



October, 1988
Supersedes TD 41-020, pages 161-164,
dated November, 1987

Mailed to: E, D, C/41-100A

Protective Relays 41-900: Pilot Wire

Phase and Ground Pilot Wire Relay Schemes^⑨ (Dev 87, DB 41-971)

Type	Application	Time Delay On Tripping		Indicating Contactor Switch ③	Complete Set: For 3-Phase Protection Per Line Terminal	Relay Data		
		Time	Volts dc			Internal Schematic	Style Number	Case Size
HCB	2 or 3 terminal lines, 4-15 amp, 60 Hz	Inst.	...	0.2/2.0 amps dc	1 HCB spst-cc 1 HCB dpst-cc 1 HCB dpdt	629A310 629A312 764A236	292B930A10 ^⑤ 292B930A13 ^⑤ 292B930A16	FT-42
HCB-1	2 or 3 terminal lines, 4-12 amps	Inst.	...	0.2/2.0 amps dc	1 HCB-1 spst-cc dpst-cc	763A227 763A628	292B930A29 ^⑤ 292B930A30 ^⑤	FT-42
HCB-2	2 or 3 terminal lines, 4-15 amps	.05-.4 second 0.5-1 second	48/125 48/125		1 HCB-2 spst-cc spst-cc	837A364	292B930A22 292B930A23	
HCB-3		35-50 milliseconds	125		1 HCB-3 spst-cc	848A627	292B930A33	
						1 insulating transformer 1 W-2 switch 1 milliammeter	external devices included in price	

⑨ (a) Order each item by style number from "Auxiliaries" table.

- (b) Required for 3-phase line terminal:
1 HCB or HCB-1, 2, or 3 type relay.
1 insulating transformer
1 type W-2 switch
1 milliammeter

Order all HCB type relays and auxiliaries on N-1 order with separate item for each style.

Auxiliaries for HCB and HCB-1, 2, 3 Schemes

Description	Panel Thickness	Style Number
Insulating transformer, 50 or 60 Hertz 4/1 6/1	... ...	7882A26G07 ^⑤ 7882A26G08 ^⑤
W-2 switch	1/4" 1 1/2" 2 1/2"	508A468G01 ^⑤ 508A468G02 508A468G03
RC-351 milliammeter, flush mounting case (60 Hertz ac, 0-5, 0-25 mA)	1/8" 2"	291B318A09 ^⑤ ⑤ 1964 364 ^⑤

⑥ Style number includes auxiliary transformer style number 291B606G09.

Instantaneous Overcurrent, Second Harmonic Restraint (0.2/2.0 Amps dc ICS^⑦)

Type	Contacts	Applications Harmonic Restraint Supervision	Sensitivity	IIT	Relay Data		
					Internal Schematic	Style Number	Case Size
HRU	Spst-cc	3-phase	.87 amps	(3 units) 20-80 amps	877A194	670B109A12	FT-31
	Spst-cc	1-phase	.87 amps .87 amps .87 amps 2.0 amps 4.0 amps	(1 unit) 1-4 amps 1-4 amps 20-80 amps 1-4 amps 4-16 amps	187A512 ^⑦ 861A783 ^⑥ 861A783 ^⑥ 187A512 ^⑦ 187A512 ^⑦	292B024A11 292B024A16 292B024A12 292B024A10 292B024A09	FT-21

⑤ Denotes item available from stock.

①②③④⑤ Standard notes, see page 3.

⑦ HRU and IIT contacts are in series.

⑥ HRU and IIT contacts are in parallel.



Pilot Wire Monitoring, For Detection of Pilot Wire Faults (Dev 74)

Type	Application (Detection of Pilot Wire Faults)	Rating: Volts		Remote Trip: dc	Number of Line Terminals	Relay Data		Case Size
		Monitoring	dc			Internal Schematic	Style Number	
PMA ⑩	Shorted, open, reversed, grounded	120			2 3	184A500 187A191	290B101A09 290B101A10	FT-31
PMA-1 ⑩	Shorted, open, reversed	120			2 3	184A514 187A192	290B101A17 290B101A18	FT-21
PMD ⑩	Shorted, open, reversed, grounded	...	48/125		2	184A497	290B110A09	FT-21
		...	250	.....	2		290B110A10	
		...	48/125	.....	3	184A583	290B110A12	
		...	250	.....	3		290B110A13	
	Shorted, open reversed, grounded w/telephone relay	...	48		2	3490A61	290B110A14	
		...	125	.....	2		290B110A15	
		...	250	.....	2		290B110A16	
		...	48	.....	3	3490A62	290B110A17	
PMD-1 ⑩	Shorted, open, reversed	...	48/125		2	184A498	290B111A09	FT-11
		...	250	.....	2		290B111A10	
		...	48/125	.....	3	184A582	290B111A12	
		...	250	.....	3		290B111A13	
PM-13 ⑩	Shorted, open, reversed, remote trip	120		48/125 ⓐ	2	184A512	290B118A09	FT-32
			.....	250 ⓐ	2		290B118A10	
			.....	48/125 ⓐ	3		290B118A17	
			.....	250 ⓐ	3		290B118A18	
		...	48/125	48/125 ⓐ	2	184A495	290B119A09	
			250	250 ⓐ	2		290B119A10	
PMG-13 ⑩	Shorted, open, reversed, grounded, remote trip	120		48/125 ⓐ	2	184A513	290B112A09	FT-32
		120	.....	250 ⓐ	2		290B112A10	
		120	.....	48/125 ⓐ	3		290B112A17	
		120	.....	250 ⓐ	3		290B112A18	
		...	48/125	48/125 ⓐ	2	184A499	290B113A09	
		...	250	250 ⓐ	2		290B113A10	
		...	48/125	48/125 ⓐ	3	184A658	290B113A17	
		...	250	250 ⓐ	3		290B113A18	
	Shorted, open, reversed, grounded, remote trip w/telephone relay	...	48	48 ⓐ	2	3490A59	290B113A11	
		...	125	125 ⓐ	2		290B113A12	
		...	250	250 ⓐ	2		290B113A13	
		...	48	48 ⓐ	3	3490A60	290B113A19	
PM-5	Ground only	...	0.1 mA		2 or 3	184A501	290B109A09	FT-11
		...	1.0 mA	.....	2 or 3	184A489	290B115A17	
		...	2.0 mA	.....	2 or 3	184A798	290B116A09	
PM-23 ⑩	Shorted, open, reversed, or remote trip	...	ⓑ		2 or 3	187A874	290B114A25 ⓐ	FT-21

Flexitest Case Type

Type	Application	Rating mA dc	Number of Line Terminals	Relay Data		Case Size
		ⓑ		Internal Schematic	Style Number	
PM-43 ⑩	Remote trip, adjustment of dc mA monitoring	1.0	2 or 3	188A439	292B716A09	FT-21

Pilot Wire, Dc Current Limit Unit Small Molded Base Type

Type	Application	Rating: mA dc	Relay Data			
			Internal Schematic	Style Number	Glass Window Cover	
					Solid Cover	Projection
					Projection	Semi-Flush
PM-4 ⑩	Current limit adjuster	1.0	2D1845	290B117A09	290B117A10	290B117A11

ⓐ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑦ 60 Hertz.

ⓐ PM-13 and PMG-13 have internal resistor for remote trip applications.

ⓑ Pickup is 1.0 mA dc for detection of open, shorted, or reversed pilot wires. Pickup for remote trip function is 2.0 mA dc.

⑩ Style number includes one 10 mfd external capacitor style number 289B493H01 (dc and 60 Hertz applications).

**Neutralizing Reactors and Capacitors – 50/60 Hz**

Description	Rating	Number Per Set ^⑦	Internal Schematic	Outline Drawing	Style Number
Reactor; with Surge Voltage Protector (SVP)		1	6D1260	815A659	7882A27G03 ^⑤
without Surge Voltage Protector (SVP)		1			7882A27G01
Capacitor; for use with above reactors	1 mfd	2			949 122 (Included in reactor price) ^⑧

Mutual Drainage Reactor For 50 & 60 Hz

Description	Internal Schematic	Outline Drawing	Style Number
Mutual drainage reactor with Surge Voltage Protector (SVP)	253A180	815A568	7882A28G03 ^⑤

Pilot Wire Auxiliary Equipment
Remote Trip Resistors

Number of Line Terminals	Remote Trip Voltage: dc	Resistor Value in Ohms for Relay Types Located as Shown Below				To Operate Trip Contacts of Relay Type:	Style Number of Resistor Assembly ^⑩
		PMA or PMA-1	PMD or PMD-1	PMG-13 or PM-13 (ac or dc Supply)	PM-23 or Combination of PM-3 with PM-2 and/or PM-4		
		Station A		Station B	Station C		
2	48	200	200	....	None	PM-3 or PM-23	288B898G32
	125	3550	3550	....	required		288B898G26
	250	9300	9300	....	required		288B898G27
	48	....	....	200 ^⑪	200	PM-3, PM-13, PM-23, PMG-13	288B898G32
	125	....	....	2120 ^⑪	2120		288B898G30
	250	....	....	5600 ^⑪	5600		288B898G22
3	48	200	....	....	None	PM-3 or PM-23	288B898G32
	125	2000	....	....	required		288B898G24
	250	5000	....	....	required		1878169
	48	....	200	....			288B898G32
	125	....	2000	....			288B898G24
	250	....	5600	....			288B898G22
	48	....	....	200 ^⑪	200	PM-3, PM-13, PM-23, PMG-13	288B898G32
	125	....	....	1500 ^⑪	1500		288B898G31
	250	....	....	4000 ^⑪	4000		288B898G25

Carrier Auxiliary Relays (Dev 85)

Type	Application	Amps	Volts dc	Contactor Switch	Relay Data		
					Internal Schematic	Style Number	Case Size
KA-1	K-Dar overreaching transfer trip ^⑩	0.5-2.0	48/125	None	184A238	289B860A10	FT-32
		0.5-2.0	48/250			289B860A11	
		1-4	48/125			289B860A18	
KA-4	K-Dar directional comparison blocking for use with KR carrier ^⑩	0.5	48	.112 amp, 27 ohm	629A389	293B237A09	FT-32
		0.5	125	.112 amp, 27 ohm		293B237A10	
		0.5	250	.028 amp, 435 ohm		293B237A11	
	K-Dar directional comparison blocking for use with TC carrier ^⑩	0.5	48	.112 amp, 27 ohm	629A476	293B237A29	FT-32
		0.5	125	.112 amp, 27 ohm		293B237A30 ^⑤	
		0.5	250	.028 amp, 435 ohm		293B237A31	
	K-Dar directional comparison blocking for use with KR or TC carrier	0.5	48	.112 amp, 27 ohm	3511A91	6704D83A01	FT-32
		0.5	125	.112 amp, 27 ohm		6704D83A02	
		0.5	250	.028 amp, 435 ohm			
	for use with TA-3 tones	0.5	48	.112 amp, 27 ohm	3493A16	715B043A23	FT-32
		0.5	125	.112 amp, 27 ohm		715B043A24	
		0.5	250	.028 amp, 435 ohm		715B043A25	

Pilot Wire Auxiliary Equipment
Balancing Resistor, For 3-Terminal Lines

Rating: Ohms	Outline Drawing	Style Number
0-31.5	880A797	290B664G65

Note: A special pilot wire monitoring, weatherproof cabinet is available that includes mounted and wired insulating transformer, neutralizing transformer with Surge Voltage Protector (SVP), special PMA or PM-2 relay, 1 MFD. capacitor (6000Vdc), 5KV porcelain insulator, 2PDT toggle switch, 4PST toggle switch, terminal block, 60W resistor heater, and duplex receptical. Contact Construction Equipment Division, Visalia, California, Plant for further information and price. Refer to Westinghouse drawing 5460J55.

^⑤ Denotes item available from stock.

^① ^② ^③ ^④ ^⑤ ^⑥ Standard notes, see page 3.

^⑦ Set includes 1 reactor and 2 capacitors. Specify each item separately by style number on order.

^⑧ No reduction in price for omission of capacitors.

^⑨ 1 amp operation indicator.

^⑩ Style number includes 2 resistors assembled on one mounting bracket. One assembly required per station.

^⑪ Mounted internally in relay case.



Pilot System Auxiliary Relays (Dev 85)

Type	Application	Volts dc	Indicating Contactor Switch Amps dc	Relay Data		
				Internal Schematic	Style Number	Case Size
TT-9	Tone monitoring for single and dual channel transfer trip system	48/125	1	187A327	290B674A21	FT-11
		250	1	187A327	290B674A22	
		48/125	0.2/2.0	188A692	290B674A25	
		250	0.2/2.0	188A692	290B674A28	
TT-12	KDAR overreaching transfer trip for use with any tone having a separate guard and trip relay	48	1	879A973	717B689A09	FT-22
		125Ⓢ	1	879A974	717B689A10	
		125Ⓢ	0.2/2.0	879A974	717B689A12	
		250Ⓢ	1	879A974	717B689A11	
	K-Dar overreaching transfer trip and channel monitoring for use with TCF carrier and DIT-1 tones.	48	1	879A975	717B689A17	
		125Ⓢ	1	879A976	717B689A18	
		250Ⓢ	1	879A976	717B689A19	
TT-17	K-Dar underreaching transfer trip	125	0.2/2.0	188A526	292B780A09	FT-22
TT-18	K-Dar single-pole trip system-interlocking auxiliary	125	None	3491A60	292B620A15	FT-22
		250		876A739	292B620A13	
TT-19	K-Dar single-pole trip system-potential switching auxiliary	48	None	188A345	292B622A09	FT-22
		125		188A345	292B622A10	
		250		862A289	292B622A11	

Solid State Auxiliary Relays, For Use With EM Distribution Relays Only (Dev 85, DB 41-959A)

Type	Application	Transient Blocking Time	Volts dc	Line Terminals	Logic Drawing	Style Number ⑤	Case Size
STU Strong Feed	Directional Comparison Unblocking with TCF-10 Carrier or DIT-1 tones over SSB	18 ms	48	2	5492D16	202C668A32	19" rack mounted 3 rack units
				3	5492D16	202C668A33	
			125	2	5492D16	202C668A44	
		25 ms		3	5492D16	202C668A45	
			48	2	5492D16	202C762A32	
				3	5492D16	202C762A33	
STU Weak Feed		18 ms	48	2	5492D16	202C762A44	
				3	5492D16	202C762A45	
			125	2	5492D16	202C762A32	
		25 ms		3	5492D16	202C762A33	
			48	2	5492D16	202C762A44	
				3	5492D16	202C762A45	
STU-12 Strong Feed	Directional Comparison Permissive Overreaching Transfer Trip- using DIT-1 audio tones	18 ms	48	2	6263D39	204C003A32	19" rack mounting 3 rack units
				3	6263D39	204C003A33	
			125	2	6263D39	204C003A44	
		25 ms		3	6263D39	204C003A45	
			48	2	6263D39	204C009A32	
				3	6263D39	204C009A33	
STU-12 Weak Feed		18 ms	48	2	6263D39	204C009A44	
				3	6263D39	204C009A45	
			125	2	6263D39	204C009A32	
		25 ms		3	6263D39	204C009A33	
			48	2	6263D39	204C009A44	
				3	6263D39	204C009A45	
STU-12 Strong Feed		18 ms	48	2	6263D45	204C007A32	
				3	6263D45	204C007A33	
			125	2	6263D45	204C007A44	
		25 ms		3	6263D45	204C007A45	
			48	2	6263D45	204C013A32	
				3	6263D45	204C013A33	
STU-12 Weak Feed		18 ms	48	2	6263D45	204C013A44	
				3	6263D45	204C013A45	
			125	2	6263D45	204C013A32	
		25 ms		3	6263D45	204C013A33	
			48	2	6263D45	204C013A44	
				3	6263D45	204C013A45	

⑤ Denotes item available from stock.
 ①②③④⑤⑥ Standard notes, see page 3.
 Ⓢ External resistor supplied.
 ⑨ Price includes harness assembly which is required when the relay is sold loose and unmounted. Enter harness as separate item.



May, 1986
Supersedes TD 41-020, pages 171-174,
dated May, 1984

Mailed to: E, D, C/41-100A

Protective Relays Auxiliary Equipment

Auxiliary Equipment

Current Transformers

For CA-26 relays, see page 69.

For negative sequence relays, see page 69.

Potential Polarizing Transformers

See Page 35

Relay Maintenance Tool Kit (DB 41-075E)

Description	Style Number
Includes all tools required for normal maintenance and repair of relays referred to in this price list.	1156 341
Nut driver for FT-1 Flexitest Switch	877A821H01 ^⑤
Contact burnishing tool (with 6 blades)	182A836H01
Contact burnishing blade only	182A836H02
Cylinder unit spring adjustment tool	774B180G01

Price from PEG 120

DC to AC Inverter (DB 41-075D)

Output Volt-Amperes: Ac	Conversion Factor	Applied with Relay Type:	Style Number
0-3 va	125/250 volts dc	TK. SGR-12	1008 561 ^⑤
0-8 va	to 115 volts 60 Hertz ^⑦	RC	1008 549 ^⑤

^⑤ Denotes item available from stock.

^{①②③④⑤⑥} Standard notes, see page 3.

^⑦ For conversion from 250 volts dc, order 8 1/4" long, 160 watt, 1825 ohm potentiometer (with mounting bracket) style number 07B4865G17. Outline dimensions per DB 41-075D.



FT-1 Flexitest Switches and Test Plugs

Number of Poles		Switch Unit location (Front View)										Switch	Series Test Plug
Potential	Current	A	B	C	D	E	F	G	H	I	J	Style Number	Style Number
2 Pole													
2	0	P	P		P			P				291 B954G13	129A062G10Ⓢ
2	0											129A534G01	129A062G10Ⓢ
0	2		C	C								498A026G01	129A062G07
0	2						C	C				129A531G01	129A062G08
0	2								C	C		291B954G12	129A062G01
4 Pole													
4	0	P	P	P							P	498A022G01	129A062G10Ⓢ
4	0	P	P							P	P	129A538G01	129A062G10Ⓢ
4	0	P							P	P	P	129A506G01 Ⓢ	129A062G10Ⓢ
4	0			P	P	P	P					129A524G01	129A062G10Ⓢ
2	2	P	P						C	C		291 B956G18	129A062G01
2	2	P							C	C	P	129A507G01 Ⓢ	129A062G01
0	4		C	C	C	C						498A027G01	129A062G09
0	4						C	C	C	C		291 B956G13	129A062G02
0	4		C	C	C	C						291 B956G23Ⓢ	
5 Pole													
5	0	P	P						P	P	P	129A505G01	129A062G10Ⓢ
3	2	P	P						C	C	P	129A533G01	129A062G01
3	2	P	C	C	P	C					P	129A508G01	129A062G07
1	4		C	C							P	498A002G01	.....
0	5	C		C		C		C		C		129A555G01	.....
6 Pole													
6	0	P	P	P	P					P	P	129A550G01	129A062G10Ⓢ
6	0	P	P	P		P	P	P	P	P	P	129A504G01 Ⓢ	129A062G10Ⓢ
6	0											188A416G01	129A062G10Ⓢ
4	2	P					P	P	C	C	P	129A509G01	129A062G01
3	3	P	P						C	C	P	129A543G01	129A062G02
2	4	P						C	C	C	P	129A537G01	129A062G02
0	6	C				C	C	C	C	C	C	188A304G01	.....
0	6		C	C		C	C	C	C	C		498A014G01	.....
0	6			C		C	C	C	C	C		129A523G01	.....
0	6				C	C	C	C	C	C		129A516G01 Ⓢ	129A062G03Ⓢ
0	6				C	C	C	C	C	C		188A454G01	.....
7 Pole													
7	0	P	P	P	P			P	P	P		498A013G01	129A062G10Ⓢ
7	0	P	P	P	P				P	P	P	129A547G01	129A062G10Ⓢ
7	0		P	P	P	P	P	P	P		P	129A526G01	129A062G10Ⓢ
7	0	P	P	P	P	P	P	P	P	P		291G959G19	129A062G10Ⓢ
7	0	P	P	P	P	P	P	P	P	P	P	129A503G01	129A062G10Ⓢ
5	2	P	P	P	P	P			C	C		291 B959G18	129A062G01
5	2	P	P	P	P			C	C	P	P	129A510G01	129A062G08
5	2	P	P	C		P			P	P	P	188A261G01	129A062G07
4	3	P	P	C			C	C		P	P	188A477G01	292B319G24
3	4	P	P	P		C		C	C	C	P	498A008G01	129A062G02
3	4	P	P	P			C	C	C	C	P	129A511G01	129A062G02
3	4	P	C	C		C		C	C	P	P	188A618G01	.....

P = Potential
C = Current Non-Shorting
CC = Current Shorting
T = Red Handles



FT-1 Flexitest Switches and Test Plugs, Continued

Number of Poles		Switch Unit Location (Front View)										Switch	Series Test Plug
Potential	Current	A	B	C	D	E	F	G	H	I	J	Style Number	Style Number
8 Pole													
8	0	P	P	P	P	P			P	P	P	129A546G01	129A062G10⑤
8	0	P	P	P	P	P		P	P	P	P	129A502G01	129A062G10⑤
8	0	P	P	P	P	P	P	P	P	P	P	129A549G01	129A062G10⑤
6	2	P	P	P	P	P			C	C	P	188A632G01	129A062G01
6	2	P	P	P	P	P	C	C	P	P	P	291B960G26	129A062G08
4	4	P	P	P	P	P	C	C	C	C		129A544G01	129A062G02
4	4	P	P	P	P	C	C	C	C		P	498A016G01	.....
4	4	P	P	P	C	C	C	C		P	P	129A530G01	129A062G12
4	4	P	P	P	C	C	C	P	C	C	P	129A512G01⑤	129A062G06
4	4	P	C	C	P	P	C	C	C	C	P	629A315G01	129A062G02
2	6		C	C	C	C	C	C	P	P	P	129A525G01	129A062G09
2	6		C	C	C	C	C	C	P	P	P	129A521G01	129A062G09
1	7	P	C	C	C	C	C	C	C	C		498A019G01	292B319G22
0	8	C	C	C	C	C	C	C	C	C	C	188A229G01	.....
0	8		C	C	C	C	C	C	C	C	C	498A004G01	.....
0	8		C	C	C	C	C	C	C	C	C	129A517G01⑤	292B319G22
9 Pole													
9	0	P	P	P	P	P	P	P	P	P	P	129A551G01	129A062G10⑤
9	0	P	P	P	P	P	P	P	P	P	P	129A548G01	129A062G10⑤
6	3	P	P	P	P	P		C	C	C	P	629A483G01	.....
5	4	P	P	P	P	P	C	C	C	C	C	129A545G01	129A062G02
5	4	P	P	P	P	P	C	C	C	C	P	188A633G01	129A062G02
3	6	P	P	P	P	P	C	C	C	C	P	129A515G01⑤	129A062G03⑤
0	9	C	C	C	C	C	C	C	C	C	C	498A021G01	.....
10 Pole													
10	0	T	T	T	T	T	T	T	T	T	T	129A539G01⑤	.....
10	0	P	P	P	P	P	P	P	P	P	P	129A501G01⑤	129A062G10⑤
9	1	C	P	P	P	P	P	P	P	P	P	498A011G01	.....
8	2	P	P	P	P	P	P	P	P	C	C	129A542G01⑤	129A062G01
7	3	P	P	P	P	P	P	P	C	C	P	129A553G01	.....
6	4	P	P	P	P	P	P	C	C	C	P	129A532G01	129A062G02
6	4	P	P	P	P	P	P	P	C	C	P	129A520G01	129A062G05
6	4	P	P	P	P	P	P	P	C	C	P	129A513G01	129A062G06
6	4	C	C	C	C	P	P	P	P	P	P	498A015G01	.....
4	6	P	P	P	C	C	C	C	C	C	P	129A514G01⑤	292B319G23⑤
4	6	P	P	P	C	C	C	C	C	C	P	129A528G01⑤	.....
3	7	P	P	P	C	C	C	C	C	C	P	129A535G01⑤	292B319G22
2	8	P	P	C	C	C	C	C	C	C	P	129A519G01	.....
2	8	P	P	C	C	C	C	C	C	C	P	129A518G01⑤	292B319G22
2	8	C	C	C	C	C	C	C	C	P	P	837A407G01	.....
2	8	C	C	C	C	C	C	C	C	P	P	837A101G01	.....
1	9	C	C	C	C	C	C	C	C	C	P	129A541G01	.....
0	10	C	C	C	C	C	C	C	C	C	C	129A529G01	.....
0	10	C	C	C	C	C	C	C	C	C	C	498A020G01	.....

Devices

Description	Style Number	
Ten circuit test plug, for tests using separate supply source	1164 046⑤	
Individual current circuit test plug, for test of one current circuit	07B4618G04⑤	
Interlock bar: For 2 adjacent switch units	1270 547⑤	
For 3 adjacent switch units	1164 048	
For 4 adjacent switch units	02C9834G03	Price from PEG 120
For 5 adjacent switch units	02C9834G04	
For 6 adjacent switch units	02C9834G06	
For 10 adjacent switch units	02C9834G05⑤	

T = Red Handles
P = Potential
C = Current Non-Shorting
CC = Current Shorting



SPP Surge Protective Package
with Terminal Block

Type Terminal Capacitor Number

Type	Ter- minal Block	Capac- itor	No. Capac- tors	Scheme	Style
SPP	12 PT	.5 mfd.	2	3488A09	6299D27G01
			4	3488A10	6299D27G02
			750 V	3488A11	6299D27G03
			RMS		
			Cont.	3	3512A23 6299D27G08
			No	3527A63	6299D27G09
			PCB's		
			6		

SPP Surge Protective Package
For 19 Inch Rack Mounting

Type	Capacitor	Number	Scheme	Style
		Capacitors		
SPP	.5 mfd	6	4805D91	644B578A09
		7		644B578A10
		8		644B578A11
		750 V		644B578A12
		RMS		644B578A13
		Cont.		644B578A14
		10		644B578A15
		11		644B578A16
		No		644B578A17
		PCB's		644B578A18
		13		644B578A19
		14		644B578A20
		15		644B578A21
		16		644B578A22
		17		644B578A23
		18		644B578A24
		19		644B578A25
		20		644B578A26
		21		644B578A27
		22		644B578A28
		23		644B578A29
		24		644B578A30
		25		644B578A31
		26		
		27		
		28		



August, 1985
Supersedes TD 41-020, pages 161-164,
dated May, 1984

Mailed to: E, D, C/41-100A

Protective Relays 41-900: Pilot Wire

Phase and Ground Pilot Wire Relay Schemes®

Type	Application	Time Delay On Tripping		Indicating Contactor Switch ③	Complete Set: For 3-Phase Protection Per Line Terminal	Relay Data		
		Time	Volts dc			Internal Schematic	Style Number	Case Size
HCB	2 or 3 terminal lines, 4-15 amp, 60 Hz	Inst.	...	0.2/2.0 amps dc	1 HCB spst-cc 1 HCB dpst-cc 1 HCB dpdt	629A310 629A312 764A236	292B930A10 292B930A13 292B930A16	FT-42
HCB-1	2 or 3 terminal lines, 4-12 amps	Inst.	...	0.2/2.0 amps dc	1 HCB-1 spst-cc dpst-cc	763A227 763A628	292B930A29 292B930A30	FT-42
HCB-2	2 or 3 terminal lines, 4-15 amps	.05-.4 second 0.5-1 second	48/125 48/125		1 HCB-2 spst-cc spst-cc	837A364	292B930A22 292B930A23	
HCB-3		35-50 milliseconds	125		1 HCB-3 spst-cc	848A627	292B930A33	
1 insulating transformer 1 W-2 switch 1 milliammeter						external devices included in price		

- ③ (a) Order each item by style number from "Auxiliaries" table.
(b) Required for 3-phase line terminal:
1 HCB or HCB-1, 2, or 3 type relay.
1 insulating transformer
1 type W-2 switch
1 milliammeter

Order all HCB type relays and auxiliaries on N-1 order with separate item for each style.

