

Motor contactor CES

CES contactors

Contact endurance of the main contacts

The characteristic curves show the contact endurance of contactors when switching resistive and inductive three-phases loads (AC-1 / AC-3) depending on the breaking current and the rated operational voltage. It is assumed that the control devices operate randomly, i.e. not in synchronism with the phase angle of the supply system.

The rated operational current I_e for AC-4 duty (breaking 6 times the rated operational current) is selected for a contact endurance of approximately 200,000 operating cycles.

If a shorter endurance is sufficient, the rated operational current I_e / AC-4 can be increased.

If mixed operation is involved, i.e. normal switching (breaking of rated operational current in AC-3 duty) with intermitted inching (breaking multiples of the rated operational current in AC-4 duty) the contact endurance can be calculated approximately from the following equation:

$$X = \frac{A}{1 + \frac{C}{100} \left(\frac{A}{B} - 1 \right)}$$

Legend to the equation:

X Contact endurance for mixed operation in operating cycles

A Contact endurance for normal operation ($I_a = I_e$) in operating cycles

B Contact endurance for inching ($I_a =$ multiple of I_e) in operating cycles

C Percentage of inching operations in total operations

Short-circuit protection of CES 6 to CES 105 contactors without overload relay

Fuses, utilization category gG

or miniature circuit-breaker with C-characteristics

Technical data								
Contactor	Type	CES 6	CES 9	CES 12	CES 18	CES 25	CES 32	
Main circuit								
With fuses								
- acc. to IEC 60947-4-1	Type of coordination "1" ¹⁾	A	32	32	32	32	63	63
	Type of coordination "2" ¹⁾	A	20	20	25	25	40	40
- weld-free ²⁾	$I_k \geq 100 \times I_e$	A	10	10	10	10	16	16
With miniature circuit breaker	C-characteristic	A	16	16	25	25	--	--
Auxiliary circuit (short circuit current $I_k \geq 1$ kA)								
Contactor	Size	0 ... 1						
	Type	CES 6 to CES 32						
With fuses	A	16						
	A	6, if overload relay auxiliary contacts are in the contactor coil circuit						
with miniature circuit-breaker	A	10						
with C-characteristics	A	3, if overload relay auxiliary contacts are in the contactor coil circuit						
Contactor	Type	CES 40	CES 45	CES 65	CES 75	CES 85	CES 105	
Main circuit								
With fuses								
- acc. to IEC 60947-4-1	Type of coordination "1" ¹⁾	A	80	80	160	160	250	250
	Type of coordination "2" ¹⁾	A	63	63	100	100	125	160
- weld-free ²⁾	$I_k \geq 100 \times I_e$	A	25	25	63	80	125	125
With miniature circuit breaker	C-characteristic	A	--	--	--	--	--	--
Auxiliary circuit (short circuit current $I_k \geq 1$ kA)								
Contactor	Size	0 ... 4						
	Type	CES 40 ... CES 105						
With fuses	A	16						
	A	6, if overload relay auxiliary contacts are in the contactor coil circuit						
with miniature circuit-breaker	A	10						
with C-characteristics	A	3, if overload relay auxiliary contacts are in the contactor coil circuit						

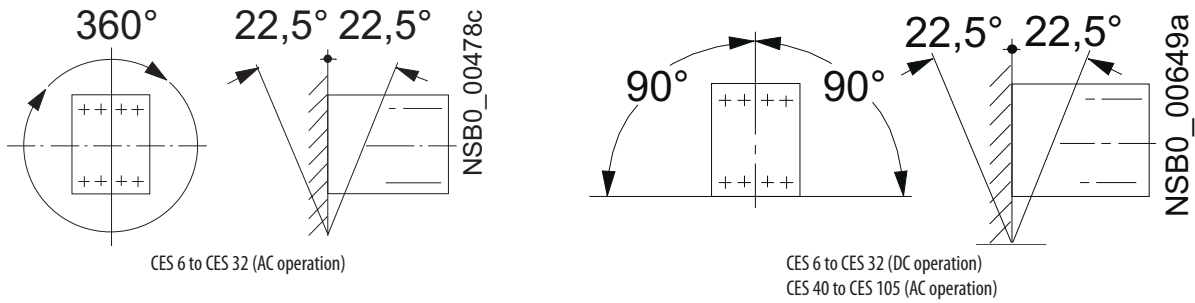
¹⁾ In accordance with IEC 60947-4-1:

Type of coordination "1": Destruction of contactor and overload relay is admissible. Contactor and/or overload relay must be replaced if necessary.

