B/W Controls has developed several long distance and low voltage remote control systems designed to meet the requirements of a broad range of industrial and commercial applications.

While these systems have been widely used with electrodes to detect and control levels and interfaces of conductive liquids and moist bulk materials, they incorporate a low voltage sensing circuit which will also operate from contact-type pilot devices such as pressure, flow, float and limit switches, thermostats and pushbuttons, etc. As a result, they can also be used to provide safe, reliable, low cost control of lighting and alarm systems, conveyors, machinery, and automated processing, packaging and transfer equipment.

Selection of the system best suited for a given application depends upon the control circuit wiring. In general, maximum distance for an AC sensing circuit is limited by the capacitance of the wires connecting the relay to the pilot device. If a DC sensing circuit is used, distance is limited by the resistance of the control circuit.

For applications requiring an AC sensing circuit use B/W Type 1500 induction relays with 24, 40, or 90 volt secondary coils, or Type 5200-L solid state relays with 270 ohm R1 resistor. For applications requiring a DC sensing circuit use Type 5200-H solid state relay with 10,000 ohm R1 resistor, Type 5300-F1 intrinsically safe control relay, or the LD1750 telephone circuit control.

Let B/W help you select a system designed to meet your specific needs.

### ELEVATED STORAGE TANK CONTROL

A model U-C1B2 control with combination motor starters is shown with Type 1500 induction relays. This arrangement is suitable located up to 900 feet from the tank. For greater distances, B/W offers various methods of remote control either over direct private wires or leased telephone circuits.

### STANDARD LD1750 CONTROL PANEL FOR TELEPHONE CIRCUIT REMOTE CONTROL

The LD1750 control is designed for reliable operation over phone circuits with up to 3000 ohms resistance. A continuous metallic circuit is required between the pilot contact and the LD1750 control unit. For installations where an isolated pair is not available, other control systems can be furnished.

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**Discount Schedule**

<table>
<thead>
<tr>
<th>LIST PRICE</th>
<th>ENCLOSURE</th>
<th>LINE VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X00</td>
<td>OC</td>
<td>115 Volt 50/60 Hz</td>
</tr>
<tr>
<td>$X100</td>
<td>N1</td>
<td>230 Volt 50/60 Hz</td>
</tr>
<tr>
<td>$X200</td>
<td>N2</td>
<td>460 Volt 50/60 Hz</td>
</tr>
<tr>
<td>$X300</td>
<td>N3</td>
<td>600 Volt 50/60 Hz</td>
</tr>
<tr>
<td>$X400</td>
<td>N4</td>
<td>800 Volt 50/60 Hz</td>
</tr>
<tr>
<td>$X500</td>
<td>N5</td>
<td>1000 Volt 50/60 Hz</td>
</tr>
</tbody>
</table>

*For use on Induction Relay secondary circuits up to 360 volts*
LONG DISTANCE AND LOW VOLTAGE REMOTE CONTROL SYSTEM USING THE SERIES 52 SOLID STATE RELAY

The Series 52 Solid State Relay is ideal for long distance and low voltage remote control systems. The Series 52 Low Sensitivity Relay is used for applications requiring AC sensing circuits. The Series 52 High Sensitivity Relay is used for applications requiring DC sensing circuits.

In general the maximum distance for an AC sensing circuit is limited by the capacitance of the wires connecting the relay to the pilot device. If a DC sensing circuit is used, distance is limited by the resistance of the control circuit. (See tables below.) In most cases the size of wire is based on the physical strength required to meet given installation conditions. #14 to #18 gauge wire is generally strong enough for private buried or overhead wiring.

The Series 52 Solid State Relays are capable of performing control functions directly from electrodes or pilot switching devices located several miles away.

Telephone circuits and some communication cables use small wires having relatively high resistance. In all cases, however, control circuit wires must have good insulation, and splices or connections must be watertight and well insulated from ground.

The built-in holding circuit feature shown below allows the Series 52 Relay to operate over a range of levels and from pushbuttons or other momentary contact switches.


