

# INSTALLATION AND OPERATION MANUAL

WITH PARTS LISTS



## MODELS

47631-066	47631-124	47631-131	47631-139
47631-067	47631-125	47631-132	47631-141
47631-068	47631-126	47631-133	47631-142
47631-069	47631-127	47631-134	47631-144
47631-078	47631-128	47631-135	47631-158
47631-121	47631-129	47631-137	47631-159
47631-122	47631-130	47631-138	47631-160
47631-123			

**THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO**

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# TABLE OF CONTENTS

<b>INTRODUCTION</b> .....	<b>PAGE I – 1</b>
WARRANTY INFORMATION .....	PAGE I – 1
<b>SAFETY – SECTION A</b> .....	<b>PAGE A – 1</b>
<b>INSTALLATION – SECTION B</b> .....	<b>PAGE B – 1</b>
GENERAL INFORMATION .....	PAGE B – 1
PREINSTALLATION INSPECTION .....	PAGE B – 1
CONTROL BOX INSTALLATION .....	PAGE B – 1
Enclosure .....	PAGE B – 1
CONTROL BOX DIMENSIONS .....	PAGE B – 1
PARTS LIST - CONTROL BOX .....	PAGE B – 3
ELECTRICAL CONNECTIONS .....	PAGE B – 3
Grounding Methods .....	PAGE B – 3
Field Wiring Connections (Incoming Power) .....	PAGE B – 4
Pump Motor Voltage Limits .....	PAGE B – 4
Power Cable Connections .....	PAGE B – 5
Control Box Specifications .....	PAGE B – 5
WIRING DIAGRAMS – CONTROL BOXES .....	PAGE B – 6
Control Box 47631–121 Pictorial Wiring Diagram .....	PAGE B – 6
Elementary Wiring Diagram .....	PAGE B – 7
47631–068 And 47631–125 Pictorial Wiring Diagram .....	PAGE B – 8
Elementary Wiring Diagram .....	PAGE B – 9
47631–122 Pictorial Wiring Diagram .....	PAGE B – 10
Elementary Wiring Diagram .....	PAGE B – 11
47631–069 And 47631–124 Pictorial Wiring Diagram .....	PAGE B – 12
Elementary Wiring Diagram .....	PAGE B – 13
47631–131 And 47631–137 Pictorial Wiring Diagram .....	PAGE B – 14
Elementary Wiring Diagram .....	PAGE B – 15
47631–126 Pictorial Wiring Diagram .....	PAGE B – 16
Elementary Wiring Diagram .....	PAGE B – 17
47631–142, 47631–158, 47631–159 And 47631–160 Pictorial Wiring Diagram .....	PAGE B – 18
Elementary Wiring Diagram .....	PAGE B – 19
47631–067, 47631–127, 47631–132 And 47631–138 Pictorial Wiring Diagram .....	PAGE B – 20
Elementary Wiring Diagram .....	PAGE B – 21
47631–066, 47631–128, 47631–133 And 47631–139 Pictorial Wiring Diagram .....	PAGE B – 22
Elementary Wiring Diagram .....	PAGE B – 23
47631–078, 47631–129, 47631–134 And 47631–141 Pictorial Wiring Diagram .....	PAGE B – 24
Elementary Wiring Diagram .....	PAGE B – 25
47631–123, 47631–130, 47631–135 And 47631–144 Pictorial Wiring Diagram .....	PAGE B – 26
Elementary Wiring Diagram .....	PAGE B – 27
Control Box Data .....	PAGE B – 28
Liquid Level Controls .....	PAGE B – 29
<b>OPERATION – SECTION C</b> .....	<b>PAGE C – 1</b>
CONTROL BOX FUNCTION .....	PAGE C – 1
Component Function .....	PAGE C – 1
<b>TROUBLESHOOTING – SECTION D</b> .....	<b>PAGE D – 1</b>
TROUBLESHOOTING CHART .....	PAGE D – 1
ELECTRICAL TESTING .....	PAGE D – 2
Test Equipment .....	PAGE D – 2

**TABLE OF CONTENTS**  
**(continued)**

Voltage Imbalance ..... PAGE D – 2  
Capacitors ..... PAGE D – 2  
Start Relay ..... PAGE D – 2

# INTRODUCTION

**Read this manual** carefully to learn how to safely install and operate your control box. Failure to do so could result in personal injury or damage to the control box or the pump.

This manual does not include maintenance instructions. Have a qualified electrician perform all maintenance. **Be sure** to follow all safety precautions as outlined by the National Electric Code and all local codes.

The control box is a rainproof enclosure with a padlockable front cover. **The enclosure is not designed to be watertight, and should not be submerged.** They are designed for use with 115, 220, 230, 460, 575 and 380 volts, depending on your pump. The integral electric motor of the submersible pump **must** be operated through the control box. The control box is **not** explosion-proof and should not be operated in a hazardous atmosphere.

Because pump installations are seldom identical, this manual cannot possibly provide detailed instructions and precautions for every aspect of each specific application. Therefore, it is the responsibility of the owner/installer of the pump to ensure that applications not addressed in this manual are performed **only** after establishing that neither operator safety nor pump integrity are compromised by the installation. Pumps and related equipment **must** be installed and operated according to all national, local and industry standards.

If there are any questions regarding the control box which are not covered in this manual or in other literature accompanying the unit, please contact your Gorman-Rupp distributor or the Gorman-Rupp Company:

**The Gorman-Rupp Company**  
P.O. Box 1217  
Mansfield, Ohio 44901-1217  
or:  
**Gorman-Rupp of Canada Limited**  
70 Burwell Road  
St. Thomas, Ontario N5P 3R7

## RECORD CONTROL BOX NUMBER

Please record the control box number, voltage, and phase in the spaces provided below. Your Gorman-Rupp distributor needs this information when you require parts or service.

Control Box: \_\_\_\_\_

Voltage: \_\_\_\_\_

Phase: \_\_\_\_\_

## WARRANTY INFORMATION

The warranty provided with your control box is part of Gorman-Rupp's support program for customers who operate and maintain their equipment as described in this and the other accompanying literature. Please note that should the equipment be abused or modified to change its performance beyond the original factory specifications, the warranty will become void and any claim will be denied.

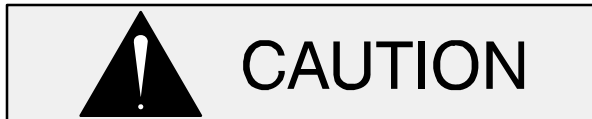
The following are used to alert personnel to procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel:



**Immediate hazards which WILL result in severe personal injury or death. These instructions describe the procedure required and the injury which will result from failure to follow the procedure.**



**Hazards or unsafe practices which COULD result in severe personal injury or death. These instructions describe the procedure required and the injury which could result from failure to follow the procedure.**



Hazards or unsafe practices which COULD result in minor personal injury or product or property damage. These instructions describe the requirements and the possible

damage which could result from failure to follow the procedure.

**NOTE**

*Instructions to aid in installation, operation, and maintenance or which clarify a procedure.*

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## SAFETY – SECTION A

The following information applies throughout this manual to Gorman-Rupp Control Boxes.

Because pump installations are seldom identical, this manual cannot possibly provide detailed instructions and precautions for each specific application. Therefore, it is the owner/installer's responsibility to ensure that applications not addressed in this manual are performed only after establishing that neither operator safety nor pump integrity are compromised by the installation.



Before attempting to install, operate, or wire this control box, familiarize yourself with this manual, and with all other literature shipped with the control box. Unfamiliarity with all aspects of control operation covered in this manual could lead to destruction of equipment, injury, or death to personnel.



Before connecting any cable to the control box, be sure to ground the control box. See Section B for suggested grounding methods.



The control box provides overload protection and power control. Do not connect the pump motor directly to the incoming power lines. If the power circuit breaker or overload relay is tripped dur-

ing operation, correct the problem before resetting or replacing.



The electrical power used to operate this control box is high enough to cause injury or death. Obtain the services of a qualified electrician to make all electrical connections. Make certain that the enclosure is properly grounded; never use gas pipe as an electrical ground. Be sure that the incoming power matches the voltage and phase of the control before connecting the power source. Do not make electrical connections if the voltage is not within the limits. If the overload unit is tripped during operation, correct the problem before restarting.



The electrical power used to operate this control box is high enough to cause injury or death. Make certain that the control handle on the control box is in the OFF position and locked out, or that the power supply to the control box has been otherwise cut off and locked out, before attempting to open or service the control box. Tag electrical circuits to prevent accidental start-up.



Do not install and operate a non-explosion proof control box in an explosive atmosphere. Install, connect, and operate the control box in accordance with MSHA Schedule 2G. If there is a conflict

between the instructions in the manual accompanying the unit and MSHA, MSHA shall take precedence. All electrical equipment supplied with this control box conformed to applicable federal regulations and National codes in effect on the date of manufacture.



Obtain the services of a qualified elec-

trician to troubleshoot, test and/or service the electrical components of this control box.



Do not attempt to repair individual components of the control box. Any component which fails should be replaced.

## INSTALLATION – SECTION B

### GENERAL INFORMATION

Review all SAFETY information in Section A.

This section is intended only to summarize recommended installation practices for the control box. If there are any questions concerning your specific application, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

### PREINSTALLATION INSPECTION

The control box was inspected before shipment from the factory. Before installation, inspect the control for damage which may have occurred during shipment. Check as follows:

- a. Inspect the control box for cracks, dents, and other obvious damage.
- b. Check that all control box components are securely attached to their mounting surfaces, and that the electrical connections are tight and free of corrosion.
- c. Compare the amperes, phase, voltage and hertz indicated on the pump motor nameplate to the ratings indicated for the control box.
- d. Carefully read all tags, decals, and markings on the control box.

If anything appears to be abnormal, contact your Gorman-Rupp distributor or the factory to determine the repair policy. **Do not** put the control box into service until appropriate action has been taken.

### CONTROL BOX INSTALLATION



**The control box furnished with the pump is designed to operate the pump.**

**The control box provides overload protection and power control. Do not connect the pump motor directly to the incoming power lines.**

### Enclosure

The control box is a NEMA Type 3R rainproof enclosure with a padlockable front cover. **The enclosure is not designed to be watertight, and should not be submerged.**

No mounting hardware is furnished with the control box. Secure the control box vertically on a level surface, above flood level. The control should be mounted on a flat surface. If the mounting surface is not perfectly flat, it may be necessary to use shims (not supplied) with the enclosure. The box should be easily accessible to the operator, and located close enough to the pump to avoid excessive voltage drop due to cable length.



Failure to mount the control box vertically on a level surface may affect operation of the pump controls.

After the box is securely installed, make certain the front cover latches properly before installing any electrical lines.

### CONTROL BOX DIMENSIONS

For the approximate physical dimensions of your control box, refer to Figure B-1.



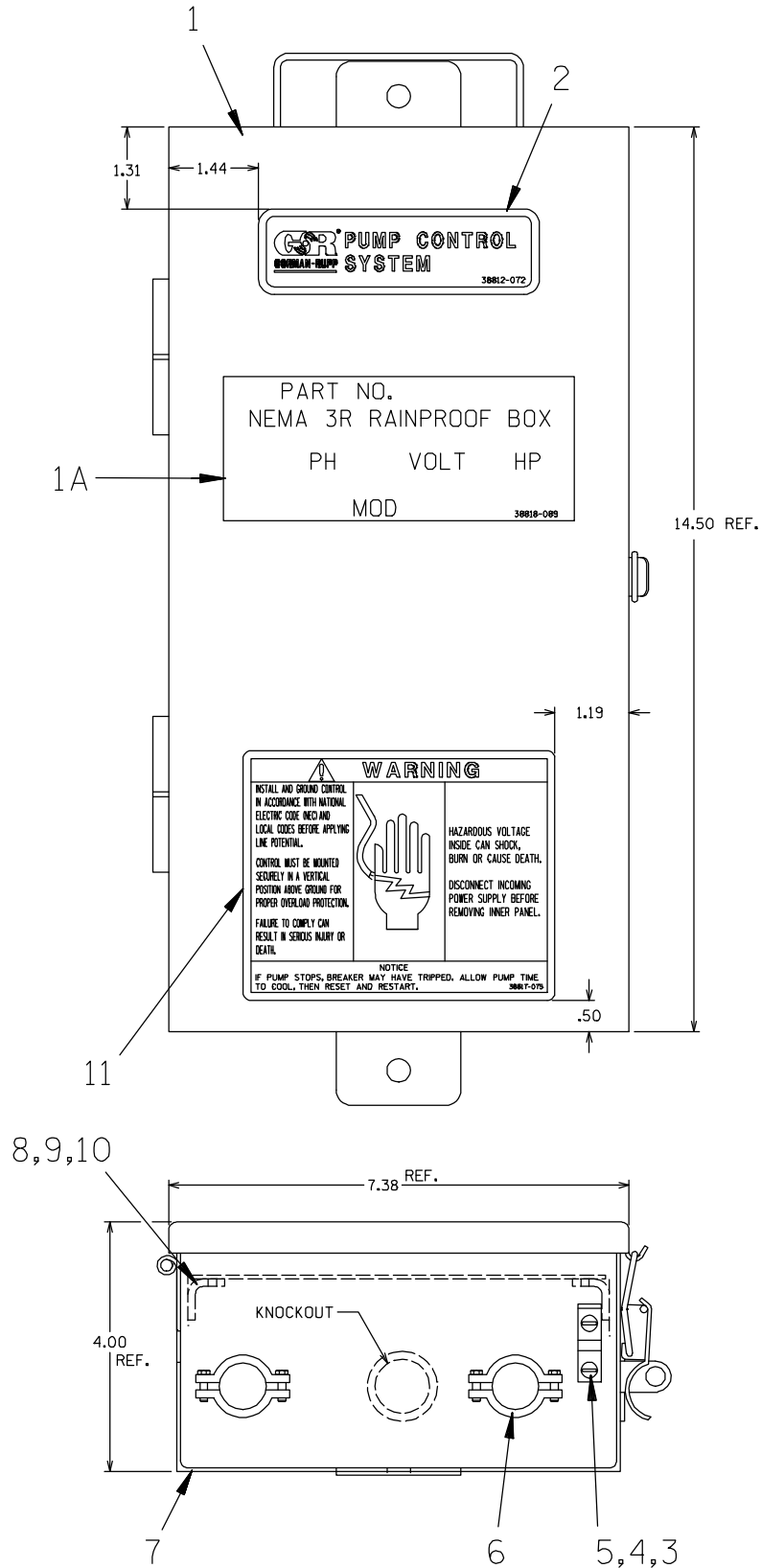


Figure 1. NEMA Size 3R Control Box Dimension

## PARTS LIST CONTROL BOX

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
1	FRONT COVER	SEE TABLE 2 AT END OF SECTION		
1A	FRONT STICKER	SEE TABLE 2 AT END OF SECTION		
2	PUMP CONTROL SYSTEM STICKER	38812-072	-----	1
3	GROUND LUG	27222-002	-----	2
4	PHILLIPS HD. MACHINE SCREW	21771-553	-----	1
5	HEX NUT	D#08	15991	1
6	CABLE CLAMP	27184-164	-----	2
7	CONTROL BOX SUB-ASSEMBLY	42821-241	-----	1
8	WARNING STICKER (INNER PANEL)	38817-075	-----	1
9	INNER PANEL	33643-097	-----	2
10	PHILLIPS HD. MACHINE SCREW	21771-553	-----	4
11	WARNING STICKER	38817-075	-----	1
12	HEAT SHRINK TUBE	31412-056	19530	2

### ELECTRICAL CONNECTIONS



Obtain the services of a qualified electrician to make all electrical connections and to service the control box.



