ABB Power T&D Company Inc.
Relay Division
Coral Springs, FL
Allentown, PA

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Mailed to: E, D, C/41-900A

Including High Threshold AR Relay
Device Number: 94X, Y, Z

Type AR and ARS High Speed Auxiliary Relays

Application

AR

The AR relay is a four-pole auxiliary type relay designed for ultra high speed circuit breaker tripping duty in protective relaying systems. It is well suited for bus arrangements where more than one breaker must be tripped. The relay may also be applied to provide isolation of primary and back-up relaying, and provide high speed tripping for zone 1 faults.

It is normally furnished with four "make" contacts and will operate in 2 ms. with 10 watts of input power. The contacts will make and carry 30 amperes long enough to trip a breaker.

AR (High Threshold)

The high threshold AR relay is a sensitive high speed auxiliary relay with 4 normally open contacts designed to be secure against misoperation due to inadvertent grounding of a station battery or the trip lead. With the battery balanced with respect to ground, the maximum momentary voltage that can be applied to an auxiliary relay for either of these grounds is half battery voltage. The operating level of the high threshold AR exceeds these levels.

The relay operates in 4 milliseconds for an energy input of 10 watts.

The AR relays are available as an open unit mounted in a small molded case or in a type FT-11 Flexitest case. They can also be supplied as a double unit in a type FT-22 Flexitest case.

ARS

The ARS relay provides a high speed contact output with a 15 to 20 volt low energy level signal input. The relay may be used as an auxiliary when high speed contact output is required in response to solid state circuitry output or as an oscillograph interface.

The driving device must be capable of providing an input to the ARS relay of 6 milliamperes at a level of 15 to 20 volts.

The type ARS relay is composed of 1 or 2 AR units mounted in a FT-11 or FT-22 Flexitest case.

Construction and Operation

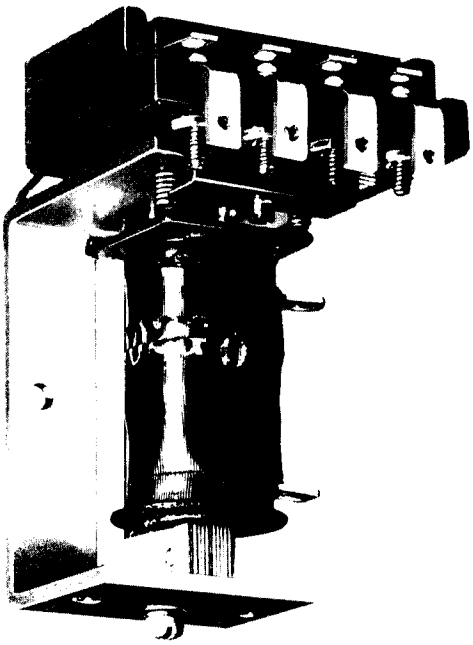
AR

The basic relay unit consists of four stationary contacts, four leaf-spring moving contacts, a moving armature and card assembly which operates the moving contacts.

The moving and stationary contacts are mounted on a molded insulation block. The molded block, coil and lamination assembly is mounted to the frame.

All contacts are fine silver.

High speed operation is obtained by the low inertia of the moving parts, a sensitive electromagnet, and the proper L/R ratio of the operating circuit.

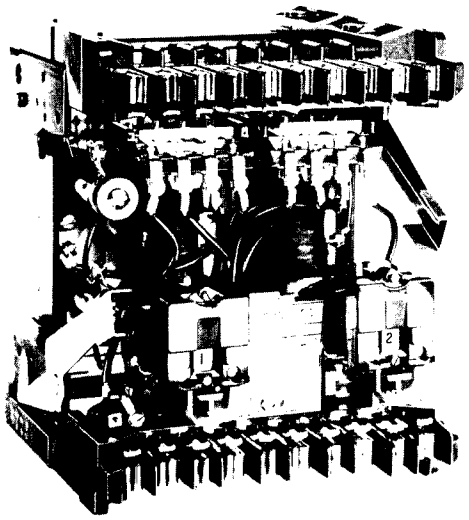


Type AR

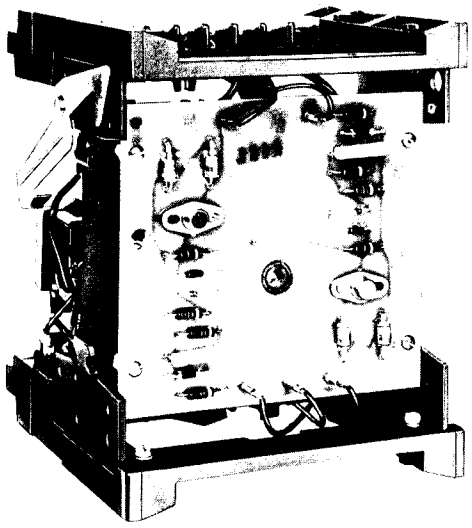
ARS

The type ARS relay is composed of 1 or 2 AR units (described at left) with series resistors, a printed circuit module, and indicating contractor switches (ICS) when required.

