 20 psi.

* Equivalent head equals vertical height from supply pump discharge to highest point in system, plus pressure drop for length of piping run, plus additional losses due to fittings.

**Pumping #2 oil (34SSUU). .85 Sp. gr.

### Supply Pump Unit Cross Reference

<table>
<thead>
<tr>
<th>Webster Model No.</th>
<th>Suntec Model No.</th>
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<tbody>
<tr>
<td>SPM-15-1 (1725 rpm)</td>
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</tr>
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<td>BH-1000M (1725 rpm)</td>
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<td>BB-1020M (3450 rpm)</td>
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<td>BH-1070M (3450 rpm)</td>
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<td>SPM-135 (1725 rpm)</td>
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</tbody>
</table>

For higher capacities, consult factory.
INSTALLATION DATA

Check Valve
Discharge Port
1/4" Pipe Thread

Compound Gauge
0-30" Hg
0-100 psi

Optional
Return Port
1/4" Pipe Thread

Inlet Port #2
1/4" Pipe Thread

Pressure Adjusting
Screw 1/8" Allen
Head Socket Under
Seal Screw

Inlet Port #1
1/4" Pipe Thread
Access to 1/8"
Bypass Plug

This Port
Never Used

Return Port
1/4" Pipe Thread

SPM-135 Models

Preferred Cover Inlet
1/2" Pipe Thread

Return Port
3/8" Pipe Thread
Containment basin optional

Wiring for intermittent operation
Dimensions

<table>
<thead>
<tr>
<th>Model</th>
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<th>B</th>
<th>C</th>
<th>D</th>
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*SPM-135 3 PHASE
Dimensions
Duplex Automatic

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Dimensions
Duplex Manual

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<th>Pipe Tap</th>
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</thead>
<tbody>
<tr>
<td>SPM-15-DM</td>
<td>14.94</td>
<td>1/4</td>
</tr>
<tr>
<td>SPM-30-DM</td>
<td>16.53</td>
<td>1/4</td>
</tr>
<tr>
<td>SPM-65-DM</td>
<td>16.90</td>
<td>1/4</td>
</tr>
<tr>
<td>SPM-135-DM</td>
<td>21.37</td>
<td>3/8</td>
</tr>
</tbody>
</table>
INSTALLATION DATA

SPM Single and Duplex Manual Models

SPM Single and Duplex Manual units are capable of supplying fuel oil to heating units or tanks located up to 200 feet above the supply pumps. They are designed for use in maintained pressure or open loop systems. Pump pressures can be set at a range from 10 psi to 100 psi. See Correct Supply Line Size charts, for maximum discharge head.

Tank to Pump Connections

Connect suction line from the tank to preferred supply pump inlet port. Connect return line from pump return port to tank. Internal 1/8" bypass plug (factory installed) must be in position for recommended two-pipe operation. Be certain all plugs and connections are secure and leak tight.

The correct suction line size can be determined by referring to the charts. Generally, the return line should be sized the same as the suction line. Check valves in the suction lines between the tank and SPM units assure that pumps are full of oil, ready for service. Check valves must be oil tight. Low pressure drop swing type are recommended to minimize friction loss.

For SPM Duplex Manual models, preferred installation calls for a separate suction line from tank to pump for each pump/motor unit. If system failure occurs because of a gross leak in the suction line of the primary unit, the second unit can still provide backup service. Check valves can be installed in return lines to allow removal of inactive pump for servicing, while primary pump continues to run.

These typical installation diagrams, illustrating a maintained pressure supply system or optional open loop system, for continuous pump operation, are shown for reference only. Compliance to all applicable codes where installed is the sole responsibility of the installer.
Typical Installations

- Optional Pressure Sensing Switch
- Optional Pressure Relief Valve
- Filter or Strainer
- Check Valve in Suction Line

Tank May Be Above or Below Ground Level

#48598 Vacuum Breaker

Standpipe 2 - 4 Feet

Vent Plug

Optional Return Loop

Typical Installation: SPM Single Units

* Required if optional return loop is not used
+ Not supplied by Webster
SPM Duplex Automatic Models

SPM Duplex Automatic units consist of two SPM Series pump/motor assemblies and an electrical control panel. They are designed for use in maintained pressure supply systems only. If system pressure falls below a preset level, the control automatically switches from the primary pump/motor unit to the secondary unit. If the backup pump/motor unit also fails to reach or maintain preset system pressure, the control also shuts off the backup unit.

A pump selector switch allows the two pump/motor units to be manually alternated for even wear on each pump. Pump pressures can be set at a range from 10 psi to 100 psi. See Correct Supply Line charts, for maximum discharge head.

Tank to Pump Connections

Units should be set for two-pipe operation. Preferred installation calls for a separate suction line from tank to pump for each pump/motor unit. If system failure occurs because of a gross leak in the suction line of the primary unit, the second unit can still provide backup service.

The correct suction line size can be determined by referring to the charts. Generally, the return line should be sized the same as the suction line. Low pressure drop, swing type check valves can be installed in the suction lines, assuring that pumps are full of oil, ready for service. Check valves in return lines allow removal of inactive pump for servicing. Use of shutoff valves in return lines is not recommended. Be certain all plugs and connections are secure and leak-tight.
This typical installation diagram illustrating a maintained pressure supply system for continuous pump operation is shown for reference only. Compliance to all applicable codes where installed is the sole responsibility of the installer.
SPM LINE SIZING

Correct sizing of the suction and discharge lines between the storage tank and supply unit is vital. The use of tubing or pipe which is too small can result in restricted oil supply. The following charts are listed to help in line sizing for supply unit installation.

The charts can assist in determining the suggested minimum suction and discharge line sizes for Standard Schedule 40 iron or steel pipe (IPS) and for Type K copper tubing, which is recommended for underground service.*

To use the line sizing charts, first a supply unit must be sized to meet the specific application. Once this has been accomplished, the unit model number (ex. SPM-30) should be used as a guide in referring to the correct suction and/or discharge sizing charts.

NOTE: The use of pipe or tubing which is too small can cause increased frictional losses. The result could be an inadequate system discharge pressure. Check local and state codes pertaining to oil heating systems for any requirements which may affect the installation and/or operation of the system.

The following charts apply to all SPM Single, SPM Duplex Manual and SPM Duplex Automatic models. These charts are not intended to be used in sizing pipe for any other supply or transfer pump/motor units.