The electrical power used in this control box is high enough to cause injury or death. Make certain that the control box is properly grounded after installation. Make certain that the power source phase and voltage matches the data on the control box. Complete all electrical connections before connecting the power supply to the control box. Make certain to ground the appropriate lead

of the power source before connecting power to the control. Make certain that the control box is properly grounded after installation.

#### Grounding Methods

Electrically ground the installation before connecting the field wiring to the control box. Install a grounding terminal to the enclosure and connect it to a properly embedded electrode.

The material used for the electrode **must** be an excellent conductor of electricity, such as copper. If iron or steel is used, it must be galvanized or otherwise metal plated to resist corrosion. **Do not** coat the electrode with any material of poor conductivity, such as paint or plastic.

The electrode must conform to the recommendations of N.E.C. ARTICLE 250. Follow all installation requirements of the N.E.C., and all applicable codes. See Figure B-2 for some suggested grounding methods.

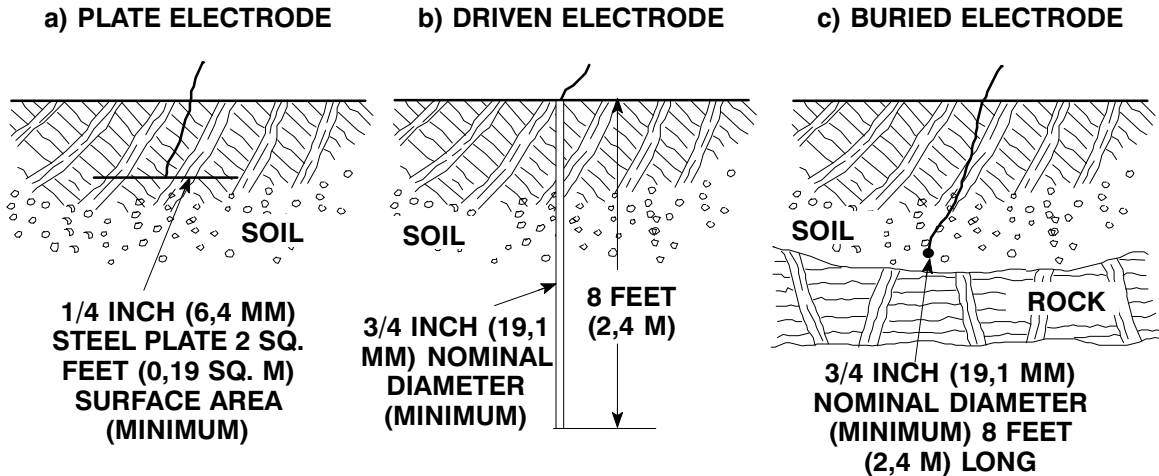


Figure B-2. Suggested Grounding Methods

- a. **Plate Electrode:** An iron or steel plate, 1/4 inch (6,4 mm) thick, completely impeded in the ground. The plate must present a surface area of at least 2 square feet (1858,1 sq. cm).
  - b. **Driven Electrode:** A rod or pipe, 3/4 inch (19,1 mm) in diameter minimum, 8 feet (2,4 m) long, completely driven into the ground.
  - c. **Buried electrode:** If rock or stone prevents embedding the full 8 foot (2,4 m) length of the ground rod, bury it horizontally in a trench.
- Space the ground rod or plates at least 6 feet (1,8 m) from any other electrode or ground rod, such as those used for signal circuits, radio grounds, lightning rods, etc.

The earth surrounding the ground rod or plate **must** contain enough moisture to make a good electrical connection. In dry or sandy areas, pour water around the rod, or consult qualified personnel to devise a method of improving the connection.

**Field Wiring Connections (Incoming Power)**



**The electrical power used to operate this pump is high enough to cause injury or death. Obtain the services of a qualified electrician to make all electrical connections. Make certain that the pump and enclosure are properly**

**grounded; never use gas pipe as an electrical ground. Be sure that the incoming power matches the voltage and phase of the pump and control before connecting the power source. Do not run the pump if the voltage is not within the limits.**

The control is designed to regulate the power supply. The field wiring must be properly sized to ensure an adequate voltage supply. The voltage available **at the pump motor** must be within the indicated range.

Table 1. Pump Motor Voltage Limits

Nominal Voltage	Phase	Minimum Voltage	Maximum Voltage
115	1	110	120
200	1	190	210
220 (50 Hz)	1	209	230
230	1	220	240
230	3	210	250
380 (50 Hz)	3	345	415
460	3	420	500
575	3	520	630

If the voltage is not within the recommended limits, obtain the services of a qualified electrician to determine the correct field wiring size and other details to ensure an adequate voltage supply.

Make certain all connections are tight and that cable entry points are rainproof. Support the cable

weight, if required, to prevent excessive strain on cable clamps and cable.

### NOTE

*After the power cables have been connected to the control box, make certain the connection is waterproof.*

---

### Power Cable Connections



The electrical power used to operate the control box is high enough to cause injury or death. Obtain the services of a qualified electrician to make all electrical connections. Make certain that incoming power to the control box is in the off position and locked out, or that the power supply to the control box has been otherwise cut off and locked out, before connecting power or accessory cables.

When necessary to change or connect power cables to the control box, make certain the incoming power is **OFF** and **LOCKED OUT**. Make certain the control box is **properly grounded** and that the electrical data on the control matches the pump motor name plate data.

Connect the power cable to the control box as shown in the wiring diagrams in this section. Use conduit or cable clamps to secure the power and accessory cables to the control box. Make certain that all connections are tight and that cable entry points are rainproof.

### Control Box Specifications

Overload relays are provided to protect the pump motor.



If burnout of the overload protection occurs, the complete overload protection must be replaced.

WIRING DIAGRAM

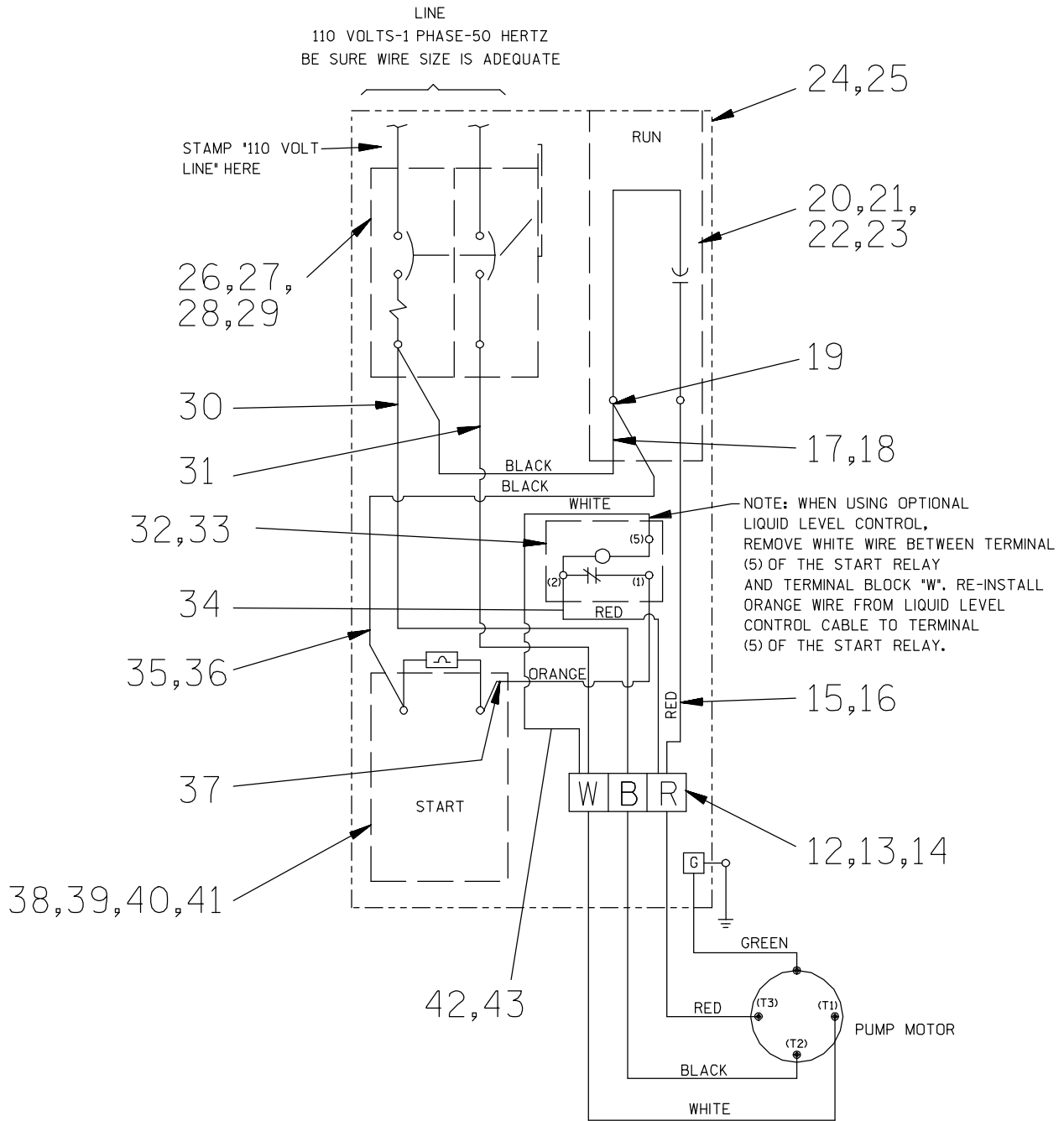


Figure B-3. Control Box 47631-121 Pictorial Wiring Diagram

For specific control box data information, refer to the chart at the end of this section.

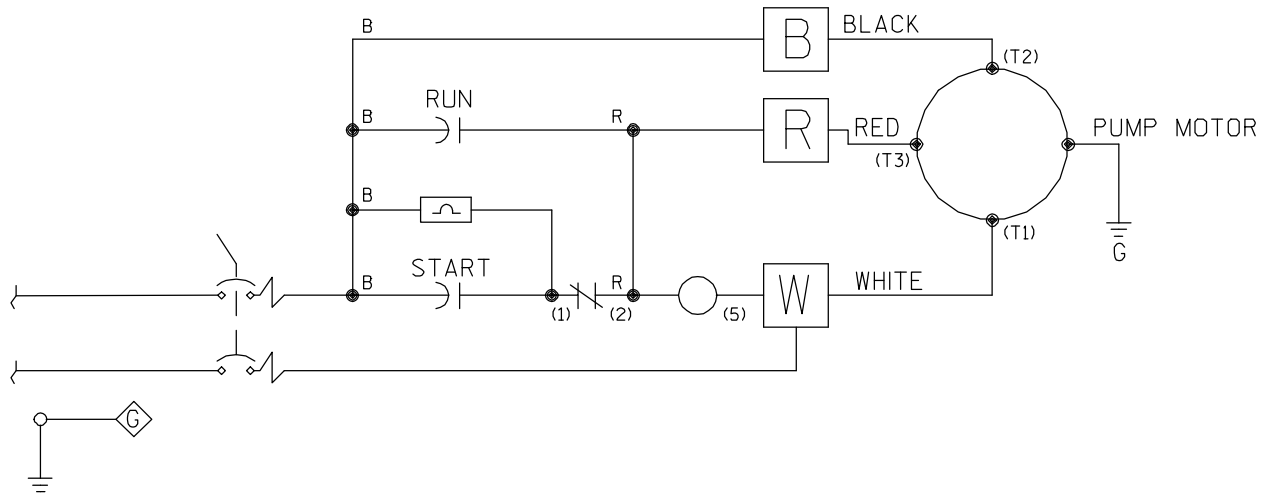


Figure B-4. Control Box 47631-121 Elementary Wiring Diagram

REPAIR PARTS LIST

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	END BARRIER	27233-026	-----	1	28	OVERLOAD UNIT	SEE TABLE 2		
13	TERMINAL BLOCK	27233-216	-----	3	29	PHIL HD MACH SCREW	21771-552	-----	2
14	PHIL HD MACH SCREW	21771-552	-----	2	30	#10 AWG TEW/AWM BLK	18162-043	-----	1
15	FEMALE CONNECTOR	S1768	-----	1	31	#10 AWG TEW/AWM WHT	18162-041	-----	1
16	#10 AWG TEW/AWM RED	18162-042	-----	1	32	START RELAY	SEE TABLE 2		
17	#10 AWG TEW/AWM BLK	18162-043	-----	1	33	PHIL HD MACH SCREW	21771-551	-----	1
18	FEMALE CONNECTOR	S1768	-----	1	34	#14 AWG TEW/AWM RED	18162-022	-----	1
19	FEMALE CONNECTOR	S1790	-----	1	35	FEMALE CONNECTOR	27236-052	-----	2
20	RUN CAPACITOR	SEE TABLE 2			36	#14 AWG TEW/AWM BLK	18162-023	-----	1
21	PHIL HD MACH SCREW	21771-552	-----	2	37	#14 AWG TEW/AWM ORG	18162-026	-----	1
22	RUN CAP BRACKET	27581-906	-----	2	38	START CAPACITOR	SEE TABLE 2		
23	PHIL HD MACH SCREW	21771-551	-----	1	39	START CAP BRACKET	27581-901	-----	1
24	SUB-PLATE	34621-153	15121	1	40	CAPACITOR CAP	27588-011	-----	1
25	PHIL HD MACH SCREW	21771-551	-----	4	41	FLAT PH HD MACH SCR	CG#10-01 1/2S 15991		2
26	FLAT WASHER	K#08	15991	4	42	#14 AWG TEW/AWM WHT	18162-021	-----	1
27	PHIL HD MACH SCREW	21771-553	-----	2	43	FEMALE CONNECTOR	27236-043	-----	3

