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Owner's Manual

Transport Series Centrifuges

Models

Transport 9100, 7100 & 3100



TRANSPORT SERIES



GETTING STARTED

Your L-K Transport Series centrifuge comes completely assembled ready for installation. Most necessary hardware for installation is supplied. Refer to the following parts list and wiring diagram.

ITEM	QTY	PART#	DESCRIPTION
1	1		Centrifuge
2	1	J-243	Circuit Breaker 12V 50AMP
3	8	J-239	Shock Mount
4	4		Mounting Screw 1/4-20X3
5	2		Grounding Screw 1/4-20X3/4
6	2		Screw #10 -32X3/4"
7	6		Washer 1/4 SAE
8	2		Star Washer #10
9	6		Star Washer 1/4
10	4		Lock Nut 10-32 W/Insert
11	6		Lock Nut 1/4-20 W/Insert
12	2	J-244	Ring Terminal 8 ga X#10
13	1	J-260	Relay ground 14 ga black
14	36"		Wire 14 ga Red

INSTALLATION

You will need:

- Crimp tool for wiring terminals.
- Solenoid or relay (60 amp continuous rating)
- available upon request.

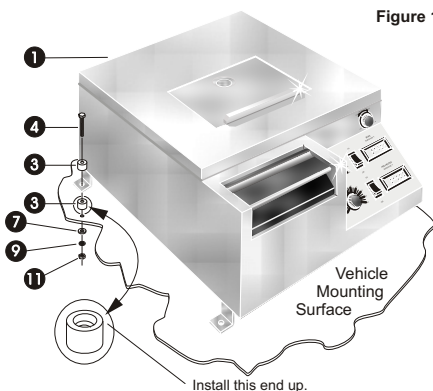
WIRING

For wiring the centrifuge to your 12 Volt negative ground system refer to Figure 2 and follow the instructions below. Make sure all switches and knobs are in the off position before proceeding with this installation. DO NOT take power from any existing vehicle wiring!

There are 2 wires that extend from the centrifuge. Both are 8 gage. One is red and the other black. Attach the ground lug on the black wire to your chassis using a 1/4-20 X 3/4" bolt (Item 5), star washer (Item 9), 1/4" washer (Item 7) and lock nut (Item 11). Be sure the

For best results mount the centrifuge in an enclosure to protect it from the outside elements. Windy conditions and rain will significantly lower the operating temperature, resulting in time delays.

Figure 1



Mount the centrifuge to your tool box, truck bed, car trunk, etc. using the 1/4-20 X 3" bolts (Item 4), star washers (Item 9), shock mounts (Item 3), 1/4" washer (Item 7) and 1/4-20 lock nuts (Item 11) supplied. See illustration.

connection point is a good ground. If additional wire length is needed, add only what is needed, maintaining the same gage wire. Keep the wire as short as possible.

Run the red wire to a dedicated solenoid or relay (not supplied, but available upon request) with a minimum 60 amp continuous rating. Cut off excess wire and attach using an appropriate terminal. See Figure 2a for the connection point.

Using the excess 8 ga red wire, attach one end to the solenoid or relay using an appropriate terminal and run the other end of the wire to the circuit

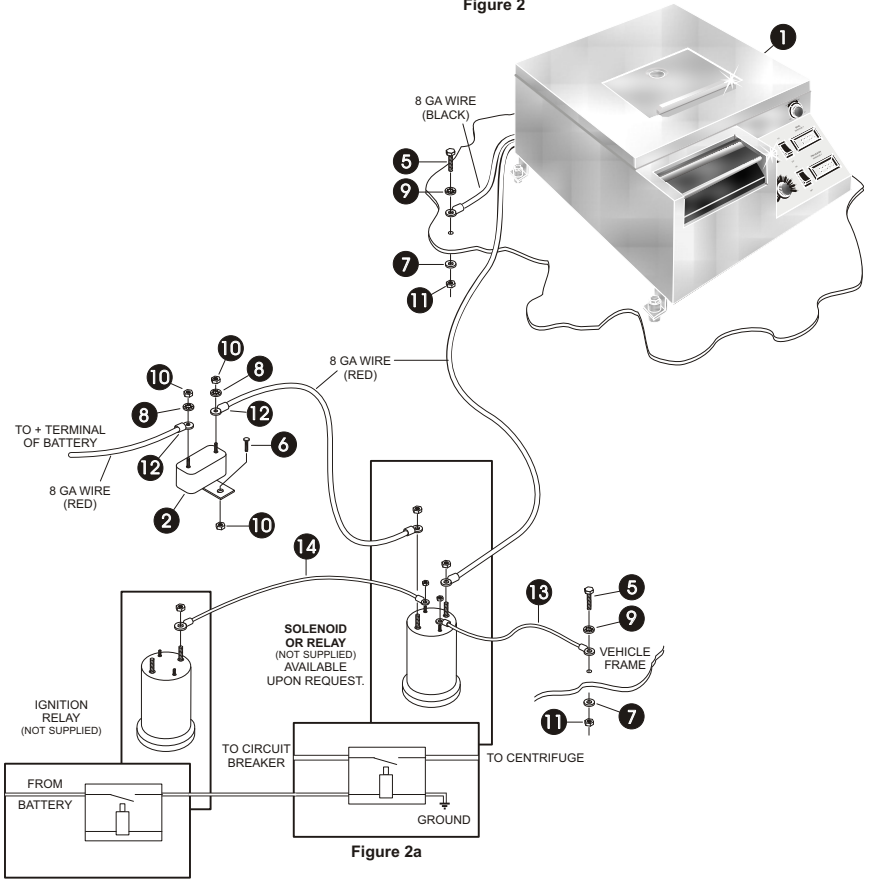
breaker supplied (Item 2). The circuit breaker should be mounted as close to the battery as possible using the 10-32 X 3/4" screws (Item 6) and #10-32 lock nut (Item 10) supplied. Remove excess wire and attach to the auxiliary side of the circuit breaker using the ring terminal (Item 12), star washer (Item 8) and 10-32 lock nut (Item 10) supplied.

