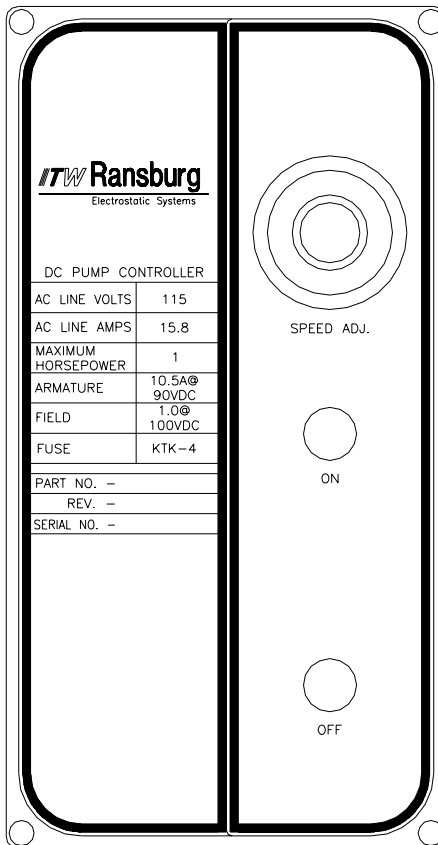

RCS-100FP FLUID PUMP MOTOR SPEED CONTROL STATION



MODEL: 70945

IMPORTANT: Before using this equipment, carefully read **SAFETY PRECAUTIONS**, starting on page 1, and all instructions in this manual. Keep this Service Bulletin for future reference.

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SAFETY

SAFETY PRECAUTIONS

Before operating, maintaining or servicing any ITW Ransburg coating system, read and understand all of the technical and safety literature for your ITW Ransburg products. This manual contains information that is important for you to know and understand. This information relates to **USER SAFETY** and **PREVENTING EQUIPMENT PROBLEMS**. To help you recognize this information, we use the following symbols. Please pay particular attention to these sections.

A WARNING! states information to alert you to a situation that might cause serious injury if instructions are not followed.

A CAUTION! states information that tells how to prevent damage to equipment or how to avoid a situation that might cause minor injury.

A NOTE is information relevant to the procedure in progress.

While this manual lists standard specifications and service procedures, some minor deviations may be found between this literature and your equipment. Differences in local codes and plant requirements, material delivery requirements, etc., make such variations inevitable. Compare this manual with your system installation drawings and appropriate ITW Ransburg equipment manuals to reconcile such differences.


Careful study and continued use of this manual will provide a better understanding of the equipment and process, resulting in more efficient operation, longer trouble-free service and faster, easier troubleshooting. If you do not have the manuals and safety literature for your Ransburg system, contact your local ITW Ransburg representative or ITW Ransburg.



WARNING

- ▶ The user **MUST** read and be familiar with the Safety Section in this manual and the ITW Ransburg safety literature therein identified.
- ▶ This manual **MUST** be read and thoroughly understood by **ALL** personnel who operate, clean or maintain this equipment! Special care should be taken to ensure that the **WARNINGS** and safety requirements for operating and servicing the equipment are followed. The user should be aware of and adhere to **ALL** local building and fire codes and ordinances as well as **NFPA 33 SAFETY STANDARD, 1995 EDITION**, prior to installing, operating, and/or servicing this equipment.

WARNING

- ▶ The hazards shown on the following page may occur during the normal use of this equipment. Please read the hazard chart beginning on page 2.

AREA Tells where hazards may occur.	HAZARD Tells what the hazard is.	SAFEGUARDS Tells how to avoid the hazard.
<p>Spray Area</p> 	<p>Fire Hazard</p> <p>Improper or inadequate operation and maintenance procedures will cause a fire hazard.</p> <p>Protection against inadvertent arcing that is capable of causing fire or explosion is lost if any safety interlocks are disabled during operation. Frequent power supply shutdown indicates a problem in the system requiring correction.</p>	<p>Fire extinguishing equipment must be present in the spray area and tested periodically.</p> <p>Spray areas must be kept clean to prevent the accumulation of combustible residues.</p> <p>Smoking must never be allowed in the spray area.</p> <p>The high voltage supplied to the atomizer must be turned off prior to cleaning, flushing or maintenance.</p> <p>When using solvents for cleaning:</p> <p>Those used for equipment flushing should have flash points equal to or higher than those of the coating material.</p> <p>Those used for general cleaning must have flash points above 100°F (37.8°C).</p> <p>Spray booth ventilation must be kept at the rates required by NFPA 33, 1995 Edition, OSHA and local codes. In addition, ventilation must be maintained during cleaning operations using flammable or combustible solvents.</p> <p>Electrostatic arcing must be prevented.</p> <p>Test only in areas free of combustible material.</p> <p>Testing may require high voltage to be on, but only as instructed.</p> <p>Non-factory replacement parts or unauthorized equipment modifications may cause fire or injury.</p> <p>If used, the key switch by-pass is intended for use only during set-up operations. Production should never be done with safety interlocks disabled.</p> <p>Never use equipment intended for use in waterborne installations to spray solvent based materials.</p>

AREA Tells where hazards may occur.	HAZARD Tells what the hazard is.	SAFEGUARDS Tells how to avoid the hazard.
General Use and Maintenance	Improper operation or maintenance may create a hazard. Personnel must be properly trained in the use of this equipment.	Personnel must be given training in accordance with the requirements of NFPA-33, Chapter 16, 1995 edition. Instructions and safety precautions must be read and understood prior to using this equipment. Comply with appropriate local, state, and national codes governing ventilation, fire protection, operation maintenance, and housekeeping. OSHA references are Sections 1910.94 and 1910.107. Also refer to NFPA-33, 1995 edition and your insurance company requirements.
Explosion Hazard / Incompatible Materials 	Halogenated hydrocarbon solvents for example: methylene chloride and 1,1,1,-Trichloroethane are not chemically compatible with the aluminum that might be used in many system components. The chemical reaction caused by these solvents reacting with aluminum can become violent and lead to an equipment explosion.	Aluminum is widely used in other spray application equipment - such as material pumps, regulators, triggering valves, etc. Halogenated hydrocarbon solvents must never be used with aluminum equipment during spraying, flushing, or cleaning. Read the label or data sheet for the material you intend to spray. If in doubt as to whether or not a coating or cleaning material is compatible, contact your material supplier. Any other type of solvent may be used with aluminum equipment.
Toxic Substances 	Certain material may be harmful if inhaled, or if there is contact with the skin.	Follow the requirements of the Material Safety Data Sheet supplied by coating material manufacturer. Adequate exhaust must be provided to keep the air free of accumulations of toxic materials. Use a mask or respirator whenever there is a chance of inhaling sprayed materials. The mask must be compatible with the material being sprayed and its concentration. Equipment must be as prescribed by an industrial hygienist or safety expert, and be NIOSH approved.

INTRODUCTION

GENERAL DESCRIPTION

The information in this document is intended ONLY to indicate the components and their working relationship in typical use. These are NOT installation instructions. Each installation is unique and should be directed by an ITW Ransburg representative or made from the ITW Ransburg installation drawings provided for your particular installation.

In order to provide our users with the most up-to-date technology possible, we are constantly seeking to improve products. If technological change occurs after a product is on the market, we will implement that technology in future production and, if practical, make it available to current users as a retrofit, update or supplement. If you find some discrepancy between your unit and the available documentation, as a result of such an improvement, contact your ITW Ransburg Representative to resolve the difference.

