



System Control

Installation, Operation & Service Manual



⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the Installation, Operation and Service Manual thoroughly before installing or servicing this equipment.

Installation must be done by an electrician qualified in the installation and service of control systems for heating equipment.

Installer

Please take the time to read and understand these instructions prior to any installation. Installer must give a copy of this manual to the owner.

Owner

Keep this manual in a safe place in order to provide your serviceman with necessary information.



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Product Approval

ROBERTS GORDON® appliances have been tested and CE certified as complying with the essential requirements of the Gas Appliance Directive, the Low Voltage Directive, the Electromagnetic Compatibility Directive and the Machinery Directive for use on natural gas and LPG when installed, commissioned and maintained in accordance with these instructions.

These instructions refer to appliances designed to operate in the European Union.

Appliances designed for other countries (Non-European Union) are available on request.

This appliance must be installed in accordance with the local and national codes in force and used only in a sufficiently ventilated space, as specified in these instructions.

Before installation, check that the local gas distribution systems, nature of gas and pressure, and adjustment of the appliance are compatible.

SECTION 1: INTRODUCTION

1.1 Safety



Your Safety is Important to Us! This symbol is used throughout the manual to notify you of possible fire, electrical or burn hazards. Please pay special attention when reading and following the warnings.

Installation, service and annual inspection of controller must be done by an electrician qualified in the installation and service of control systems for heating equipment.

Installation, service and annual inspection of heater must be done by a contractor qualified in the installation and service of gas or oil fired heating equipment.

Read this manual carefully before installation, operation, or service of this equipment.

The appliance must be applied and operated under the general concepts of reasonable use and installed using best building practices.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

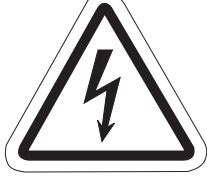
For optimum heater performance and safe heating conditions, inspect and maintain heater(s) before every heating season as necessary. Also, know and maintain heater clearances to combustibles, see heater Installation, Operation and Service Manual for further details. If you require additional manuals, contact your ROBERTS GORDON® independent distributor or sales number +44 (0)121 506 7709 or online at www.rg-inc.com, www.combat.co.uk, www.roberts-gordon.co.uk or www.blackheatheaters.co.uk.

1.2 What is a ROBERTS GORDON® System Control?

The ROBERTS GORDON® System Control is an electronic controller designed for the control of CORAYVAC® and BLACKHEAT® (multiburner only) systems.

The System Control is capable of giving four zones of burners' temperature control and power. The control will also give power output to as many as two pumps, provided that the load is not greater than 20 A and 1 Ø. For additional electrical specifications see *Page 4, Section 2.2*.

1.3 Electrical Requirements

⚠ DANGER

Electrical Shock Hazard
Disconnect electric before service.
Controller must be properly grounded to an electrical source.
Failure to follow these instructions can result in death or electrical shock.

Failure to comply with the installation instructions will invalidate the limited warranty.

All wiring must comply with current wiring regulations and any local regulations which may apply. Always switch off the supply to the system control and disconnect by removing the plug before removing the top panel.

The system control, burners and pump must be electrically grounded in accordance with local specifications and codes.

1.4 Check Installation Materials

Before proceeding with the installation of the ROBERTS GORDON® System Control, check the following points:

1.4.1 Thermostats

The ROBERTS GORDON® NRG Control or 24Vac thermostats can be used with the System Control. Electronic 24 Vac thermostats and mechanical thermostats with heat anticipator can be used as well. The System Control offers a 24 Vac power supply to power electronic thermostats.

Roberts-Gordon Europe Limited offers a selection of low voltage thermostats approved for the use with the System Control.

The thermostats measure the air temperature in the building. It is important that the thermostat is located in an area within the heated zone at occupant level. Do not place thermostat in an area shaded from the low-intensity, infrared heating system.

1.4.2 Electrical Installation Materials

A 230V, 50Hz, 1 ph, 20A power supply to the System Control must be installed and comply with current wiring regulations and any local regulations which may apply.

Total load powered by the panel must not exceed 20 A. Loads totaling more than 20 A must be

powered from an additional power supply circuit by the use of a load relay package.

1.4.3 Pressure Switch

For CORAYVAC® and BLACKHEAT® multiburner systems, a pressure switch (P/N E0007074, included with the pump assembly) is required for installation on the inlet of the pump. This switch is required to interlock the operation of the pump with the control panel.

! CAUTION

Product Damage Hazard

Pressure switch must be installed on all ROBERTS GORDON® systems to ensure safety and operation.

System will not operate without pressure switch.

Failure to follow these instructions can result in product damage.

SECTION 2: SPECIFICATIONS

FIGURE 1: Panel Layout



2.1 Material Specifications

Enclosure Material: Metal
 Weight: 6.8 lbs (3.08 kg)
 Dimensions: 10.2" x 11.4" x 2.8"
 (25.4 x 29.0 x 7.1 cm)
 Protection: Rating IP20

2.2 Electrical Specifications

Supply: 230 V, 50 Hz, 1 Ø, 20 A
 Zone Relay: Single pole 20 A, 230 Vac (resistive)
 Pump Relay: Single pole 20 A, 230 Vac (resistive)
 Thermostats: ROBERTS GORDON® NRG control or low voltage 24Vac (mechanic and electronic, also "power stealing")

2.3 Pump Specifications

Pump Model	Watts	Full Load Current	
		230 V 1 Ø 50 Hz	400 V 3 Ø 50 Hz
83BWL G	250	2.05	-
90BWTL	550	3.3	-
RG30-1	750	4.5	-
RG45-1	1100	6.4	-
RG30-3	750	-	1.77
RG45-3	1100	-	2.51

For alternate fans, please contact the manufacturer.