WIRING DIAGRAM

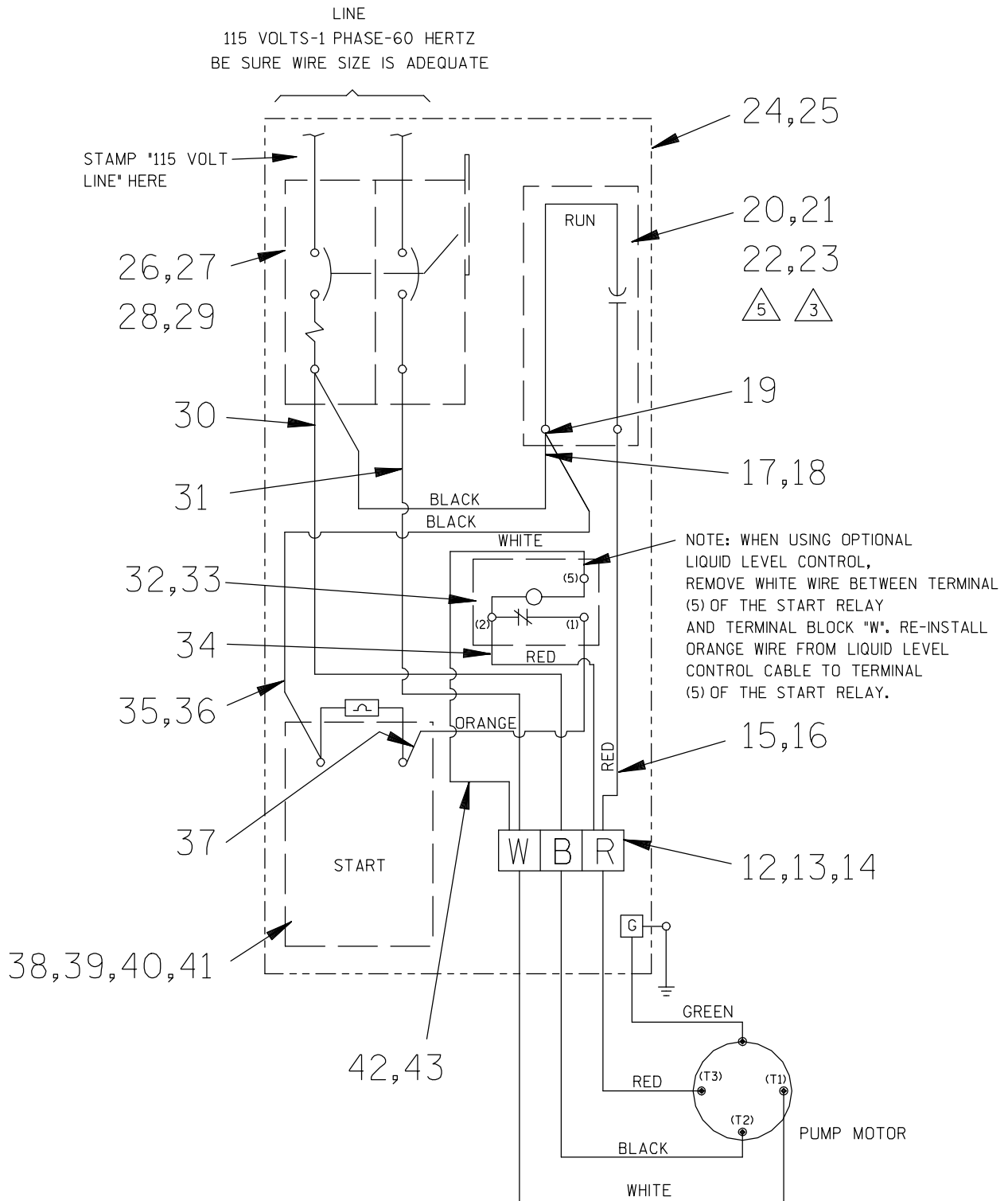


Figure B-5. Control Boxes 47631-068 And 47631-125 Pictorial Wiring Diagram

For specific control box data information, refer to the chart at the end of this section.

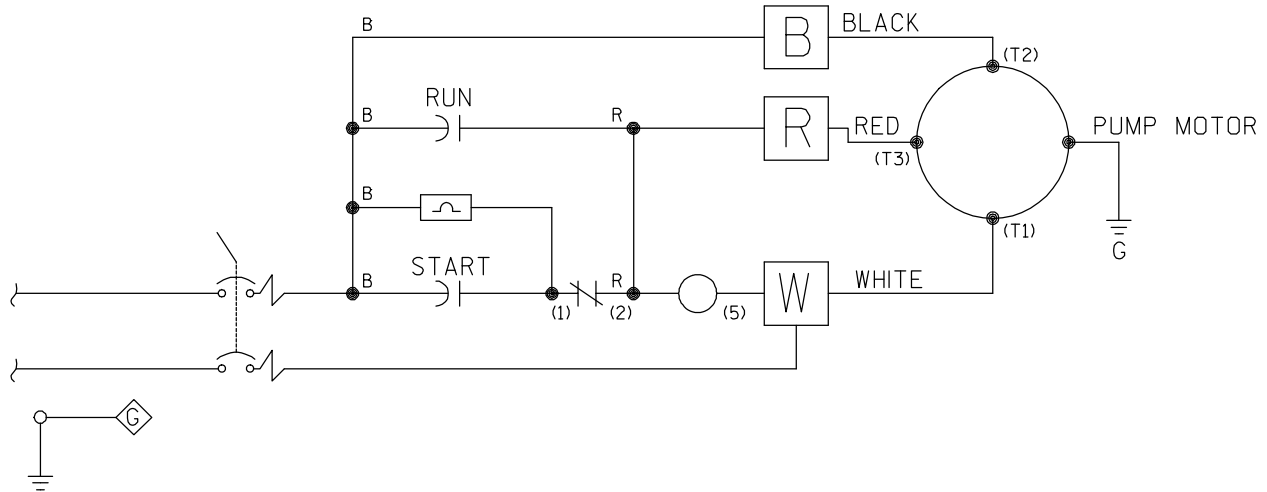


Figure B-6. Control Boxes 47631-068 And 47631-125 Elementary Wiring Diagram

REPAIR PARTS LIST

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	END BARRIER	27233-026	-----	1	28	OVERLOAD UNIT	SEE TABLE 2		
13	TERMINAL BLOCK	27233-216	-----	3	29	PHIL HD MACH SCREW	21771-552	-----	2
14	PHIL HD MACH SCREW	21771-552	-----	2	30	#10 AWG TEW/AWM BLK	18162-043	-----	1
15	FEMALE CONNECTOR	S1768	-----	1	31	#10 AWG TEW/AWM WHT	18162-041	-----	1
16	#10 AWG TEW/AWM RED	18162-042	-----	1	32	START RELAY	SEE TABLE 2		
17	#10 AWG TEW/AWM BLK	18162-043	-----	1	33	PHIL HD MACH SCREW	21771-551	-----	1
18	FEMALE CONNECTOR	S1768	-----	1	34	#14 AWG TEW/AWM RED	18162-022	-----	1
19	FEMALE CONNECTOR	S1790	-----	1	35	FEMALE CONNECTOR	27236-052	-----	2
20	RUN CAPACITOR	SEE TABLE 2			36	#14 AWG TEW/AWM BLK	18162-023	-----	1
21	PHIL HD MACH SCREW	21771-552	-----	2	37	#14 AWG TEW/AWM ORG	18162-026	-----	1
22	RUN CAP BRACKET	27581-906	-----	2	38	START CAPACITOR	SEE TABLE 2		
23	PHIL HD MACH SCREW	21771-551	-----	1	39	START CAP BRACKET	27581-901	-----	1
24	SUB-PLATE	34621-153	15121	1	40	CAPACITOR CAP	27588-011	-----	1
25	PHIL HD MACH SCREW	21771-551	-----	4	41	FLAT PH HD MACH SCR	CG#10-01 1/2S 15991		2
26	FLAT WASHER	K#08	15991	4	42	#14 AWG TEW/AWM WHT	18162-021	-----	1
27	PHIL HD MACH SCREW	21771-553	-----	2	43	FEMALE CONNECTOR	27236-043	-----	3



WIRING DIAGRAM

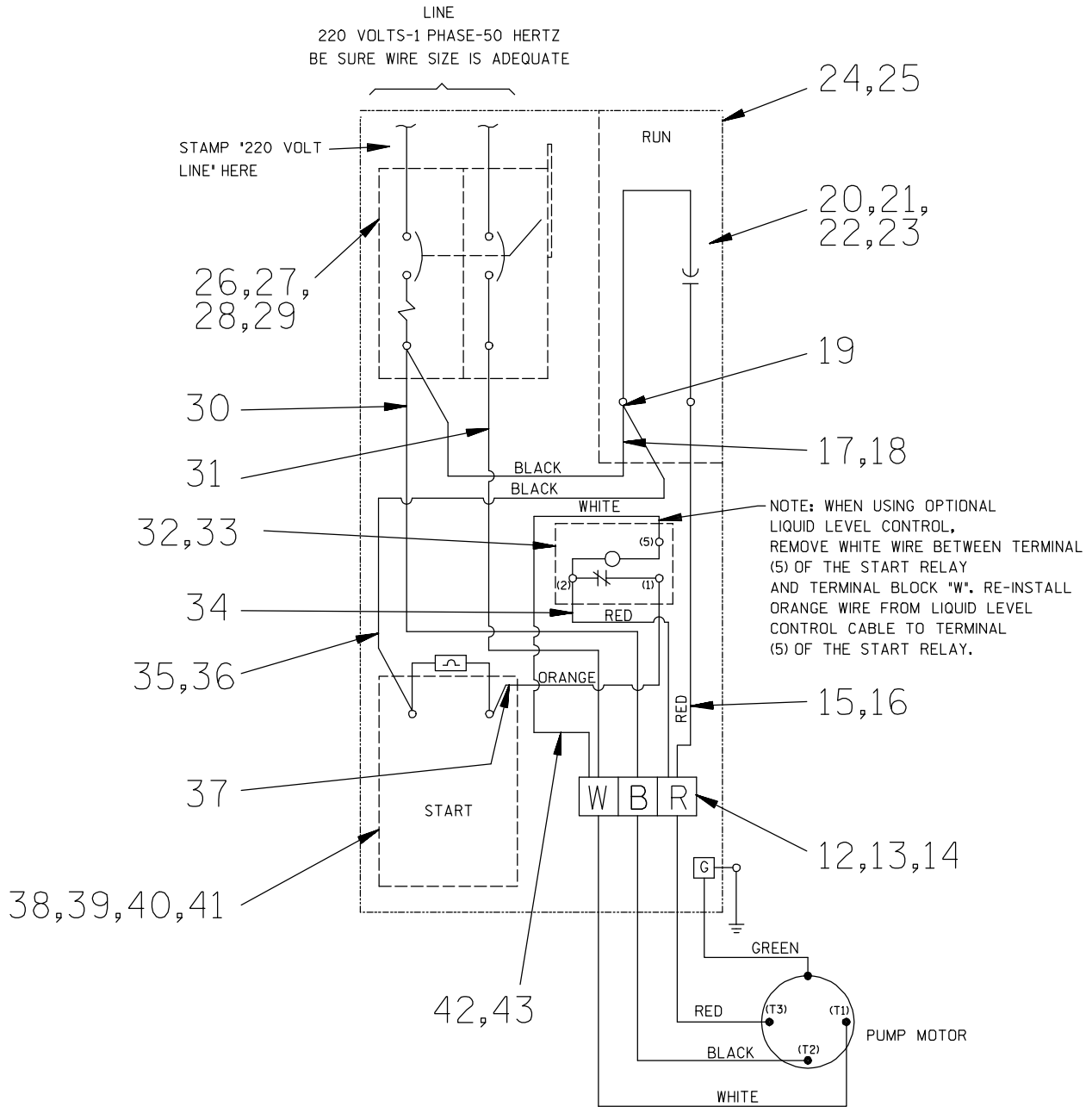


Figure B-7. Control Box 47631-122 Pictorial Wiring Diagram

For specific control box data information, refer to the chart at the end of this section.