Auxiliaries for HCB and HCB-1, 2, 3 Schemes

Description	Panel Thickness	Style Number
Insulating transformer, 50 or 60 Hertz	4/1 6/1	7882A26G07 7882A26G08
W-2 switch	1/4" 1 1/2" 2 1/4"	508A468G01 ⑤ 508A468G02 ⑤ 508A468G03
RC-351 milliammeter, flush mounting case (60 Hertz ac, 0-5, 0-25 mA)	1/4" 2"	291B318A09 ⑥ 1964 364 ⑥

⑤ Style number includes auxiliary transformer style number 291B606G09.⑤

Note: A special pilot wire monitoring, weatherproof cabinet is available that includes mounted and wired insulating transformer neutralizing transformer with KX-642 tube and socket, special PMA or PM-2 relay, 1 MFD. capacitor (6000VDC), 5KV porcelain insulator, 2 PDT toggle switch, 4PST toggle switch, terminal block, 60W resistor heater, and duplex receptical. Contact Distribution Equipment Division, Visalia, California for further information and price. Refer to Westinghouse drawing 5460J55.

Instantaneous Overcurrent, Second Harmonic Restraint (0.2/2.0 Amps dc ICS®)

Type	Contacts	Applications Harmonic Restraint Supervision	Sensitivity	IIT	Relay Data Internal Schematic	Style Number	Case Size
HRU	Spst-cc	3-phase	.87 amps	(3 units) 20-80 amps	877A194	670B109A12	FT-31
	Spst-cc	1-phase	.87 amps .87 amps .87 amps 2.0 amps 4.0 amps	(1 unit) 1-4 amps 1-4 amps 20-80 amps 1-4 amps 4-16 amps	187A512 ⑦ 861A783 ⑧ 861A783 ⑧ 187A512 ⑦ 187A512 ⑦	292B024A11 292B024A16 292B024A12 292B024A10 292B024A09	FT-21

- ⑤ Denotes item available from stock.
① ② ③ ④ ⑤ Standard notes, see page 3.
⑦ HRU and IIT contacts are in series.
⑧ HRU and IIT contacts are in parallel.



Pilot Wire Monitoring, For Detection of Pilot Wire Faults

Type	Application (Detection of Pilot Wire Faults)	Rating: Volts Monitoring		Remote Trip: dc	Number of Line Terminals	Relay Data		Case Size
		Ac ^⑦	dc			Internal Schematic	Style Number	
PMA ⑩	Shorted, open, reversed, grounded	120			2 3	184A500 187A191	290B101A09 290B101A10	FT-31
PMA-1 ⑩	Shorted, open, reversed	120			2 3	184A514 187A192	290B101A17 290B101A18	FT-21
PMD ⑩	Shorted, open, reversed, grounded	...	48/125 250		2 2	184A497	290B110A09 ^⑤ 290B110A10	FT-21
		...	48/125 250	.....	3 3	184A583	290B110A12 290B110A13	
		...	48 125 250	.....	2 2 2	3490A61	290B110A14 290B110A15 290B110A16	
		...	48 125 250	.....	3 3 3	3490A62	290B110A17 290B110A18 290B110A19	
	Shorted, open reversed, grounded w/telephone relay	...	48/125 250		2 2	184A498	290B111A09 ^⑤ 290B111A10	FT-11
		...	48/125 250	.....	3 3	184A582	290B111A12 290B111A13	
		...	48/125 250	.....	2 2	184A512	290B118A09 290B118A10 290B118A17 290B118A18	
		...	48/125 250	.....	3 3	184A650	290B119A09 290B119A10 290B119A17 290B119A18	
PMG-13 ⑩	Shorted, open, reversed, grounded, remote trip	120		48/125 ^⑧ 250 ^⑧	2 2	184A513	290B112A09 290B112A10 290B112A17 290B112A18	FT-32
		120	.....	48/125 ^⑧ 250 ^⑧	3 3	184A499	290B113A09 ^⑤ 290B113A10	
		120	.....	48/125 ^⑧ 250 ^⑧	2 2	184A658	290B113A17 290B113A18	
		120	.....	48/125 ^⑧ 250 ^⑧	3 3	3490A59	290B113A11 290B113A12 290B113A13	
	Shorted, open, reversed, grounded, remote trip w/telephone relay	...	48/125 250	48/125 ^⑧ 250 ^⑧	2 2	3490A60	290B113A19 290B113A20 290B113A21	FT-21
		...	48 125 250	48 ^⑧ 125 ^⑧ 250 ^⑧	3 3 3	184A501	290B109A09	
		...	48 125 250	48 ^⑧ 125 ^⑧ 250 ^⑧	2 or 3	184A489	290B115A17 ^⑤	
		...	2.0 mA	.....	2 or 3	184A798	290B116A09	
		...	⑨	.....	2 or 3	187A874	290B114A25 ^⑤	
		...	.....	.....	2 or 3	188A439	292B716A09	

Flexitest Case Type

Type	Application	Rating mA dc ⑨	Number of Line Terminals	Relay Data		
				Internal Schematic	Style Number	Case Size
PM-43 ⑩	Remote trip, adjustment of dc mA monitoring	1.0	2 or 3	188A439	292B716A09	FT-21

Pilot Wire, Dc Current Limit Unit Small Molded Base Type

Type	Application	Rating: mA dc	Relay Data Internal Schematic	Style Number		
				Solid Cover	Glass Window Cover	Projection
PM-4 ⑩	Current limit adjuster	1.0	2D1845	290B117A09	290B117A10	290B117A11

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.

⑦ 60 Hertz.

⑧ PM-13 and PMG-13 have internal resistor for remote trip applications.

⑨ Pickup is 1.0 mA dc for detection of open, shorted, or reversed pilot wires. Pickup for remote trip function is 2.0 mA dc.

⑩ Style number includes one 10 mfd external capacitor style number 289B493H01^⑤ (dc and 60 Hertz applications).

**Neutralizing Reactors and Capacitors – 50/60 Hz**

Description	Rating	Number Per Set ^⑦	Internal Schematic	Outline Drawing	Style Number
Reactor; with KX-642 tube and socket	4000 v	1	6D1260	815A659	7882A27G03 ^⑤
without KX-642 tube and socket		1			7882A27G01 ^⑤
Capacitor; for use with above reactors	1 mfd	2	.....	.....	949 122 ^⑤ (Included in reactor price) ^⑥

Mutual Drainage Reactor For 50 & 60 Hz

Description	Internal Schematic	Outline Drawing	Style Number
Mutual drainage reactor with KX-642 tube and socket	253A180	815A568	7882A28G03 ^⑤

Pilot Wire Auxiliary Equipment**Remote Trip Resistors**

Number of Line Terminals		Remote Trip Voltage: dc	Resistor Value in Ohms for Relay Types Located as Shown Below				To Operate Trip Contacts of Relay Type:	Style Number of Resistor Assembly ⑩
		PMA or PMA-1	PMD or PMD-1	PMG-13 or PM-13 (ac or dc Supply)	PM-23 or Combination of PM-3 with PM-2 and/or PM-4			
		Station A			Station B	Station C		
2	48	200	200	....	None required	None required	PM-3 or PM-23	288B898G32
	125	3550	3550	....				288B898G26
	250	9300	9300	....				288B898G27
	48	....	....	200⑧	200	....	PM-3, PM-13, PM-23, PMG-13	288B898G32
	125	....	....	2120⑧	2120	....		288B898G30
	250	....	....	5600⑧	5600	....		288B898G22
3	48	200	....	....	None required	None required	PM-3 or PM-23	288B898G32
	125	2000	....	....				288B898G24
	250	5000	....	....				1878169
	48	....	200	....				288B898G32
	125	....	2000	....				288B898G24
	250	....	5600	....				288B898G22
	48	....	....	200⑧	200	200	PM-3, PM-13, PM-23, PMG-13	288B898G32
	125	....	....	1500⑧	1500	1500		288B898G31
	250	....	....	4000⑧	4000	4000		288B898G25

Carrier Auxiliary Relays

Type	Application	Amps	Volts dc	Contactor Switch	Relay Data		
					Internal Schematic	Style Number	Case Size
KA-1	K-Dar overreaching transfer trip ^⑩	0.5-2.0	48/125	None	184A238	289B860A10	FT-32
		0.5-2.0	48/250			289B860A11	
		1-4	48/125			289B860A18	
		1-4	48/250			289B860A19	
KA-4	K-Dar directional comparison blocking for use with KR carrier ^⑩	0.5	48	.112 amp, 27 ohm	629A389	293B237A09	
		0.5	125	.112 amp, 27 ohm		293B237A10 ^⑤	
		0.5	250	.028 amp, 435 ohm		293B237A11	
	K-Dar directional comparison blocking for use with TC carrier ^⑩	0.5	48	.112 amp, 27 ohm	629A476	293B237A29	
		0.5	125	.112 amp, 27 ohm		293B237A30 ^⑤	
		0.5	250	.028 amp, 435 ohm		293B237A31	
		0.5	48	.112 amp, 27 ohm	3511A91	6704D83A01	
		0.5	125	.112 amp, 27 ohm		6704D83A02	
	K-Dar directional comparison blocking for use with KR or TC carrier	0.5	125	None	862A354	293B237A15	
	for use with TA-3 tones	0.5	48	None	3493A16	715B043A23	FT-32
		0.5	125	None		715B043A24	
		0.5	250	None		715B043A25	

Pilot Wire Auxiliary Equipment**Balancing Resistor, For 3-Terminal Lines**

Rating: Ohms	Outline Drawing	Style Number
0-31.5	880A797	290B664G65 (Price from PEG 120)

Note: A special pilot wire monitoring, weatherproof cabinet is available that includes mounted and wired insulating transformer, neutralizing transformer with KX-642 tube and socket, special PMA or PM-2 relay, 1 MFD. capacitor (6000Vdc), 5KV porcelain insulator, 2PDT toggle switch, 4PST toggle switch, terminal block, 60W resistor heater, and duplex receptical. Contact Distribution Equipment Division, Visalia, California. Plant for further information and price. Refer to Westinghouse drawing 5460J55.

^⑤ Denotes item available from stock.

^① ^② ^③ ^④ ^⑤ ^⑥ Standard notes, see page 3.

^⑦ Set includes 1 reactor and 2 capacitors. Specify each item separately by style number on order.

^⑧ No reduction in price for omission of capacitors.

^⑨ 1 amp operation indicator.

^⑩ Style number includes 2 resistors assembled on one mounting bracket. One assembly required per station. Price from PEG 120.

^⑪ Mounted internally in relay case.



Pilot System Auxiliary Relays

Type	Application	Volts dc	Indicating Contactor Switch Amps dc	Relay Data		Case Size
				Internal Schematic	Style Number	
TT-8	K-Dar overreaching transfer trip	125	1	185A322	290B673A10	FT-21
TT-9	Tone monitoring for single and dual channel transfer trip system	48/125	1	187A327	290B674A21	FT-11
		250	1	187A327	290B674A22	
		48/125	0.2/2.0	188A692	290B674A25	
		250	0.2/2.0	188A692	290B674A28	
TT-12	Transfer trip universal channel auxiliary	48	1	879A973	717B689A09	FT-22
		125⑤	1	879A974	717B689A10⑤	
		125⑤	0.2/2.0	879A974	717B689A12	
		250⑤	1	879A974	717B689A11	
TT-16	K-Dar overreaching transfer trip	48	1	879A975	717B689A17	FT-22
		125⑤	1	879A976	717B689A18	
		250⑤	1	879A976	717B689A19	
TT-17	K-Dar underreaching transfer trip	48	0.2/2.0	876A127	292B492A15	FT-22
		125	0.2/2.0		292B492A16	
		250	0.2/2.0		292B492A17	
TT-18	K-Dar single-pole trip system-interlocking auxiliary	125	None	3491A60	292B620A15	FT-22
		250		876A739	292B620A13	
TT-19	K-Dar single-pole trip system-potential switching auxiliary	48	None	188A345	292B622A09	FT-22
		125		188A345	292B622A10	
		250		862A289	292B622A11	
TT-21	K-Dar/TCF overreaching transfer trip	125	1	837A793	670B414A09	FT-11
		250	1	837A793	670B414A25	
		125	0.2/2.0	837A811	670B414A10	
		250	0.2/2.0	837A811	670B414A26	

Note: When requiring styles and ordering information for TT-1 relays, contact local Westinghouse Sales Office.

Solid State Auxiliary Relays, For Use With EM Distribution Relays Only

Type	Application	Transient Blocking Time	Volts dc	Line Terminals	Logic Drawing	Style Number ⑨	Case Size
STU Strong Feed	⑤ Directional Comparison Unblocking with TCF-10 Carrier or DIT-1 tones over SSB	18 ms	48	2 3	5492D16 5492D16	202C668A32 202C668A33	19" rack mounted 3 rack units
			125	2 3	5492D16 5492D16	202C668A44 202C668A45	
		25 ms	48	2 3	5492D16 5492D16	202C762A32 202C762A33	
			125	2 3	5492D16 5492D16	202C762A44 202C762A45	
			48	2 3	6263D39 6263D39	204C003A32 204C003A33	
			125	2 3	6263D39 6263D39	204C003A44 204C003A45	
STU Weak Feed	⑤ Directional Comparison Permissive Overreaching Transfer Trip- using DIT-1 audio tones	18 ms	48	2 3	5492D22 5492D22	202C659A32 202C659A33	19" rack mounting 3 rack units
			125	2 3	5492D22 5492D22	202C659A44 202C659A45	
		25 ms	48	2 3	5492D22 5492D22	203C136A32 203C136A33	
			125	2 3	5492D22 5492D22	203C136A44 203C136A45	
			48	2 3	6263D45 6263D45	204C007A32 204C007A33	
			125	2 3	6263D45 6263D45	204C007A44 204C007A45	
STU-12 Weak Feed	⑤ Directional Comparison Permissive Overreaching Transfer Trip- using DIT-1 audio tones	18 ms	48	2 3	5492D22 5492D22	202C659A32 202C659A33	19" rack mounting 3 rack units
			125	2 3	5492D22 5492D22	202C659A44 202C659A45	
		25 ms	48	2 3	5492D22 5492D22	203C136A32 203C136A33	
			125	2 3	5492D22 5492D22	203C136A44 203C136A45	
			48	2 3	6263D45 6263D45	204C013A32 204C013A33	
			125	2 3	6263D45 6263D45	204C013A44 204C013A45	

- ⑤ Changed or added since previous issue.
 ⑤ Denotes item available from stock.
 ① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.
 ⑥ External resistor supplied.
 ⑦ Price includes harness assembly which is required when the relay is sold loose and unmounted. Enter harness as separate item.



October, 1986
Supersedes TD 41-020, pages 129-144
dated August, 1986

Mailed to: E, D, C/41-100A

Protective Relays 41-700: General and Specific Purpose

Indicators

Type	Application	Operation Indicators		Rating, Amps	Relay Data		Case Size
		Units Per Case	Wiring Arrangement		Internal Schematic	Style Number	
JL ②	Lockout (125 volts dc)	4	.....	0.1 dc	182A983	1876 025⑧	FT-21
				0.03 dc	184A012	1961 413⑨	
	250 volts dc	4	.....	0.1 dc	182A983	288B807A12⑧	
	125 volts dc	4	.....	0.2 dc	182A983	288B807A13⑧	
	230 volts ac	4	.....	0.1 ac/dc	182A983	1956 868⑧	
	440 volts ac	4	.....	0.3 ac/dc	185A511	1962 749⑧	
JM ②	Circuit operation indicator	1	.....	0.2 dc	183A042	1727 521	Small glass proj.(rear conn.)
		1	.....	1.0 dc		1727 522	
		6	6 per group, one side common, 7 terminals	0.2 dc 1.0 dc 2.0 dc	183A011	1876 026 1878 872 1878 873	FT-11
			3 groups of 2 units each, 9 terminals	0.2 dc 1.0 dc 2.0 dc	183A461	1955 593⑤ 1956 069 1956 070	
	Peak current indicator	6	Series wired, 2 terminals	3-30 ac 5-25 ac 5-50 ac	183A012	1876 028 1876 029 1876 030	FT-11

Generator

Loss of Field, Three Phase

Type	Indicating Contactor Switch ③	Rating			Range: Ohms		Relay Data		Case Size
		Volts Ac	Volts Dc	Amps Ac	Long Reach	Short Reach	Internal Schematic	Style Number	
KLF ②	0.2/2.0 amp dc	120⑩	48	5	2.08-56.0	0.79-18.0	184A958	290B481A13 290B481A09⑤ 290B481A10	FT-41
			125 250					629A834 290B481A14⑩ 290B481A15⑩	
KLF-1 ②		Volts Ac V _{LN} 69 V _{LN} ⑪	48				187A724	292B333A09 292B333A10 292B333A11	
			125 250					762A612 292B333A15⑩ 292B333A16⑩	
		120 V _{LN} ⑪	125 250				187A725	1957 946 1957 947	

Generator or Transformer

Over Excitation, Volts per Hertz, Three Phase, 50/60 Hz

Type	Contacts	Settings				Ratings Dc Volts	Internal Schematic	Style Number	Case Size
		Voltage Range Ac Volts	Frequency Range Hertz	Minimum Trip Time Seconds	Adj. Pickup Range % of V/Hz				
MVH	Dpst-cc	90-120	12.5-90	3.0/6.0	105-120	125	9644A52	1351D76A01	FT-22

⑤ Denotes item available from stock.
① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.
⑧ Intermittently rated.
⑨ Continuously rated.

⑩ Delta or open-delta connected potential transformer
secondaries.
⑪ Wye connected potential transformer secondaries.
⑫ Undervoltage contact shorted out.

⑬ Changed or added since previous issue.



Field Ground Detection

Type	Relay Scale	Field Voltage: Volts Dc	Relay Data		
			Internal Schematic	Style Number	Case Size
DGF ⑩	Center zero .75-0-.75 mA dc	80	183A113	288B857A14	FT-21
		125		1876 039⑤	
		160		288B857A13	
		250		1878 175	
		375		1878 176	
		440		288B857A17	
		500		1961 087	
		600		288B857A16⑬	

Auxiliary, Ac Voltage, or Dc Voltage or Current Non-Adjustable Pickup, Double Pole, Flexitest Case

Type	Contacts	Frequency: Hertz	Rating	Relay Data			Double Unit		
				Single Unit Internal Schematic	Style Number	Case Size	Internal Schematic	Style Number	Case Size
SG Current or voltage	Dpdt	Dc	1 amp dc	183A340	1878 755	FT-11	3514A07	1955 556	FT-22
			2 amps dc		1878 756			1955 557	
			3 amps dc		1878 757			1955 558	
			4 amps dc		1878 758			1956 447	
			5 amps dc		1878 759			1955 449	
Self- reset			6 volts dc	183A108	1878 760		183A457	1955 560	
			12 volts dc		1878 761			1955 561	
			24 volts dc		1878 762			1955 562	
			32 volts dc		1878 763			1955 563	
			48 volts dc		1878 764			1955 564	
			62.5 volts dc		1878 765			1955 565	
			125 volts dc		1878 766⑤			1955 566⑤	
			250 volts dc		1878 767			1955 567	
		50/60	12 volts ac	183A108	1878 768		183A457	1955 568	
			24 volts ac		1878 769			1955 569	
			90 volts ac		1878 770			1955 570	
			115 volts ac		1878 771			1955 571	
			208 volts ac		1878 772			1955 572	
			230 volts ac		1878 773			1955 573	
			275 volts ac		1878 774			1955 574	
			460 volts ac		1878 775			1955 575	
			575 volts ac		1878 776			1955 576	

Non-Adjustable Pickup, Double Pole, Molded Case

Type	Contacts	Frequency: Hertz	Rating	Relay Data			
				Internal Schematic	Solid Projection Cover Style Number	Projection Glass Window Cover Style Number	Semi-Flush Glass Window Cover
Rear Connected							
SG Current or voltage	Dpdt: 2 cc and 2 co	Dc	1 amp dc	1D2102	1157 848	1162 959	1342 932
			2 amps dc		1729 023	1729 024	1729 025
			3 amps dc		1157 849	1162 960	1342 933
			4 amps dc		1956 249	1956 253	1956 257
			5 amps dc		1157 850	1162 961	1342 934
Self- reset			6 volts dc		1343 116	1340 082	1343 117
			12 volts dc		1155 686	1162 949	1343 118
			24 volts dc		1155 687	1162 950	1342 923 ^⑤
			32 volts dc		1729 011	1729 012	1729 013
			48 volts dc		1155 688	1162 951	1342 924 ^⑤
			62.5 volts dc		1729 017	1729 018	1729 019
			125 volts dc		1155 689 ^⑤	1162 952	1342 925 ^⑤
			250 volts dc		1343 088	1343 089	1343 090
		50/60	12 volts ac		1956 250	1956 254	1956 258
			24 volts ac		1878 284	1878 285	1878 286
			90 volts ac		1956 251	1956 255	1956 259
			115 volts ac		1155 693	1162 956	1342 929 ^⑤
			208 volts ac		1726 053	1726 054	1726 005
			230 volts ac		1155 694	1162 957	1342 930 ^⑤
			275 volts ac		1956 252	1956 256	1956 260
			460 volts ac		1155 695	1162 958	1342 931
			575 volts ac		1725 778	1725 799	1725 780

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑩ Has two self-contained resistors; one a varistor (non-linear).

⑬ Includes external resistor.

**Auxiliary, Ac Voltage, or Dc Voltage or Current**

Non-Adjustable Pickup, Double Pole, Molded Base Without Cover (Open Type)

Type	Contacts	Frequency: Hertz	Rating	Relay Data	
				Without Cover	Style Number
Front Connected					
SG Current or voltage Self- reset	Dpst-2 cc	Dc	1 amp dc	57D389	1157 852
			2 amps dc		1729 026
			3 amps dc		1157 853
			4 amps dc		1956 261
			5 amps dc		1157 854
			6 volts dc		1338 226
			12 volts dc		1059 230
			24 volts dc		1059 231
			32 volts dc		1729 014
			48 volts dc		1008 534
			62.5 volts dc		1729 020
		125 volts dc	1008 535⑤		
		250 volts dc	1337 424⑤		
		50/60	12 volts ac	1163 654	
			24 volts ac	1337 364	
			90 volts ac	1537 212	
			115 volts ac	1008 539⑤	
			208 volts ac	1726 056	
			230 volts ac	1008 540	
275 volts ac	1003 884				
460 volts ac	1008 541⑤				
575 volts ac	1544 302				

Non-Adjustable Pickup, Double Pole, Molded Base, With and Without Cover

Type	Contacts	Frequency: Hertz	Rating	Relay Data			
				Without Cover (Open Type)		Solid Cover & Base (Front Conn.)	
				Internal Schematic	Style Number	Internal Schematic	Style Number
Front Connected							
SG	Dpdt-2 cc and 2 co	Dc	1 amp dc	57D390	1875 946	629A337	293B254A09
			2 amps dc		1729 027		293B254A10
Current or voltage			3 amps dc		1875 947		293B254A11
			4 amps dc		1956 245		293B254A12
			5 amps dc		1875 948		293B254A13
Self- reset			6 volts dc		1340 727		293B254A14
			12 volts dc		1205 619		293B254A15
			24 volts dc		1205 620 [Ⓢ]		293B254A16 [Ⓢ]
			32 volts dc		1729 015		293B254A17
			48 volts dc		1205 612 [Ⓢ]		293B254A18 [Ⓢ]
			62.5 volts dc		1729 021		293B254A19
			125 volts dc		1161 540 [Ⓢ]		293B254A20 [Ⓢ]
			250 volts dc		1210 936 [Ⓢ]		293B254A21 [Ⓢ]
	50/60		12 volts ac		1956 246		293B254A22
			24 volts ac		1878 282		293B254A23
			90 volts ac		1956 247		293B254A25
			115 volts ac		1205 616 [Ⓢ]		293B254A26 [Ⓢ]
			208 volts ac		1726 057		293B254A27
			230 volts ac		1205 617 [Ⓢ]		293B254A28
			275 volts ac		1956 248		293B254A29
			460 volts ac		1205 618 [Ⓢ]		293B254A30
			575 volts ac		1725 781		293B254A31

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.



Auxiliary, Ac Voltage, or Dc Voltage or Current

Non-Adjustable Pickup, Double Pole, Molded Base, With Glass Window Cover

Type	Contacts	Frequency: Hertz	Rating	Relay Data	
				With Glass Window Cover	
				Internal Schematic	Style Number
Front Connected					
SG Current or voltage Self-reset	Dpdt-2 cc and 2 co	Dc	1 amp dc	629A337	293B255A09
			2 amps dc		293B255A10
			3 amps dc		293B255A11
			4 amps dc		293B255A12
			5 amps dc		293B255A13
			6 volts dc		293B255A14
			12 volts dc		293B255A15
			24 volts dc		293B255A16
			32 volts dc		293B255A17
			48 volts dc		293B255A18
	50/60		62.5 volts dc	293B255A19	
			125 volts dc	293B255A20	
			250 volts dc	293B255A21	
			12 volts ac	293B255A22	
			24 volts ac	293B255A23	
			90 volts ac	293B255A25	
			115 volts ac	293B255A26	
			208 volts ac	293B255A27	
			230 volts ac	293B255A28	
			275 volts ac	293B255A29	
			460 volts ac	293B255A30	
			575 volts ac	293B255A31	

Auxiliary Dc Voltage or Current, Non-Adjustable Pick-up, With Copper Slug

For Time Delay Dropout, Intermittent Duty, Dc Operated

Type	Contacts	Rating	Relay Data					
			Molded Base With Solid Cover Projection Mounting		Molded Base With Glass Window Cover: Semi-Flush Mounting			
			Internal Schematic	Style Number	Internal Schematic	Style Number		
Rear Connected								
SG Self- reset	Dpdt: 2 cc and 2 co	1 amp dc	182A903	1961 590	1D2102	1961 593		
		3 amps dc		1961 591		1961 594		
		5 amps dc		1961 592		1961 595		
		24 volts dc	1961 578	1961 582				
		48 volts dc	1961 579	1961 583				
		125 volts dc	1961 580	1961 584				
		250 volts dc	1961 581	1961 585				
Type	Contacts	Relay Data	Molded Base Without Cover		Molded Base With Solid Cover		Molded Base With Glass Window Cover	
			Internal Schematic	Style Number	Internal Schematic	Style Number	Internal Schematic	Style Number
			Front Connected					
SG Self- reset	Dpdt: 2 cc and 2 co	1 amp dc	57D390	1961 596	629A337	293B257A09	629A337	293B256A09
		3 amps dc		1961 597		293B257A11		293B256A11
		5 amps dc		1961 598		293B257A12		293B256A12
		24 volts dc	1961 586	293B257A17	293B256A17			
		48 volts dc	1961 587	293B257A18	293B256A18			
		125 volts dc	1961 588	293B257A19	293B256A19			
		250 volts dc	1961 589	293B257A20	293B256A20			

⑤ Denotes item available from stock.
①②③④⑤⑥ Standard notes, see page 3.

