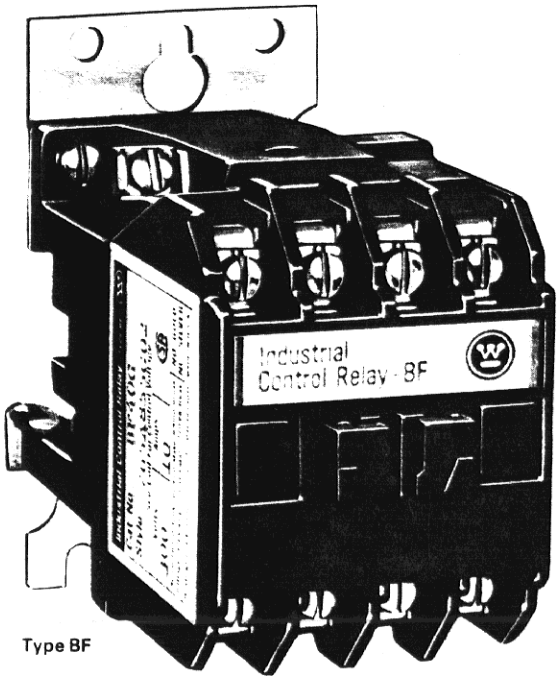
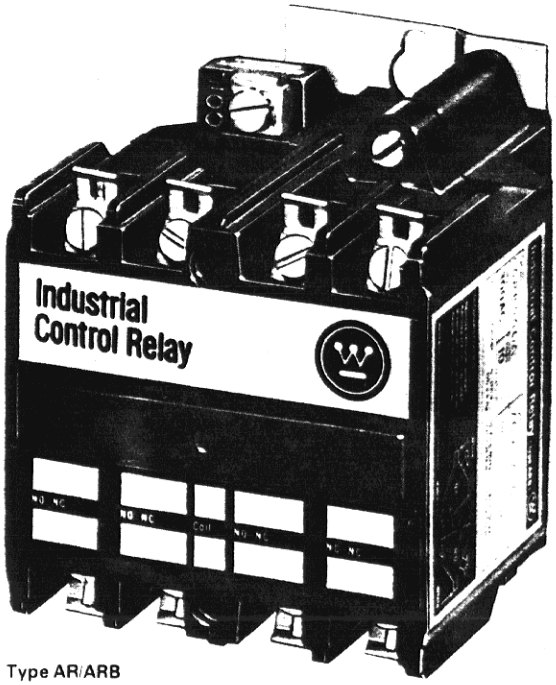
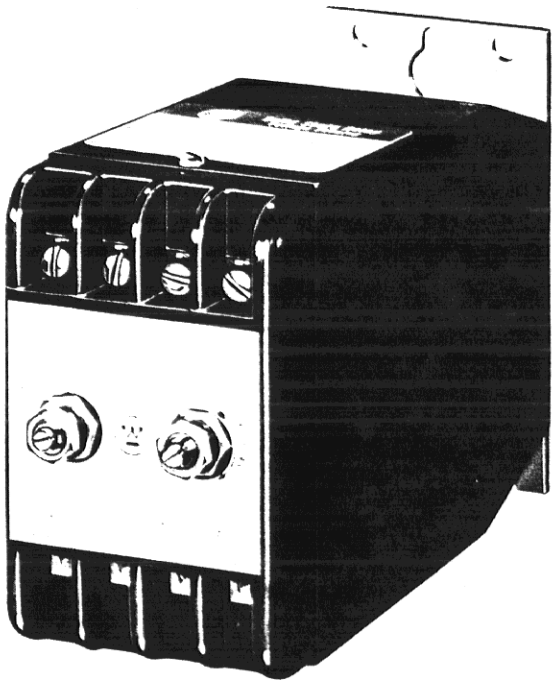
Industrial Control Relays



Type BF

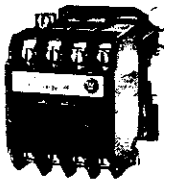


Type AR/ARB



Solid State
Voltage Sensing

Industrial Control Relay Selector Guide



Type BF

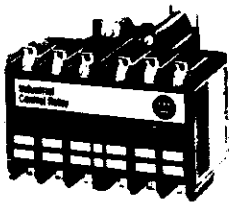
Type BFD

Type BF
300 Volts Ac, 2-12 Poles, 10 Amps. Max.
Fixed and Universal Contacts ..... **Page 3**

Type BFD
250 Volts Dc, 2-12 Poles, 10 Amps. Max.
Fixed and Universal Contacts ..... **Page 3**

Type BF/BFD Accessories
Timers-Pneumatic and Solid State
Filler Relay
Permanent Magnet Latch
Mounting Strip
Enclosure ..... **Page 4, 5**

Type AR/ARB
4 Pole



Type AR/ARB
6 Pole

Type AR
600 Volts Ac, 4-10 Poles, 10 Amps. Max.
Convertible Contacts ..... **Page 6, 7**

Type ARB
300 Volts Ac, 4-10 Poles, 10 Amps. Max.
Convertible Contacts ..... **Page 6, 7**

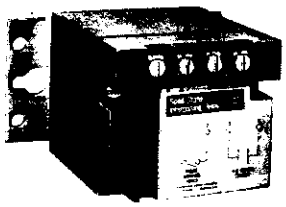
Type ARD
250 Volts Dc, 4-10 Poles, 10 Amps. Max. ..... **Page 6, 7**

Type AR/ARB/ARD Accessories
Top Deck Pole Adder
Timers: Pneumatic and Solid State
Permanent Magnet Latch
Surge Suppressor
Mounting Strip
Enclosures ..... **Page 8, 9, 10**

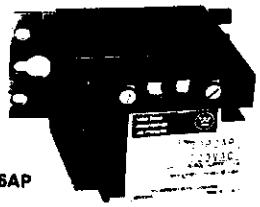
Type Z

Type Z
300 Volts Ac or 250 Volts Dc, Two Pole
Double Throw, 10 Amps., ½ Hp. Max. ..... **Page 12**

Special Purpose Relays



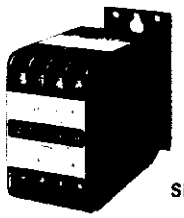
Type R56AP



Type BOP

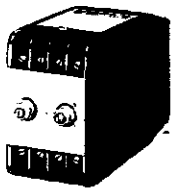
Type R56AP
Solid State Interposing Relay, NO Contact, 120 Volts Ac ..... **Page 13**

Type BOP
Solid State Undervoltage Coil Protector, 120/110 Volts Ac ... **Page 13**



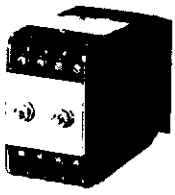
Single Pole

Solid State Relays
Single Pole
5 to 135 Volts Ac, 2 Amps. RMS Max. Solid State
Contact ..... **Page 1**



Resistance Sensing

Resistance Sensing Relay
120/110 Volts Ac, 2 Amps. RMS Max. Solid State Contact . **Page 16, 17**

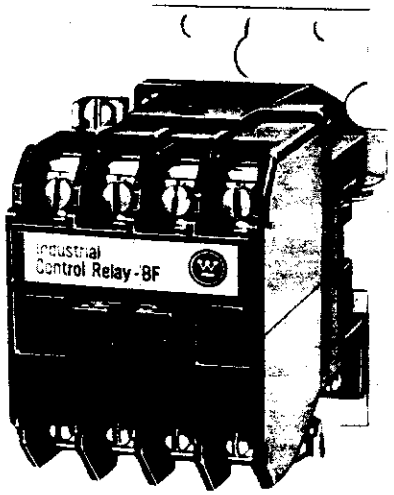


Voltage Sensing

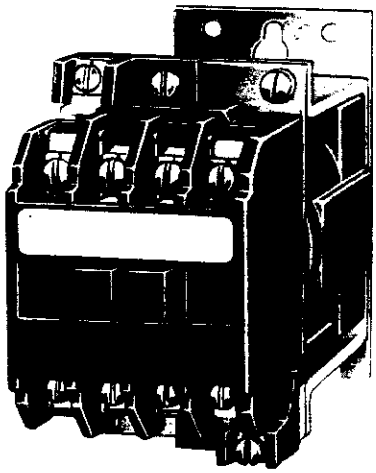
Voltage Sensing Relay
70-280 Volts Ac Input, 2 Amps. RMS
Max. Solid State Contact ..... **Page 18, 19**

Replacement Parts ..... **Page 11**

Type BF/BFD Relays



Type BF



Type BFD

Description

Type BF and BFD relays are compact industrial control relays ideally suited for machine tool and similar applications where size is a factor. They are available with either fixed or universal contacts. Type BF is Ac operated, 300 volts maximum, and the BFD is Dc operated, 250 volts. Fixed contact relays are available in any combination of NO and NC poles from two-twelve. Universal contact relays have two, four and six universal poles, each consisting of one NO and one NC contact. The NO and NC contacts of the universal poles are electrically isolated and both can be used in the same manner as a fixed contact relay without regard to polarity.

BF and BFD relays have captive clamp terminals fully accessible from the front, a pressure molded coil with low operating temperature, and silver alloy contacts suitable for three volts, three milliamps. Overlap contacts are available.

Ordering Information

- Order by catalog number. Listed catalog numbers include 120/110 volt, 60/50 Hz. coils.
- For other coil voltages, substitute letter for desired voltage from table below as last digit in relay catalog number; i.e., BF22F becomes BF22G.
- Replacement coils listed on page 11.

Other Available Coil Voltages

BF Ac Coils			BFD Dc Coils	
Suffix Letter	Volts	Hertz	Suffix Letter	Volts Dc
H	12	60	C	6
I	24	60	D	12
J	48	60	L	24
V	110	60	Y	48
G	240/220	60/50	B	95
C	440	60	T	240

BF Relay Electrical Ratings

Ac Rating – NEMA A300

Volts	Maximum Current			Maximum VA	
	Cont.	Make	Break	Make	Break
120	10	60	6	7200	720
240	10	30	3	7200	720

Dc Rating – N300

Volts	Maximum Current			
	Cont.	Make or Break 2 Poles in Series	Make or Break Single Pole	Max. VA Make or Break
120	10	2.2	1.1	275
240	10	1.1	.55	275

Resistive Rating:
3 Amps at 125 Volts Dc
1.5 Amps at 250 Volts Dc

Hp Ratings (UL Recognized)

Phase	Ac Volts	
	115	230
1	1/6	1/2
3	..	1

Coil Data

(Dependent on Contact Arrangement)

- Pick-up Time: 25-40 Milliseconds Dc; 11-18 milliseconds Ac
- Drop-out Time: 15-25 Milliseconds Dc; 11-18 milliseconds Ac
- Coil Power (Dc): 12 Watts, 250 Volts Max.
- Coil Power (Ac): 72 VA Open, 12 VA Closed

① Relays available with dual tabs for AMP-FASTON* push-on terminals at no extra cost. To order, insert letter F as third digit in Ac relay catalog number, as BFF22F, and as fourth digit in Dc relay catalog number, as BFDF22S.

* Trade mark of AMP, Incorporated.

