INSTRUCTION MANUAL

For

Conductivity Switch

Model 352

Robertshaw
Industrial Products Division

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Instruction Manual Number

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SECTION I
DESCRIPTION

1.1 GENERAL

The Robertshaw Model 352 Conductivity Switch is a conductivity sensing ON-OFF control instrument completely self-contained and enclosed in a Weatherproof and Explosive-proof housing. The instrument is designed to be mounted directly on a bare (non insulated) sensing probe or electrode to detect conductive liquid levels or the interface between nonconductive and conductive liquids.

1.2 MODEL IDENTIFICATION

Identify instrument models in accordance with the description listed in each table. Dashes are used in the model number only in those spaces as indicated in the example below.

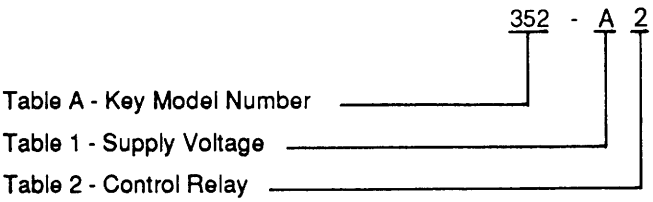


Table A- Key Model Number

Model No.	Description
352	Conductivity sensing ON-OFF Control Instrument . Completly self-contained including plug-in control relay and threshold resistance adjustment . Mounts directly on a bare (non insulated) sensing probe or electrode. Does not include probe.

Table 1-Supply Voltage

Designation	Description
A	120 VAC ± 10%, 50/60 Hz
B	240 VAC ± 10%, 50/60 Hz

Table 2 - Control Relay

Designation	Description
2	DPDT electromechanical relay

SECTION II
SPECIFICATIONS

2.1 ENVIRONMENTAL

Enclosure Classification: Class I, Division I, Groups C and D and Weatherproof NEMA 4.

Operating and Storage Temperature: -40 ° F to +160 ° F (-40 ° C to 71 ° C)

Vibration Limits: ±2 g's, 20 to 100 Hz

Humidity: 0 to 95% RH @ 100° F(37° C)

Shock: 75 g's for 11 milliseconds without permanent damage.

2.2 ELECTRICAL

Supply Voltage: 120 VAC ± 10%, 50/60 Hz;
240 VAC ± 10%, 50/60 Hz

Supply Power: 5 W, 15 VA Maximum

Output Relay - Electromechanical Relay:
Form: DPDT
Rating : 5A, 120 VAC, Noninductive; 2.2A, 240 VAC, Noninductive; 5A, 28 VDC

2.3 PERFORMANCE

Resistance Operating Range: 200 Ohms to 2.0 Meg

Hysteresis on Deadband: 15% Maximum

Temperature Coefficient: 0.05%/100 °F (0.05%/55.6 °C)

Supply Coefficient: 0.2%/10% supply variation

Minimum Recommended ON-to-OFF Resistance Ratio: 5:1

Probe Voltage: 10 VAC Maximum

Probe Current: 1.0 ma Maximum

SECTION III
INSTALLATION

3.1 GENERAL

Examine the instrument for possible shipping damages. IMPORTANT: If for any reason it is determined that parts should be returned to the factory, please notify the nearest Robertshaw sales representative prior to shipment. Each unit must be properly packaged to prevent damage. Robertshaw assumes no responsibility for equipment damaged in shipment due to improper packaging.

Choose the location in accordance with good instrument practice, avoiding extremes of temperature.

3.2 PROBE MOUNTING (See Figure 1)

Robertshaw bare (noninsulated) probes are provided in a variety of sizes and types for specific applications involving liquids.

> ***CAUTION***
> *Do not disturb the probe packing gland; to do so will render the probe useless. The glands are sealed at the factory under controlled conditions, and once opened they cannot be reassembled without new packing materials.*

3.2.1 Horizontal

Horizontally mounted rod-type probes must be installed in the vessel at the desired point of level detection. Horizontally mounted probes provide the closest control (smallest dead-band) in that a small level change at or near the probe will produce a large resistance change.

On applications involving viscous liquids or materials that have a tendency to "cling" or "build-up", it is recommended that the probe be mounted on a slight downward angle to permit draining of the material from the probe. Do not install horizontal probes in a nozzle or recess as material may collect in the nozzle and cause false operation.