**Auxiliary, Ac Voltage, or Dc Voltage or Current****6-Pole, Non-Adjustable Pickup, Flexitest Case Type**

Type	Reset	Contacts	Frequency, Hertz	Rating		Relay Data							
				Volts	Amps	Internal Schematic	Style Number	Case Size					
MG-6 ②③ Current or voltage	Self ⑩	Six cc	Dc	...	1	183A223	288B977A09	FT-22					
				...	2		288B997A10						
				...	3		288B977A11						
				...	4		288B977A31						
				...	5		288B977A12						
				6	...		288B977A13						
				12	...		288B977A14						
				24	...		288B977A15						
				32	...		288B977A16						
				48	...		288B977A17						
				62.5	...		288B977A18						
				125	...		288B977A19 ^⑤						
				250	...		288B977A20						
			60	115	...		288B977A21 ^⑤						
				208	...		288B977A22						
				230	...		288B977A23						
				460	...		288B977A24						
				575	...		288B977A25						
				Electric and hand ⑦⑨ ⑩	Six cc		Dc		6	...	183A222	288B978A09	FT-22
									12	...		288B978A10	
24	...	288B978A11											
32	...	288B978A12											
48	...	288B978A13											
62.5	...	288B978A14											
125	...	288B978A15											
250	...	288B978A16											
60	115	...	288B978A17										
	208	...	288B978A18										
	230	...	288B978A19										
	460	...	288B978A20										
	575	...	288B978A21										
Six cc with operating coil cutoff contact	60	Dc	24	...		289B364A09	FT-22						
			48	...		289B364A10							
			125	...		289B364A11							
			250	...		289B364A12							
			115	...		289B364A13							
			208	...		289B364A14							
			230	...		289B364A15							
			460	...		289B364A16							
			575	...		289B364A17							

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑦ For extremely fast pickup on 125 volt dc control circuits, MG-6 relays are available using 24 volt dc operating and 125 volt dc reset coils, with or without operating coil cutoff contact.

Relay with operating coil cutoff contact – style number 1962 113.

Relay without operating coil cutoff contact – style number 1961 333.

Relay with operating coil cutoff contact (molded base, glass window, semi-flush mtg. – style no. 1961 640)

⑧ See page 134 for external series resistors and sheet metal cabinets.

⑨ Different combinations of the operating coil and reset coil ratings can be supplied. Choose from the standard ratings listed. Use standard price. Order similar to style number of relay with identical operating coil ratings, except with reset coil rating.

⑩ Reset coil voltage rating is for 30 second energization.



Auxiliary, Ac Voltage, or Dc Voltage or Current
6-Pole, Non-Adjustable Pickup, Molded Base Type

Type	Reset	Contacts	Frequency: Hertz	Rating		Relay Data Internal Schematic	Molded Base with Glass Window Cover		Molded Base without Cover (Front Connected) Style Number		
				Volts	Amps		Style Number				
							Projection	Semi-Flush			
MG-6 ② Current or voltage	Self	Six cc	Dc	...	1	4D1072	289B359A09	289B360A09	1163 792		
				...	2		289B359A10	289B360A10	1956 264		
				...	3		289B359A11	289B360A11	1163 793		
				...	4		289B359A12	289B360A12	1956 992		
				...	5		289B359A13	289B360A13	1163 794		
				6	...		289B359A14	289B360A14	1163 795		
				12	...		289B359A15	289B360A15	1163 796		
				24	...		289B359A16	289B360A16 ^⑤	1163 797 ^⑤		
				32	...		289B359A17	289B360A17	1163 798		
				48	...		289B359A18	289B360A18 ^⑤	1163 799		
				62.5	...		289B359A19	289B360A19	1163 800		
				125	...		289B359A20 ^⑤	289B360A20 ^⑤	1163 801 ^⑤		
				250	...		289B359A21	289B360A21	1163 802		
			60	115	...		289B359A22 ^⑤	289B360A22 ^⑤	1163 803 ^⑤		
				208	...		289B359A23	289B360A23	1544 277		
				230	...		289B359A24	289B360A24 ^⑤	1163 804		
				460	...		289B359A25	289B360A25	1163 805		
				575	...		289B359A26	289B360A26	1163 806		
		Electric and hand	Six cc	Dc	6	...	4D1076	289B361A09	289B362A09	1163 822	
					12	...		289B361A10	289B362A10	1163 823	
					24	...		289B361A11	289B362A11	1163 824	
					32	...		289B361A12	289B362A12	1163 825	
					48	...		289B361A13	289B362A13	1163 826	
					62.5	...		289B361A14	289B362A14	1163 827	
					125	...		289B361A15 ^⑤	289B362A15 ^⑤	1163 828 ^⑤	
					250	...		289B361A16	289B362A16	1163 829	
					60	115		...	289B361A17	289B362A17	1163 830 ^⑤
						208		...	289B361A18	289B362A18	1544 278
						230		...	289B361A19	289B362A19 ^⑤	1163 831
						460		...	289B361A20	289B362A20	1163 832
						575		...	289B361A21	289B362A21	1163 833
			Operating and reset coils have same rating ⑦	Six cc	Dc	24	...		289B473A09	289B473A20	289B363A09
						48	...		289B473A10	289B473A21 ^⑤	289B363A10
						125	...		289B473A11 ^⑤	289B473A22 ^⑤	289B363A11 ^⑤
						250	...		289B473A12	289B473A23	289B363A12
						60	115		...	289B473A13	289B473A24	289B363A13
		208					...		289B473A14	289B473A25	289B363A14
		230		...	289B473A15		289B473A26		289B363A15		
		460		...	289B473A16		289B473A27		289B363A16		
		575		...	289B473A17		289B473A28		289B363A17		
with operating coil cutoff contact	60	115		...	289B473A13		289B473A24		289B363A13		
		208		...	289B473A14	289B473A25	289B363A14				
		230		...	289B473A15	289B473A26	289B363A15				
		460	...	289B473A16	289B473A27	289B363A16					
		575	...	289B473A17	289B473A28	289B363A17					

External Series Resistors
For MG-6 Relays
(See DB 41-750B for Application)

Size	Ohms	Style Number ^⑨
3½"	67	184A369G20
8%	33.5	07B4865G16
	180	07B4865G15
	300	1875 692
	710	07B4865G14

Sheet Metal Cabinet with Cover
For SG and MG-6 Front Connected
(Without Cover) Relays
NEMA I Enclosure

Type Relay	Number Relays Per Cabinet	Cabinet Style Number ^⑨
MG-6	1	1164 761
SG	1	1730 654
	2	1095 759

- ⑤ Denotes item available from stock.
①②③④⑤⑥ Standard notes, see page 3.
⑦ Different combinations of the operating coil and reset coil ratings can be supplied. Choose from the standard ratings listed. Use standard price. Order similar to style number of relay with identical operating coil ratings, except with reset coil ratings.
⑧ Includes mounting brackets.
⑨ Price from PEG 120.

**Auxiliary, Non-Adjustable Pickup, 2 Milliseconds Operating Time**
Molded Base Type

Type	Contacts ^⑨	Dc Rating		Relay Data			
		Volts	Watts	Front Connected Glass Window Cover ^⑦		Projection Rear Connected Glass Window Cover ^⑧	
				Internal Schematic	Style Number	Internal Schematic	Style Number
AR Single Unit	4 make	48 125 250	10	629A899	606B029A11 606B029A09 ^⑤ 606B029A10	836A859	644B590A09 644B590A10 644B590A11
	2 make and 2 break	48 125 250	10	837A112	606B029A14 606B029A13 ^⑤ 606B029A15	836A917	644B590A12 644B590A13 644B590A14
	2 make 1 break	125	10	.....	.....	837A309	644B590A21

Flexitest Case Type

Type	Contacts	Dc Rating		Indicating Contactor Switch Amps Dc③	Relay Data		Case Size
		Volts	Watts		Internal Schematic	Style Number	
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 606B017A15⑤ 606B017A16	
	4 make	125	10	Two 0.2/2.0	848A823	606B017A22⑤	
Type	Contact Arrangement		Dc Rating		Relay Data		Case Size
	(Front View) Left Unit	Right Unit	Volts	Watts	Internal Schematic	Style Number	
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	

Auxiliary, High Threshold, 70 Volt Pickup, 4 Milliseconds Operating Time
Molded Base Type

Type	Contacts ^⑨	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	774B470A12	3512A30	644B590A28
Flexitest Case Type							
Type	Contacts	Dc Rating		Indicating Contactor Switch Amps Dc ^⑩	Relay Data		
		Volts	Watts		Internal Schematic	Style Number	Case Size
AR Single Unit	4 make	125	10	 Two 0.2/2.0	3495A73	774B471A12	FT-11
		125	10		3500A88	774B471A18	
Type	Contact Arrangement	Dc Rating		Relay Data			
	(Front View) Left Unit	Right Unit	Volts	Watts	Internal Schematic	Style Number	Case Size
AR Double Unit	4 make	4 make	125	10	3500A90	774B472A12	FT-22

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.

⑦ Ten terminal case; can have 4 electrically independent contacts.

⑧ Eight terminal case; cannot have 4 electrically independent contacts.

⑨ Maximum of 2 break contacts.

⑩ No break contacts allowed.



Auxiliary

Non-Adjustable Pick up, 2 Millisecond Operating Time

Type	Input Voltage – dc	Supply Voltage – dc	Watt	Contact Arrangement	ICS Units	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		48 125 250		2M2B	2	719B947 719B948	717B770A14 717B770A15 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-2M28		719B950	717B770A21 717B770A22	
Single input per unit		48 125		2M2B-2M2B		719B949	717B770A23 717B770A24	
		48 125 250		4M-4M	2	719B954 719B955	717B770A25 717B770A26 717B770A27	

Dc Current, Non-Adjustable, Molded Base, Glass Window Cover

Type	Circuit Closing Contacts Per Unit	Elements	Ratings: Amps Dc		Relay Data		
			CS	ICS	Internal Schematic	Style Number Projection	Semi-Flush
TR-1	Single	1	None	0.2-2⑤	836A926	.....	290B311A25⑤
	Double	1	None	0.2-2⑤	836A799	.....	290B311A26
	Single	1	None	1.0⑤	837A026	290B311A27	.....
	Double	1	None	1.0⑤	3502A41	.....	290B311A28
	Double	1	1.0⑦	None	184A741	.....	1726 850
	Double	1	2.0⑦	None	184A741	1961 049	.....
	Double	2	1.0⑦	None	182A938	1961 246⑤	1726 820⑤
	Double	2	2.0⑦	None	22D1943	1544 670	1544 669
	Single	2	2.0⑦	None	31D5224	.....	1727 494
	Double	2	1.0⑦	None	22D1943	290B311A20	290B311A13

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

When used as an auxiliary relay,

⑦ 1 and 2 amp dc: 125 volts dc use one style 1164 990⑤ series resistor 22 ohms.

250 volts dc use two style 1164 990⑤ series resistors 22 ohms.

⑧ 0.2-2.0 amp dc: 125 volts dc use one style 1955 870⑤ series resistor 100 ohms.

250 volts dc use two style 1955 870⑤ series resistors 100 ohms.

⑨ Independent contactor switch circuits.

**Auxiliary
DC Current, Non-Adjustable**

Type	Contacts	Elements	Rating: Amps Dc		Relay Data	
			CS	ICS	Internal Schematic	Style Number
FT- 11 Flexitest Case						
TR-1	Two circuit closing per element	2	None	0.2-2 ^⑩	183A356	1955 703 ^⑤
		2	None	1.0 ^⑨	184A062	1961 148
TR-3	Two circuit closing for 2 elements; 1 circuit closing for the 3rd element	3	0.2-2	None	188A025	1957 986

FT-22 Flexitest Case

TR-3	Two circuit closing per element	3	2.0	None	184A031	1961 105
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When used as an auxiliary relay

- ⑨ 1 and 2 amp dc: 125 volts dc use one style 1164 990 series resistor.
250 volts dc use two style 1164 990 series resistors.
⑩ 0.2-2.0 amp dc: 125 volts dc use one style 1955 870^⑤ series resistor.
250 volts dc use two style 1955 870^⑤ series resistors.

Static Tripping Units

Type ⑦	Application	Diodes Per Case	Unit Reference Number	Voltage Rating: Dc Volts	Maximum Reverse Volts	Relay Data	
						Internal Schematic	Style Number
TRB-1	Test Unit (HU)	1	304-F	120 ac	300	184A234	407C275G03
	Blocking diode	1	304-F 304-M	48/125 250	300 600	184A415 184A415	184A414G12 ^⑤ 184A414G13 ^⑤
TRB-2	Blocking and Tripping Zeners	2	IN-2846A	48/125	...	187A696	408C003G01 ^⑤
		4	IN-2846RA IN-2846A	250	...	187A617	408C003G02
TRB-3		3	IN-2846A	48/125	...	187A697	408C003G03
TRB-4		4	IN-2846A	48/125	...	187A698	408C003G04

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.

⑦ TRB-1 relays are rated 5 amps dc continuously, and 30 amps dc for one second.

October, 1986



General Purpose

Instantaneous, Current Operated, Dc or 25-60 Hertz
Mechanical Operation Indicator, Two Normally Open Contacts
Flexitest Case Type

Type	Adjustable Range: Amps	Dropout Ratio		Relay Data		
		Ac	Dc	Self-Reset Internal Schematic	Style Number	Case Size
One Unit Per Case						
SC	0.5-2	85-98%	65-80%	182A854	1876 046⑤	FT-21
	1-4				1876 047	
	2-8				1876 048⑤	
	4-16				1876 049	
	10-40				1876 050	
	20-80				1876 051	
	40-160				1876 052	
	4-100 (taps)				1876 053	

Two Units Per Case^⑦

SC	0.5-2	85-98%	65-80%	182A855	1876 054	FT-21
	1-4				1876 055	
	2-8				1876 056	
	4-16				1876 057	
	10-40				1876 058	
	20-80				1876 059	
	40-160				1876 060	
	4-100 (taps)				1876 061	

Three Units Per Case^⑦

SC	0.5-2	85-98%	65-80%	183A193	1878 393	FT-32
	1-4				1878 394	
	2-8				1878 395 ^⑤	
	4-16				1878 396	
	10-40				1878 397	
	20-80				1878 398	
	40-160				1878 399	
	4-100 (taps)				1878 400	

Small Glass Projection Case Type

Type	Adjustable Range: Amps	Dropout Ratio		Small Glass Projection Case			
		Ac	Dc	Self Reset		Front Connected	
				Rear Connected			
				Internal Schematic	Style Number	Internal Schematic	Style Number
One Unit Per Case							
SC	0.25-1	85-98%	65-80%	871766		184A942	.....
	0.5-2				1962 591		
	1-4				1096 937		292B400A10
	2-8				1096 938		292B400A11 ^⑤
	4-16				1096 939 ^⑤		292B400A12 ^⑤
					1096 940 ^⑤		292B400A13 ^⑤
	10-40				1096 941		292B400A14 ^⑤
	20-80				1096 942		292B400A15
	40-160				1100 866		292B400A16
	4-100 (taps)				1094 830		.....

^⑤ Denotes item available from stock.

^{①②③④⑤⑥} Standard notes, see page 3.

^⑦ Relays can be supplied with different ratings on each unit. Choose from standard ratings listed. Use standard price. Order similar to style number of relay with rating desired for first unit and then specify other rating.



General Purpose
Instantaneous, Current Operated, Dc or 25-60 Hertz Mechanical Operation Indicator
Two Normally Open Contacts
Flexitest Case Type

Type	Adjustable Range: Amps	Dropout Ratio	Relay Data		Case Size	Hand Reset		Case Size	
			Ac	Dc		Internal Schematic	Style Number		
One Unit Per Case									
SC-1	0.5-2	35-60%	25-40%	182A854	1876 062	FT-21	182A854	1876 078	FT-21
	1-4				1876 063		1876 079		
	2-8				1876 064		1876 080		
	4-16				1876 065		1876 081		
	10-40		1876 066		1876 082				
	20-80		1876 067		1876 083				
	40-160		1876 068		1876 084				
	4-100 (taps)		1876 069		1876 085				

Two Units Per Case^⑦

SC-1	0.5-2	35-60%	25-40%	182A855	FT-21	182A855	1876 070	FT-21
	1-4						1876 071	
	2-8						1876 072	
	4-16						1876 073	
	10-40						1876 074	
	20-80						1876 075	
	40-160						1876 076	
	4-100						1876 077	

Three Units Per Case^⑦

SC-1	0.5-2	35-60%	25-40%	183A193	FT-32	183A193	1878 401	FT-32
	1-4						1878 402	
	2-8						1878 403	
	4-16						1878 404	
	10-40						1878 405	
	20-80						1878 406	
	40-160						1878 407	
	4-100 (taps)						1878 408	

Small Glass Projection Type

Type	Adjustable Range: Amps	Dropout Ratio Ac	Dc	Small Glass Projection Case		
				Internal Schematic	Self Reset	Hand Reset
					Style Number	Style Number
Rear Connected (One Unit Per Case)						
SC-1	0.5-2	35-60%	25-40%	871 766	1096 943	1096 949
	1-4				1096 944	1096 950
	2-8				1096 945	1096 951
	4-16				1096 946	1096 952
	10-40	1096 947	1906 953			
	20-80	1096 948 ^⑤	1096 954			
	40-160	1100 867	1100 868			
	4-100 (taps)	94D335	1100 864	1731 458		

Front Connected (One Unit Per Case)

SC-1	0.5-2	35-60%	25-40%	184A942	292B403A09	292B403A21
	1-4				292B403A10	292B403A22
	2-8				292B403A11	292B403A23
	4-16				292B403A12	292B403A24
	10-40				292B403A13	292B403A25
	20-80				292B403A14	292B403A26
	40-160				292B403A15	292B403A27
	4-100 (taps)				292B403A18	292B403A35

^⑤ Denotes item available from stock.
^{①②③④⑤⑥} Standard notes, see page 3.

^⑦ Relays can be supplied with different ratings on each unit. Choose from standard ratings listed. Use standard price. Order similar to style number of relay with rating desired for first unit and then specify other rating.



General Purpose

Instantaneous, Voltage Operated Mechanical Operation Indicator,
Two Normally Open Contacts
Flexitest Case Type

Type	Frequency, Hertz	Adjustable Range: Volts	Dropout Ratio		Relay Data		
			Ac	Dc	Self Reset		
					Internal Schematic	Style Number	Case Size

One Unit Per Case

SV ②	60	7- 16 70-160 140-320 280-640	85-98%		182A856		1956 708 1876 094⑤ 1876 095 1876 096	FT-21
		Dc					1876 097 1876 098	

Two Units Per Case⑦

SV ②	60	70-160 140-320 280-640	85-98%		182A857		1876 099 1876 100 1876 101	FT-21
		Dc					1876 102 1876 103	

Three Units Per Case⑦

SV ②	60	70-160 140-320 280-640	85-98%		183A192		1878 417 1878 418 1878 419	FT-32
		Dc					1878 420 1878 421	

Small Glass Projection Type

Type	Frequency, Hertz	Adjustable Range: Volts	Dropout Ratio		Small Glass Projection Case		
			Ac	Dc	Internal Schematic	Self Reset	Style Number

Rear Connected (One Unit Per Case)

SV ②	60	7- 16 70-160 140-320 280-640	85-98%		871766		1956 709 1096 955 1724 993 1876 916	
		Dc					1096 958 1731 455	

Front Connected (One Unit Per Case)

SV ②	60	7- 16 70-160 140-320 280-640	85-98%		184A942		292B402A09 292B402A10⑤ 292B402A11⑤ 292B402A12	
		Dc					292B402A13 292B402A14	

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑦ Relays can be supplied with different ratings on each unit. Choose from standard ratings listed. Use standard price. Order similar to style number of relay with rating desired for first unit and then specify other rating.

**General Purpose**

Instantaneous, Voltage Operated

Mechanical Operation Indicator, Two Normally Open Contacts

Flexitest Case Type

Type	Frequency Hertz	Adjustable Range: Volts	Dropout Ratio		Relay Data			Hand Reset		
			Ac	Dc	Self Reset Internal Schematic	Style Number	Case Size	Internal Schematic	Style Number	Case Size
One Unit Per Case										
SV-1 ②	60	70-160 140-320 280-640	40-80%		182A856	1876 104 1876 105 1876 106	FT-21	182A856	1876 114 1876 115 1876 116	FT-21
	Dc			25-40%		1876 107 1876 108			1876 117 1876 118	
Two Units Per Case										
SV-1 ②	60	70-160 140-320 280-640	40-80%		182A857	1876 109 1876 110 1876 111	FT-21	182A857	1876 119 1876 120 1876 121	FT-21
	Dc			25-40%		1876 112 1876 113			1876 122 1876 123	
Three Units Per Case⑦										
SV-1 ②	60	70-160 140-320 280-640	40-80%		183A192	1878 422 1878 423 1878 424	FT-32	183A192	1878 475 1878 476 1878 477	FT-32
	Dc			25-40%		1878 425 1878 426			1878 478 1878 479	

Small Glass Projection Type

Type	Frequency, Hertz	Adjustable Range: Volts	Dropout Ratio Ac	Dc	Small Glass Projection Case		
					Internal Schematic	Self Reset Style Number	Hand Reset Style Number
Rear Connected (One Unit Per Case)							
SV-1 ②	60	70-160 140-320 280-640	40-80%		871766	1096 959 1876 917 1876 918	1096 963 1876 919 1876 920
	Dc	50-150 100-300		25-40%		1096 962 1731 456	1096 966 1731 457
Front Connected (One Unit Per Case)							
SV-1 ②	60	70-160 140-320 280-640	40-80%		184A942	292B401A09 292B401A10 292B401A11	292B401A21 292B401A22 292B401A23
	Dc	50-150 100-300		25-40%		292B401A12 292B401A13	292B401A24 292B401A25

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑦ Relays can be supplied with different ratings on each unit. Choose from standard ratings listed. Use standard price. Order similar to style number of relay with rating desired for first unit and then specify other rating.



General Purpose

Undervoltage, Self Reset, Constant Dropout over 20 to 60 Hertz, Ac

Type	Contacts	Voltage Rating			Phase	Relay Data		
		Nominal	Maximum Pickup	Dropout (Adjustable Calibrated Scale)		Internal Schematic	Style Number	Case Size
SVF	2 co	120	95 (at 45 volt dropout)	30 to 45	Single	184A796	1961 843	FT-21
SVF-3					Three	3513A05	606B321A22	
SVF-1	Electrically independent		100 (at 36 volt dropout)	24 to 36	Single	184A796	1961 845	
SVF-31		120 208		18 to 30 31 to 52	Three	3513A05	606B321A09 606B321A10	

Voltage Operated, With Definite Time Delay on Pickup

Type	Contacts	Adjustable Range: Volts			Indicating Contactor Switch ^③	Relay Data		
		Unit # 1 (Left Hand)	Unit # 2 (Right Hand)	Time Delay: Seconds		Internal Schematic	Style Number	Case Size
SVT	Spst-cc	140-320	55-125	0.2-4.0	0.2/2.0 amps dc	763A022	606B031A09	FT-31

One Unit Per Case

Type	Indicating Contactor, Switch	Adjustable Range	Drop Out Ratio	Contacts	Relay Data		
					Block Diagram	Style Number	Case Size
SSCT	1 Amp DC	0.5 – 2.0 Amp 2 – 8 4 – 16 10 – 40	90-98%	2M ^② 2M ^② 2M ^② 2M ^②	3516A15 3516A15 3516A15 3516A15	1321D79A03 1321D79A02 1321D79A04 1321D79A05	FT-11
	1 Amp DC	0.5 – 2.0 2 – 8 4 – 16 10 – 40		2M 2M 2M 2M	3517A80 3517A80 3517A80 3517A80	1321D79A07 1321D79A06 1321D79A08 1321D79A09	
SSVT	1 Amp DC	60 – 140 Volts	90-98%	1M1B	3516A14	1321D79A01	FT-11
	0.2 Amps DC	60 – 140		1M1B	3516A14	1321D79A11	
	None	60-140		2M ^②	3527A97	1321D79A13	
	1 Amp DC	140 – 320		1M1B 1M1B ^②	3516A14 3533A36	1321D79A10 1321D79A15	

Three Units Per Case

Type	Indicating Contactor, Switch	Adjustable Range	Drop Out Ratio	Contacts (Each Unit)	Relay Data		
					Block Diagram	Style Number	Case Size
SSCT	3 – 1 Amp	0.5 – 2.0 Amp 2 – 8 4 – 16 10 – 40	90-98%	2M ^② 2M ^② 2M ^② 2M ^②	3522A43	1334D03A02 1334D03A01 1334D03A03 1334D03A04	FT-21
	1 – 1 Amp	0.5 – 2.0 2 – 8 4 – 16 10 – 40		2M ^② 2M ^② 2M ^② 2M ^②	3522A44	1334D03A06 1334D03A05 1334D03A07 1334D03A08	
SSVT	3 – 1 Amp	60 – 140 Volts	92-99%	1M1B ^②	3525A80	1338D83A01	FT-21
	1 – 1 Amp	60 – 140		1M1B ^②	3525A81	1338D83A02	

⑤ Denotes item available from stock.

②③④⑤⑥ Standard notes, see page 3.

③ Contacts are electrically independent – refer to block diagram reference.

**General Purpose
Current Operated**

Type	ITH Units Per Case	Contacts (Per ITH Unit)	Indicating Contactor Switch ③	Contactor Switch "CS"	Operation Indicator	Current Range: Amps Ac	Relay Data		
							Internal Schematic	Style Number	Case Size
ITH 60 Hertz ②	1	Dpst-cc ⑧	0.2/2.0 amps dc	.....	.....	0.02-0.04 0.032-0.064	183A449	1962 552 289B007A17 1955 594⑤ 1956 071⑤ 1956 072	FT-11
			One ICS target seal-in unit per relay	.....	.....	0.25-0.5 0.5-1.0 1-2		1956 073 1956 074 1956 077 1956 075 1956 076	
				.....	.....	2-4 4-8 6-12 8-16 16-32			
	3	Dpst-cc ⑦⑧	.....	One 2.0 amps dc seal-in per relay	Three 0.2 amp dc units	0.25-0.5 0.5-1.0 1-2 2-4 4-8	183A128	2888714A27⑤ 288B714A28 288B714A09 288B714A10 2888714A17⑤	FT-11
						6-12 8-16 16-32		2888714A29 288B714A11 288B714A12	
					Three 1.0 amp dc units	0.25-0.5 0.5-1.0 1-2 2-4 4-8 6-12 8-16 16-32	183A128	288B714A30 2888714A31 288B714A13 288B714A14⑤ 288B714A18⑤ 2888714A32 288B714A15 288B714A16	
	4		.....	One 2.0 amps dc seal-in unit	Four 0.2 amp dc units	3 units 8-16 } 1 unit 1-2 }	183A152	288B714A21	FT-11
						3 units 16-32 } 1 unit 2-4 }		2888714A22	
					Four 1.0 amp dc units	3 units 8-16 } 1 unit 1-2 }		288B714A23	
						3 units 16-32 } 1 unit 2-4 }		288B714A24	
IT	1	Dpst-cc ⑤	0.2/2.0 amps dc	.....	.....	0.15-0.30 0.5-1.0 1.0-2.0	9640A39	1351D17A01⑤ 1351D17A04 1351D17A05	FT-11
	3	Dpst-cc ⑦⑧	.....	One 2.0 amps dc seal-in unit	Three 0.2 amp dc units	0.15-0.30	9640A40	1351D18A01	FT-11

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑦ Relays can be supplied with different ratings on each unit. Choose from standard ratings listed. Use standard price. Order similar to style number of relay with rating desired for first unit and then specify other rating.

⑧ Electrically common contact circuits per unit.