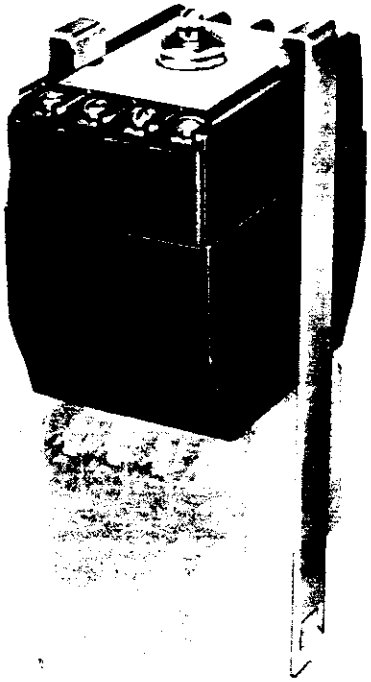
List Prices

Number of Poles	Contacts N.O.	Contacts N.C.	BF Relays① 120/60, 110/50 Ac Coil Catalog Number	BF Relays① List Price	BFD Relays① 120 Volt Dc Coil Catalog Number	BFD Relays① List Price
Universal Contact						
2	2	2	BF22F	$ 56	BFD22S	$ 76
3	3	3	BF33F	64	BFD33S	84
4	4	4	BF44F	72	BFD44S	92
5	5	5	BF55F	88	BFD55S	108
6	6	4	BF64F	88	BFD64S	108
6	6	6	BF66F	104	BFD66S	124
8	8	4	BF84F	104	BFD84S	124
Fixed Contact						
0	filler relay		BF00	12	.....	..
2	2	0	BF20F	48	BFD20S	68
	1	1	BF11F	48	BFD11S	68
	0	2	BF02F	48	BFD02S	68
3	3	0	BF30F	56	BFD30S	76
	2	1	BF21F	56	BFD21S	76
	1	2	BF12F	56	BFD12S	76
	0	3	BF03F	56	BFD03S	76
4	4	0	BF40F	64	BFD40S	84
	3	1	BF31F	64	BFD31S	84
	2	2	use Universal 2-pole relay			
	1	3	BF13F	64	BFD13S	84
	0	4	BF04F	64	BFD04S	84
6	6	0	BF60F	72	BFD60S	92
	5	1	BF51F	72	BFD51S	92
	4	2	BF42F	72	BFD42S	92
	3	3	use Universal 3-pole relay			
	2	4	BF24F	72	BFD24S	92
	0	6	BF06F	72	BFD06S	92
8	8	0	BF80F	88	BFD80S	108
	7	1	BF71F	88	BFD71S	108
	6	2	BF62F	88	BFD62S	108
	5	3	BF53F	88	BFD53S	108
	4	4	use Universal 4-pole relay			
	0	8	BF08F	88	BFD08S	108
10	10	0	BF100F	104	BFD100S	124
	8	2	BF82F	104	BFD82F	124
	7	3	BF73F	104	BFD73S	124
	6	4	use Universal 6-pole relay			
	5	5	use Universal 5-pole relay			
	4	6	BF46F	104	BFD46S	124
	2	8	BF28F	104	BFD28S	124
12	12	0	BF120F	120	BFD120S	140
	8	4	use Universal 8-pole relay			
	7	5	BF75F	120	BFD75S	140
	6	6	use Universal 6-pole relay			
	5	7	BF57F	120	BFD57S	140
	4	8	BF48F	120	BFD48S	140

Contact Arrangements: See Page 11.

Overlapping Contacts for BF Relay
Add $12 list per set. Factory installed.

Type BF/BFD Relay Accessories



Solid State Timer

BST and BSTD Solid State Timers

- BST (for BF Relay)
- BSTD (for BFD Relay), field-convertible to 48 or 24 volts Dc.
- Field mountable to relay using spring-loaded latch arms.
- For ON Delay and OFF Delay applications.
- Self contained units have one NO Solid State Contact.
- No interference with relay wiring or testing when mounted on relay.
- For panel mounting timers, see CS 16-322.

Wiring to Relay

- In parallel with coil – one timed and up to 12 instantaneous contacts,
  or
- In series with coil – up to 12 timed contacts in one relay.

Application

- Accurate timing
- Minimal time-setting drift with age.
- Adjustable timing range.
- Increased resolution on short time adjustment.
- Operation in adverse environments.

Filler Relay

- An empty relay case for mounting timer when other relays cannot be used. Catalog Number, BF00; **List Price, $12**

Electrical Characteristics

Input: 120/110 Volts Ac, 60/50 Hz, ±10%
250, 120, 48, 24 Volts Dc, ±10%
Power Required: 2 VA Max.
Contact Ratings
BST: Will switch 120 Volt Ac BF relay
BSTD: (Will switch BFD relays):
120 Volt Dc, 0.1 Amp
48 Volt Dc, 0.25 Amp
24 Volt Dc, 0.5 Amp
Repeatability: ±3% of time setting for ±10% change in line voltage, or 15°C change in ambient temperature.
Ambient Temperature Range: −20°C to +70°C
Duty Cycle: 150 operations/minute maximum
Reset Time:
On Delay: BST, 50 ma max.
BSTD, 100 ma independent of time setting and duty cycle
Off Delay: BST and BSTD, Instantaneous

List Prices

Voltage	Time Delay Range ①	Catalog Number	List Price
On Delay			
Ac	.1 to 30 seconds	BST-ON	**$144**
Ac	30 to 60 seconds	BST-ONB	**144**
Dc	.1 to 30 seconds	BSTD-ON	**184**
Off Delay			
Ac	.1 to 30 seconds	BST-OF	**144**
Ac	30 to 60 seconds	BST-OFB	**1**
Dc	.1 to 30 seconds	BSTD-OF	**1**

① Longer timing ranges available; contact Westinghouse.

Permanent Magnet Latch

BFML Permanent Magnet Latch

- Field Mountable on BF Relays; factory installed on BFD relays.
- Latch coil continuously rated.
- Latch plunger adjustable for optimum performance
- Latch or unlatch manually
- Unlatching Power Requirements: 24 VA Ac open gap, 7 VA closed gap; Burden: 4 Watts (Ac)

List Prices

For Ac Relays				For Dc Relays ①		
Coil Volts	Coil Hz	Catalog Number	List Price	Coil Volts	Catalog Number	List Price
24	60	BFMLI	**$56**	24	BFMLL	**$68**
48	60	BFMLJ	**56**	48	BFMLM	**68**
120/110	60/50	BFMLF	**56**	120	BFMLS	**68**
240/220	60/50	BFMLG	**56**	240	BFMLT	**68**

Filler Relay

- An empty relay case for mounting timer when other relays cannot be used. Catalog Number, BF00; **List Price, $6**

Enclosures For Dimensions, see page 11.

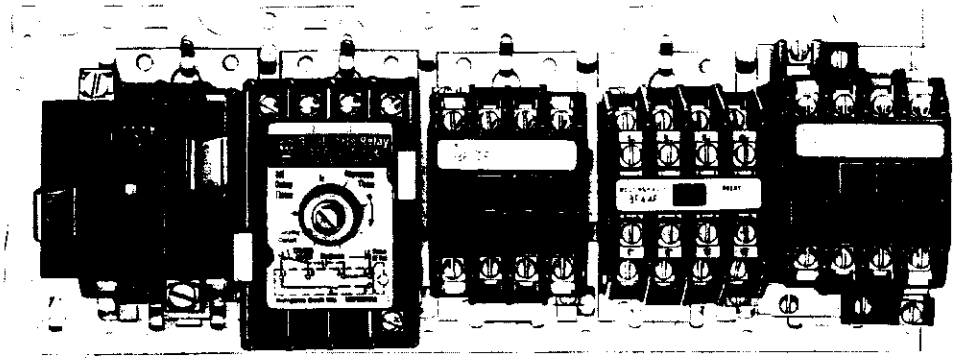
NEMA 1 Enclosure

Type Relay	No. of Poles	Style Number	List Price
BF	All	4977D40G04	**$28**
BFD	4-8	4977D40G04	**28**
BF w/Latch or Timer	All	4977D40G05	**40**
BFD	10-12	4977D40G05	**40**

NEMA 12 Enclosure

Type Relay	No. of Poles	Style Number	List Price
BF	All	5680D43G01	**$64**
BFD	4-8	5680D43G01	**64**
BF w/Latch or Timer	All	5680D43G02	**72**
BFD	10-12	5680D43G02	**7**

Mounting Strip for BF/BFD Relays

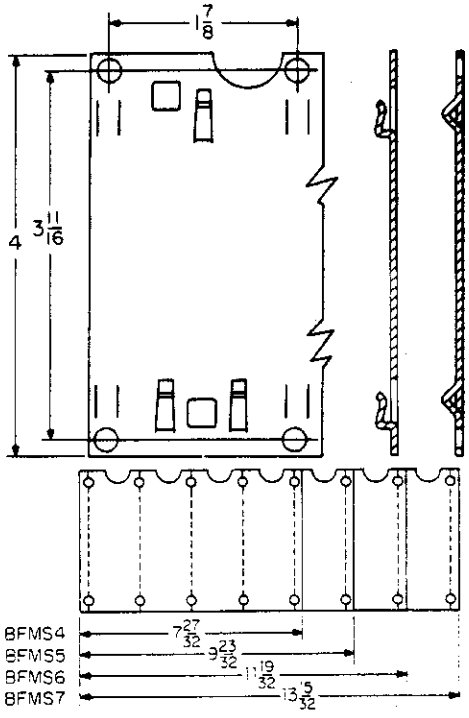


Description

- Eliminates drilling mounting holes for each relay
- Standard lengths accept four to seven relays
- Can be mounted to control panel by screws or spot welding
- Relays easily installed or removed with twist of screwdriver (See below)
- Normal packaging is 10 strips of any one catalog number

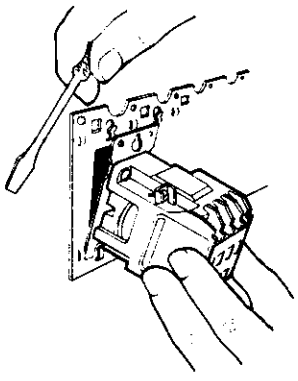
No. of Stations	Catalog Number	List Price
4	BFMS4	**$3.20**
5	BFMS5	**3.40**
6	BFMS6	**3.60**
7	BFMS7	**3.80**

BF Mounting Strip Dimensions, Inches

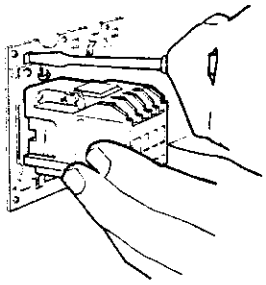


Installation of BF Device on Mounting Strip

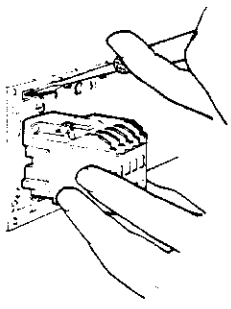
Place device so that steel hooks engage bottom of relay base plate.



Insert screwdriver in square opening on mounting strip above the relay.



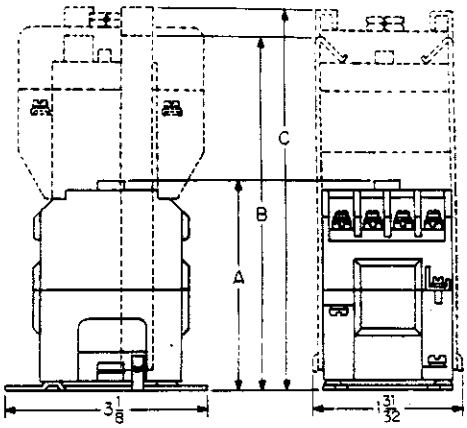
A twist of the screwdriver forces the device into place. To remove device, insert screwdriver below the relay and reverse the procedure.