Again, using the excess 8 ga red wire, attach one end to the battery side of the circuit breaker using the ring terminal (Item 12), star washer (Item 8) and 10-32 lock nut (Item 10) supplied. Attach the other end to the battery using the proper terminal for your battery.

Attach one end of the black 16 ga ground wire (Item 13) to the solenoid or relay using an appropriate terminal and attach the ground lug on this wire to your chassis using a 1/4-20 X 3/4" bolt (Item 5), star washer (Item 9), 1/4" washer (Item 7) and lock nut (Item 11). Be sure the connection point is a good ground. See Figure 2a for the connection point on the solenoid or relay.

Attach one end of the red 16 ga ground wire (Item 14) to the solenoid or relay using an appropriate terminal and attach the other end to your ignition switch solenoid or relay. See Figure 2b for the connection point.

Figure 2



MAINTENANCE

Vibration, especially when carried over washboard roads can loosen the most secure screw. Periodically, check your centrifuge for loose screws, especially your mounting screws.

Clean your unit after each test. Build-up of oil residues can cause problems with operation and efficiency of your centrifuge.

Periodically, check the sample tube cushion inside the shields of the trunnion arm. Replace if worn excessively.

BE CAREFUL!

Your L-K Centrifuge was designed to optimize operator safety. Realizing the limits of any powered mechanical device and carefully following safety guidelines will help assure accident-free use. Observe and follow carefully all instructions and guidelines in this manual as well as OSHA safety standards.

- Ø **Be sure** there are no foreign objects in the centrifuge bowl.
- Ø Keep bowl lid closed while samples are spinning.
- Ø **NEVER** try to slow the trunnion arm down or place your hands or any object inside the bowl while the trunnion arm is spinning. Allow the trunnion arm to come to a complete stop before removing your sample.
- Ø Turn all switches off when not in use.
- Ø **NEVER** leave your centrifuge unattended while the samples are spinning.

- Ø **NEVER** leave the centrifuge unattended while Pre-Heaters are on high.
- Ø **NEVER** leave the centrifuge unattended while unit is on.
- Ø Turn Pre-Heaters off when not heating a sample.
- Ø This unit gets hot to the touch. Care should be taken to avoid unnecessary contact with the centrifuge housing.
- Ø Disconnect power supply before removing or replacing electrical or mechanical parts.
- Ø **DO NOT** leave oily rags or any type of combustible material in or around your centrifuge.
- Ø **DO NOT** allow unauthorized visitors access to your centrifuge.
- Ø **STAY ALERT.** Watch what you are doing. Use Common Sense. Do not operate this unit when you are tired or while under the influence of medication, alcohol, or drugs.

OPERATION

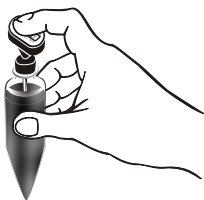
This Centrifuge should not be operated without the vehicle's engine running. Depending on its condition, your battery can run down in a very short time when the heaters are turned on.

This Unit was designed to work with a style "D", 6" Short Cone Tube fabricated in compliance with API 10.4 & ASTM D 96-88. For best results we recommend L-K Short Cone Tubes - part number S10D, S10D2, S12D, or S12D2. Verified tubes also available.

TRANSPORT 9100

Once samples are collected and prepared for heating, place sample bottles in the left two tube holders. Turn on pre-heater section and bowl heater. Set temperature control to 160°F on pre-heater and bowl. Place thermometers in both bottles. We recommend the use of rubber stoppers with a hole drilled in the center for the thermometer. See Figure 3. The use of these stoppers will make it easier to shake the sample without removing the thermometer and therefore give you more accurate readings. Less spillage will occur as well, resulting in a cleaner operation. Use a digital thermometer for best results. They are accurate and easy to read.

Figure 3

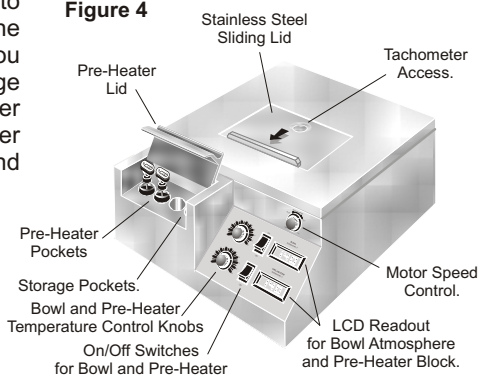


Watch the LCD readout of the sample pre-heater. When the temperature reaches about 155°F, turn the setting down to 140°F. Shake the sample and check actual temperature. From an ambient temperature of 72°F, your sample should reach 140°F in 10 to 12 minutes. See Figure 4.