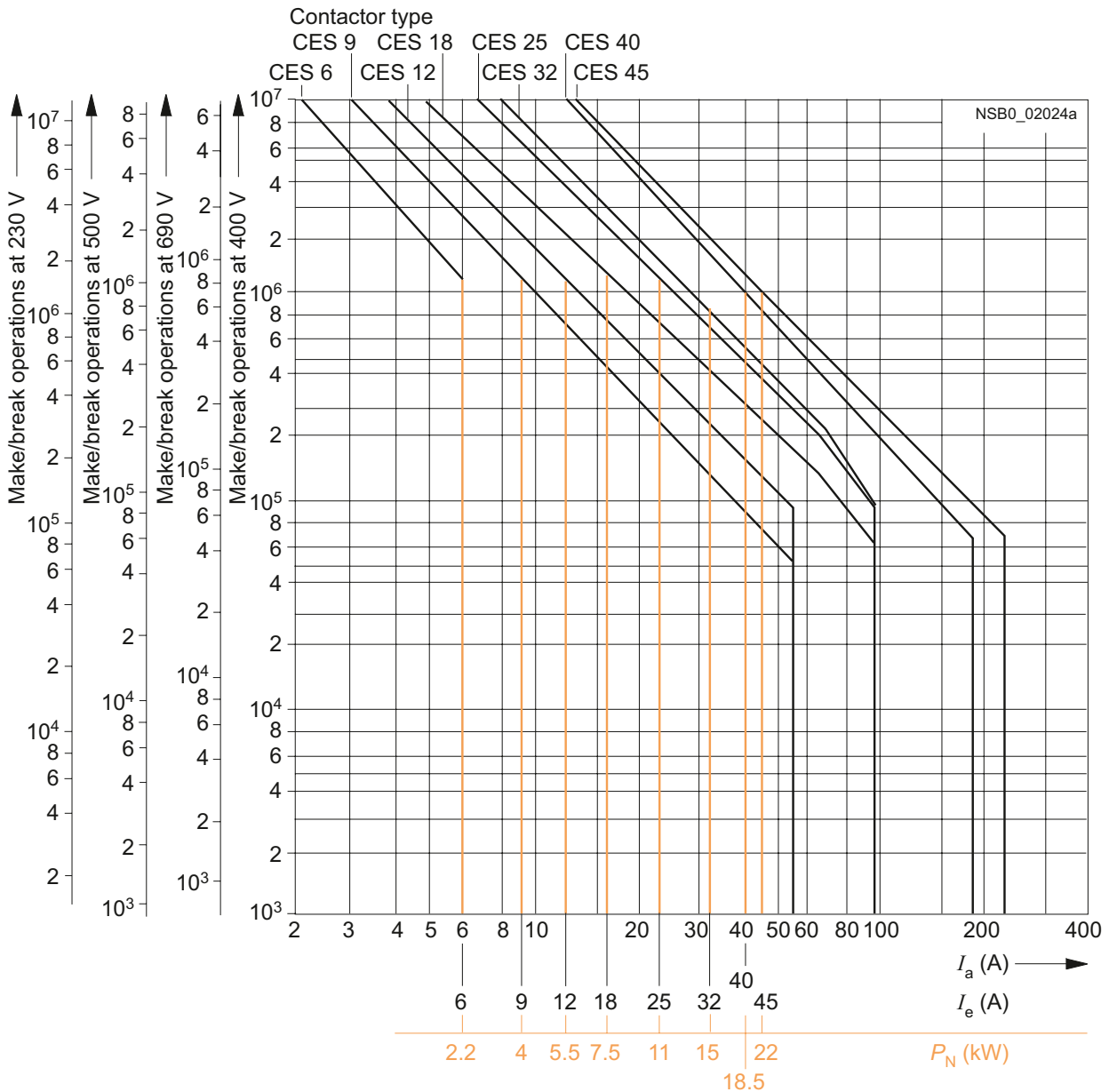
Type of coordination "2": No damage can be tolerated on the overload relay, but contact welding on the contactor is permitted if the contacts can easily be separated.

²⁾ Test conditions according to IEC 60947-4-1.