General Purpose

High Speed Toggle Type, Current or Voltage Operated

No Time Delay on Reset

Small Glass Case Type

Type	Units Per Case	Contacts	Operating Coil Rating	Reset Coil Rating	Small Glass Projection Case Internal Schematic	Style Number
SX	1	2 circuit closing	120 volts, 60 Hertz	120 volts, 60 Hertz	184A255	289B900A09
			240 volts, 60 Hertz	240 volts, 60 Hertz		289B900A10
		Independent	48 volts dc	48 volts dc		289B900A11
			125 volts dc	125 volts dc		289B900A12
			250 volts dc	250 volts dc		289B900A13
			1.0 amp dc	125 volts dc	837A038	289B900A14
			1.0 amp dc	250 volts dc		289B900A15
		1 circuit closing	120 volts, 60 Hertz	120 volts, 60 Hertz	184A254	289B900A17
			240 volts, 60 Hertz	240 volts, 60 Hertz		289B900A18
		Independent	48 volts dc	48 volts dc		289B900A19
			125 volts dc	125 volts dc		289B900A20
			250 volts dc	250 volts dc		289B900A21
			1.0 amp dc	125 volts dc		289B900A22
			2.0 amps dc	125 volts dc		289B900A23
		1 circuit closing	1.0 amp dc	120 volts, 60 Hertz	184A354	289B900A26
			1.0 amp dc	240 volts, 60 Hertz		289B900A27
		1 circuit opening	1.0 amp dc	48 volts dc		289B900A28
			1.0 amp dc	125 volts dc		289B900A29
		Common contacts with reset coil cutoff contact	1.0 amp dc	250 volts dc		289B900A30
			48 volts dc	48 volts dc		289B900A31
			125 volts dc	125 volts dc		289B900A32
			250 volts dc	250 volts dc		289B900A33

With or Without Time Delay on Reset

Flexitest Case Type

Type	Units Per Case	Contacts	Operating Coil Rating	Reset Coil Rating	Time Delay on Reset ^⑦	Relay Data Internal Schematic	Style Number	Case Size
SX	1	Spdt	1.0 amp dc	48 volts dc	Yes	184A180	289B544A12	FT-11
			1.0 amp dc	125 volts dc		184A180	289B544A09 ^⑤	
			1.0 amp dc	250 volts dc		184A180	289B544A21	
			5 amp dc	125 volts dc		184A180	289B544A10	
			125 volts dc	125 volts dc		184A181	289B544A11	
		Dpdt	1.0 amp dc	48 volts dc	No	184A178	289B459A18	
			1.0 amp dc	125 volts dc		184A178	289B459A15 ^⑤	
			1.0 amp dc	250 volts dc		184A178	289B459A19	
			5.0 amps dc	125 volts dc		184A178	289B459A16	
			125 volts dc	125 volts dc		184A179	289B459A17 ^⑤	
			120 volts, 60 Hertz	120 volts, 60 Hertz		184A179	289B459A20	
			5 amps dc	48 volts dc		184A178	289B459A21	
			1 amp dc	120 volts ac			289B459A22	
			48 volts dc	125 volts dc				
						184A179	289B459A23	
	2	Spst (per unit)	1.0 amp dc	48 volts dc	No	184A214	289B546A12	FT-11
			1.0 amp dc	125 volts dc		184A214	289B546A09	
			1.0 amp dc	250 volts dc		184A214	289B546A13	
			5.0 amps dc	125 volts dc		184A214	289B546A10	
			125 volts dc	125 volts dc		187A740	289B546A11	
			250 volts dc	250 volts dc		187A740	289B546A14	
		Dpdt (per unit)	48 volts dc	48 volts dc		184A213	289B547A11	FT-22
			125 volts dc	125 volts dc			289B547A09	
			250 volts dc	250 volts dc			289B547A10	

^⑤ Denotes item available from stock.

^① ^② ^③ ^④ ^⑤ Standard notes, see page 3.

^⑦ 5 to 15 cycles (factory set at 10 cycles on a 60 Hz base).

Westinghouse Electric Corporation
Relay and Telecommunications Division
Coral Springs, FL 33065



March, 1987
Supersedes TD 41-020, pages 121-124
dated September, 1986

Mailed to: E, D, C/41-100A

Protective Relays 41-600: Reclosing

Multiple Reclosure, Automatic Reset

Type	Contacts (Multiple)	Ratings: Volts Timer®	Auxiliary Units		Relay Data		
			X and Y	Z (Coils)	Internal Schematic	Style Number	Case Size
RC	cc and co	120/240 ac	120/240 ac and 48/125 dc }	None	3536A64	1346D28A01®	FT-32
				48 dc	3536A66	1346D28A12	
				125 dc	3536A66	1346D28A09®	
				None	3536A65	1346D28A08	
				120 ac	3536A66	1346D28A20	
				240 ac	3536A66	1346D28A19®	
RCL	cc and co	120/240	120/240 ac and 48/125 dc }	24 dc	None	3536A64	1346D28A03
				250 dc	None	3536A64	1346D28A02
						3537A57	1351D35A01®
						9640A56	1351D35A03
			250 dc	None	9640A56	1351D35A02	

Motor Ratings: For 125 or 250 volt dc timer motor operation, order dc to ac inverter (see page 171). Potentiometer required on 250 volt dc operation.

Multiple Reclosure, Automatic Reset, Solid State Timing Circuit

Type	Contacts	Rating: Volts dc	Time Delay: Seconds [Ⓐ]		Relay Data		
			Reset (Ind. Adj.)	Reclose (Ind. Adj.)	Internal Schematic	Style Number	Case Size
DRC-1	Spst-cc	48	10-60	0-45	1321D77	7188784A26 [Ⓢ]	FT-32
		125			1321D77	718B784A25 [Ⓢ]	
		250			1321D75	718B784A27	

Single Reclosure, Hand Reset (Molded Base and Flexitest Case Types)

Type and Contacts	Frequency, Hertz	Volts	Molded Base Cover With Glass Window	Flexitest Case Type			Case Size
				Internal Schematic	Projection Type Style Number	Semi-Flush Style Number	
SGR-1 ② Spdt-cc and co	50-60	115	26D589	1337 330	1723 564	183A292	FT-11
		208		1961 288	1961 289	183A292	
		230		937 473	1731 442	183A292	
	Dc	5 amp	26D589	1962 816	.....	183A292	288B981A16
		24	26D589	1961 286	1961 287	183A292	288B981A14
		48		1731 437	1731 438	183A292	1878 305
		125		937 474	1731 439	183A292	1878 306
		250		1731 440	1731 441	183A292	1878 307

[Ⓢ] Denotes item available from stock.

[Ⓐ][Ⓑ][Ⓒ][Ⓓ][Ⓔ] Standard notes, see page 3.

[Ⓐ] From one to six closing attempts with adjustable speed from instantaneous to 60, 90, 180, or 360 seconds before lockout depending on the adjustment selected. Reset is not independently adjustable and is determined by the operating time selected.

[Ⓑ] From one to three closing attempts before lockout.



Single Reclosure, Automatic Reset

Type	Contacts	Time Delay: Seconds		Volts Dc	Relay Data		
		Reset	Reclose		Internal Schematic	Style Number	Case Size
SGR-51 One-Shot Reclosing	Spst-cc	3-30	Inst.	48/125 dc 250 dc	201C422 202C646	691 B536A09⑤ 691 B536A10	FT-11
SGR-52 One-Shot Reclosing with Reclose Initiate	Spst-cc	3-30	0-2 2-20 0.1-4.0 0-2 2-20	48/125 dc 48/125 dc 48/125 dc 250 dc 250 dc	1582C07 1582C07 1582C07 1582C13 1582C13	1346D91A01⑥ 1346D91A03⑥ 1346D91A07 1346D91A05 1346D91A04	FT-11

Single Reclosure, Automatic Reset, Rack Mounted, 3 Rack Units

Type	Contacts	Volts Dc	Time Delay: Seconds		Relay Data	
			Reset	Reclose	Internal Schematic	Style Number
SGRU-52 Single-Shot Reclosing with Reclose Initiate	Spst-cc	48/125 125	3-30	0-2 2-20	205C886 205C885	691 B448A18⑥ 691 B448A17⑥
SGRU-54 Two-Shot Reclosing with Reclose Initiate	Spst-cc	125	3-30	0-2/2-20 0-2/6-60	6659D20 6663D49	691 B448A29⑥ 691 B448A30⑥

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑥ Price includes 3-foot harness assembly required when sold loose and unmounted. Enter harness as separate item, Style No. 265C042G01.

**Synchronism Verifier – Bus and Line**

Type	Application	Contacts	Indicating Contactor Switch Amps Dc③	Rating: Volts		Calibration (Degrees)	Relay Data		
				Ac	Dc		Internal Schematic	Style Number	Case Size
Without Bus and Line Relays									
CVE ②	Synchronism check	Spst-cc	None	120	...	20° 30°	184A540	293B285A09® 293B285A11	FT-21
			0.2 1.0 2.0		20° 20° 40°	185A122	293B285A19 293B285A20 293B285A18		
			Dpst-cc	None	20° 30°	188A515	293B285A26 293B285A27		
With Bus and Line Voltage Units									
CVE-1 ②	For use with RC reclosing relay W/commoned potential coils	Spst-cc	None	120	...	20°	188A624	292B353A29®	FT-21
	CVE contact supervised by voltage contacts	Spst-cc	None	120	...	40°	188A029	1957 989	
	With internal switch for live bus dead line or dead bus live line – com- moned potential coil	Spst-cc	None	120	...	20°	878A184	292B353A22®	
	With internal switch for live bus dead line or dead bus live line – W/O com- moned potential coil	Spst-cc	None	120	...	20°	880A759	292B353A24	
	W/O commoned potential coil	Spst-cc	0.2	120	...	20°	880A495	292B353A34	
		Spst-cc	None	120	...	20°	880A496	292B353A38	
CVE-2 ②	Synchronism check, bus and line voltage units, selective reclosing	Dpst-cc	None	120	48⑦	20°	188A389	292B665A10 292B665A09	FT-32
			None	120	125⑦	20°			

Synchronism Verifier – Fast Transfer (Continuous Energized)

Type	Application	Contacts	Indicating Contactor Switch Amps Dc③	Rating: Volts		Calibration (Degrees)	Relay Data		
				Ac	Dc		Internal Schematic	Style Number	Case Size
CVE-3 ●	Synchronism check with seal-in contact, w/o commomed potential coil	Spst-cc	None	120	48	20°	9646A84	1353D90A02	FT-21
				120	125	20°		1353D90A01	

● Changed or added since previous issue.

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑦ Reset – 1 amp dc operating coils on toggle unit.



SRCU-2 Multi-Shot Solid State Reclosing Relay With Internal Synchronism Check and Line-Bus Monitors, 3 Rack Unit

Type	Outputs	Volts: dc	Time Delay: Seconds			Logic II Module Included	Internal Logic Schematic	Style Number ⑥
			Reset	High Speed Reclose	TD-1 and TD-2 Reclose			
SRCU-2 Adjustable 1-3 shots to lockout	2 Form-C contacts for lockout	48/125	3-60 adjustable	.05-1.0 adjustable	2-120 adjustable	No	645F607	645F102A01
	2 N.O. contacts for reclose					Yes⑦	645F607	645F102A02

⑦ Logic II module adds the options of supervisory close inhibit function, and DLDB voltage output. See Descriptive Bulletin 41-670 for details.

⑥ Price includes 3-foot harness assembly required when sold loose and unmounted. Enter harness as separate item, Style No. 202C761G02.



June, 1985

Supersedes TD 41-020, pages 81-82,
dated May, 1984

Mailed to: E, D, C/41-100A

Protective Relays 41-500: Frequency, Temperature and Timing

Frequency

Underfrequency, Instantaneous, 120 Volts, 60 Hertz

Type	Contacts	Hertz		Indicating Contactor Switch ^③	Timing Circuit Voltage Rating ‡	Relay Data		
		Adjustable Range	Time Delay			Internal Schematic	Style Number	Case Size
KF ^②	Spdt-cc and co	55.0-59.5	6-30 (adj.)	0.2/2.0 amp dc	48/125 volts dc	849A318	671B287A09 ^⑤	FT-21
			6 (non. adj.)		120 volts ac adj.	862A525	671B287A15 ^⑤	
					125/250 volts dc	862A596	671B287A16	
					120 volts ac	861A659	671B287A13	

‡ 50 hertz relays are available with dc timing circuits only.

Under or Overfrequency, 120 Volts 60 Hertz

Type	Contacts	Range: Hertz		Indicating Contactor Switch ^③	Relay Data Internal Schematic	Style Number	Case Size
		Underfrequency	Overfrequency				
CF-1 ^②	Spst-cc	50-60	.....	0.2/2.0 amp dc	187A441	291B995A10 ^⑤	FT-21
		.....	50-60			291B995A13	
		.....	55-65			291B995A12	
		.....	60-70			291B995A09	
	Spdt-cc	50-60	.....		188A359	291B995A22	
		.....	50-60			291B995A25	
		.....	55-65			291B995A24	
		.....	60-70			291B995A21	

^⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ – See page 3 for standard notes.



MDF Relay Style and Rating Data 50/60 Hertz

Relay Type	Sensing V.A.C.	Power Supply D.C.	Power Supply A.C.	No. Set Points U/O Freq.	Alarm	Reclose Initiate Set Point	Internal Schematic	Style No.	Case Size
MDF-1	120	48		1	Yes	Yes	3528A21	1344D82A11	FT-32 (Weight-relay 10.6 lbs. in carton - 15 lbs.)
MDF-1	120	125		1	Yes	Yes	3528A21	1344D82A12 ^⑤	
MDF-1	120	250		1	Yes	Yes	3528A21	1344D82A13	
MDF-1	120		120	1	Yes	Yes	3530A13	1344D82A14 ^⑤	
MDF-1	240		240	1	Yes	Yes	3530A13	1344D82A15	
MDF-2	120	48		2	Yes	Yes	3528A22	1344D82A21	
MDF-2	120	125		2	Yes	Yes	3528A22	1344D82A22 ^⑤	
MDF-2	120	250		2	Yes	Yes	3528A22	1344D82A23	
MDF-2	120		120	2	Yes	Yes	3530A14	1344D82A24	
MDF-2	240		240	2	Yes	Yes	3530A14	1344D82A25	
MDF-3	120	48		3	Yes	Yes	3528A23	1344D82A31	
MDF-3	120	125		3	Yes	Yes	3528A23	1344D82A32 ^⑤	
MDF-3	120	250		3	Yes	Yes	3528A23	1344D82A33	
MDF-3	120		120	3	Yes	Yes	3530A15	1344D82A34	
MDF-3	240		240	3	Yes	Yes	3530A15	1344D82A35	
MDF-4	120	48		4	Yes	Yes	3528A24	1344D82A41	
MDF-4	120	125		4	Yes	Yes	3528A24	1344D82A42 ^⑤	
MDF-4	120	250		4	Yes	Yes	3528A24	1344D82A43	
MDF-4	120		120	4	Yes	Yes	3530A16	1344D82A44 ^⑤	
MDF-4	240		240	4	Yes	Yes	3530A16	1344D82A45	

⑤ Denotes item available from stock.



February, 1985
Supersedes TD 41-020, pages 83-84
dated May, 1984

Mailed to: E, D, C/41-100A

Protective Relays 41-500: Frequency, Temperature and Timing

Temperature Thermal Overload

Type	Units Per Case	Contacts Per Unit	Contactor Switch (CS)	Operation Indicators: Amp Dc	Amps: Ac/Dc Heater Unit	Instantaneous Trip Unit	Relay Data Internal Schematic	Style Number	Case Size
BL-1	One	Spst-cc	2.0 amp dc	Two 0.2 amp Two 1.0 amp	2.5-5	One 6-50	629A288	293B119A11 293B119A09 ^⑤	FT-21
25 to 60 Hertz ⑨		Spdt-co and cc		Two 1.0 amp			629A289	293B119A10	
	Two	Spst-cc		Three 0.2 amp Three 1.0 amp		Two 6-50	629A280	293B119A23 ^⑤ 293B119A21 ^⑤	
		Spdt-cc and co		Three 0.2 amp Three 1.0 amp Three 2.0 amp			629A290	293B119A24 293B119A22 ^⑤ 293B119A30	
							3508A12		

Type	Contacts	Contactor Switch (CS-1)	Operation Indicator	Temperature Range	Rating: Volts ⑩	Relay Data Internal Schematic	Style Number	Case Size
DT-3	Spdt-co and-cc	48 volts dc 125 volts dc 125 volts dc 125 volts dc 125 volts dc 250 volts dc	None None 0.2 amp dc None None None	50°-190°C	120 ac 120 ac 120 ac 240 ac 125 dc 250 dc	184A451 184A451 836A573 184A451 762A503 762A503	1962 384 1961 834 ^⑤ 288B881A32 288B881A26 1963 345 ^⑩ 288B881A28 ^{⑦⑩}	FT-21
(10 ohm search coils only 25°C copper)		None	None	60°-120°C 60°-140°C 100°-160°C 0°-100°C 60°-120°C 60°-120°C 50°-190°C	20 dc 20 dc 48 dc 125 dc 125 dc 250 dc 240 ac	182A789 184A287 836A556 3503A64 182A789 182A789 184A851	1876 041 ^⑩ 1961 560 ^⑩ 288B881A13 ^⑩ 288B881A15 ^⑩ 1876 042 ^⑩ 1876 043 ^{⑦⑩} 1962 311	

DT-3 ②	Spdt-co and cc	125 Vdc	0.2 amp dc	50°-190°C 100°-160°C	120 ac	3496A13	774B048A09 774B048A10	FT-21
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(120 ohm
0°C Nickel
sensor)

DT-3 ②	Spdt-co and cc	125 Vdc 120 Vac	0.2 amp dc	50°-190°C	120 Vac 120 Vac	3521A42	774B048A25 774B048A26	FT-21
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(100 ohm
0°C platinum
sensor)

Temperature and Overload

Type	Contacts	Indicating Contactor Switch ^③	Balance Temperature	Number of Terminals on Relay	Relay Data Internal Schematic	Style Number	Case Size
CT ^② (10 ohm coil only)	Spst-cc	0.2/2.0 Amps dc	See Note (b)	6 8	187A339 187A340	1876 044 1876 045	FT-21

When ordering CT relays advise:

- Resistance of leads from exploring coil to relay.
- Full-load secondary current of protected machine. CT ratio should be chosen so that relay current at full load is between 3.25 and 5.0 Amp. The trip temperature is 5°C above the balance temperature for full load current between 3.25 and 2.25 amperes the trip temperature is 10°C above the balance temperature.
- Maximum safe operating temperature at which relay must trip if full load current or more is present.
- Frequency.

If (a) is not known, order 8-terminal relay; otherwise order 6-terminal relay. Specific style number will be assigned to relay when built in accord with ordering information supplied.

⑤ Denotes item available from stock.

① ② ③ ④ ⑥ Standard notes, see page 3.

⑦ Style number includes external series resistor.

⑧ Ac ratings are 60 Hertz.

⑨ BL-1 relay not recommended for dc machine applications.

⑩ For applications where the search coils supplied on generators or motors are permanently grounded on one end, the dc circuits cannot be used as a dc supply for the DT-3. Use ac relays which have internal rectifiers as a source of dc.



Timing

Type	Operation Indicator	Time Range Reset Stroke	Energized Stroke	Seal-in Contact	Frequency	Volts	Relay Data Internal Schematic	Style Number	Case Size				
Square Metal Case													
TK ②	None	Quick	2 Sec. to 50 Min.	Without	60 Hertz	115	56D806	1877 892	5 1/2" square				
						208		1956 243					
						230		1877 893					
						460		1877 894					
					575	1877 897							
					Dc⑦	125	28D245	1956 290					
						250		1956 240					
						With		60 Hertz		115	56D807	1877 904	
				208					1956 244				
				230	1877 905⑤								
				460	1877 906								
				575	1877 909								
				Dc⑦	125	183A901	1956 242						
							250	1956 241					
Flexitest Case													
	None	Quick	2 Sec. to 50 Min.	Without	60 Hertz	115	57D7908	1876 009⑤	FT-21				
						208		1956 238					
						230		1876 010					
						460		1876 011					
					575	1876 012							
					Dc⑦	125	57D7911	1876 013					
						250		1956 067					
						With		60 Hertz		115	57D7909	1876 014⑤	
				208					1956 239				
				230	1876 015								
				460	1876 016								
				575	1876 017								
				Dc⑦	125	183A208	1876 018						
							250	1956 068					
Type	Timing Range: Seconds Min. Max.		Rating Ac Current	Dc Voltage	Output Contact Circuits	TX Units	Indicating Contactor Switch③	Relay Data Internal Schematic	Style Number	Case Size			
TD-4	Zone 2 0.1-1.0 Zone 3 0.5-3.0		48/125/250	Common Independent	2	.06 sec or less	Reset Time	184A615	644B301A09⑤	FT-21			
								185A232	644B301A10⑤				
								837A071	644B301A19				
	Zone 2 0.1-1.0 Zone 3 0.3-1.5							185A210	644B301A17				
								837A071	644B301A18				

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑦ For 125 or 250 volt dc operation, order dc to ac inverter (page 171). Potentiometer required on 250 volt operation. See "Inverter", page 171.



May, 1984
Supersedes TD 41-020, pages 85-86
dated January, 1982

Mailed to: E, D, C/41-100A

Protective Relays 41-500: Frequency, Temperature and Timing

Timing

Type	Timing Range: Seconds	Rating: Dc Volts	TX Units	Indicating Contactor Switch ^⑤	Relay Data Internal Schematic	Style Number	Case Size
TD-5 One unit per case Time delay on pickup	.05-.04	24/32 48/125 250	None	0.2/2.0 amps dc	187A293	293B301A21 293B301A22 ^⑤ 293B301A23	FT-11
		48/125 250	One		188A016	293B301A30 ^⑤ 293B301A31	
	.05-1.0	24/32 48/125 250	None		187A293	293B301A09 293B301A10 ^⑤ 293B301A11	
		48/125 250	One		188A016	293B301A24 ^⑤ 293B301A27	
	0.2-4.0	24/32 48/125 250	None		187A293	293B301A12 293B301A13 ^⑤ 293B301A14	
		48/125 250	One		188A016	293B301A25 ^⑤ 293B301A28	
	1.5-30.0	24/32 48/125 250	None		187A293	293B301A15 293B301A16 ^⑤ 293B301A17	
		48/125 250	One		188A016	293B301A26 293B301A29	
	With Avalanche Diodes	48/125 250	One	0.2/2.0 amps dc	876A763	293B301A37 ^⑤ 293B301A38	FT-11
		48/125 250				293B301A33 ^⑤ 293B301A35	
		48/125				293B301A39	
		48/125 250				293B301A34 293B301A36	
TD-50 2 input start	.05-.04	48/125	With	0.2/2.0 amps dc	3504A92	774B872A09 ^⑤	FT-21
	.05-1	48/125				774B872A11	
	.2-4	48/125				774B872A12	
	.05-.04	250				774B872A10	
TD-51	0.2-4.0	48/125	With	None	880A373	293B301A20	FT-11
Time delay on dropout -- one normally open and one normally closed contact brought out							
TD-52 Two timing ranges per case	.05-.04	24/32 48/125 250	None	0.2/2.0 amps dc	629A606	606B038A09 606B038A10 606B038A11	FT-22
	.05-1.0	24/32 48/125 250	None		629A606	606B038A17 606B038A18 606B038A19	
	0.2-4.0	24/32 48/125 250	None		629A606	606B038A25 606B038A26 ^⑤ 606B038A27	
		48/125	None		849A147	606B038A29	
	1.5-30.0	24/32 48/125 250	None	0.2/2.0 amps dc	629A606	606B038A33 606B038A34 606B038A35	
TD-53	.05-1.0	125	None	0.2/2.0 amps dc	764A246	644B297A15	FT-11
	0.2-4.0	125				644B297A20	
	0.2-4.0	250				644B297A21	

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.





May, 1984
Supersedes TD 41-020, pages 75-78,
dated January, 1982

Mailed to: E, D, C/41-100A

Protective Relays 41-400: Distance

K-Dar Compensator Distance Relaying

Phase Protection – 1, 2, 3, or 4 Zones – 5 Amperes, 60 Hertz, Spst-cc Contacts

Relay Function

Relay Complement (Order each relay separately by style number)

	One Zone		Two Zones				Three Zones		Four Zones	
	A	B	A	B	C	D	A	B	Primary	Backup
1st Zone Phase	KD-10	KD-5	KD-10	KD-10	KD-10	KD-10	KD-10	KD-10	KD-10	.....
2nd Zone Phase	.....	.....	KD-10	KD-11	KD-10	SD-2	KD-10	KD-10	KD-10	KD-10
3rd Zone Phase	.....	.....	.....	.....	.....	.....	KD-11	KD-11	.....	KD-10
Timer ^⑦	.....	.....	TD-5 ^⑧	TD-5	CO-7 ^⑨	.....	TD-4	TD-52	TD-5	TD-4

Type	Range: Secondary Ohms – Line-to-Neutral	Volts Dc	Maximum Torque Angle Factory Setting – Degrees Current Lags Voltage		Indicating Contactor Switch Amps Dc ^③	Relay Data		
			$\phi - \phi$ Unit	3ϕ Unit		Internal Schematic	Style Number	Case Size
KD-3^② Single phase	Short reach .75-20	...	...	75°	0.2/2.0	185A348	290B658A09	FT-31
	Long reach 1.13-30	...	...	35°	1.0	185A378	290B658A10	
KD-5^② Three phase	.2-4.35	...	45°*	35°*	0.2/2.0	188A426	292B335A22	FT-42
		...	45°*	35°*	1.0	188A421	292B335A21	
	1.1-30	...	35°*	30°*	0.2/2.0	836A681	292B335A26	
		...	45°*	35°*	0.2/2.0		292B335A27	
KD-10 Three phase	0.2-4.5	...	75°	60°	0.2/2.0	3490A81	719B195A10 ^⑤	FT-42
			60°	45°		3490A81	719B195A16 ^⑩	
			75°	60°		3507A74	719B195A20 ^⑩	
			75°	75°	1.0	3507A64	719B195A22 ^{⑩⑪}	
			75°	60°		3514A65	719B195A25	
	0.75-21	...	75°	75°	0.2/2.0	3507A70	719B195A11 ^⑤	
			75°	75°		3499A68	719B195A13 ^⑩	
			60°	60°		3507A70	719B195A14 ^{⑤⑩}	
			75°	75°	1.0	3514A66	719B195A26	
	1.3-36.0	...	75°	75°	0.2/2.0	880A988	719B195A12 ^⑤	
			75°	75°		880A971	719B195A09 ^⑩	
			75°	75°	1.0	3514A67	719B195A27	
KD-11 Three phase	0.2-4.5	...	75°	60°	0.2/2.0	3512A02	719B196A17	FT-42
			75°	60°		3514A24	719B196A18 ^⑩	
			75°	60°	1.0	3514A70	719B196A21	
	0.75-21	...	75°	75°	0.2/2.0	3490A82	719B196A11 ^⑤	
			75°	75°		3507A72	719B196A15 ^⑩	
			75°	75°	1.0	3514A68	719B196A19	
SD-2 Three phase	1.3-36.0	...	75°	75°	0.2/2.0	880A989	719B196A12 ^⑤	FT-42
			75°	75°		880A972	719B196A09 ^⑩	
			75°	75°	1.0	3514A69	719B196A20	
SD-2 Three phase	.8-25.6	125	60° Non-adjustable		0.2/2.0	188A271	1957 913	FT-42
		250			0.2/2.0		292B850A10	
		48			0.2/2.0		292B850A11	

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.

⑦ Ratings and styles of TD-4, TD-5, and TD-52 timing relays are listed on pages 83, 84. Order by style number.

⑧ TD-52 relay may be substituted for TD-5 relay.

⑨ CO-7 timer is a 2-unit CO-7 relay in FT-31 case. If other CO relay characteristics are desired, see pages 10 and 11.

⑩ Three phase unit is separately polarized.

⑪ 60° $\phi - \phi$ unit has a slightly reduced range.

⑫ Contacts like KD-11 relay (make-break contacts).

⑬ $\phi - \phi$ and 3ϕ units contacts to separate terminals.

* Standard setting.



K-Dar Compensator Distance Relaying Test Equipment

Test Box

For testing KD, KD-1, KD-3, KD-4, KD-5, KD-41, KD-10 and KD-11 relays.

Style Number	Internal Schematic
606B960A09 ^⑤	644B623

Three Zone Ground Protection

Order each relay separately by style number.
Each terminal consists of:

	A	or	B
1st Zone	KDXG		KDXG
2nd Zone	KDXG		KDXG
3rd Zone	KDXG		KDXG
Directional Timer	KRT		KDTG
Auxiliary Transformer	IK		IK

Auxiliary Current Transformer (For 50 and 60 Hz Applications)

Type	Outline and Drilling Plan	Style Number	Case Size
IK	187A151	540D759G01 ^⑤	...

