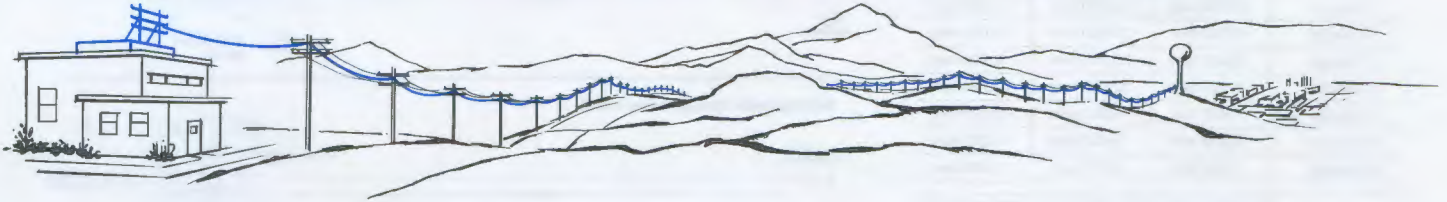


LONG DISTANCE REMOTE CONTROL SYSTEMS



BIW 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 de-

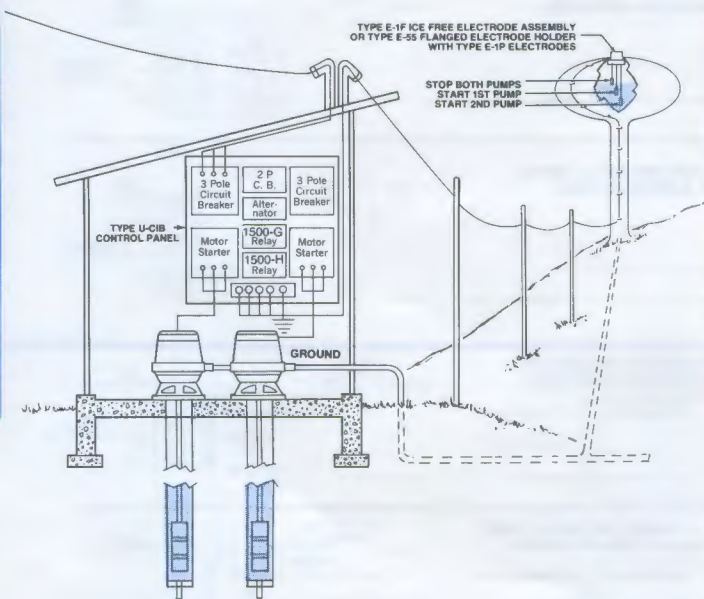
pends upon the control circuit wiring. In general, maximum distance for an AC sensing circuit is limited by the capacitance of the wires connecting the relay to the pilot device. If a DC sensing circuit is used, distance is limited by the resistance of the control circuit.

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

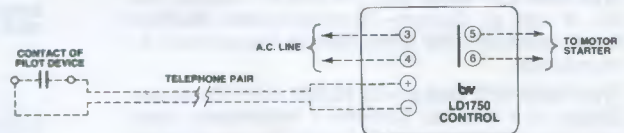
A model U-C1B2 control with combination motor starters is shown with Type 1500 induction relays. This arrangement is suitable located up to 900 feet from the tank. For greater distances, B/W offers various methods of remote control either over direct private wires or leased telephone circuits.



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.



Catalog Number Example

8040—LD1750—X—L1—N4

DISCOUNT SCHEDULE LL1
Prices Subject to Change Without Notice

LINE VOLTAGE		ENCLOSURE		LIST PRICE
115 Volt 50/60 Hz	L1	OC	Open Chassis	300.00
230 Volt 50/60 Hz	L2	N1	Nema 1 & 3R	400.00
460 Volt 50/60 Hz	L3	N4	Nema 4	600.00
		N12	Nema 12	1000.00

04-136200 Lightning Arrestor
(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 water-tight 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.

Low Sensitivity 5200-L Relay with 270 ohm R1 resistor: output—8 Volts AC. Current—30 milliamperes. Maximum circuit resistance—200 ohms. Maximum capacitance—3.7 microfarads.

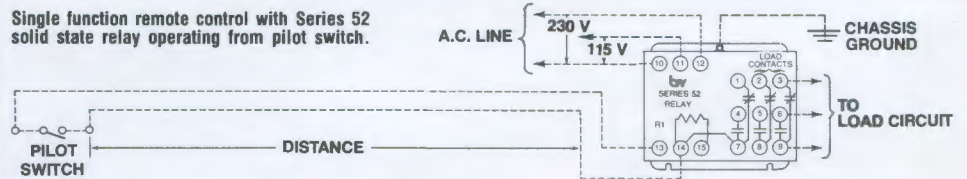
High Sensitivity 5200-H Relay with 10,000 ohm R1 resistor: Output—9.6 Volts DC. Current—1 milliampere. Maximum circuit resistance—9,600 ohms. Maximum capacitance—120 microfarads.

