ASEA BROWN BOVERI

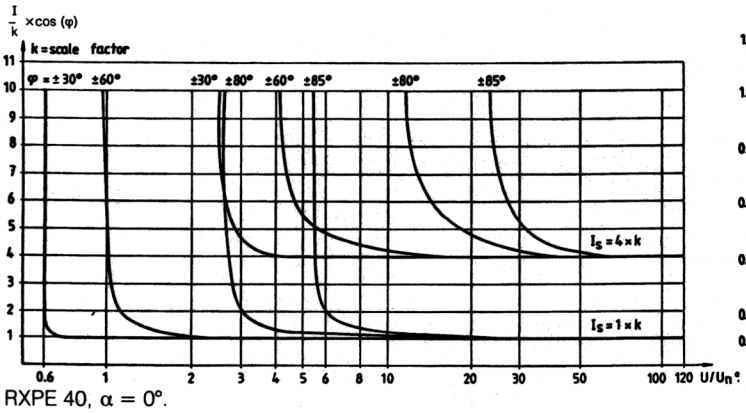
Directional relay data table

B03-3003[E]

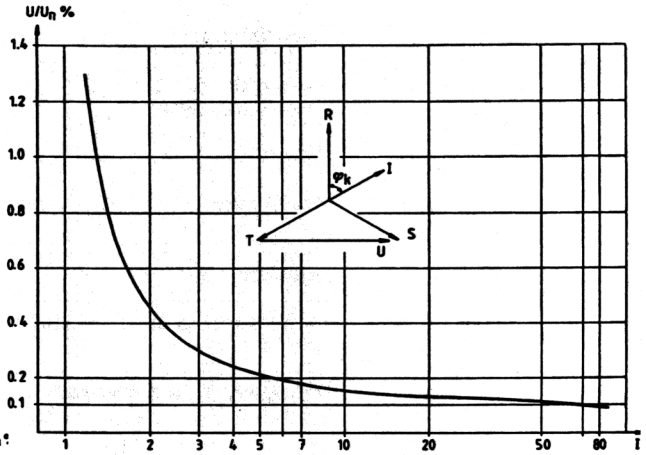
January 1987
Changed since May 1983
Data subject to change without notic

ABB Relays

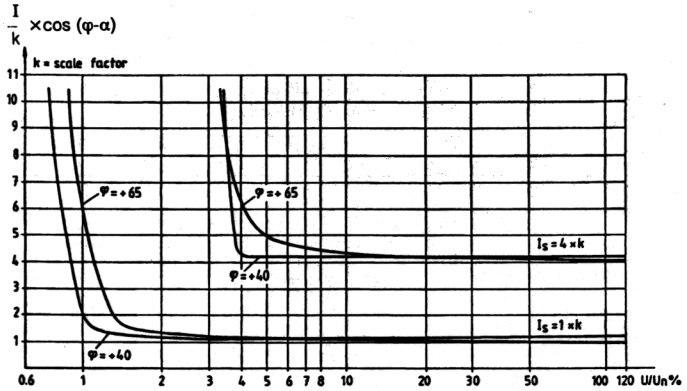
Current and voltage operate values for different values of φ.



RXPE 40, α = 0°.



RXPE 42, α = −30° Phase angle φ_k = 30 to 90°
The curve is valid for all settings.



RXPE 47, α = +65°

Definitions:
α = characteristic angle of the relay (positive as **I** lags U).
$\mathbf{I_s}$ = set current.
I = energising current.
U = polarizing voltage.
φ = angle between energising current and the polarizing voltage (positive as **I** lags U).
φ_k = phase angle of the short circuit current.
k = scale factor.

