


Pluggable interface relays and optocouplers

Technical data – CR-P, CR-M, CR-U

Input circuit - coil data


CR-P range

	Rated control supply voltage U_s	Rated frequency	Make voltage (at 20 °C)	Maximum voltage (at 55 °C)	Break voltage	Rated power	Coil resistance (at 20 °C)	Tolerance of coil resistance
DC coils	12 V DC	-	8.4 V DC	30.6 V DC	$\geq 0.1 U_s$	0.4-0.48 W	360 Ω	$\pm 10\%$
	24 V DC	-	16.8 V DC	61.2 V DC	$\geq 0.1 U_s$	0.4-0.48 W	1440 Ω	$\pm 10\%$
	48 V DC	-	33.6 V DC	122.4 V DC	$\geq 0.1 U_s$	0.4-0.48 W	5700 Ω	$\pm 10\%$
	110 V DC	-	77 V DC	280 V DC	$\geq 0.1 U_s$	0.4-0.48 W	25200 Ω	$\pm 10\%$
AC coils	24 V AC	50 / 60 Hz	19.2 V AC	28.8 V AC	$\geq 0.15 U_s$	0.75 VA	400 Ω	$\pm 10\%$
	48 V AC	50 / 60 Hz	38.4 V AC	57.6 V AC	$\geq 0.15 U_s$	0.75 VA	1550 Ω	$\pm 10\%$
	110 V AC	50 / 60 Hz	88 V AC	132 V AC	$\geq 0.15 U_s$	0.75 VA	8900 Ω	$\pm 10\%$
	120 V AC	50 / 60 Hz	96 V AC	144 V AC	$\geq 0.15 U_s$	0.75 VA	10200 Ω	$\pm 10\%$
	230 V AC	50 / 60 Hz	184 V AC	276 V AC	$\geq 0.15 U_s$	0.75 VA	38500 Ω	$\pm 10\%$

CR-P optocouplers range

Input circuit	CR-P024MOS1	CR-P024TRI1
Input resistance	2200 Ω	1950 Ω
Rated control voltage	24 V DC	24 V DC
Pull-in voltage	10 V DC	10 V DC
Maximum input voltage	32 V DC	32 V DC
Nominal input current	10 mA	12 mA
Input power	260 mW	295 mW
Typical switching-on time	50 ms	< 1/2 cycle
Typical switch-off time	250 ms	< 1/2 cycle

CR-M range

	Rated control supply voltage U_s	Rated frequency	Make voltage (at 20 °C)	Maximum voltage (at 55 °C)	Break voltage	Rated power	Coil resistance (at 20 °C)	Tolerance of coil resistance
DC coils	12 V DC	-	9.6 V DC	13.2 V DC	$\geq 0.1 U_s$	0.9 W	160 Ω	$\pm 10\%$
	24 V DC	-	19.2 DC	26.4 V DC	$\geq 0.1 U_s$	0.9 W	640 Ω	$\pm 10\%$
	48 V DC	-	38.4 V DC	52.8 V DC	$\geq 0.1 U_s$	0.9 W	2600 Ω	$\pm 10\%$
	60 V DC	-	48 V DC	66 V DC	$\geq 0.1 U_s$	0.9 W	4000 Ω	$\pm 10\%$
	110 V DC	-	88 V DC	121 V DC	$\geq 0.1 U_s$	0.9 W	13600 Ω	$\pm 10\%$
	125 V DC	-	100 V DC	137.5 V DC	$\geq 0.1 U_s$	0.9 W	16000 Ω	$\pm 10\%$
	220 V DC	-	176 V DC	242 V DC	$\geq 0.1 U_s$	0.9 W	54000 Ω	$\pm 10\%$
AC coils	24 V AC	50 / 60 Hz	19.2 V AC	26.4 V AC	$\geq 0.2 U_s$	1.6 VA	158 Ω	$\pm 10\%$
	48 V AC	50 / 60 Hz	38.4 V AC	52.8 V AC	$\geq 0.2 U_s$	1.6 VA	640 Ω	$\pm 10\%$
	60 V AC	50 / 60 Hz	48 V AC	66 V AC	$\geq 0.2 U_s$	1.6 VA	930 Ω	$\pm 10\%$
	110 V AC	50 / 60 Hz	88 V AC	121 V AC	$\geq 0.2 U_s$	1.6 VA	3450 Ω	$\pm 10\%$
	120 V AC	50 / 60 Hz	96 V AC	132 V AC	$\geq 0.2 U_s$	1.6 VA	3770 Ω	$\pm 10\%$
	230 V AC	50 / 60 Hz	184 V AC	253 V AC	$\geq 0.2 U_s$	1.6 VA	16100 Ω	$\pm 10\%$