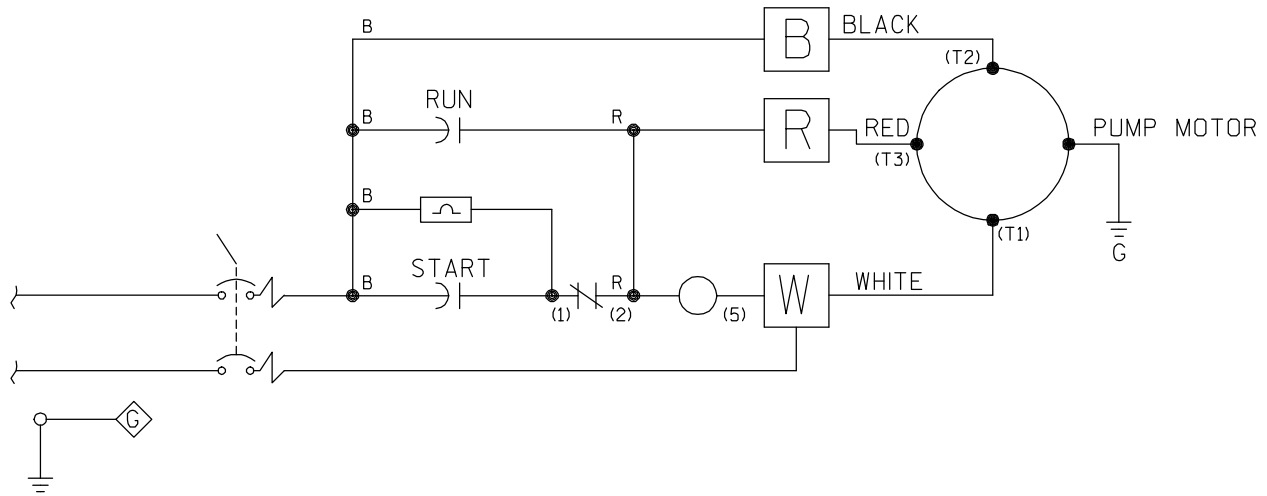


Figure B-8. Control Box 47631-122 Elementary Wiring Diagram

REPAIR PARTS LIST

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	END BARRIER	27233-026	-----	1	28	OVERLOAD UNIT	SEE TABLE 2		
13	TERMINAL BLOCK	27233-216	-----	3	29	PHIL HD MACH SCREW	21771-552	-----	2
14	PHIL HD MACH SCREW	21771-552	-----	2	30	#10 AWG TEW/AWM BLK	18162-043	-----	1
15	FEMALE CONNECTOR	S1768	-----	1	31	#10 AWG TEW/AWM WHT	18162-041	-----	1
16	#10 AWG TEW/AWM RED	18162-042	-----	1	32	START RELAY	SEE TABLE 2		
17	#10 AWG TEW/AWM BLK	18162-043	-----	1	33	PHIL HD MACH SCREW	21771-551	-----	1
18	FEMALE CONNECTOR	S1768	-----	1	34	#14 AWG TEW/AWM RED	18162-022	-----	1
19	FEMALE CONNECTOR	S1790	-----	1	35	FEMALE CONNECTOR	27236-052	-----	2
20	RUN CAPACITOR	SEE TABLE 2			36	#14 AWG TEW/AWM BLK	18162-023	-----	1
21	PHIL HD MACH SCREW	21771-552	-----	2	37	#14 AWG TEW/AWM ORG	18162-026	-----	1
22	RUN CAP BRACKET	27581-906	-----	2	38	START CAPACITOR	SEE TABLE 2		
23	PHIL HD MACH SCREW	21771-551	-----	1	39	START CAP BRACKET	27581-901	-----	1
24	SUB-PLATE	34621-153	15121	1	40	CAPACITOR CAP	27588-014	-----	1
25	PHIL HD MACH SCREW	21771-551	-----	4	41	FLAT PH HD MACH SCR	CG#10-01 1/2S 15991		2
26	FLAT WASHER	K#08	15991	4	42	#14 AWG TEW/AWM WHT	18162-021	-----	1
27	PHIL HD MACH SCREW	21771-553	-----	2	43	FEMALE CONNECTOR	27236-043	-----	3

WIRING DIAGRAM

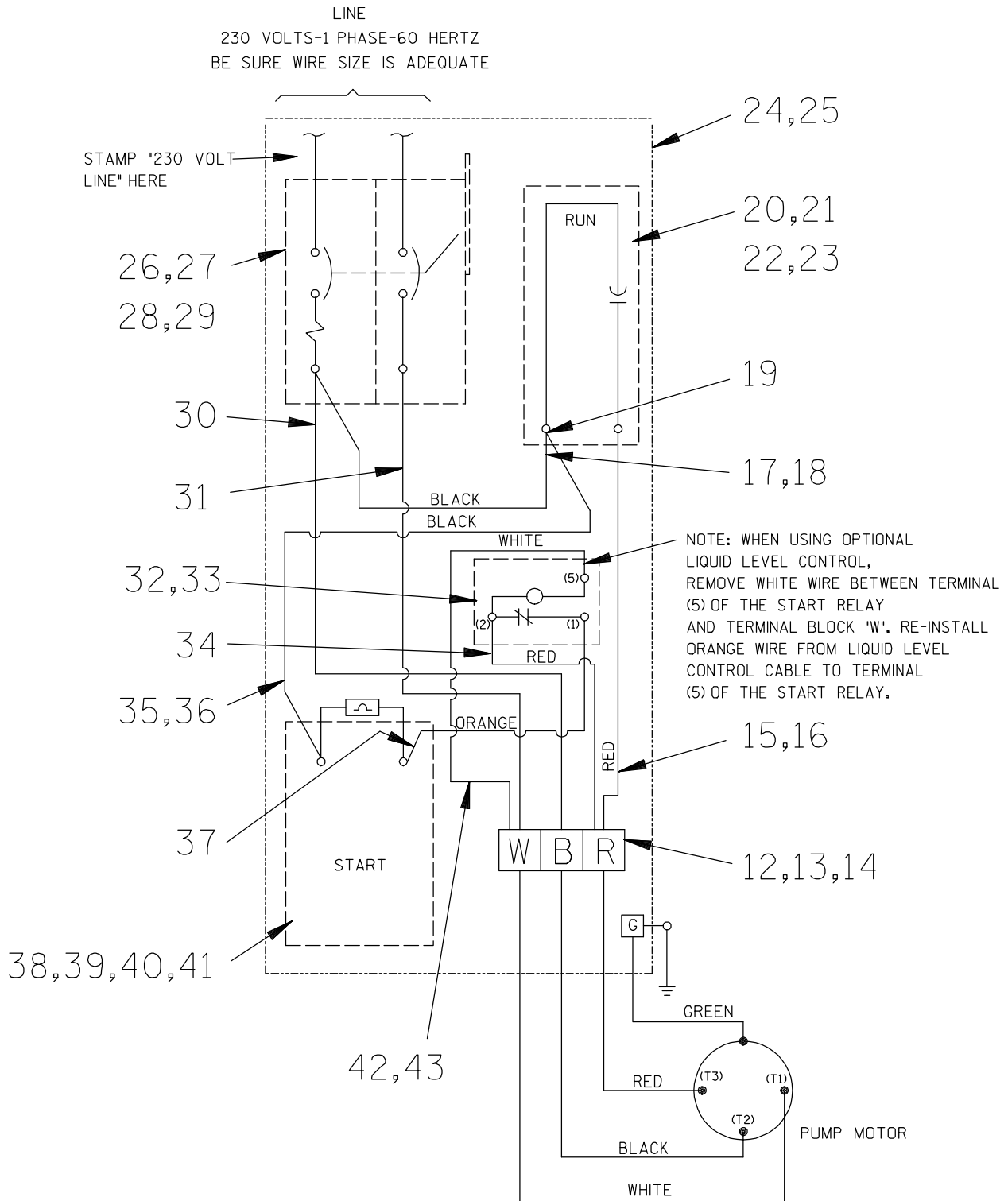


Figure B-9. Control Boxes 47631-069 And 47631-124 Pictorial Wiring Diagram

For specific control box data information, refer to the chart at the end of this section.

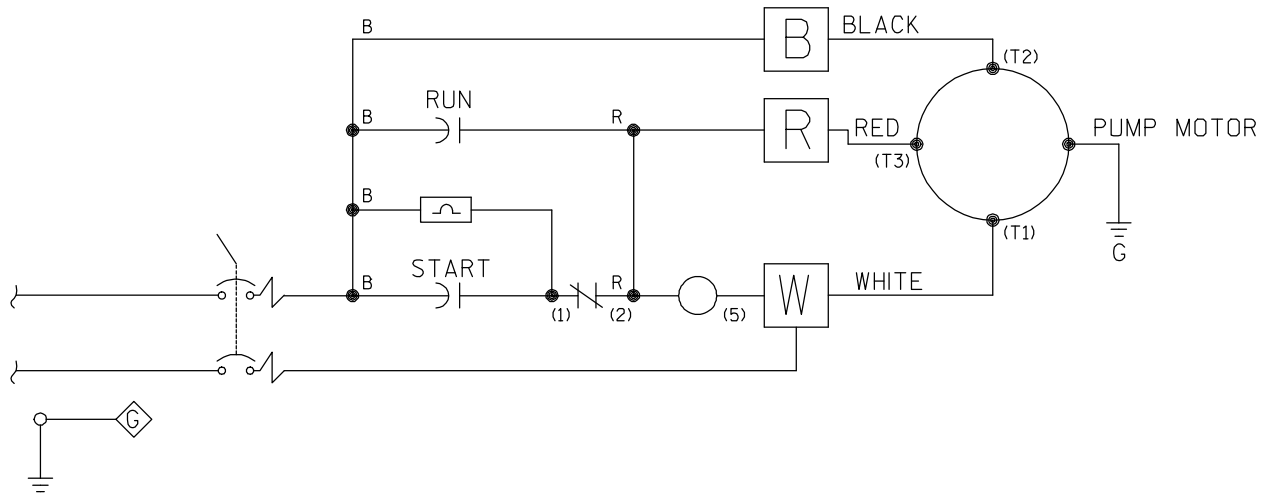
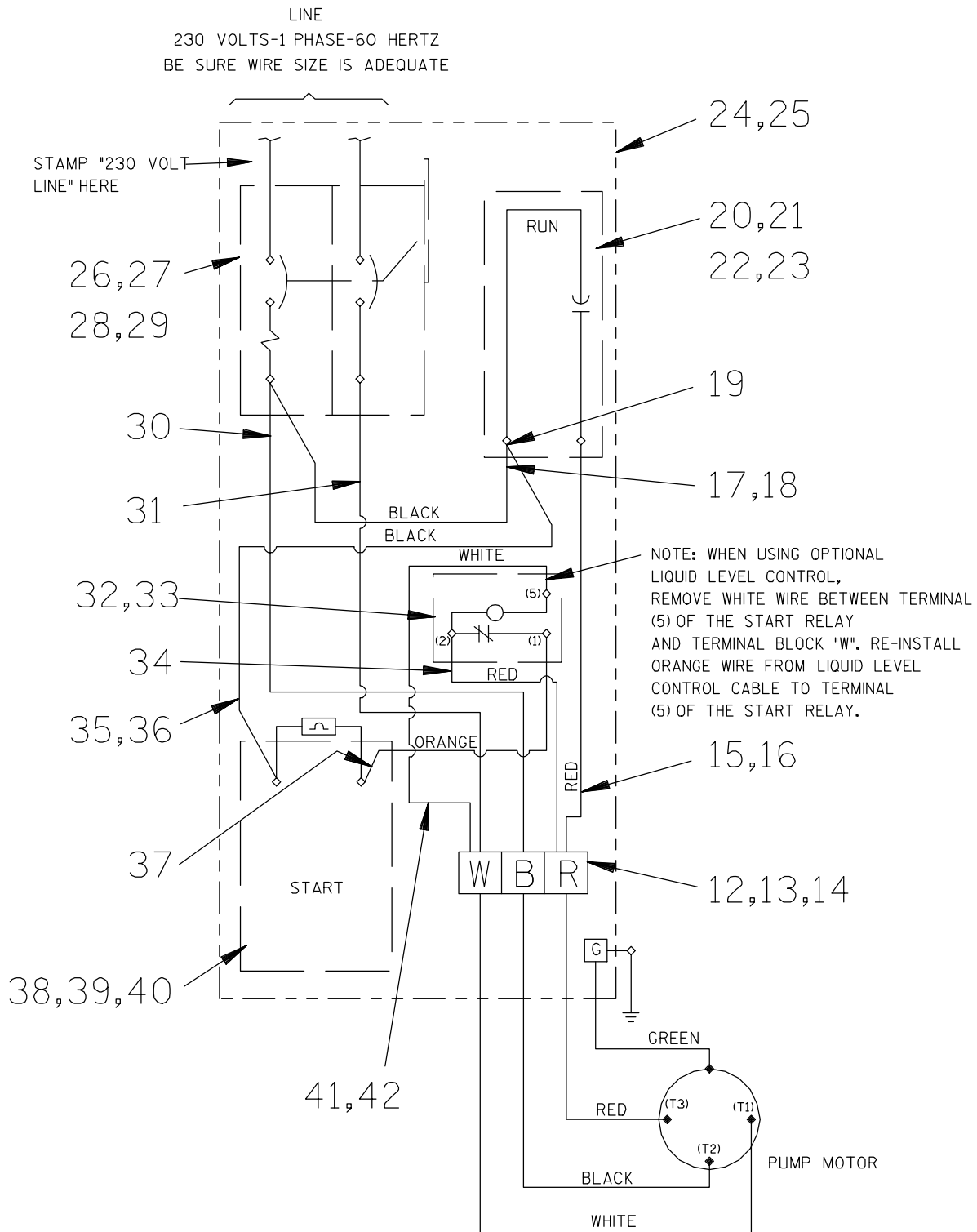