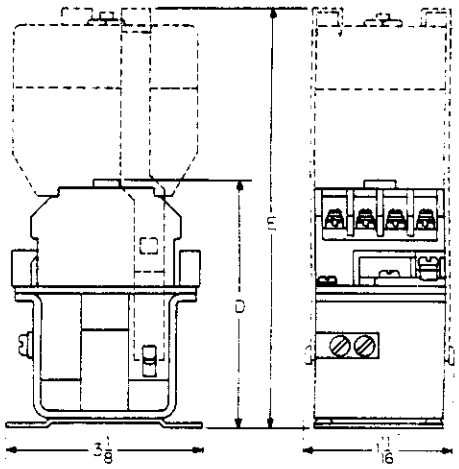
Dimensions, Inches

Not to be used for construction purposes unless approved.

BF Relay With Permanent Magnet Latch and Solid State Timer

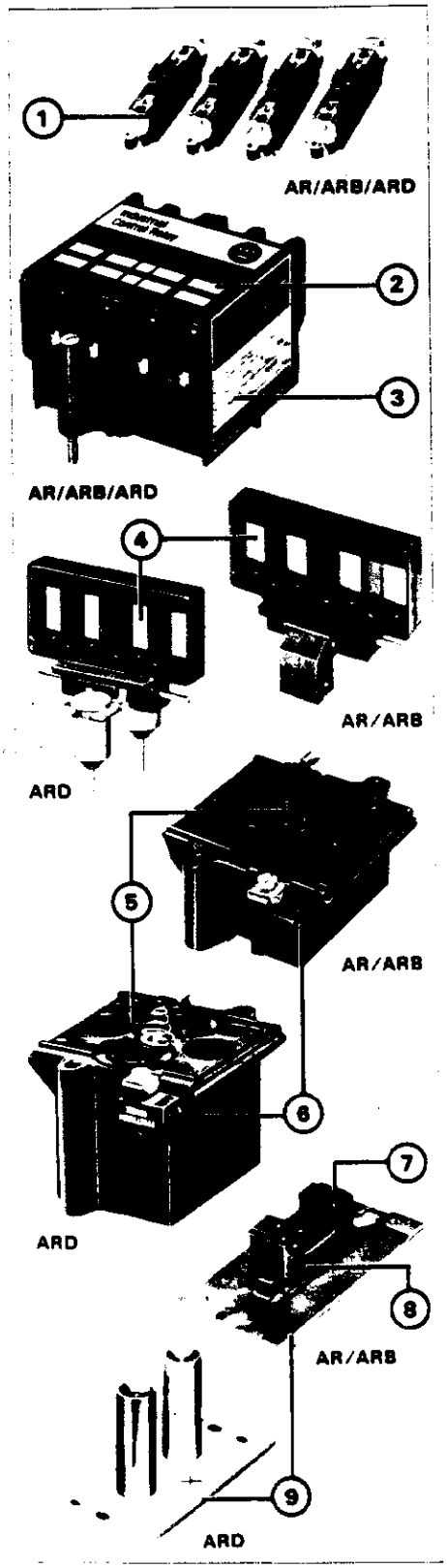


BFD Relay With Solid State Timer



No. of poles	Dim. A BF Only	Dim. B BF With Latch	Dim. C BF With Timer	Dim. D BFD Only	Dim. E BFD With Timer
4	3 7/32	6 7/32	5 7/8	4 1/32	7 1/16
8	4 3/16	7 3/16	6 7/8	4 31/32	8
12	4 13/16	7 13/16	7 1/2	5 5/8	8 21/32

Type AR/ARB/ARD Relay Construction Features



(1) Contact Cartridges
Relay contacts are contained in this unique cartridge that slips in and out of the relay by loosening the terminal screws without disturbing wiring to any other poles. Conversion from either NO or NC is accomplished by removing and inverting the cartridge.

(2) Nameplate
This exclusive feature provides space for marking wiring number to simplify initial wiring and layout time.

(3) Cover Assembly
Houses contact cartridges and crossbar/armature assembly. Acts as base for mounting 4-pole top deck adder, latch and solid state timer attachment.

(4) Armature/Cross Bar Assembly
The armature/crossbar assembly acts as carrier for contact cartridges. The crossbar is manually operable with visual indication of operation to allow easy checking of contacts without energizing the coil.

(5) Stainless Steel Kick-out Spring
This spring is held captive on the coil base, eliminates contact kiss and provides for millions of trouble-free operations.

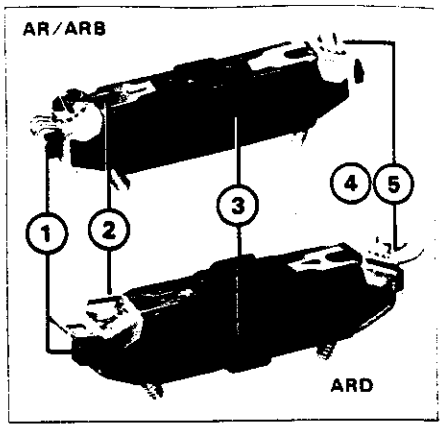
(6) Operating Coil
Operating coils are double wound. This results in greater coil surface, less temperature rise and longer coil life. Encapsulation of the coil minimizes chances of mechanical and atmospheric damage. Coils are color-coded for voltage characteristics, providing quick, easy identification. Coils are interchangeable between 4- and 6-pole relays, and may be changed quickly and easily by loosening and removing two screws.

(7) C Frame Magnet (AR/ARB Only)
Built-in permanent air gap assures long mechanical life.

(8) Magnet Cushion (AR/ARB Only)
Provides resilient mounting for magnet assembly. The result is quiet operation, low shock and minimum contact bounce.

(9) Base Plate
Provides solid base for mounting relay. Two-point key hole slot mounting permits fast, easy installation on mounting strip.

Contact Cartridge Features



(1) One Cartridge for All Pole Spaces
Modern design of these relays permits use of **one cartridge for all pole spaces** of 4- and 6-pole relays, and 4-pole adder.

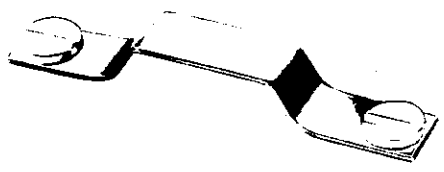
(2) Terminal Accessibility
Terminals are angled 25° for easy wiring accessibility. Even when 4-pole adder, latch, or solid state timer are used, bottom deck terminals are still accessible.

(3) Contact Identification
Cartridge ends are coded for easy contact identification. NC contacts are identified by white markings, and NO by black marking. To convert from either NO or NC, invert cartridge and replace in relay.

(4) Terminal Wiring
Standard cartridges have clamp terminals (screw with captive wiring saddle) which accept #16 to #12 wire. Wire is clamped between saddle and cartridge body. Easy grip tabs on saddle facilitate their removal. Screw terminals (without saddle) are available for use with ring type connectors.

(5) Terminal Saddle Crimped
Crimping of terminal saddle makes solderless connections mechanically tight, and minimizes loose terminal connections.

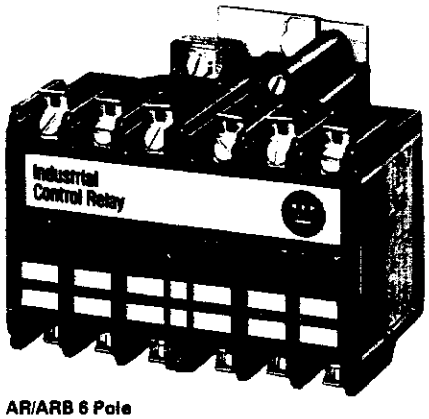
Exclusive Knife-edge Contacts



AR/ARB/ARD relays feature exclusive Westinghouse knife-edge contacts which cut through surface film to insure circuit continuity, and makes possible dry circuit capability down to 3 volts, 3 milliamps.

Type AR/ARB/ARD Convertible Contact Relays

AR/ARB 4 Pole



AR/ARB 6 Pole

Application
AR/ARB/ARD relays are designed for use on machine tools, process lines, conveyors, and similar automatic and semi-automatic equipment that require dependable, precision control over millions of operating cycles.

Description
AR/ARB/ARD relays are electro-mechanical convertible contact relays. AR/ARB relays are Ac devices, and the ARD is for Dc applications. They can be mounted in any position.

Available in either 4 or 6-pole configurations, AR/ARB relays are easily converted to 8 or 10 poles simply by adding a 4-pole deck. In addition, mechanical latch and pneumatic or solid state timer attachments are available for use with 4 and 6-pole relays.

Contacts are convertible from either NO to NC to provide any combination desired, up to a maximum of 10, except that for the ARD, the number of NC poles cannot exceed six in any pole configuration. Wide spacing of contacts simplifies installation, contact testing, and maintenance. Contacts are electrically and mechanically isolated from each other.

List Prices
AR/ARB/ARD Relays

Number of Pole Spaces	Contacts NO	NC	Blank Cavities	ARB 300 Volt Relays 120/60, 110/50 Ac Coil Catalog Number	List Price	AR 600 Volt Relays 120/60, 110/50 Ac Coil Catalog Number	List Price	ARD Dc Relays 120 Volt Dc Coil Catalog Number	List Price
4	0	0	4	AR/ARB4A	$32	AR/ARB4	$ 32	ARD4S	$ 52
	2	0	2	ARB420A	48	AR420A	56	ARD420S	76
	4	0	0	ARB440A	64	AR440A	80	ARD440S	100
6	0	0	6	AR/ARB6A	48	AR/ARB6A	48	ARD6S	68
	4	0	2	ARB640A	80	AR640A	96	ARD640S	116
	6	0	0	ARB660A	96	AR660A	120	ARD660S	140
8	6	0	2	ARB860A	80	AR860A	104	ARD860S	124
	8	0	0	ARB880A	96	AR880A	128	ARD880S	148

Contact Cartridges

Type Terminal	Standard Cartridges Catalog Number	List Price①	20 Amp. Cartridges Catalog Number	List Price	Overlap Contact Cartridges Catalog Number	List Price②
300 Volt Ac Cartridges						
With Clamp Terminals	ARBC	$ 8	.....	...	ARBOC	$16
With Screw Terminals	ARBCR	8	.....	...	ARBOCR	16
600 Volt Ac Cartridges						
With Clamp Terminals	ARC	12	ARGC	$20	AROC	24
With Screw Terminals	ARCR	12	ARGCR	20	AROCR	24
Dc Cartridges						
With Clamp Terminals	ARDC	12	.....	...	ARDOC	24
With Screw Terminals	ARDCR	12	.....	...	ARDOCR	24

① Standard cartridges are sold only in cartons of 4 cartridges. Catalog number and list price are for single cartridge.
② Overlap contact cartridges are sold in sets of 2 cartridges. Catalog number and list price are for sets of 2.

Contact Ratings

300 Volt Ac Cartridges: NEMA A300

Volts	Cont. Current	Max. Current Make	Max. Current Break	Max. VA Make	Max. VA Break
120	10	60	6	7200	720
240	10	30	3	7200	720

600 Volt Ac Cartridges: NEMA A600

Volts	Cont. Current	Max. Current Make	Max. Current Break	Max. VA Make	Max. VA Break
120	10	60	6	7200	720
240	10	30	3	7200	720
480	10	15	1.5	7200	720
600	10	12	1.2	7200	720

Dc Cartridges NEMA N600

Volts	Cont. Current	Make or Break Two Poles in Series	Make or Break Single Pole	Max. VA Make or Break
125	10	2.2	1.1	275
250	10	1.1	.55	275
600	10	.4	....	275
Resistive Load				
125	10	...	3.0	...
250	10	...	1.5	...