*Charts represent maximum horizontal run vs. vertical lift or vertical head for Standard Schedule 40 iron or steel pipe (IPS) and for Type K copper tubing, recommended for underground service. The actual OD and wall thickness are indicated for each tube size. (NOTE: The nominal size of Type K tubing is 1/8” smaller than actual OD.)
RECOMMENDED
SUCTION LINE
SIZE
SPM-15

VERTICAL LIFT (FEET)


3/8" I.P.S. 3/4" O.D. (.049 WALL) (1/2" NOM. TYPE K)

3/8" O.D. (.049 WALL) (5/8" NOM. TYPE K)

1/4" I.P.S.
Suction Charts represent maximum horizontal run vs. vertical lift for Standard Schedule 40 iron or steel pipe (IPS) and for Type K copper tubing, recommended for underground service. The actual OD and wall thickness are indicated for each tube size. (NOTE: The nominal size of Type K tubing is 1/8" smaller than actual OD.)
RECOMMENDED SUCTION LINE SIZE

SPM-65
Suction Charts represent maximum horizontal run vs. vertical lift for Standard Schedule 40 iron or steel pipe (IPS) and for Type K copper tubing, recommended for underground service. The actual OD and wall thickness are indicated for each tube size. (NOTE: The nominal size of Type K tubing is 1/8" smaller than actual OD.)
RECOMMENDED
DISCHARGE LINE
SIZE
SPM-15
Discharge Charts represent maximum horizontal run vs. vertical lift for Standard Schedule 40 iron or steel pipe (IPS) and for Type K copper tubing, recommended for underground service. The actual OD and wall thickness are indicated for each tube size. (NOTE: The nominal size of Type K tubing is 1/8" smaller than actual OD.)
RECOMMENDED DISCHARGE LINE SIZE
SPM-65
Discharge Charts represent maximum horizontal run vs. vertical lift for Standard Schedule 40 iron or steel pipe (IPS) and for Type K copper tubing, recommended for underground service. The actual OD and wall thickness are indicated for each tube size. (NOTE: The nominal size of Type K tubing is 1/8" smaller than actual OD.)
RECOMMENDED DISCHARGE LINE SIZE
SPM-15-DA
Discharge Charts represent maximum horizontal run vs. vertical lift for Standard Schedule 40 iron or steel pipe (IPS) and for Type K copper tubing, recommended for underground service. The actual OD and wall thickness are indicated for each tube size. (NOTE: The nominal size of Type K tubing is 1/8" smaller than actual OD.)
RECOMMENDED DISCHARGE LINE SIZE
SPM-65-DA
Discharge Charts represent maximum horizontal run vs. vertical lift for Standard Schedule 40 iron or steel pipe (IPS) and for Type K copper tubing, recommended for underground service. The actual OD and wall thickness are indicated for each tube size. (NOTE: The nominal size of Type K tubing is 1/8” smaller than actual OD.)
The adjusting screws on the Pressuretrol, located in the factory wired control panel, should be set carefully according to instructions, below.

**Setting Pump Pressure**

1. Set the differential scale indicator on the pressuretrol at approximately 5 (half-way between 10 and bottom of scale). This permanently sets the differential scale. Set main scale indicator at 0, so supply pump can run continuously during purging of supply line.

2. Purge lines. Run both supply pumps to assure both are oil filled. For priming purposes, OSV valves can be manually operated by inserting a stiff wire (paper clip) through the cover hole, and depressing the diaphragm plate.

3. Pressure adjustment, *pump one*: Install compound gauge in tee fitting in supply line of highest or most remote burner. After starting *pump one*, start all burners. With all burners operating at maximum firing rate, adjust *pump one* so gauge at remote burners, reads 20 psi.

4. Pressuretrol adjustment: With all burners firing, switch to *pump two* and adjust *pump two* so gauge at last burner reads slight positive pressure (2-5 psi). Gradually increase the pressuretrol main scale setting until *pump two* stops, *pump one* starts, and alarm buzzer sounds. Allow *pump one* to run and build pressure. With *pump one* running and *pump two* off, turn *pump two* pressure adjusting screw about one-quarter turn clockwise.

5. Pressure adjustment, *pump two*: Move selector switch to *off* momentarily, then back to *pump two*. Alarm will shut off and pump two will start. Adjust *pump two* pressure setting so it is the same as *pump one* (set in step three). Switch back and forth between both pumps
to confirm pressure settings are identical. Shut off all burners. Pressure at any oil safety valve in system must not exceed maximum operating pressure of 60 psi, when supply pump is running and all burners are off.

ELECTRICAL CONNECTIONS

The electrical connections between the pump/motor assemblies and control panel are made at the factory. Connect electric service to the terminal strip in the control panel using conduit and wire sizes as required by local codes.

Control circuits operate on 115 volts. Always connect white neutral wire to Terminal 2. Never connect 230 volts between Terminal L1 and Terminal 2. Green ground wire from power source should be connected to one of the panel mounting screws.

Important: SPM-135-DA motors are dual voltage and are prewired for 230 volts at factory. To operate on 115 volts, consult motor manufacturer’s instructions accompanying unit for proper wiring. Before starting unit, check motor voltage and confirm that 115 volt motors are wired to panel as shown in Figure One with Terminal 2 and Terminal L2 Jumper and that 230 volt motors are wired as shown in Figure Two without Terminal 2 and Terminal L2 Jumper.
SPMV SERIES

High Capacity AC Motor/Pump Units
430-1730 gph

Designed for high capacity applications where 430-1730 gph are required. Quiet running, gear type pumps are available in four sizes and incorporate hardened integral shafts, journals and gears, special anti friction bearings, Buna N seals, and cast iron gear plates. Standard motors ranging from 1/2 hp to 7.5 hp (373 W to 5.6 kw) are 1725 rpm NEMA “C” face, 115 volt single-phase or 230 volt three-phase, 60 cycle type with TEFC enclosures through 2 hp (1490 W) and OPDP enclosures over 2 hp (1490 W).

Webster AC motor/pump high capacity fuel oil supply units are designed to be used with fuel oils including JP4 whose viscosities do not exceed 6,000 S.U.S. and with a suction less than 10” of mercury or an inlet pressure not to exceed 35 psi continuously (capable of intermittent duty at 10,000 S.U.S., 20” of mercury and 50 psi inlet). The unit is designed to operate in -20°F to +200°F conditions. The motor is precision aligned and coupled to the pump with a machined adapter and flexible couplings.
SPMV DUPLEX

Pump/Motor Units

Available in flow rates from 430 GPH through 1730 GPH. Systems can be designed for single phase 115/208/230V, 60 or 50CY, or three phase 208/230/460V, 60 or 50CY, applications. The SPM duplex models consist of two pump and motor assemblies with a pre-piped common discharge manifold. One pump operates continuously, with the second providing backup services if the main pump fails. Either automatic (SPM-DA models) or manual (SPM-DM models) controls are available. The duplex automatic series are designed specifically for buildings where a constant supply of oil must be assured...hospitals, apartment buildings, schools and other commercial or industrial buildings. The duplex pump set has a second pump for standby or auxiliary service. Furnished with automatic or manual standby controls, the duplex automatic is equipped with a pressure sensing device which detects loss of pressure of primary pump. If standby pump is brought into service, an alarm sounds which indicates malfunction in primary pump. The electric control circuit on the duplex automatic pump set is equipped with a lead-lag switch to permit manual alternation of pump to provide even pump wear. The manually operated duplex pump sets offer the same protection as the automatic except the standby pump must be turned on manually which requires that maintenance personnel always be available.
SPECIFICATIONS
SPMV SERIES
AC High Capacity Fuel Oil Supply Units

Capacity:
430 to 1730 gph with fluid viscosity to 10,000 SSU.