2.4 Burner Electrical Ratings

CORAYVAC® burners: 230 V, 50 Hz, 1 Ø 0.1 A

BLACKHEAT® (multiburner only) burners: 230 V, 50 Hz, 1 Ø 0.3 A

2.5 Indicator Lights

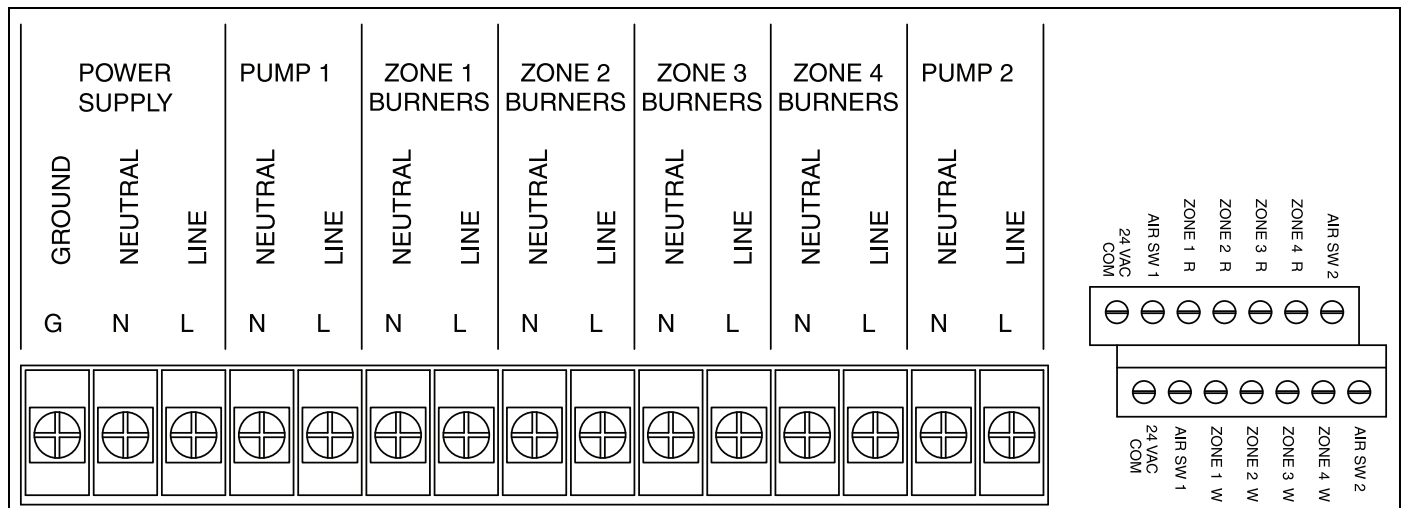
See Page 4, Figure 1.

1. LINE POWER, when lit, indicates power is supplied to the panel.
2. PUMP POWER 1, when, lit, indicates the relay for power to pump 1 is energized.
3. PUMP POWER 2, when, lit, indicates the relay for power to pump 2 is energized.
4. PRESSURE SWITCH 1, when lit, indicates that pressure switch 1 is closed. When blinking, indicates that the system is in lockout.
5. PRESSURE SWITCH 2, when lit, indicates that pressure switch 2 is closed. When blinking, indicates that the system is in lockout.
6. ZONE, when lit, indicates which zone relay is energized.

2.6 Terminal Block Guide


Figure 2 is a guide to the terminal abbreviations.

FIGURE 2: Terminal Block Guide



SECTION 3: INSTALLATION

⚠ DANGER



Electrical Shock Hazard

Disconnect electric before service.

Controller must be properly grounded to an electrical source.

Failure to follow these instructions can result in death or electrical shock.

Installation of the System Control and the associated external electrical wiring must be completed by an electrician qualified in the installation of control systems for heating equipment.

3.1 Preparation

Before installing the System Control, observe the following:

3.1.1 Ensure that you have a copy of the site layout for the project that identifies clearly the separate zones.

3.1.2 Read *Page 2, Section 1.4* carefully to ensure the correct installation materials are available.

3.2 Installing the System Control Panel

3.2.1 Choose a mounting location for the System Control. It is advisable to choose a visible location near the pump.

Do not mount System Control outdoors or in an area with moisture spray, excessive moisture or humidity. To avoid damage from possible drips, do not mount controller directly beneath pump.

3.2.2 Remove the cover of the System Control by removing the four securing screws.

3.2.3 Place the cover and the hardware in a safe place for refitting after the external wiring connections have been made.

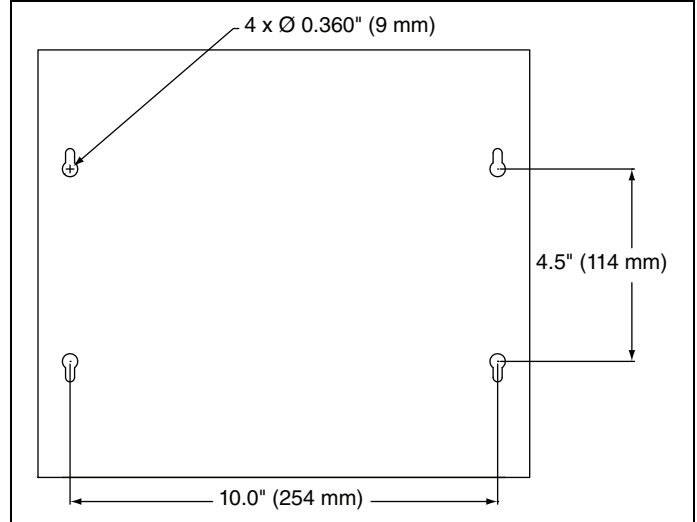
3.2.4 Position the mounting hole location of the System Control per *Figure 3*.