Coil Data (Dependent on Contact Arrangement):
Pick-up Time: 8-14 Ms Ac, 24-30 Ms Dc
Drop-out Time: 8-14 Ms Ac, 11-15 Ms Dc
Coil Power Ac: 96 VA Open, 14 VA Close
Dc: 14 Watts Open, 250 Volts Max.

Ordering Information
Order by Catalog Number

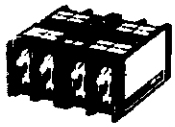
Relays listed in the price table are supplied with NO contacts convertible to NC. When ordering relays with NO and NC poles, **add $4.00 list per relay.** Order by description.

To order relays with screw terminals for ring-type connectors, add suffix R to catalog number of relay. No extra charge. Example: AR420AR.

Ac relays listed in price tables have 120/60, 110/50 coils designated by suffix letter A. Dc relays have a 120 volt coil designated by suffix letter S. For other coil voltages, see table page 9 and substitute suffix letter shown in table for desired voltage for suffix letters A or S in catalog numbers.

Type AR/ARB/ARD Relay Accessories

Four Pole Top Deck Adder



- Increases contact capacity from four/six poles to eight/ten poles
- Mounts on top of basic relay using three screws
- Will not interfere with wiring, testing or converting cartridges
- Screw terminals for ring connectors available; to order add suffix R to catalog number of adder

List Prices

No. of Pole Spaces	Contacts N.O.	N.C.	Blank Cavities	Catalog Number	List Price
With 300 Volt Cartridges					
4	2	0	2	ARBA20	**$16**
	4	0	0	ARBA40	**32**
With 600 Volt Cartridges					
	0	0	4	ARA	**16**
4	2	0	2	ARA20	**24**
	4	0	0	ARA40	**48**
With Dc Cartridges					
4	2	0	2	ARDA20	**24**
	4	0	0	ARDA40	**48**

ARPT Pneumatic Timer

- Mounts on basic four or six pole AR/ARB Relay
- Field convertible from On Delay to Off Delay, or vice versa
- Repeatability accuracy: ±15%

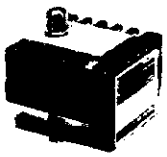
List Prices

Timing Range, Seconds	Catalog Number	List Price
.2-20	ARPT-20	**$112**
4-60	ARPT-60	**112**
20-200	ARPT-200	**112**

Contact Ratings: NEMA A600

Ac Volts	Normal Load Break (Amps.)	Inrush and Interrupting Capacity (Amps.)
120	6.0	60
240	3.0	30
480	1.5	15
600	1.2	12

ART Solid State Timer



- Mounts on basic four or six pole relay using two screws
- Has one N.O. Solid State Contact.
- On Delay or Off Delay applications
- Will switch 120 volt Ac and Dc coils
- ARTD is field convertible to 24 or 48 volts Dc

List Prices

Voltage	Time Delay, Seconds①	Catalog Numbers On Delay	Off Delay	List Price
Ac	.1-30	ART-ON	ART-OF	**$144**
Ac	30-60	ART-ONB	ART-OFB	**184**
Dc	.1-30	ARTD-ON	ARTD-OF	**184**

Electrical Ratings

Input: 120 Volts Ac, ±10%, 50/60 Hz;
120, 48, 24 Volts Dc, ±10%
Power Required: Ac, Dc: 2 VA max.
Contact Ratings: Ac, .2 amps inductive (1.3 amps max. inrush.)
Dc (will switch 4, 8, 10 pole ARD relays:
120 Volts Dc, .1 amp.
48 Volts Dc, .25 amp.
24 Volts Dc, .5 amp.
Repeatability: Ac ±2% with 10% voltage variation, ±7.5% with 15°C temperature variation:
Dc, ±1% with 10% voltage variation, and 15%C temperature variation
Ambient Temp. Range: Ac, Dc: −20°C to +70°C
Duty Cycle: Ac, Dc: 150 Operations/minute max.
Reset Time:
On Delay: ART, 50 ma. Max; ARTD, 100 ma independent of time setting and duty cycle.
Off Delay: ART and ARTD, Instantaneous

ARML Permanent Magnet Latch

Latch attachment "sets" when base relay is energized, holding relay "On" after relay coil is de-energized. Latch releases relay when energized. Clearing coil on latch is energized to release relay.

- Field mountable to four and six pole AR/ARB/ARD relays.
- Latch plunger is adjustable for optimum performance.
- Latch coil continuously rated.
- Unlatching power requirement:
  Open Gap: 24 VA
  Closed Gap: 7 VA
  Burden: 4 Watts Ac, 6 Watts Dc

List Prices

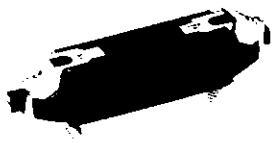
For Ac Control Circuits

Operating Volts	Coil Hz	Catalog Number	List Price
24	60	ARMLG	**$56**
48	60	ARMLI	**56**
120	60/50	ARMLA	**56**
240	60/50	ARMLW	**56**
220	60	ARMLB	**56**
440	60	ARMLH	**56**
480	60	ARMLX	**56**

For Dc Control Circuits

Coil Volts	Catalog Number	List Price
24	ARMLL	**$68**
48	ARMLM	**68**
120	ARMLS	**68**
240	ARMLT	**68**

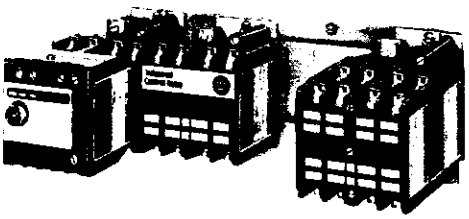
ARSS Surge Suppressor



- Mounts in contact cavity of AR/ARB relays
- Limits high transient voltages resulting from de-energizing relay coil or other electro-mechanical devices
- Protects sensitive instruments and solid state devices
- 120 Volts Ac max.

Catalog Number: ARSS; **List Price: $16**

Mounting Strip for AR/ARB/ARD Devices



- Eliminates drilling mounting holes for each relay
- Accepts four to seven four pole, or two to five six pole devices
- Can be mounted to control panel using screws
- Devices easily mounted using two screws in pre-drilled holes. Self-tapping screws are included.

List Prices

Strip Catalog Number	Strip Length, Inches	Number of Relays Channel Will Accept		List Price
		4-Pole	6-Pole	
ARMS4	$11^{13}/_{32}$	4	2	**$6.40**
ARMS5	$14^{11}/_{32}$	5	3	**6.80**
ARMS6	$17^{7}/_{32}$	6	4	**7.20**
ARMS7	$20^{3}/_{32}$	7	5	**7.40**

Enclosures for AR/ARB/ARD Relays

See page 11 for dimensions.

List Prices

Type Relay	No. of Poles	Style Number	List Price
NEMA 1 Enclosure			
AR/ARB	All	4977D40G04	**$28**
AR/ARB w/latch or timer	4,6	4977D40G05	**40**
ARD	4,6	4977D40G04	**28**
ARD w/adder, latch or timer	4,6	4977D40G05	**40**
NEMA 12 Enclosure			
AR/ARB	All	5680D43G01	**64**
AR/ARB w/latch or timer	4,6	5680D43G02	**72**
ARD	4,6	5680D43G01	**64**
ARD w/adder, latch or timer	4,6	5680D43G02	**72**

Other Available Coil Voltages

Ac relays listed have 120/60, 110/50 coils designated by suffix letter A. Dc relays have 120 volt coil designated by suffix letter S. For other coil voltages, substitute suffix letter shown in catalog number. Example: Cat. No. AR/ARB4A has 120/60, 110/50 coil; substitute B for A to order 208/60 coil, Cat. No. AR/ARB4B. Replacement coils are listed on page 11.

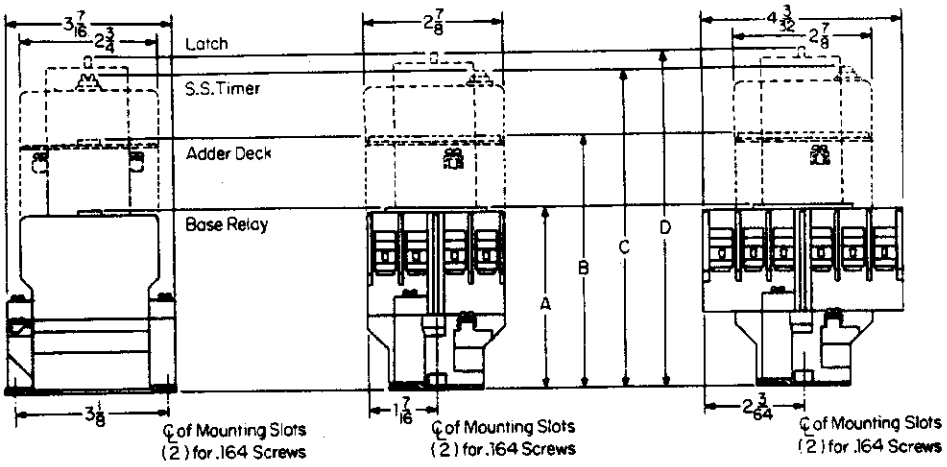
Ac Coils				**Dc Coils**	
Voltage	Hertz	Color Code	Suffix Letter	Volts	Suffix Letter
12	60	None	F	12	D
24	60	None	I	24	L
48	60	None	G	48	M
110	60	None	V		
208	60	None	B	95	B
240/220	60/50	Green	W	120	S
440/380	60/50	None	H	240	T
480/440	60/50	Yellow	X		
550	60	None	D		
600/550	60/50	None	E		

For other voltages, refer to Westinghouse.

AR/ARB/ARD Relay Dimensions, Inches

Not to be used for construction purposes unless approved.

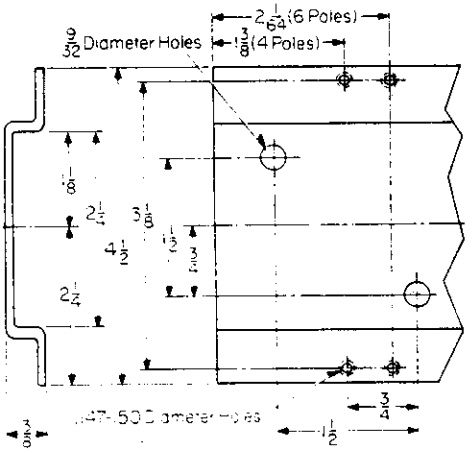
4 and 6 Pole Relays with 4 Pole Adder, Solid State Timer and Mechanical Latch.