Three Zone Ground Protection, Single Phase

Type	Rating Volts	Amps	Frequency, Hertz	Range: Ohms	Operation Indicator ^③	Dc Voltage Rating	Relay Data Internal Schematic	Style Number	Case Size
KDXG	70	5	60	.2-11.0	1.0 amp dc	48/125 250	185A189	290B660A09 ^⑤ 290B660A10	FT-42
					2.0 amp dc	48/125		290B660A11	

Directional Unit Timer Relays, for Use With KDXG Relays

Type	Timing Range: Zone 2	Zone 3	Operation Indicator (OI) 3 Per Relay For Zones 1, 2 and 3	Contact Switch (CS) 1 Per Relay	Dc Voltage Rating	Relay Data Internal Schematic	Style Number	Case Size
KRT	0.1-1.0 seconds	0.5-3.0 seconds	1 amp dc	1 amp dc	48 125 250	185A251	290B670A09 290B670A10 ^⑤ 290B670A11	FT-42
			2 amp dc	2 amp dc	125		290B670A12	

Type	Range: Secondary Ohms Line-To-Line	Contacts	Operation Indicator (OI) 3 Per Relay For Zones 1, 2 and 3	Contact Switch (CS) 1 Per Relay	Dc Voltage Rating	Relay Data Internal Schematic	Style Number	Case Size
KDTG Three phase	1.5-30	Spst-cc	1 amp dc	1 amp dc	48 125 250	836A716	670B032A11 670B032A09 ^⑤ 670B032A10	FT-42

^⑤ Denotes item available from stock.
^① ^② ^③ ^④ ^⑤ ^⑥ Standard notes, see page 3.

**Distance Relay, Solid State, Three Phase, Single Zone**

Type	Range: Secondary Ohms Line-to- Neutral	Volts		Maximum Sensitivity Angle ⑦	Indicating Contactor Switch 0.2-2.0 amp dc	Output	Relay Data		
		Dc	Ac (60 Hertz)				Internal Schematic	Style Number	Case Size
SKD-T	0.2-4.35	48	120	60°-80°	with	Contact	1346D93	1346D96A01	FT-42
		125	120					1346D96A02	
	.75-20.0	48	120					1346D96A03	
		125	120					1346D96A04	
	1.1-31.0	48	120					1346D96A05	
		125	120					1346D96A06	
SKD-1T	0.2-4.35	48	120	60°-80°	with	Contact	1346D97	1346D96A07	FT-42
		125	120					1346D96A08	
	.75-20.0	48	120					1346D96A09	
		125	120					1346D96A10	
	1.1-31.0	48	120					1346D96A11	
		125	120					1346D96A12	

Ground Distance Relay, Solid State, Three Phase, Single Zone

Type	Range Secondary Ohms	Volts		ICS Unit:	Maximum Sensitivity Angle⑦	Output	Relay Data		
							Internal Schematic	Style Number	Case Size
SDG-1T⑥	0.2-4.35	48		0.2-2.0 amp	60°-80°	Contact	1347D11	6698D11A06	FT-42
		125					1347D11	6698D11A07⑤	
	1.0-30.0	48		0.2-2.0 amp	60°-80°	Contact	1347D11	6698D11A04	
		125					1347D11	6698D11A05⑤	
SDG-2T⑥	1.0-30.0	48		0.0-2.0 amp	60°-80°	Contact	6694D77	6698D11A01	FT-42
	0.2-4.35	125					6694D77	6698D11A02⑤	
	1.0-30.0	125					6694D77	6698D11A03⑤	
SDG-4T⑥	0.2-4.35	48		0.2-2.0 amp	60°-80°	Contacts – one form A one form B	1347D14	6667D56A14	FT-42
		125					1347D14	6667D56A15	
	1.0-30.0	48		0.2-2.0 amp	60°-80°	Contacts – one form A one form B	1347D14	6667D56A12	
		125					1347D14	6667D56A13	
	1.0-30.0	48		0.2-2.0 amp	60°-80°	Contact – one form A	6685D04	6667D56A08	
		125					6685D04	6667D56A09	
	0.2-4.35	48		0.2-2.0 amp	60°-80°	Contact – one form A	6685D04	6667D56A10	
		125					6685D04	6667D56A11	

⑥ Changed or added since previous issue.

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.

⑦ Factory setting, 75°.



Out-of-Step Blocking Relay, Polyphase

Type	Volts		Range: Ohms	Maximum Sensitivity Angle ^⑦	Relay Data		Case Size
	Dc	Ac (60 Hz)			Internal Schematic	Style Number	
KS-3⑥	48	120	1.3-37	60°-80°	3526A98	1341D14A01	FT-32
	125	120				1341D14A02	
	250	120				1341D14A03	

Out-of-Step Sensing and Tripping Relay, Polyphase

Type	Volts Dc	Indicating Contactor Switch	Range: Ohms	Maximum Sensitivity Angle ^⑦	Internal Schematic	Style Number	Case Size
KST	125	0.2/2.0	.75-20	60°-80°	3490A33	6659D67A01	FT-42

⑥ Changed or added since previous issue.

⑤ Denotes item available from stock.

⑦ Factory setting, 75°.

Westinghouse Electric Corporation
Relay-Instrument Division
Coral Springs, FL 33065



June, 1985
Supersedes TD 41-020, pages 67-70
dated May, 1984

Mailed to: E, D, C/41-100A

Protective Relays 41-300: Differential

Percentage Differential, Inverse Time, Single Phase

With 0.2/2.0 Amps Dc Indicating Contact or Switch^⑤

Type	Application	Contacts	Frequency, Hertz	Amperes, Ac		Sensitivity	Relay Data			
				Minimum Trip	Instantaneous Trip (IIT)		Fault Detector	Internal Schematic	Style Number	Case Size
CA	Generator	Spst-cc	25 to 60	0.18 0.45	None	None	10% 25%	57D4553	290B892A09⑤ 290B892A10⑤	FT-21
		Dpst-cc		0.18 0.45			10% 25%	183A649	290B892A17 290B892A18	
	2-winding transformer	Spst-cc	50 to 60	2.75	None	None	50%	57D4554	290B893A09⑤	
					10-40 20-80 40-160			185A530	290B893A12 290B893A13 290B893A11	
		Dpst-cc			None			183A658	290B893A17⑤	
CA-16 ②	Bus	Spst-cc	60	0.15	None	None	Variable	185A419	671 B157A09⑤	FT-32
					10-40 20-80			185A443	671 B157A11	
					None	0.15 4-16		187A434	671 B157A20⑤	
		Dpst-cc			None	4-16 None		188A684	671 B157A15	
								629A286	671 B157A22	
					Spst-cc	0.9 1.0 2.0		None 40-160 40-160	None		185A419 185A443 185A443	671 B157A19 671 B157A14 671 B157A16
CA-26 ②	2 & 3 winding transformer	Spst-cc	60	1.25	None	None	Variable	185A419	671 B158A09	FT-32
					10-40 40-160	None		185A443	671 B158A16	
					None	4-16 4-16		185A442	671 B158A11	
						629A041		671 B158A14		
		Dpst-cc		None	None		629A286	671 B158A15		

Instantaneous Overcurrent, Second Harmonic Restraint

Type	Contacts	Applications Harmonic Restraint Supervision	Indicating Contact Switch	Sensitivity	IIT	Relay Data Internal Schematic	Style Number	Case Size
HRU	Spst-co	3-phase	0.2/2.0 Amp dc	.87 amps	(3 units) 20-80 amps	837A104	670B109A09	FT-31
	Spst-cc	1-phase		.87 amps .87 amps .87 amps 2.0 amps 4.0 amps	(1 unit) 1-4 amps 1-4 amps 20-80 amps 1-4 amps 4-16 amps	187A512 ^⑦ 861A783 ^⑦ 861A783 ^⑦ 187A512 ^⑦ 187A512 ^⑦	292B024A11 292B024A16 292B024A12 292B024A10 292B024A09	FT-21

Breaker Pole Disagreement

Type	Volts, dc	Indicating Contact Switch 0.2-2.0 amp dc	Timer Range: Seconds Left (T2)	Right (T3)	Scheme	Style Number	Case
SLB 10 amp continuous rating	125	2 Units	0.1-1.0	0.2-4	1327D68	1535F57A02 ^⑤	FT-42
	125	1 Unit	0.1-1.0	None	1328D44	1535F57A03	
	48	2 Units	0.1-1.0	0.2-4	1327D68	1535F57A04	
	48	1 Unit	0.1-1.0	None	1327D44	1535F57A05	
	250	2 Units	0.1-1.0	0.2-4	1327D68	1535F57A06	
SLB-1 ^⑥ 10 amp continuous rating	48	2 Units	.05-1.0	0.2-4.0	1749F11	1347D99A01	FT-42
	125	2 Units	.05-1.0	0.2-4.0	1749F11	1347D99A02 ^⑤	
	250	2 Units	.05-1.0	0.2-4.0	1749F11	1347D99A03	

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.

⑦ HRU and IIT contacts are in series.

⑧ HRU and IIT contacts are in parallel.

⑨ Changed or added since previous issue.



High Speed Variable Percentage Differential, Single Phase, 15% Second Harmonic Restraint

Type	Application	Contacts	Frequency, Hertz	Indicating Contactor Switch ^③	Sensitivity	Rating: Amperes Ac	Relay Data		
							Internal Schematic	Style Number	Case Size
HU ②	2-winding transformer	Spst-cc	60	0.2/2.0 Amps dc	30%	2.9-8.7	184A762	290B346A09 ^⑤	FT-31
		Dpst-cc					185A036	290B346A21 ^⑤	
		Spst-cc			35%		184A762	1962 553	
		Dpst-cc			35%		185A036	1963 125	
HU-1 ②	3-winding transformer	Spst-cc	60	0.2/2.0 Amps dc	30%	2.9-8.7	184A736	290B346A10 ^⑤	FT-31
		Dpst-cc					185A037	290B346A22 ^⑤	
		Spst-cc					184A736	1957 938	
HU-4 ②	4-restraint transformer and bus	Dpst-cc	60	0.2/2.0 Amps dc	30%	2.9-8.7	188A542	292B804A23 ^⑤	FT-42
					35%		188A542	292B804A22	
				1.0 Amp dc	35%		848A772	292B804A24	

Test Unit for HU, HU-1, HU-4 Relays

Type	Rectifier	Rating Dc 1-Second	Maximum Reverse Volts	Maximum Reverse Current	Nominal Input Rating	Rectifier Data		
						Internal Schematic	Case Outline Drawing	Style Number
TRB-1	304F	30 Amps	300	4 milli-amps	125 volts ac	184A234	184A117 (Fig. 2)	407C275G03

Solid State High Speed Differential, Three Phase

Type	Application	Dc Rating	Output	Frequency, Hertz	Indicator	Sensitivity Minimum Trip, Ac	Relay Data		
							Internal Schematic	Style Number ^⑥	Case Size
SA-1 ^②	Generator	48/125 Volts	Single	60	1 Amp.	.14 Amp.	629A406	290B225A10 ^⑤	FT-32
		250 Volts					876A613	290B225A14	
		48/125 Volts				.5 Amp.	877A847	290B225A13	
		250 Volts				.5 Amp.	3492A04	290B225A16	

Linear Coupler Instantaneous Differential, Single Phase

Type	Application	Contacts	Indicating Contactor Switch ^③	Rating Ohms	Volts, Dc	Relay Data		
						Internal Schematic	Style Number	Case Size
LC-1 ^②	Bus, and phase	Spst-cc	0.2/2.0 Amps dc	30-80	...	57D7918	1876 166	FT-11
LC-2 ^②	Bus, Phase, and ground			30-80	48	762A696	606B504A09	
					125	848A931	606B504A13 ^⑥	
					250		606B504A11	

Permanent Test Facilities For Linear Coupler System

Equipment	Quantity	Internal Schematic	Style Number
W-2 Test Switch	1	407C096	781A444G01 ^⑦
Test Transformer	1		119D114A10 ^⑦
Resistor, 0.5 Ohm, 4"	1		1002399-A ^⑦
RC-351 Voltmeter, 0.5 Volt (for total bus load up to 2500 amp)	3		409C535A21
RC-351 Voltmeter, 1.0 Volt (for bus loads 2500 to 5000 amp)	3		409C535A22

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑦ Obtain price and shipment from Switchgear Division, East Pittsburgh, Pa.

⑧ Style includes external reactor assembly 205C676G01.

**Transformers****Auxiliary Current Transformer**

Used to form neutral with negative sequence relays, Types COQ, CRQ, KRQ, IRQ, see P.B. 42-850.

Style Number	List Price
7881A01G01 (5/5)⑤	Refer to Energy Metering and Control Division, Raleigh, N.C.
7881A01G02 (10/5)⑤	
7881A01G03 (15/5)⑤	

Type A Auto-Balance Transformer

For use with CA-26 relays. See Catalog Section 42-000 (P.B. 42-852).

Volt-amperes	Frequency, Hertz	Ratio Range	Phase	Style Number	List Price
50 100	25 to 60	10.8/5 to 5/5	1	7881A16G01⑤ 7881A16G02	Refer to Energy Metering and Control Division, Raleigh, N.C.

High Impedance Bus Differential, Single Phase

Type	Overvoltage Unit(V) (Adjustable)	Instantaneous Overcurrent Unit(IT)	Indicating Contactor Switch(ICS)	Internal Schematic	Style Number	Case Size
KAB ② ④	75-200 Vac 150-400 Vac	3-48 Amps. (Low Tap 3-12A) (High Tap 12-48A)	0.2/2.0 Amps. dc	9643A69 9643A94	6668D37A22⑤ 6668D37A27	FT-21
	75-200	None		9643A71	6668D37A26	

Cylinder unit adjusting tool for KAB relay, Style Number 774B180G01⑤.

④ Changed or added since previous issue.

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ Standard notes, see page 3.





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Protective Relays 41-200: Power and Product

Over Power

Type	Application and Relay Rating				Contacts	Indicating Contactor Switch③	Maximum Torque Angle	Relay Data		
	Single Phase		Three Phase					Internal Schematic	Style Number	Case Size
	Volts	Single Phase Watts	Volts Line to Line	√3 Single Phase Watts						
CW② Single unit relay	120	20-120 100-600	...	.....	Spst-cc	0.2/2.0 amps dc	I in phase with V	183A773	289B988A09⑤ 289B988A10	FT-21
	120	20-120 100-600	...	.....	Dpst-cc			183A774	289B988A11 289B988A12	
	...	.....	120	20-120 100-600	Spst-cc		I leads V by 30°	183A776	289B988A17⑤ 289B988A18⑤	FT-11
	...	.....	240	35-200	Spst-cc			183A776	289B988A25	
	...	.....	208	35-200 175-1000	Spst-cc			183A776	289B988A21⑤ 289B988A22	
	...	.....	120	20-120 100-600	Dpst-cc			184A554	289B988A19 289B988A20	
	...	.....	120	20-120 100-600	Spdt-cc and co⑦	None		629A173	289B988A23 289B988A24	
	...									

Under Power

Type	Application and Relay Rating				Contacts	Indicating Contactor Switch③	Maximum Torque Angle	Relay Data		
	Single Phase		Three Phase					Internal Schematic	Style Number	Case Size
	Volts	Single Phase Watts	Volts Line to Line	√ 3 Single Phase Watts						
CW②	120	20-120 100-600	...	...	Spst-co	0.2/2.0 amp dc	I in phase with V	184A954	289B988A14 289B988A15	FT-21
Single unit relay										

Over and Underpower, Three Phase, Without ICS^③ Unit

Type and Contacts	Volts Line to Line	Amps	I _L × V _{L-L} √3 Single Phase Watts		Maximum Torque Angle	Relay Data		
			Range	Taps		Internal Schematic	Style Number	Case Size
CWD② Spdt-cc and co	120	5	10-60 20-120 50-300 100-600	Without	I leads V by 30°	188A024	292B332A18 292B332A09 292B332A11 292B332A10	FT-11
		8	150-900				292B332A19	
	120	5 8	20-120 100-600	With	188A396	292B332A26 292B332A27		
		208	5 8			35-200 175-1000	292B332A28 292B332A25	

^⑤ Denotes item available from stock.

^①^②^③^④^⑤^⑥ Standard notes, see page 3.

^⑦ Electrically common moving contact.



Product, Single Phase, Ground Protection

Type	Polarization	Contacts	Product Range I ²	Indicating Contactor Switch③	Instantaneous Trip: IIT ④	Relay Data			
						Internal Schematic	Style Number	Case Size	
CWC②	Current	Spst-cc	.25-4.0	0.2/2.0 amps dc	None	57D7919	291 B935A09	FT-21	
		Dpst-cc	57D7920			670B989A09			
		Spst-cc	2.25-36		4-16 10-40	57D7921	291 B935A21 291 B935A22		
					None	57D7919	291 B935A10		
					10-40 20-80	57D7921	291 B935A23 291 B935A24		
CWP② ⑦	Voltage	Spst-cc	Volt-Amps 20-150	0.2/2.0 amps dc	None	183A711	291 B928A09	FT-21	
					2-8 4-16 10-40	183A713	291 B928A11 291 B928A12 291 B928A13		
					None	183A711	291 B928A10		
			75-600		2-8 4-16 10-40	183A113	291 B928A14 291 B928A15 291 B928A16		
					None	183A712	291 B928A23		
					2-8 4-16 10-40	183A714	291 B928A17 291 B928A18 291 B928A19		
		Dpst-cc	20-150		None	183A712	291 B928A24	FT-21	
					2-8 4-16 10-40	183A714	291 B928A20 291 B928A21 291 B928A22		
					None	183A712	291 B928A24		
			75-600		2-8 4-16 10-40	183A714	291 B928A20 291 B928A21 291 B928A22		
					None	183A712	291 B928A24		
					2-8 4-16 10-40	183A714	291 B928A20 291 B928A21 291 B928A22		
CWP-1 ⑦	Voltage	Spst-cc	Sensitivity 0.3 amp at 250V	0.2/2.0 amps dc	None	188A417	292B865A09	FT-31	
		Dpst-cc			None	188A425	292B865A10		

Power Flow, Directional, Three Phase

Type	Application	Rating: Ac		Operation Indicator	Contactor Switch (CS)	Indicating Contactor Switch ^③	Relay Data		
		Amps	Volts				Internal Schematic	Style Number	Case Size
H-3 ^② ^⑧	Line Protection I lags by 45°	5	120 208	1.0 amp dc	1.0 amp dc	None	183A335	1955 361 ^⑤ 1955 363	FT-22
	Generator protection I in phase (watt relay)	5	 70 120				183A335	1956 200 1955 515	
HV-4 ^② ^⑧	Motor transfer V ₁ leads V ₂ by 55°	..	120	0.2/2.0 amps dc	1.0 amp dc	None	183A346	1955 519	FT-22

Reverse Power, Single Phase

Type and Time Curve	Contacts	Indicating Contactor Switch ^③	Volts Line-to-Line	Relay Data		
				Internal Schematic	Style Number	Case Size
CRN-1 ^②	Spst-cc	0.2/2.0 amps dc	120 208	184A404	290B038A09 ^⑤ 290B038A11 ^⑤	FT-21
Inverse	Dpst-cc		120 208	184A405	290B038A10 290B038A12	

^⑤ Denotes item available from stock.

^① ^② ^③ ^④ ^⑤ ^⑥ Standard notes, see page 3.

^⑦ See page 35 for potential polarizing transformers.

^⑧ H-3, HV-3, HV-4 relays have electrically independent contacts, circuit opening and circuit closing.



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Protective Relays 41-200: Voltage

Over or Undervoltage, Non-Directional, Single Phase

Type and Time Curve	Contacts	Frequency Hertz	Indicating Contactor Switch ③	Volts: Ac		Relay Data			
				Nominal	Adjustable Range	Internal Schematic	Style Number	Case Size	
Undervoltage									
CV-1② Long	Spst-cc	60	0.2/2.0 amp dc	120	55-140	182A724	1875 506⑤	FT-11	
				240	110-280		1875 507		
				480	220-560		288B549A13		
	Dpst-cc			120	55-140	182A725	1875 514		
				240	110-280		1875 515		
				480	220-560		289B053A13		
CV-2② Short	Spst-cc			120	55-140	182A724	1875 508⑤		
				240	110-280		1875 509⑤		
				480	220-560		288B549A21		
	Dpst-cc			120	55-140	182A725	1875 516		
				240	110-280		1875 517		
				480	220-560		289B053A25		
Overvoltage									
CV-4② Long	Spst-cc	60	0.2/2.0 amp dc	120	55-140	182A724	1875 510⑤	FT-11	
				240	110-280		1875 511		
				480	220-560		288B584A13		
	Dpst-cc			120	55-140	182A725	1875 518		
				240	110-280		1875 519		
				480	220-560		288B975A13		
CV-5② Short	Spst-cc			120	55-140	182A724	1875 512⑤		
				240	110-280		1875 513		
				480	220-560		288B584A21		
	Dpst-cc			120	55-140	182A725	1875 520		
				240	110-280		1875 521		
				480	220-560		288B975A25		
			11V 120-200 Vac	120	55-140	183A490	1956 061		
Over or Undervoltage									
CV-6② Long	Spdt-cc and co⑦	60	0.2/2.0 amp dc in over-voltage circuit	120	55-140	182A727	1875 522⑤	FT-11	
				240	110-280		1875 523		
				480	220-560		288B585A13		
CV-7② Short				120	55-140	182A727	1875 524⑤		
				240	110-280		1875 525		
				480	220-560		288B585A22		
CV-6② Long	Spdt cc & co	60	0.02/2.0 amp dc in under-voltage circuit	120	55-140	183A283	1962 090	FT-11	
				240	110-280		1961 007		
CV-7② Short				120	55-140	183A283	1955 332		
				240	110-280		1961 875		

⑤ Denotes item available from stock.
①②③④⑤⑥ Standard notes, see page 3.
⑦ Electrically common moving contact.
⑧ Continuous rating.



Over or Undervoltage, Non-Directional, Single Phase Continued

Type and Time Curve	Contacts	Frequency, Hertz	Indicating Contactor Switch ③	IIV ⑧	Volts: Ac		Relay Data		
					Nominal	Adjustable Range	Internal Schematic	Style Number	Case Size
Third Harmonic Voltage Comparator									
DGSH	Spdt	60	0.2/2.0 amps dc	....	....	....	3058A52	571B736A09⑤	FT-31
Overvoltage, 8 % Pickup									
CV-8② Short	Spst-cc	60	0.2/2.0 amp dc	None	67⑤	5.4⑩	182A743	1875 526	FT-21
					199	16.0⑩	182A726	1875 527⑤	FT-11
					67⑤	5.4-20	185A038	183A205A15⑤	FT-21
					199	16-40	188A307	288B618A12⑤	FT-11
					290	22.5⑩	185A129	1963 590	FT-21
	Dpst-cc				67	5.4⑩	183A499	1956 201	FT-21
					199	16⑩	184A192	1961 422	FT-11
					199	16⑩	629A001	288B618A22	FT-11
	Spdt-cc and co								
				None	199	16.0⑩	184A563	288B618A21	
Undervoltage, Frequency Compensated									
CV-21	Spst-cc	30-90	0.2/2.0 amps dc	None	120	55-140	185A133	290B568A09	FT-11
					240	110-280		290B568A10	
Long	Dpst-cc	30-90			120	55-140	185A134	290B571A09	
CV-22	Spst-cc	30-90			120	55-140	185A133	290B568A21	
					240	110-280		290B568A22	
Short	Dpst-cc	30-90			120	55-140	185A134	290B571A21	
Overvoltage, Frequency Compensated									
CV-24	Spst-cc	30-90	0.2/2.0 amps dc	None	120	55-140	185A133	290B569A09	FT-11
					120-200	55-140		290B569A10	
Long	Dpst-cc	30-90		None	120	55-140	185A134	290B572A09	
					120-200	55-140		290B572A10	
CV-25	Spst-cc	30-90			120	55-140	185A133	290B569A21	
					240	110-280		290B569A22	
Short		30-90			120-200	55-140	187A998	290B569A24	
					240	110-280		290B569A23	
	Dpst-cc	30-90			120	55-140	185A134	290B572A21	
					120-200	55-140	187A994	290B572A22	
Over or Undervoltage, Frequency Compensated									
CV-26 Long	Spdt-cc and co⑦	30-90	0.2/2.0 amps dc	None	120	55-140	185A135	290B570A09	FT-11
					240	110-280		290B570A10	
CV-27 Short	Spdt-cc and co⑦	30-90			120	55-140	185A135	290B570A21	
					240	110-280		290B570A22	

⑤ Denotes item available from stock.

①②③④⑤⑧ Standard notes, see page 3.

⑦ Electrically common moving contact.

⑧ Continuous rating.

⑩ Use one style number 1956 449 resistor assembly (8½", 375 ohms) with CV-8 relay for sensitive detection and 160 volts continuous. See DB 41-200.

⑩ Not adjustable.

**Over or Undervoltage, Three Phase**

Type and Time Curve	Application	Contacts	Indicating Contactor Switch ③	Volts: Ac		Control Volts: Dc	Relay Data		
				Nominal	Adjustable Range		Internal Schematic	Style Number	Case Size
CP②	Undervoltage or Reverse Phase	Spdt-cc and co⑦	None	120	70-120		183A962	289B415A09⑤	FT-11
				240	140-240	.....		289B415A10⑤	
				480	280-480	.....		289B415A22	
		0.2/2.0 amps dc		120	70-120		183A960	289B415A13⑩⑤	
				240	140-240	.....		289B415A14⑩	
				480	280-480	.....		289B415A24	
				120	70-120		183A961	289B415A17⑨	
				240	140-240	.....		289B415A18⑨	
				480	280-480	.....		289B415A26⑨	
		Spdt-cc and co⑥	0.2/2.0 amps dc	120	70-120	24/48	184A202	289B889A09⑩	
				120	70-120	125/250		289B889A11⑩⑤	
			None	120	70-120	230 (ac)	184A469	289B889A13	
				240	140-240	24/48	184A202	289B889A21⑩	
		0.2/2.0 amps dc		240	140-240	125/250		289B889A23⑩	
				480	280-480	24/48		289B889A24⑩	
				480	280-480	125/250		289B889A25⑩	

Voltage, Three Phase

Type	Contacts	Indicating Contactor Switch ③	Adjustable Voltage Range	Relay Data		
				Internal Schematic	Style Number	Case Size
KP	co and cc	1 amp dc None	30-120 volts, 60 Hertz	862A656 862A967	691B369A09 691B369A10	FT-21

Over or Undervoltage, Three PhaseInstantaneous Negative Sequence Overvoltage and Inverse Time Delay Undervoltage
60 Hertz

Type	Contacts	Adjustable Voltage Range	Sensitivity ⑩	Indicating Contactor Switch ③	Aux. Time Delay Relay	Relay Data		
						Internal Schematic	Style Number	Case Size
CVQ②	Spdt-cc and co	55-140	5% - 10% adjustable	0.2/2.0 amps dc	None	188A644	293B146A09⑤	FT-31
					6 Cycle	880A343	293B146A10	
					1.0 amps ac 2.0 amps ac	None 763A013	1963 847 1963 391	

Over or Undervoltage, High Speed, Non-Directional

Type	Contacts	Indicating Contactor Switch ③	Adjustable Range Ac	Relay Data		
				Internal Schematic	Style Number	Case Size
KV-1	Spdt	None 1 amp dc	15-45 under or over	184A198	1961 945	FT-21
			15-45 over 108-132 over	184A262	1961 563 290B414A22	
			80-100 under or over 90-105 under or over	185A336	290B414A27 290B414A28	

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑦ Electrically common moving contact.

⑧ Electrically independent front and back contact circuits.