Pressure:
Inlet pressure should not exceed 3 psi.
Outlet pressure up to 500 psi.

Fluid Temperature Limits:
-20° F to +200° F.

Motors:
Standard: 60 cycle, 1750 rpm, NEMA 56C frame.
1/2 through 7 1/2 hp available.
To be specified when ordering: Single-phase 115/230 VAC, or three-phase 230/460 VAC. ODP or TEFC.

Porting:
1” NPT (086K-194K)
1 1/2 X 1 1/4 NPT (237K-388K)

Mounting:
Integral mounting foot.

Maximum Inlet Vacuum: 15” Hg
Continuous operation: 10” Hg
Use of external filter recommended.

In applying these supply units, the pressures indicated are at the pump outlet. You must also consider line losses.

All pumps relying on atmospheric pressure to push the fuel oil into them are subject to cavitation. As fuel viscosity (thickness) increases, the tendency for cavitation becomes greater. Therefore, it is best to mount the pump at the base of the tank and to use the largest diameter, shortest length, and straightest inlet possible. A large diameter inlet pipe or hose necked down at the pump is preferable to a longer length of smaller diameter pipe because the fuel tends to adhere to the inside of the pipe.

When initially starting a unit, it is desirable and sometimes necessary to have a vent valve or plug on the pressure side of the pump to facilitate its priming.
### SPMV PUMP CODE ANALYSIS SELECTION TABLES

#### Table 1. Motor Horsepower (1725 rpm Standard)

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>.50 hp</td>
</tr>
<tr>
<td>75</td>
<td>.75 hp</td>
</tr>
<tr>
<td>100</td>
<td>1.0 hp</td>
</tr>
<tr>
<td>150</td>
<td>1.5 hp</td>
</tr>
<tr>
<td>200</td>
<td>2.0 hp</td>
</tr>
<tr>
<td>300</td>
<td>3.0 hp</td>
</tr>
<tr>
<td>500</td>
<td>5.0 hp</td>
</tr>
<tr>
<td>750</td>
<td>7.5 hp</td>
</tr>
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</table>

#### Table 2. Motor Phase

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Single-phase, 60 cycle, 115/230 VAC</td>
</tr>
<tr>
<td>B</td>
<td>Three-phase, 60 cycle, 230/460 VAC</td>
</tr>
<tr>
<td>X</td>
<td>Consult factory for other types</td>
</tr>
</tbody>
</table>

#### Table 3. Motor Enclosure

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>TEFC std. thru 2 hp</td>
</tr>
<tr>
<td>O</td>
<td>OPDP std. over 2 hp</td>
</tr>
<tr>
<td>E</td>
<td>Explosion Proof</td>
</tr>
</tbody>
</table>

#### Table 4. Pump Model

<table>
<thead>
<tr>
<th>Maximum gph Nominal</th>
<th>Under Pressure, Read Horsepower Required at 1750 rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25 psi</td>
</tr>
<tr>
<td>439</td>
<td>.50</td>
</tr>
<tr>
<td>900</td>
<td>1.00</td>
</tr>
<tr>
<td>1114</td>
<td>1.00</td>
</tr>
<tr>
<td>1730</td>
<td>2.00</td>
</tr>
</tbody>
</table>

HP ratings shown are for No. 2 fuel oil. Consult factory for hp ratings for heavier weight oils. For lower flow rates consult Bulletin 131-49161. For higher pressures and/or flow rates, consult factory.

### SPMV Duplex Ordering Code

When ordering SPMV Duplex models add suffix:

- “DM,” for manual control models, or “DA,” for automatic control models.

Example: SPMV-50AT/086K-DA

<table>
<thead>
<tr>
<th>Code</th>
<th>Duplex Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM</td>
<td>Duplex with manual controls</td>
</tr>
<tr>
<td>DA</td>
<td>Duplex with automatic controls</td>
</tr>
</tbody>
</table>
## SPMV Series Single and Duplex Supply Units

### Dimensions

<table>
<thead>
<tr>
<th>HP</th>
<th>NEMA Size (Standard)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>.50</td>
<td>56C 56C TEFC</td>
<td>6.30</td>
<td>9.00</td>
<td>8.25</td>
<td>9.20</td>
</tr>
<tr>
<td>.75</td>
<td>56C 56C TEFC</td>
<td>6.30</td>
<td>9.00</td>
<td>8.25</td>
<td>9.20</td>
</tr>
<tr>
<td>1.00</td>
<td>56C 56C TEFC</td>
<td>6.30</td>
<td>9.00</td>
<td>8.25</td>
<td>10.20</td>
</tr>
<tr>
<td>1.50</td>
<td>56C 56C TEFC</td>
<td>6.30</td>
<td>9.00</td>
<td>8.25</td>
<td>11.20</td>
</tr>
<tr>
<td>2.00</td>
<td>56C 56C TEFC</td>
<td>6.30</td>
<td>9.00</td>
<td>8.25</td>
<td>11.20</td>
</tr>
<tr>
<td>3.00</td>
<td>182TC OPDP</td>
<td>7.30</td>
<td>9.63</td>
<td>11.05</td>
<td>11.00</td>
</tr>
<tr>
<td>5.00</td>
<td>184TC OPDP</td>
<td>7.30</td>
<td>9.63</td>
<td>11.05</td>
<td>12.40</td>
</tr>
<tr>
<td>7.50</td>
<td>213TC OPDP</td>
<td>8.00</td>
<td>11.63</td>
<td>13.00</td>
<td>13.90</td>
</tr>
</tbody>
</table>

### Pump Models

<table>
<thead>
<tr>
<th>Model</th>
<th>E</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>086K</td>
<td>4.90</td>
<td>19.05 (.50HP)</td>
<td>20.85 (3.00HP)</td>
</tr>
<tr>
<td>194K</td>
<td>5.65</td>
<td>19.80 (.75HP)</td>
<td>23.10 (5.00HP)</td>
</tr>
<tr>
<td>237K</td>
<td>8.80</td>
<td>22.95 (.75HP)</td>
<td>27.85 (7.50HP)</td>
</tr>
<tr>
<td>388K</td>
<td>9.80</td>
<td>23.95 (.75HP)</td>
<td>* 28.65 (7.50HP)</td>
</tr>
</tbody>
</table>