3.2.5 Remove the knockouts required for the conduit entry into the System Control panel. The knockouts are on the top of the system control case. If the knockouts are required to be on the bottom the case can be rotated 180°.

3.2.6 When the case is rotated 180°, the LED status circuit card needs to be rotated so that the LED's match the upright cover panel. Remove the LED sta-

tus circuit card by squeezing each standoff gently with pliers one at a time until it is loose. Rotate the circuit card so that it will line up with the upright cover and re-attach to the standoffs. The ribbon cable that connects the LED status circuit card to the circuit card assembly will have a twist in it. Use caution not to cause any creases or put any tension to the ribbon cable when rotating the circuit card.

FIGURE 3: Mounting Hole Layout



3.3 Select the External Wiring Diagram for the Installation

3.3.1 Use *Page 8, Section 4* for the external wiring of the burners, thermostats and pressure switch.

3.3.2 Use the table below to select the correct pump external wiring diagram.

Pump	Supply Voltage	Page	Section	Figure
CORAYVAC®				
RG30-1, RG45-1	230 V 1 Ø 50 Hz	9	4	6
RG30-3, RG45-3	400 V 3 Ø 50 Hz	10	4	7
BLACKHEAT®				
Airflow 83 BWLG	230 V 1 Ø 50 Hz	8	4	5
Airflow 90 BWTL	230 V 1 Ø 50 Hz	8	4	5

The BLACKHEAT® pumps Airflow 83 BWLG and 90 BWTL are equipped with thermal overloads.

All CORAYVAC® pumps must use a fan starter kit as indicated on table on the next page. The overload must be set to the full load ampere.

Pump Model	Full Load Current	Overload Range	Description	Part Number
RG30-1	4.5	4 to 6	Fan Starter Kit	S7412K
			1 Overload ZE6	C2351B
			2 Contactor DILM- 10 4KW,240 V Coil	C2348
			3 Enclosure QEVISS GW44207	C2353B
RG30-3	1.77	1.6 to 2.4	Fan Starter Kit	S7411K
			1 Overload ZE2.4	C2355B
			2 Contactor DILM- 10 4KW,240 V Coil	C2348
			3 Enclosure QEVISS GW44207	C2353B
RG45-1	6.4	4 to 6	Fan Starter Kit	S7412K
			1 Overload ZE6	C2351B
			2 Contactor DILM- 10 4KW,240 V Coil	C2348
			3 Enclosure QEVISS GW44207	C2353B
RG45-3	2.51	2.4 to 4	Fan Starter Kit	S7445K
			1 Overload ZE4	C2350B
			2 Contactor DILM- 10 4KW,240 V Coil	C2348
			3 Enclosure QEVISS GW44207	C2353B

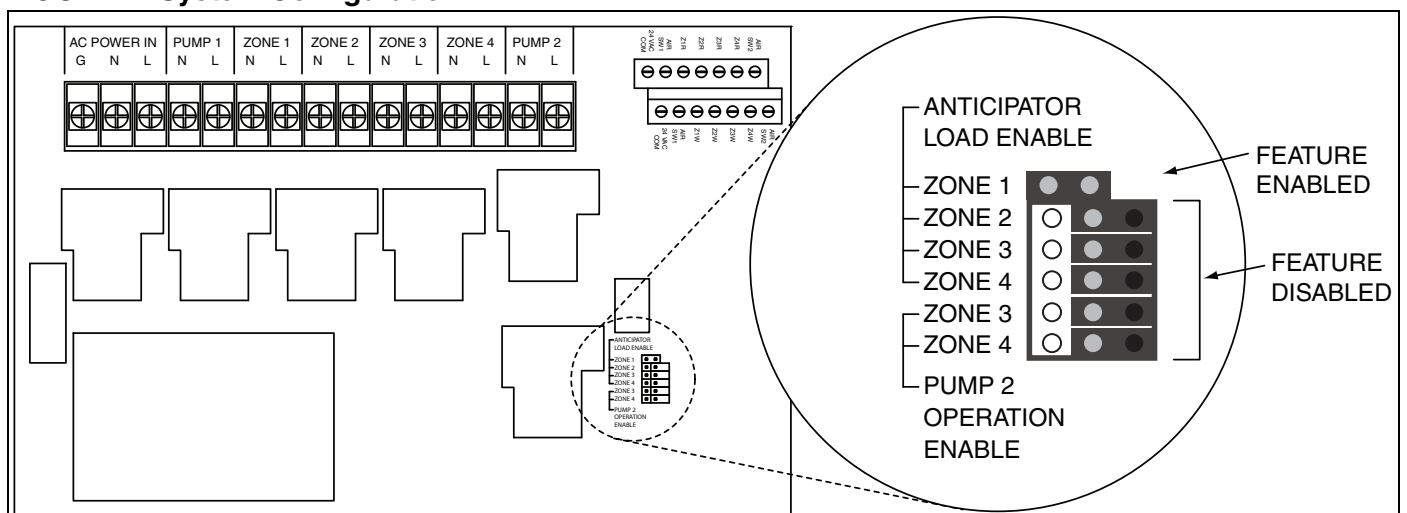
3.4 System Configuration

See Page 7, Figure 4 for details. Below the ribbon cable J2 connector, there are six configurable jumpers. They indicate whether the thermostat for each zone uses an anticipator. If the thermostat for that associated zone has an anticipator, then use a jumper to cover both pins for that zone. If the thermostat for the associated zone does not use an anticipator, then cover the right side pin only.