The RCS-100FP Fluid Pump Motor Speed Control Station (70945) converts single phase, 115 volt alternating current to regulated direct current to provide adjustable speed control of the DC motor drive. It accurately adjusts the pump speed to provide fluid delivery from 0 to 1000cc per minute (depending on fluid viscosity) using the 9966-21 single pump configuration. Delivery for other gearing configurations may vary. However, once established, replication of flow, especially at low delivery rates, is excellent. In many systems, having consistent fluid delivery is just as important as high transfer efficiencies for optimizing the total amount of coating used.

The ON/OFF switch and vernier speed control dial are mounted on the speed control cover panel for the 70945-01 model and remotely mounted on the external 19289-03 (explosion proof control station) for the 70945-02 model.

RANSBURG NO.2 PROCESS

This is a method for electrostatically applying coatings to objects. A high voltage charge is supplied to an atomizer, creating an electrostatic field between it and the target object. The target is electrically grounded through its support which may be either stationary or moving.

A fluid system delivers coating material to the atomizer where it is delivered uniformly to the target object. Here, under the influence of the electrostatic field, the coating material is atomized to form a spray mist of electrically charged particles. The charged particles are attracted to and deposited on the target object. The forces between the charged particles and the grounded target are sufficient to turn normal overspray around and deposit it on the back surface of the target. Therefore, nearly all of the spray is deposited.

A control station provides either manual or automatic operation of the equipment. Controls normally include, but are not limited to, fan and conveyor interlocks and a protective current overload device.

SPECIFICATIONS

Environmental / Physical

Height:	9.5 in.
Width:	5 in.
Depth:	5.25 in.
Weight:	12 lbs.

Electrical

INPUT

Voltage:	115 VAC, 50Hz or 60 Hz
Current:	4 amperes max.

OUTPUT

(As factory configured for a 1/4 HP motor)

Voltage:	0-90 VDC (Armature)
Current:	2.8 amperes max. (Armature)
Voltage:	90 VDC (Field)
Current:	1.0 ampere (Field)

***NOTE**

- ▶ Reference the service literature supplied with the DC pump drive for additional specifications.

NOTES:

INSTALLATION

⚠ WARNING

- ▶ The user **MUST** read and be familiar with the section on SAFETY in this manual and the ITW Ransburg safety literature therein identified.

The controller must be mounted in a location free of vibration.

Multiple controllers may be mounted side by side, as close to each other as the mounting feet will allow.

MOUNTING

⚠ WARNING

- ▶ The control unit **MUST** be located outside the hazardous area. (See NFPA No.33).

The minimum clearance at the top and bottom of the controller may be as narrow as the conduit fittings allow.

The atmosphere surrounding the controller must be free of combustible vapors, chemical fumes, oil vapor, and electrically conductive or corrosive materials.

The controller may be mounted either vertically or horizontally. However, never mount the controller upside down, immediately beside or above heat generating equipment, or directly below water or steam pipes.

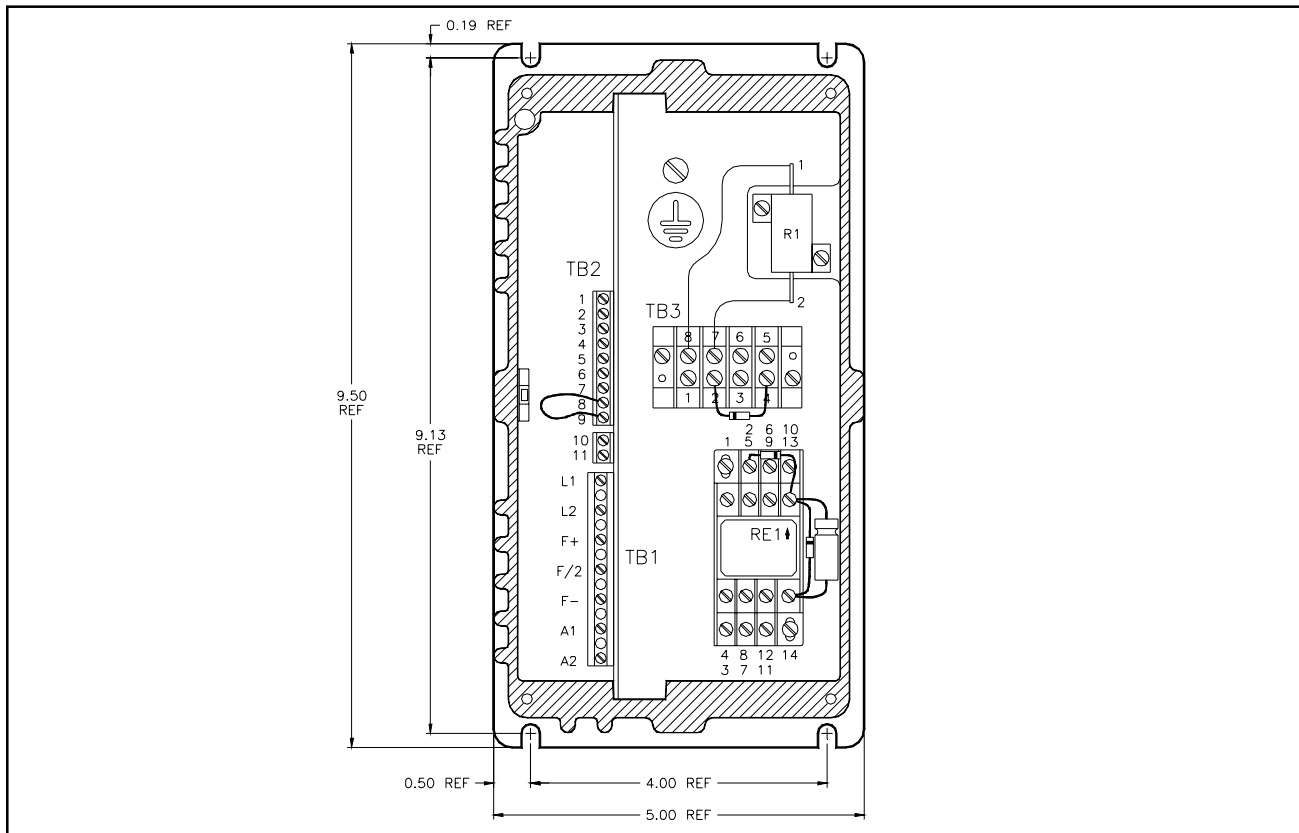


Figure 1: Mounting Dimensions

AC POWER INPUT

CAUTION

- ▶ The user is responsible for conforming with the National Electrical Code and all applicable local codes which govern such practices as wiring protection, grounding, disconnects, and other protection.

The 70945 operates on 115 VAC, 50/60 Hz only. Step-down transformers may be used to convert 230/460 VAC to 115 VAC if necessary. The hot side of the 115 VAC should be connected to the motor thermostat, the return line from the motor thermostat should be connected to the terminal strip marked TB1-L1, and the neutral side to terminal strip RE1-8. (See Figure 3 on page 9.)

The thermostat is a temperature sensing protector, mounted on the motor. The two leads from the device must be connected to the control circuit which initiates corrective action.

The motor armature, field and thermostat wiring can be located in the same cable or conduit as allowed by the National Electrical Code, Article 300-2.

It is recommended that a fused disconnect be installed ahead of the controller. Consult your local codes.

Use stranded wire, minimum gauge 14 AWG for all connections. Long cable runs may require the use of a larger gauge than normal to avoid excessive voltage drop.

Connect the green or bare wire of the line supply to the ground screw located near the top conduit entry hole in the controller case. Then ground the controller case by connecting the ground screw to earth ground.

The motor frame and remote control station(s) must also be grounded.

WARNING

- ▶ Personal injury may occur if the controller, motor, and operator station(s) are not properly grounded.