* Add 4" for Explosion Proof

---

**SPMV Single Supply Unit**

**SPMV Duplex Automatic Supply Unit**

Dimensions for 3 Phase

Duplex Automatic Assembly as Shown
B series transfer pumps are designed to provide efficient pumping of #1 to #6 fuel oils, in capacities from 80 to 290 gallons per hour, at pressures up to 500 PSI (except #1 oil). With high-density gray iron body construction, heat-treated alloy steel gears and shafts, and special antifriction bearings. B series transfer pumps offer superior durability and high mechanical efficiency. Double lip Viton seals, are standard. These pumps are also available in pump and motor packages. Available in 115/230 volt single phase or 230/460 volt three phase, simplex, duplex automatic and duplex manual configurations. All B series pumps are UL approved.
## Specifications

<table>
<thead>
<tr>
<th>Gear Sizes:</th>
<th>18B (.35” gear width)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>37B (.70” gear width)</td>
</tr>
<tr>
<td></td>
<td>47B (1.00” gear width)</td>
</tr>
<tr>
<td></td>
<td>59B (1.40” gear width)</td>
</tr>
<tr>
<td>Capacity:</td>
<td>80 to 290 GPH @ 1750 RPM</td>
</tr>
<tr>
<td></td>
<td>#1 to #6 fuel oil @ 75 degrees F., 100 PSI</td>
</tr>
<tr>
<td>Pressures:</td>
<td>#4 to #6 fuel oils - up to 500 PSI</td>
</tr>
<tr>
<td></td>
<td>#2 fuel oil - up to 350 PSI</td>
</tr>
<tr>
<td>Operating Speeds:</td>
<td>To 1725 RPM</td>
</tr>
<tr>
<td>Porting: *</td>
<td>1/4” NPTF: Side inlet and side outlet</td>
</tr>
<tr>
<td></td>
<td>3/4” NPTF: Side inlet and side outlet 59B only</td>
</tr>
<tr>
<td>Shaft Seal:</td>
<td>Standard - Double lip type, Viton</td>
</tr>
<tr>
<td>Filter:</td>
<td>No internal filter</td>
</tr>
<tr>
<td></td>
<td>External filter recommended</td>
</tr>
<tr>
<td>Relief Valve:</td>
<td>No Relief Valve Use</td>
</tr>
<tr>
<td></td>
<td>External Relief Valve</td>
</tr>
<tr>
<td>Inlet Pressure:</td>
<td>3 PSI MAX</td>
</tr>
<tr>
<td>Inlet Vacuum:</td>
<td>10” Hg maximum</td>
</tr>
<tr>
<td>UL Listed</td>
<td></td>
</tr>
</tbody>
</table>

### SPMB Duplex PUMP/MOTOR UNITS

Available in flow rates from 80 GPH through 290 GPH. Systems can be designed for single phase 115/208/230V, 60 or 50CY, or three phase 208/230/460V, 60 or 50CY, applications. The SPM duplex models consist of two pump and motor assemblies with a pre-piped common discharge manifold. One pump operates continuously, with the second providing backup service if the main pump fails. Either automatic (SPM-DA models) or manual (SPM-DM models) controls are available. The duplex automatic series are designed specifically for buildings where a constant supply of oil must be assured...hospitals, apartment buildings, schools and other commercial or industrial buildings. The duplex pump set has a second pump for standby or auxiliary service. Furnished with automatic or manual standby controls, the duplex automatic is equipped with a pressure sensing device which detects loss of pressure of primary pump. If standby pump is brought into service, and alarm sounds which indicates malfunction in primary pump. The electric control circuit on the duplex automatic pump set is equipped with a lead-lag switch to permit manual alternation of pump to provide even pump wear. The manually operated duplex pump sets offer the same protection as the automatic except the standby pump must be turned on manually which requires that maintenance personnel always be available. Available with either SPM or SPMV pump/motor units.
**SPMB Ordering Code**

<table>
<thead>
<tr>
<th>SPMB</th>
<th>50</th>
<th>A</th>
<th>T</th>
<th>18BR</th>
<th>DM</th>
</tr>
</thead>
</table>

**MOTOR HORSEPOWER (1725 RPM STANDARD)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>* 25</td>
<td>.25 HP</td>
</tr>
<tr>
<td>* 33</td>
<td>.33 HP</td>
</tr>
<tr>
<td>50</td>
<td>.50 HP</td>
</tr>
<tr>
<td>75</td>
<td>.75 HP</td>
</tr>
<tr>
<td>100</td>
<td>1.0 HP</td>
</tr>
<tr>
<td>150</td>
<td>1.5 HP</td>
</tr>
<tr>
<td>200</td>
<td>2.0 HP</td>
</tr>
<tr>
<td>300</td>
<td>3.0 HP</td>
</tr>
</tbody>
</table>

* = only available in 115V or 230V single phase

**MOTOR PHASE**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Single Phase / 60 cycle / 115/208/230 VAC</td>
</tr>
<tr>
<td>B</td>
<td>Three Phase / 60 cycle / 208 / 230 / 460 V AC</td>
</tr>
<tr>
<td>X</td>
<td>Consult factory for other types</td>
</tr>
</tbody>
</table>

**MOTOR ENCLOSURE**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>TEFC Std/ thru 2 HP</td>
</tr>
<tr>
<td>O</td>
<td>OPDP Std. over 2 HP</td>
</tr>
<tr>
<td>E</td>
<td>Explosion Proof</td>
</tr>
</tbody>
</table>

When sizing SPMB units, remember that the pressures indicated are at the pump outlet.

All pumps relying on atmospheric pressure to push the fuel oil into them are subject to cavitation. As fuel viscosity (thickness) increases, the tendency for cavitation becomes greater. Therefore, it is best to mount the pump at the base of the tank and to use the largest diameter, shortest length, and straightest inlet possible.
MOTOR HORSEPOWER (1725 RPM STANDARD)

Under pressure, read horsepower required at 1750 RPM

<table>
<thead>
<tr>
<th>Pump Model</th>
<th>Maximum gph</th>
<th>25 psi</th>
<th>100 psi</th>
<th>200 psi</th>
<th>300 psi</th>
</tr>
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<tbody>
<tr>
<td>18BR</td>
<td>82</td>
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<td>47BR</td>
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<td>.50</td>
<td>.75</td>
<td>1.00</td>
</tr>
<tr>
<td>59BR</td>
<td>292</td>
<td>.25</td>
<td>.50</td>
<td>.75</td>
<td>1.50</td>
</tr>
</tbody>
</table>

SPMB Duplex Ordering Code
When ordering SPMB Duplex models add suffix:

“DM,” for manual control models, or “DA,” for automatic control models.

Example: SPMB-50AT/18BR-DA

<table>
<thead>
<tr>
<th>Code</th>
<th>Duplex Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM</td>
<td>Duplex with manual controls</td>
</tr>
<tr>
<td>DA</td>
<td>Duplex with automatic controls</td>
</tr>
</tbody>
</table>

A large diameter inlet pipe or hose necked-down at the pump is preferable to a longer length of similar diameter pipe because the fuel tends to adhere to the inside of the pipe.