The bottom two jumpers are associated with Pump 2 operation. They indicate whether Pump 2 is active and which zones are associated with it. Pump 2 can


only be associated with Zone 3 and/or Zone 4. To enable Pump 2, use a jumper to cover both pins for the zone(s) that will operate on Pump 2. To disable Pump 2, cover only the right side of the pin of zone 3 and 4.

FIGURE 4: System Configuration



SECTION 4: TYPICAL EXTERNAL WIRING DIAGRAMS

⚠ **DANGER**



Electrical Shock Hazard
Disconnect electric before service.

More than one disconnect switch may be required to disconnect electric to the unit.

Failure to follow these instructions can result in death or electrical shock.

4.1 Airflow 83 BWLG, Airflow 90 BWTL External Wiring Diagram

The external wiring diagram below shows the connections for four zones of BLACKHEAT® multiburner burners.

The zones are connected to a single pump, unless zone 3 and/or zone 4 are selected to function with the optional pump 2. The external wiring diagram below shows connection to an Airflow 83 BWLG, Airflow 90 BWTL 230 V 1 Ø pump.

4.1.1 External Wiring Connection Details

If any of the original wire supplied with the heater must be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C and 600 V.

The low voltage circuit must use shielded cable, one end earthed, the other insulated.

FIGURE 5: External Wiring Diagram ROBERTS GORDON® Airflow 83 BWLG, Airflow 90 BWTL 230 V 1 Ø Pump

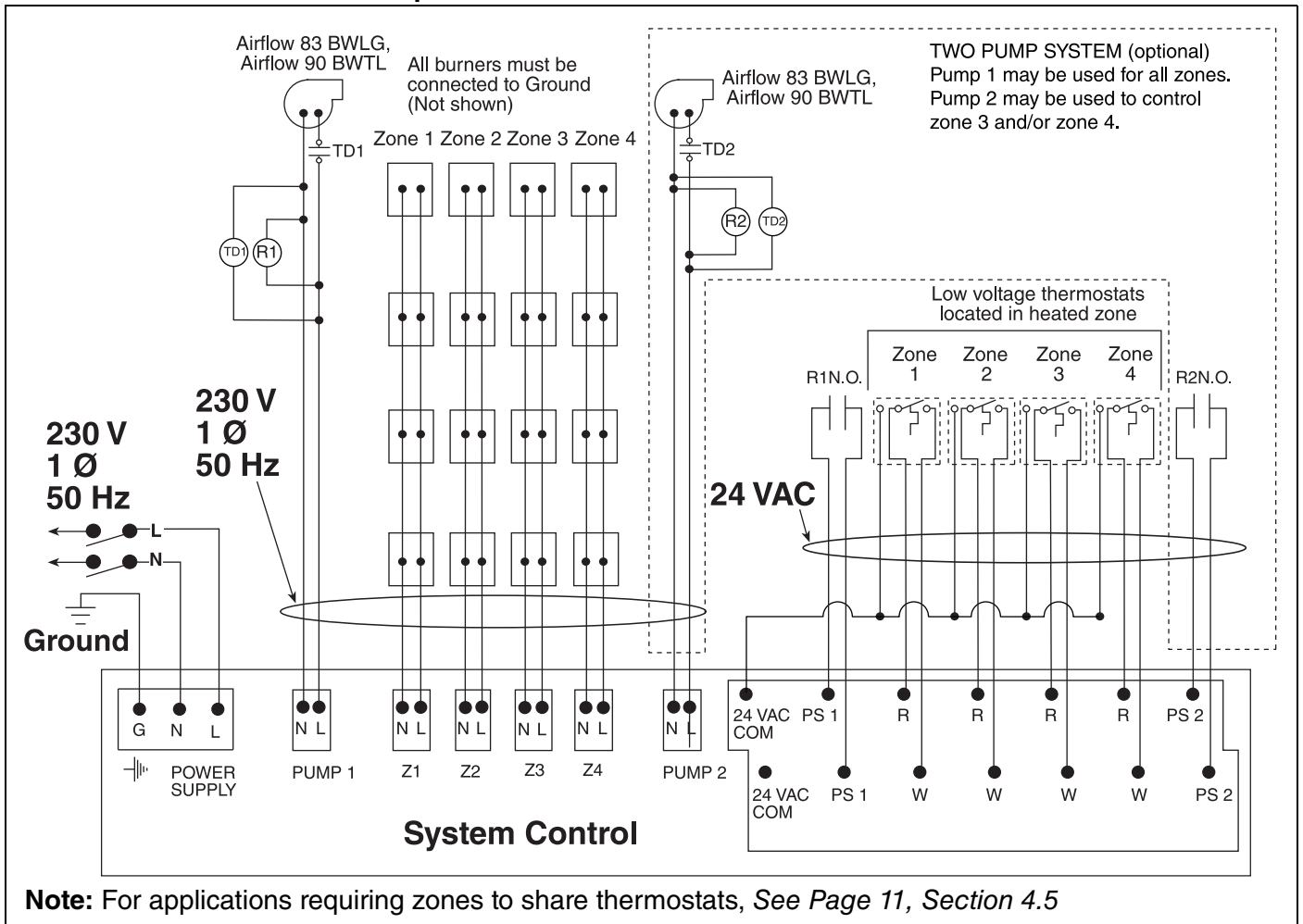
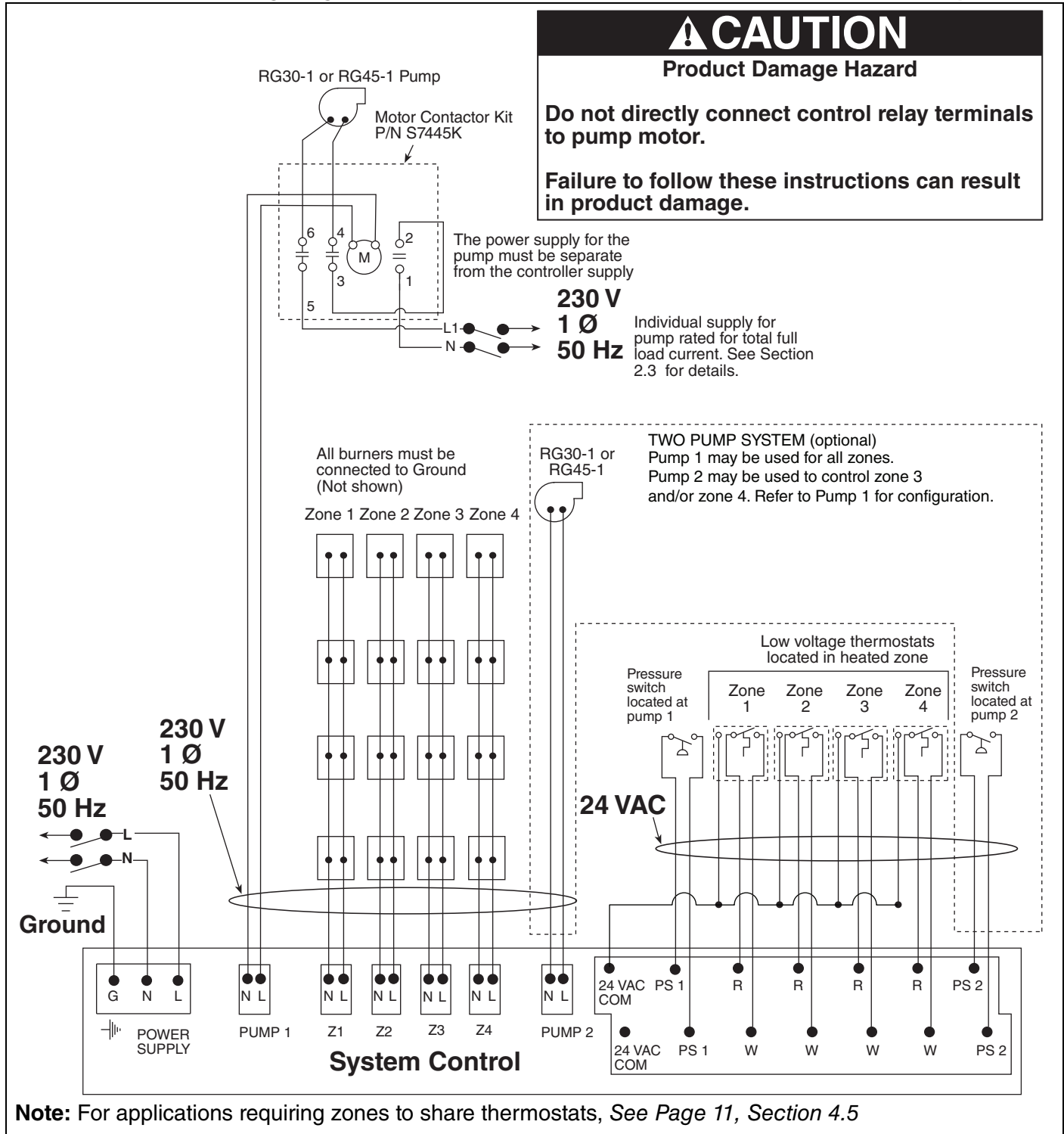