While an isolation transformer may not be required, it can provide the following advantages:

1. Reduce risk of personal injury if high voltage drive circuits are accidentally touched.
2. Provide a barrier to externally generated AC supply transients. This can prevent controller damage from abnormal line occurrences.
3. Reduce the potential for damaging current if the motor armature, motor field, or motor wiring become grounded.

Do not use power factor correction capacitors on the supply line to the controller.

INTERLOCKS

The high voltage ON interlock is connected to terminal strip TB3. The controller is designed to accept either 115 VAC high voltage interlock, 24 VAC interlock, or 24 VDC interlock. These are connected to TB3 as shown on the following interlock wiring diagram.

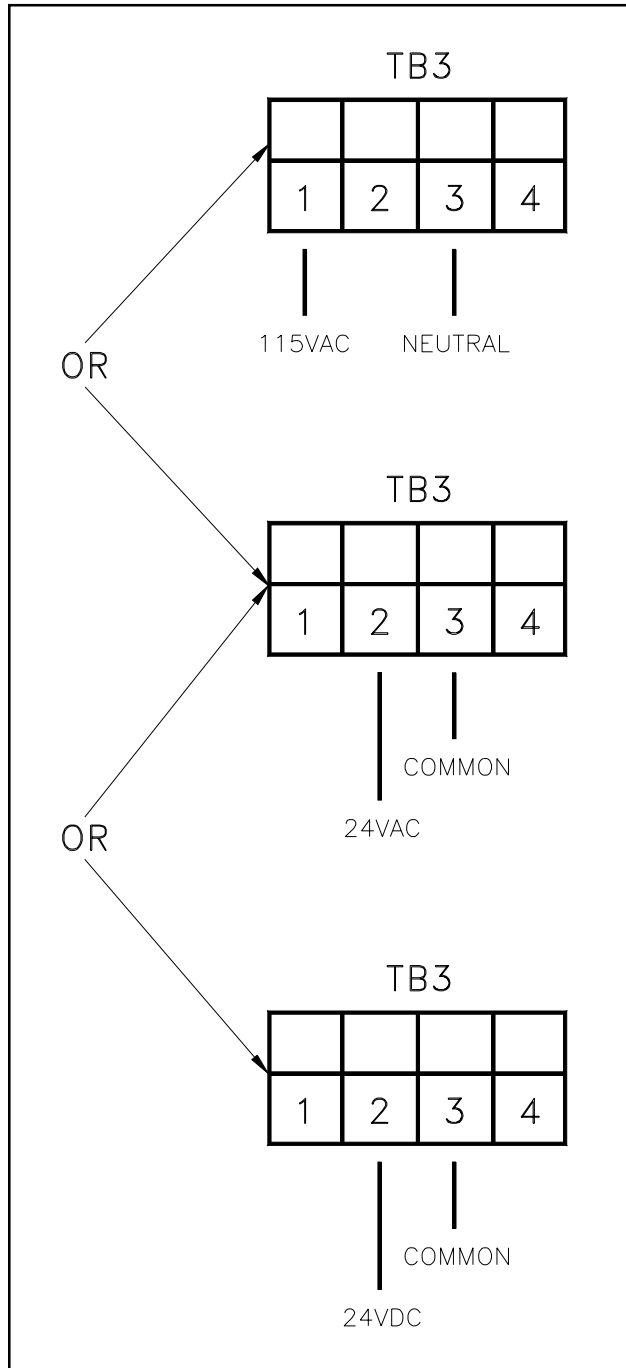


Figure 2: Interlock Connections

EXTERNAL CONTROL

For model 70945-02, external control connections are made to TB2 terminal strip. The potentiometer connects to TB2-1, 2, and 3, and the OFF/ON controls to TB3 and RE1 as shown in external wiring.

The Remote Control Station is approved as explosion proof and suitable for use in hazardous areas classified as Class I, Division I, Groups C and D.

! WARNING

- ▶ Proper wiring practices **MUST** be adhered to and **MUST** be suitable for the location for which the remote station is located. Refer to the National Electrical Code, NFPA 70.

For model 70945-01, the speed adjust and OFF/ON controls are wired internally. No other connections are needed for these functions.

OUTPUT

Output connections to the DC pump drive are made to TB1 terminals F+ and F- (to the motor field connections F1 and F2 respectfully) and TB1 terminals A1 and A2 (to the motor armature connections A1 and A2 respectfully).

***NOTE**

- ▶ On earlier versions of the 70945, controller, the motor armature outputs were labeled as A- and A+. A1 should be connected to TB1-A+ and A2 to TB1-A-. The motor operating in the wrong direction is an indication that the armature wires are reversed.

! CAUTION

- ▶ Do **NOT** use external line switching to start and stop the motor.

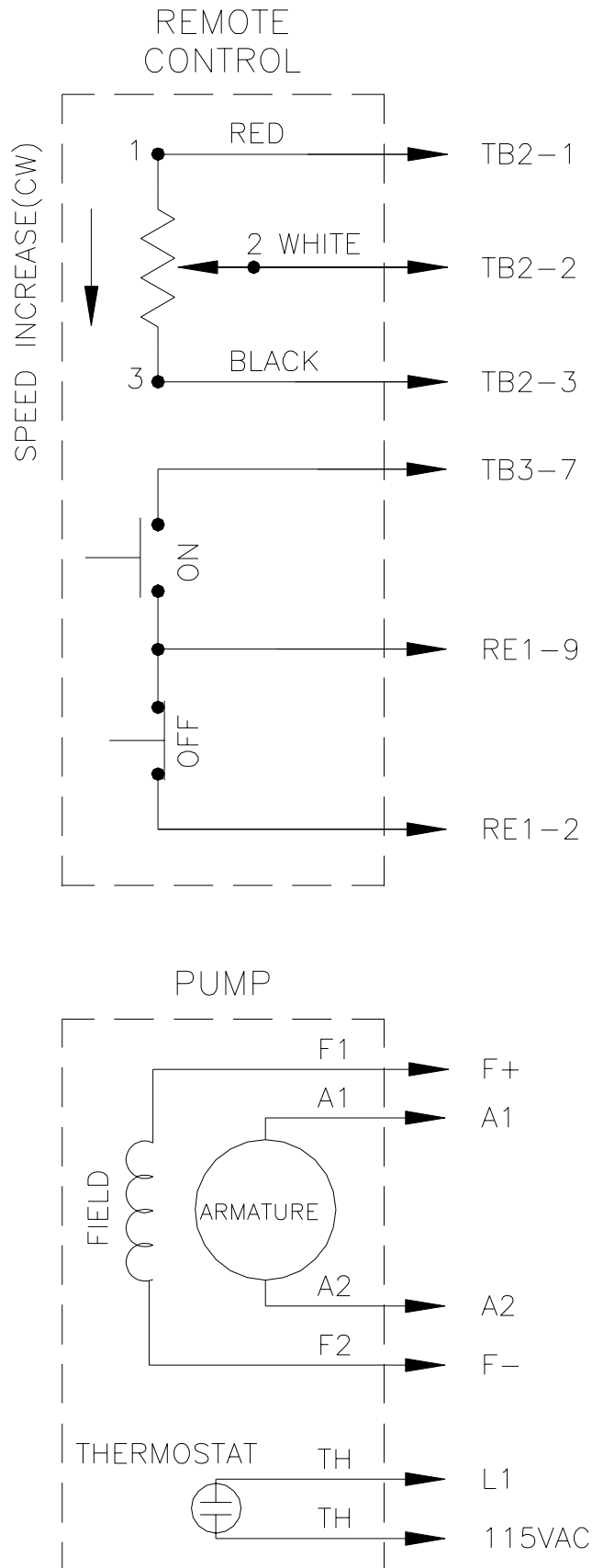


Figure 3: External Wiring Diagram

OPERATION

⚠ WARNING

- ▶ Before operating the speed control unit, be sure that the AC power per the external wiring diagram and that the high voltage interlock wiring is connected to the proper terminals as described in the installation section.

magnitude of an external speed reference signal, as applicable. This potentiometer or the speed reference signal may be adjusted while the motor is running or may be preset before the motor is started.