Figure B-10. Control Boxes 47631-069 And 47631-124 Elementary Wiring Diagram

REPAIR PARTS LIST

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	END BARRIER	27233-026	-----	1	27	PHIL HD MACH SCREW	21771-553	-----	2
13	TERMINAL BLOCK	27233-216	-----	3	28	OVERLOAD UNIT	SEE TABLE 2		
14	PHIL HD MACH SCREW	21771-552	-----	2	29	PHIL HD MACH SCREW	21771-552	-----	2
15	FEMALE CONNECTOR	S1768	-----	1	30	#10 AWG TEW/AWM BLK	18162-043	-----	1
16	#10 AWG TEW/AWM RED	18162-042	-----	1	31	#10 AWG TEW/AWM WHT	18162-041	-----	1
17	#10 AWG TEW/AWM BLK	18162-043	-----	1	32	START RELAY	SEE TABLE 2		
18	FEMALE CONNECTOR	S1768	-----	1	33	PHIL HD MACH SCREW	21771-551	-----	1
19	FEMALE CONNECTOR	S1790	-----	1	34	#14 AWG TEW/AWM RED	18162-022	-----	1
20	RUN CAPACITOR	SEE TABLE 2			35	FEMALE CONNECTOR	27236-052	-----	2
21	PHIL HD MACH SCREW	21771-552	-----	2	36	#14 AWG TEW/AWM BLK	18162-023	-----	1
22	RUN CAP BRACKET				37	#14 AWG TEW/AWM ORG	18162-026	-----	1
	-47631-069	27581-906	-----	2	38	START CAPACITOR	SEE TABLE 2		
	-47631-124	27581-907	-----	2	39	START CAP BRACKET	27581-901	-----	1
23	PHIL HD MACH SCREW	21771-551	-----	1	40	CAPACITOR CAP	27588-014	-----	1
24	SUB-PLATE	34621-153	15121	1	41	FLAT PH HD MACH SCR	CG#10-01 1/2S 15991		2
25	PHIL HD MACH SCREW	21771-551	-----	4	42	#14 AWG TEW/AWM WHT	18162-021	-----	1
26	FLAT WASHER	K#08	15991	4	43	FEMALE CONNECTOR	27236-043	-----	3

### WIRING DIAGRAM



**Figure B-11. Control Boxes 47631-131 And 47631-137 Pictorial Wiring Diagram**

For specific control box data information, refer to the chart at the end of this section.

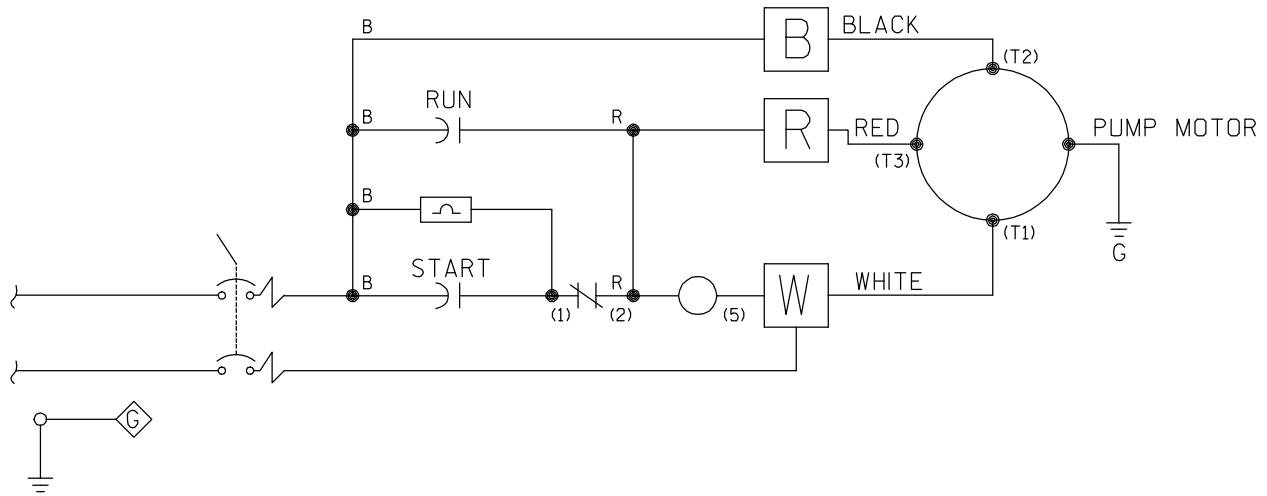


Figure B-12. Control Boxes 47631-131 And 47631-137 Elementary Wiring Diagram

REPAIR PARTS LIST

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	END BARRIER	27233-026	-----	1	27	PHIL HD MACH SCREW	21771-553	-----	2
13	TERMINAL BLOCK	27233-216	-----	3	28	OVERLOAD UNIT	SEE TABLE 2		
14	PHIL HD MACH SCREW	21771-552	-----	2	29	PHIL HD MACH SCREW	21771-552	-----	2
15	FEMALE CONNECTOR	S1768	-----	1	30	#10 AWG TEW/AWM BLK	18162-043	-----	1
16	#10 AWG TEW/AWM RED	18162-042	-----	1	31	#10 AWG TEW/AWM WHT	18162-041	-----	1
17	#10 AWG TEW/AWM BLK	18162-043	-----	1	32	START RELAY	SEE TABLE 2		
18	FEMALE CONNECTOR	S1768	-----	1	33	PHIL HD MACH SCREW	21771-551	-----	1
19	FEMALE CONNECTOR	S1790	-----	1	34	#14 AWG TEW/AWM RED	18162-022	-----	1
20	RUN CAPACITOR	SEE TABLE 2			35	FEMALE CONNECTOR	27236-043	-----	2
21	PHIL HD MACH SCREW	21771-552	-----	2	36	#14 AWG TEW/AWM BLK	18162-023	-----	1
22	RUN CAP BRACKET				37	#14 AWG TEW/AWM ORG	18162-026	-----	1
	-47631-131	27581-906	-----	2	38	START CAPACITOR	SEE TABLE 2		
	-47631-137	27581-909	-----	2	39	START CAP BRACKET	27581-909	-----	1
23	PHIL HD MACH SCREW	21771-551	-----	1	40	PH HD MACH SCR	21771-552	-----	2
24	SUB-PLATE	34621-153	15121	1	41	#14 AWG TEW/AWM WHT	18162-021	-----	1
25	PHIL HD MACH SCREW	21771-551	-----	4	42	FEMALE CONNECTOR	27236-043	-----	3
26	FLAT WASHER	K#08	15991	4					

WIRING DIAGRAM

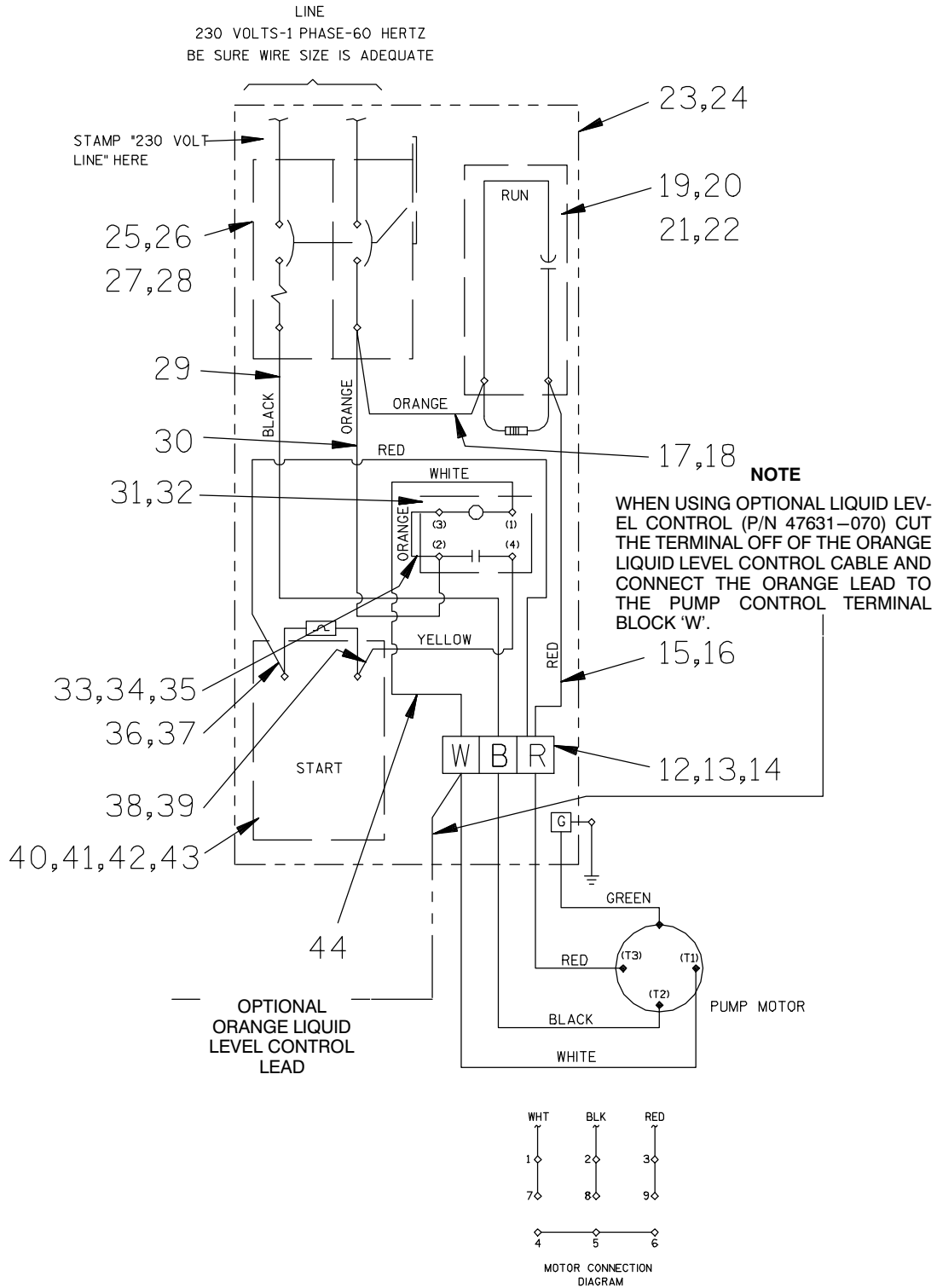


Figure B-13. Control Box 47631-126 Pictorial Wiring Diagram

For specific control box data information, refer to the chart at the end of this section.