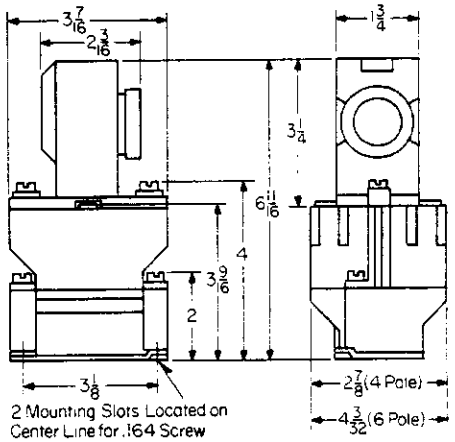
End View, 4 and 6 Poles — Side View, 4 Pole — Side View, 6 Pole

Relay Description	AR/ARB Dimensions				ARD Dimensions			
	A	B	C	D	A	B	C	D
4, 6 Pole Relays	3 9/16	...	...	...	4 5/8	...	...	...
4, 6 Pole Relays W/Adder	...	4 15/16	...	...	...	6	...	...
4, 6 Pole Relays W/Timer	...	...	6	...	...	...	7 1/16	...
4, 6 Pole Relays W/Latch	...	...	...	6 25/64	...	...	...	7 29/64

Mounting Channel Dimensions



ARPT Timer Dimensions



Replacement Parts Operating Coils

BF Relay

Volts	Hertz	Style Number	List Price
12	60	178C603G06	**$19.20**
24	60	178C603G15	**19.20**
48	60	178C603G05	**19.20**
110	60	178C603G54	**19.20**
120/110	60/50	178C603G01	**19.20**
240/220	60/50	178C603G02	**19.20**
440	60	178C603G07	**19.20**

AR and ARB Relays

Volts	Hertz	Style Number	List Price
12	60	176C663G06	**$26.80**
24	60	176C663G07	**26.80**
48	60	176C663G08	**26.80**
120/110	60/50	176C663G01	**26.80**
208	60	176C663G02	**26.80**
240/220	60/50	176C663G03	**26.80**
480/440	60/50	176C663G04	**26.80**
600/550	60/50	176C663G05	**26.80**

Type BFD

Volts	Hertz	Style Number	List Price
6	Dc	503C428G12	**$26.80**
12	Dc	503C428G06	**26.80**
24	Dc	503C428G07	**26.80**
48	Dc	503C428G04	**26.80**
120	Dc	503C428G02	**26.80**
240	Dc	503C428G01	**26.80**

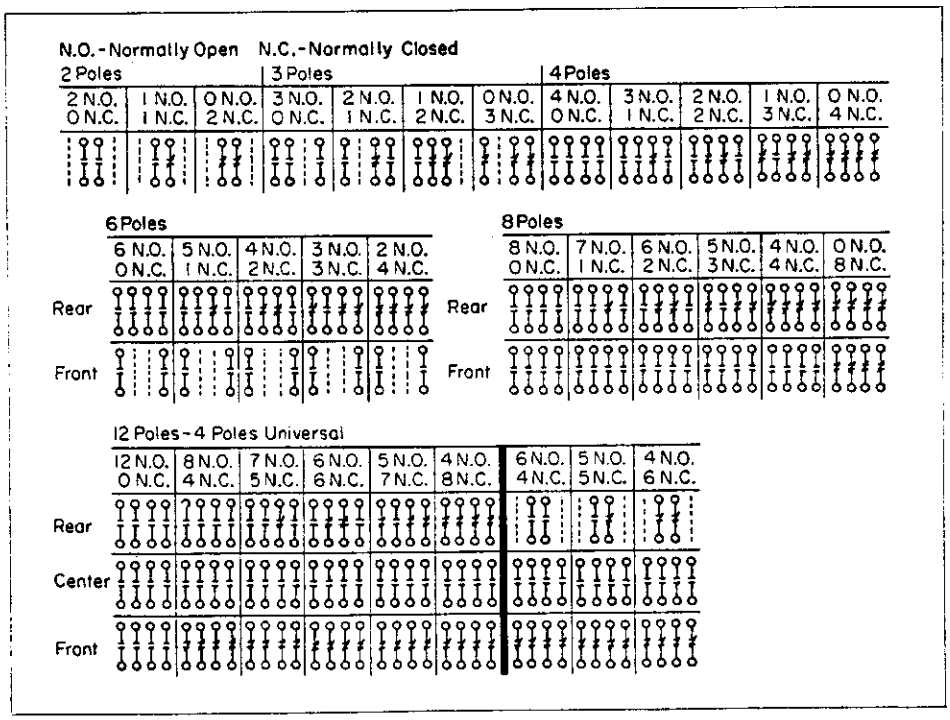
ARD Relay

Volts	Style Number	List Price E-1 Discount
120	1253C48G01	**$34.60**
240	1253C48G02	**34.60**
12	1253C48G03	**34.60**
24	1253C48G04	**34.60**
48	1253C48G05	**34.60**
95	1253C48G06	**34.60**

Z Relay

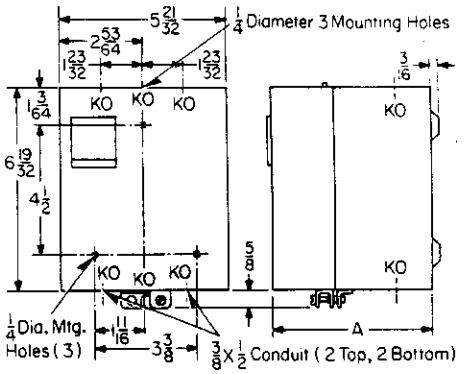
Ac, 60 Hertz		Dc		List Price
Volts	Style Number	Volts	Style Number	
6	206B968G01	6	206B968G07	**$19.20**
12	206B968G02	12	206B968G08	**19.20**
24	206B968G03	24	206B968G09	**19.20**
115/120	206B968G04	120	206B968G10	**19.20**
220	206B968G05	...	.....	**19.20**

Contact Arrangements for BF, BFD Relays



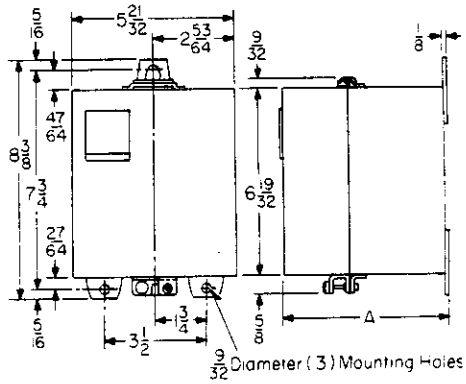
Enclosure Dimensions, Inches

NEMA 1 for Types BF, BFD, AR, ARB and ARD



Type Relay	Poles	Dim. "A"
BF	All	5 11/32
BF with latch or timer	4, 8	7 31/32
AR/ARB	All	5 11/32
AR/ARB with latch or timer	4, 6	7 31/32
ARD	4, 6	5 11/32
ARD with adder, latch or timer	4, 6	7 31/32
BFD	4-8	5 11/32
BFD	10, 12	7 31/32

NEMA 12 for Types BF, BFD, AR, ARB and ARD



Type Relay	Poles	Dim. "A"
BF	All	5 1/2
BF with latch or timer	4, 8	7 15/16
AR, ARB	All	5 1/2
AR, ARB with latch or timer	4, 6	7 15/16
ARD	4, 6	5 1/2
ARD with adder, latch or timer	4, 6	7 15/16
BFD	4-8	5 1/2
BFD	10, 12	7 15/16

Type Z General Purpose Relay

Application
The Type Z, a small, versatile two-pole relay with exceptionally long life, is a general purpose machine tool device for switching light loads and fractional hp motors with inherent motor protection. Used for either Ac or Dc applications, it is especially suitable as an interposing relay to operate larger contactors and starters and as a field loss relay with Dc motors.

Description
Available with DPDT or DPST contacts, meets U.L. Standard clearances for 300 volt and is designed for panel mounting. It has easily removable coils, for either Ac or Dc operation. Coil burden is approximately 5 watts Ac or 3 watts Dc. Standard terminals include dual quick-connect terminals plus binding screws.

Ratings
Ac Non-Inductive: 10 amps
Inductive: 60 amps make, 6 amps break at 125 Volts Ac
30 amps make, 3 amps break at 250 Volts Ac
½ Hp at 115 or 230 volts
Dc Standard Relay, 2 poles in Series:
Make or break: .2 amp at 250 volts Dc, .8 amp at 125 Volts Dc.

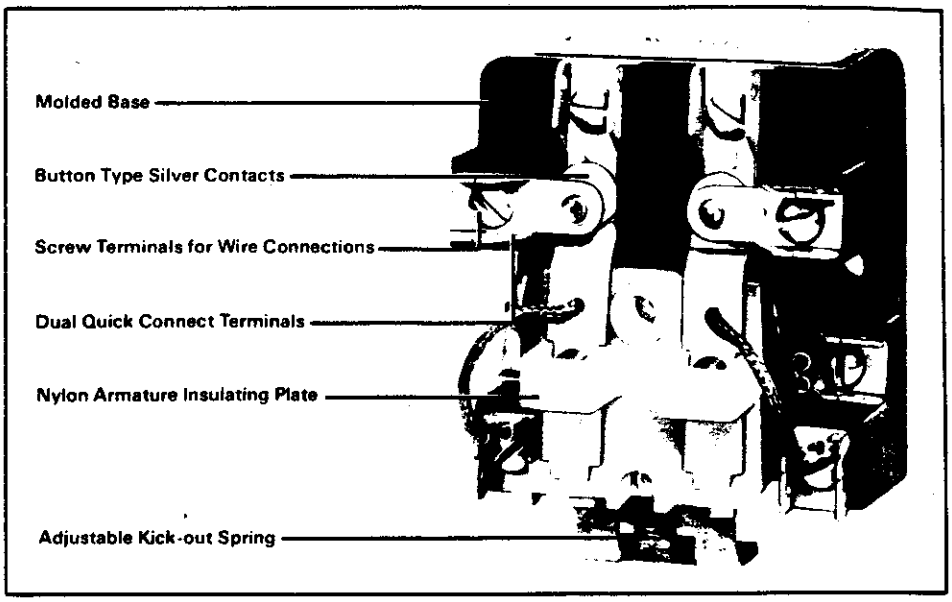
Dc Relay with Magnetic Blow-out, 2 poles in Series:
Make or Break: 2 amps at 250 volts Dc, 8 amps at 125 volts Dc.③

Coil Burden: Approx. 5 watts Ac, 3 watts Dc

Enclosures
For dimensions, see Page 18

Description	Style Number	List Price
NEMA 1	4977D40G04	$28
NEMA 12	5680D43G01	64

Ordering Information
Order by catalog number. If no catalog number is shown, order by description.



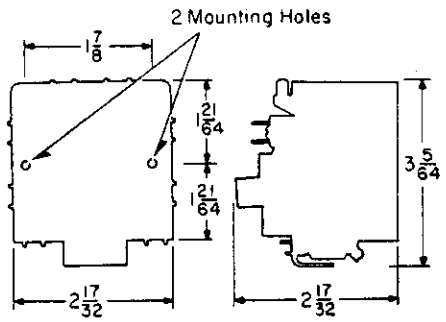
List Prices
2 Pole Open Devices, 300 Volts Maximum

Volts	Double Throw 2 N.O., 2 N.C.		Single Throw 2 N.O.		Single Throw 2 N.C.		Single Throw 1 N.O., 1N.C.	
	Catalog Number	List Price	Catalog Number	List Price	Catalog Number	List Price	Catalog Number	List Price
Ac, 60 Cycles								
115/120②	Z22A	$68	Z20A	$34	Z02A	$40	Z11A	$40
230	Z22B	68	Z20B	34	Z02B	40	Z11B	40
Dc③								
120②	Z22S	68	Z20S	34	Z02S	40	Z11S	40
240	Z22T	68	Z20T	40	Z02T	46	Z11T	46

② 6, 12, 24 volt Ac or Dc also available. Order similar to 115 volt catalog number and specify voltage.
③ Relays are available with magnetic blowout for Dc interruption. Order similar to catalog number listed and **add $8.00 list** each.

Dimensions, Inches

Not to be used for construction purposes unless dimensions are approved.