Slide open the lid to the bowl and place the preheated tubes into the shields. In the bottom of the shield there is a cushion for the tube to rest on. Do not remove this cushion and be sure there is no oil residue build-up. Remove both thermometers. **Check to be sure there are no foreign objects inside the bowl.** Close the lid. Turn the motor speed switch clockwise, slowly at first, until the desired rpm is achieved. You can check rpm's with a hand held tachometer through the hole in the top of the lid. The tip to tip diameter of the

tubes while spinning is 15.25". At 1525 rpm's you should achieve 500 rcf's. At 2000 rpm's you should achieve 865 rcf's. The motor in this unit is capable of turning 2200 rpm's or greater, achieving 1050 rcf's. Keep this in mind. Slower speeds are better for extending the life of the unit. Keep bowl lid closed while the motor is running. After your specified time period for spinning, turn the motor speed control knob counterclockwise to the off position.

Figure 4



Allow time for the motor to slow down before opening the lid. ***DO NOT try to slow the trunnion arm down or place your hands or any object inside the bowl while the trunnion arm is spinning. Allow the trunnion arm to come to a complete stop before removing your sample.***

Open the lid. Place thermometers in the sample tubes before removing them from the trunnion arm shields. Check temperature to be sure sample is correct according to your test procedure.

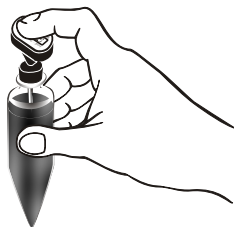
Remove your samples and close the lid. Keep the lid to the bowl closed at all times. This will minimize heat loss and provide greater operator safety.

When the centrifuge is not in use, be sure all knobs and switches are turned off.

TRANSPORT 7100

Once samples are collected and prepared for heating, place sample bottles in the left two tube holders. Set bowl heater switch to ON position. Set pre-heater switch to HIGH. Place thermometers in both bottles. We recommend the use of rubber stoppers with a hole drilled in the center for the thermometer. See Figure 5. The use of these stoppers will make it easier to shake the sample without removing the thermometer and therefore give you more accurate readings. Less spillage will occur as well, resulting in a cleaner operation. Use a digital thermometer for best results. They are accurate and easy to read.

Figure 5

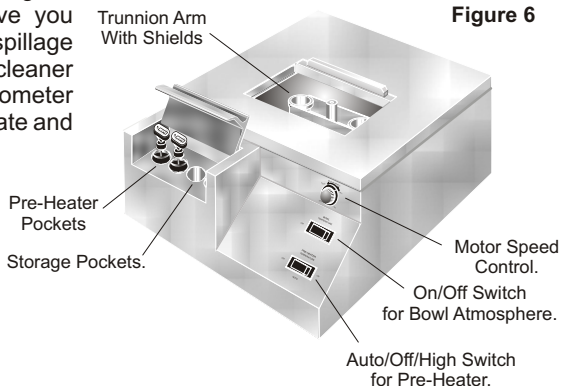


After about 5 minutes, shake your samples to check average temperature. Repeat this every couple of minutes. When the temperature reaches about 125°F, turn the switch to AUTO to prevent overshooting the temperature. From an ambient temperature of 72°F, your sample should reach 140°F in 10 to 12 minutes. See Figure 6.

Slide open the lid to the bowl and place the preheated tubes into the shields. In the bottom of the shield there is a cushion for the tube to rest on. Do not remove this cushion and be sure there is no oil residue build-up. Remove both thermometers. **Check to be sure there are no foreign objects inside the bowl.** Close the lid. Turn the motor speed switch clockwise, slowly at first, until the desired rpm is achieved. You can check rpm's with a hand held tachometer through the hole in the top of the lid. The tip to tip diameter of the

tubes while spinning is 15.25". At 1525 rpm's you should achieve 500 rcf's. At 2000 rpm's you should achieve 865 rcf's. The motor in this unit is capable of turning 2200 rpm's or greater, achieving 1050 rcf's. Keep this in mind. Slower speeds are better for extending life of the unit. Keep bowl lid closed while the motor is running. After your specified time period for spinning, turn the motor speed control knob counterclockwise to the off position.

Figure 6



Allow time for the motor to slow down before opening the lid. **DO NOT try to slow the trunnion arm down or place your hands or any object inside the bowl while the trunnion arm is spinning. Allow the trunnion arm to come to a complete stop before removing your sample.**

Open the lid. Place thermometers in the sample tubes before removing them from the trunnion arm shields. Check temperature to be sure sample is correct according to your test procedure.

Remove your samples and close the lid. Keep the lid to the bowl closed at all times. This will minimize heat loss and provide greater operator safety.

When the centrifuge is not in use, be sure all knobs and switches are turned off.

TRANSPORT 3100

Once samples are collected and prepared for spinning, slide open the lid to the bowl and place the sample tubes into the shields. In the bottom of the shield there is a cushion for the tube to rest on. Do not remove this cushion and be sure there is no oil residue build-up.

Check to be sure there are no foreign objects inside the bowl. Close the lid.