TYPICAL CAPACITANCE AND RESISTANCE VALUES

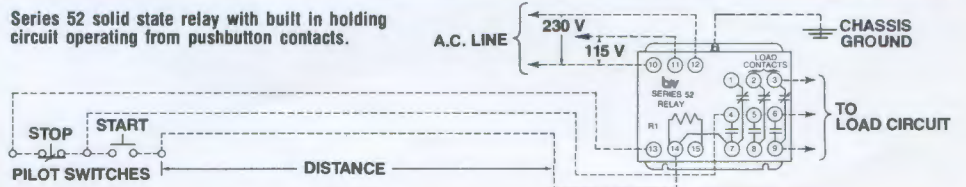
CONTROL WIRES	CAPACITANCE Mfd/1000 feet
Telephone pair	0.015 mfd
Two #14 in open air	0.02 mfd
Two #14 in 1/2" conduit	0.04 mfd
Two #14 in lead sheath	0.30 mfd
Smaller wires have less capacitance.	

COPPER WIRE SIZE	RESISTANCE Ohms/1000 feet
14 gauge	2.6 ohms
16 gauge	4.1 ohms
18 gauge	6.5 ohms
20 gauge	10.4 ohms
22 gauge	16.5 ohms
24 gauge	26.2 ohms
26 gauge	41.7 ohms

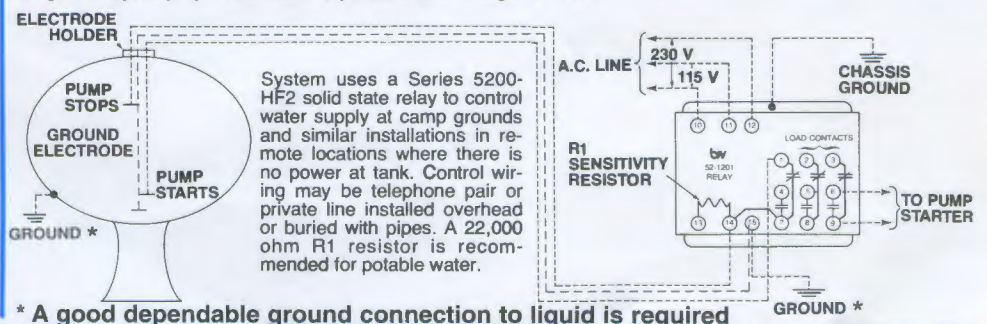
Single function remote control with Series 52 solid state relay operating from pilot switch.



Series 52 solid state relay with built in holding circuit operating from pushbutton contacts.



Single Pump/Pump Up Control with no power at tank—Diagram F-1704



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



Long Distance and Low Voltage Remote Control Systems

Application Recommendations

Basic components used in these systems are B/W induction relays and Type 5200-LF1 solid state relays for applications requiring an ac sensing circuit and Type 5200-HF2 solid state relays. LD1750 control units and Type 5300 intrinsically safe control relays for use where a dc sensing circuit is required.

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. 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 water-tight and well insulated from ground.

Typical Capacitance and Resistance Values

CONTROL WIRES	CAPACITANCE Mfd/1,000 feet	COPPER WIRE SIZE	RESISTANCE Ohms/1,000 feet
Telephone pair	0.015 mfd	14 gauge	2.6 ohms
Two #14 in open air	0.02 mfd	16 gauge	4.1 ohms
Two #14 in 1/2" conduit	0.04 mfd	18 gauge	6.5 ohms
Two #14 in lead sheath	0.30 mfd	20 gauge	10.4 ohms
		22 gauge	16.5 ohms
		24 gauge	26.2 ohms
		26 gauge	41.7 ohms

Smaller wires have less capacitance.

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.

Following are basic specifications for B/W long distance induction relays. When ordering, please specify line voltage and frequency plus secondary coil voltage required.

Contact Ratings: 1 hp single phase, 115 or 230 volts ac; 25 amperes at 115 or 230 volts ac; standard duty pilot rating up to 600 volts ac.

Primary Coils: Available for all standard voltages up to 600 volts ac at 25 or 50/60 hertz. Maximum power required is 9 volt-amperes.

Secondary Coils: Selection of the proper secondary coil is based upon control circuit parameters as listed in the following tables.

CONTROL CIRCUIT PARAMETER	SECONDARY COILS		
	24 Volt #02-088800	40 Volt #02-088900	90 Volt #02-089000
Maximum distance	30,000 feet	30,000 feet	12,000 feet
Maximum resistance	80 ohms	280 ohms	1400 ohms
Maximum capacitance	16.0 microfarads	4.6 microfarads	0.9 microfarads
Secondary voltage	26 volts	48 volts	106 volts
Short circuit current	220 milliamperes	120 milliamperes	55 milliamperes

LD1750 Telephone Circuit Controls



This packaged B/W remote control system is ideally suited to application over leased tele-

phone circuits and other high resistance or high capacitance control wires. A continuous metallic circuit is required between the pilot contact 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 load 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.