Mounting position



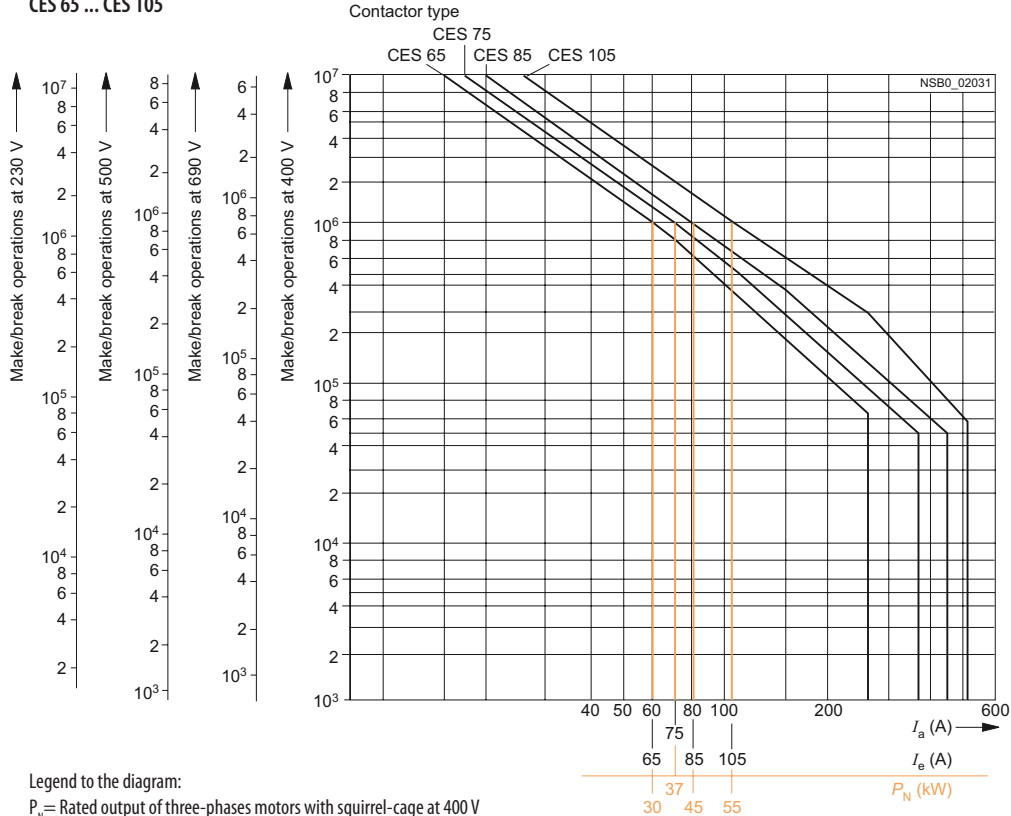
CES 6 ... CES 45



Legend to the diagram:
 P_N = Rated output of three-phases motors with squirrel-cage at 400 V
 I_a = Breaking current
 I_e = Rated operational current

CES contactors

CES 65 ... CES 105



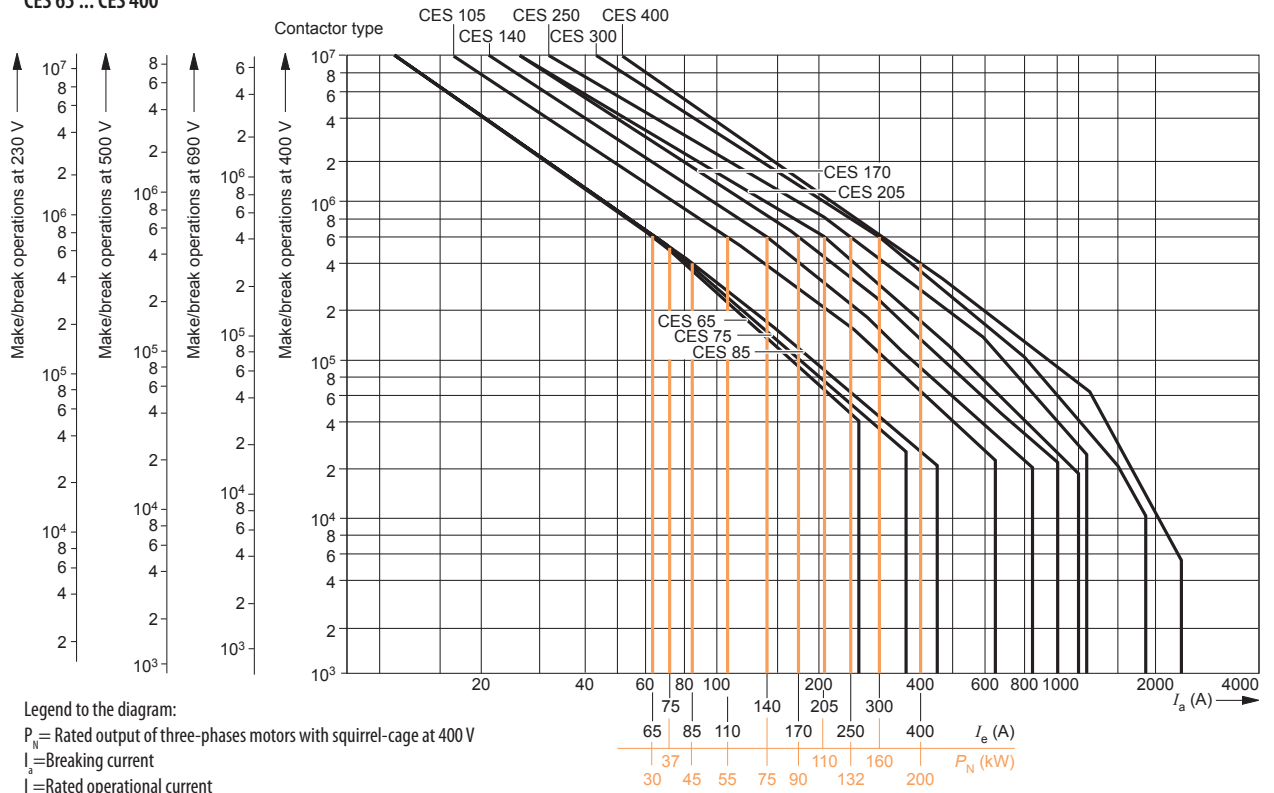
Legend to the diagram:

P_N = Rated output of three-phases motors with squirrel-cage at 400 V

I_a = Breaking current

I_e = Rated operational current

CES 65 ... CES 400



Legend to the diagram:

P_N = Rated output of three-phases motors with squirrel-cage at 400 V

I_a = Breaking current

I_e = Rated operational current

Technical data							
Contactor	Type		CES 6 ... CES 18		CES 25, CES 32		
General data							
Mechanical endurance	Basic units	Operating cycles	15 million				
	Auxiliary contact blocks		10 million				
Rated insulation voltage U_i (pollution degree 3)	V		690				
Rated impulse withstand voltage U_{imp}	kV		8				
Protective separation ¹⁾ between coil and main contacts	V		≤ 500		≤ 690		
Permissible ambient temperature ²⁾	°C		-25 to +55 in operation, -50 to +80 when stored				
Degree of protection	acc. to IEC 60947-1		IP 20				
Power consumption of the coils			(with cold coil) and $1.0 \times U_s$				
AC operation		Hz	50/60				
	closing	VA	77/71				
	cos φ		0.81/0.75				
	closed	VA	11/9				
	cos φ		0.28/0.27				
DC operation	closing = closed	W	6.2				
Permissible residual current of the electronics (at 0-Signal)			≤ 8 mA × $\frac{220V}{U_s}$ AC operation		≤ 1.25 mA × $\frac{220V}{U_s}$ DC operation		
Coil voltage tolerance			0.8 ... 1.1 × U_s				
Operating times at 0.8 to 1.1 × U_s			Break time = opening time + arcing time (Values are applicable with the coil in cold state and at operating temperature)				
AC operation	closing time	ms	8 ... 35		10 ... 35		
	opening time	ms	4 ... 18		5 ... 20		
DC operation	closing time	ms	20 ... 170		35 ... 180		
	opening time	ms	10 ... 25		10 ... 25		
Arcing time		ms	10		10		
Operating times at $1.0 \times U_s$							
AC operation	closing time	ms	10 ... 25		10 ... 25		
	opening time	ms	5 ... 18		5 ... 20		
DC operation	closing time	ms	30 ... 70		40 ... 80		
	opening time	ms	12 ... 20		10 ... 20		
Shock resistance	Rectangular pulse	AC	g/ms	7.7/5 & 4.4/10		5.5/5 & 3.2/10	
		DC	g/ms	9.3/5 & 5.4/10		5.8/5 & 3.4/10	
	Sine pulse	AC	g/ms	12/5 & 6.8/10		8.7/5 & 5.1/10	
		DC	g/ms	14.7/5 & 8.5/10		9/5 & 5.3/10	
Conductor cross-sections (screw connection; 1 or 2 conductor connection possible)	Main conductor:						
	solid	mm ²	2 x (0.5 ... 1); 2 x (1 ... 2.5); 1 x 4		2 x (2.5 ... 6)		
	finely stranded with end sleeve	mm ²	2 x (0.5 ... 1); 2 x (0.75 ... 2.5)		2 x (0.5 ... 1); 2 x (1.5 ... 4)		
	Pin-end connector (DIN 46 231)	mm ²	1 x (1 ... 2.5)		1 x (1 ... 6)		
	solid or stranded	AWG	2 x (18 ... 12)		2 x (14 ... 10)		
	Terminal screw		M3.5		M4		
	Auxiliary conductor:						
	solid	mm ²	2 x (0.5 ... 1); 2 x (1 ... 2.5)		2 x (0.5 ... 1); 2 x (1 ... 2.4)		
	finely stranded with end sleeve	mm ²	2 x (0.5 ... 1); 2 x (0.75 ... 2.5)		2 x (0.5 ... 1); 2 x (0.75 ... 2.5)		
	Pin-end connector (DIN 46 231)	mm ²	2 x (1 ... 1.5)		2 x (1 ... 1.5)		
solid or stranded	AWG	2 x (18 ... 12)		2 x (18 ... 12)			
Specified tightening torque of the terminal screws	Main conductor:		0.8 ... 1.4 Nm (7 ... 12 lb.in)		1 ... 1.5 Nm (8.8 ... 13 lb.in)		
	Auxiliary conductor		0.8 ... 1.4 Nm (7 ... 12 lb.in)		0.8 ... 1.4 Nm (7 ... 12 lb.in)		
Operating frequency z in operating cycles per hour (o.c./h)			Operation:		Operation:		
Contactors without overload relay	No-load operating frequency	1/h	AC	DC	AC	DC	
	Rated duty at AC-1	1/h	10000	1500	5000	1500	
	at AC-2 and AC-3	1/h	1500	1500	1500	1500	
	at AC-4	1/h	1000	1000	750	750	
Contactor with overload relay (mean value)		1/h	15		15		

¹⁾ Acc. to IEC 60947-1, Annex N.




²⁾ When CES 6 to CES 32 AC operated contactors are mounted in rows, the minimum gap between them must be 5 mm when the coil voltage is $1.1 \times U_s$, the ambient temperature ≥ 45 °C and the load factor of all relays is 100 %.