⑨ ICS in high voltage contact circuit only.

⑩ ICS in low voltage contact circuit only.

⑪ Percentage of phase-to-neutral voltage - negative sequence unit.

⑫ Modification kit available for 5th harmonic suppression . . . Style 1600C65G01.



Over or Undervoltage, Non-Directional

Type and Time Curve	Contacts	Indicating Contactor Switch ③	Time Curve: Seconds⑥	Volts: Ac		Relay Data			
				Maximum Continuous	Adjustable Range	Internal Schematic	Style Number	Case Size	
Adjustable, Under and Overvoltage									
CVD 60 Hertz② Inverse	Spdt-cc and co⑦	None		148	105-135	184A176	1961 156	FT-11	
			1.9	176	40-160		289B970A09⑤		
			....	296	210-270		289B970A13		
			1.9	352	80-320		289B970A10		
			2.0	132	30-120	184A176	289B970A20		
			1.5	132	30-120		289B970A21		
			....	253	180-230		289B970A16		
			0.2/2.0 amps dc	1.5	132	30-120	184A973		289B970A12
				1.9	176	40-160	184A793		289B970A15
						148	105-135		184A793	1962 734
			.25 amp ac (ACS)		148	105-135	184A538		1961 943
			2 operation indicators 0.2/2.0 amps dc	2.0	132	30-120	629A184		289B970A28

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.

⑦ Electrically common moving contact.

⑥ The time it takes relay to close contacts from mid scale to end scale with "Test Point" settings.
(Refer to M scale.)



May, 1986
Supersedes TD 41-020, pages 25-40,
dated May, 1984

Mailed to: E, D, C/41-100A

Protective Relays 41-100: Current Directional

Overcurrent, Directional, Single Phase, 60 Hertz For Phase and Ground Fault Protection

Type and Time Curve	Type of Protection	Contacts	Operation Indicator or Indicating Contactor Switch③	Current Range: Amps Ac		Relay Data				
				Time Unit	IIT Unit④	Internal Schematic	Style Number	Case Size		
CR-6②	Phase	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	57D4549	288B563A12	FT-21		
Definite	132 volts ac continuous			2-6			1875 555⑤			
				4-12					1875 556	
				0.5-2.5					57D4520	288B563A13
				2-8					288B563A14	
				4-16					288B563A15	
				10-40					288B563A16	
				20-80					288B563A21	
40-160										
2-6	4-16	57D4520	1875 557							
10-40	1875 558									
20-80	288B563A22									
40-160	288B563A23									
4-12	10-40	57D4520	1875 559							
20-80	1875 560									
CR-7②	Phase	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	57D4549	288B571A12	FT-21		
Moderately inverse	132 volts ac continuous			2-6			1875 567			
				4-12			1875 568			
				0.5-2.5			57D4520		288B571A13	
				2-8			288B571A14			
				4-16			288B571A15			
				10-40						
				20-80						
40-160										
2-6	4-16	57D4520	1875 569							
10-40	1875 570									
4-12	10-40	57D4520	1875 571							
20-80	1875 572									
40-160	288B571A21									
CR-8②	Phase	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	57D4549	288B574A12	FT-21		
Inverse	132 volts ac continuous			2-6			1875 579⑤			
				4-12			1875 580⑤			
				0.5-2.5			57D4520		288B574A13	
				2-8			288B574A14			
				4-16			288B574A15			
				10-40			288B574A16			
				20-80						
40-160										
2-6	4-16	57D4520	1875 581							
10-40	1875 582									
4-12	4-16	57D4520	288B574A22							
10-40	1875 583									
20-80	1875 584									
40-160	1956 011									
CR-9②	Phase	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	57D4549	288B576A12	FT-21		
Very inverse	132 volts ac continuous			2-6			1875 591⑤			
				4-12			1875 592⑤			
				0.5-2.5			57D4520		288B576A13	
				2-8			288B576A14			
				4-16			288B576A15			
				10-40						
				20-80						
40-160										
2-6	4-16	57D4520	1875 593							
10-40	1875 594									
4-12	10-40	57D4520	1875 595							
20-80	1875 596									

⑤ Denotes item available from stock.
①②③④⑤⑥ Standard notes, see page 3.



Overcurrent, Directional, Single Phase, 60 Hertz, Continued
For Phase and Ground Fault Protection

Type and Time Curve	Type of Protection	Contacts	Operation Indicator or Indicating Contactor Switch ^⑥	Current Range: Amps Ac		Relay Data		
				Time Unit	IIT Unit ^④	Internal Schematic	Style Number	Case Size
CR-11^② Extremely inverse	Phase 132 volts ac continuous	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4549	288B940A09 288B940A10 288B940A11	FT-21
				0.5-2.5		57D4520	288B940A12 288B940A13 288B940A14	
				2-6		57D4520	288B940A16 288B940A17	
				4-12		57D4520	288B940A15	
CRC-6^② Definite	Ground Current Polarized 230 amp/1 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6	None	57D4539	1876 952 1876 953	FT-21
				0.5-2.5		57D4540	1876 954 1876 955	
				2-6			1876 956 1876 957	
CRC-7^② Moderately inverse	Ground Current Polarized 230 amp/1 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6	None	57D4539	1875 597 1875 598	FT-21
				0.5-2.5		57D4540	1876 964 1875 599	
				2-6			1876 965 1875 600 1878 777	
CRC-8^② Inverse	Ground Current Polarized 230 amp/1 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6	None	57D4539	1875 601 1875 602	FT-21
				0.5-2.5		57D4540	1876 966 1875 603 288B582A21	
				2-6			1876 967 1875 604	
CRC-9^② Very inverse	Ground Current Polarized 230 amp/1 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6	None	57D4539	1875 605 1875 606	FT-21
				0.5-2.5		57D4540	1876 968 1875 607	
				2-6			1876 969 1875 608	
CRC-11^② Extremely inverse	Ground Current Polarized 230 amp/1 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4539	289B370A09 289B370A10 289B370A11	FT-21
				0.5-2.5		57D4540	289B370A13 289B370A14 289B370A15 289B370A16	
				2-6			289B370A17 289B370A18 289B370A19 289B370A20	
				4-12			289B370A21 289B370A22 289B370A23 289B370A24	
CRP-7^{② ⑦} Moderately inverse	Ground Voltage Polarized 208 volt/30 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6	None	57D4545	1875 561 1875 562	FT-21
				0.5-2.5		57D4546	1875 563 1875 564	
				2-6			1875 565 1875 566	

^⑥ Denotes item available from stock.

^{① ② ③ ④ ⑤ ⑥} Standard notes, see page 3.

^⑦ See page 35 for potential polarizing transformers.

**Overcurrent, Directional, Single Phase, 60 Hertz, Continued**
For Phase and Ground Fault Protection

Type and Time Curve	Type of Protection	Contacts	Indicating Contactor Switch ^③	Current Range: Amps Ac		Relay Data		
				Time Unit	IIT Unit ^④	Internal Schematic	Style Number	Case Size
CRP-8 ^{②⑦} Inverse	Ground Voltage Polarized 208 volt/30 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6	None	57D4545	1875 573 1875 574 ^⑤	FT-21
				0.5-2.5	4-16 10-40 20-80 40-160	57D4546	1875 575 1875 576 288B573A22 288B573A23	
				2-6	4-16 10-40 20-80		1875 577 1875 578 1878 818	
CRP-9 ^{②⑦} Very inverse	Ground Voltage Polarized 208 volt/1 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6	None	57D4545	1875 585 ^⑤ 1875 586	FT-21
				0.5-2.5	4-16 10-40 20-80	57D4546	1875 587 1875 588 1956 014	
				2-6	4-16 10-40		1875 589 1875 590	
CRP-11 ^② Extremely inverse	Ground Voltage Polarized 208 volt/30 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4545	1878 843 1955 393 1955 394	FT-21
				0.5-2.5	2-8 4-16	57D4546	289B311A17 289B311A18	
				2-6	1-4 2-8 4-16 10-40 40-160		289B311A23 289B311A26 289B311A19 289B311A20 289B311A25	
				4-12	2-8 10-40 20-80		289B311A24 289B311A21 289B311A22	
CRD-6 ^{②⑦} Definite	Ground Current and Voltage Polarized 208 volt/30 sec 230 amp/1 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4561	1876 796 1876 797 1876 798	FT-31
				0.5-2.5	2-8 4-16	57D4560	1876 799 1876 800	
				2-6	4-16 10-40		1876 801 1876 802	
				4-12	10-40 20-80		1876 803 1876 804	
CRD-7 ^{②⑦} Moderately inverse	Ground Current and Voltage Polarized 208 volt/30 sec 230 amp/1 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4561	1876 805 1876 806 1876 807	FT-31
				0.5-2.5	2-8 4-16 10-40	57D4560	1876 808 1876 809 288B597A23	
				2-6	4-16 10-40		1876 810 1876 811	
				4-12	10-40 20-80		1876 812 1876 813	
CRD-8 ^{②⑦} Inverse	Ground Current and Voltage Polarized 208 volt/30 sec 230 amp/1 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4561	1876 814 1876 815 1876 816	FT-31
				0.5-2.5	2-8 4-16 10-40 20-80	57D4560	1876 817 1876 818 288B601A24 288B601A25	
				2-6	4-16 10-40 20-80		1876 819 1876 820 1878 933	
				4-12	10-40 20-80		1876 821 1876 822	

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ Standard notes, see page 3.

⑦ See page 35 for potential polarizing transformers.



Overcurrent, Directional, Single Phase, 60 Hertz, Continued
For Phase and Ground Fault Protection

Type and Time Curve	Type of Protection	Contacts	Indicating Contactor Switch ^③	Current Range: Amps Ac		Relay Data		
				Time Unit	IIT Unit ^④	Internal Schematic	Style Number	Case Size
CRD-9 ② ⑦ Very inverse	Ground Current and Voltage Polarized 208 volt/30 sec 230 amp/1 sec	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	57D4561	1876 823	FT-31
				2-6			1876 824	
				4-12			1876 825	
				0.5-2.5	2-8	57D4560	1876 826	
					4-16		1876 827	
				2-6	4-16		1876 828	
CRD-11 ② ⑦ Extremely inverse	Ground Current and Voltage Polarized	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	57D4561	1955 395	FT-31
				2-6			1955 396	
				4-12			1955 397	
				0.5-2.5	2-8	57D4560	289B230A17	
					4-16		289B230A18	
				2-6	4-16		289B230A19	
					10-40		289B230A20	
				4-12	10-40		289B230A21	
					20-80		289B230A22	

Overcurrent, Directional, Negative Sequence, Time Overcurrent
For Ground Fault Protection

Type and Time Curve	Contacts	Indicating Contactor Switch ^③	Current Range: Amps Ac		Relay Data		
			Time Unit	Instantaneous Trip: IIT Unit ^④	Internal Schematic	Style Number	Case Size
CRQ-9 Very inverse	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	184A965	774B230A09	FT-42
			2-6			774B230A10	
			4-12			774B230A11	
			0.5-2.5	2-8	184A966	774B230A12	
				4-16		774B230A13	
				10-40		774B230A14	
				20-80		774B230A15	
			2-6	4-16		774B230A16	
				10-40		774B230A17	
				20-80		774B230A18	
			4-12	10-40		774B230A19	
				20-80		774B230A20	

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ Standard notes, see page 3.

⑦ See page 35 for potential polarizing transformers.

**Overcurrent, Directional, Single Phase, With Instantaneous Trip Unit**

24/48/125/250 Volt Dc Control

Type, Time Curve and Contacts	Application	Indicating Contactor Switch ^③	Current Range: Amps Ac		Relay Data		
			Time Unit	Instantaneous Trip	Internal Schematic	Style Number	Case Size
IRC-2② Short	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A034	289B435A09	FT-31
				4-16		289B435A10	
				10-40		289B435A11	
				20-80		289B435A12	
Spst-cc	Current Polarized		2-6	4-16		289B435A13	
				10-40		289B435A14	
			4-12	20-80		289B435A15	
				10-40		289B435A17	
IRC-5② Long	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A034	289B523A09	FT-31
				4-16		289B523A10	
				10-40		289B523A11	
				20-80		289B523A12	
Spst-cc	Current Polarized		2-6	4-16		289B523A13	
				10-40		289B523A14	
			4-12	20-80		289B523A15	
				10-40		289B523A17	
IRC-6② Definite	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A034	289B436A09	FT-31
				4-16		289B436A10	
				10-40		289B436A11	
				20-80		289B436A12	
Spst-cc	Current Polarized		2-6	4-16		289B436A13	
				10-40		289B436A14	
			4-12	20-80		289B436A15	
				10-40		289B436A17	
IRC-7② Moderately inverse	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A034	289B437A09	FT-31
				4-16		289B437A10	
				10-40		289B437A11	
				20-80		289B437A12	
Spst-cc	Current Polarized		2-6	4-16		289B437A13	
				10-40		289B437A14	
			4-12	20-80		289B437A15	
				10-40		289B437A17	
IRC-8② Inverse	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A034	289B438A09	FT-31
				4-16		289B438A10	
				10-40		289B438A11	
				20-80		289B438A12	
Spst-cc	Current Polarized		2-6	4-16		289B438A13	
				10-40		289B438A14	
			4-12	20-80		289B438A15	
				10-40		289B438A17	
IRC-9② Very inverse	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A034	289B439A09	FT-31
				4-16		289B439A10	
				10-40		289B439A11	
				20-80		289B439A12	
Spst-cc	Current Polarized		2-6	4-16		289B439A13	
				10-40		289B439A14	
			4-12	20-80		289B439A15	
				10-40		289B439A17	
IRC-11② Extremely inverse	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A034	289B931A09	FT-31
				4-16		289B931A10	
				10-40		289B931A11	
				20-80		289B931A12	
Spst-cc	Current Polarized		2-6	4-16		289B931A13	
				10-40		289B931A14	
			4-12	20-80		289B931A15	
				10-40		289B931A17	

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.



Overcurrent, Directional, Single Phase, With Instantaneous Trip Unit, Continued
24/48/125/250 Volt Dc Control

Type, Time Curve and Contacts	Application	Indicating Contactor Switch③	Current Range: Amps Ac		Relay Data		
			Time Unit	Instantaneous Trip⑦	Internal Schematic	Style Number	Case Size
IRD-6②⑦	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A020	289B446A09	FT-41
Definite				4-16		289B446A10	
Spst-cc				10-40		289B446A11	
	20-80	289B446A12					
	Current and Voltage Polarized		2-6	4-16		289B446A13	
				10-40		289B446A14	
				20-80		289B446A15	
	230 amps/1 sec 208 volts/30 sec		4-12	10-40		289B446A17	
				20-80		289B446A18	
IRD-7②⑦	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A020	289B447A09	FT-41
Moderately inverse				4-16		289B447A10	
Spst-cc				10-40		289B447A11	
	20-80	289B447A12					
	Current and Voltage Polarized		2-6	4-16		289B447A13	
				10-40		289B447A14	
				20-80		289B447A15	
	230 amps/1 sec 208 volts/30 sec		4-12	10-40		289B447A17	
				20-80		289B447A18	
IRD-8②⑦	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A020	289B448A09	FT-41
Inverse				4-16		289B448A10	
Spst-cc				10-40		289B448A11	
	20-80	289B448A12					
	Current and Voltage Polarized		2-6	4-16		289B448A13	
				10-40		289B448A14	
				20-80		289B448A15	
	230 amps/1 sec 208 volts/30 sec		4-12	10-40		289B448A17	
				20-80		289B448A18	
IRD-9②⑦	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A020	289B449A09	FT-41
Very inverse				4-16		289B449A10⑤	
Spst-cc				10-40		289B449A11⑤	
	20-80	289B449A12					
	Current and Voltage Polarized		1-4	1-4		289B449A35	
				2-8		289B449A34	
				4-16		289B449A16	
	230 amps/1 sec 208 volts/30 sec			10-40		289B449A33	
				20-80		289B449A32	
			2-6	4-16		289B449A13	
				10-40		289B449A14	
				20-80		289B449A15	
			4-12	10-40		289B449A17	
				20-80		289B449A18	
IRD-11②⑦	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8	184A020	289B932A09	FT-41
Extremely inverse				4-16		289B932A10	
Spst-cc				10-40		289B932A11	
	20-80	289B932A12					
	Current and Voltage Polarized		2-6	4-16		289B932A13	
				10-40		289B932A14	
				20-80		289B932A15	
	230 amps/1 sec 208 volts/30 sec		4-12	10-40		289B932A17	
				20-80		289B932A18	

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard footnotes, see page 3.

⑦ See potential polarizing transformers, page 35.

**Overcurrent, Directional, Single Phase, With Instantaneous Trip Unit, Continued**
24/48/125/250 Volt Dc Control

Type, Time Curve and Contacts	Application	Indicating Contactor Switch③	Current Range: Amps Ac		Relay Data		
			Time Unit	Instantaneous Trip	Internal Schematic	Style Number	Case Size
IRP-7②⑦ Moderately inverse Spst-cc	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8 4-16 10-40 20-80	184A033	289B442A09 289B442A10 289B442A11 289B442A12	FT-31
				2-6 1-4 4-16 10-40 20-80		289B442A16 289B442A13 289B442A14 289B442A15	
	Voltage Polarized		208 volts/30 sec	4-12	10-40 20-80	289B442A17 289B442A18	
IRP-8②⑦ Inverse Spst-cc	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8 4-16 10-40 20-80	184A033	289B443A09 289B443A10 289B443A11 289B443A12	FT-31
				2-6 4-16 10-40 20-80		289B443A13 289B443A14 289B443A15	
	Voltage Polarized		208 volts/30 sec	4-12	10-40 20-80	289B443A17 289B443A18	
IRP-9②⑦ Very inverse Spst-cc	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	5-2 2-8 4-16 10-40 20-80	184A033	289B444A16 289B444A09 289B444A10 289B444A11 289B444A12	FT-31
				2-6 4-16 10-40 20-80		289B444A13 289B444A14 289B444A15	
	Voltage Polarized		208 volts/30 sec	4-12	10-40 20-80	289B444A17 289B444A18	
IRP-11②⑦ Extremely inverse Spst-cc	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	2-8 4-16 10-40 20-80	184A033	289B933A09 289B933A10 289B933A11 289B933A12	FT-31
				2-6 4-16 10-40 20-80		289B933A13 289B933A14 289B933A15	
	Voltage Polarized		208 volts/30 sec	4-12	10-40 20-80	289B933A17 289B933A18	

Type, Time Curve and Contacts	Application	Indicating Contactor Switch	CS-1 Auxiliary Switch	Control Circuit: Volts Dc	Current Range: Amps Ac		Relay Data		
					Time Unit	Instantaneous Trip	Internal Schematic	Style Number	Case Size
IRV-2②	Phase Fault Detection	0.2/2.0 amp dc 2 ICS units per relay	48/125/250 volts dc	48/125/250	0.5-2.5	1-4	185A421	290B089A18	FT-31
Short						2-8		290B089A09	
Spst-cc	Voltage Polarized				4-16	290B089A10			
					10-40	290B089A11			
	120 volts 60 Hertz	20-80	290B089A12						
		2-6	4-16	290B089A13					
10-40	290B089A14								
20-80	290B089A15								
4-12	4-16	290B089A19							
	10-40	290B089A16							
	20-80	290B089A17							

② Denotes item available from stock.

①②③④⑤⑥ Standard footnotes, see page 3.

⑦ See potential polarizing transformers, page 35.



Overcurrent, Directional and Time, With Instantaneous Trip Unit, Continued
24 or 48/125/250 Volt Dc Control

Type, Time Curve and Contacts	Application	Indicating Contactor Switch	CS-1 Auxiliary Switch	Control Circuit: Volts Dc	Current Range: Amps Ac		Relay Data		
					Time Unit	Instantaneous Trip	Internal Schematic	Style Number	Case Size
IRV-6②	Phase Fault Detection	0.2/2.0 amp dc 2 ICS units per relay	48/125/250 volts dc	48/125/250	0.5-2.5	1-4 2-8 4-16 10-40 20-80	185A421	290B091A18 290B091A09 290B091A10 290B091A11 290B091A12	FT-31
Definite	Voltage Polarized								
Spst-cc	120 volts 60 Hertz				2-6	4-16 10-40 20-80		290B091A13 290B091A14 290B091A15	
					4-12	4-16 10-40 20-80		290B091A19 290B091A16 290B091A17	
IRV-7②	Phase Fault Detection	0.2/2.0 amp dc 2 ICS units per relay	48/125/250 volts dc	48/125/250	0.5-2.5	1-4 2-8 4-16 10-40 20-80	185A421	290B092A18 290B092A09 290B092A10 290B092A11 290B092A12	FT-31
Moderately inverse	Voltage Polarized								
Spst-cc	120 volts 60 Hertz				2-6	4-16 10-40 20-80		290B092A13 290B092A14 290B092A15	
					4-12	4-16 10-40 20-80		290B092A19 290B092A16 290B092A17	
IRV-8②	Phase Fault Detection	0.2/2.0 amp dc 2 ICS units per case	48/125/250 volts dc	48/125/250	0.5-2.5	1-4 2-8 4-16 10-40 20-80	185A421	290B093A18 290B093A09 290B093A10 290B093A11 290B093A12	FT-31
Inverse	Voltage Polarized								
Spst-cc	120 volts 60 Hertz				2-6	4-16 10-40 20-80		290B093A13 290B093A14 290B093A15	
					4-12	4-16 10-40 20-80		290B093A19 290B093A16 290B093A17	
IRV-9②	Phase Fault Detection	0.2/2.0 amp dc 2 ICS units per case	48/125/250 volts dc	48/125/250	0.5-2.5	1-4 2-8 4-16 10-40 20-80	185A421	290B094A18 290B094A09 290B094A10 290B094A11 290B094A12	FT-31
Very Inverse	Voltage Polarized								
Spst-cc	120 volts 60 Hertz				2-6	4-16 10-40 20-80		290B094A13 290B094A14 290B094A15	
					4-12	4-16 10-40 20-80		290B094A19 290B094A16 290B094A17	
IRV-11②	Phase Fault Detection	0.2/2.0 amp dc 2 ICS units per relay	48/125/250 volts dc	48/125/250	0.5-2.5	1-4 2-8 4-16 10-40 20-80	185A421	290B095A18 290B095A09 290B095A10 290B095A11 290B095A12	FT-31
Extremely inverse	Voltage Polarized								
Spst-cc	120 volts 60 Hertz				2-6	4-16 10-40 20-80		290B095A13 290B095A14 290B095A15	
					4-12	4-16 10-40 20-80		290B095A19 290B095A16 290B095A17	

⑤ Denotes item available from stock.
① ② ③ ④ ⑤ ⑥ Standard footnotes, see page 3.

**Overcurrent, Directional, Negative Sequence, Instantaneous and Time**
24/48/125/250 Volt Dc Circuit

Type, Time Curve and Contacts	Application	Indicating Contactor Switch ③	Current Range: Amps Ac		Relay Data		
			Time Unit	Instantaneous Trip	Internal Schematic	Style Number	Case Size
IRQ-2 Short Spst-cc	Ground Detection	0.2/2.0 amp dc	0.5-2.5	2-8 4-16 10-40 20-80	185A096	774B233A09 774B233A10 774B233A11 774B233A12	FT-42
			2-6	4-16 10-40 20-80		774B233A13 774B233A14 774B233A15	
			4-12	10-40 20-80		774B233A16 774B233A17	
IRQ-5 Long Spst-cc	Ground Detection	0.2/2.0 amp dc	0.5-2.5	2-8 4-16 10-40 20-80	185A096	774B234A09 774B234A10 774B234A11 774B234A12	FT-42
			2-6	4-16 10-40 20-80		774B234A13 774B234A14 774B234A15	
			4-12	10-40 20-80		774B234A16 774B234A17	
IRQ-6 Definite Spst-cc	Ground Detection	0.2/2.0 amp dc	0.5-2.5	2-8 4-16 10-40 20-80	185A096	774B235A09 774B235A10 774B235A11 774B235A12	FT-42
			2-6	4-16 10-40 20-80		774B235A13 774B235A14 774B235A15	
			4-12	10-40 20-80		774B235A16 774B235A17	
IRQ-7 Moderately inverse Spst-cc	Ground Detection	0.2/2.0 amp dc	0.5-2.5	2-8 4-16 10-40 20-80	185A096	774B236A09 774B236A10 774B236A11 774B236A12	FT-42
			2-6	4-16 10-40 20-80		774B236A13 774B236A14 774B236A15	
			4-12	10-40 20-80		774B236A16 774B236A17	
IRQ-8	Ground Detection	0.2/2.0 amp dc	0.5-2.5	2-8 4-16 10-40 20-80	185A096	774B237A09 774B237A10 774B237A11 774B237A12	FT-42
			2-6	4-16 10-40 20-80		774B237A13 774B237A14 774B237A15	
			4-12	10-40 20-80		774B237A16 774B237A17	
		1.0 amp dc	0.5-2.5	10-40	848A617	774B237A22	

③ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard footnotes, see page 3.



Overcurrent, Directional, Negative Sequence, Instantaneous and Time, Continued
24/48/125/250 Volt Dc Control

Type, Time Curve and Contacts	Application	Indicating Contactor Switch ③	Current Range: Amps Ac		Relay Data		
			Time Unit	Instantaneous Trip⑦	Internal Schematic	Style Number	Case Size
IRQ-9 Very inverse Spst-cc	Ground Fault Detection	0.2/2.0 amp dc	0.5-2.5	5-2 2-8 4-16 10-40 20-80	185A096	774B238A19 774B238A09 774B238A10 774B238A11 774B238A12	FT-42
				2-6 4-16 10-40 20-80		774B238A13 774B238A14 774B238A15	
				4-12 10-40 20-80		774B238A16 774B238A17	

Instantaneous, Directional Single Phase Overcurrent Unit

Type, Time Curve and Contacts	Application	Indicating Contactor Switch③	CS-1 Auxiliary Switch	Instantaneous Unit Range: Amps: Ac	Voltage Rating (Continuous)	Relay Data		
						Internal Schematic	Style Number	Case Size
KRC Instantaneous Spst-cc	Ground Fault Detection Current Polarized 230 amps/1 sec	1.0 amp dc		0.5-2.0 1-4 2-8 4-16 10-40		183A022	289B145A17 289B145A18 289B145A19 289B145A20 289B145A21	FT-31
KRD⑦ Instantaneous Spst-cc	Ground Fault Detection Dual Polarized 208 volts/30 sec also 230 amps/1 sec	1.0 amp dc		0.5-2.0 1-4 2-8 4-16 10-40		183A412	289B145A31 289B145A32⑤ 289B145A33 289B145A34 289B145A35	
KRP⑦ Instantaneous Spst-cc	Ground Fault Detection Voltage Polarized 208 volts/30 sec 230 amps/1 sec }	1.0 amp dc		0.5-2.0 1-4 2-8 4-16 10-40		183A025	289B145A25 289B145A26⑤ 289B145A27 289B145A28 289B145A29	
KRV Instantaneous Spst-cc	Phase Fault Detection Voltage Polarized 120 volts 60 Hertz	1.0 amp dc	24 to 250 v dc	0.5-2.0 1-4 2-8 4-16 10-40 20-80	132 ac	185A456	289B145A09 289B145A10 289B145A11 289B145A12 289B145A13 289B145A14	

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard footnotes, see page 3.

⑦ See potential polarizing transformers, page 35.