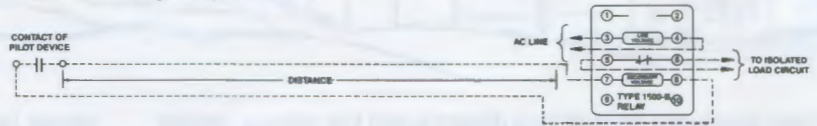
COPPER WIRE SIZE	SINGLE WIRE WITH GROUND RETURN		
	Maximum Recommended Distances		
	24 Volt Secondary	40 Volt Secondary	90 Volt Secondary
14 gauge	30,000 feet	30,000 feet	12,000 feet
16 gauge	18,000 feet	30,000 feet	12,000 feet
18 gauge	12,000 feet	30,000 feet	12,000 feet
20 gauge	6,000 feet	23,000 feet	12,000 feet
22 gauge	4,000 feet	15,000 feet	12,000 feet
24 gauge	2,500 feet	9,000 feet	12,000 feet
26 gauge	1,500 feet	6,000 feet	12,000 feet

COPPER WIRE SIZE	REMOTE CONTROL THROUGH LOOP CIRCUIT		
	Maximum Recommended Distances		
	24 Volt Secondary	40 Volt Secondary	90 Volt Secondary
14 gauge	15,000 feet	30,000 feet	12,000 feet
16 gauge	9,000 feet	30,000 feet	12,000 feet
18 gauge	6,000 feet	21,000 feet	12,000 feet
20 gauge	3,500 feet	13,000 feet	12,000 feet
22 gauge	2,000 feet	8,000 feet	12,000 feet
24 gauge	1,200 feet	5,000 feet	12,000 feet
26 gauge	800 feet	3,000 feet	12,000 feet

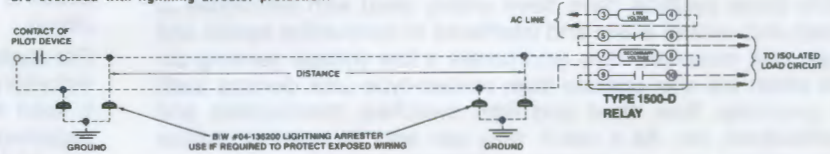
Single conductor remote control using ground return.



Remote control through a loop circuit.



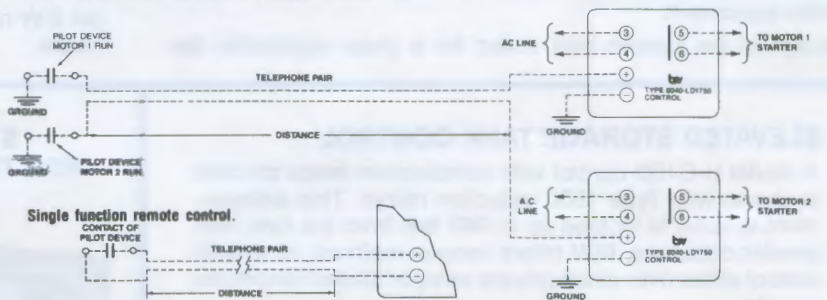
Remote control through a loop circuit. Control wires are overhead with lightning arrester protection.



In operation, the control system applies 57 volts dc to the telephone circuit, with current inherently limited to 18 milliamperes even on a direct short circuit. The distance between the LD1750 and a remote pilot device is limited only a maximum allowable circuit resistance of 3000 ohms and a maximum circuit capacitance of 150 microfarads. Power required is 16 volt-amperes.

Available in models to operate from all standard voltages up to 600 volts ac at 25 or 50/60 hertz, these systems are equipped with heavy duty load contacts. Rating are: 1 hp, single phase, 115 or 230 volts ac; 22 amperes at 115 or 230 volts ac; standard duty pilot rating up to 600 volts ac.

Dual function remote control over a single telephone pair.



Single function remote control.



Contact Ratings: 10 amperes at 120 or 240 volts ac or 28 volts dc; 1/4 hp at 120 volts ac and 1/3 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-LF1 Relay with 270 ohm R1 resistor: Output—8 volts ac. Current—30 milliamperes. Maximum circuit resistance—200 ohms. Maximum capacitance—3.7 microfarads.

Type 5200-HF2 Relay with 10,000 ohm R1 resistor: Output—9.6 volts dc. Current—1 milliampere. Maximum circuit resistance—9,600 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 5300-S-F1 relay with 10,000 ohm sensitivity resistor: Maximum circuit resistance—9,600 ohms. Maximum capacitance—120 microfarads.

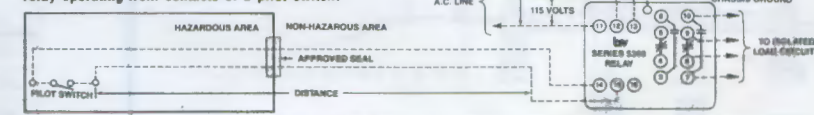
Single function remote control with Series 52 solid state relay operating from pilot switch.



Series 52 solid state relay with built in holding circuit operating from pushbutton contacts.



Intrinsically safe remote control with Series 53 relay operating from contacts of a pilot switch.



Series 53 relay with intrinsically safe holding circuit operating from the contacts of two pilot switches.