Turn the motor speed switch clockwise, slowly at first, until the desired rpm is achieved. You can check rpm's with a hand held tachometer through the hole in the top of the lid. The tip to tip diameter of the tubes while spinning is 15.25". At 1525 rpm's you should achieve 500 rcf's. At 2000 rpm's you should achieve 865 rcf's. The motor in this unit is capable of turning 2200 rpm's or greater, achieving 1050 rcf's. Keep this in mind. Slower speeds are better for extending life of the unit. Keep bowl lid closed while the motor is running. After your specified time period for spinning, turn the motor speed control knob counterclockwise to the off position. Allow time for the motor to slow down before opening the lid. Open the lid and remove the samples.

DO NOT try to slow the trunnion arm down or place your hands or any object inside the bowl while the trunnion arm is spinning. Allow the trunnion arm to come to a complete stop before removing your sample.

When the centrifuge is not in use, be sure all knobs and switches are turned off.

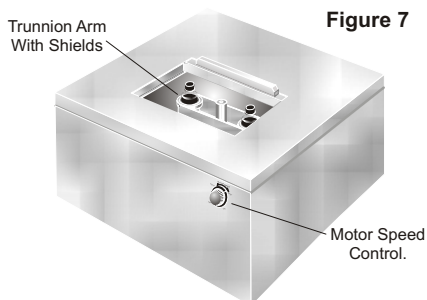


Figure 7

Industry Standard Procedure for Field Testing

1.0 Procedure

1.1 Fill each of two centrifuge tubes to exactly the 50mL/100-part mark with a sample taken directly from the sampling device. Then fill each tube with solvent to exactly the 100mL/200-part mark. Read the top of the meniscus at both the 50mL/100-part and 100mL/200-part marks. If experience indicates that a demulsifier is required and one has not already been added to the solvent, add to each tube the quantity of demulsifier-solvent stock solution that has previously been determined to be satisfactory for the crude oil under test. Stopper each tube tightly and invert the tubes a minimum of 10 times to ensure that the oil and solvent are uniformly mixed.

NOTE: Caution--In general, the vapor pressures of hydrocarbons at 60°C (140°F) are approximately double those at 40°C (104°F). Consequently, tubes should always be inverted at a position below eye level.

1.1.1 Where the crude oil is very viscous and mixing of the solvent with the oil is difficult, the solvent may be added to the centrifuge tube prior to the oil to facilitate mixing. In this case, extreme care must be taken to fill the centrifuge tube to exactly the 50mL/100-part mark with solvent and then to exactly the 100mL/200-part mark with the sample.

1.2 Loosen the stoppers to prevent pressure buildup during heating and immerse the tubes to the 100mL/200-part mark in a pre-heater. Heat the contents to 60°C ±3°C (140°F ±5°F).

1.3 Secure the stoppers and again invert the tubes 10 times to ensure uniform mixing of the oil and solvent.

1.4 Place the tubes in the trunnion cups on opposite sides of the centrifuge to establish a balanced condition. Retighten the stoppers and spin for at least 5 minutes at a minimum relative centrifugal force of 500. (For Transport Series Centrifuges--1525 RPM'S)

1.5 Immediately after the centrifuge comes to rest, verify the temperature. Do not disturb the oil-water interface with the thermometer. The test is invalid if the final temperature after centrifugation is below 52°C (125°F).

NOTE 8---If the final temperature is found to be below 52°C (125°F), adjust the centrifuge heater to increase the final test temperature and reinitiate the procedure, beginning with 1.2.

1.5.1 Read and record the combined volume of sediment and water at the bottom of each tube as indicated in Table 1 and Fig. 8a for 100mL tubes (Table 2 and Fig. 8b for 200-part tubes). Reheat both tubes to 60°C ±3°C (140°F ±5°F), return the tubes without agitation to the centrifuge, and spin for another 5 min at the same rate. Repeat this operation until two consecutive consistent readings are obtained on each tube.

1.6 For the test to be considered valid, a clear interface must be observed between the oil layer and the separated water. No identifiable layering (that is, an emulsion) should be present immediately above the oil-water interface. In such cases, one or more of the following remedies may be effective:

1.6.1 Shake the mixture between whirlings in the centrifuge just enough to disperse the emulsion.

1.6.2 Use a different or an increased amount of demulsifier. (The demulsifier should not, however, contribute to the volume of sediment and water.)

1.6.3 Use a different or an increased amount of solvent. After a satisfactory procedure for a particular type of oil has been worked out, it will ordinarily be suitable for all samples of the same crude oil.

2.0 Calculation and Report

2.1 Compare the readings of the two tubes. If the difference between the two readings is greater than one subdivision on the centrifuge tube or 0.025mL/0.05% for readings of 0.10mL/0.20% and below, the readings are not admissible and the determination shall be repeated.

2.2 If tubes graduated in 100mL have been used for the determination, record the sum of the final volumes of sediment and water in each tube obtained, as specified in Section 1, and report this sum as the percentage of sediment and water. Report the results as shown in Table 3.

2.3 If direct-reading 200-part tubes have been used for the determination, the percentage of sediment and water is the average, to three decimal places, of the values read directly from the two tubes. The percentage can only be read directly from a 200-part tube if the tube contains 100 parts of oil.