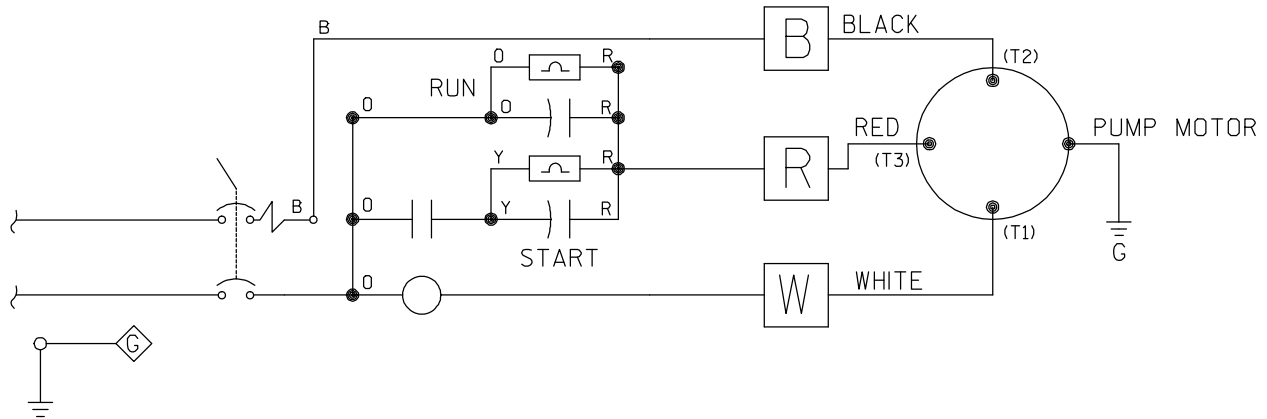


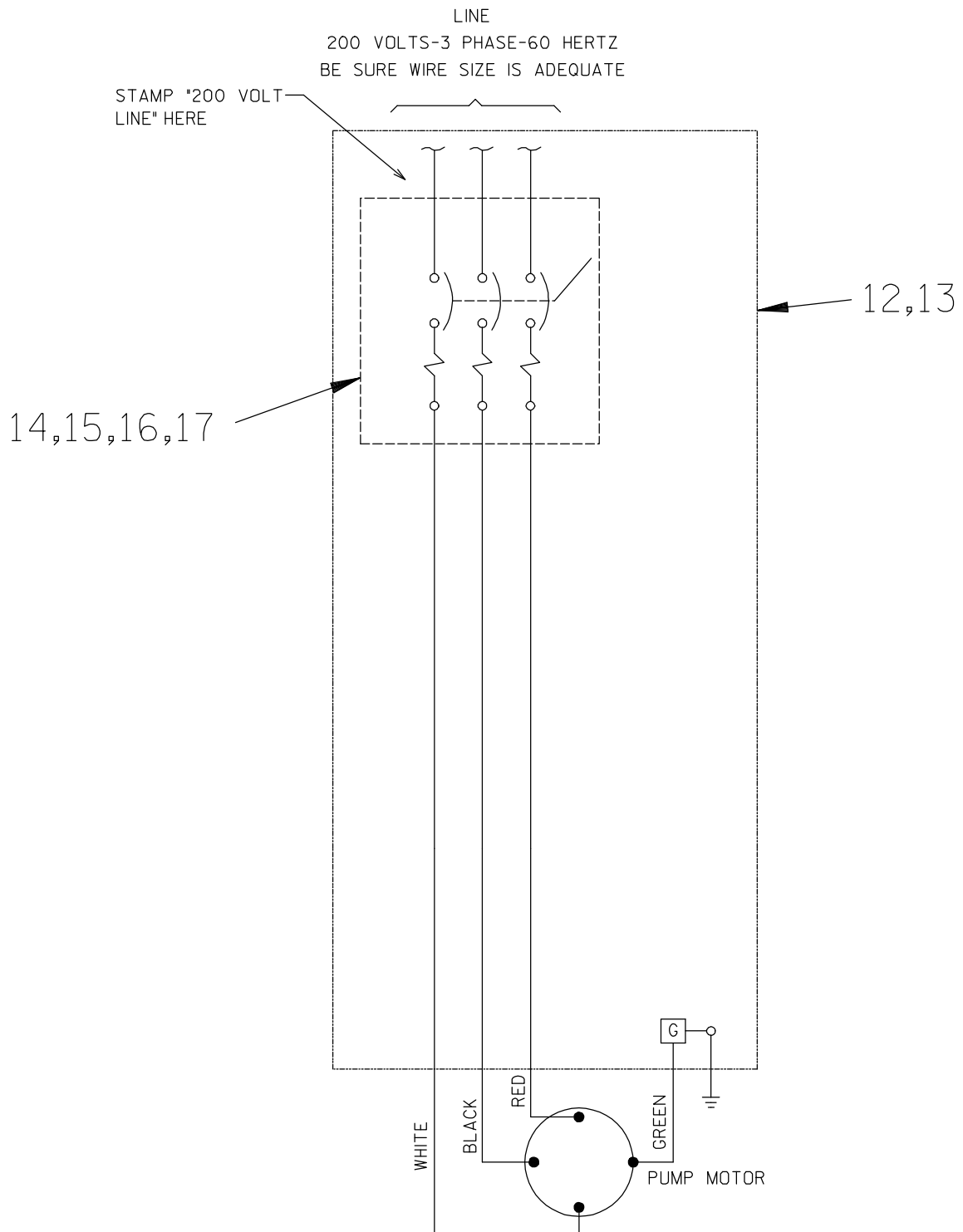
Figure B-14. Control Box 47631-126 Elementary Wiring Diagram

REPAIR PARTS LIST

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	END BARRIER	27233-026	-----	1	29	#14 AWG TEW/AWM BLK	18162-023	-----	1
13	TERMINAL BLOCK	27233-216	-----	3	30	#14 AWG TEW/AWM ORG	18162-026	-----	1
14	PHIL HD MACH SCREW	21771-552	-----	2	31	START RELAY	SEE TABLE 2		
15	FEMALE CONNECTOR	S1790	-----	1	32	PHIL HD MACH SCREW	21771-551	-----	2
16	#14 AWG TEW/AWM RED	18162-022	-----	1	33	#14 AWG TEW/AWM ORG	18162-026	-----	1
17	#14 AWG TEW/AWM ORG	18162-026	-----	1	34	TERMINAL ADAPTOR	27236-201	-----	1
18	FEMALE CONNECTOR	S1790	-----	1	35	FEMALE CONNECTOR	S1790	-----	5
19	RUN CAPACITOR	SEE TABLE 2			36	FEMALE CONNECTOR	27236-052	-----	1
20	PHIL HD MACH SCREW	21771-552	-----	2	37	#14 AWG TEW/AWM RED	18162-022	-----	1
21	RUN CAP BRACKET	27581-906	-----	2	38	#14 AWG TEW/AWM YEL	18162-024	-----	1
22	PHIL HD MACH SCREW	21771-551	-----	1	39	FEMALE CONNECTOR	27236-052	-----	1
23	SUB-PLATE	34621-153	15121	1	40	START CAPACITOR	SEE TABLE 2		
24	PHIL HD MACH SCREW	21771-551	-----	4	41	START CAPACITOR BRKT	27581-908	-----	1
25	FLAT WASHER	K#08	15991	4	42	CAPACITOR CAP	27588-014	-----	1
26	PHIL HD MACH SCREW	21771-553	-----	2	43	FLT PH HD MACH SCR	CG#10-01 1/2S 15991		2
27	OVERLOAD UNIT	SEE TABLE 2			44	#14 AWG TEW/AWM WHT	18162-021	-----	1
28	PHIL HD MACH SCREW	21771-552	-----	2					



### WIRING DIAGRAM



**Figure B-15. Control Boxes 47631-142, 47631-158, 47631-159 And 47631-160  
Pictorial Wiring Diagram**

For specific control box data information, refer to the chart at the end of this section.

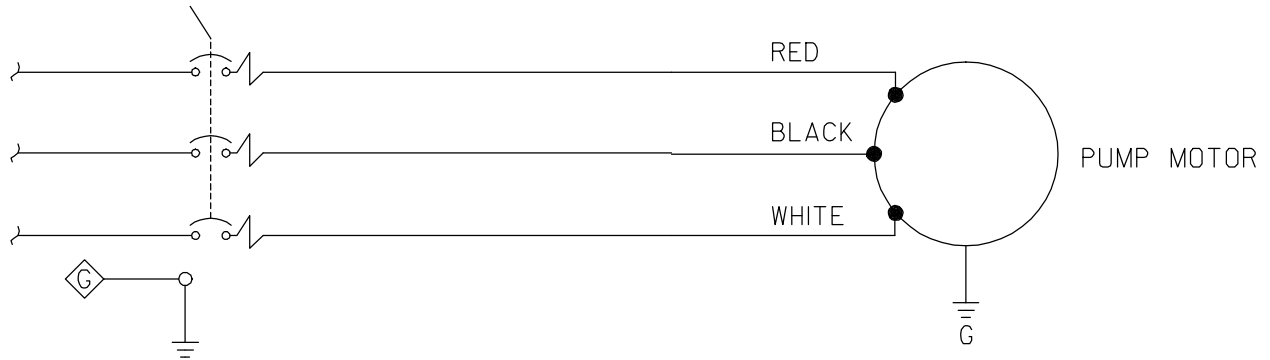
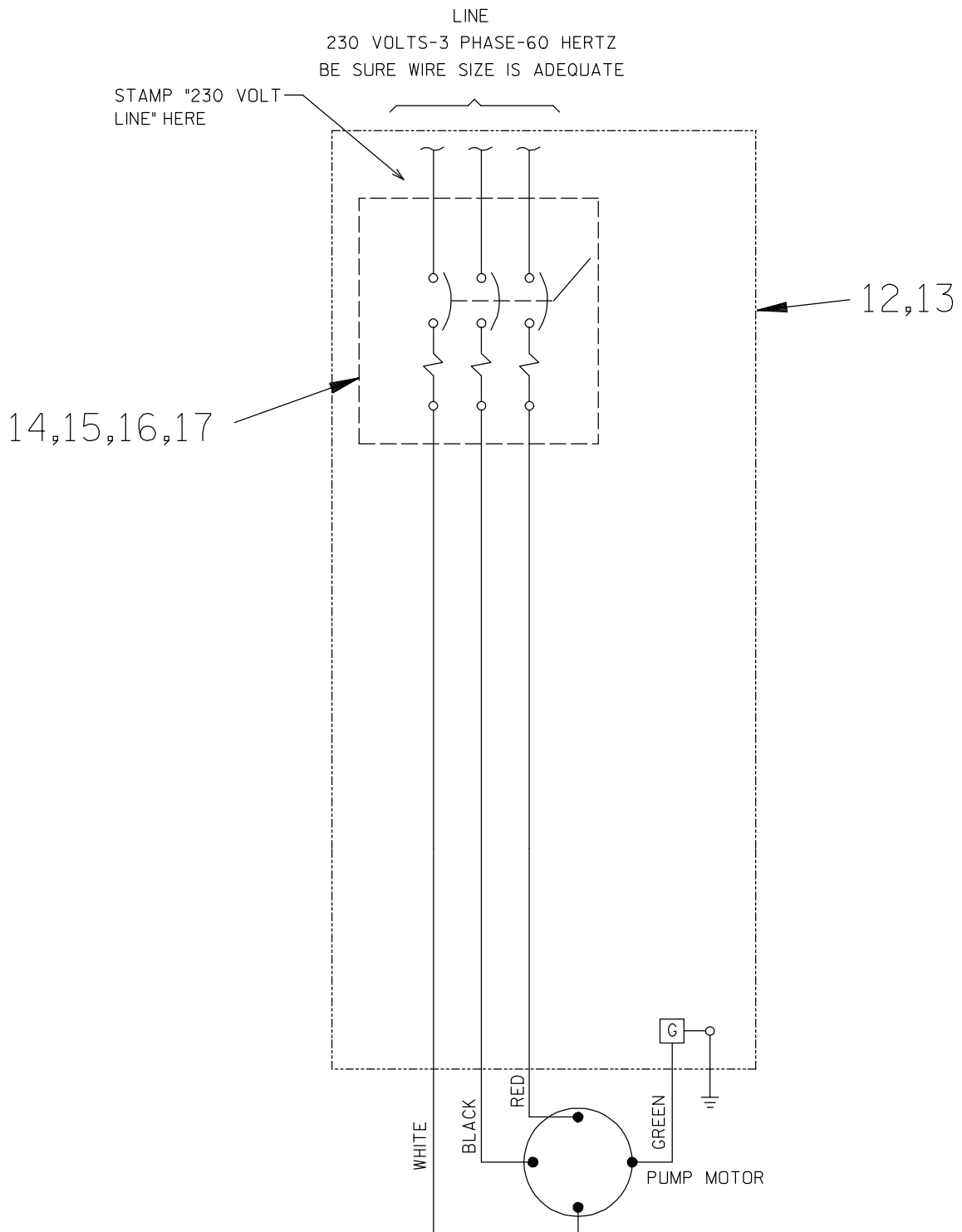


Figure B-16. Control Boxes 47631-142, 47631-158, 47631-159 And 47631-160  
Elementary Wiring Diagram

**REPAIR PARTS LIST**

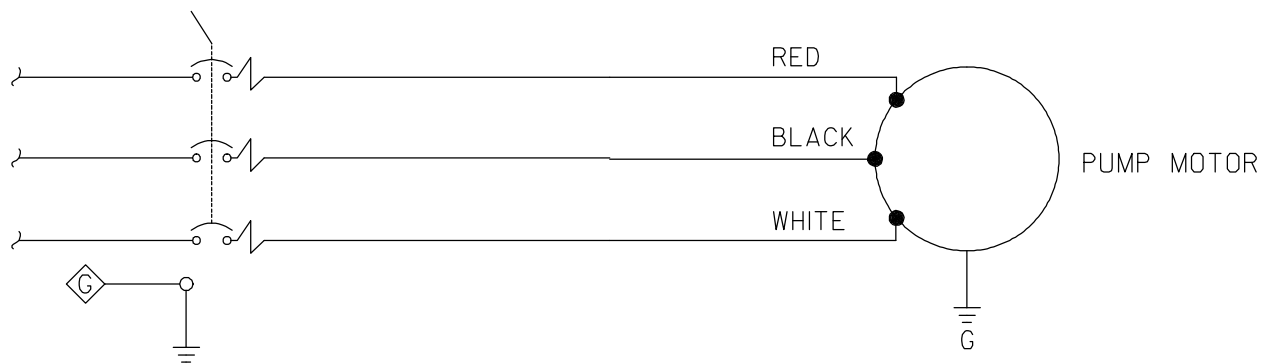
ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	SUB-PLATE	34621-153	15121	1
13	PHILLIPS HD MACHINE SCREW	21771-551	-----	4
14	OVERLOAD UNIT	SEE TABLE 2		
15	PHILLIPS HD MACHINE SCREW	21771-553	-----	3
16	FLAT WASHER	K#08	15991	6
17	PHILLIPS HD MACHINE SCREW	21771-552	-----	3

### WIRING DIAGRAM



**Figure B-17. Control Boxes 47631-067, 47631-127, 47631-132 And 47631-138  
Pictorial Wiring Diagram**

For specific control box data information, refer to the chart at the end of this section.