The rates of acceleration and deceleration are preset by the ACCEL and DECEL potentiometers, respectfully, located on the controller board.

Maximum and minimum speeds are preset by the MAX SPD and MIN SPD potentiometers, respectfully, located also on the control board.

NORMAL START-UP

1. Turn power to the controller ON at the factory disconnect.
2. Turn the fluid to the pump ON.
3. Set the vernier knob for speed adjust at the remote station or set the controller to 0.

⚠ CAUTION

- ▶ This is a three-turn potentiometer.

⚠ WARNING

- ▶ Ground **MUST** be maintained whenever transferring flammable fluid from one container to another. Both containers **MUST** be properly connected to a proven ground first and then to each other. Personnel executing such a transfer **MUST** also be grounded.

4. Start the conveyor. Push the high voltage ON button. Start the rotators. Push the ON button on the pump control and rotate the speed adjust potentiometer to the desired setting.

The speed control will supply power to the pump, thus beginning fluid delivery once the ON pushbutton is operated either on the speed control unit itself for the 70945-01 models or on the remote station for the 70945-02 models. Operation will be interrupted any time the high voltage interlock signal is removed from the terminals on TB3. To begin fluid delivery after the high voltage interlock signals are applied, the ON pushbutton must be activated once again.

Motor speed is directly proportional to the setting of the SPEED ADJ potentiometer or the

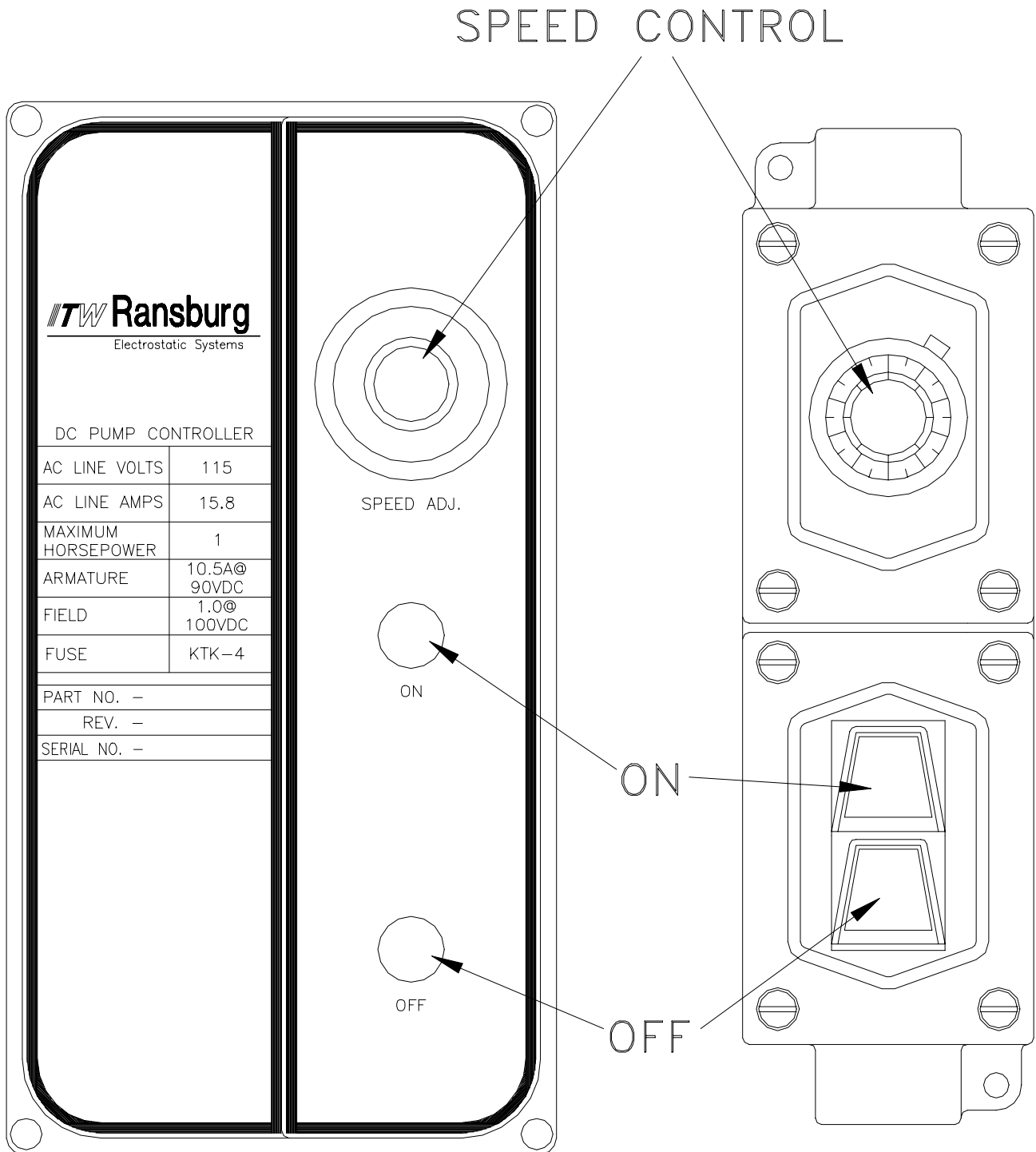


Figure 4: Controls

MAINTENANCE

WARNING

- ▶ ALWAYS disconnect all electrical power prior to attempting any service on this equipment.

WARNING

- ▶ Remember, high pressure air can be DANGEROUS and should NEVER be used against the body. It can blind, deafen and may even penetrate. If used for cleaning equipment, the user should wear safety glasses.

WARNING

- ▶ The integrity of the system ground MUST be inspected regularly and maintained. (See ITW Ransburg bulletin SL-80-08, "Equipment Grounding".)

Very little maintenance is required of the control unit other than routinely checking electrical connections to ensure that they remain tight. Any time a cover is removed from the unit, the outside should be cleaned thoroughly to keep dust and foreign matter from entering the interior of the case.

NOTES:

TROUBLESHOOTING GUIDE

General Problem	Cause	Solution
Motor Will Not Start	<ol style="list-style-type: none"> 1. AC line open 2. Operator controls inoperative or connected incorrectly 3. Relay 1RE bad 4. Line voltage selection jumper J1 in wrong position 5. Controller not enabled 6. Controller not adjusted correctly 7. Open shunt field winding or wiring to the motor shunt field, causing loss of torque 8. Motor failure 9. Control board failure 	<ol style="list-style-type: none"> 1. - Be sure rated AC line voltage is applied to controller. - Measure for 115 VAC between TB1-L2 and 1RE-8. 2. Hold HV control ON, measure HV interlock input voltage. 115 VAC - TB3-1 to TB3-3 -or- 24 VAC - TB3-2 to TB3-3 -or- 24 VDC - TB3-2 to TB3-3 3. Be sure HV control ON signal is present (above). Measure for 115 VAC between TB1-L1 and TB1-L2. If not, replace 1RE. 4. Be sure J1 is in the 115 VAC position. 5. Be sure that TB2-8 is jumpered to TB2-9. 6. Turn the ACCEL and CUR LMT potentiometers fully clockwise (100%). 7. Check the motor shunt field and associated circuitry for a loose or broken wire. 8. Repair or replace motor. 9. Repair or replace the controller.
Controller Line Fuse Blows When AC Line Power is Applied to the Controller	<ol style="list-style-type: none"> 1. Wiring faulty or incorrect 2. Circuit, component, or wiring grounded 3. Motor shunt field shorted or grounded 4. Control board failure 	<ol style="list-style-type: none"> 1. Check all external wiring terminating in the controller. 2. Remove ground fault. 3. Repair or replace motor. 4. Repair or replace controller.

