

B/W Controls

Long Distance and Low Voltage Remote Control Systems

Application Recommendations

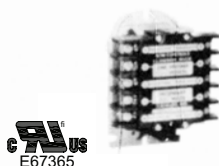
Basic components used in these systems are B/W induction relays and Type 5200-LF1 solid state relays for applications requiring an ac sensing circuit and Type 5200-HF2 solid state relays. Series 8040-1750 control units and Type 5300 intrinsically safe control relays for use where a dc sensing circuit 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
Smaller wires have less capacitance.		22 gauge	16.5 ohms
		24 gauge	26.2 ohms
		26 gauge	41.7 ohms

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

8040-1750 Telephone Circuit Control



This packaged B/W remote control system is ideally suited to applications over leased telephone circuits and other high resistance or high capacitance control wires. A continuous metallic circuit is required between the pilot contact device and the 8040-1750 control unit. For installations where an isolated pair is not available, other control systems can be furnished.

The 8040-1750 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.

Series 8040

B|W Controls

Control Panels

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

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 8040-1750 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.

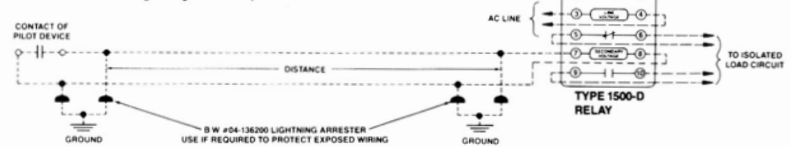
Single conductor remote control using ground return.



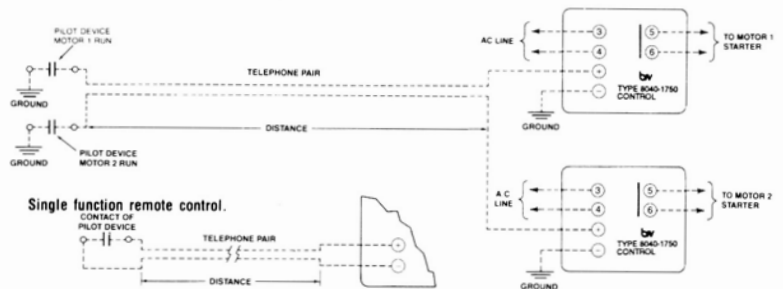
Remote control through a loop circuit.



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



Dual function remote control over a single telephone pair.



Single function remote control.



8040 Control Panels Continued

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.

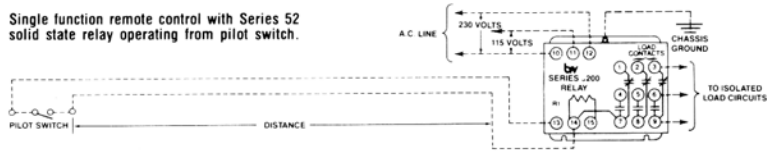
Power Requirement: 9 volt-amperes, 6 watts.

Low Energy Control Circuit Parameters:

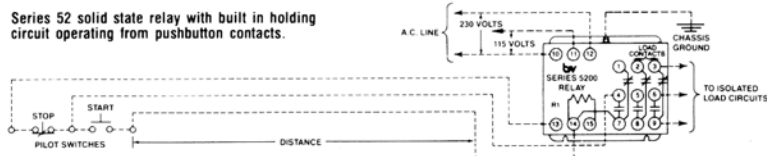
Type 5200-LF1 Relay with 270 ohm R1 resistor: Output—8 volts ac. Current—30 milliamperes. Maximum circuit resistance—200 ohms. Maximum capacitance—3.7 microfarads.

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.

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.



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.

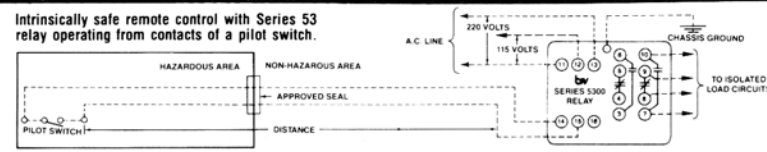
Contact Arrangement: DPDT load contacts plus SP normally open holding circuit contact.

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.

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.