When initially starting a unit, it is desirable and sometimes necessary to have a vent valve or plug on the pressure side of the pump to facilitate its priming.
## DIMENSIONS

<table>
<thead>
<tr>
<th>HP</th>
<th>NEMA</th>
<th>Type (Standard)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>.50</td>
<td>56C</td>
<td>TEFC</td>
<td>9.00</td>
<td>8.25</td>
<td>9.20</td>
</tr>
<tr>
<td>.75</td>
<td>56C</td>
<td>TEFC</td>
<td>9.00</td>
<td>8.25</td>
<td>9.20</td>
</tr>
<tr>
<td>1.00</td>
<td>56C</td>
<td>TEFC</td>
<td>9.00</td>
<td>8.25</td>
<td>10.20</td>
</tr>
<tr>
<td>1.50</td>
<td>56C</td>
<td>TEFC</td>
<td>9.00</td>
<td>8.25</td>
<td>11.20</td>
</tr>
<tr>
<td>2.00</td>
<td>56C</td>
<td>TEFC</td>
<td>9.00</td>
<td>8.25</td>
<td>11.20</td>
</tr>
<tr>
<td>3.00</td>
<td>182TC</td>
<td>OPDP</td>
<td>9.63</td>
<td>11.05</td>
<td>11.00</td>
</tr>
<tr>
<td>5.00</td>
<td>184TC</td>
<td>OPDP</td>
<td>9.63</td>
<td>11.05</td>
<td>12.40</td>
</tr>
<tr>
<td>7.50</td>
<td>213TC</td>
<td>OPDP</td>
<td>11.63</td>
<td>13.00</td>
<td>13.90</td>
</tr>
</tbody>
</table>

### Pump

<table>
<thead>
<tr>
<th>Model</th>
<th>E</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>18BR</td>
<td>3.36</td>
<td>(.50HP) 17.06</td>
</tr>
<tr>
<td>37BR</td>
<td>3.71</td>
<td>(.75HP) 17.41</td>
</tr>
<tr>
<td>47BR</td>
<td>4.05</td>
<td>(.75HP) 17.75</td>
</tr>
<tr>
<td>59BR</td>
<td>4.40</td>
<td>(.75HP) 18.10</td>
</tr>
</tbody>
</table>
SPMB
SINGLE SUPPLY UNIT

SPMB
DUPLEX AUTOMATIC SUPPLY UNIT

(Dimensions are for 3 Phase Duplex Automatic Consult Factory for Single Phase Dimensions)
TRANSFER PUMP UNITS

Transfer pumps/motors consist of an electric motor and Webster fuel unit. Each Webster fuel unit has been designed for a variety of needs from fuel supply to fuel transfer. With capacities ranging from 9 to 150 gph at 100 psi, Webster transfer units are capable of satisfying virtually every system supply or transfer need.

SPECIFICATIONS

35223 Series, 35202 Series, 49116 Series

**Capacities:**
35223 Series—80 to 155 gph at 100 psi.
35202 Series—9 to 65 gph at 100 psi.
49116 Series—31 to 66 gph at 100 psi.

**Maximum Working Pressure:**
35223 Series—80 to 200 psi.
35202 Series—100 to 300 psi.
49116 Series—100 psi

**Motors:**
All motors 60 cycle, 1750 rpm, continuous duty 115 volt. 1/6 and 1/4 hp are split phase. 1/2hp is capacitor start—induction run, TEFC with dual 115/230 volt windings.

**Fuel Units (Close Coupled to Motor):**
35223 Series uses Websters' B Series Fuel Oil Transfer Units.
35202 Series uses Websters' V Series or R Series Fuel Transfer Units.
49116 Series uses Webster's 1R00 Series Fuel Transfer Units.

**Mounting:**
Four bolt foot mount. 10" Hg vacuum.

Use of external filter recommended.

35223 SERIES TRANSFER UNITS

The 35223 Series Pump/Motor Unit consists of a Webster B Series fuel oil transfer pump close coupled to a 1/4 hp electric motor. This unit is designed for transfer of fuel oils #6 or lighter at maximum working pressures up to 200 PSI depending on motor hp.
### SELECTION TABLE

#### 35223 Series Pump/Motor Units

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>35223-1</td>
<td>115</td>
<td>1/4</td>
<td>18B</td>
<td>200 psi</td>
<td>80 gph</td>
<td>16.04</td>
<td>6.32</td>
</tr>
<tr>
<td>35223-3</td>
<td>115</td>
<td>1/4</td>
<td>37B</td>
<td>100 psi</td>
<td>155 gph</td>
<td>16.39</td>
<td>6.67</td>
</tr>
</tbody>
</table>

![Diagram of pump/motor units]
35202 SERIES TRANSFER UNITS

35202 Series Pump/Motor Units consist of a Webster R Series or V Series fuel unit with integral pressure valve, close coupled to a motor. This series is available with 1/6, 1/4 or 1/2 hp electric motors with a pumping capacity to 65 gph at 100 psi.
<table>
<thead>
<tr>
<th>Models</th>
<th>Motor Voltage</th>
<th>Motor Type No.</th>
<th>Motor hp</th>
<th>Fuel unit Type No.</th>
<th>Maximum Working Pressure psi</th>
<th>Pump Blocked Nozzle Watts</th>
<th>gph at 100 psi</th>
<th>gph at Maximum Working Pressure</th>
<th>Suction Capacity gph</th>
</tr>
</thead>
<tbody>
<tr>
<td>35202</td>
<td>115</td>
<td>34499-3</td>
<td>1/4</td>
<td>2R223C-5BQ14</td>
<td>300</td>
<td>210</td>
<td>30</td>
<td>23</td>
<td>70</td>
</tr>
<tr>
<td>35202-2</td>
<td>115</td>
<td>34499-1</td>
<td>1/6</td>
<td>2R111C-5BQ3</td>
<td>150</td>
<td>75</td>
<td>12</td>
<td>10</td>
<td>35</td>
</tr>
<tr>
<td>35202-9</td>
<td>Less motor, includes accessories</td>
<td>34499-1</td>
<td>1/6</td>
<td>2R213C-5BQ14</td>
<td>150</td>
<td>130</td>
<td>30</td>
<td>29</td>
<td>70</td>
</tr>
<tr>
<td>35202-10</td>
<td>Less motor, includes accessories</td>
<td>34499-1</td>
<td>1/6</td>
<td>2R616C-5BQ14</td>
<td>150</td>
<td>245</td>
<td>65</td>
<td>60</td>
<td>125</td>
</tr>
<tr>
<td>35202-27</td>
<td>115</td>
<td>34499-1</td>
<td>1/6</td>
<td>1R162C-4BQ6</td>
<td>125</td>
<td>70</td>
<td>9</td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>35202-29</td>
<td>115/230 dual</td>
<td>34499-6</td>
<td>1/2</td>
<td>2R626C-5BQ14</td>
<td>300</td>
<td>410</td>
<td>65</td>
<td>50</td>
<td>125</td>
</tr>
<tr>
<td>35202-35</td>
<td>115/230 dual</td>
<td>34499-6</td>
<td>1/2</td>
<td>V022C-4D020</td>
<td>300</td>
<td>270</td>
<td>40</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>35202-38</td>
<td>115</td>
<td>34499-8</td>
<td>1/3</td>
<td>V002C-4EJ</td>
<td>100</td>
<td>175</td>
<td>65</td>
<td>65</td>
<td>65</td>
</tr>
</tbody>
</table>

Above Capacity in gph at 1725 rpm pumping #2 fuel oil at 75°F.