2.4 If the volume of oil is greater or less than 50mL/100-parts, calculate the percentage of sediment and water as follows:

Table 1 Procedure for Reading a 100mL Cone-Shaped Tube

Volume of Sediment and Water, mL	Read to Nearest, mL
0.0-0.2	0.025
0.2-1.0	0.05
>1.0	0.10

Table 2 Procedure for Reading a 200-Part Cone-Shaped Tube

Volume of Sediment and Water, %	Read to Nearest, %
0.0-0.4	0.05
0.4-2.0	0.10
>2.0	0.20

Sediment and water, percent = $(S/V) \times 100$

Where:

S = volume of sediment and water, mL or parts

V = volume of oil tested, mL or parts.

For example, if the total volume of oil tested (**V**) is 20mL and the volume of sediment and water (**S**) is 0.15mL:

Sediment and water, % = $(0.15/20) \times 100 = 0.75$

Table 3 Expression of Results

Volume of Sediment and Water, mL		Total Sediment and Water, %
Tube 1	Tube 2	
None Visible	Trace	0
None Visible	0.025	0.025
0.025	0.025	0.05
0.025	0.05	0.075
0.05	0.05	0.10
0.05	0.075	0.125
0.075	0.075	0.15
0.075	0.10	0.175
0.10	0.10	0.20
0.10	0.15	0.25

Figure 8a

Procedure for Reading Sediment
and Water in Sample Tubes
Reading in 100 mL

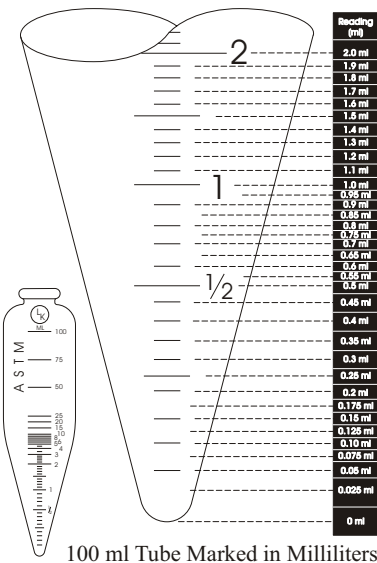
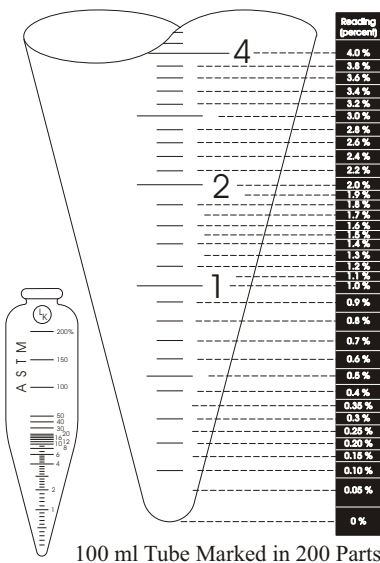