3.2.2 Vertical

Vertically mounted rod-type probes should be installed in either the top or bottom of the vessel with the mid-point on the probe corresponding to approximately the desired level detection point. Vertically installed probes allow a variation in the level detection point up and down the length of the probe by means of the instrument zero adjustment.

3.3 INSTRUMENT MOUNTING

The Model 352 Conductivity Switch may be mounted or oriented in any position. See Figure 3-1 for mounting dimensions.

> ***CAUTION***
> *Care should be exercised when tightening the probe conduiet to the probe so as not to disturb the packing gland. To do so may cause the probe to become damaged.*

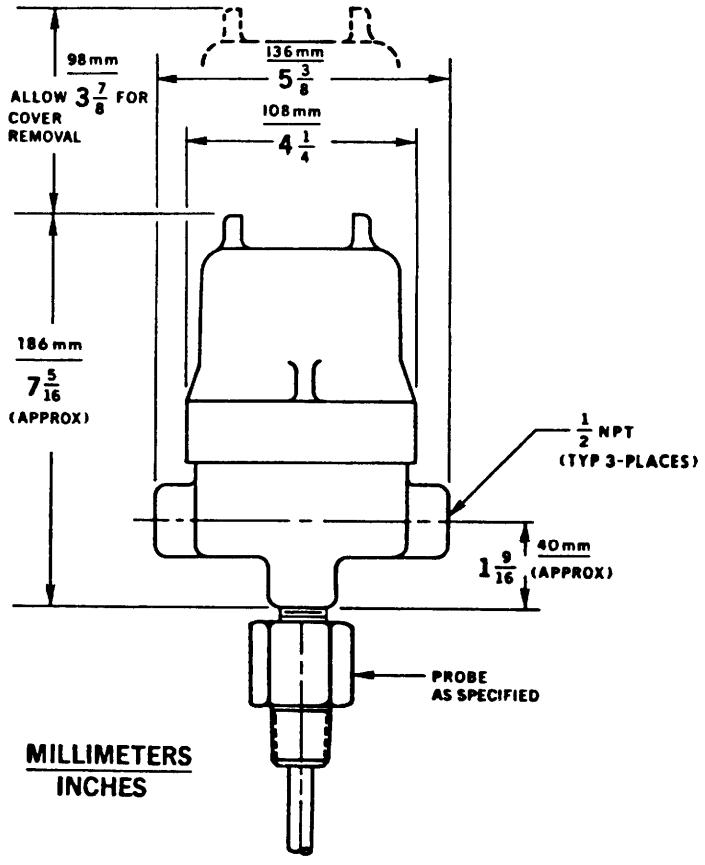


Figure 3-1. Probe Mounting and Conduiet Dimensions.

3.4 ELECTRICAL CONNECTIONS

All electrical connections should be made in accordance with Figure 3-2. See Specifications for control relay contact ratings.