Type **B03 no.**	**RXPE 40** –3013 E	**RXPE 42** –3011 E	**RXPE 47** –3012 E
Rated voltage U_n	110 V, 50–60 Hz	110 V, 50 or 60 Hz	110 V, 50–60 Hz
Characteristic angle α	0°	–30°	+65°
Scale ranges (Multiple models) 1 to 4×a scale factor	3, 10, 30, 100 mA 0.3, 1 or 3 A	100 mA 0.3, 1, 3 or 5 A	10, 30, 100 mA 0.3, 1 or 3 A
Indication	Target		No indication
Operate value	I×cos (φ–α) ≥set current, for U = U_n. For U <U_n acc. to the curves on page 1.		
Reset ratio	>85%		
Consistency of operate value/Graduation error (highest setting)	<1%/±2%		
Consistency of characteristic angle at rated voltage for currents up to 100×set value	±0.6°	±5°	
Operate time when current increases from 0 According to time curves in	B03-3013E	B03-3011E	B03-3012E
Consistency of operate time for current larger than 2×set value	Time curves 1 and 2 ±20% | 3 and 4 ±30%	±20%	±30%
Reset time when current through the relays drops to 0 According to time curves in	B03-3013E	B03-3011E	B03-3012E
Permitted Auxilliary voltage range in % if rated aux voltage	80 to 110% for dc voltages 70 to 120% for ac voltages		
Permitted ambient temperature °C	–10 to +40		
Percent change in operate value per °C temperature change at lowest/highest setting %/°C	+0.2/+0.1		

Current overload capacity scale range		Continuous	1 second	Continuous	1 second	Continuous	1 second
3–12 mA	A	0.6[1/]	12[1/]	–	–	–	–
10–40 mA	A	2.2[1/]	50[1/]	–	–	2.2	50
30–120 mA	A	6	120	–	–	15	350
100 mA – 4 A	A	15	350	15	350	15	350
3–20 A	A	20	350	20	350	20	350

[1/] The overload capacity can be increased with a current limiting module containing 1 to 3 anti-parallel diode pairs connected in series.

Scale range	3–12 mA			10–40 mA	
Number of used diode pairs	1	2	3	1	2
Max permitted angle φ at highest/lowest setting	72°/85°	81°/87.8°	84°/88.5°	85°/88.8°	87°/89.2°
Overload capacity, continuous/1 second[2/] A	10/40–70	8/40–70	6/40–70	10/40–70	8/40–70

[2/] The lower value applies to diodes which have been continuously loaded with max permissible current.

Type **B03 no.**			**RXPE 40** –3013 E	**RXPE 42** –3011 E	**RXPE 47** –3012 E
Voltage overload capacity max in % of rated voltage continuous/1 second		%	120/150	120/200	270/550
Power consumption Auxiliary voltage circuit dc voltage	24 V	W	1.0		
	48–55 V	W	1.9–2.8		
	110–125 V	W	2.4–3.2		
	220–250 V	W	4.9–6.5		
ac voltage	110 V, 50–60 Hz	VA	4.1		
Current measuring circuit, at current =lowest setting scale for range	3–12, 10–40,		PF=1	PF=0.8	PF=1
	30–120 mA	mVA	0.08	–	0.1
	100–400 mA	mVA	0.12	0.12	0.15
	0.3–1.2 A	mVA	0.4	0.8	0.5
	1–4 A	mVA	3	5	4
	3–12 A	mVA	20	25	25
	5–20 A	mVA	–	60	–
Voltage circuit		VA	4	3.4	1.4
		PF=	1	0.9 cap	0.9 cap
Contact data Number of contacts			1 Transfer+1no		1no
Max system voltage dc/ac		V	300/250		250/250
Current-carrying capacity (for already closed contact) 200 ms/1 s		A	90/50		3/2
continuously		A	5		2
Making and conducting capacity 200 ms/1 s		A	30/10		2/2
Breaking capacity ac PF ≥0.1	max 250 V	A	10		0.6
dc L/R ≤40 ms	55/110 V	A	1/0.4		0.4/0.2
	125/220 V		0.3/0.2		0.16/0.1
	250 V		0.15		0.08
Insulation Tests Dielectric test, 50 Hz, 1 min.:					
voltage circuits to contact circuits and ground			2.0 kV		
current circuits to other circuits and ground			2.5 kV		
Impulse voltage test, 1.2/50 µs, 0.5 J			5.0 kV		
Disturbance Tests Power frequency test, 50 Hz, 2 min.:			0.5 kV		
Fast transient test, 2 min.:			4–8 kV		
1 MHz burst test, 2 s, common/transverse			2.5/1.0 kV		
Dimension (S and C)/**Mass** (kg)			4S 12C/1.1 kg		

