



5200 SERIES RELAY DATA SHEET

Series 5200 Solid-State relays are designed for controlling a wide variety of high and low resistance liquids, moist bulk materials, and general purpose use in applications requiring a low voltage control circuit.

Supplied as compact package units, they combine performance-proven solid-state printed circuitry with an electromechanical load relay that features isolated double pole / double throw contacts for energizing pump motors, valves and other operating equipment.

Equipped with silicon controlled rectifiers, the 5200 Series Relay assures years of service without change in operating characteristics. The Relay will operate with less than a 10% difference between pull-in and drop-out resistance and can be mounted in any position. Units are field selectable for either DIRECT or INVERSE operation.

Series 5200 Solid-State Relays are available in two sensitivity ranges, LOW and HIGH.

LOW SENSITIVITY:

This relay is designed for the control or detection of electrically conductive liquids with low to medium specific resistance. Typical liquids are potable and waste water, most acids, plating solutions, fruit juices, soup, beer, milk, and soft drinks. With a low voltage AC electrode potential, this relay operates with no shock or sparking hazard. It is ideal for food, drug, dairy, and chemical processing applications.

HIGH SENSITIVITY:

This relay is recommended for the control or detection of electrically conductive liquids with medium to high specific resistance. Typical liquids are distilled and de-ionized water steam condensate, alcohol, glycols and anhydrous ammonia. It is also suitable for detecting or controlling ore, foundry sand and other bulk materials with low moisture content. With a low voltage DC electrode potential and no existing shock hazard in the electrode circuit, this relay is an excellent choice for use in applications where the relay must be located many thousands of feet away from the electrodes.

SPECIFICATIONS

Dual Input Voltage:

115 or 240 VAC 50/60 Hz (+10% / -20%)

Power Consumption:

9 Volt-Amperes, 6 watt Max.

Contact Rating:

10 Amps at 120 or 240 VAC or 28 VDC

1/4 HP at 120 VAC and 1/3 HP at 240 VAC

Output Contact Arrangement:

Double pole, double throw load contacts plus single pole, double throw holding circuit contacts

Ambient Temperatures:

-40° F to 180° F

-40° C to 82.2° C

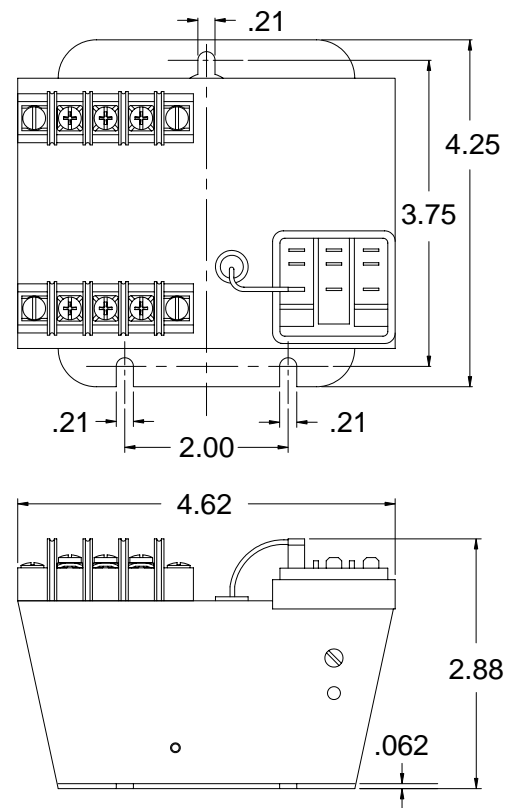
Sensing Circuit:

Low Sensitivity: 8 volt ac and less than 30 ma short-circuit.

High Sensitivity: 9.6 volt dc and less than 1 ma short-circuit.



DIMENSIONAL DATA



SENSITIVITY SELECTION

B / W level control systems use the liquid as an electrical conductor to complete the Series 5200 relay sensing circuit, and it is necessary that the relay have an operating sensitivity greater than the resistance of the liquid to be controlled. The sensitivity of both models of the Series 5200 relay is determined by the value of the replaceable R1 resistor used. Since the resistance of liquids vary over a large range, a wide selection of fixed and variable sensitivities are available as detailed on the chart below. When operating from contacts of pilot switches, any of the resistors can be used but it is recommended that the smallest R1 resistor value be used.

FIXED SENSITIVITY

Both the low and high sensitivity relays are shipped from the factory with a complete set of fixed resistors. The proper R1 resistor must be selected during installation as shown in the wiring diagrams. Fixed sensitivity type relays are recommended when operating from pilot switch contacts or when the liquid being controlled is always the same.

VARIABLE SENSITIVITY

Both the low and high sensitivity relays are available with variable resistance potentiometers. A kit can be supplied for field installation. The low sensitivity model has two variable sensitivity ranges and the high sensitivity model has three variable sensitivity ranges as shown in the table below. Variable sensitivity models are recommended for applications where the relay is to be used on a variety of liquids. They also should be used for interface detection or on applications where foam is present and it is necessary to operate on the liquid phase only.