NOTE: 35202-38 ratings are for 1000 SSU fuel.
Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>Outlet Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>35202</td>
<td>15.61</td>
<td>7.39</td>
<td>1/4-18 NPTF</td>
</tr>
<tr>
<td>35202-9**</td>
<td>15.61</td>
<td>7.39</td>
<td>1/4-18 NPTF</td>
</tr>
<tr>
<td>35202-2</td>
<td>14.09</td>
<td>6.89</td>
<td>1/8-27 NPTF</td>
</tr>
<tr>
<td>35202-27</td>
<td>13.47</td>
<td>7.39</td>
<td>1/8-27 NPTF</td>
</tr>
<tr>
<td>*35202-29</td>
<td>19.45</td>
<td>5.75</td>
<td>1/4-18 NPTF</td>
</tr>
<tr>
<td>35202-10**</td>
<td>18.83</td>
<td>5.13</td>
<td>1/4-18 NPTF</td>
</tr>
<tr>
<td>*35202-35</td>
<td>18.83</td>
<td>5.13</td>
<td>1/4-18 NPTF</td>
</tr>
</tbody>
</table>

**Dimensions same as 35202-29 Less Motor

*See Drawing

SPM WITH A “V” OR “R” SERIES PUMP HEAD SINGLE SUPPLY UNIT USING A 56C FRAME MOTOR

*35202-29 AND 35202-35
49116 SERIES TRANSFER UNITS

49116 Series Pump/Motor Units consist of a Webster 1 R00 Series Fuel Transfer Unit close coupled to a 1/4 hp electric motor. This unit requires the use of an external pressure regulating valve. The 49116 Series is capable of up to 66 gph at 100 psi.

SELECTION TABLE

<table>
<thead>
<tr>
<th>Models</th>
<th>Replaces Discount Model</th>
<th>Pump Type No.</th>
<th>Suction Capacity gph</th>
<th>Delivery gph 100 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>49116</td>
<td>35223-19</td>
<td>1R003C-4EH</td>
<td>48</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>35223-21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49116-1</td>
<td>35223-23</td>
<td>1R004C-4EH</td>
<td>66</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>35223-25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49116-2</td>
<td>—</td>
<td>1R006C-4EH</td>
<td>95</td>
<td>66</td>
</tr>
</tbody>
</table>

① Capacity in gph at 1725 rpm pumping #2 fuel oil at 75°F

For typical installation suggestions, please refer to the SPM Supply Pump/Motor section.

NOTE: The installation drawings contained in this service guide are intended for reference use only. Consult your local heating contractor for specific installation recommendations and designs which comply with the state and local codes in your area.
<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>49116</td>
<td>14.44</td>
<td>4.72</td>
</tr>
<tr>
<td>49116-1</td>
<td>15.06</td>
<td>5.34</td>
</tr>
<tr>
<td>49116-2</td>
<td>15.06</td>
<td>5.34</td>
</tr>
</tbody>
</table>
Webster oil heat products are recommended for their convenience and ease of installation. Seven types of mounting flanges, brackets, shaft sleeves and couplings are manufactured and stocked for use with Webster fuel units and pumps.

Complete dimension drawings are shown.

<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi-Foot Flange</td>
<td>A45Q 1</td>
<td>Figure One</td>
</tr>
<tr>
<td>4 Bolt Adapter Flange (Nema 56C Motor Mount)</td>
<td>41489</td>
<td>Figure Three</td>
</tr>
<tr>
<td>Horizontal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting Flange</td>
<td>A43Q7</td>
<td>Figure Four</td>
</tr>
<tr>
<td>Bell Housing</td>
<td>34330</td>
<td>Figure Five</td>
</tr>
<tr>
<td>Adapter For B Pump</td>
<td>1100013</td>
<td>Has MTG EARS</td>
</tr>
<tr>
<td>4 Bolt 56C Adapter Flange</td>
<td>80316-1</td>
<td>Figure Six</td>
</tr>
</tbody>
</table>
OIL SAFETY U/L® LISTED

OIL SAFETY VALVES
INSTALLATION INSTRUCTIONS

Webster OSV® valves can be used for the following applications which require slightly different installations:

1. Preventing tank siphoning and oil leaks in the event of line breaks. (See Section “A”)
2. For use with a supply pump (booster pump) to prevent excessive pressure at the inlet of the burner fuel unit. (See Section “B”)

Many state and local codes require a device that will automatically shut off the oil supply before it enters a building should the line between the device and the burner be broken. NFPA standards require that the pressure at the burner fuel pumps must not exceed 3 PSI. The Webster OSV® satisfies both requirements when properly installed. Check local codes for any special requirements.

SECTION “A”

Using the OSV® valve to help prevent oil spills from broken or corroded lines and fittings.

Operation

A recent Environmental Protection Agency sponsored study found that most oil leaks are found in the piping rather than the tank. Webster OSV® valves help prevent oil spills by stopping oil flow in the event of line breaks caused by corroded lines or leaky fittings. The OSV® 9 is mounted in the supply line as close as possible to the tank. Operation is simple. The OSV® requires a vacuum on its outlet side to open the valve and allow oil flow. When the burner is shut down, there is no vacuum from the fuel unit and the OSV® valve is closed—oil flow is stopped. When the burner starts up, vacuum from the fuel unit opens the OSV®, allowing oil to flow.

If a corroded broken line or a loose fitting causes a leak to develop between the OSV® and burner, air enters the line. Fuel unit vacuum is reduced and the OSV® will not open, preventing tank siphoning and a major spill.

BIO OIL SAFETY VALVE UPGRADE
OSV38 and OSV50

Webster currently has an Oil Safety Valve for Bio and Waste Oil applications. This valve is U/L listed for Bio Fuel and is compatible with a wide range of other fuels such as B20-B100, #1-#2 Fuel Oil, Diesel, Kerosene and Waste Oil, with a Temperature Range of -40 to 140°F.
INSTALLATION

The OSV® should be mounted on the supply line as close to the tank as possible.

CAUTION: DO NOT mount the OSV® more than three feet above the fuel unit inlet or more than three feet above the lowest point in the fuel line connecting the OSV® to the burner fuel unit.