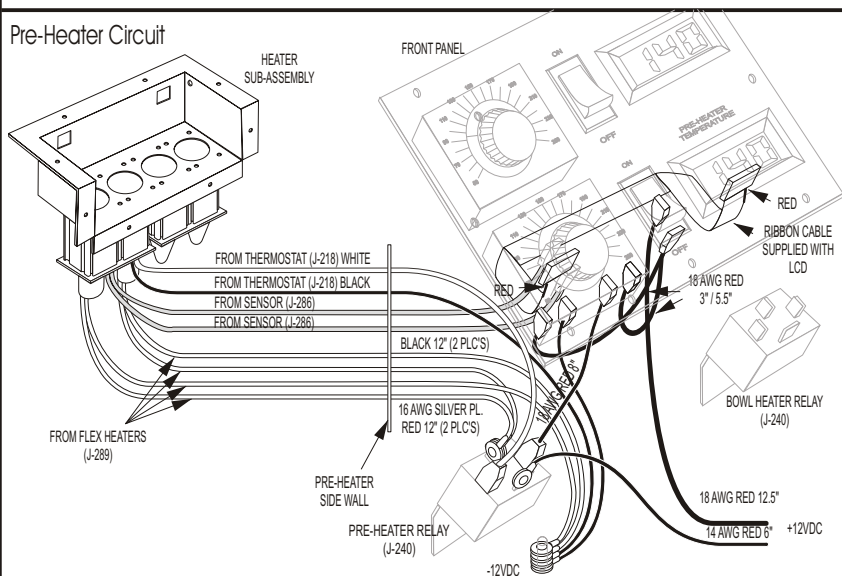
Figure 8b

Procedure for Reading Sediment
and Water in Sample Tubes
Reading in 200 Parts

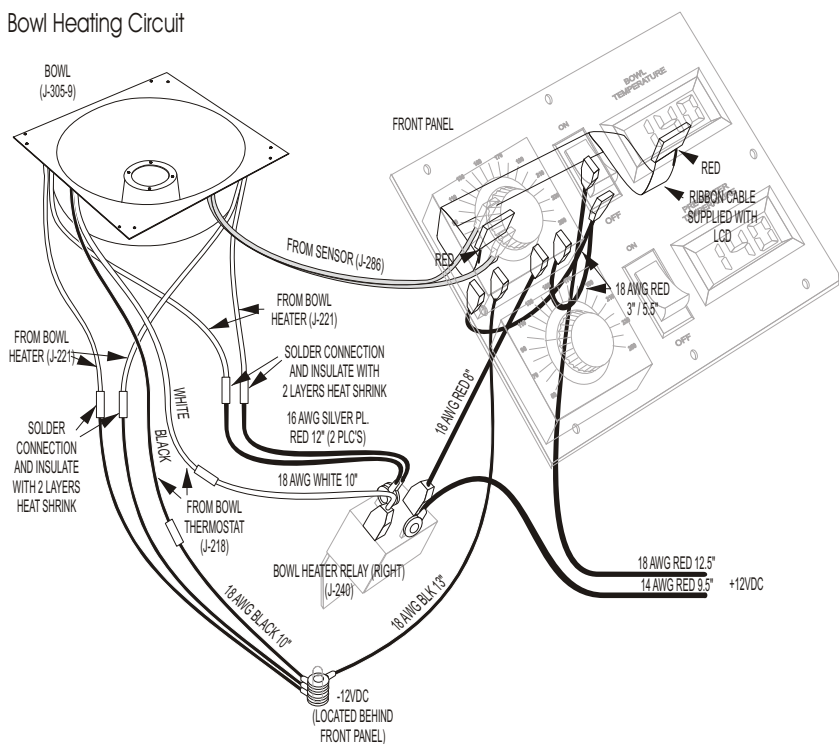


Transport 9100 Wiring Diagrams

Pre-Heater Circuit

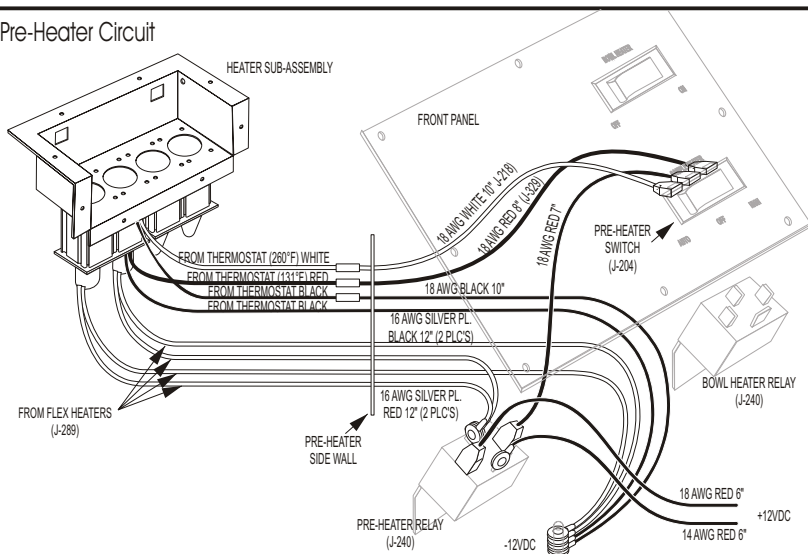


Bowl Heating Circuit

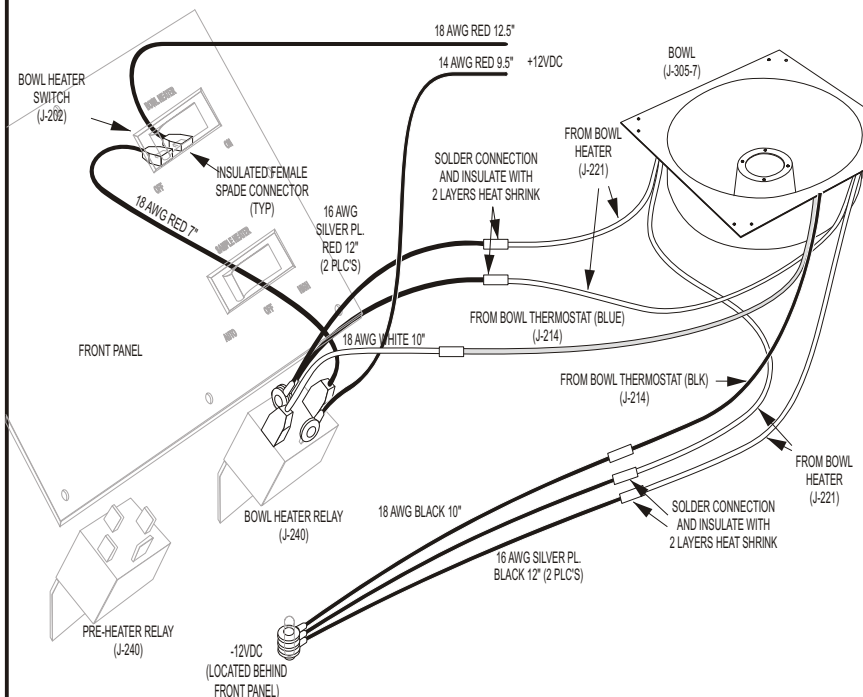


Transport 7100 Wiring Diagrams

Pre-Heater Circuit