Technical data

Technical data						
Contactor		Type	CES 40		CES 45	
General data						
Mechanical endurance	Basic units	Operating cycles	10 million			
	Auxiliary contact blocks		10 million			
Rated insulation voltage U_i (pollution degree 3)		V	690			
Rated impulse withstand voltage U_{imp}		kV	8			
Protective separation ¹⁾ between coil and main contacts		V	≤ 415			
Permissible ambient temperature		°C	-25 to +55 in operation, -50 to +80 when stored			
Degree of protection	acc. to IEC 60947-1		IP 00			
Power consumption of the coils			(with cold coil) and $1.0 \times U_s$			
AC operation		Hz	50/60			
	closing	VA	121/117			
	p.f.		0.79/0.72			
	closed	VA	16.5/13			
	p.f.		0.27/0.28			
Coil voltage tolerance			0.8 ... $1.1 \times U_s$			
Operating times at 0.8 to $1.1 \times U_s$ Break time = opening time + arcing time						
AC operation ²⁾	closing time	ms	13 ... 57			
	opening time	ms	5 ... 10			
Arcing time		ms	10			
Operating times at $1.0 \times U_s$						
AC operation ²⁾	closing time	ms	13 ... 32			
	opening time	ms	5 ... 10			
Shock resistance	Rectangular pulse	AC	g/ms	5.7/5 & 3.3/10		
		DC	g/ms	5.7/5 & 3.3/10		
	Sine pulse	AC	g/ms	9/5 & 5.2/10		
		DC	g/ms	9/5 & 5.2/10		
Conductor cross-selections (screw connection; 1 or 2 conductor connection possible)	Main conductor:		Front terminal connected	Back terminal connected	Both terminal connected	
					Front terminal	Back terminal
	solid	mm ²	1 ... 16	1 ... 16	1 ... 16	1 ... 16
	finely stranded without end sleeve	mm ²	2.5 ... 16	1.5 ... 16	2.5 ... 10	1.5 ... 16
	finely stranded with end sleeve	mm ²	1 ... 16	1 ... 16	1 ... 10	1 ... 16
	standed	mm ²	2.5 ... 25	1.5 ... 25	2.5 ... 10	1.5 ... 25
	Pin-end connector (DIN 46 231)	mm ²	1 ... 6	1 ... 6	1 ... 6	1 ... 6
	solid or stranded	AWG	14 ... 3	16 ... 3	14 ... 6	16 ... 3
	Terminal screw		M5	M5	M5	M5
	Auxiliary conductor:					
	solid	mm ²	2 x (0.5 ... 1); 2 x (1 ... 2.5)			
	finely stranded with end sleeve	mm ²	2 x (0.5 ... 1); 2 x (0.75 ... 2.5)			
	Pin-end connector (DIN 46 231)	mm ²	2 x (1 ... 1.5)			
solid or stranded	AWG	2 x (18 ... 12)				
Specified tightening torque of the terminal screws	Main conductor:		2.5 ... 3.0 Nm (22 ... 26.5 lb.in)			
	Auxiliary conductor		0.8 ... 1.4 Nm (7 ... 12 lb.in)			
Operating frequency z in operating cycles per hour (o.c./h)			Operation:		Operation:	
			AC	DC	AC	DC
Contactors without overload relay	No-load operating frequency	1/h	5000	on request	5000	on request
	Rated duty at AC-1	1/h	1200	1200	1200	1200
	at AC-2	1/h	600	600	600	600
	at AC-3	1/h	600	600	600	600
	at AC-4	1/h	250	250	200	600
Contactor with overload relay (mean value)			15		15	

¹⁾ Acc. to IEC 60947-4-1, Annex N.

²⁾ The opening time delay of the NO contacts and the closing time of the NC contacts are increased when the contactor coil is protected against voltage peaks (diode 6 to 9 times; diode combination 2 to 6 times, varistor + 2 to 5 ms).

Technical data								
Contactor	Type		CES 65	CES 75	CES 85	CES 105		
General data								
Mechanical endurance		Operating cycles	10 million (AC operation)					
Rated insulation voltage U_i (pollution degree 3)		V	1000					
Rated impulse withstand voltage U_{imp}		kV	8					
Protective separation ¹⁾ between coil and main contacts		V	≤ 500		≤ 690			
Permissible ambient temperature		°C	-25 to +55 in operation, -50 to +80 when stored					
Degree of protection		acc. to IEC 60947-1	IP 00/oper type, operating mechanism IP40					
Power consumption of the coils			(with cold coil) and $1.0 \times U_s$					
AC operation		Hz	50/60					
closing		VA	225/192		398/345			
p.f.			0.6/0.54		0.5/0.4			
closed		VA	24/16		46/29			
p.f.			0.29/0.29		0.23/0.24			
Coil voltage tolerance			0.8 ... $1.1 \times U_s$					
Operating times at 0.8 to $1.1 \times U_s$ Break time = opening time + arcing time								
AC operation ²⁾		closing time	ms		15 ... 40			
		opening time	ms		5 ... 25			
Arcing time		ms	10 ... 15					
Operating times at $1.0 \times U_s$								
AC operation ²⁾		closing time	ms		17 ... 30			
		opening time	ms		5 ... 25			
Shock resistance		Rectangular pulse	AC	g/ms		11.2/5 & 6/10		
			DC	g/ms		10.7/5 & 6.2/10 (14.5 & 7.7/10) ⁵⁾		
		Sine pulse	AC	g/ms		17.6/5 & 10.3/10		
			DC	g/ms		16.8/5 & 9.7/10 (22/5 & 12/10) ⁵⁾		
Conductor cross-selections (screw connection; 1 or 2 conductor connection possible)		Main conductor: - with box terminal		Front terminal connected	Back terminal connected	Both terminal connected		
						Front terminal		Back terminal
		solid		mm ²	6 ... 16	1 ... 16	1 ... 16	1 ... 16
		finely stranded without end sleeve		mm ²	10 ... 35	1.5 ... 16	1.5 ... 16	1.5 ... 16
		finely stranded with end sleeve		mm ²	6 ... 35	1 ... 16	1 ... 16	1 ... 16
		standed		mm ²	16 ... 50	1.5 ... 25	1.5 ... 25	1.5 ... 25
		solid or stranded		mm ²	10 ... 1/0	16 ... 3	16 ... 3	16 ... 3
		Terminal screw			M6			
		Tightening torque - without box terminal			4 ... 6 Nm (36 ... 52 lb. in)			
		finely stranded with cable lug		mm ²	10 ... 35 ⁶⁾			
		standed with cable lug		mm ²	10 ... 50 ⁶⁾			
		solid or stranded		AWG	7 ... 1/0			
		Terminal bar (max. with)		mm	12			
		Terminal screw			M6 x 20			
		Tightening torque			4 ... 6 Nm (36 ... 52 lb. in)			
Auxiliary conductor:								
solid		mm ²	2 x (0.5 ... 1); 2 x (1 ... 2.5); 1 x 4					
finely stranded with end sleeve		mm ²	2 x (0.5 ... 1); 2 x (0.75 ... 2.5)					
Pin-end connector (DIN 46 231)		mm ²	2 x (1 ... 1.5)					
solid or stranded		AWG	2 x (18 ... 12)					
Tightening torque		mm ²	0.8 ... 1.4 Nm (7 ... 12 lb. in)					