Figure 5: Troubleshooting Guide

General Problem	Cause	Solution
Controlller Line Fuse Blows When a Start Command is Initiated	<ol style="list-style-type: none"> 1. Motor shorted or grounded 2. Control board failure 3. Motor overloaded 	<ol style="list-style-type: none"> 1. Repair or replace motor. 2. Replace control board. 3. Check shunt field current. Low shunt field current causes excessive armature current. If field current is adequate, check for a mechanical overload such as a frozen pump. Also check for a shorted motor armature.
Controller Line Fuse Blows While the Motor is Running	<ol style="list-style-type: none"> 1. Loose or corroded connection / Wiring faulty, incorrect, or grounded 2. Control board failure 	<ol style="list-style-type: none"> 1. Check all terminals, connections, and wiring between the AC line, controller, and motor. 2. Repair or replace controller.
Motor Will Not Reach Top Speed	<ol style="list-style-type: none"> 1. Low line voltage 2. Motor overloaded 3. Maximum speed set too low 4. Current limit set too low 5. Control board failure 	<ol style="list-style-type: none"> 1. Check for 115 VAC \pm10% between TB1-L2 and TB1-L1. 2. Check shunt field current. Low shunt field current causes excessive armature current. If field current is adequate, check for a mechanical overload such as a frozen pump. Also check for a shorted motor armature. 3. Turn the MAX SPD potentiometer clockwise. 4. Turn the CUR LMT potentiometer clockwise. 5. Repair or replace controller.
Unstable Speed	<ol style="list-style-type: none"> 1. AC line voltage fluctuating 2. Loose or corroded connection / Wiring faulty, incorrect, or grounded 3. Motor faulty 	<ol style="list-style-type: none"> 1. Observe line voltage with a voltmeter or oscilloscope. 2. Check all terminals, connections, and wiring between the AC line, controller, and motor. 3. Check motor brushes. Replace if needed. Repair or replace motor.

Figure 5: Troubleshooting Guide (Continued)

General Problem	Cause	Solution
Line and Motor Armature Current Excessive	1. Motor overloaded	1. Check shunt field current. Low shunt field current causes excessive armature current. If field current is adequate, check for a mechanical overload such as a frozen pump. Also check for a shorted motor armature.
Motor Rotates in Wrong Direction	1. Armature wires reversed	1. Reverse armature wires, A1 and A2 to motor.

Figure 5: Troubleshooting Guide (Continued)

PARTS IDENTIFICATION

FLUID PUMP MOTOR SPEED CONTROL STATION - PARTS LIST (Figure's 6, 7, and 8)

Item #	Part #	Description	Qty
1	Assembly 70945-01 70945-02	Contained Controls Remote Controls	1 1
2	9799-01	Transformer, Step Down (Optional)	1
3	Potentiometer (Speed Adjust) 18555-02	Potentiometer Only (Notated as P1)	1
4	13683-00	3-Turn Knob Only	1
5	12948-03	Remote (With Mounting Hardware)	1
6	19289-03	Remote Station	1
7	10784-04	Fuse (Located on Circuit Board) (Notated as F1)	1
8	70528-01	Interlock Relay (Notated as RE1)	1
9	70534-00	Relay Socket	1
10	13661-02	Rectifier (Notated as D1, D2, D3)	1
11	17476-12	Capacitor (Notated as C1)	1
12	20555-02	Resistor (Notated as R1)	1
13	9572-04	Terminal Strip (Notated as TB3)	1
14	8273-02	ON Switch, Contained (Notated as PBS1)	1
15	8273-01	OFF Switch, Contained (Notated as PBS2)	1