Type B03-	RXPF 4 -3014E	
Rated voltage U_n	110 V, 50 or 60 Hz	
Characteristic angle α	Reconnectible 0° or −90°	
Operate value I >	Adjustable 1 to 4 × scale factor I_s	
Scale factor I_s	Reconnectible 3, 10 and 30 mA	
Release voltage U >	Adjustable 5–30 V	
Operate conditions ground-current operation	$I_{N x cos}(\varphi-\alpha) > I >$ and $U_N > U >$	
neutral-point voltage operation	$U_N > U >$	
Reset ratio	> 90 %	
Transient overreach	At start operation < 5 %	At delayed operation –
Operate time at ground-current operation $I_N = 2 \times I$	60 ms	– Adjustable (1–10)×0.1 s+60 ms (1–10)×0.8 s+60 ms
at neutral-point voltage operation and $U_N > U >$	–	Adjustable 2–20 s
Reset time when current and voltage drop to 0 from < 10 x I > from < 10 x U >	< 180 ms –	< 160 ms < 120 ms
Overshoot time	–	< 75 ms at 3xI > < 50 ms at 3xU >
Indicator	Yellow target	Red target
Auxiliary voltage EL dc	48, 110–125 or 250 V	
Permitted auxiliary voltage range in % of rated auxiliary voltage EL	80–110 % see B03-0330, fig. 3	
Permitted auxiliary voltage pulsation in % of rated auxiliary voltage EL	±6 %	
Permitted ambient temperature	−25 to +55°C	
Overload capacity in current circuit, continous/1 s in auxiliary voltage circuit EL, continuous	1/20 A 140 V	
Power consumption in auxiliary voltage circuit EL	< 4 W before operation < 6 W at operation	
In current circuit at ground-current operation and $I_N = I_s =$ 3 mA 10 mA 30 mA	0.015 mVA 0.020 mVA 0.050 mVA	
In voltage circuit at $U_N = U_n$	1 VA	

Type B03-	RXPF 4 -3014E
Contacts Number of contacts for start/trip	2/3
Max. system voltage dc/ac	300/250 V
Current carrying capacity (for already closed contact): 200 ms/1 s continuous	90/50 A 5 A
Making and conducting capacity, L/R > 10 ms: 200 ms/1 s	30/10 A
Breaking capacity: ac PF > 0.4 max. 250 V	10 A
dc L/R < 40 ms at U_n = 48/110 V 125/220 V 250 V	1.5/0.4 A 0.3/0.2 A 0.15 A
Insulation Tests Dielectric test, 50 Hz, 1 min: current circuit remaining circuits	2.5 kV 2.0 kV
Impulse voltage test 1.2/50 µs: α-input[1]), 0.02 J remaining inputs 0.5 J	1.0 kV 5.0 kV
Disturbance tests Power frequency test 50 Hz, 2 min: α-input[1]), remaining inputs	0.1 kV 0.5 kV
Fast transient test, 2 min: α-input[1]), remaining inputs	1–2 kV 4–8 kV
1 MHz burst test: α-input[1]), 2 s remaining inputs	0.5 kV 2.5 kV
Auxiliary voltage interruptions The relay resets at interruption	2–500 ms > 20 ms
Dimension (S and C) **Mass** (kg)	4S 12C/1.4

[1]) Input for reconnection of the characteristic α

ABB Relays AB, S-721 71 Västerås, Sweden
Tel. +46 21-32 13 00, Telefax +46 21-14 69 18
Telex 408 36 abbrly s

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