¹⁾ In accordance with IEC 60947-1, Annex N.

²⁾ The opening time delay of the NO contacts and the closing time of the NC contacts are increased when the contactor coil is protected against voltage peaks (diode 6 to 9 times; diode combination 2 to 6 times, varistor + 2 to 5 ms).

Technical data

Technical data								
Contactors		Type	CES 140	CES 170	CES 205	CES 250	CES 300	CES 400
Rated power AC-3, 400V		KW	75	90	110	132	160	200
Rated operational current I_e	40° C AC-1	A	160	210	220	300	320	500
at 400V,	AC-3	A	140	170	205	250	300	400
at 400V,	AC-4	A	68	75	96	110	125	150
Ambient Temperature	Operation	° C	-25 ... +55					
	Storage	° C	-25 ... +70					
Humidity			+40°C no more than 50%, +25°C no more than 90%					
Altitude without derating		M	≤2000					
Mechanical Life	AC - Operation	mil. cycles	3 times of AC-3 endurance					
Electrical Life	at 400V, I_e / AC-3	mil. cycles	0,6	0,6	0,6	0,6	0,6	0,4
Max. Operating Frequency without overload relay	at AC-3	cycles/hr.	1200	600	600	600	600	600
	at AC-4	cycles/hr.						
Rated insulation voltage U_i		V	1000	1000	1000	1000	1000	1000
Rated impulse withstand voltage U_{imp}		kV	8	8	8	8	8	8
Power input of coil	Holding	VA	Gr 2-3	Gr 2-3	Gr 2-3	Gr 2-3	Gr 2-3	Gr 2-3
Coil type			AC 50/60Hz 24V, 110V, 220V, 380V					
Operating range of coil	at U_s AC	x U_s	0.8-1.1	0.8-1.1	0.8-1.1	0.8-1.1	0.8-1.1	0.8-1.1
Degrees of Protection			IP00					
Short circuit protection without overload relay	ordination type 2	A	225	315	315	355	450	460
Coil Surge Suppressors			offer as accessories					
Auxiliary switch block pre-mounted in side		1NO+1NC	√	√	√	√	√	√
		2NO+2NC	√	√	√	√	√	√
		4NO+4NC	√	√	√	√	√	√
Auxiliary switch block in addition - Top mounted		NO/NC	x					
Auxiliary switch block	Rated insulation voltage U_i	V	690					
	Rated impulse withstand voltage U_{imp}	kV	6					
	Rated current capacity		AC-15: 360VA; DC-13 33W					
	Conventional thermal current I_{th}	A	10					
Dimensions (AC - Operation) H / B; Width		mm	≤120 mm	≤ 135mm	≤ 145mm	≤ 145mm	≤ 160mm	≤ 160mm
Mounting			Screw mounted, Vertical +/- 22.5°C					
Main circuit Terminal screw type			Busbar - Hex head					
Control circuit Terminal screw type			Remain as existing					
Certificates & Standards			CE, RoHS					