**Overcurrent, Directional, Negative Sequence, With Instantaneous Overcurrent Unit**

Type, Time Curve and Contacts	Application	Indicating Contactor Switch③	Current Range: Amps Ac	Relay Data Internal Schematic	Style Number	Case Size
KRQ Instantaneous	Ground Detection	1.0 amp dc	0.5-2.0 1-4 2-8 4-16 10-40	184A546	774B232A13 774B232A09 774B232A10 774B232A11 774B232A12	FT-42

Instantaneous, Directional, Single Phase Overcurrent Unit

Type Time Curve and Contacts	Application	Indicating Contactor Switch③	Current Range: Amps Ac	Relay Data Internal Schematic	Style Number	Case Size
KRD-4②⑦ Instantaneous	Ground Detection	1.0 amp dc	0.5-2.0 1-4 2-8	629A509	293B307A09⑤ 293B307A10 293B307A11	FT-31
Spst-cc	208 volts/30 sec	0.2/2.0 amp dc	0.5-2.0 1-4 2-8 4-16 10-40	762A542	293B307A12⑤ 293B307A13⑤ 293B307A14 293B307A16 293B307A15	
KRD-5②⑦ Spst-co	Ground Carrier Start	None	0.5	763A068	606B718A09	FT-31

Potential Polarizing Transformers, Single Phase (Product Bulletin 42-871 for dimensions)⑥

Volt-amps	Frequency, Hertz	Primary Volts Line to Line	Line to Neutral	Secondary Volts	Compensated at: Volt- amps	Power Factor	Connections Primary/Secondary	Style Number
50	50/60	115 200 200	66.5 115 115	115 66.5 115	25	100%	Connect wye/broken delta	9626A06G01⑥ 9626A06G02⑥ 9626A06G03⑥

Type and Contacts	Polarization	Current Rating: Amps Ac	Directional Units Number Pickup	Indicating Contactor Switch③	Relay Data Internal Schematic	Style Number	Case Size
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Overcurrent, Directional, Instantaneous, For Under Or Over Power, Single Phase

KH-1 Spdt	120 volt, 60 Hertz	5	1	.02 amp	None 1.0 amp 0.2/2.0 amp	185A513 188A563 836A832	290B807A09 290B807A11 290B807A13	FT-21
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Overcurrent, Directional, Instantaneous, Under Power

KH-21 Spst	120 volt, 60 Hertz	5	2	.02 amp each	None	187A659	1957 936	FT-21
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Overcurrent, Directional, Instantaneous, With Watt Characteristics For Overpower

KH-2 Spdt	120 volt, 60 Hertz	0.5-2.0	1	0.5-2.0 amp	None	188A206	292B410A09	FT-21
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Overcurrent, Directional, For Directional Lockout of Load Changer

KH-2 Spdt	120 volt, 60 Hertz	0.5-2 .02-0.1	2 2			836A862 862A794	290B732A11 290B732A12	FT-21
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⑥ Changed or added since previous issue.

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.

⑦ See potential polarizing transformers, this page.

⑧ Refer to Instrument Transformer Sales, Measurement and Control Div., Raleigh, NC, for price and shipment.⑨



Overcurrent, Breaker Failure, Non-Directional, Instantaneous

Type and Contacts	Ampere Range: Ac		Indicating Contactor Switch ^③	Control Voltage: Dc	Relay Data		Case Size
	Phase Units	Ground Unit			Internal Schematic	Style Number	
KC-4	0.5-2.0	0.5-2.0	0.2/2.0 amp dc	48/125	188A640	293B004A09 ^⑤	FT-41
	1-4	1-4				293B004A10 ^⑤	
	2-8	0.5-2.0				293B004A13 ^⑤	
	2-8	1-4				293B004A14 ^⑤	
	2-8	2-8				293B004A11 ^⑤	
	10-40	10-40				293B004A15 ^⑤	
	10-40	10-40	1.0 amp dc		629A915	293B004A16	
	2-8	2-8				293B004A19	
	2-8	0.5-2.0			837A984	715B568A18	
	4-16	4-16	0.2/2.0 amp dc		188A640	715B568A19	
	0.5-2.0	0.5-2.0	0.2/2.0 amp dc	250	188A640	293B004A21	
	1-4	1-4				293B004A22	
	2-8	2-8				293B004A23	
	2-8	0.5-2.0				293B004A25	
	2-8	1-4				293B004A26	
	10-40	10-40				293B004A27	

Overcurrent, Negative Sequence, Three Phase

Type and Contacts	Application	Neutral Location	Indicating Contactor Switch③	Time Unit Current Range: Amps Ac	Circuit Control Volts: Dc	Relay Data		Case Size
						Internal Schematic	Style Number	
COQ② With self-contained filter	Generator Protection	At relay	0.2/2.0 amp dc	3-5	...	182A973	3499A08A09⑤	FT-21
		Remote from relay⑦		3-5	...	183A484	3499A08A11⑤	
Spst-cc								
POQ With self-contained filter	Phase Protection	...	0.2/2.0 amp dc	0.2-1.0	24-48 125-250	183A794	774B289A11 774B289A09	
				0.5-2.5	24-48 125-250		774B289A12 774B289A10⑤	
Spst-cc								
SOQ	Generator Protection	...	0.2/2.0 amp dc	2-40	48-125	1334D69	1333D85A01 1333D85A02⑧	FT-32

⑤ Denotes item available from stock.

① ② ③ ④ ⑤ ⑥ Standard notes, see page 3.

⑦ Use one style number 7881A01G03 (15/5 Amps) auxiliary current transformer when zero sequence current in relay can exceed 0.3 per unit. Refer to Instrument Transformer Dept., Raleigh, NC, for transformer pricing and shipment.

⑧ Includes remote monitor negative sequence current type KX241.



SBFU Solid State Rack Mounted Breaker Failure Relay

Type	Description	Ampere Range: Ac		Timer Range: Seconds	Control Voltage	Tripping Voltage: Vdc	Logic Drawing	Style Number
		Ground	Phase					
SBFU ⑦	3 Overcurrent Elements 1 Timer	I ₀ -0.5-2.0	I _A -I _C	.05-.4	125 Vdc	48/125/250	264C402	265C728A12
			2-8	0.1-1.0	48 Vdc		205C984	265C728A13
	4 Overcurrent Elements 1 Timer	I ₀ -0.5-2.0	I _A -I _B -I _C	.05-.4	125 Vdc	48/125/250	264C403	204C179A34
	4 Overcurrent Elements 2 Timers	I ₀ -0.5-2.0	I _A -I _B -I _C	Two Timers	125 Vdc	48/125/250	264C403	204C179A32
				.05-.04 .05-.04				
				.05-.04 .05-.04	48 Vdc	48/125/250	205C400	204C179A33

Solid State Breaker Failure, Contact Output⑥

Type	Current Range	BFI Timer	Control Timer	No. of Overcurrent Units	Control Voltage	Indicating Contactor Switch ③	Tripping Voltage Dc	Internal Schematic	Style Number	Case Size
SBF-1 (utilizes AR Relay Output)	0.5-13.5 A	25-175 ms	150-250 ms	3	48 Vdc	2 ICS Units/relay 0.2/2.0 amp dc	48/125/250	775B813	1529F93A01⑤	FT-32
					125 Vdc				1529F93A02⑤	
					250 Vdc				1529F93A03⑤	
	.05-1.3A	25-175 ms	150-250 ms	3	48 Vdc 125 Vdc 250 Vdc	2 ICS Units/relay 0.2/2.0 amp dc	48/125/250	1487B31	1529F93A08 1529F93A09 1529F93A10	
	0.5-13.5A	25-175 ms	150-250 ms	4	48 Vdc 125 Vdc 250 Vdc				1529F93A04⑤ 1529F93A05⑤ 1529F93A06⑤	
		50-500 ms	150-600 ms	4	125 Vdc				1529F93A12	

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard footnotes, see page 3.

⑦ Price includes harness assembly which is required when the relay is sold loose and unmounted.

Enter 3 foot harness as separate item, style no. 202C761G02.⑧

⑧ Changed or added since previous issue.



Solid State Overcurrent Relay, Contact Output

Type	Voltage Supply	Indicating Contact Switch 0.2/2.0 amp. dc	AC (60 Hz) Current Rating: Amps Three Overcurrent Units	Internal Schematic	Style Number	Case
SI-T	48/125 dc	Without	0.5-16 2-64	6682D43	6681D78A01 6681D78A03	FT-22
		With	0.5-16 2-64	6682D42	6681D78A02 6681D78A04	

Over-Under-Reverse Current, Dc

Type and Contacts	Application	Scale	Operating Range: Dc		Control Volts Dc	Relay Data		Case Size
			Millivolts	Volts		Internal Schematic	Style Number	
D-3 Spdt-cc and co	Over-under current	Left zero	0-10 0-50 0-100 0-150 0-200			182A787	1876 035⑤ 1955 867 288B869A17 288B869A16 1876 036	FT-21
			0-6 ma ac	...	...	182A788	288B869A30⑦	
	Over-under current/volts	Left zero	0-10		48 125 250	182A786	288B868A13 288B868A14 288B868A15	
			0-50	...	125		288B868A31	
			0-100	... ... ...	48 125 250		288B868A16 288B868A17 288B868A18	
	High contact capacity		0-200	... ... ...	48 125 250		288B868A19 288B868A20 288B868A21	
			...	0-75	48 125 250		288B868A28 288B868A29 288B868A30	
			...	0-150	48 125 250		288B868A22 288B868A23 288B868A24	
			...	0-250	48 125 250		288B868A25 288B868A26 288B868A27	
			...					
			...					
	Over-under-reverse current	Center zero	75-0-75 ma-dc	...	...	182A787	1956 890	
			5-0-5 50-0-50 100-0-100	... ... ...	... ... ...		1876 037 1961 205 1876 038	
			5-0-5	...	48 125 250	182A786	1878 292 1878 152 1878 153	
	High contact capacity							
	2 CS switches in contact circuit							
	Over current	Suppressed zero	40-80 ...	... 20-40 75-150		182A787	1876 040 288B869A14 288B869A15	

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard notes, see page 3.

⑦ Self-contained rectifier. No contactor switch or indicator.



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September, 1986
Supersedes Technical Data 41-020,
page 17, dated August, 1986
Mailed to: E, D, C/41-100A

Type MPR Programmable Motor Protection Relay

Basic System

The basic MPR Programmable Protective relay provides multi-function protection for three phase a/c motors as follows:

Standard Functions

- Overload
- Locked Rotor
- Instantaneous Phase Overcurrent
- Instantaneous Ground
- Phase Unbalance
- Phase Reversal
- Jam
- Load Loss

Device

- (51)
- (51)
- (50)
- (50N)
- (46)
- (46)
- (51)
- (37)

Trip indication and contact output are provided for all protective functions. Alarm indication and contact output are provided for conditions which change gradually. All measured quantities, alarm and trip settings may be selected and displayed digitally on the front panel. Terminals are available for emergency restart.

Power Supply

Standard power supply is 125 volts dc/120 volts ac. The ct secondary rating must be specified. The motor frequency may be 50 or 60 hertz and is field selectable.

Options

- Phase Differential
- Over temperature

Device

- (87)
- (38, 49)

Temperature sensing via imbedded RTD's may be ordered for motor windings, motor bearings, load bearings and load case. The relay will process up to six motor winding RTD's, two motor bearing RTD's, two load bearing RTD's and one load case RTD.

Catalog Number

The relay is identified by a catalog number which defines the options desired in accordance with the table. This number should be used for ordering.

MPR Motor Protection Relay

Basic Relay

Motor Type
Induction*

Power Supply Voltage

- 48 Volts dc
- 125 Vdc/120 Vac
- 250 Vdc
- 240/208 Vac

Ct Secondary Rating

- 5 A
- 1 A

RTD Options

- Motor Windings
- All motor RTD's
- Motor and load RTD's
- No RTD's

Phase Differential

- Required
- Not required

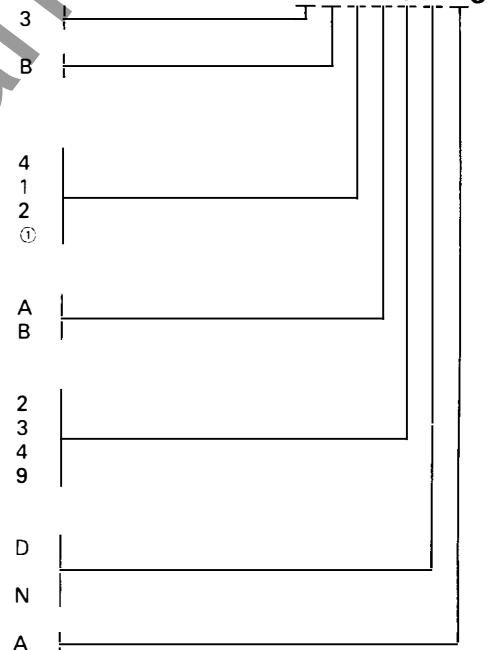
Emergency Restart Feature

*For synchronous motor application refer to factory.

① Consult Factory.

Ⓢ Changed or added since previous issue.

Typical Catalog Number
MPR 3 B 1 A 3 D A Ⓢ



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June, 1985
Supersedes TD 41-020, pages 5-16
dated May, 1984

Mailed to: E, D, C/41-100A

Protective Relays 41-100: Current Non-Directional

Type Hi-Lo CO Relay Overcurrent, Non-Directional, Single-Phase, Non-Torque Controlled Extended Range, 60 Hertz

Type	Time Curve	Contacts	Indicating Contactor Switch	Current Range		Internal Schematic	Catalog Number	Style Number	Case Size
				Amps: Ac					
				Time Unit	Instantaneous Unit IIT				
Hi-Lo CO-2	Short	Spst	0.2/2.0 Amp dc	5-2.5	None	57D4523	CO-2L1101N	265C195A01	FT-11
				1-12	None	57D4523	CO-2H1101N	265C195A05	
				5-2.5	2-48	3498A02	CO-2L1111N	265C195A03	
				1-12	6-144	3498A02	CO-2H1111N	265C195A07	
				5-2.5	6-144	3498A02	CO-2B1111N	265C195A09	
				1-12	2-48	3498A02	CO-2A1111N	265C195A11	
		Dpst		5-2.5	None	57D4524	CO-2L2101N	265C195A02	
				1-12	None	57D4524	CO-2H2101N	265C195A06	
				5-2.5	2-48	3498A03	CO-2L2111N	265C195A04	
				1-12	6-144	3498A03	CO-2H2111N	265C195A08	
				5-2.5	6-144	3498A03	CO-2B2111N	265C195A10	
				1-12	2-48	3498A03	CO-2A2111N	265C195A12	
Hi-Lo CO-5	Long	Spst	0.2/2.0 Amp dc	5-2.5	None	57D4523	CO-5L1101N	264C897A01	FT-11
				1-12	None	57D4523	CO-5H1101N	264C897A05	
				5-2.5	2-48	3498A02	CO-5L1111N	264C897A03	
				1-12	6-144	3498A02	CO-5H1111N	264C897A07	
				5-2.5	6-144	3498A02	CO-5B1111N	264C897A09	
				1-12	2-48	3498A02	CO-5A1111N	264C897A11	
		Dpst		5-2.5	None	57D4524	CO-5L2101N	264C897A02	
				1-12	None	57D4524	CO-5H2101N	264C897A06	
				5-2.5	2-48	3498A03	CO-5L2111N	264C897A04	
				1-12	6-144	3498A03	CO-5H2111N	264C897A08	
				5-2.5	6-144	3498A03	CO-5B2111N	264C897A10	
				1-12	2-48	3498A03	CO-5A2111N	264C897A12	
Hi-Lo CO-6	Definite	Spst	0.2/2.0 Amp dc	5-2.5	None	57D4523	CO-6L1101N	264C898A01	FT-11
				1-12	None	57D4523	CO-6H1101N	264C898A05	
				5-2.5	2-48	3498A02	CO-6L1111N	264C898A03	
				1-12	6-144	3498A02	CO-6H1111N	264C898A07	
				5-2.5	6-144	3498A02	CO-6B1111N	264C898A09	
				1-12	2-48	3498A02	CO-6A1111N	264C898A11	
		Dpst		5-2.5	None	57D4524	CO-6L2101N	264C898A02	
				1-12	None	57D4524	CO-6H2101N	264C898A06	
				5-2.5	2-48	3498A03	CO-6L2111N	264C898A04	
				1-12	6-144	3498A03	CO-6H2111N	264C898A08	
				5-2.5	6-144	3498A03	CO-6B2111N	264C898A10	
				1-12	2-48	3498A03	CO-6A2111N	264C898A12	
Hi-Lo CO-7	Moderately Inverse	Spst	0.2/2.0 Amp dc	5-2.5	None	57D4523	CO-7L1101N	264C899A01	FT-11
				1-12	None	57D4523	CO-7H1101N	264C899A05	
				5-2.5	2-48	3498A02	CO-7L1111N	264C899A03	
				1-12	6-144	3498A02	CO-7H1111N	264C899A07	
				5-2.5	6-144	3498A02	CO-7B1111N	264C899A09	
				1-12	2-48	3498A02	CO-7A1111N	264C899A11	
		Dpst		5-2.5	None	57D4524	CO-7L2101N	264C899A02	
				1-12	None	57D4524	CO-7H2101N	264C899A06	
				5-2.5	2-48	3498A03	CO-7L2111N	264C899A04	
				1-12	6-144	3498A03	CO-7H2111N	264C899A08	
				5-2.5	6-144	3498A03	CO-7B2111N	264C899A10	
				1-12	2-48	3498A03	CO-7A2111N	264C899A12	
Hi-Lo CO-8	Inverse	Spst	0.2/2.0 Amp dc	5-2.5	None	57D4523	CO-8L1101N	264C900A01	FT-11
				1-12	None	57D4523	CO-8H1101N	264C900A05	
				5-2.5	2-48	3498A02	CO-8L1111N	264C900A03	
				1-12	6-144	3498A02	CO-8H1111N	264C900A07	
				5-2.5	6-144	3498A02	CO-8B1111N	264C900A09	
				1-12	2-48	3498A02	CO-8A1111N	264C900A11	
		Dpst		5-2.5	None	57D4524	CO-8L2101N	264C900A02	
				1-12	None	57D4524	CO-8H2101N	264C900A06	
				5-2.5	2-48	3498A03	CO-8L2111N	264C900A04	
				1-12	6-144	3498A03	CO-8H2111N	264C900A08	
				5-2.5	6-144	3498A03	CO-8B2111N	264C900A10	
				1-12	2-48	3498A03	CO-8A2111N	264C900A12	

© Denotes item available from stock.

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard footnotes, see page 3.



Type Hi-Lo CO Relay
Overcurrent, Non-Directional, Single-Phase, Non-Torque Controlled Extended Range, 60 Hertz

Type	Time Curve	Contacts	Indicating Contactor Switch	Current Range Amps: Ac		Internal Schematic	Catalog Number	Style Number	Case Size
				Time Unit	Instantaneous Unit IIT				
Hi-Lo CO-9	Very Inverse	Spst	0.2/2.0 Amp dc	.5-2.5	None	57D4523	CO-9L1101N	264C901A01⑤	FT-11
				1-12	None	57D4523	CO-9H1101N	264C901A05⑤	
				.5-2.5	2-48	3498A02	CO-9L1111N	264C901A03⑤	
				1-12	6-144	3498A02	CO-9H1111N	264C901A07⑤	
				.5-2.5	6-144	3498A02	CO-9B1111N	264C901A09	
				1-12	2-48	3498A02	CO-9A1111N	264C901A11	
	Dpst			.5-2.5	None	57D4524	CO-9L2101N	264C901A02	
				1-12	None	57D4524	CO-9H2101N	264C901A06	
				.5-2.5	2-48	3498A03	CO-9L2111N	264C901A04	
				1-12	6-144	3498A03	CO-9H2111N	264C901A08⑤	
				.5-2.5	6-144	3498A03	CO-9B2111N	264C901A10	
				1-12	2-48	3498A03	CO-9A2111N	264C901A12	
Hi-Lo CO-11	Extremely Inverse	Spst	0.2/2.0 Amp dc	.5-2.5	None	57D4523	CO-11L1101N	265C047A01⑤	FT-11
				1-12	None	57D4523	CO-11H1101N	265C047A05⑤	
				.5-2.5	2-48	3498A02	CO-11L1111N	265C047A03⑤	
				1-12	6-144	3498A02	CO-11H1111N	265C047A07⑤	
				.5-2.5	6-144	3498A02	CO-11B1111N	265C047A09	
				1-12	2-48	3498A02	CO-11A1111N	265C047A11	
	Dpst			.5-2.5	None	57D4524	CO-11L2101N	265C047A02	
				1-12	None	57D4524	CO-11H2101N	265C047A06	
				.5-2.5	2-48	3498A03	CO-11L2111N	265C047A04	
				1-12	6-144	3498A03	CO-11H2111N	265C047A08	
				.5-2.5	6-144	3498A03	CO-11B2111N	265C047A10	
				1-12	2-48	3498A03	CO-11A2111N	265C047A12	

Non-Standard CO Overcurrent, Non-Directional, Single Phase, 60 Hertz

Type	Time Curve	Contacts	Operation Indicator or Indicating Contactor Switch①	Current Range: Amps ac		Relay Data		
				Time Unit	Instantaneous Unit④⑤	Internal Schematic	Style Number	Case Size
CO-2② Torque controlled	Short	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	57D4527	289B093A09 289B093A10 289B093A11	FT-11
				2-6				
				4-12	57D4529	289B093A13 289B093A14 289B093A15 289B093A16		
				0.5-2.5			IIT 2-8	
				IIT 4-16				
				IIT 10-40				
				IIT 20-80	289B093A17 289B093A18 289B093A19 289B093A20			
				2-6		IIT 2-8		
				IIT 4-16				
				IIT 10-40				
IIT 20-80	289B093A21 289B093A22 289B093A23 289B093A24							
4-12		IIT 4-16						
IIT 10-40								
IIT 20-80								
IIT 40-160								
CO-2②⑤ with high dropout ITH	Short	Spst-cc	0.2/2.0 amp dc 2 ICS units per relay	0.5-2.5	ITH .25-.5 ITH .5-1.0 ITH 1-2 ITH 2-4 ITH 4-8 ITH 6-12	183A786	183A801A05 183A801A06 183A801A07 183A801A08 183A801A09 183A801A10	FT-11
				2-6	ITH 2-4 ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A801A21 183A801A17 183A801A18 183A801A19 183A801A20		
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A801A25 183A801A26 183A801A27 183A801A28		
CO-4② Non-torque controlled	Long (step)	Spst-cc	One 0.2/2.0 amp dc	4-12	IIT 20-80 IT 10-40	183A115	1876 247⑤	FT-21

⑤ Denotes item available from stock.
①②③④⑤⑥ Standard footnotes, see page 3.

**Non-Standard CO Overcurrent, Non-Directional, Single Phase, 60 Hertz, Continued**

Type	Time Curve	Contacts	Operation Indicator or Indicating Contactor Switch③	Current Range:		Relay Data		
				Amps Ac				
				Time Unit	Instantaneous Unit④⑤	Internal Schematic	Style Number	Case Size
CO-5 Torque controlled ②	Long	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4527	289B432A21 289B432A09 289B432A10	FT-11
				0.5-2.5	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	289B432A22 289B432A23 289B432A24 289B432A25	
				2-6	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	289B432A12 289B432A13 289B432A14 289B432A15	
				4-12	IIT 4-16 IIT 10-40 IIT 20-80 IIT 40-160	57D4529	289B432A16 289B432A17 289B432A18 289B432A19	
CO-5 ②⑤ with high dropout ITH	Long	Spst-cc	0.2/2.0 amp dc 2 ICS units per relay	0.5-2.5	ITH 2.5-5 ITH 5-1.0 ITH 1-2 ITH 2-4 ITH 4-8 ITH 6-12	183A786	183A802A05 183A802A06 183A802A07 183A802A08 183A802A09 183A802A10	FT-11
				2-6	ITH 2-4 ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A802A21 183A802A17 183A802A18 183A802A19 183A802A20	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A802A25 183A802A26 183A802A27 183A802A28	
CO-6 ② Non-Torque controlled	Definite	Spst-co	3 amp ac	4-12	None	183A055	1876 248	FT-21
					IIT 10-40 IIT 20-80	183A054	1876 249 1876 250	
CO-6 ② Torque controlled	Definite	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4527	288B715A21 288B715A09 288B715A10	FT-11
				0.5-2.5	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	288B715A22 288B715A23 288B715A24 288B715A25	
				2-6	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	288B715A12 288B715A13 288B715A14 288B715A15	
				4-12	IIT 4-16 IIT 10-40 IIT 20-80 IIT 40-160	57D4529	288B715A16 288B715A17 288B715A18 288B715A19	
CO-6 ②⑤ with high dropout ITH	Definite	Spst-cc	0.2/2.0 amp dc 2 ICS units per relay	0.5-2.5	ITH 2.5-5 ITH 5-1.0 ITH 1-2 ITH 2-4 ITH 4-8 ITH 6-12	183A786	183A803A05 183A803A06 183A803A07 183A803A08 183A803A09 183A803A10	FT-11
				2-6	ITH 2-4 ITH 4-8 ITH 6-12 ITH 12-16 ITH 16-32	183A786	183A803A21 183A803A17 183A803A18 183A803A19 183A803A20	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A803A25 183A803A26 183A803A27 183A803A28	

⑤ Denotes item available from stock.

①②③④⑤⑥ Standard footnotes, see page 3.



Non-Standard CO Overcurrent, Non-Directional, Single Phase, 60 Hertz, Continued

Type	Time Curve	Contacts	Operation Indicator or Indicating Contactor Switch ^③	Current Range: Amps Ac		Relay Data		
				Time Unit	Instantaneous Unit ^{④⑤}	Internal Schematic	Style Number	Case Size
CO-7② Torque controlled	Moderately inverse	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4527	288B716A09 288B716A10 288B716A11	FT-11
				0.5-2.5	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	288B716A13 288B716A14 288B716A15 288B716A16	
				2-6	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	288B716A17 288B716A18 288B716A19 288B716A20	
				4-12	IIT 4-16 IIT 10-40 IIT 20-80 IIT 40-160	57D4529	288B716A21 288B716A22 288B716A23 288B716A24	
CO-7②⑤ with high dropout ITH	Moderately inverse	Spst-cc	0.2/2.0 amp dc 2 ICS units per relay	0.5-2.5	ITH .25-.5 ITH .5-1.0 ITH 1-2 ITH 2-4 ITH 4-8 ITH 6-12	183A786	183A804A05 183A804A06 183A804A07 183A804A08 183A804A09 183A804A10	FT-11
				2-6	ITH 2-4 ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A804A21 183A804A17 183A804A18 183A804A19 183A804A20	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A804A25 183A804A26 183A804A27 183A804A28	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A804A25 183A804A26 183A804A27 183A804A28	
CO-8② Non-torque controlled	Inverse	Spst-co	3 amp ac	4-12	None IIT 10-40 IIT 20-80	183A055 183A054 183A054	1876 251 1876 252 1876 253	FT-21
CO-8② Torque controlled	Inverse	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4527	288B717A09 288B717A10 288B717A11	FT-11
				0.5-2.5	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	288B717A13 288B717A14 288B717A15 288B717A16	
				2-6	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	288B717A17 288B717A18 288B717A19 288B717A20	
				4-12	IIT 4-16 IIT 10-40 IIT 20-80 IIT 40-160	57D4529	288B717A21 288B717A22 288B717A23 288B717A24	
CO-8②⑤ with high dropout ITH	Inverse	Spst-cc	0.2/2.0 amp dc 2 ICS units per relay	0.5-2.5	ITH .25-.5 ITH .5-1.0 ITH 1-2 ITH 2-4 ITH 4-8 ITH 6-12	183A786	184A004A05 184A004A06 184A004A07 184A004A08 184A004A09 184A004A10	FT-11
				2-6	ITH 2-4 ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	184A004A21 184A004A17 184A004A18 184A004A19 184A004A20	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	184A004A25 184A004A26 184A004A27 184A004A28	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	184A004A25 184A004A26 184A004A27 184A004A28	

⑤ Denotes item available from stock.
①②③④⑤⑥ Standard notes, see page 3.