FIGURE 6: External Wiring Diagram ROBERTS GORDON® RG30-1 or RG45-1 230 V 1Ø Pump



4.2 RG30-1 or RG45-1 230 V 1Ø External Wiring Diagram

The external wiring diagram above shows the connections for four zones of CORAYVAC® system burners.

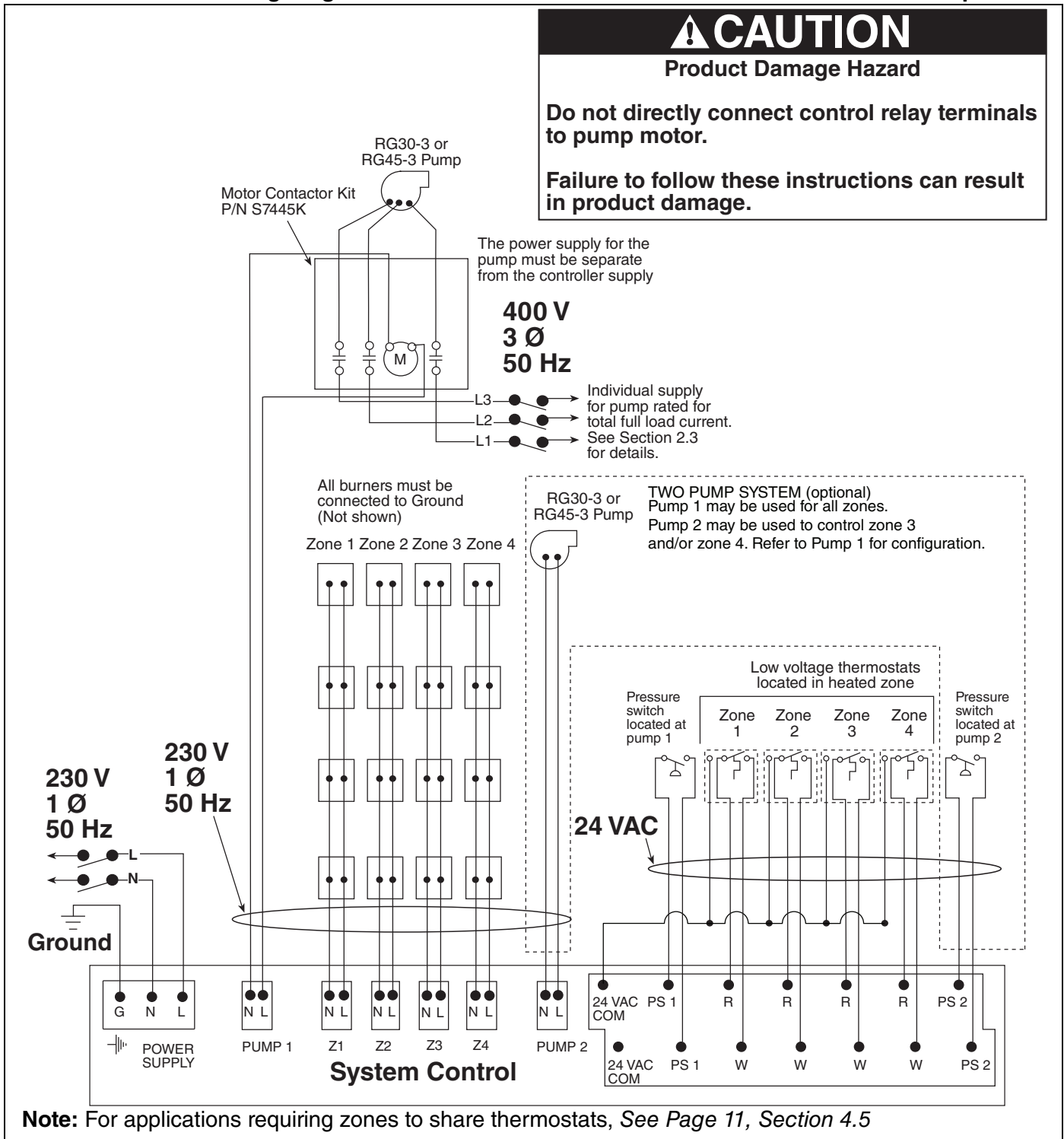
The zones are connected to a single pump, unless zone 3 and/or zone 4 are selected to function with the optional pump 2. The external wiring diagram above shows connection to an RG30-1 or RG45-1 1Ø pump.