With the rated supply voltage applied to the relay, the proper signal voltage applied to an input terminal will cause the related AR unit to pick up. The AR unit will then energize the ICS (if used), which will seal around the AR unit contacts.



Type ARS Front View



Type ARS Rear View

Characteristics

The AR unit without a series resistor has a sensitivity of 500 milliwatts. By properly combining the AR unit and a series resistor, an optimum speed of 2 milliseconds can be obtained for an energy input of 10 watts.

All AR units are capable of being energized continuously. All high speed relays will pick up at 80% of rated voltage or less; and drop out at 10% of rated voltage or higher.

AR (High Threshold)

The relay is adjusted to have a pickup value less than 80% of rating, but not less than 50% of the typical battery equalizing charge voltage, i.e. minimum pickup is greater than:

28 volts for 48 volt rating
70 volts for 125 volt rating
140 volts for 250 volt rating

The relay will drop out at 10% of rated voltage or higher. The relay is only available in a 4 make contact configuration. Typical effective contact bounce is outlined below:

AR Only

The operate time of the relay with delayed dropout is about 6 ms. at rated voltage for a normally open contact. The relay will have a 0.1 second dropout time after being energized at least 0.015 seconds.

AR Unit Operate and Reset Times

Rated Operating Energy (Watts)	Operate Time (milliseconds)		Reset Time (millseconds)
	NO Contact Closes	NC Contact Opens	NC Contact Closes
10	2.0	1.5	4.0
2.25	3.5	2.5	3.5

AR relay only. 2.25 Watt AR is a different style than the 10 Watt AR.

AR Unit Contact Rating

Contact Circuit Volts DC	Interrupting Rating (Amps)				Carry Rating (Amps)
	Resistive		Inductive L/R – .005		
	Single	Double	Single	Double	Continuous
48	3.750	20.	1.750	20.	3
125	0.500	1.7	0.350	1.2	3
250	0.250	1.0	0.150	0.250	3

AR Unit Contact Bounce

Contact Loading	Effective Bounce Time in Milliseconds	
	Normally Open	Normally Closed
Dry Circuit	2	6-8
10 Watt (one AR)	1	. . .
Breaker Trip Coil	.2	. . .

ARS Maximum Circuit Delay Time

Input (Dc Volts)	Voltage Applied	Delay Time in Microsecond
20	15	90
48/125	42	700
	105	300

Further Information

List Prices: PL 41-020
Technical Data: TD 41-025
Instructions:
  Type AR, IL 41-759
  Type ARS, IL 41-759.2
  Type AR (High Threshold), IL 41-759.3
Renewal Parts:
  Type AR, RPD 41-901
  Type ARS, RPD 41-902
Flexitest Case Dimensions: DB 41-076
Contactor Switches: DB 41-081
Other Protective Relays:
  Application Selection Guide, TD 41-016

Carton Dimensions and Weights

Case Type	No of Units	Net Weight Lbs.	(KG)	Shipping Wt. Lbs.	(KG)	Domestic Carton Inches (cm)
Small Glass	1	2	(.91)	4	(1.8)	4.75(12) × 8(20.3) × 8.5(21.6)
Flexitest FT-11	1	7	(3.2)	10	(4.5)	9(22.8) × 9(22.8) × 10(25.4)
Flexitest FT-21	2	11	(5.0)	15	(6.8)	9(22.8) × 12(30.5) × 13(33)

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Including High Threshold AR Relay

Type AR and ARS High Speed Auxiliary Relays

Auxiliary, Non-Adjustable Pickup, 2 Milliseconds Operating Time

Molded Base Type (Device Number: 94X, Y, Z)

Type	Contacts	Dc Rating		Relay Data			
		Volts	Watts	Front Connected Glass Window Cover⑤		Projection Rear Connected Glass Window Cover⑥	
				Internal Schematic	Style Number	Internal Schematic	Style Number
AR Single Unit	4 make	48 125 250	10	629A899	606B029A11 606B029A09⑤ 606B029A10	836A859	644B590A09 644B590A10 644B590A11
	2 make and 2 break	48 125 250	10	837A112	606B029A14 606B029A13ⓠ 606B029A15	836A917	644B590A12 644B590A13 644B590A14
	2 make and 1 break	125	10	.....	.....	837A309	644B590A21

Flexitest Case Type

Type	Contacts	Dc Rating		Indicating Contactor Switch Amps Dc③	Relay Data		
		Volts	Watts		Internal Schematic	Style Number	Case Size
AR Single Unit	4 make	48 125 250	10	....	629A496	606B017A11 606B017A09⑤ 606B017A10	**FT-11**
	2 make and 2 break	48 125 250	10	....	837A113	774B401A16 606B017A15ⓠ 606B017A16	
	4 make	125	10	Two 0.2/2.0	848A823	606B017A22ⓠ	