Non-Standard CO Overcurrent, Non-Directional, Single Phase, 60 Hertz, Continued

Type	Time Curve	Contacts	Operation Indicator or Indicating Contactor Switch ^③	Current Range: Amps Ac		Relay Data		
				Time Unit	Instantaneous Unit ^{④⑤}	Internal Schematic	Style Number	Case Size
CO-9 ^② Non-torque controlled	Very Inverse	Spst-co	3 amp ac	4-12	None IIT 10-40 IIT 20-80	183A055 183A054 183A054	1876 254	FT-21
							1876 255	
							1876 256	
CO-9 ^② Torque controlled	Very Inverse	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4527	288B718A09	FT-11
							288B718A10	
							288B718A11	
				0.5-2.5	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	288B718A13	
							288B718A14	
							288B718A15	
				2-6	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	288B718A17	
							288B718A18	
							288B718A19	
				4-12	IIT 4-16 IIT 10-40 IIT 20-80 IIT 40-160	57D4529	288B718A21	
							288B718A22	
							288B718A23	
CO-9 ^{②⑤} with high dropout ITH	Very Inverse	Spst-cc	0.2/2.0 amp dc 2 ICS units per relay	0.5-2.5	ITH 1-2.5 ITH 5-1.0 ITH 1-2 ITH 2-4 ITH 4-8 ITH 6-12	183A786	183A805A05	FT-11
							183A805A06	
							183A805A07	
				2-6	ITH 2-4 ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A805A08	
							183A805A09	
							183A805A10	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A805A21	
							183A805A17	
							183A805A18	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A805A19	
							183A805A20	
							183A805A28	
CO-11 ^② Non-torque controlled	Extremely Inverse	Spst-co	3 amp ac	4-12	None IIT 10-40 IIT 20-80	183A055 183A054 183A054	1876 257	FT-21
							1876 258	
							1876 259	
CO-11 ^② Torque controlled	Extremely Inverse	Spst-cc	0.2/2.0 amp dc	0.5-2.5 2-6 4-12	None	57D4527	289B094A09	FT-11
							289B094A10	
							289B094A11	
				0.5-2.5	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80	57D4529	289B094A13	
							289B094A14	
							289B094A15	
				2-6	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80		289B094A16	
							289B094A17	
							289B094A18	
				4-12	IIT 2-8 IIT 4-16 IIT 10-40 IIT 20-80 IIT 40-160		289B094A19	
							289B094A20	
							289B094A21	
CO-11 ^{②⑤} with high dropout ITH	Extremely Inverse	Spst-cc	0.2/2.0 amp dc 2 ICS units per relay	.1-.5 0.5-2.5 0.5-2.5 0.5-2.5 0.5-2.5 0.5-2.5	ITH 5-1.0 ITH 25-.5 ITH 5-1.0 ITH 1-2 ITH 2-4 ITH 4-8 ITH 6-12	183A786	1961 555	FT-11
							183A806A05	
							183A806A06	
				2-6	ITH 2-4 ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A806A07	
							183A806A08	
							183A806A09	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A806A10	
							183A806A21	
							183A806A17	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A806A18	
							183A806A19	
							183A806A20	
				4-12	ITH 4-8 ITH 6-12 ITH 8-16 ITH 16-32	183A786	183A806A25	
							183A806A26	
							183A806A27	
							183A806A28	

^⑤ Denotes item available from stock.^{①②③④⑤⑥} Standard footnotes, see page 3.



Overcurrent, Solid State, Single Phase, Non-Directional, 60 Hertz

Type	Time Curve	Output	Current Range: Amps Ac		Indication	Internal Schematic	Style Number	Case Size
			Time Unit	Instantaneous Unit				
SCO-2T	Short	Spst	0.5-12	1-35 multiplier	Separate for time & inst. outputs	6706D67	6706D99A02	FT-11
SCO-5T	Long	cc		of time tap			6706D99A05	
SCO-6T	Definite						6706D99A06	
SCO-7T	Moderately Inverse						6706D99A07	
SCO-8T	Inverse						6706D99A08	
SCO-9T	Very Inverse						6706D99A09	
SCO-11T	Extremely Inverse						6706D99A11	

Overcurrent, Non-Directional, Instantaneous

Type	Current Range: Amps Ac		Indicating Contactor Switch③	Relay Data		Style Number	Case Size
	Single Unit	Double Unit Switch③		Internal Schematic			
KC-2		.5-2	0.2/2.0	837A454		670B326A10	FT-31
Spst-cc	.....	1-4	amp dc			670B326A11	
	.....	2-8				670B326A09⑤	
	.....	4-16				670B326A12	
	.....	10-40				670B326A13	
KO-1	.5-2		1 amp dc	184A044		1961 146	FT-21
Spdt-cc & co	2-8	.....				1963 135	
	.5-2		0.2/2.0	188A392		1963 136	1963 521
	4-16	.....	amp dc			1963 296	
	1-4	.....					

Overcurrent, Non-Directional, Instantaneous, 60 Hertz

Type	Current Range, Ac		Indicating Contactor Switch: Amp Dc	Contacts	Relay Data		
	Phase Amps	Ground Amps			Internal Schematic	Style Number	Case Size
	2-Unit	1-Unit					
KO-3	10-40	10-40	0.2-2.0	Spst-cc	629A413	1958 078	FT-41
	0.5-2.0	0.5-2.0	None	Spst-co	184A045	1962 353	
	1-4	1-4				1963 702	
	2-8	2-8				1961 145	
	2-8	0.5-2.0				1962 523	
	2-8	1-4				1963 005	
	4-16	4-16				1962 953	
	4-16	1-4				1963 733	
	4-16	2-8				1962 868	
	10-40	10-40				1962 181	
	10-40	1-4				1963 626	

Over and Undercurrent

Type	Construction	Contacts (adjustable front and back)	Indicating Contactor Switch③	Current Range: Amps Ac		Relay Data		Case Size
				Time Unit		Internal Schematic	Style Number	
COD ②	Without taps		None	.1-4 .2-8		184A541	289B979A31 289B979A32	FT-11
	With taps	Spdt-cc on undercurrent and cc overcurrent		0.5-2.5 2-6 4-12		184A371	289B979A17 289B979A18 289B979A19	
	Without taps		None	0.5-2 1.5-6		184A541	289B979A29 289B979A30	
			0.2/2.0 amp dc ICS on overcurrent circuit	.5-2.0 .2-8		185A430	1962 735 289B979A37	

⑤ Denotes item available from stock.

⑥ Price change or addition since previous issue.

①②③④⑤⑥ Standard footnotes, see page 3.



Overcurrent, Non-Directional, Single Phase With and Without Auxiliary Time Delay Unit

Type and Time Curve	Auxiliary Time Delay Unit (6 Cycles)	Current Range: Amps Ac			Indicating Contactor Switch③	Relay Data Internal Schematic	Style Number	Case Size					
		Time Unit Spst-cc	IIT # 1 ④	IT Unit # 2	ITH Unit ⑤								
COM-5②⑦ Long	Without	0.5-2.5	4-16 10-40	None	2-4 2-4	0.2/2.0 amp dc 2 ICS units per relay	183A989	289B355A09 289B355A10	FT-21				
		2-6	10-40 20-80 20-80 40-160		4-8 4-8 16-32 16-32			289B355A11 ⑤ 289B355A12 ⑤ 289B355A15 289B355A16					
		4-12	10-40 20-80 20-80 40-160		6-12 6-12 16-32 16-32			289B355A13 289B355A14 289B355A17 289B355A18					
		0.5-2.5	2-8 4-16	None	2-4 2-4		184A036	289B456A09 289B456A10		FT-21			
		2-6	10-40 10-40 20-80 20-80 40-160		4-8 16-32 4-8 16-32 16-32			289B456A13 289B456A21 289B456A14 289B456A15 289B456A16					
		4-12	10-40 20-80 20-80 40-160		6-12 6-12 16-32 16-32			289B456A17 289B456A18 289B456A19 289B456A20					
	0.5-2.5	2-8 4-16 10-40	1-4 1-4 2-8	None	184A276	289B511A09 289B511A10 289B511A11	FT-21						
	2-6	4-16 10-40	2-8 2-8			289B511A12 289B511A13							
	4-12	20-80 40-160 40-160	10-40 10-40 20-80			289B511A14 289B511A15 289B511A16							
	COM-6 Definite	Without	0.5-2.5	4-16 10-40	None	2-4 2-4		0.2/2.0 amp dc 2 ICS units per relay	183A989	290B471A09 290B471A10	FT-21		
2-6			10-40 20-80 20-80 40-160		4-8 4-8 16-32 16-32		290B471A11 290B471A12 290B471A13 290B471A14						
4-12			10-40 20-80 20-80 40-160		6-12 6-12 16-32 16-32		290B471A15 290B471A16 290B471A17 290B471A18						
COM-7 Moderately inverse			Without	0.5-2.5	4-16 10-40	None	2-4 2-4		0.2/2.0 amp dc 2 ICS units per relay	183A989		290B472A09 290B472A10	FT-21
				2-6	10-40 20-80 20-80 40-160		4-8 4-8 16-32 16-32					290B472A11 290B472A12 290B472A13 290B472A14	
				4-12	10-40 20-80 20-80 40-160		4-8 6-12 16-32 16-32					290B472A15 290B472A16 290B472A17 290B472A18	

⑤ Denotes item available from stock.

② Price change or addition since previous issue.

①②③④⑤⑥ Standard footnotes, see page 3.

⑦ Relays with time delay auxiliary unit suitable for use on dc control circuits rated 24/48/125/250 volts dc. Shipped connected for 125-volt dc service.



Overcurrent, Non-Directional, Single Phase With and Without Auxiliary Time Delay Unit, Continued

Type and Time Curve	Auxiliary Time Delay Unit	Current Range: Amps Ac				Indicating Contactor Switch	Relay Data				
		Time Unit Spst-cc	IIT Unit #1 ④	IT Unit #2	ITH Unit ⑤		Internal Schematic	Style Number	Case Size		
COM-8 Inverse	Without	0.5-2.5	4-16 10-40	None	2-4 2-4	0.2/2.0 amp dc 2 ICS units per relay	183A989	290B473A09 290B473A10	FT-21		
		2-6	10-40 20-80 20-80 40-160		4-8 4-8 16-32 16-32			290B473A11 290B473A12 290B473A13 290B473A14			
			4-12		10-40 20-80 20-80 40-160			6-12 6-12 16-32 16-32		290B473A15 290B473A16 290B473A17 290B473A18	
	With (6 Cycles)	2-6	10-40 10-40	None	4-8 8-16	184A036	290B473A27 290B473A25	FT-21			
		4-12	10-40		8-16		290B473A26				
	COM-9 Very inverse	Without	0.5-2.5	4-16 10-40	None	2-4 2-4	0.2/2.0 amp dc 2 ICS units per relay	183A989	290B474A09 290B474A10	FT-21	
			2-6	10-40 20-80 20-80 40-160		4-8 4-8 16-32 16-32			290B474A11 290B474A12 290B474A13 290B474A14		
				4-12		10-40 20-80 20-80 40-160 4-16			6-12 6-12 16-32 16-32 16-32		290B474A15 290B474A16 290B474A17 290B474A18 290B474A19
With (7 Cycles)		2-6	10-40 10-40	None	6-12	184A036	290B475A24				
		4-12	10-40		6-12		290B475A25				
COM-11 ② Extremely inverse		Without	0.5-2.5	4-16 10-40	None	2-4 2-4	0.2/2.0 amp dc 2 ICS units per relay	183A989	290B475A09 290B475A10	FT-21	
			2-6	10-40 20-80 20-80 40-160		4-8 4-8 16-32 16-32			290B475A11 290B475A12 290B475A13 290B475A14		
				4-12		10-40 20-80 20-80 40-160			6-12 2-4 6-12 16-32 16-32		290B475A15 290B475A19 290B475A16 290B475A17 290B475A18
	With (7 Cycles)	2-6	10-40 10-40	None	6-12	184A036	290B475A24				
		4-12	10-40		6-12		290B475A25				

⑤ Denotes item available from stock.
 ② Price change or addition since previous issue.
 ① ② ③ ④ ⑤ ⑥ Standard footnotes, see page 3.



Overcurrent, Voltage Controlled, Non-Directional, Single Phase, Continued

Type	Time Curve	Adjustable Voltage Range	Contacts	Indicating Contactor Switch ③	Current Range: Amps Ac		Relay Data		
					Time Unit	Instantaneous Trip: IIT Unit④	Internal Schematic	Style Number	Case Size
COV-6 ②	Definite	80-100 volts ac	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	183A047	288B774A19 1878 495 1878 496	FT-21
					2-6				
					4-12				
					0.5-2.5				
					2-8	2-8	183A048	288B774A20 288B774A21 288B774A22	
					4-16				
					10-40				
					2-6				
					4-16	4-16	183A048	1878 497 1878 498 1878 499 1878 500	
					10-40				
					20-80				
					4-12				
					4-16	4-16	183A048	1878 501 1878 502 1878 503 1878 504	
					10-40				
					20-80				
					40-160				
COV-7 ②	Moderately inverse	80-100 volts ac	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	183A047	288B773A19 1878 505 1878 506	FT-21
					2-6				
					4-12				
					0.5-2.5				
					2-8	2-8	183A048	288B773A20 288B773A21 288B773A22	
					4-16				
					10-40				
					2-6				
					4-16	4-16	183A048	1878 507 1878 508 1878 509 1878 510	
					10-40				
					20-80				
					4-12				
					4-16	4-16	183A048	1878 511 1878 512 1878 513 1878 514	
					10-40				
					20-80				
					40-160				
COV-8 ②	Inverse	80-100 volts ac	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	183A047	288B776A20 1876 243⑤ 1876 244	FT-21
					2-6				
					4-12				
					0.5-2.5				
					2-8	2-8	183A048	288B776A21 288B776A22 288B776A23	
					4-16				
					10-40				
					2-6				
					4-16	4-16	183A048	1878 515 1878 516 1878 517⑤ 1878 518	
					10-40				
					20-80				
					4-12				
					4-16	4-16	183A048	1878 519 1878 520 1878 521 1878 522	
					10-40				
					20-80				
					40-160				

⑤ Denotes item available from stock.

⑥ Price change or addition since previous issue.

① ② ③ ④ ⑤ ⑥ Standard footnotes, see page 3.



Overcurrent, Voltage Controlled, Non-Directional, Single Phase, Continued

Type	Time Curve	Adjustable Range	Contacts	Indicating Contactor Switch ^③	Current Range: Amps Ac		Relay Data		
					Time Unit	Instantaneous Trip: IIT Unit ^④	Internal Schematic	Style Number	Case Size
COV-9 ^②	Very inverse	80-100 volts ac	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	183A047	288B775A19	FT-21
					2-6			1876 245	
					4-12			1876 246	
					0.5-2.5	2-8	183A048	288B775A20	
						4-16		288B775A21	
						10-40		288B775A22	
					2-6	2-8	183A048	1878 523	
						4-16		1878 524	
						10-40		1878 525	
						20-80		1878 526	
					4-12	4-16	183A048	1878 527	
						10-40		1878 528	
						20-80		1878 529	
						40-160		1878 530	
COV-11 ^②	Extremely inverse	80-100 volts ac	Spst-cc	0.2/2.0 amp dc	0.5-2.5	None	183A047	1956 083	FT-21
					2-6			1956 084	
					4-12			1956 085	
					0.5-2.5	2-8	183A048	1956 086	
						4-16		1956 087	
						10-40		1956 088	
					2-6	2-8	183A048	1956 089	
						4-16		1956 090	
						10-40		1956 091	
						20-80		1956 092	
					4-12	4-16	183A048	1956 093	
						10-40		1956 094	
						20-80		1956 095	
						40-160		1956 096	

Phase Balance, Three Phase

Type	Contacts	Indicating Contactor Switch ^③	Taps	Continuous Current Rating	Relay Data		
					Internal Schematic	Relay Style No.	Case Size
CM ^②	Spst-cc	0.2/2.0 amp dc	1, 2, or 3 amps	7	762A812	290B960A21 ^⑤	FT-31

Ratio Ground Relay, Three Phase, Four Wire, Non-Directional

Type	Contacts	Indicating Contactor Switch ^③			Internal Schematic	Relay Style No.	Case Size
CGRS ^⑥	Spst-cc	0.2/2.0 amp dc			3529A06	1345D81A01 ^⑤	FT-21

③ Changed or added since previous issue.

⑤ Denotes item available from stock.

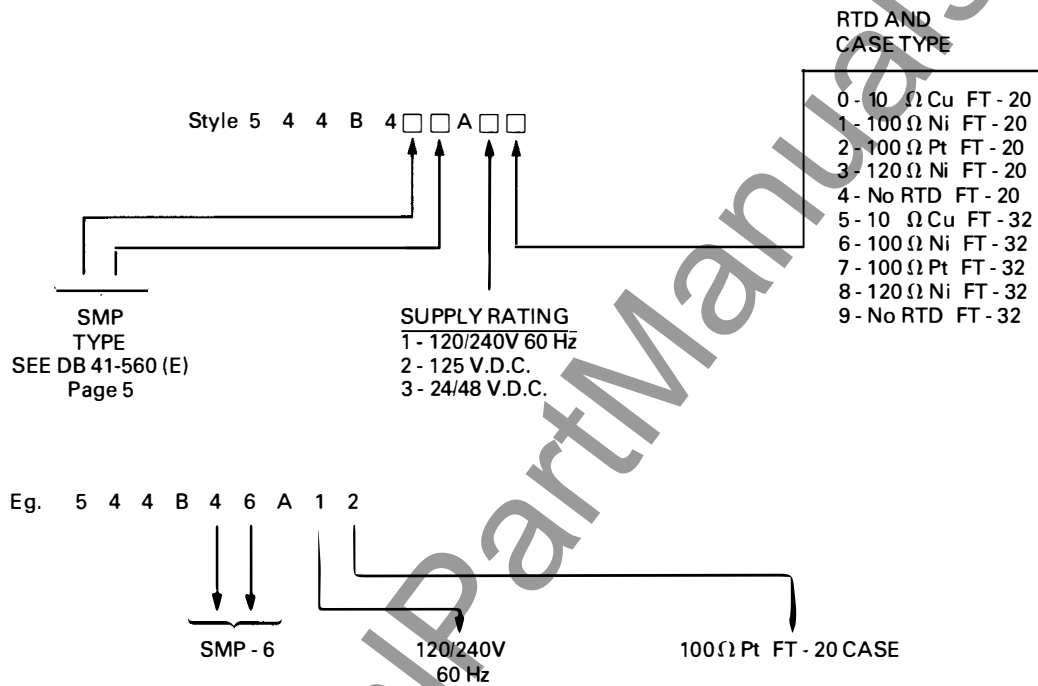
⑥ Price change or addition since previous issue.

①②③④⑤⑥ Standard footnotes, see page 3.



Type SMP Relay

SMP Type and Style Code



For 50 Hz specify sim. to S# except 50 Hz.
For 250 VDC Supply specify sim. to S# except 250 VDC.

When ordering, specify:
1. Type
2. Style number
3. Quantity



Type SMP Relay: For Complete Motor Protection

For Synchronous Motors it is assumed that Static Slipsyn® or equivalent will be provided as well.

All SMP Relays include the following

Motor Protection

- Overload
- Stall
- Phase Current Unbalance
- Ground Fault
- Trip and Alarm Annunciation

Select the relay type required based on the additional features required from the table below.

Type	Power Supply Voltage	Case	Trip and Alarm Reset	RTD Logic① & Digital Temp. Ph. Unbalance Indication	Bearing① Temp. Monitor	Phase Fault Detector	Relay Data DB 41-560	
							Style Number	Internal Schematic
SMP-64	120/240V 50/60 Hz	FT-32	Self	Yes	Yes	Yes	See Page 15	2815C25
SMP-54		FT-20② or FT-32			No	No		2682C39
SMP-06					Yes	No		
SMP-05					No	Yes		
SMP-02					No	No		
SMP-01					No	No		
SMP-65			FT-32	Hand	Yes	Yes	Yes		2815C25
SMP-55		FT-20② or FT-32	No			No	2682C39	
SMP-61			Yes			Yes		
SMP-51			No			No		
SMP-21			Yes			Yes		
SMP-11			No			No		
SMP-66	125 VDC		FT-32	Self	Yes	Yes		Yes	2815C25
SMP-56		FT-20② or FT-32	No			No	2682C39	
SMP-62			Yes			Yes		
SMP-52			No			No		
SMP-22			Yes			Yes		
SMP-12			No			No		
SMP-67			Hand	Yes	Yes	Yes		Yes	2815C25
SMP-57		No				No	2689C39	
SMP-63						Yes		
SMP-53						No		
SMP-23						Yes		
SMP-13		No				No		

① For use with the following RTD types supplied in the motor

- 10 Ohm Copper
- 100 Ohm Nickel
- 100 Ohm Platinum
- 120 Ohm Nickel

For rated accuracy RTD leads must be 3 wire; matched within 0.20% of RTD resistance and lead resistance must be less than 25% of RTD resistance.

② The FT-20 case is **not** fully drawout.

Note: The FT-20 case is not fully drawout. Relays for 120/240V 50/60 Hz power supply voltage can be supplied with FT-32 fully drawout Flexitest case for an addition of \$60.00 list each for relays in FT-20 cases.

Westinghouse Electric Corporation
Relay and Telecommunications Division
Coral Springs, FL 33065



May 1, 1987
Supersedes TD 41-020, pages 1-4
dated September 1, 1986

Mailed to: E, D, C/41-100A

Protective Relay

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For Relay-Instrument Switchboards, see Section 40-100.

**Ordering Information****Selling Policy 50-000 and Discounts****Apply**

When ordering, specify:

1. Type
2. Style number
3. Quantity
4. Special features, if any

All prices are contained in Price List 41-020.

For relays or apparatus not listed herein, see Price List 40-021, Price List 40-022 or negotiate.

Reference to description and application information for relays listed herein is detailed in Selector Guides 41-000A, C and D and Technical Data 41-010.

Standard Footnotes

(Where Applicable)

- ① Universal operation indicator is rated 0.2 to 30 amps dc.
- ② 50-Hertz relays and auxiliaries can be supplied at same price. Order "Similar to Style Number, except 50 Hertz".
- 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 voltage rating on order.

- ④ **IIT:** Indicating Instantaneous Trip rated per ranges shown in price tables. Unit is adjustable, and has target actuated when coil is energized at or above pickup setting. Unit has a dropout ratio of 65% at minimum setting and 90% at maximum setting.
- ⑤ **ITH:** High dropout Instantaneous Trip rated per ranges shown in price tables. Unit has a dropout to pickup ratio of 90% over entire 2 to 1 pickup range. Contacts close when ITH coil is energized at or above pickup setting.
- ⑥ **IIV:** Instantaneous Indicating Voltage unit which is ac voltage operated. The unit has an adjustable range of 120-200 volts. When energized at or above pickup setting contacts of the unit close and a target indicates completion of the trip circuit.

Mounting Hardware

Mounting hardware furnished with all relays listed herein is for flush mounting on panels up to $\frac{3}{16}$ " thick. For projection mounting on either thin (up to and including $\frac{3}{16}$ ") or thick (from $\frac{3}{16}$ " to $2\frac{1}{2}$ ") panels, enter separate bulk quantity item or items on order for hardware from listing below. No extra charge.

A. For Flexitest® Cases, Projection Mounting

Case Size	No. of Terminals on Relay	Hardware Style Number	
		For Thin Panel	For Thick Panel
FT-11	Up to 10	58C9121G24	58C9121G28
FT-21, 31, 41	Up to 10	58C9121G25	1876 416
FT-22, 32, 42	Up to 16	58C9121G25	1877 809
FT-22, 32, 42	17 to 20	58C9121G25	1876 414

B. For Other Relay Cases, Projection Mounted on Thick Panels
(thin panel projection mounting hardware is furnished as standard)

Type of Projection Case	Hardware Style Number
Small Glass (SV, SC, SG, etc.)	839 114
Molded Base, with Glass Window Cover (MG-6 self-reset)	1724 677
Molded Base, with Glass Window Cover (MG-6 electric reset)	1724 678
Molded Base with Molded Cover (SG projection up to $1\frac{1}{2}$ " panel only)	1878 325

FT-1 Switch Thick Panel Hardware

- 1" – Style Number 407C844G03
2" – Style Number 407C844G04

Panel Adapter Plates

Description	Style Number	List Price
S-10 FT case to FT-11	291B875H04	\$240 ⑥
M-10 FT case to FT-21	291B875H05	240 ⑥
M-20 FT case to FT-32	291B875H01	240 ⑥

Applied Protective Relaying (B-7235F)

An authoritative handbook covering the application and selection of protective relays, 22 Chapters, 480 pages.

Price: \$50.00, plus state and/or local taxes, where applicable.

Add \$5.00 for Domestic handling and mailing.

Add \$10.00 for Overseas handling and air delivery.

Order from: Customer Service Department
Printing Division
Westinghouse Electric Corporation
Trafford, Pennsylvania 15085

Contact Abbreviations

Spst – single pole single throw
Spdt – single pole double throw
Dpst – double pole single throw
Dpdt – double pole double throw
Cc – circuit closing
Co – circuit opening

Frequency

All relays are for 60 Hertz operation, unless otherwise indicated. 50 Hertz types are available where indicated by note ②, at no extra price.

- ⑥ Changed or added since previous issue
⑤ Denotes item available from stock.



Instruction Leaflets

Copies of instruction leaflets on apparatus listed in this price list are furnished only when specifically requested.

When required, leaflets should be ordered as a separate item. The total quantity ordered will be furnished at the following prices:

Quantity of a Specific Leaflet on One Order	List Price
1 to 10	No Charge
11 to 100	\$3.00 each net
101 or more	Refer to factory

Drawings

Copies of standard Westinghouse drawings covering outline and mounting dimensions, and internal wiring diagrams on apparatus listed in this price list are furnished only when specifically requested.

ONE reproducible, ONE aperture cards[Ⓢ] or UP TO NINE paper prints will be supplied without charge.

Larger quantities will be supplied at the following net prices:

	Paper Prints	Vellum Paper Reproducibles	.003 Mylar Reproducibles [Ⓢ]
8½" x 11" (A Size)	\$2.10 ea.	\$ 5.10 ea.	\$ 6.60 ea.
11" x 17" (B Size)	2.40 ea.	5.40 ea.	12.00 ea.
17" x 22" (C Size)	2.70 ea.	6.00 ea.	24.30 ea.
22" x 34" (D Size)	3.00 ea.	7.70 ea.	31.50 ea.
28" x 40" (F Size)	3.75 ea.	12.00 ea.	64.50 ea.
Larger Size	.60 sq. ft.	1.50 sq. ft.	6.75 sq. ft.

[Ⓢ] \$25.00 minimum on each order.
[Ⓢ] This pertains to 35 mm aperture cards only. A minimum charge of \$50.00 will apply on orders for 105 mm aperture cards.

Protective Relay Certification

When purchasing protective relays, the following types of certification are available on request. All require extra order handling and result in shipping date extension. Any relay shipped by the Relay-Instrument Division is guaranteed under warranty and will be of the same high quality regardless of the number of extra tests and documents called for on an order. The following certificates are available on a charge basis. Refer to the division for costs.

- 1. Certificate of Compliance – Sampling Basis (QAP #82-028)
This is a general statement from Quality Control that material supplied on the order has been type tested to meet the specification of ANSI C37.90 and that the accuracy is traceable to the National Bureau of Standards. The charge for this is \$150.00.
- 2. Certificate of Conformance Test Basis (QAP #82-030)
This is a general statement from Quality Control based on tests of specific items shipped that the material supplied meets the order requirements.
Copies of the electrical test data are made available to the customer. The charge for this service is \$250.00 per certificate plus \$25.00 per each relay tested.

Note: All of the above presumes standard Westinghouse tests and procedures are followed. Special requirements must be negotiated. Audit requirements should be reviewed by the Relay and Telecommunications Division.

Ⓢ Changed or added since previous issue.