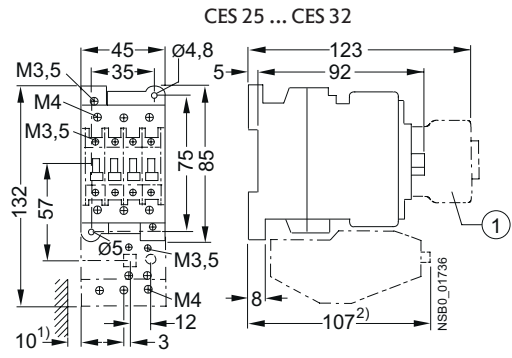
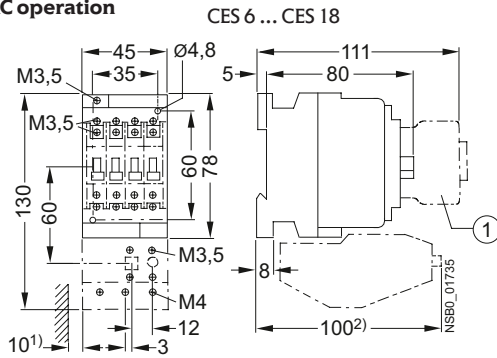
Technical data										
Contactor	Type			CES 6	CES 9	CES 12	CES 18	CES 25	CES 32	
Load ratings of the contactors with AC										
Thermal load	10 s current ¹⁾			A	90	90	96	96	176	176
Power loss per conducting path	at I _e /AC-3			W	0.6	0.6	1.1	1.1	1.6	1.6
AC-1 duty, switching resistive load²⁾										
Rated operational currents I _e	at 40 °C to at 55 °C to	690 V	A	25	25	25	25	38	38	
		690 V	A	20	20	20	20	32	32	
Minimum conductor cross-section at I _e load	at 40 °C at 55 °C			mm ²	4	4	4	4	10	10
				mm ²	4	4	4	4	10	10
AC-2 and AC-3 duty										
Rated operational currents I _e	up to	400 V	A	6	9	12	18	25	32	
		500 V	A	6	9	12	16	17	32	
		690 V	A	6	6.6	8.8	12.2	12.2	27	
Max. rating of slipping or squirrel-cage motors at 50 and 60 Hz	at	230 V	kW	1.5	2.4	3.3	4	5.5	8.5	
		400 V	kW	2.2	4	5.5	7.5	11	15	
		500 V	kW	3	5.5	7.5	9	11	21	
		690 V	kW	4	5.5	7.5	11	11	23	
AC-4 duty (contact endurance approx. 200.000 operating cycles I_a = 6 x I_e)										
Rated operational currents I _e	up to	400 V	A	3.1	3.3	4.3	7.7	8.5	15.6	
		690 V	A	3.1	3.3	4.3	7.7	8.5	15.6	
Ratings of squirrel-cage motors at 50 and 60 Hz	at	230 V	kW	0.8	0.85	1.15	2	2.2	4.3	
Max. permitted rated operational current I _e /AC-4 = [^] I _e /AC-3 up to 500 V with endurance and operating frequency		400 V	kW	1.15	1.4	1.9	3.5	4	7.5	
		690 V	kW	1.9	2.4	3.3	6	6.6	13	
Contactor										
Load ratings of the contactors with AC										
Thermal load	10 s current ¹⁾			A	400	400	360	500	800	800
Power loss per conducting path	at I _e /AC-3			W	2.0	2.5	3.5	6	7.5	10
AC-1 duty, switching resistive load²⁾										
Rated operational currents I _e	at 40 °C to at 55 °C to	690 V	A	65	65	90	100	105	105	
		690 V	A	55	55	80	90	100	105	
Minimum conductor cross-section at I _e load	at 40 °C at 55 °C			mm ²	16	16	35	35	50	50
				mm ²	16	16	25	35	35	35
AC-2 and AC-3 duty										
Rated operational currents I _e	up to	400 V	A	40	45	65	75	85	105	
		500 V	A	32	38	40	63	75	85	
		690 V	A	27	27	40	63	75	75	
		1000 V	A	--	--	6	6	30	30	
Max. rating of slipping or squirrel-cage motors at 50 and 60 Hz	at	230 V	kW	11	15	18.5	22	26	37	
		400 V	kW	18.5	22	30	37	45	55	
		500 V	kW	21	25	30	41	50	59	
		690 V	kW	23	23	39	56	67	67	
		1000 V	A	--	--	--	--	39	39	
AC-4 duty (contact endurance approx. 200.000 operating cycles I_a = 6 x I_e)										
Rated operational currents I _e	up to	400 V	A	18.5	24	28	34	42	54	
		690 V	A	18.5	24	28	34	42	54	
		1000 V	A	--	--	--	23	23	34	
Ratings of squirrel-cage motors at 50 and 60 Hz	at	230 V	kW	5.2	7.3	8.5	10.3	12	16.3	
Max. permitted rated operational current I _e /AC-4 = [^] I _e /AC-3 up to 500 V with endurance and operating frequency		400 V	kW	9	12.6	14.7	17.9	22	28.4	
		690 V	kW	15.5	20.8	24.3	29.5	38	49	
		1000 V	kW	--	--	--	30	30	45	
Contactor										
Load ratings of the contactors with AC										
Thermal load	10 s current ¹⁾			A	1140	1360	1640	2500	2500	3400
Power loss per conducting path	at I _e /AC-3			W	14	14	20	16	23	40
AC-1 duty, switching resistive load²⁾										
Rated operational currents I _e	at 40 °C to at 55 °C to	690 V	A	170	230	240	325	325	425	
		690 V	A	160	210	220	300	300	400	
Minimum conductor cross-section at I _e load	at 40 °C at 55 °C			mm ²	70	120	120	185	185	2x150
				mm ²	70	95	120	185	185	240
AC-2 and AC-3 duty										
Rated operational currents I _e	up to	500 V	A	140	170	205	250	300	400	
		690 V	A	110	170	170	250	250	400	
		1000 V	A	42	68	68	95	95	180	
Max. rating of slipping or squirrel-cage motors at 50 and 60 Hz	at	230 V	kW	45	56	66	82	96	131	
		400 V	kW	75	95	115	142	168	232	
		500 V	kW	98	118	145	178	210	289	
		690 V	kW	105	163	163	245	245	397	
		1000 V	A	65	90	90	132	132	250	
AC-4 duty (contact endurance approx. 200.000 operating cycles I_a = 6 x I_e)										
Rated operational currents I _e	up to	690 V	A	68	75	96	110	125	150	
		1000 V	A	34	42	42	57	57	80	
Ratings of squirrel-cage motors at 50 and 60 Hz	at	230 V	kW	21	23	30	35	40	49	
Max. permitted rated operational current I _e /AC-4 = [^] I _e /AC-3 up to 500 V with endurance and operating frequency		400 V	kW	36	40	52	61	69	85	
		690 V	kW	63	69	90	105	119	147	
		1000 V	kW	45	55	55	75	75	110	