See Figures 1 & 2 below.

![Figure 1. Gravity Feed In Basement](image1)

![Figure 2. Mobile Home Gravity System](image2)

Failure to observe the above caution will compromise valve action and may result in tank siphoning action in the event of a line failure between tank and burner.

TROUBLESHOOTING

The OSV® valve will not open during fuel unit operation if there is any air leak in the system between OSV® and burner that prevents development of the operational vacuum required. (See Table 1).

If there is no oil flow to burner or prime is lost

A. Check to see if OSV® valve is stopping oil flow. Turn on burner and manually depress OSV® diaphragm plate with paper clip to see if burner fires up.
1. Check system vacuum. Use a vacuum gauge at fuel unit inlet side. Run burner and shutoff. Vacuum should be maintained. Loss of vacuum indicates air leak.
2. Check all above ground fittings and line for air leaks.
3. Conduct a pressure check of the line.
4. If line does not maintain pressure, the line probably has a break and needs replacing.

B. If there is no oil flow even when OSV® valve is manually opened then check filter, shut-off or foot valve or tank.

**CAUTION:** Always disconnect the OSV® when blowing out the lines with compressed air or damage to the valve will result.

**NOTE:** Outside installation may not be suitable where the OSV® would be exposed to temperatures below freezing.

### Dimensions & Specifications

![Diagram of OSV® valve with dimensions and specifications]

Standard Model use prefix “OSVA”
BIO Model use prefix “OSV”
The BIO OSV valve is U/L listed for Bio Fuel and is compatible with a wide range of other fuels such as B20-B100, #1-#2 Fuel Oil, Diesel, Kerosene, Diesel and Waste Oil.
Temperature Range -40 to 140 Degrees F

**SECTION “B”**
For use with a supply pump (booster pump) to prevent excessive pressure at the inlet of the burner fuel unit

**Operation/Installation**
Webster Oil Safety Valves provide important protection in oil burner supply systems with pressurized supply lines. By isolating burner fuel units from supply line pressure sources (a supply pump or overhead tank, for example), the OSV® relieves pressure strain on fuel unit inlets and seals.

For this application, the OSV® is installed close to the burner assembly. A sustained vacuum at the outlet side of the OSV®, generated by fuel unit operation, causes the valve to open.
The OSV® operates as a pressure reducer, with supply line pressure on the valve inlet side and fuel pump vacuum on the valve outlet side.

In systems with burners connected for one-pipe operation, GPH flow through the valve is the same as the burner nozzle firing rate. In two pipe operation, GPH flow through the valve is the same as the fuel unit suction capacity. Refer to fuel unit manufacturer’s specification for inlet suction capacity. Operation of OSV® valves in parallel is not recommended.

**Recommended Maximum Flow Rates and Pressure**

<table>
<thead>
<tr>
<th>Flow thru Valve</th>
<th>Inlet Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSI</td>
<td>PSI</td>
</tr>
<tr>
<td>5 gph</td>
<td>2.5</td>
</tr>
<tr>
<td>15 gph</td>
<td>2.7</td>
</tr>
<tr>
<td>30 gph</td>
<td>3.7</td>
</tr>
<tr>
<td>40 gph</td>
<td>4.0</td>
</tr>
<tr>
<td>50 gph</td>
<td>4.5</td>
</tr>
<tr>
<td>60 gph</td>
<td>5.0</td>
</tr>
<tr>
<td>70 gph</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Vacuum (inches Hg) to operate valve is shown for various flow and pressure conditions.

Values given are averages of test results and may vary slightly.

**Entrapment Caution**

In supply systems having a check valve on the supply pump discharge, an entrapment condition may exist between the supply pump and OSV®. In the burner OFF condition, cold oil in the line expands when heating to room temperature, causing a line pressure increase that may prevent the OSV® from operating, or may cause leakage at the threaded joints. The condition may be observed by use of a pressure gauge at the inlet side of the OSV®, or on the discharge side of the supply pump check valve. Correction requires use of a pressure relief valve as shown in Figure 3, set to insure a maximum 60 PSI at any OSV® inlet under all conditions.

**Figure 3. Supply Pump Systems — Multi Level**
OPEN LOOP SYSTEM

To insure a flooded supply line, a standpipe before the junction of the supply line with the return line is required. The standpipe on the supply line must be at least three feet higher than any point in the supply line system before joining the return line. Use of a W ebster 48598 vacuum breaker is recommended.

![Diagram of central supply system for mobile homes]

Figure 4. Central Supply Systems for Mobile Homes

GENERAL CONSIDERATIONS

PORTING CONNECTIONS

The OSV® valve is installed in the supply line between the tank and burner. Its location depends on the application (see sections A & B). The OSV® “IN” port is connected to the tank side. The OSV® “OUT” port is connected to the burner side of the line. Non hardening pipe dope is recommended for use on the fitting threads. Do not use teflon tape, as it may void all warranties.

MOUNTING

The OSV® can be mounted in any position. In those environments where dirt or moisture is particularly a problem, the preferred position is with the cover down. This allows any moisture from the diaphragm area to drain out the manual access hole.

FILTER

A dependable in-line filter is recommended between the tank and OSV® to help assure optimum valve performance. Dirt on the valve seat area could prevent the valve from sealing tightly.

PRIMING

For priming purposes, the OSV® can be manually operated by inserting a paper clip or stiff wire through the manual access hole, and depressing the diaphragm plate. Remove the wire immediately if oil appears at the fuel unit vent, the burner fires up, or there is any sign of oil at the burner fuel unit.

CHECK LOCAL CODES

The installer is responsible for complying with all applicable codes. Typical installation diagrams are shown for reference only.
REGULATING VALVES FOR OIL HEATING SYSTEMS

RV SERIES
Webster RV Series valves are designed to provide fuel oil pressure regulation in oil heating applications such as transfer or supply pump systems or high firing capacity burners. RV valves will handle #1 through #6 grade fuel oil in rated pressures ranging from 20 to 500 psi (1.4 to 34.5 bar). RV-2100 Series models regulate pressure for capacities to 150 gph (568 l/hr) and RV-3000 Series valves regulate pressure to 600 gph (2270 l/hr). RV-2000 models regulate pressure and also provide delivery cutoff for capacities to 100 gph (378 l/hr).

SPECIFICATIONS
RV-2000
For all fuel oils, #1 through #6. Combines pressure regulation and cut-off. Chrome plated piston valve and improved composition sealing disc resist corrosion; gives positive seal and sharp, clean cut-off. Capacities to 100 gph.

RV-2100
Same as RV-2000 except does not have delivery cut-off. Pressure regulating only. Capacities to 150 gph.