Type	Contact Arrangement (Front View)		Dc Rating		Relay Data		
	Left Unit	Right Unit	Volts	Watts	Internal Schematic	Style Number	Case Size
AR Double Unit	4 make	4 make	48 125 250	10	629A495	606B028A11 606B028A09⑤ 606B028A10	**FT-22**
	2 make and 2 break	2 make and 2 break	48 125	10	762A580	606B028A20 606B028A13	
		3 make and 1 break	125	10	876A296	606B028A23	
		4 make	125	10	762A529	606B028A12	

⑤ Denotes item available from stock.
ⓠ Denotes item is "Qwik Ship" style. Qwik Ship is being phased in during 1990/1991 – check for availability.
③ **ICS:** Indicating Contactor Switch (dc current operated) having seal-in contacts and indicating target which are actuated when the ICS coil is energized at or above pickup current setting. Suitable for dc control voltages up to and including 250 volts dc. Two current ranges available:
(1) 0.2/2.0 amps dc, with tapped coil.
(2) 1.0 amp dc, without taps.

Rating of ICS unit used in specific types of relays is shown in price tables. All other ratings must be negotiated.

When ac current is necessary in a control trip circuit, the ICS unit can be replaced by an **ACS** unit.

The ACS unit may be supplied in place of an ICS unit at no additional cost. Specify system voltage rating on order.

④ Maximum of 2 break contacts.
⑤ Ten terminal case; available with 4 electrically independent contacts.
⑥ Eight terminal case; not available with 4 electrically independent contacts.

Auxiliary, High Threshold, 70 Volt Pickup, 4 Milliseconds Operating Time

Molded Base Type (Device Number: 94X, Y, Z)

Type	Contacts②	Dc Rating		Relay Data			
		Volts	Watts	Front Connected Glass Window Cover		Rear Connected Projection Mounted – Solid Cover	
				Internal Schematic	Style Number	Internal Schematic	Style Number
AR Single Unit	4 make	125	10	3500A85	774B470A12⑤	3512A30	644B590A28

Flexitest Case Type

Type	Contacts	Dc Rating		Indicating Contactor Switch Amps Dc③	Relay Data		
		Volts	Watts		Internal Schematic	Style Number	Case Size
AR Single Unit	4 make	125 125	10 10	..... Two 0.2/2.0	3495A73 3500A88	774B471A12⑤ 774B471A18	**FT-11**

Type	Contact Arrangement (Front View)		Dc Rating		Relay Data		
	Left Unit	Right Unit	Volts	Watts	Internal Schematic	Style Number	Case Size
AR Double Unit	4 make	4 make	125	10	3500A90	774B472A12⑥	**FT-22**

⑤ Denotes item available from stock.
⑥ Denotes item is "Qwik Ship" style. Qwik Ship is being phased in during 1990/1991 – check for availability.
② Not available with break contacts.

③ **ICS:** Indicating Contactor Switch (dc current operated) having seal-in contacts and indicating target which are actuated when the ICS coil is energized at or above pickup current setting. Suitable for dc control voltages up to and including 250 volts dc. Two current ranges available:
(1) 0.2/2.0 amps dc, with tapped coil.
(2) 1.0 amp dc, without taps.

Rating of ICS unit used in specific types of relays is shown in price tables. All other ratings must be negotiated.

When ac current is necessary in a control trip circuit, the ICS unit can be replaced by an **ACS** unit.

The ACS unit may be supplied in place of an ICS unit at no additional cost. Specify system voltage rating on order.

Auxiliary

Non-Adjustable Pickup, 2 Millisecond Operating Time (Device Number: 94X, Y, Z)

Type	Input Voltage – dc	Supply Voltage – dc	Watts	Contact Arrangement	ICS Unit	Internal Schematic	Style Number	Case Size
ARS	20	48 125	10	2M	2	719B963	718B820A09 718B820A10	**FT-11**
Single unit		250				719B944	718B820A11	
Single input per unit		48 125 125 250		2M1B 2M	1	719B945 775B051 719B946	718B820A12 718B820A13 718B820A15 718B820A14	
ARS	20	48 125	10	2M2B	None	719B951	717B770A10 717B770A11	**FT-22**
Single unit		48 125		4M		719B952	717B770A12 717B770A13	
Double input per unit		48 125		2M2B	2	719B947	717B770A14 717B770A15	
		250				719B948	717B770A16	
		48 125		4M		719B956	717B770A17 717B770A18	
ARS	20	48 125	10	4M-4M	None	719B953	717B770A19 717B770A20	**FT-22**
Double unit		48 125		4M-2M2B		719B950	717B770A21 717B770A22	
Single input per unit		48 125		2M2B-2M2B		719B949	717B770A23 717B770A24	
		48 125		4M-4M	2	719B954	717B770A25 717B770A26	
		250				719B955	717B770A27	

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