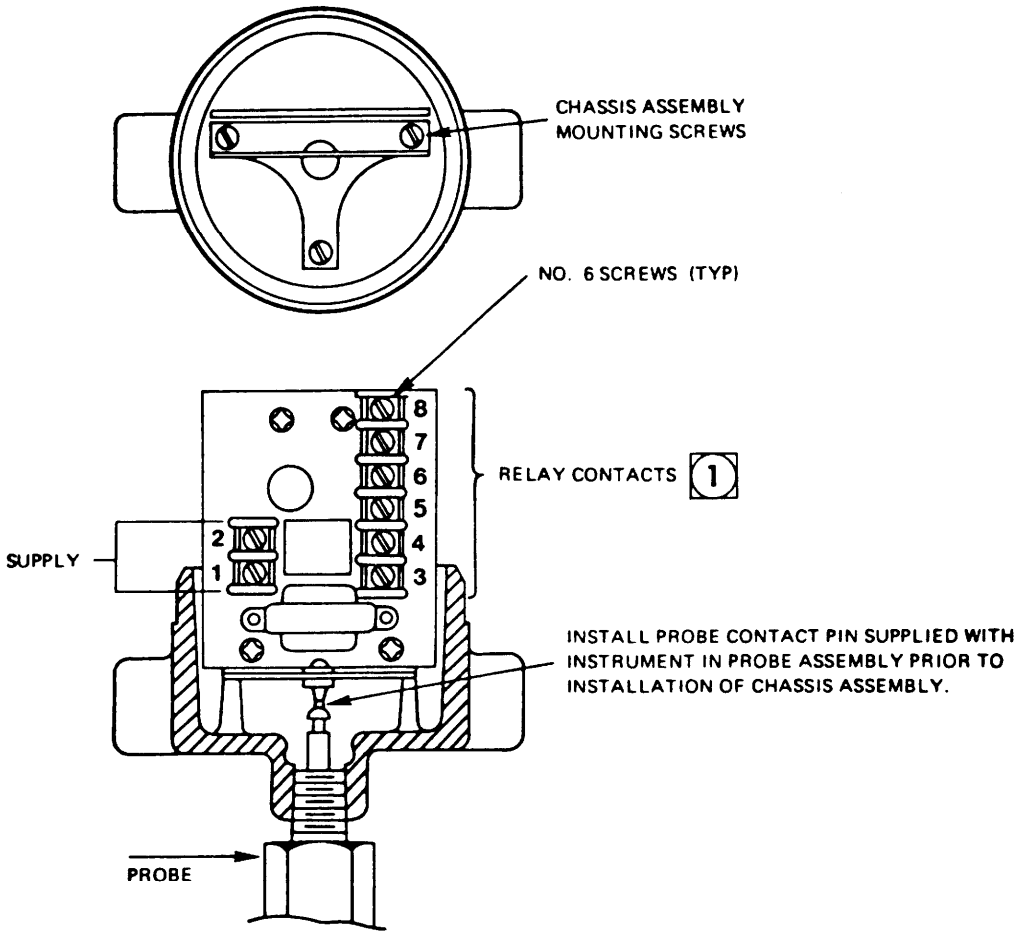
WARNING

Hazardous voltages (120 VAC or 240 VAC) are present on terminals 1 and 2.

CAUTION

Verify that the probe gland or condulet housing is grounded to earth ground.

The instrument chassis assembly may be removed from the housing for wiring installation by loosening the three chassis mounting screws and withdrawing chassis straight out.



ELECTRICAL CONNECTIONS

SUPPLY VOLTAGE SEE RATING PLATE		1 RELAY CONTACTS		
TERMINAL		TERMINAL		
1	120V 50/60 HZ	3	NORMALLY CLOSED NO. 1	1
2		4	COMMON NO. 1	
1	240V 50/60 HZ	5	NORMALLY OPEN NO. 1	
2		6	OPTIONAL NORMALLY CLOSED NO. 2	
		7	OPTIONAL COMMON NO. 2	
		8	OPTIONAL NORMALLY OPEN NO. 2	

1 CONTROL RELAY CONTACT DESIGNATIONS ARE SHOWN WITH RELAY IN THE DE-ENERGIZED CONDITION. THE RELAY IS NORMALLY ENERGIZED AND BECOMES DE-ENERGIZED WHEN LEVEL OR PROCESS REACHED THE CONTROL POINT.

Figure 3-2. Electrical Connections for the Model 352 Conductivity Switch.

SECTION IV
OPERATION

4.1 CIRCUIT DESCRIPTION

The circuit is shown in Figure 5-1. The input signal to integrated circuit IC1 is an a-c resistance bridge with one leg of the bridge being formed by the probe in a conductive material. Integrated circuit IC1, is used as an amplitude and phase discriminator. The output of integrated circuit IC1 drives transistor Q1 through a voltage divider formed by resistors R6 and R7. Transistor Q1 supplies the current to operate relay K1 through resistor R8. Resistor R8 is used to limit the initial charging current to capacitor C1. When relay K1 changes state, a positive feedback signal is returned to integrated circuit IC1 through resistor R5. Capacitor C1 is used to reduce the pulsating d-c voltage across relay K1.

4.2 SELECTING THE OPERATION MODE

The Model 352 Conductivity Switch is designed with field-changeable operational mode provisions to allow for fail-safe relay contact closure upon loss of electrical power.

Applications for high level detection should utilize the High Level Fail Safe (HLFS) mode which is defined as a decrease in resistance to cause the control relay to become de-energized. Loss of electrical power or other failures would cause the control relay to become de-energized indicating a high level or unsafe condition.