Contact Arrangements

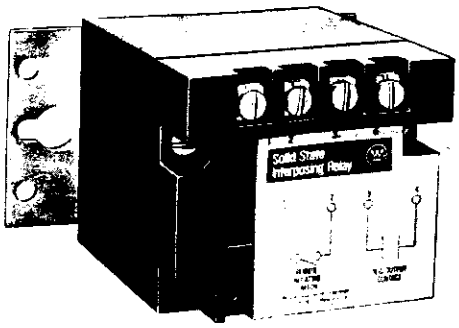
Type Z Relays

N.O.-Normally Open N.C.-Normally Closed

2 N.O. 0 N.C.	1 N.O. 1 N.C.	0 N.O. 2 N.C.	2 N.O. 2 N.C.

Special Application Relays

R56AP Interposing Relay



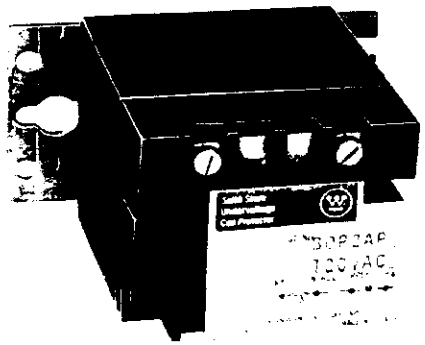
The R56AP interposing relay is a low energy solid state device with a single NO solid state contact. It can be used as a 120 volt Ac control relay, and will operate on as little as 40 volts Ac input. Is useful in applications requiring long control wiring runs where excessive voltage drop would prevent the contactor or relay from energizing. Will operate a size 4 contactor from 10,000 feet using #18 wire.

Ratings
Max. Continuous Current: 1 amp @ 120 Volts Ac
Max. Leakage Current (Off): 2 mA @ 120 Volts Ac

List Price

Catalog Number	Rating	List Price (Dis. C10-S5)
R56AP	120 V Ac	**$56**

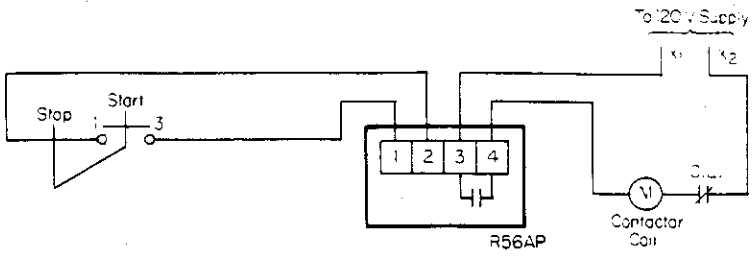
Undervoltage Coil Protector (BOP)



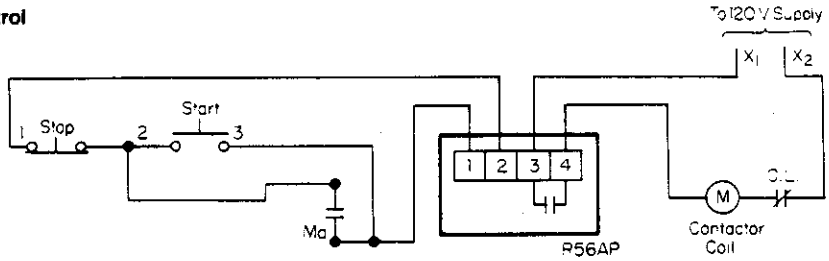
The Westinghouse "brownout" protector is designed to be used with both Type A200 and Type B200 motor starters and contactors. During low voltage dips and "brownouts" when there is insufficient voltage to pull in the starter, the BOP acts to limit current flowing to the contactor coil. The device is installed in series with the starter or contactor coil in both two wire and three wire circuits. In two wire control circuits, power must be removed before undervoltage coil protector will reset. May be used with up to a size 4 contactor.

Wiring Diagrams, R56AP Interposing Relay

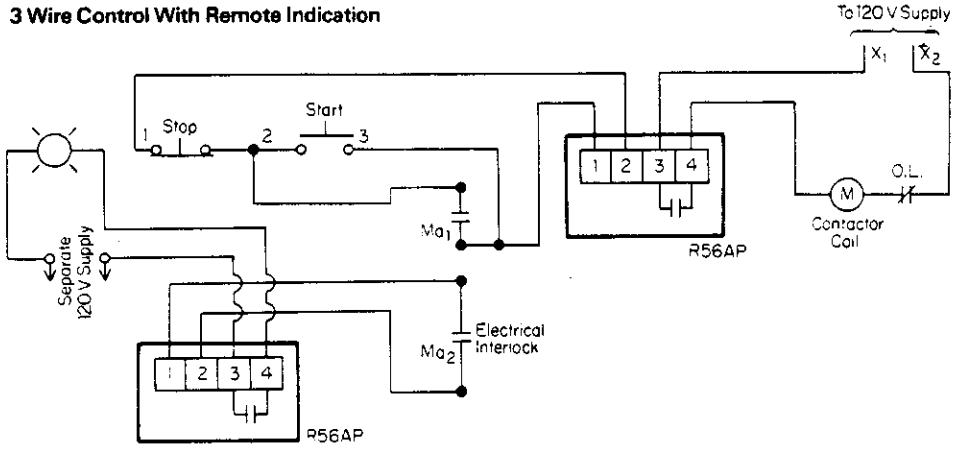
2 Wire Control



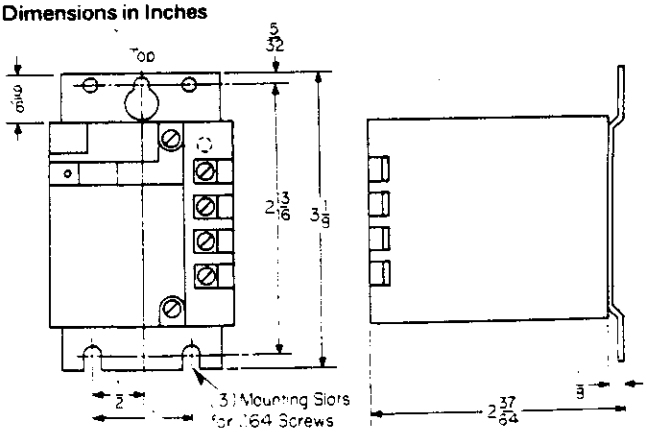
3 Wire Control



3 Wire Control With Remote Indication



Dimensions, R56AP and BOP
Dimensions in Inches



List Prices

Catalog Number	Ac Volts	Starter Size	List Price (Dis. C10-S5)
BOP-2AP	120	00-2	**$26**
BOP-4AP	120	3, 4	**26**

Single Pole Solid State Relay

Description

The Westinghouse single pole solid state relay is a proven, reliable, long-life device for industrial applications. It is environmentally sealed and available in both normally open and normally closed versions. A transformer isolated input removes polarity restrictions in control circuit wiring, thus allowing direct replacement in circuits using electromechanical relays. The input circuit also features a wide sensitivity range that accepts voltage inputs ranging from 5 to 135 volts Ac. Since the input current burden is small (6 ma or less), smaller control wiring over much greater distances is possible. For extremely long distances, the relay provides different voltage sensitivity taps to compensate for control wiring voltage drop.

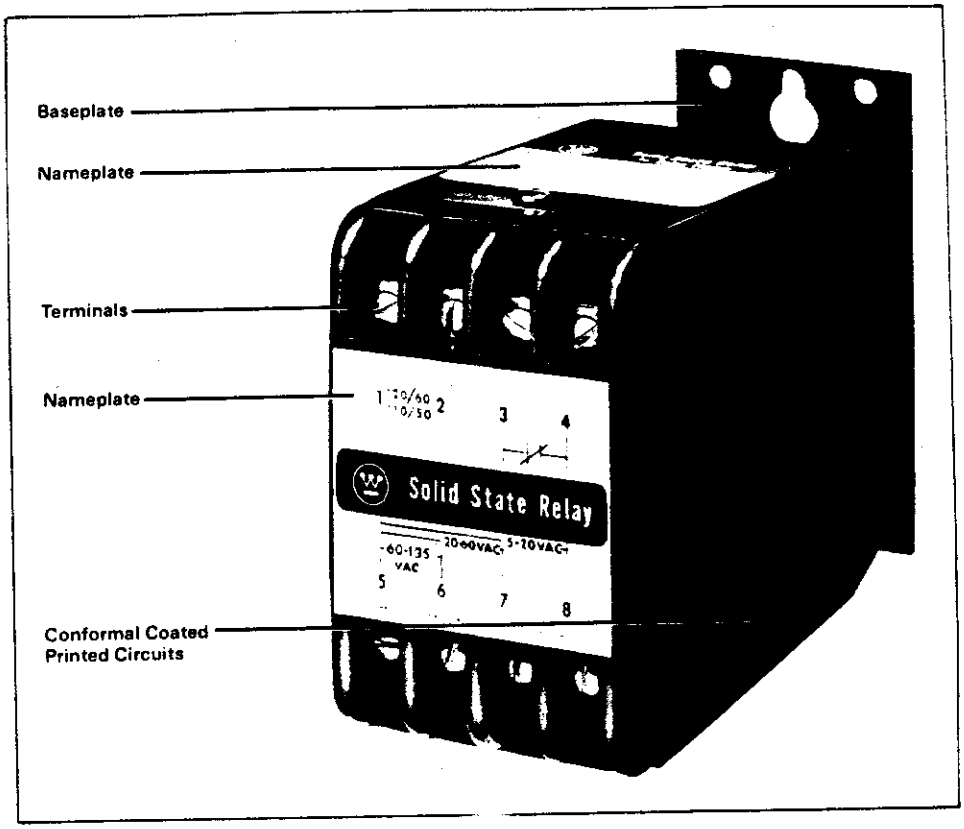
Application

The solid state relay is a totally silent, reliable device that is not normally harmed by dust, humidity, or other typical contact fouling environments. Since this relay is a more versatile, functional equivalent of an electromechanical relay, applications requiring this versatility are now possible:

- Remote starter and contactor control (interposing relay)
- Liquid level detection
- High duty cycle, interlocking, alarm, or fail-safe applications
- Functional equivalent of power AND gate:

Version	Supply Voltage	Input Voltage	Output Contact
N.O.	OFF	OFF	OPEN
N.O.	OFF	ON	OPEN
N.O.	ON	OFF	OPEN
N.O.	ON	ON	CLOSED
N.C.	OFF	OFF	OPEN
N.C.	OFF	ON	OPEN
N.C.	ON	OFF	CLOSED
N.C.	ON	ON	OPEN

- Explosion-proof applications
- Silent operation: suited for labs, operating rooms, offices
- Inaccessible locations where relay replacement is impracticable



Construction Features

Baseplate
Same baseplate as BF relays, mounts in same area.

Terminals
Captive, pressure clamp type, accepts one or two solid or stranded #14 or smaller wires.

Nameplates
On face of relay, contains wiring information and terminal identification.

Conformal Coated Printed Circuit
Protects against shock, dirt or other environmental hazards.

Built-in Surge Protection
Protects solid state contact from damage due to line and load transients.

List Prices

Solid State Contact②	Style Number	List Price
Normally Open	506C896G01	$180
Normally Closed	506C896G02	180

Enclosure – NEMA Type 1

Style Number	List Price
4977D40G04	$28

Accessories
Mounting Strip (same as used for BF Relays)

No. of Stations	Channel Length (In.)	Catalog Number	List Price
4	$7^{27}/_{32}$	BFMS4	$3.20
5	$9^{23}/_{32}$	BFMS5	3.40
6	$11^{19}/_{32}$	BFMS6	3.60
7	$13^{15}/_{32}$	BFMS7	3.80

Electrical Ratings

Input Voltage

Supply: 120/110, 60/50 Hz., 2.5 VA

Trigger Input: 60 volts Ac @ 3 mA to 135 volts Ac @ 6 mA;
20 volts Ac @ 3 mA to 60 volts Ac @ 6 mA;
5 volts Ac @ 2 mA to 20 volts Ac @ 6 mA.
25 to 400 Hz

Solid State Contact (NO or NC) ①:
2 amps RMS continuous max. (inductive or resistive load), ② 132 volts Ac RMS max.