RV-3000
Same as RV-2100 except capacities to 600 gph.
Dimensions

RV-3000

Pressure Adjust

Tank Return
(3/4-14 NPTF)

2-15/16

1 1/2

5 3/4

1-13/16

IN

OUT

Input and regulated line 3/4-14 NPTF

RV-2000

RV-2100

Pressure Adjust

Tank Return
(3 Ports)
3/8-18 NPTF

2-15/16

2

1 1/2

2-15/16

4 19/32

3 11/32

1 13/32

IN

Cut-off delivery
outlet RV-2000
only - 1/8-27 NPTF

Input and no cut-off regulated line (3 Ports)
3/8-18 NPTF
## SELECTION TABLE

<table>
<thead>
<tr>
<th>Type Number</th>
<th>Porting</th>
<th>Description</th>
<th>Adjustment Range (psi)</th>
<th>Preset Capacity gph (Max.)</th>
<th>Factory Set Pressure (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV-2001</td>
<td></td>
<td></td>
<td>100-165</td>
<td>100</td>
<td>100†</td>
</tr>
<tr>
<td>RV-2002</td>
<td>3/8</td>
<td>Regulating &amp; Cut-off Valve</td>
<td>100-330</td>
<td>100</td>
<td>100†</td>
</tr>
<tr>
<td>RV-2003</td>
<td></td>
<td></td>
<td>10-25</td>
<td>140</td>
<td>10†</td>
</tr>
<tr>
<td>RV-2004</td>
<td></td>
<td></td>
<td>40-110</td>
<td>140</td>
<td>10†</td>
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<tr>
<td>RV-2101</td>
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<td>Valves (See Note 1)</td>
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<td>80-140</td>
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*(PSI Range and Setting based on 50 gph flow, #2 Fuel Oil, except RV-3000 Series is based on 150 gph flow.)*

Valve may be reset at installation to meet system requirement.

*Valve stamped at factory with preset pressure.

†Valve not stamped with factory preset pressure

**NOTE 1:** These special valves meet the requirements of the New York City’s Board of Air Resources. The valve body dimensions are the same as those shown at the right for the RV-2000 and RV-2100 Series valves. Differences are: 1) The top and bottom valve end caps are taper pinned to the body to prevent removal. 2) The pressure adjustment seal screw and washer, once installed by the customer, cannot be removed to prevent tampering with the set pressure.
INSTALLATION DATA

RV-2000  Valve Regulation with Cutoff

RV-2100  Valve Regulation without Cutoff

RV-3000  Valve Regulation without Cutoff
The RV-2000 series regulating valve can also be used as a relief valve. Designed to provide system pressure relief for #1 through #6 fuel oil grades and for rated pressure ranges of 0 to 500 psi. @150 gph or less. The following adjustment ranges are available: 100-330 psi use RV-2002, 10-25 psi use RV-2003, 40-110 psi use RV-2004. Pipe as configured.
VACUUM BREAKER (48598)
Incorporates Viton "O" Ring seat, 3/8-18 NPTF ports. Can be used as a suction line check valve.

INSTALLATION DATA

![Diagram of installation data](image)

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Inches
Mercury Hg

![Graph of flow vs. mercury](image)

132-4859B Vacuum Breaker
Vacuum Hg vs. Flow
345SU Oil @ 80°F
Troubleshooting
GENERAL PUMP PROBLEMS

- Noisy pump
- Pump will not prime
- Rumble coming from burner at start-up
- Oil leaking from pump cover gasket or blown cover gasket
- Pump loses prime after an extended shutdown
- Vacuum coming from return port on oil pump (two pipe installation)
- Pump seizes at start-up, blows seal, damage to discharge pressure gauge
- Supply unit does not run
- Unit runs but no oil reaches supply pump
- Unit supplies oil to distribution system, but no delivery of oil at OSV valves
- Oil delivery at OSV valves, but burners do not fire
- Burner pump seal damaged
- Pressure increases in supply line after shutdown
- Oil Safety Valve does not open

Noisy pump
Check for air leaks
Check for high vacuum condition, (10 in. for single stage and 15 in. for two stage pumps)

Pump will not prime
Measure suction inlet vacuum, should not exceed 15 in. of vacuum
Check that all plugs and suction line connections are airtight
Be certain by-pass plug is in position on two pipe installation
Use adequate size suction line
Be certain suction line filter or strainer has adequate capacity

Rumble coming from burner at start-up
Check cutoff at pump or external solenoid

Oil leaking from pump cover gasket(s) blown cover gasket(s)
Check for correct pump rotation

Pump loses prime after an extended shutdown
Check all pipe connections for air leaks
Return line not submersed in oil
In supply pump applications the return loop may need a vacuum breaker installed to prevent siphoning
Vacuum coming from return port on oil pump (two pipe installation)
By-pass plug not installed
If by-pass plug is installed check for blocked suction line

Pump seizes at start-up, blows seal, damage to discharge pressure gauge
Check for blocked return line or drain port from pump
By-pass plug should be removed on single pipe installation

SUPPLY PUMP PROBLEMS

Supply Unit does not run
Check motor electrical connections
Check for obstruction in return line such as a reversed check valve
Check circuit breaker and correct possible overload

Unit runs, but no oil reaches supply pump
Measure suction inlet vacuum, should not exceed 15 in. of vacuum
Check that all plugs and suction line connections are airtight
Be certain by-pass plug is in position
Use adequate size suction line
Be certain suction line filter or strainer has adequate capacity

Unit supplies oil to distribution system, but no delivery of oil at OSV valves
Confirm specified unit can provide needed vertical discharge pressure
Check that all supply line connections are air and oil tight
Use adequate size supply line
Minimize supply line restrictions
Prime pump and purge supply lines of air
Check pump pressure settings

Oil delivery at OSV valves, but burners do not fire
Confirm specified unit can provide needed capacity
(Size to firing rate for single pipe burners or size to gear set capacity for two piped burners)
In pressurized system, adjust pressure to develop a reading of 10-15 PSI at the most remote or highest burner
In open loop system, install standpipe, back pressure valve, vacuum breaker or over-sized drop pipe
Check to assure that pressures at OSV inlet does not exceed maximum of 60 PSI
Check for leaking or damaged OSV
Check for line failure between OSV and burner pump
Check burner for fuel pump failure or ignition problems

**Burner pump seal damaged**
Install OSV to assure pressure at burner pump does not exceed 3 PSI
Install pressure relief valve if entrapment condition is suspected

**Pressure increases in supply line after shutdown**
Check to assure that pressures at OSV inlet does not exceed maximum of 60 PSI
Install pressure relief valve if entrapment condition is suspected

**OIL SAFETY VALVE PROBLEMS**

**Oil Safety Valve does not open**
Too much pressure at inlet of valve
Flow exceeds recommended flow rate for valve.
Entrapment condition (expansion of oil in supply line)
Check for air leaks between the OSV valve and burner pump
MANUFACTURERS REPS

Webster and its Representatives have the resources and technical background to answer any installation or service questions you may have.

Please refer to the listing below for the Webster Representative near you.

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