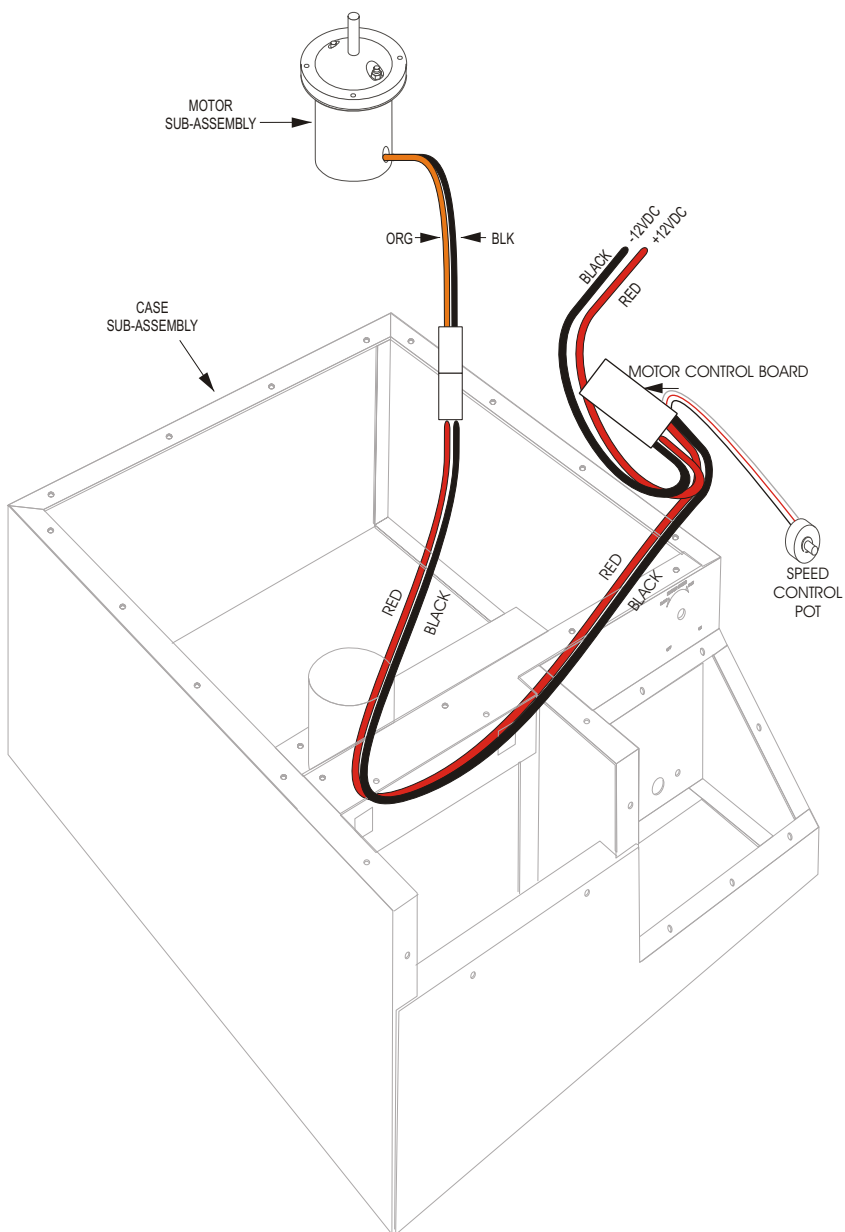


Bowl Heating Circuit

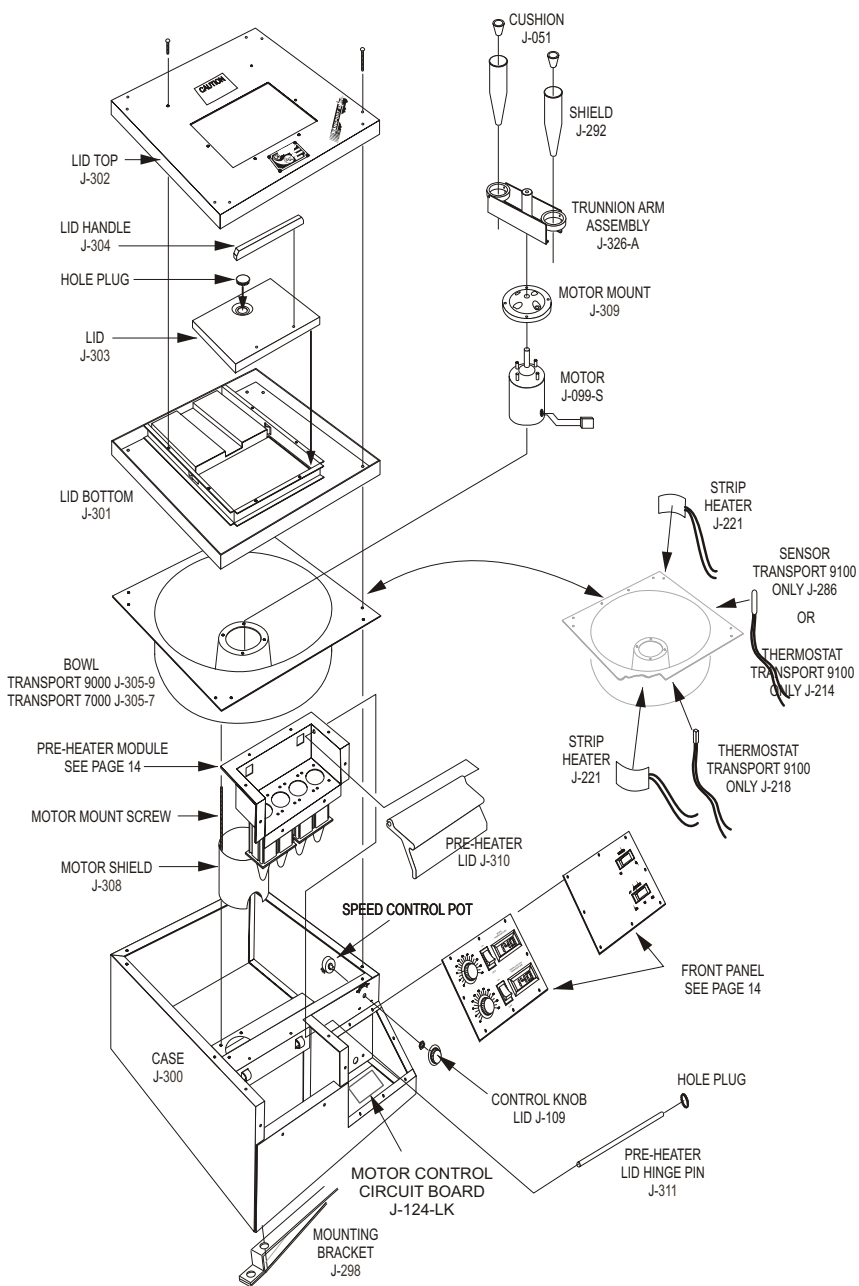


Transport 3100, 7100 & 9100 Wiring Diagrams

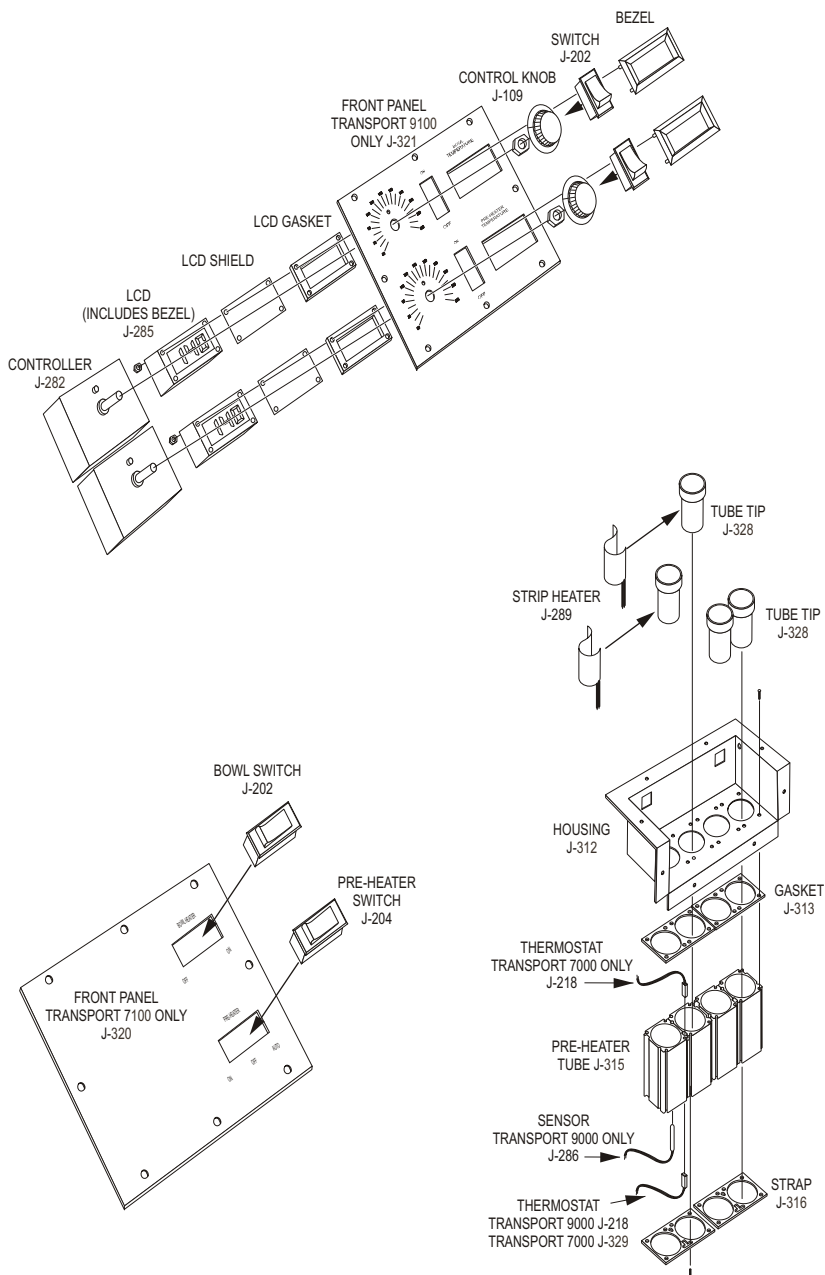
Motor Circuit



Transport 9100 & 7100 Parts List



Transport 9100 & 7100 Parts List



Model Number:

Serial Number:



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LIMITED WARRANTY

Your L-K Centrifuge is warranted against defective parts and workmanship for 1 (one) year under circumstances of normal use. If signs of unusual wear occur, parts will be repaired or replaced within this period at the discretion of the manufacturer. This warranty is void where situations of abuse are evident.

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