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Type	CR-P...1	CR-P...2	CR-M...2	CR-M...3	CR-M...4	CR-U...2	CR-U...3		
Output circuit(s)	11-12/14	11-12/14 21-22/24	11-12/14 21-22/24	11-12/14 21-22/24 31-32/34	11-12/14 21-22/24 31-32/34 41-42/44	11-12/14 31-32/34	11-12/14 21-22/24 31-32/34		
Kind of output	Relay, 1 c/o	Relay, 2 c/o	Relay, 2 c/o	Relay, 3 c/o	Relay, 4 c/o	Relay, 2 c/o	Relay, 3 c/o		
Contact material	AgNi	AgNi AgNi/Au 5 μm	AgNi	AgNi	AgNi AgNi/Au 5 μm	AgNi			
Rated operational voltage U_e (VDE 0110, IEC 60947-1)	250 V								
Minimum switching voltage	5 V		10 V (AgNi); 5 V (AgNi/Au)			10 V			
Maximum switching voltage	DC 300 V DC		250 V DC						
	AC 440 V AC		250 V AC				440 V AC		
Minimum switching current	5 mA (AgNi), 2 mA (AgNi/Au)		5 mA (AgNi)	5 mA (AgNi)	2 mA (AgNi/Au)	5 mA			
Rated free air thermal current I_{th}	16 A	8 A	12 A	10 A	6 A	10 A			
Rated operational current (IEC 60947-5-1)	AC-12 (resistive) 230 V	16 A	8 A	12 A	10 A	6 A	10 A		
	AC-15 (inductive) 230 V	1.5 A	1.5 A	1.5 A	1.5 A	1 A	1.5 A		
	AC-15 (inductive) 120 V	3 A			1.5 A		3 A		
	DC-12 (resistive) 24 V	16 A	8 A	12 A	10 A	6 A	10 A		
	DC-13 (inductive) 24 V	2.5 A	2 A	2.5 A	2.5 A	2 A	2 A		
	DC-13 (inductive) 120 V	0.22 A							
AC rating (UL 508)	utilization category (pilot duty) (contact rating code designation)	B300		B300			B300		
	max. rated operational voltage	300 V AC		300 V AC			300 V AC		
	max. continuous thermal current at utilization category	5 A		5 A	5 A	2.5 A	5 A		
	max. making / breaking apparent power at utilization category	3600 / 360 VA		3600 / 360 VA			1800 / 180 VA	3600/360 VA	
	utilization category (resistive) (CSA22.2 No.14....)	16 A, 250 V AC	8 A, 250 V AC	10 A, 250 V AC 12 A, 150 V AC	6 A, 250 V AC 10 A, 150 V AC	5 A, 250 V AC 10 A, 150 V AC	10 A, 250 V AC (resistive + single-phase)		
DC rating * (UL 508; NEMA ICS-5)	utilization category (pilot duty) (contact rating code designation)	R300							
	max. rated operational voltage	300 V DC							
	max. continuous thermal current at utilization category	1 A							
	max. making / breaking apparent power at utilization category	28 VA							
	utilization category (resistive) (CSA22.2 No.14....)	-	10 A, 24 V DC	-			10 A, 28 V DC		
Maximum making (inrush) current	30 A	15 A	24 A	20 A	12 A	20 A			
Minimum switching power	0.3 W (AgNi), 0.05 W (AgNi/Au)		0.3 W (AgNi), 0.1 W (AgNi/Au)			0.3 W			
Maximum switching (breaking) power	AC1 (resistive)	4000 VA	2000 VA	3000 VA	2500 VA	1500 VA	2500 VA		
Contact resistance	≤ 100 mΩ								
Maximum operating frequency	rated load AC-1	600 switching cycles/h		1200 switching cycles/h					
	without load	72000 switching cycles/h		18000 switching cycles/h			12000 switching cycles/h		

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Type		CR-P...1	CR-P...2	CR-M...2	CR-M...3	CR-M...4	CR-U...2	CR-U...3
Mechanical lifetime		> 3 x 10 ⁷ switching cycles		> 2 x 10 ⁷ switching cycles				
Electrical lifetime	electrical AC1 (resistive)	> 0.7 x 10 ⁵ switching cycles (16 A, 250 V)	> 10 ⁵ switching cycles (8 A, 250 V)	> 10 ⁵ switching cycles (12 A, 250 V) (10 A, 250 V) (6 A, 250 V)			> 10 ⁵ switching cycles (12 A, 250 V)	
	cos φ	see reduction factor F						
Response time		typ. 7 ms		typ. 13 ms (DC), 10 ms (AC)			typ. 18 ms (DC), 12 ms (AC)	
Release time		typ. 3 ms		typ. 3 ms (DC), 8 ms (AC)			typ. 7 ms (DC), 10 ms (AC)	
Isolation data								
Rated insulation voltage		400 V AC		250 V AC				
Insulation class (In accordance to VDE 0110b)		C250 / B400		C250 / B250			C250	
Rated impulse withstand voltage U _{imp}	between coil and contacts	5 kV		2.5 kV				
	between open contacts	1 kV		1.5 kV				
	between c/o (SPDT) contacts	-	2.5 kV	2.5 kV		≥ 2 kV	2 kV	
Clearance between coil and contacts		≥ 10 mm		≥ 2.5 mm		≥ 1.6 mm	≥ 3 mm	
Creepage distance between coil and contacts		≥ 10 mm		≥ 4 mm		≥ 3.2 mm	≥ 4.2 mm	
Overvoltage category		III		III		II	III	
Pollution degree		3		3		2	3	
General data								
Dimensions		see 'Dimensional drawings'						
Mounting		on socket (see accessories)						
Mounting position		any						
Degree of protection		IP 67		IP 40				
Electrical connection								
Connection		by socket						
Environmental data								
Ambient temperature range	operation	DC: -40...+85 °; AC: -40...+70 °C		DC: -40...+70 °; AC: -40...+55 °C				
	storage	-40 ... +85 °C						
Vibration resistance 10-150 Hz	n/o contact	10 g		5 g			5 g	
	n/c contact	10 g	5 g	5 g		5 g		
Shock resistance	n/o contact	30 g	20 g	10 g		10 g		
	n/c contact	30 g	20 g	5 g		10 g		
Standards / Directives								
Standards		IEC/EN 61810-1						
Low Voltage Directive		-		2014/35/EU				
RoHS Directive		2011/65/EU						

* These ratings are based on different type tests which are not covered by the cULus or CSA approvals.