Applications for low level detection should utilize the Low Level Fail Safe (LLFS) mode which is defined as an increase in resistance to cause the control relay to become de-energized indicating a low level or unsafe condition.

4.3 CHANGING THE OPERATIONAL MODE

The operational mode may be changed by relocating the jumpers on the Printed Circuit Assembly.(See Figure 4-1.) The supply voltage to the instrument should be momentarily disconnected when making this change.

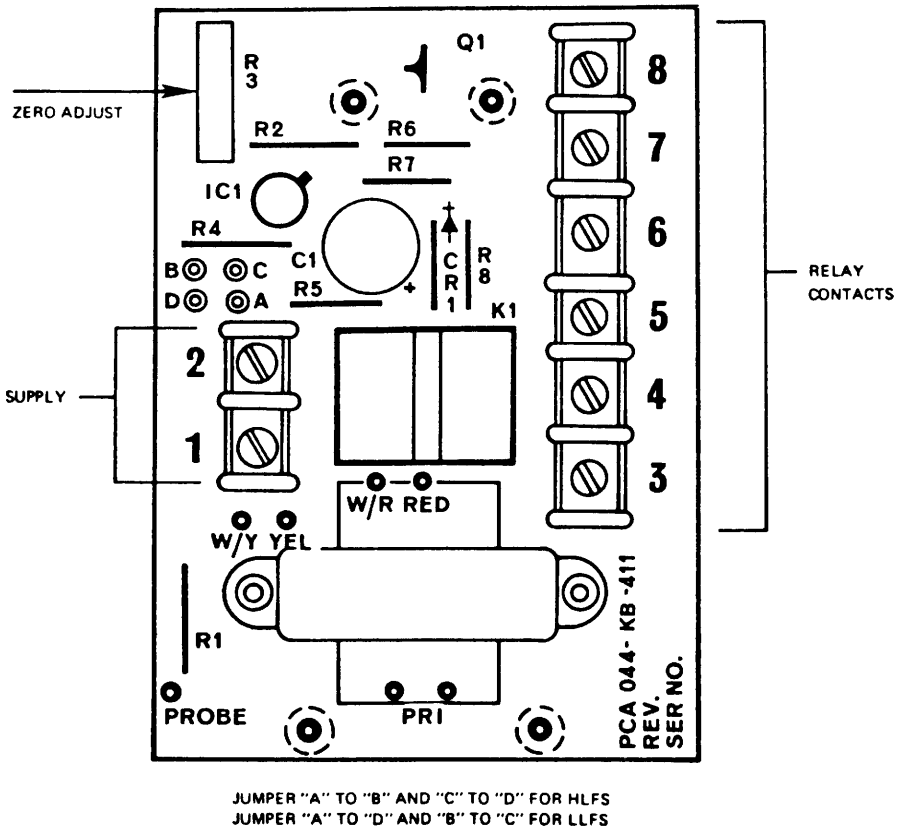


Figure 4-1. Model 352 Conductivity Operational Mode Adjustment

SECTION V
MAINTENANCE

5.1 TROUBLESHOOTING

Visually inspect the equipment for defective mechanical and electrical connections. Listed below is a list of possible troubles which may occur. Refer to Figure 5-1 when making the recommended measurements. A multi-purpose meter such as a Fluke Model 8020A is recommended for use for the measurements.

5.1.1 No Relay or Alarm Action

a. Verify the line voltage (120 VAC or 240 VAC) is applied to instrument.

b. Verify that Secondary No. 1 (between Red and White-Red leads) voltage of transformer T1 is 23 VAC.

c. Verify that Secondary No. 2 (between Yellow and White -Yellow leads or between points A and C on the PCA) voltage of transformer T1 is 3.5 VAC.

d. Verify that relay K1 coil resistance is 700 ohms.

e. Check conductivity of process material.

5.2 CALIBRATION

With the material to be sensed adjusted to the desired level and in contact with the probe, slowly adjust ZERO (R3) potentiometer until relay K1 just becomes de-energized. The instrument is calibrated and ready for operation.