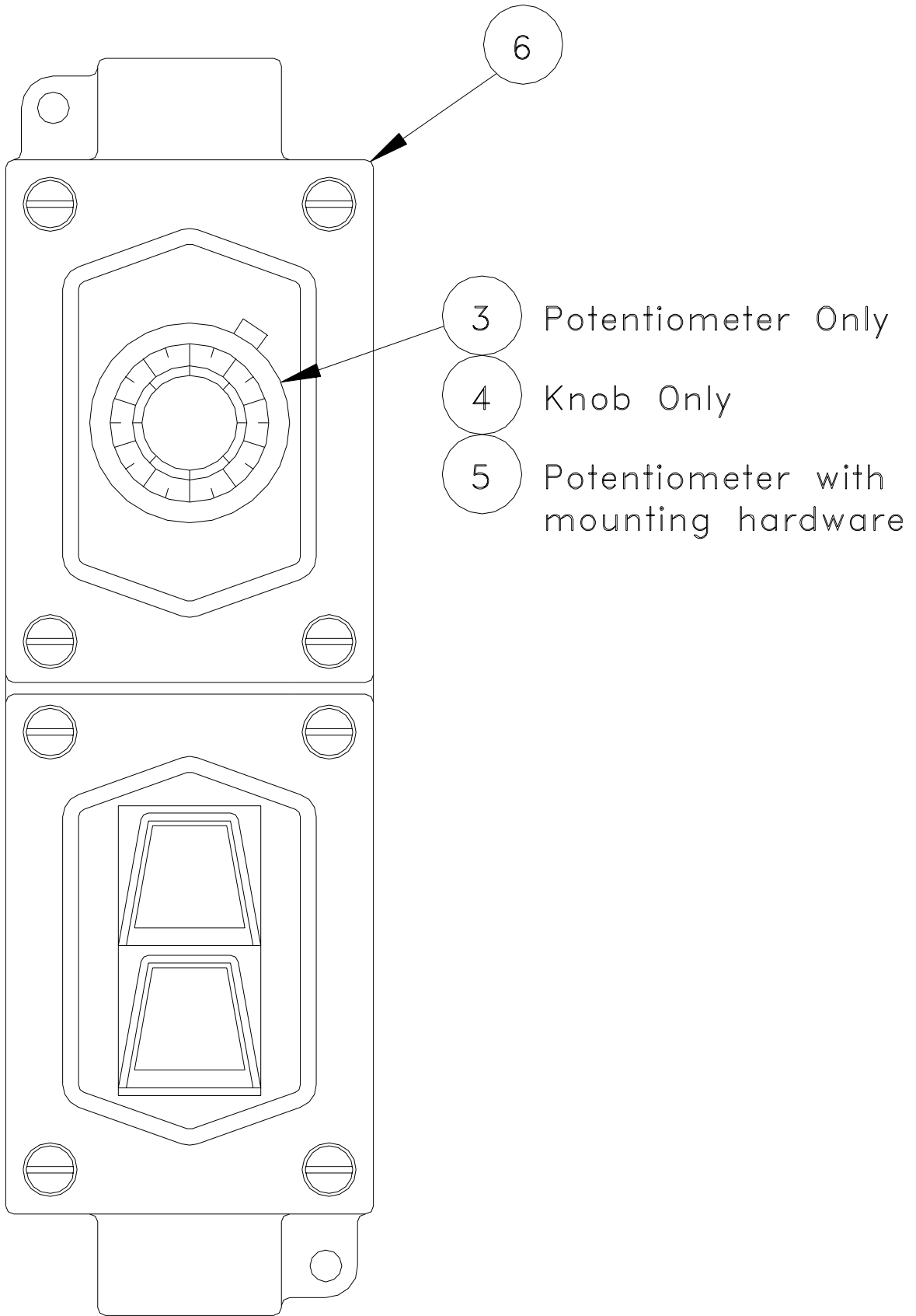


Figure 6: Remote Control Station

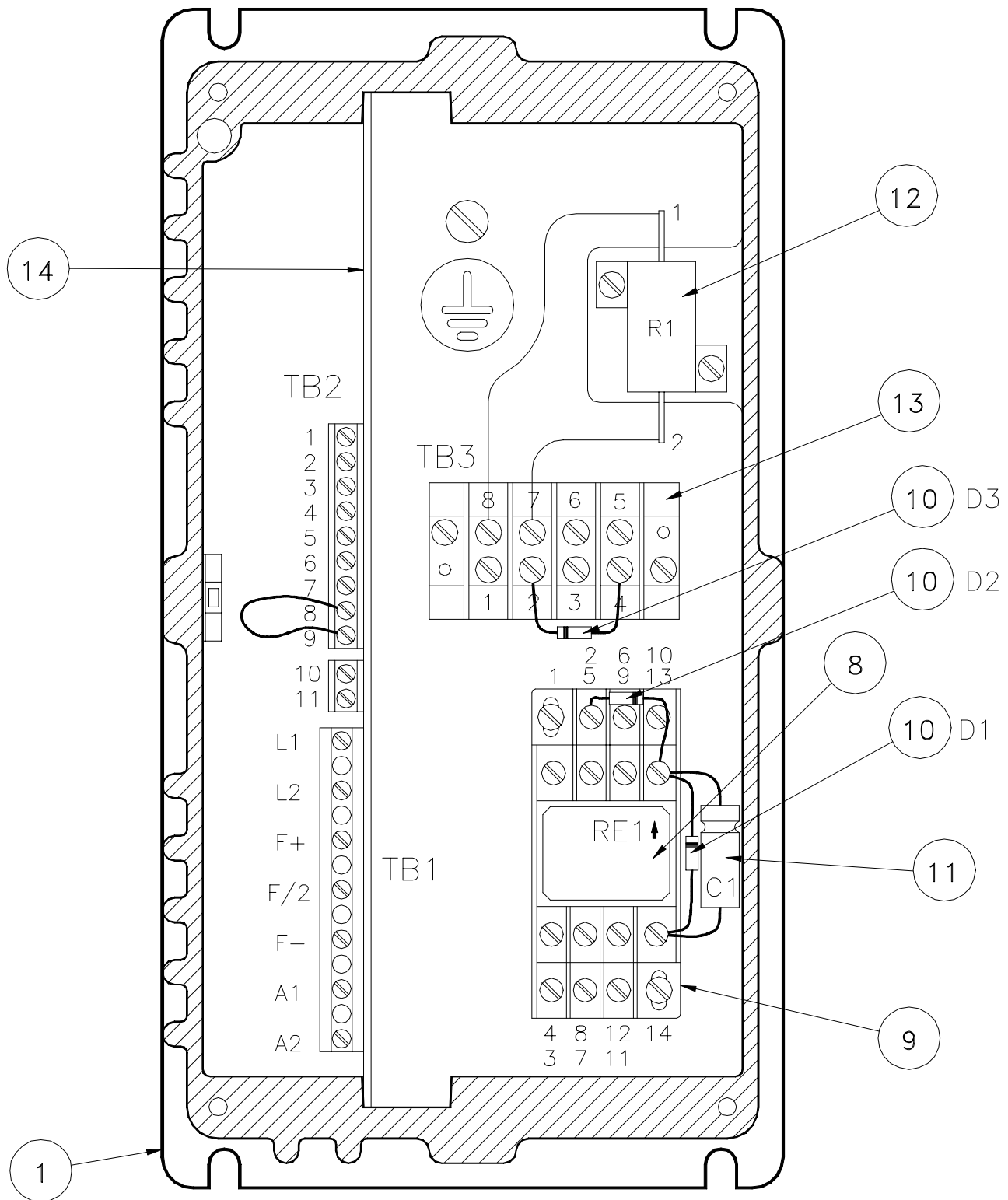
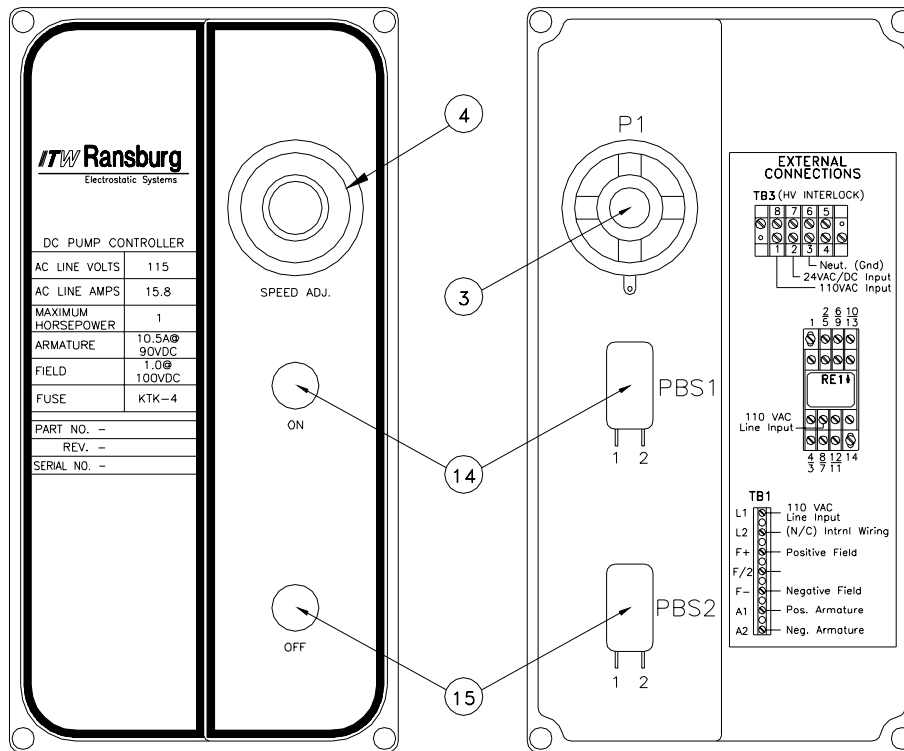