4.2.1 External Wiring Connection Details

If any of the original wire supplied with the heater must be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C and 600 V.

The low voltage circuit must use shielded cable, one end earthed, the other insulated.

FIGURE 7: External Wiring Diagram ROBERTS GORDON® RG30-3 or RG45-3 400 V 3 Ø Pump



4.3 RG-30-3 or RG45-3 400V 3 Ø Pump External Wiring Diagram

The external wiring diagram above shows the connections for four zones of CORAYVAC® system burners.

The zones are connected to a single pump, unless zone 3 and/or zone 4 are selected to function with the optional pump 2. The external wiring diagram above shows connection to an RG30-3 or RG45-3 400 V 3 Ø pump.

4.3.1 External Wiring Connection Details

If any of the original wire supplied with the heater must be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C and 600 V.

4.4 Thermostat Wire Lengths

To ensure proper thermostat operation the recommendations for wire gauges as indicated below must be used.

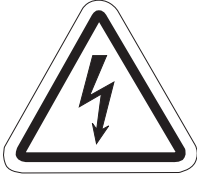
Distance (m)	mm ²
Up to 150	0.75

4.5 Thermostat Wiring

Some applications may call for zones to operate off of a single thermostat. Zones 1 and 3 may share a thermostat and zones 2 and 4 may share a thermostat. At no time should either zone 1 or 3 be connected to zone 2 or 4. Doing so will result in damage to the control board.

SECTION 5: TROUBLESHOOTING

⚠ DANGER



Electrical Shock Hazard
Disconnect electric before service.

More than one disconnect switch may be required to disconnect electric to the unit.

Failure to follow these instructions can result in death or electrical shock.