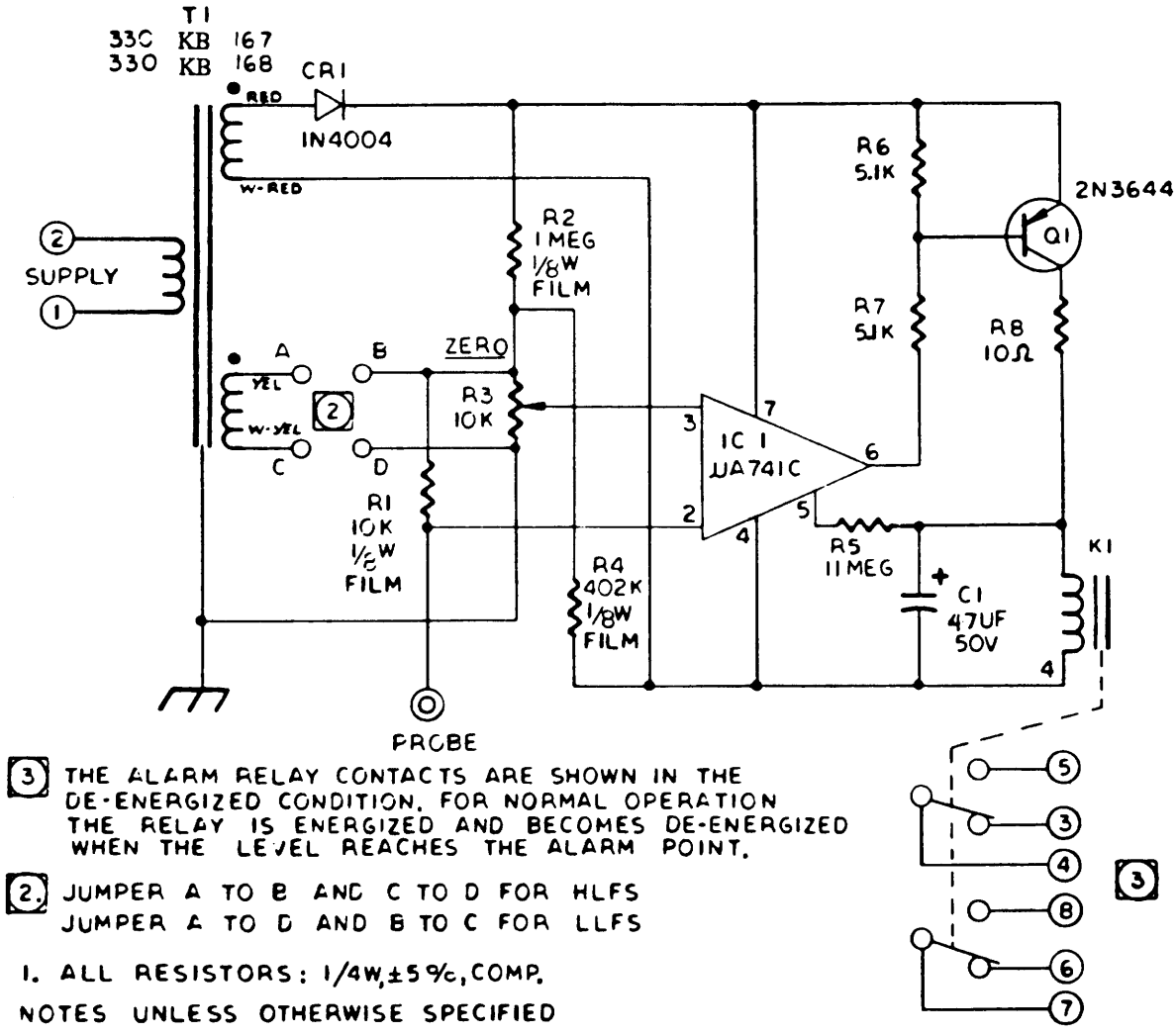


Figure 5-1. Schematic Diagram for the Model 352 Conductivity Switch

SECTION VI
PARTS LIST

6.1 GENERAL

Listed below are the major subassemblies and components used in the Model 352 Conductivity Switch.

Item No.	Description	Part No.	Used On
1	Printed Circuit Assembly	044KB411-03 044KB411-04	352-A2 352-B2
2	Transformer, 120 VAC Transformer, 240 VAC	330KB167 330KB168	352-A2 352-B2
3	Relay, DPDT	250KB051-02	352-A2 352-B2
4	Kit, Probe Termination	909GM079	352-A2 352-B2

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