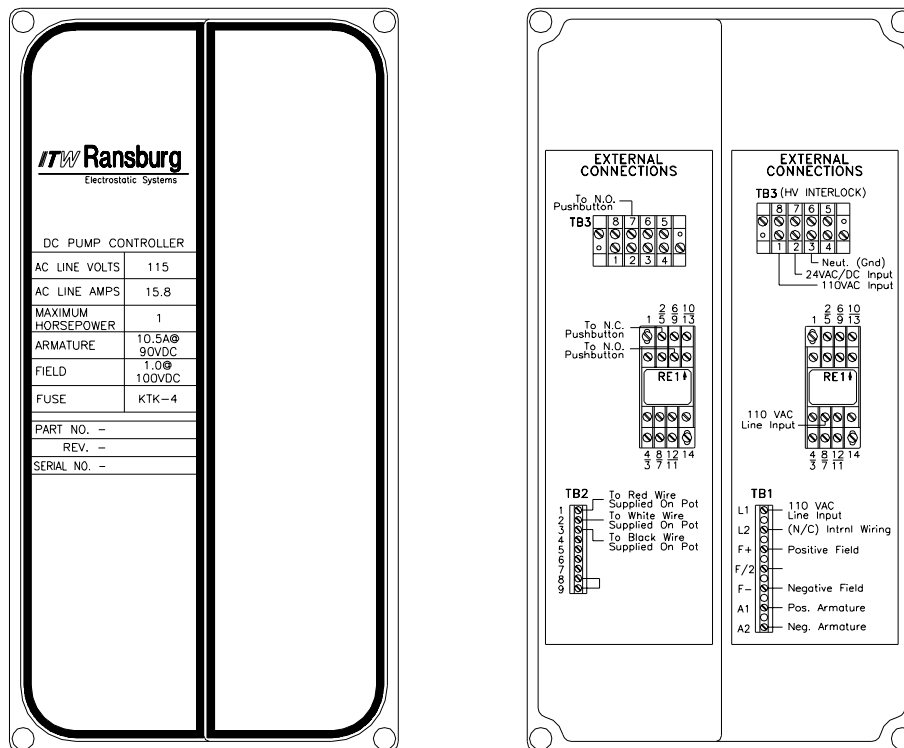
Figure 7: Parts Identification

CONTAINED CONTROLS



EXTERNAL VIEW, COVER

INTERNAL VIEW, COVER



REMOTE CONTROLS

Figure 8: Controller, External and Internal Controls

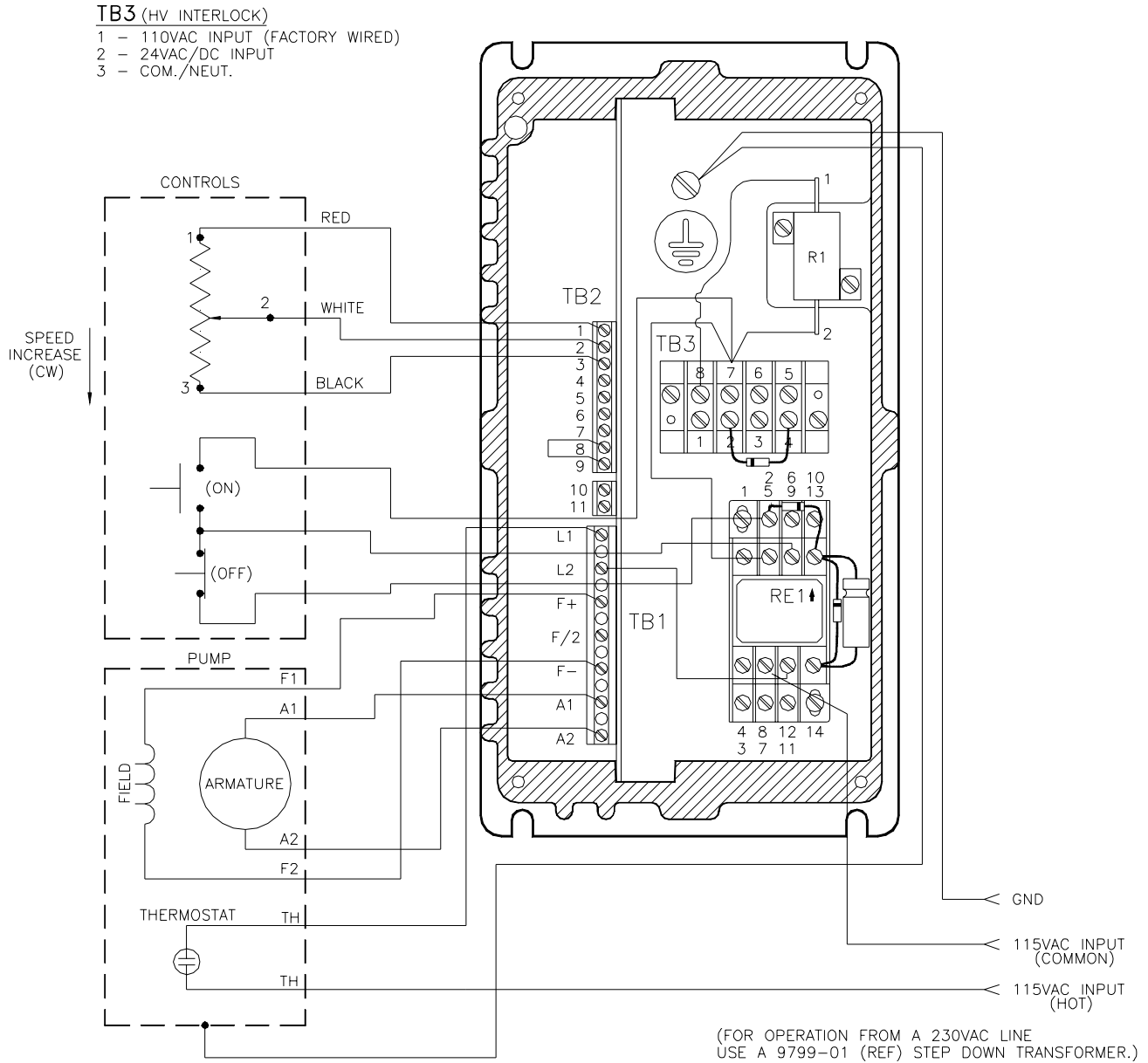
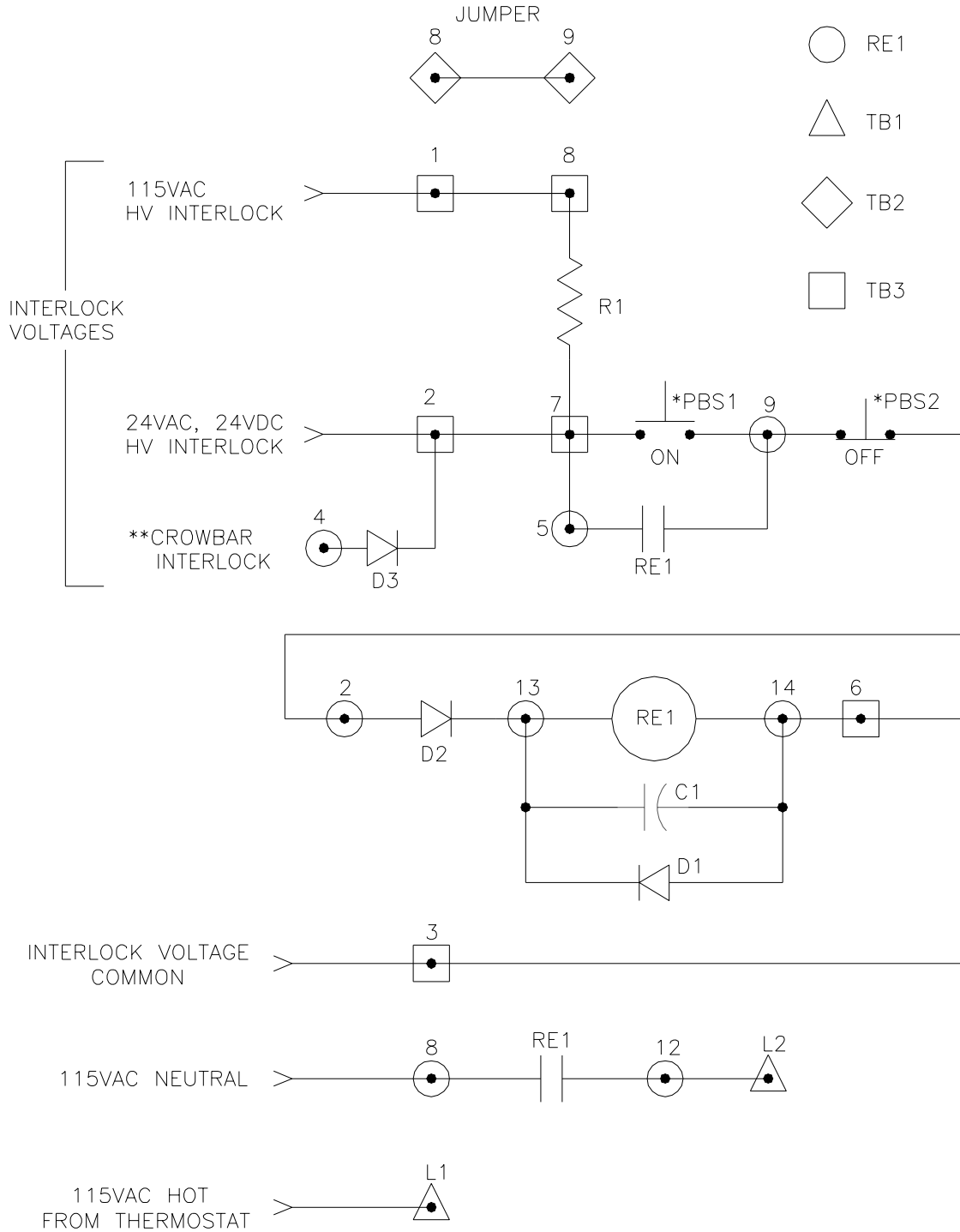