Contacts should be used only on Ac or unfiltered rectified Ac circuits. Contact will not switch off Dc unless current passes through zero.

Ambient Temp. Range: −20°C to +60°C ③

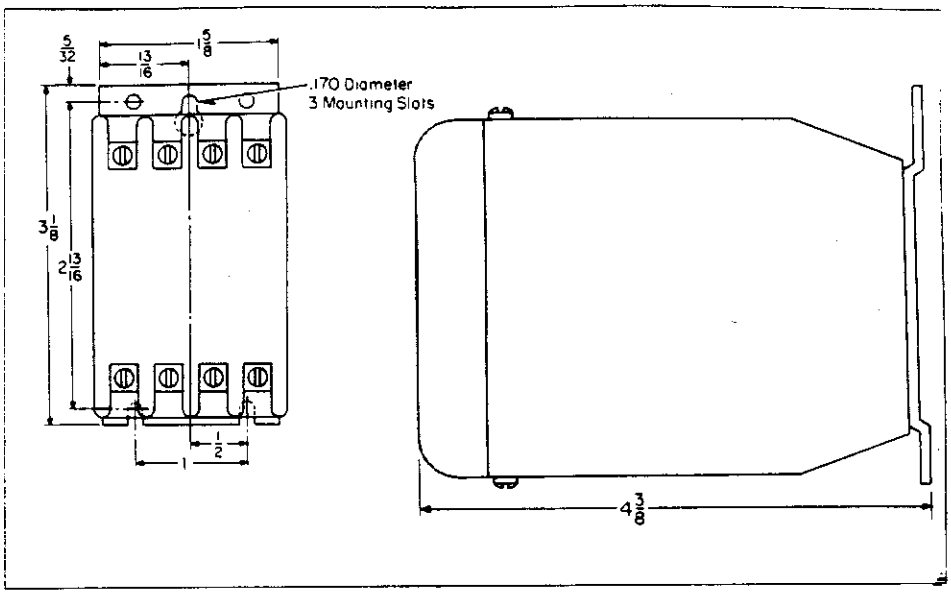
Open Contact Leakage Current:
3 mA maximum

Closed Contact Voltage Drop:
3 volts Ac maximum

① Can initiate any U.S. made size 4 motor starter.
② 12 amps RMS max. inrush for 3 cycles. If inrush-current is greater than 2 amps and relay is operated more than once every 30 minutes, refer to Westinghouse, as derating may be necessary. If surge current is 2 amps or less, no derating is necessary. If currents exceeding these ratings could occur, we suggest adding a series fuse having an I^2T rating equal to 3 amp ◆ 2 sec.
③ Refer to Westinghouse if operation in a higher ambient temperature is desired. Derating may be necessary.

Dimensions, Inches

Not to be used for construction purposes unless approved.



Resistance Sensing Relay

Application
The Westinghouse Resistance Sensing Relay is a versatile, accurate, solid state device suited for numerous industrial control systems.

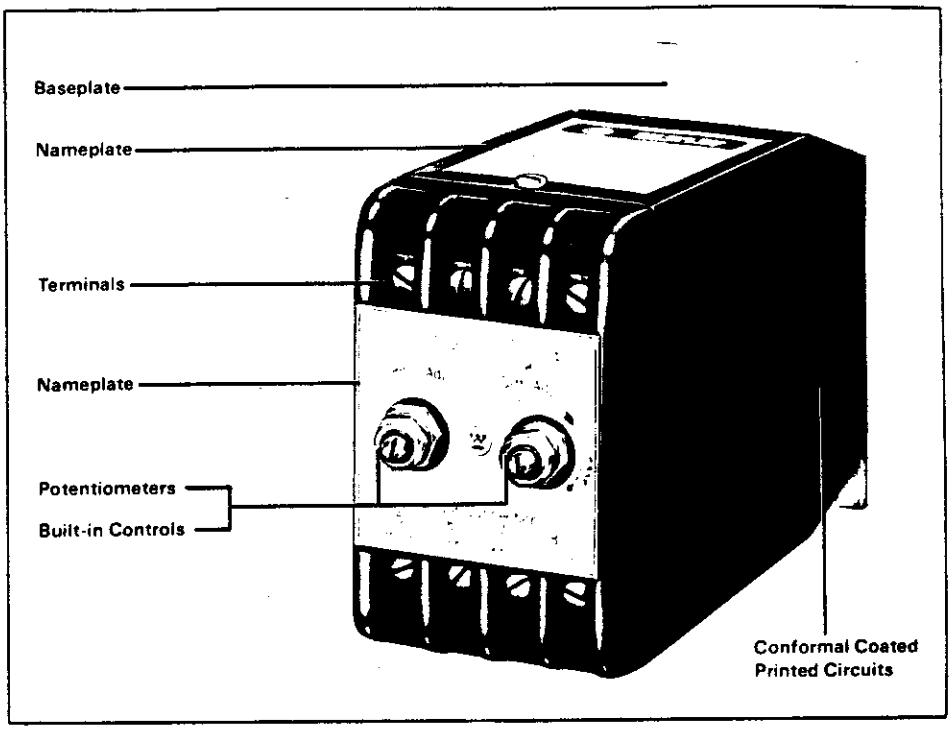
Typical applications include:
- Motor Temperature Protection
- Bearing Temperature Protection
- Fluid Flow Control
- Stop Motion Control
- Bin Filling Control
- Fluid Temperature Control
- Inspection
- Strain Gauge
- Positioning Servo System

Description/Operation
The Westinghouse Resistance Sensing Relay is designed for use with external variable resistance sensors such as:
- PTC and NTC thermistors
- Photo cells
- Infrared cells
- Liquid level probes
- Go, no-go gauges
- Contact-making thermometers and instruments

The relay compares the resistance value of the sensor to a self-contained adjustable resistance reference. Its solid state contact transfers when the sensor resistance exceeds a set value.

The sensor can be connected to the relay in two different ways to provide either a N/O or N/C output contact. Thus, sensors with inverse characteristics can be used to perform the same control function as sensors with direct characteristics (i.e. NTC and PTC thermistors).

The standard sensor adjustment permits relay to be used with sensors having a resistance range of 20 to 1000 ohms at point of contact transfer. Higher resistance sensors may be used without sacrificing adjustment resolution by connecting a bias resistor to terminals provided on the relay. A built-in differential adjustment is provided to control the resistance value at which the relay will transfer the output contact back to its normal condition after the initial transfer.



The relay supply voltage input is transformer isolated from the solid state contact; thus the relay can be used without regard to polarity in same manner as electromechanical relays.

The sensor circuit is connected internally to the soild state contact. The solid state contact, therefore, must be supplied from an undergrounded source to prevent any possibility of personnel shock or relay damage resulting from an unintentional sensor ground.

The voltage supplied to the sensor circuit from the internal power supply is 16 volts d-c max.

Construction Features

Baseplate
Standard BF Relay baseplate, mounts in same space as BF Relays.

Nameplates
Visible from front, contain wiring, electrical and terminal information.

Terminals
Captive, pressure clamp-type, recessed for electrical protection. Accepts one or two solid or stranded wires #14 or smaller.

Adjustment Potentiometer With Insulated Shafts
Provides shock proof adjustment.

Built-in Controls
Provides for easier set-up and adjustment.

Sensor Connection Terminals
Application flexibility enables sensor to be connected in two different ways.

Conformal Coated Printed Circuit
Protects relay against shock, moisture, dirt, and other environmental hazards.

Built-in surge protection protects solid state contact from damage due to line and load transients.

List Prices
Style No.: 506C193G01 ..... **$220 List**

Enclosure
NEMA 1 Style No.: 4977D40G04 .... **$28 List**

Accessories

Mounting Strip (Same as used for BF relays)

No. of Stations	Channel Length (In.)	Catalog Number	List Price
4	$7^{27}/_{32}$	BFMS4	**$3.20**
5	$9^{23}/_{32}$	BFMS5	**3.40**
6	$11^{19}/_{32}$	BFMS6	**3.60**
7	$13^{15}/_{32}$	BFMS7	**3.80**

Electrical Ratings
Input Voltage:
120/110 Volts Ac, 60/50 Hz., 2.5 VA

Solid State Contact①:
2 amps continuous Max. (inductive or resistance), 132 volts Ac max.

Ambient Temp. Range: −20°C to +60°C②

Open Contact Leakage Current:
3 MA maximum

Closed Contact Voltage Drop:
3 volts Ac maximum

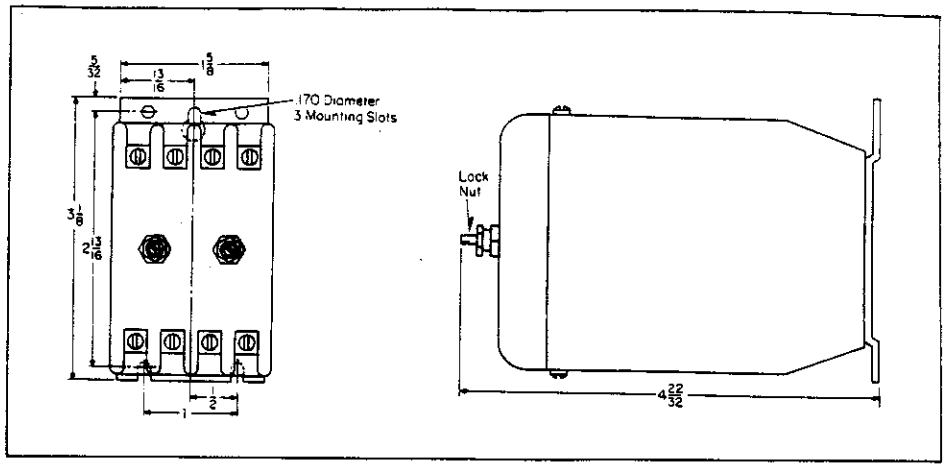
Accuracy:
±0.1% of resistance setting (for +10%, −15% change in rated line voltage and a 50°C ambient temperature change) for a switching resistance of 20 Ohms to 10,000 Ohms

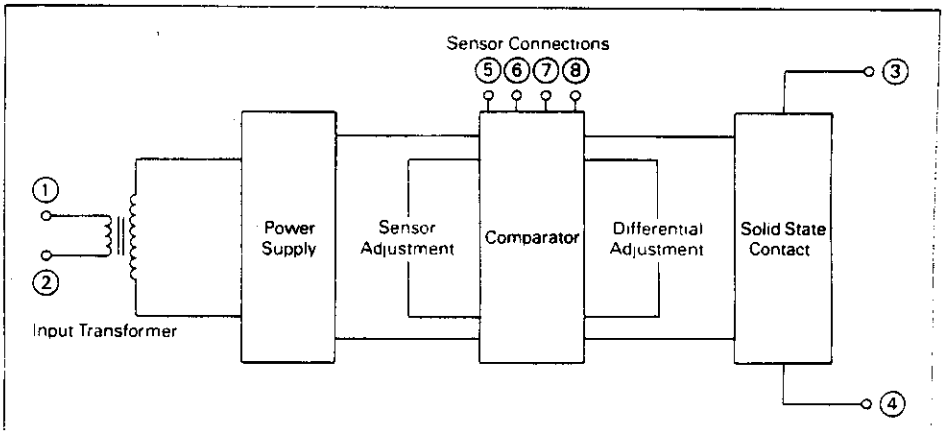
Maximum Switching Resistance:
50,000 Ohms

Minimum Switching Resistance:
20 Ohms

Differential Resistance Range:
Solid state contact can be set to open at 99% to 50%, or 101% to 150% of the contact closure resistance value, depending upon method of sensor connection.