SENSITIVITY SELECTION CHART

| | R1 SENSITIVITY RESISTOR | | SENSING CIRCUIT LIMITATIONS | | MAXIMUM OPERATING SENSITIVITY | |
|---------------------------|----------------------------|----------------|---|--|----------------------------------|----------------------|
| | Nominal Resistance | Part Number | Maximum Capacitance Electrode Wire to Ground | Maximum Lead Wire Lengths in Feet | Direct Operation | Inverse Operation |
| LOW SENSITIVITY RELAY | 270 Ohms | 04154900 | 3.7 Microfarads | 15,000 | 200 Ohms | 330 Ohms |
| | 470 Ohms | 04155000 | 1.7 Microfarads | 15,000 | 340 Ohms | 570 Ohms |
| | 1,000 Ohms | 04138300 | .80 Microfarads | 15,000 | 730 Ohms | 1,200 Ohms |
| | 1,800 Ohms | 04155100 | .44 Microfarads | 11,000 | 1,300 Ohms | 2,200 Ohms |
| | 3,900 Ohms | 04155200 | .20 Microfarads | 5,000 | 2,800 Ohms | 4,800 Ohms |
| | 10,000 Ohms | 04149400 | .08 Microfarads | 2,000 | 7,300 Ohms | 12,000 Ohms |
| | 22,000 Ohms | 04138400 | .036 Microfarads | 900 | 16,000 Ohms | 26,000 Ohms |
| | Variable | 52110205 | .80 Microfarads | 15,000 | 100-700 Ohms | 200-1200 Ohms |
| | Variable | 52110206 | .036 Microfarads | 900 | .6K-15K Ohms | 1K-24K Ohms |
| | | | | | | |
| HIGH SENSITIVITY RELAY | 10,000 Ohms | 04149400 | 120 Microfarads | 50,000 | 9,600 Ohms | 9,600 Ohms |
| | 22,000 Ohms | 04138400 | 55 Microfarads | 50,000 | 21,000 Ohms | 21,000 Ohms |
| | 68,000 Ohms | 04138500 | 18 Microfarads | 50,000 | 66,000 Ohms | 66,000 Ohms |
| | .33 Megohms | 04138600 | 4.0 Microfarads | 50,000 | .31 Megohms | .32 Megohms |
| | .82 Megohms | 04138800 | 1.5 Microfarads | 35,000 | .80 Megohms | .81 Megohms |
| | 2.2 Megohms | 04138900 | 0.5 Microfarads | 12,000 | 2.1 Megohms | 2.2 Megohms |
| | 5.6 Megohms | 04139000 | 0.2 Microfarads | 4,000 | 5.4 Megohms | 5.6 Megohms |
| | 12.0 Megohms | 04139100 | 0.1 Microfarads | 2,000 | 11.6 Megohms | 12.0 Megohms |
| | Variable | 52120205 | 12 Microfarads | 50,000 | 2K-100K Ohms | 2K-100K Ohms |
| | Variable | 52120206 | 1.2 Microfarads | 28,000 | 7K-1.0 Megohms | 7K-1.0 Megohms |
| | Variable | 52120207 | 0.2 Microfarads | 4,000 | 47K-5.0 Megohms | 47K-5.0 Megohms |
| | | | | | | |

ELECTRODE LEAD WIRES

Shielded cable is not required, and ordinary insulated wire can be used for electrode leads. Lead wires should be isolated from, not run in the same conduit with, power and load carrying circuits to avoid direct coupling with these circuits. While capacitance of the lead wire to ground has some slight affect on sensitivity, this factor need only be considered when the relay is located more than 900 feet away from the electrodes. (Reference the **SENSITIVITY SELECTION CHART**)

5200 SERIES SOLID-STATE RELAY CATALOG NUMBERING SYSTEM

5200 - LF1 - N1

| RELAY CODE | ENCLOSURE TYPE |
|------------|--|
| OC | Open Chassis |
| N1 | NEMA 1, General Purpose |
| N4 | NEMA 4, Weather Proof, Watertight / Dust Tight |
| N4X | NEMA 4X, Fiberglass, Watertight, Dust Tight, Corrosion Resistant |
| N7 | NEMA 7, Class I, Group D; Class II, Groups E, F & G |
| N12 | NEMA 12, Oil Tight |