⚠ WARNING

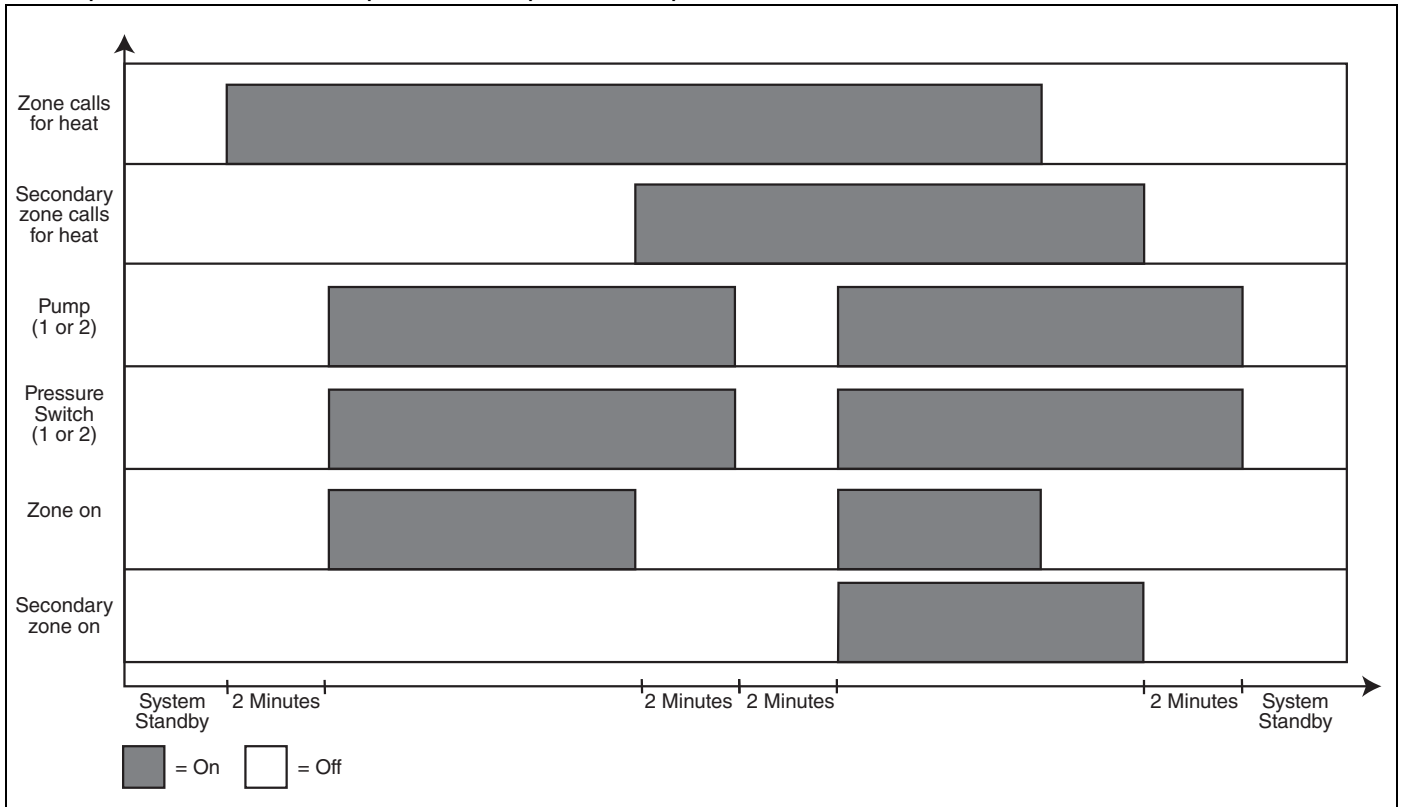


Explosion Hazard
Turn off gas supply to heater before service.

Failure to follow these instructions can result in death, injury or property damage.

5.1 Sequence of Operation

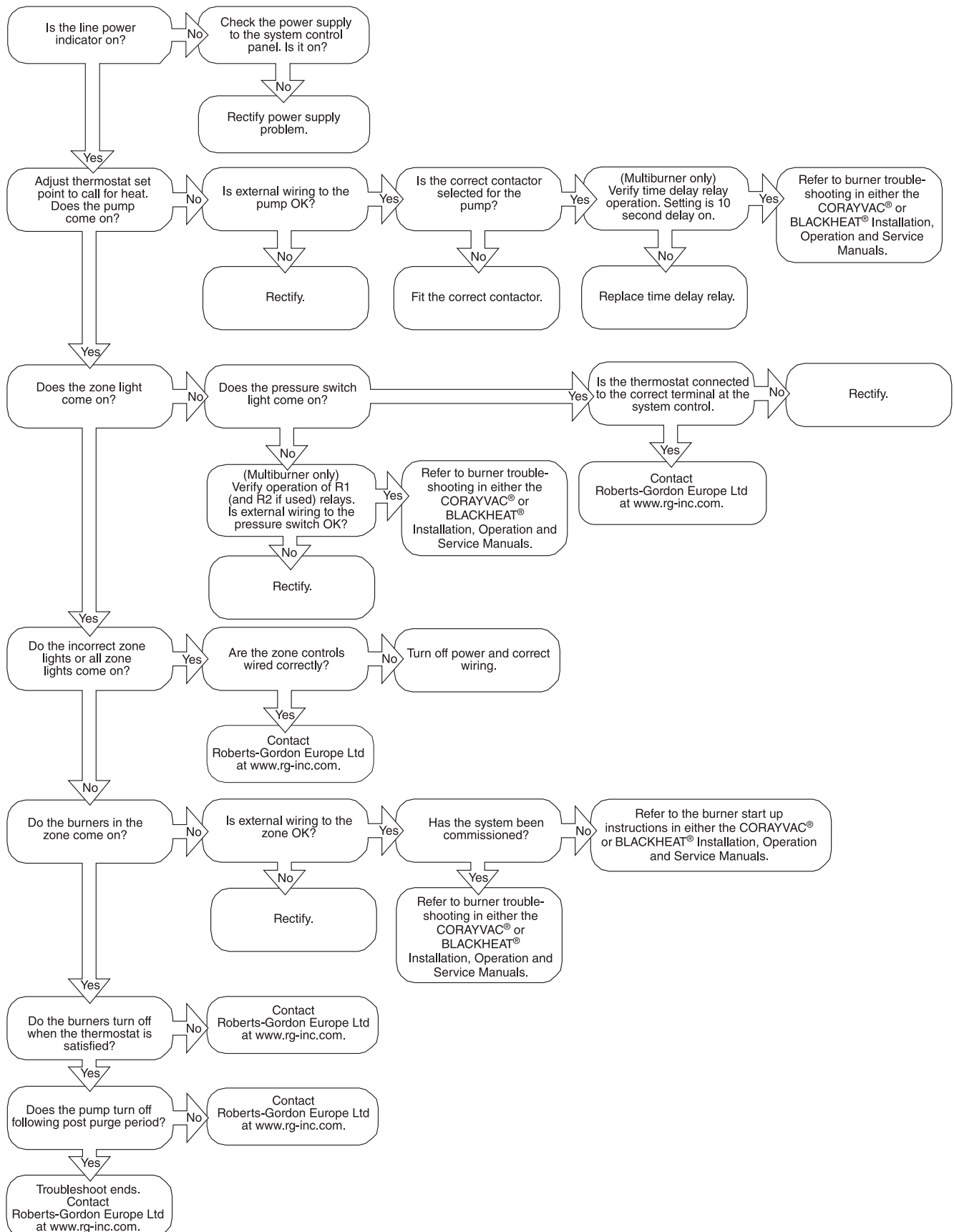
The sequence chart below represents sequence of operation for all four zones.