① 12 amps max. inrush for 3 cycles. If inrush current is greater than 2 amps and relay is operated more than once every 30 minutes, refer to Westinghouse as derating may be necessary. If inrush is 2 amps or less, no derating is necessary. If currents in excess of these ratings could occur, we suggest adding a series fuse having an I^2T rating equal to 3 amp 2 sec.
② Refer to Westinghouse if operation in a higher ambient temperature is desired. Derating may be necessary.





Input Transformer
Provides isolation from input to output.

Power Supply
Converts Ac input voltage to Dc.

Sensor Adjust
Sets resistance value at which relay contact will transfer from Open to Closed.

Comparator
Transfers "solid state contact" from normal state to opposite state at predetermined values of sensor resistance

Differential Adjust
Sets resistance value at which relay contact will transfer from Closed to Open

Solid State Contact
Performs same function as contact in electromechanical relay

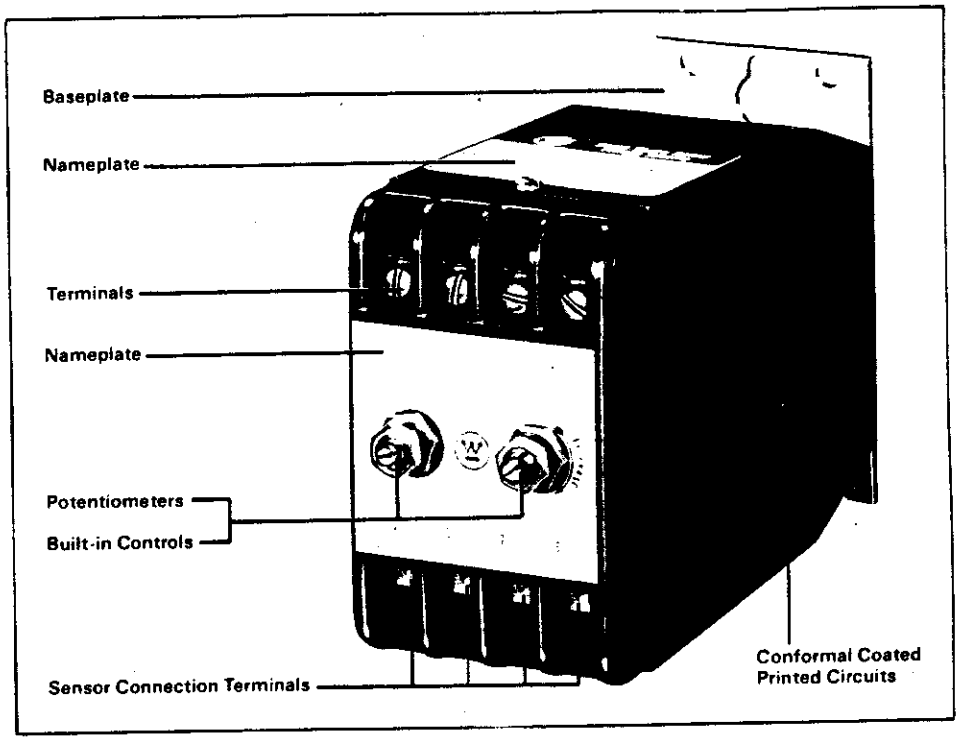
Voltage Sensing Relay

Description
The Westinghouse voltage sensing relays are highly accurate, solid state, Ac voltage sensing devices available in both overvoltage and undervoltage styles. Three voltage ranges are available: 70 – 120 Volts Ac, 100 – 140 Volts Ac, 200 – 280 Volts Ac. All relays include built-in insulated shaft potentiometers for voltage adjustment and differential adjustment. Relay circuit boards are conformal coated for environment-free operation. Input is transformer isolated from solid state output contact. Mounting dimensions are same as BF relay.

Application
Overvoltage Line Protection
Undervoltage Line Protection
Unbalanced Line Voltage Protection
Over-and-Underspeed Control (From Tachometer Input)
Any Ac Voltage Level Monitoring

Operation
Overvoltage Relay – Solid state contact is "normally closed". Differential adjustment sets – upper limit where contact will open. After opening, contact will remain open until voltage drops below value set with voltage adjustment potentiometer. Three adjustment ranges are available: 70 – 120 Volts Ac, 100 – 140 Volts Ac, and 200 – 280 Volts Ac.

Undervoltage Relay – Solid state contact is normally open and closes when voltage exceeds upper limit set by voltage adjustment potentiometer. Contact will remain closed until voltage drops below the value set with differential adjustment. Contact will not reclose until voltage once again exceeds upper limit. Available in same voltage ranges as over-voltage design.



Construction Features

Baseplate
Same baseplate as BF relay, mounts in same area.

Nameplates
On face of relay, contain wiring information and terminal identification.

Terminals
Captive, pressure clamp type, accepts one or two solid or stranded #14 or smaller wires.

Adjustment Potentiometer With Insulated Shafts
Provides shock-proof adjustment.

Built-in Controls
Provides for easier set-up and adjustment.

Conformal Coated Printed Circuit
Protects relay against shock, moisture, dirt, and other environmental hazards.

Built-in Surge Protection
Protects solid state contacts from damage due to load and line transients.

List Prices

Style Number	Voltage Range	List Price
Undervoltage		
506C084G09	70 to 120 Ac	**$260**
506C084G01	100 to 140 Ac	**260**
506C084G05	200 to 280 Ac	**260**
Overvoltage		
506C084G10	70 to 120 Ac	**260**
506C084G02	100 to 140 Ac	**260**
506C084G06	200 to 280 Ac	**260**

Enclosure

Style No. (NEMA 1)	List Price
4977D40G04	**$28**

Accessories

Mounting Strip (Same as used for BF Relays)

No. of Stations	Channel Length (In.)	Catalog Number	List Price
4	$7^{27}/_{32}$	BFMS4	**$3.20**
5	$9^{23}/_{32}$	BFMS5	**3.40**
6	$11^{19}/_{32}$	BFMS6	**3.60**
7	$13^{15}/_{32}$	BFMS7	**3.80**

Electrical Ratings
Operating Voltage Range:
70 to 280 volts Ac, 3 VA burden

Variable Differential Range:
See curves at right.

Repeatability: ±0.5 volts Ac of setting.

Solid State Contact:
2 amps continuous max.① (inductive or resistive), 132 volts Ac max.

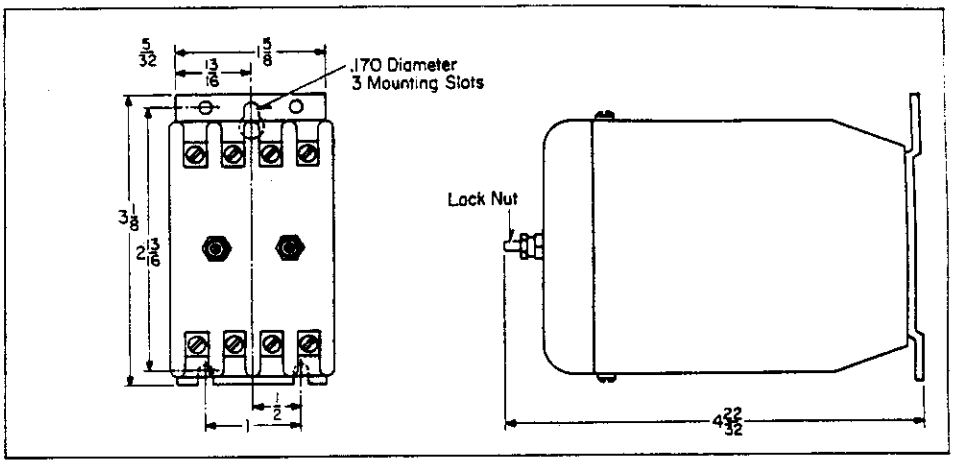
Ambient Temp. Range: −20°C to +60°C②

Open Contact Leakage Current:
3 MA maximum

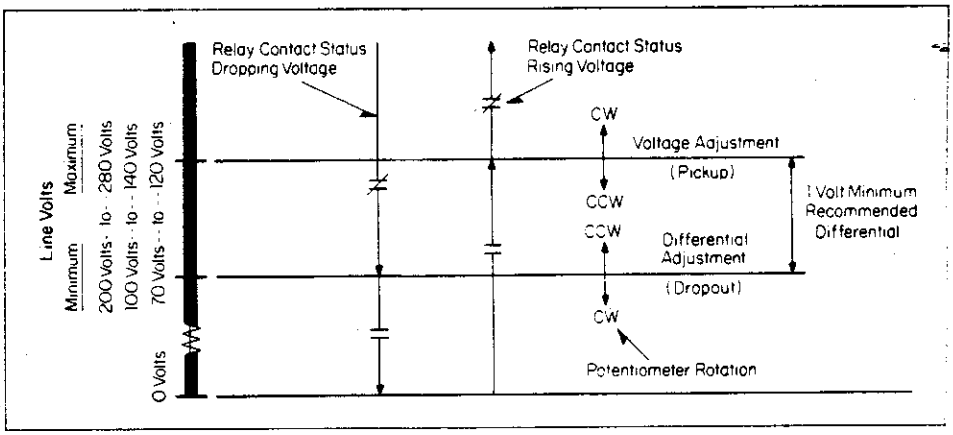
Closed Contact Voltage Drop:
3 volts Ac maximum.

① 12 amps max. inrush for 3 cycles. If inrush current is greater than 2 amps and relay is operated more than once every 30 minutes, refer to Westinghouse as derating may be necessary. If inrush is 2 amps or less, no derating is necessary. If currents in excess of these ratings could occur, we suggest adding a series fuse having an I^2T rating equal to a 3 amp 3 sec.
② Refer to Westinghouse if operation in a higher ambient temperature is desired. Derating may be necessary.

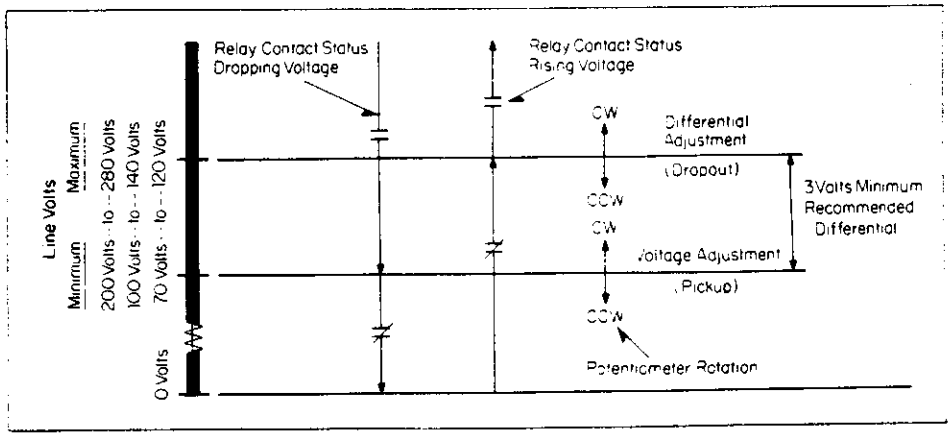
Dimensions, Inches



Undervoltage Relay



Overvoltage Relay



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