Figure 9: Wiring Diagram



*IN 70945-02 MODEL, THESE CONTROLS ARE REMOTE.

**THIS INPUT IS REQUIRED WHEN USING A CROWBAR POWER SUPPLY WITH A 71616 INTERFACE AND A HV TRANSFER SWITCH.

Figure 10: Interface Schematic

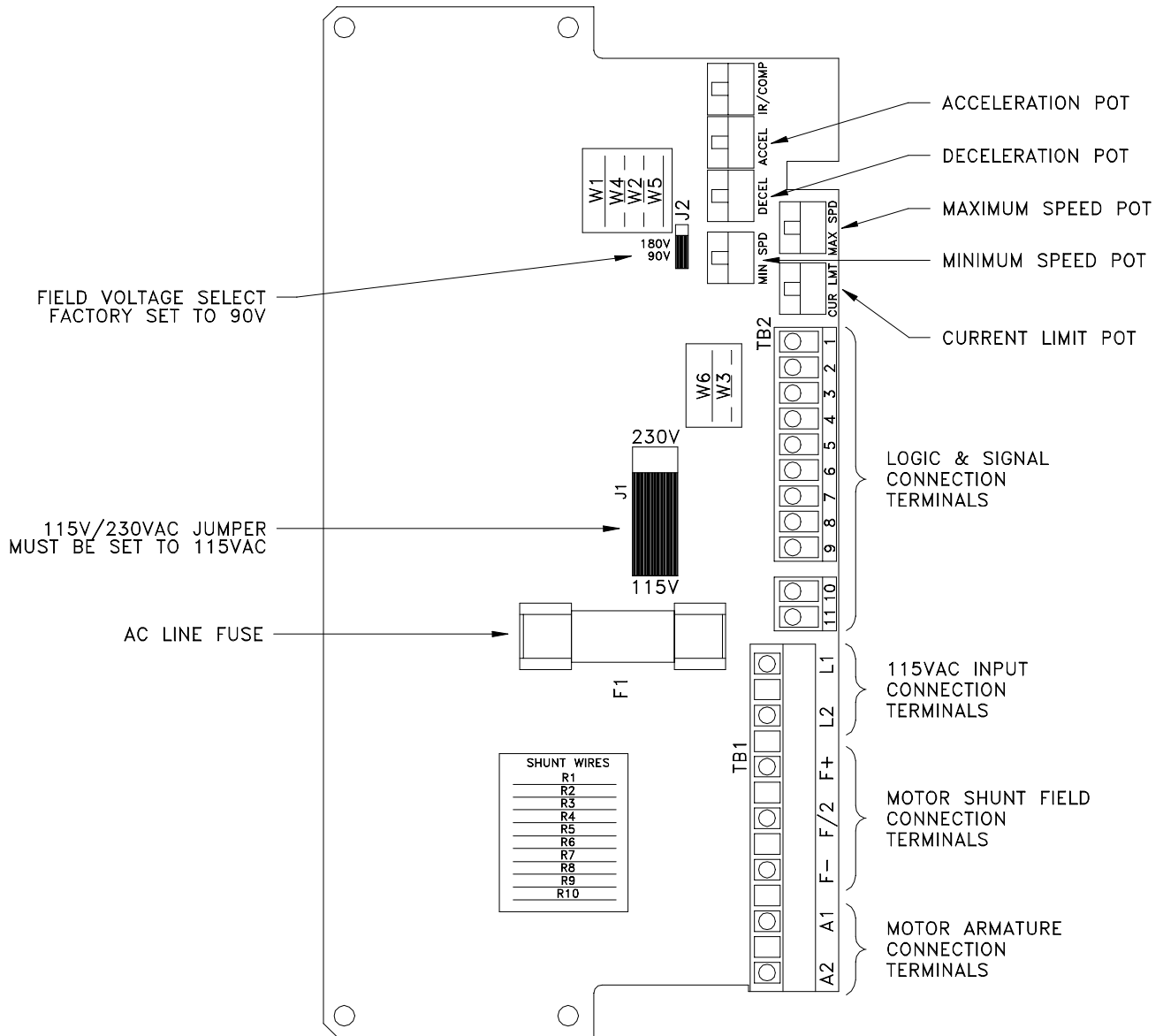


Figure 11: Control Board

WARRANTY POLICIES

WARRANTY FOR THE FLUID PUMP MOTOR SPEED CONTROL STATION

The ITW Ransburg Fluid Pump Motor Speed Control Station is warranted to be free of defects in workmanship and material. The terms of this warranty, except as hereinafter provided, extend from one year from the date of first installation. This excludes equipment failures which are the result of misapplication, misuse, incorrect maintenance, or normal wear. If, after inspection by ITW Ransburg a defect is confirmed, we will at our option repair, replace or issue credit, minus allowance for usage received.

This Warranty Does NOT Cover:

1. Components inspected and determined by ITW Ransburg not to have been installed and maintained in accordance with ITW Ransburg service instruction LN-9227-00 (latest edition).
2. Cost of repair/replacement and return transportation from ITW Ransburg of merchandise determined not to be defective.

There is no other express warranty, implied warranties, including those of merchantability and fitness for a particular purpose are limited to one year from purchase and to the extent permitted by law any and all implied warranties are excluded. This is the exclusive remedy, and liability for consequential or incidental damages under any and all warranties are excluded to the extent exclusion is permitted by law. Some states do not allow limitations on how long an implied warranty lasts, or the limitation or exclusion of consequential or incidental damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

In the event of malfunction, first ensure that the equipment is the correct equipment to do the job required, is properly installed and adjusted, and is correctly maintained and operated. Then, if a claim is made that ITW Ransburg equipment or a part thereof does not operate properly, contact your ITW Ransburg distributor through which the equipment was purchased or your ITW Ransburg representative.

Automotive Systems*

ITW Automotive Finishing Group
125-137 Victor Avenue
Highland Park, Michigan 48203-3125
Telephone: 313/ 867-6700
Fax: 313/ 867-5030

Order Desk: Telephone: 877/ 852-7797 Fax: 877/ 852-7796

Technical/Service Assistance: Telephone: 800/ 626-3565 Fax: 313/ 867-5030

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Fax: 419/ 470-2270

Website: www.itwransburg.com

E-Mail: marketing@itwransburg.com

Order Desk: Telephone: 800/ 726-8097 Fax: 800/ 359-2341

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ITW Ransburg

Electrostatic Systems

An Illinois Tool Works Company



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