### TYPICAL CAPACITANCE AND RESISTANCE VALUES

<table>
<thead>
<tr>
<th>CONTROL WIRES</th>
<th>CAPACITANCE Mfd/1000 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone pair</td>
<td>0.015</td>
</tr>
<tr>
<td>Two #14 in open air</td>
<td>0.02</td>
</tr>
<tr>
<td>Two #14 in ½ conduit</td>
<td>0.04</td>
</tr>
<tr>
<td>Two #14 in lead sheath</td>
<td>0.30</td>
</tr>
<tr>
<td>Smaller wires have less capacitance.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COPPER WIRE SIZE</th>
<th>RESISTANCE Ohms/1000 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 gauge</td>
<td>2.6</td>
</tr>
<tr>
<td>16 gauge</td>
<td>4.1</td>
</tr>
<tr>
<td>18 gauge</td>
<td>6.5</td>
</tr>
<tr>
<td>20 gauge</td>
<td>10.4</td>
</tr>
<tr>
<td>22 gauge</td>
<td>16.5</td>
</tr>
<tr>
<td>24 gauge</td>
<td>26.2</td>
</tr>
<tr>
<td>26 gauge</td>
<td>41.7</td>
</tr>
</tbody>
</table>

System uses a Series 5200-HF2 solid state relay to control water supply at camp grounds and similar installations in remote locations where there is no power at tank. Control wiring may be telephone pair or private line installed overhead or buried with pipes. A 22,000 ohm R1 resistor is recommended for potable water.

* A good dependable ground connection to liquid is required.
INDUCTION RELAY CONTROL SYSTEMS

B/W induction relays provide a simple and inexpensive means of controlling production processing functions from remote locations over long distances with the safety inherent in low energy, low voltage control circuit that is isolated from the ac power supply.

Installed near pumps, motors or other operating equipment, they permit use of low-cost light gauge wires for the control circuit to the remote pilot device. Moreover, if an earth ground return is used, all that’s required is a single conductor wire.

LD1750 TELEPHONE CIRCUIT CONTROLS

This packaged B/W remote control system is ideally suited to application over leased telephone circuits and other high resistance or high capacitance control wires. A continuous metallic circuit is required between the pilot control device and the LD1750 control unit. For installations where an isolated pair is not available, other control systems can be furnished.

The LD1750 control system is designed for safe, reliable operation. It consists of a transformer to isolate the telephone control circuit from the ac power supply, a filtered low energy dc power supply, and a sensitive dc relay operating a B/W Type 1500-A induction relay. Other B/W induction relays with other pilot contact arrangements are also available.

SOLID-STATE RELAY CONTROL SYSTEMS

B/W Series 5200 solid-state relays are offered in two basic types for use in a wide range of low and high sensitivity applications. Both are designed to operate on either 115 or 230 volts ac at 50/60 hertz. Both are capable of performing control functions directly from electrodes or pilot switching devices located several miles away. Both also feature a built-in holding circuit which allows them to operate over a range of levels and from pushbuttons or other momentary contact switches.

In addition, their operating characteristics are virtually unaffected by ambient temperatures ranging from -40°F up to +180°F, or by variations from 80% to 110% of their rated voltage.

INTRINSICALLY SAFE CONTROL SYSTEMS

B/W Series 5300 control relays were developed especially to provide an intrinsically safe and economical means of detecting and controlling a wide range of processing variables in areas where a potentially explosive atmosphere may exist. Designed to operate on 115 or 230 volts ac at 50/60 hertz, they have been tested and approved by Factory Mutual for use in applications involving Class I areas. When properly installed, they provide an external probe or pilot control circuit that is inherently incapable of releasing sufficient electrical energy to ignite even the most flammable or volatile gases and vapors classified in Groups A, B, C, and D. Accordingly, they may also be used in Class II and Class III locations.
### Contact Ratings:
- 10 amperes at 120 or 240 volts ac or 26 volts dc; 1/4 hp at 120 volts ac and 1/8 hp at 240 volts ac.

### Contact Arrangement:
DPDT load contacts plus SPDT holding circuit contacts.

### Power Requirement:
- 9 volt-amperes, 6 watts.

### Low Energy Control Circuit Parameters:
- **Type 5200-HF2 Relay** with 10,000 ohm R1 resistor: Output—9.6 volts dc. Current—1 milliampere. Maximum circuit resistance—6,600 ohms. Maximum capacitance—120 microfarads.

### Contact Ratings:
- 25 amperes resistive load at 120 or 240 volts ac and 24 volts dc; 1 hp at 120 volts ac and 2 hp at 240 volts ac.

### Contact Arrangement:
DPDT load contacts plus SP normally open holding circuit contact.

### Power Requirement:
- 9 volt-amperes, 6 watts.

### Control Circuit Energy:
Inherently limited to less than 1 milliampere at 9.6 volts dc to assure intrinsically safe operation under any abnormal fault conditions.

### Control Circuit Parameters:
- **Type S300-S-F1 relay** with 10,000 ohm sensitivity resistor: Maximum circuit resistance—9,600 ohms. Maximum capacitance—120 microfarads.

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**B/W Controls**

**SECTION 8040**

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