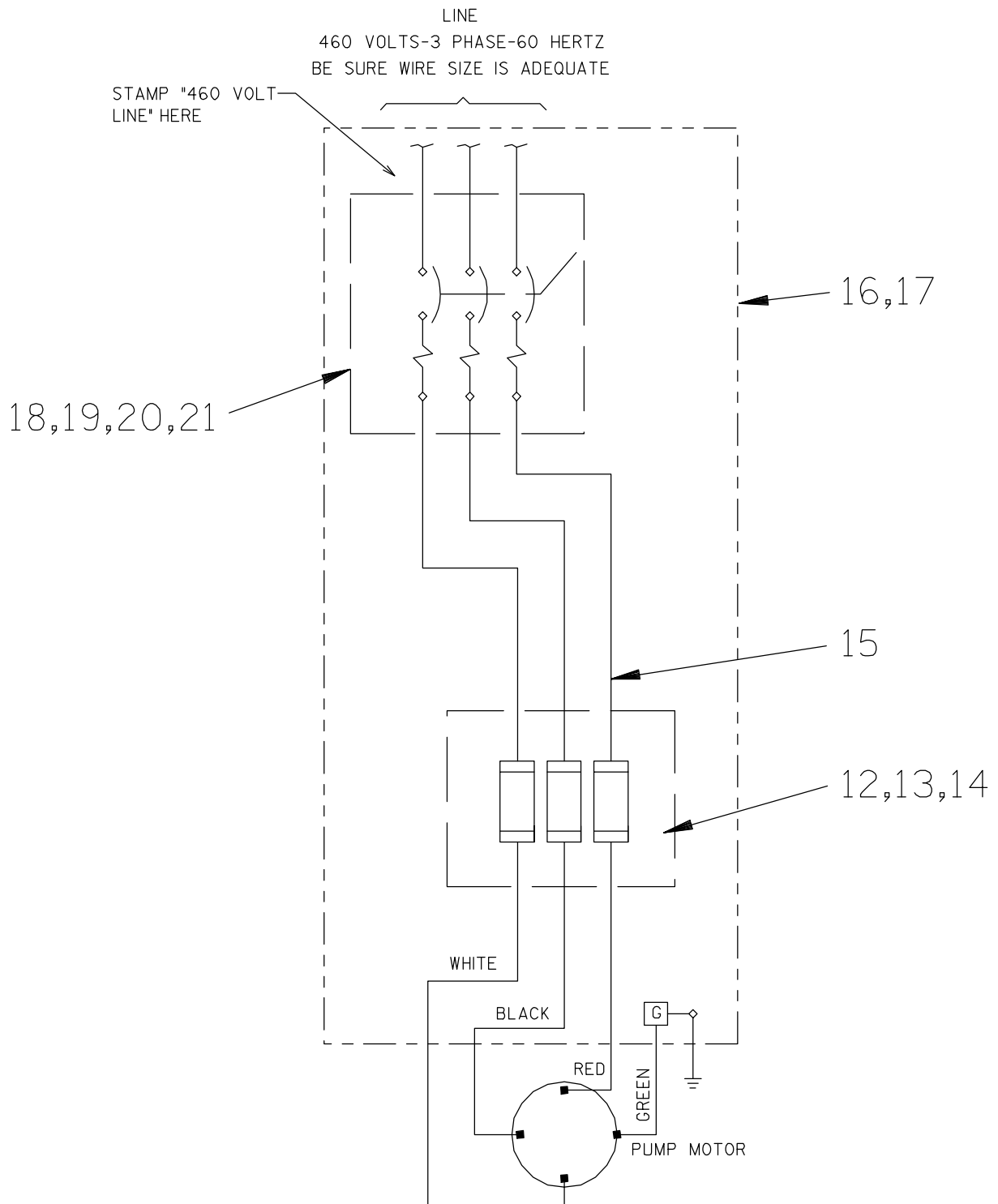


**Figure B-18. Control Boxes 47631-067, 47631-127, 47631-132 And 47631-138  
Elementary Wiring Diagram**

**REPAIR PARTS LIST**

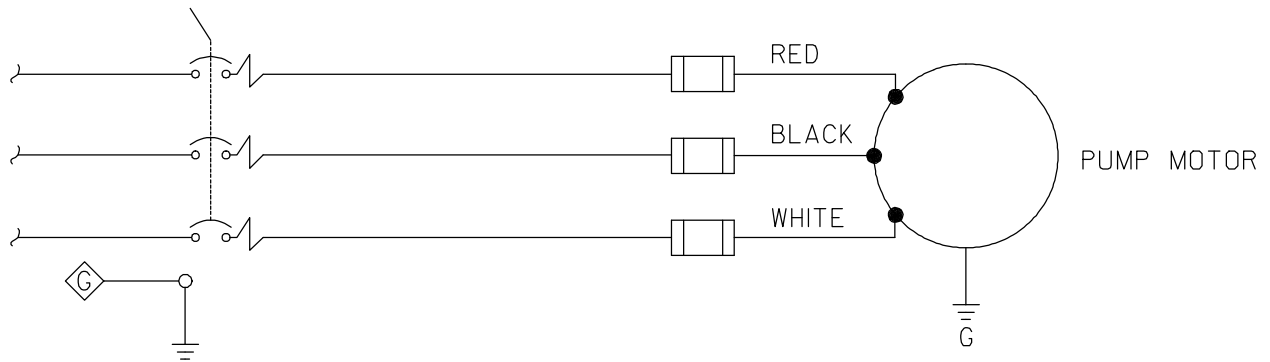
ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	SUB-PLATE	34621-153	15121	1
13	PHILLIPS HD MACHINE SCREW	21771-551	-----	4
14	OVERLOAD UNIT	SEE TABLE 2		
15	PHILLIPS HD MACHINE SCREW	21771-553	-----	3
16	FLAT WASHER	K#08	15991	6
17	PHILLIPS HD MACHINE SCREW	21771-552	-----	3

### WIRING DIAGRAM



**Figure B-19. Control Boxes 47631-066, 47631-128, 47631-133 And 47631-139  
Pictorial Wiring Diagram**

For specific control box data information, refer to the chart at the end of this section.

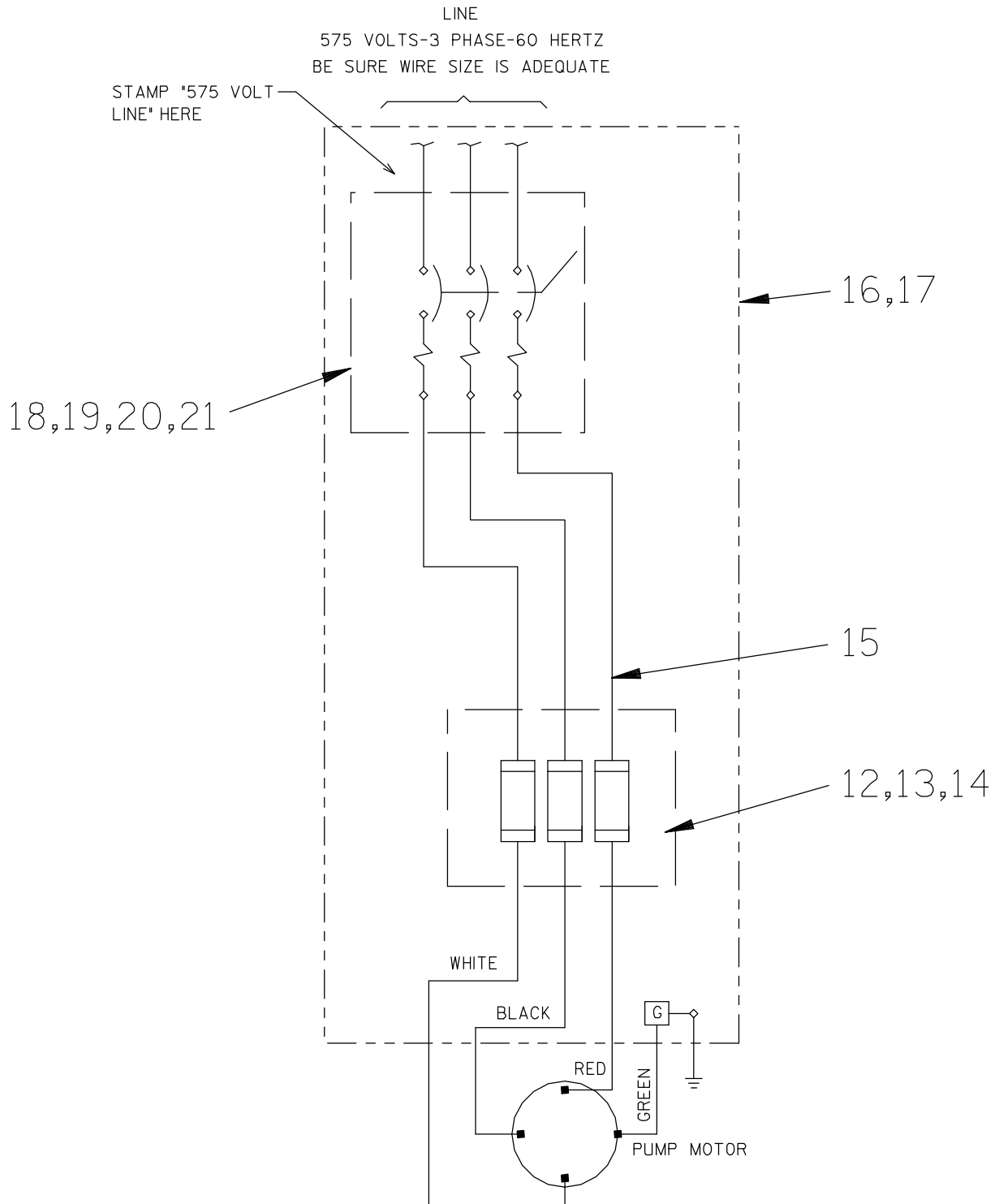


**Figure B-20. Control Boxes 47631-066, 47631-128, 47631-133 And 47631-139  
Elementary Wiring Diagram**

**REPAIR PARTS LIST**

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	FUSE BLOCK	27314-306	-----	1
13	PHILLIPS HD MACHINE SCREW	21771-551	-----	2
14	FUSE	27311-120	-----	3
15	#10 AWG TEW/AWM BLK	18162-043	-----	2
16	SUB-PLATE	34621-153	15121	1
17	PHILLIPS HD MACHINE SCREW	21771-551	-----	4
18	OVERLOAD UNIT	SEE TABLE 2		
19	PHILLIPS HD MACHINE SCREW	21771-553	-----	3
20	FLAT WASHER	K#08	15991	6
21	PHILLIPS HD MACHINE SCREW	21771-552	-----	3

### WIRING DIAGRAM



**Figure B-21. Control Boxes 47631-078, 47631-129, 47631-134 And 47631-141 Pictorial Wiring Diagram**

For specific control box data information, refer to the chart at the end of this section.

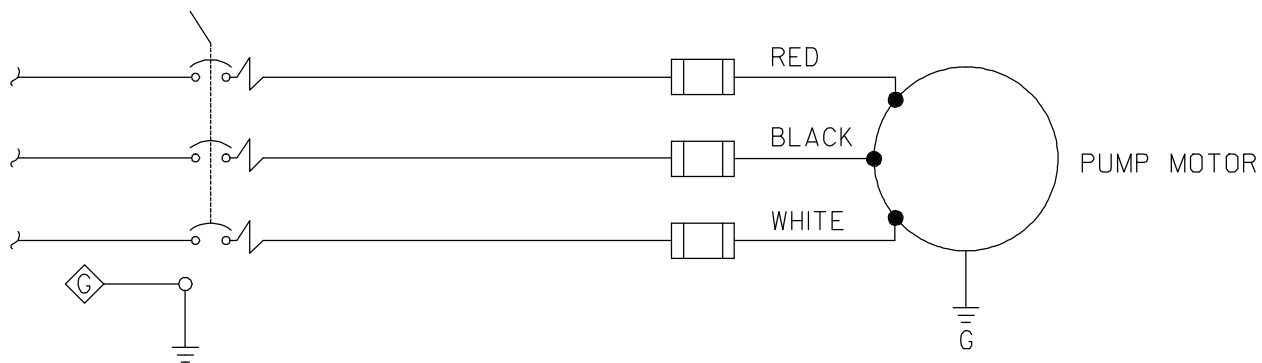


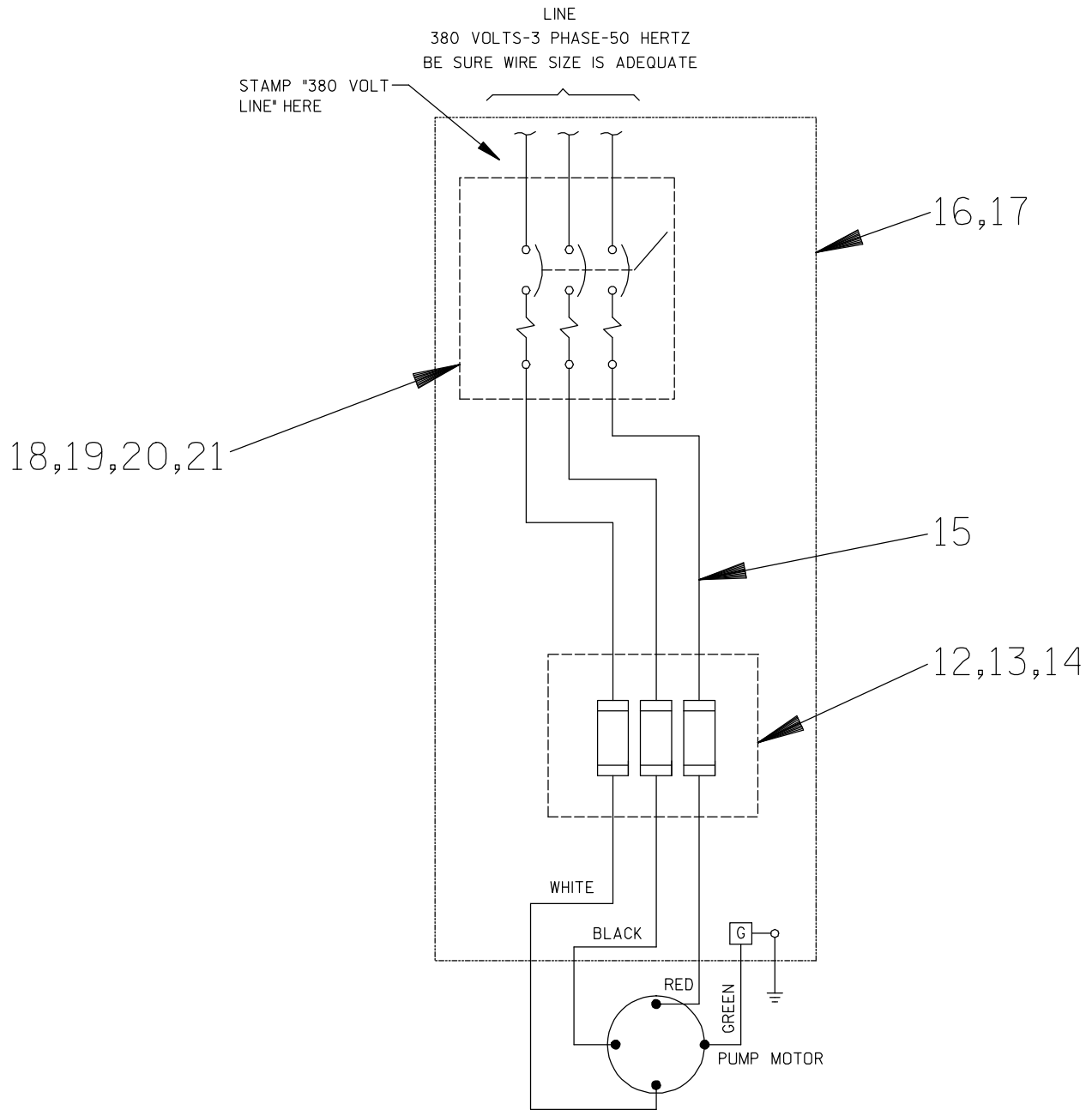
Figure B-22. Control Boxes 47631-078, 47631-129, 47631-134 And 47631-141  
Elementary Wiring Diagram