CORAYVAC®: Pressure switch (1 or 2) located at vacuum pump (1 or 2).
 Multi-Burner: Relays (1 or 2) inside system controller.

FIGURE 8: System Control Troubleshooting Chart

If control is not working properly, disconnect power to control and check for signs of physical damage to the front and back of the circuit board, water damage (corrosion) or scorching. If damage is found, identify and rectify source of damage. Replace circuit board (P/N 10090102), if it has permanent damage.



SECTION 6: REPLACEMENT PARTS





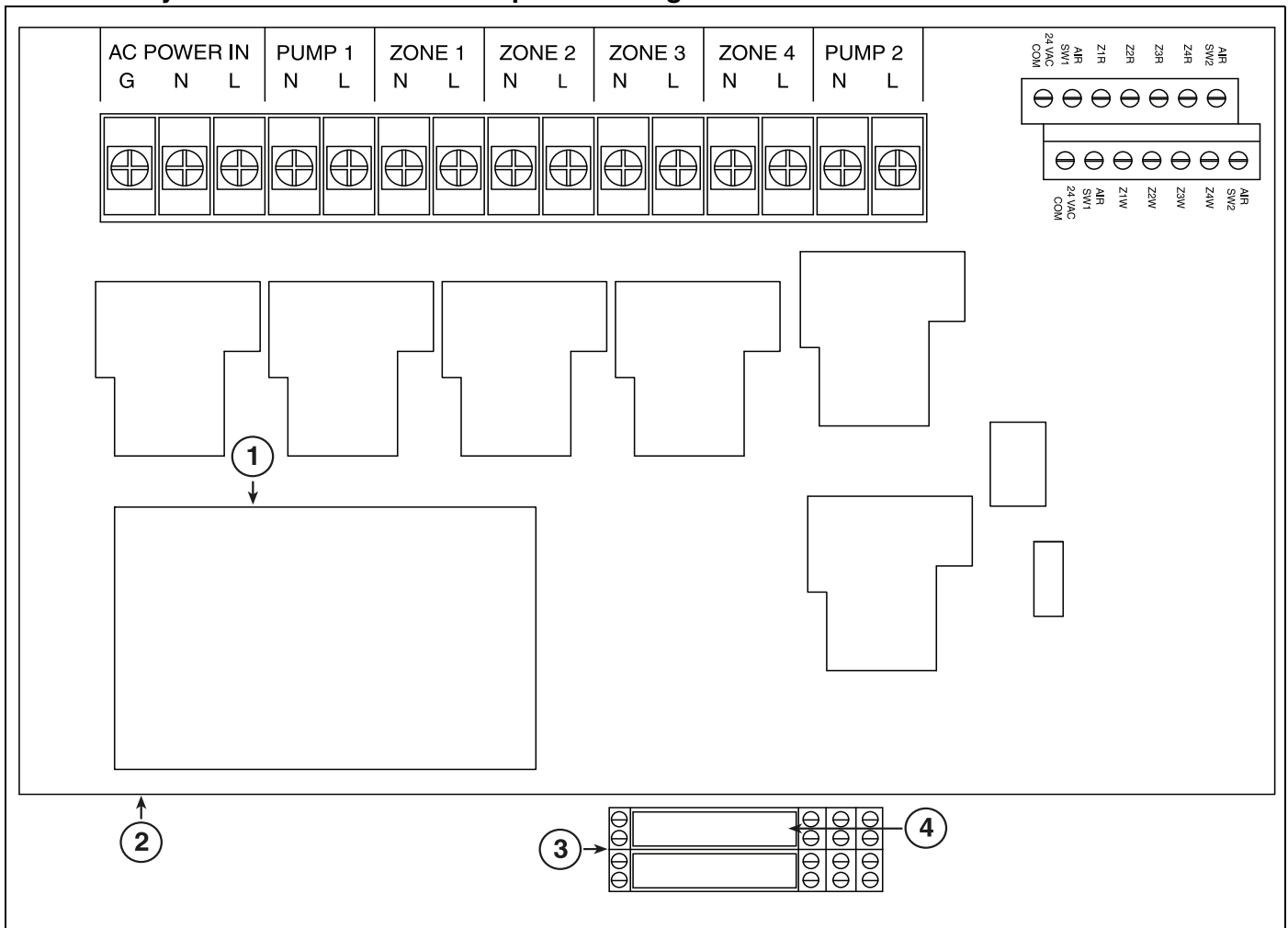
⚠ DANGER		⚠ WARNING	
			
Electrical Shock Hazard	Explosion Hazard	Fire Hazard	Carbon Monoxide Hazard
<p>Use only genuine ROBERTS GORDON® replacement parts per this installation, operation and service manual.</p> <p>Failure to follow these instructions can result in death, electric shock, injury or property damage.</p>			

FIGURE 9: System Control Internal Components Diagram



Item	Description	Part Number
1	Transformer	N/A
2	Board Assembly	10090102
3	Relay Socket	90447200
4	Relay 240 VAC	90447100

6.1 Replacement Parts Instructions

⚠ DANGER



Electrical Shock Hazard
Disconnect electric before service.

More than one disconnect switch may be required to disconnect electric to the unit.

Failure to follow these instructions can result in death or electrical shock.

⚠ WARNING



Explosion Hazard

Turn off gas supply to heater before service.

Failure to follow these instructions can result in death, injury or property damage.

6.1.1 Transformer

The transformer on the board cannot be replaced.
See Page 14, Figure 9, Item 1.

6.1.2 Microprocessor Programming

The microprocessor may be re-programmed by a reprogramming device.

Should the microprocessor program become suspect during troubleshooting, consult Roberts-Gordon Europe Limited.