SEE CATALOG SECTION 1500 FOR ENCLOSURE DIMENSIONS

| RELAY CODE | R1 SENSITIVITY RESISTANCE | TYPICAL LIQUIDS |
|--------------|---------------------------|---|
| LF1 Fixed | 270 ohms | All metallic circuits, B / W Unifloat® |
| | 470 ohms | Strong electrolytes: Plating solutions |
| | 1,000 ohms | Weak electrolytes: Ammonium hydroxide, borax, acetic acid |
| | 1,800 ohms | Most food processing applications: Beer, wine, fruit juices, milk, buttermilk |
| | 3,900 ohms | Highly corrosive acid or caustic solutions where electrode current must be minimized to extend electrode life: Hydrochloric acid, sulfuric acid. etc. |
| | 10,000 ohms | Ordinary water with medium to high mineral content, sewage, water soluble oil and starch solutions. |
| | 22,000 ohms | Most water with low mineral content, soft water - (<i>not distilled or de-ionized water</i>). Use High Sensitivity Relay Control |
| LV1 Variable | Variable 100-700 ohms | Same as above for 270, 470, and 1,000 ohms Fixed Relays |
| LV1 Variable | Variable .6K-15K ohms | Same as above for 1,800 thru 22,000 ohms Fixed Relays |
| HF2 Fixed | 10,000 ohms | Ordinary water with medium to high mineral content, sewage, water soluble oil and starch solutions, long distance applications. |
| | 22,000 ohms | Water with low mineral content, soft water - (<i>not distilled or de-ionized water</i>), sugar syrup solutions, long distance applications. |
| | 68,000 ohms | Steam condensate, corn syrup, strong alcohol solutions up to 50% |
| | 330,000 ohms | Alcohol solutions up to 70% |
| | 820,000 ohms | De-ionized or distilled water, 95% glycerin, 90% Hydrogen peroxide, 95% ethyl alcohol, granular solids with high moisture content |
| | 2.2 Megohms | Glacial acetic acid, acetone, granular solids with high moisture content |
| | 5.6 Megohms | M.E.K. (Methyl ethyl ketone) |
| | 12.0 Megohms | Anhydrous ammonia |
| HV3 Variable | Variable 2K-100K ohms | Same as above for 10,000 thru 68,000 ohms Fixed Relays |
| HV4 Variable | Variable 7K-1.0 Megohms | Same as above for 330,000 thru 820,000 ohms Fixed Relays |
| HV5 Variable | Variable 47K-5.0 Megohms | Same as above for 2.2 and 5.6 Megohms Fixed Relays |

Note: D1 water, glycols, alcohols and granular solids may require the 2.2, 5.6 or 12.0 Megohms R1 resistors depending upon their purity or moisture content.

GROUND CONNECTIONS

In all installations, a good external ground connection and a dependable return circuit to the liquid are required. In most instances, grounding to a metal pipe leading to the tank is suitable, but electrical conduit should not be used for this purpose.

If a good ground connection to the liquid is not available, an additional ground electrode is required. When used, the ground electrode should extend slightly below the longest operating electrode. In addition, it is also desirable to ground the relay chassis directly to the ground terminal or through a relay mounting screw.

SERIES 5200 RELAY OPERATION

Positive fail-safe control can be obtained simply by connecting the proper R1 resistor to the terminal block for direct or inverse operation as shown in the diagrams.

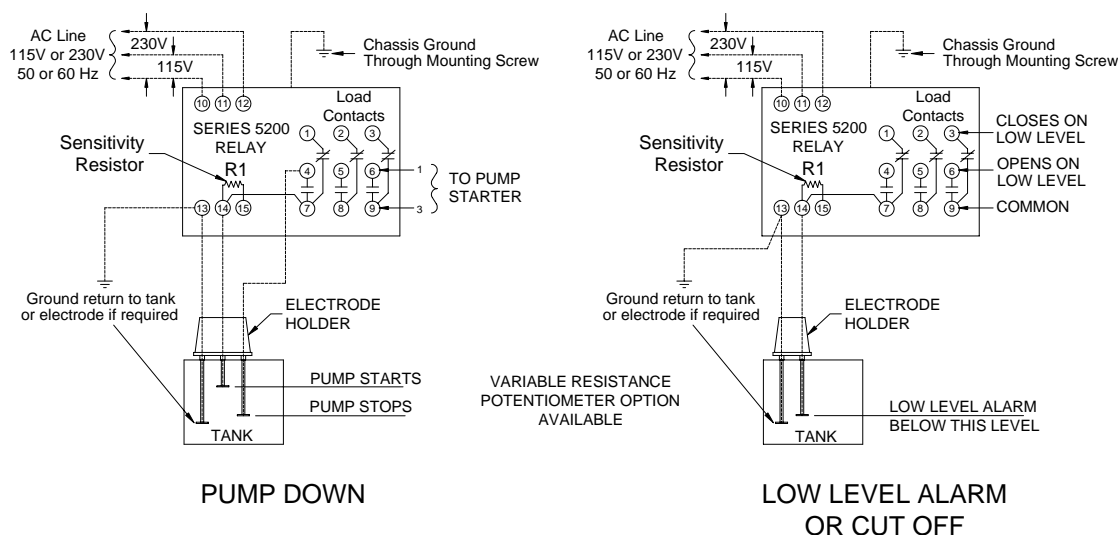
DIRECT OPERATION

In *direct operation*, the load relay is energized when liquid contacts the *upper* electrode, or Unifloat® reed switch, and electrode current is flowing.

INVERSE OPERATION

In *inverse operation*, the load relay is energized when the liquid falls below the *lower* electrode, or Unifloat® reed switch, and current ceases to flow.

DIRECT OPERATION FROM B/W ELECTRODES



INVERSE OPERATION FROM B/W ELECTRODES