**REPAIR PARTS LIST**

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	FUSE BLOCK	27314-306	-----	1
13	PHILLIPS HD MACHINE SCREW	21771-551	-----	2
14	FUSE	27311-120	-----	3
15	#10 AWG TEW/AWM BLK	18162-043	-----	2
16	SUB-PLATE	34621-153	15121	1
17	PHILLIPS HD MACHINE SCREW	21771-551	-----	4
18	OVERLOAD UNIT	SEE TABLE 2		
19	PHILLIPS HD MACHINE SCREW	21771-553	-----	3
20	FLAT WASHER	K#08	15991	6
21	PHILLIPS HD MACHINE SCREW	21771-552	-----	3

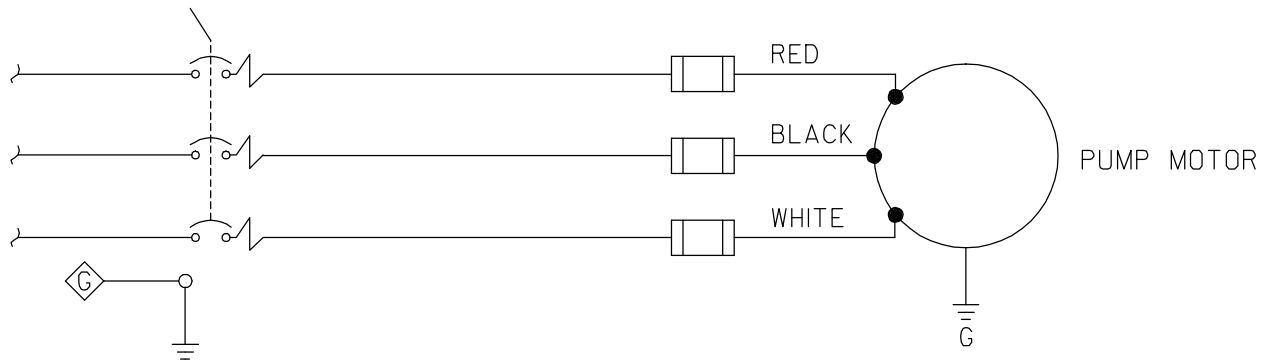


WIRING DIAGRAM



**Figure B-23. Control Boxes 47631-123, 47631-130, 47631-135 And 47631-144  
Pictorial Wiring Diagram**

For specific control box data information, refer to the chart at the end of this section.



**Figure B-24. Control Boxes 47631-123, 47631-130, 47631-135 And 47631-144  
Elementary Wiring Diagram**

### REPAIR PARTS LIST

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
12	FUSE BLOCK	27314-306	-----	1
13	PHILLIPS HD MACHINE SCREW	21771-551	-----	2
14	FUSE	27311-120	-----	3
15	#10 AWG TEW/AWM BLK	18162-043	-----	2
16	SUB-PLATE	34621-153	15121	1
17	PHILLIPS HD MACHINE SCREW	21771-551	-----	4
18	OVERLOAD UNIT	SEE TABLE 2		
19	PHILLIPS HD MACHINE SCREW	21771-553	-----	3
20	FLAT WASHER	K#08	15991	6
21	PHILLIPS HD MACHINE SCREW	21771-552	-----	3

Table 2. Control Box Data Chart

CONTROL BOX PART NO.	FRONT COVER ASSY	FRONT CVR STICKER PART NO.	OVERLOAD PART NO.	START RELAY PART NO.	FUSE BLOCK PART NO.	FUSE (QTY 3) PART NO.	START CAP. PART NO.	RUN CAPACITOR PART NO.
47631-066	42821-234	38818-071	27541-286		27314-306	27311-120		
47631-067	42821-233	38818-070	27541-279					
47631-068	42821-232	38818-069	27541-101	9483A			9482B	27571-303
47631-069	42821-235	38818-072	27541-102	9483			9482A	27571-302
47631-078	42821-251	38818-078	27541-297		27314-306	27311-120		
47631-121	42821-255	38818-080	27541-101	9483A			9482B	27571-303
47631-122	42821-256	38818-081	27541-102	9483			9482A	27571-302
47631-123	42821-258	38818-083	27541-286		27314-306	27311-120		
47631-124	42821-267	38818-089	27541-104	9483			9482A	27571-323
47631-125	42821-268	38818-090	27541-103	9483A			9482B	27571-304
47631-126	42821-269	38818-091	27541-104	27547-015			27581-015	47883-002
47631-127	42821-270	38818-092	27541-274					
47631-128	42821-271	38818-093	27541-285		27314-306	27311-120		
47631-129	42821-272	38818-094	27541-294		27314-306	27311-120		
47631-130	42821-273	38818-095	27541-294		27314-306	27311-120		
47631-131	42821-274	38818-096	27541-105	9483			11343	27571-304
47631-132	42821-275	38818-097	9485J					
47631-133	42821-276	38818-098	9485N		27314-306	27311-120		
47631-134	42821-277	38818-099	27541-295		27314-306	27311-120		
47631-135	42821-278	38818-100	27541-285		27314-306	27311-120		
47631-137	42821-280	38818-102	27541-106	9483			11343	27571-306
47631-138	42821-281	38818-103	9485L					
47631-139	42821-282	38818-104	9485M		27314-306	27311-120		
47631-141	42821-283	38818-105	27541-296		27314-306	27311-120		
47631-142	42821-284	38818-106	27541-266					
47631-144	42821-286	38818-108	9485N		27314-306	27311-120		
47631-158	42821-291	38818-118	9485M					
47631-159	42821-292	38818-119	27541-285					
47631-160	42821-293	38818-120	27541-265					

Table 3. Liquid Level Controls

Part Number	Size
47631-070	1PH 115/230V 120V SEC.
47631-071	USE 47631-136
47631-072	3PH 575V 120V SEC.
47631-073	3PH 50Hz 380V 120V SEC.
47631-080	1PH 50 Hz 110/220V 120V SEC.
47631-136	3PH 230/460V 120V SEC.

## OPERATION – SECTION C

Review all SAFETY information in Section A.

Follow the instructions on all tags, labels and decals attached to the control box.



The electrical power used to operate this control box is high enough to cause injury or death. Make certain that the tie handle in the control box is in the OFF position and locked out, or that the power supply to the control box has been otherwise cut off and locked out, before attempting to open or service the control box. Tag electrical circuits to prevent accidental start-up.



Obtain the services of a qualified electrician to make all electrical connections, and to troubleshoot, test and/or service the electrical components of the control box.

### CONTROL BOX FUNCTION

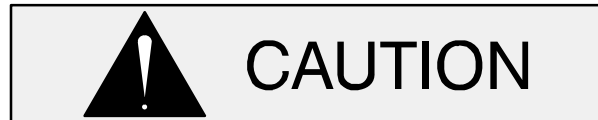


The control box is not designed to be explosion-proof. Do not operate in an explosive atmosphere.

The control box is provided to facilitate operation of the pump. It contains controls for starting and stopping the pump, and provides overload protection for the pump motor. The pump control may be equipped with an optional automatic liquid level sensing device, in which case the circuits are also contained within the control box.



The control box provides overload protection and power control. Do not connect the pump motor directly to the incoming power lines.



Since operation of the pump motor is dependent upon the quality and performance of the electrical controls, the pump warranty is valid only when controls have been specified or provided by The Gorman-Rupp Company.

### Component Function

The control box contains the following hand-operated switches and controls:

- The **tie handle** operates the control box circuit breakers. In the OFF position, the tie handle opens the circuit breakers to interrupt incoming power through the control box and prevent pump operation. In the ON position, it closes the circuit breakers to permit pump operation. The circuit breakers will open or “trip” automatically in the event of a short circuit overload current. When tripped, move the tie handle to OFF and back to ON to reset the circuit breakers.
- The **overload unit** is also the ON and OFF switch. The overload relay will trip automatically if the current drawn by the motor exceeds design specifications. Allow 10 seconds for the unit to cool after tripping before resetting.

### NOTE

*If the circuit breaker trips, do not reset it immediately. Wait at least ten minutes before resetting the tie handle back to the ON position. If the overload unit continues to trip, operational problems exist.*

- The **liquid level devices** (optional equipment) operate in conjunction with the 3-position switch (HAND-OFF-AUTO) supplied as part of that option. After the level sensors and circuitry have been installed, pump operation may be automatically controlled for filling or dewatering functions (see **LIQUID LEVEL DEVICES**, Section B).

Always terminate incoming power to the control box before investigating control box circuitry problems.



**Always terminate power to the control box before performing service functions.**

Power through the control box may be terminated by moving the tie handle to the OFF position, thereby opening the circuit breakers. This stops the pump, but **does not** terminate incoming power through the field wiring connected to the control box.

## TROUBLESHOOTING – SECTION D

Review all **SAFETY** information in Section A.



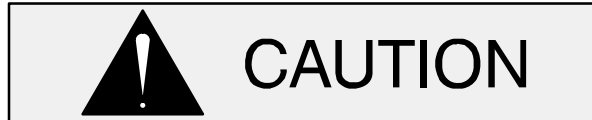
**The electrical power used to operate this control box is high enough to cause injury or death. Obtain the services of a qualified electrician to troubleshoot, test and/or service the electrical components.**

Many of the probable remedies listed in the troubleshooting chart below require use of electrical test instruments; for specific procedures, see **Electrical Testing** at the end of the troubleshooting chart.

When troubleshooting, also refer to the technical information accompanying the pump and optional equipment.

### TROUBLESHOOTING CHART

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO START, OVERLOAD UNIT NOT TRIPPED (MANUAL MODE)	Power source incompatible with control box.	Correct power source.
	No voltage at line side of circuit breaker.	Check power source for blown fuse, open overload unit, broken lead, or loose connection.
	No voltage at line terminals on bottom of overload unit in control box.	Check power source for blown fuse, open disconnect, broken wire, or loose connection.
OVERLOAD UNIT TRIPS	Low or high voltage, or excessive voltage drop between pump and control box.	Measure voltage at control box. Check that wiring is correct type, size, and length. (See <b>Field Wiring Connections</b> , Section B).
	Power input phases not balanced.	If imbalance exceeds 1 percent, notify power company.
	Control box not compatible with pump.	Electrical data on control box and pump name plate must agree. Replace control box if not in agreement.
	Foreign object locking impeller or bearing frozen.	Remove foreign material or replace damaged bearing. If bearing is damaged, check for water in motor housing.
	Motor windings short-circuited.	Check motor windings with ohmmeter.

**ELECTRICAL TESTING**

Be certain to refer to the wiring diagram(s) in the Installation Section of this manual before reconnecting any electrical components which have been disconnected.

**Test Equipment**

A volt/amp/ohmmeter and megohmmeter of adequate range and quality will be required to conduct the electrical tests. The suggested equipment indicated below is commercially available, or an equivalent substitute may be used.

Equipment	Use
Ammeter/ Voltmeter	To check AC Voltage and current (amperage)
Ohmmeter	To measure resistance (ohms) to ground

**Voltage Imbalance**

Each phase of the incoming three-phase power must be balanced with the other two as accurately as a commercial voltmeter will read. If the phases are out of balance, contact your power company and request that they correct the condition.

**Capacitors**

The start capacitor is designed to split the electrical phase during the initial power surge at motor start-up. The start capacitor is controlled by the start relay at motor startup. When the motor reaches load speed, the start relay cuts out and permits the run capacitor to maintain operation. Both the start and run capacitors are located in the control box.



Before disconnecting the capacitor leads, discharge the capacitors; use a screwdriver with an insulated handle, and place the blade across the two terminals of each capacitor to short the terminals.

Zero-balance the ohmmeter set to read RX100K, and test the capacitors as follows:

- a. Disconnect the capacitor leads, and remove the resistor from the start capacitor.
- b. Place a test lead against each of the terminals of the start capacitor for a few seconds. If the ohmmeter needle moves toward zero then slowly drifts back to the left, the capacitor is good. If the needle remains at infinity ( $\infty$ ) the capacitor is open; if the needle remains at zero, the capacitor is shorted. In either case, the capacitor must be replaced.
- c. Test the run capacitor as in b. In addition, test the metal run capacitor for shorts to ground by touching one test lead to the capacitor case and the other lead to each of the capacitor terminals in turn. The ohmmeter should read infinity ( $\infty$ ); if it does not, the capacitor is grounded and must be replaced.

**Start Relay**

The start relay is located in the control box.

Disconnect the two wires from relay terminal 2. Use a zero-balanced ohmmeter set to read RX100K, and touch one lead to relay terminal 2 and the other to relay terminal 5. The resistance reading should be between 4000 to 6000 ohms; if the reading is not in this range, the start relay is defective and should be replaced.

**NOTE**

Repair of individual electrical components is not recommended. Replace defective and/or malfunctioning components.

**For U.S. and International Warranty Information,  
Please Visit [www.grpumps.com/warranty](http://www.grpumps.com/warranty)  
or call:  
U.S.: 419-755-1280  
International: +1-419-755-1352**

**For Canadian Warranty Information,  
Please Visit [www.grcanada.com/warranty](http://www.grcanada.com/warranty)  
or call:  
519-631-2870**