¹⁾ Acc. to IEC 60947-4-1.

²⁾ Industrial furnaces and electric heaters with resistance heating for example (higher current during heating-up allowed for).

Dimensional drawings

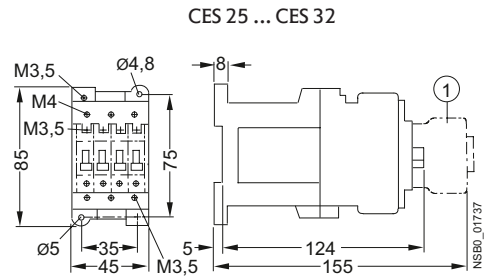
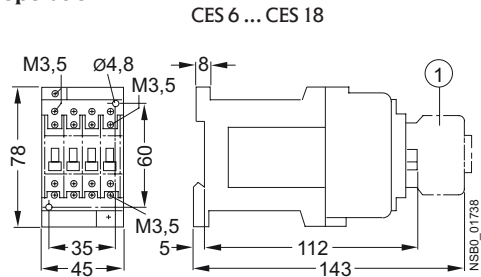
AC operation



- ① Auxiliary switch block
- 1) Minimum clearance from the earthed parts.
- 2) Dimension for the square OFF-button (stroke 3 mm). Dimension for the round RESET-button (stroke 2.5 mm) less than 2.5 mm.

- ① Auxiliary switch block
- 1) Minimum clearance from the earthed parts.
- 2) Dimension for the square OFF-button (stroke 3 mm). Dimension for the round RESET-button (stroke 2.5 mm) less than 2.5 mm.

DC operation

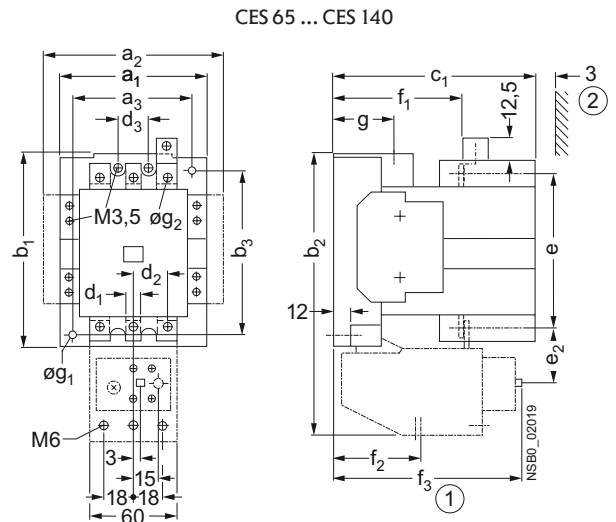
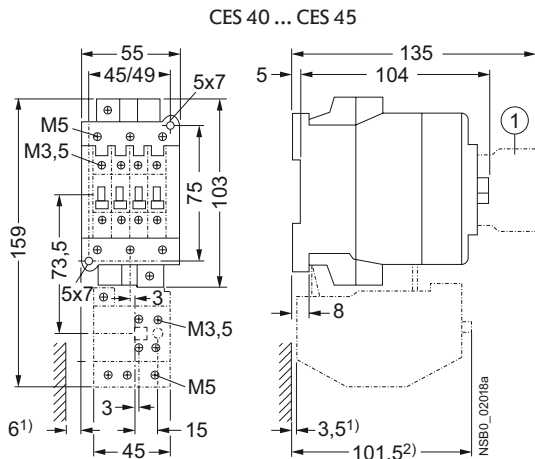


- ① Auxiliary switch block

- ① Auxiliary switch block

• Clearance when mounted in rows:

When CES 6 to CES 32 AC operated contactors are mounted in rows, the minimum gap between them must be 5 mm when the coil voltage $1.1 \times U_n$, the ambient temperature $\geq 45^\circ C$ and the load factor of all relays is 100 %.

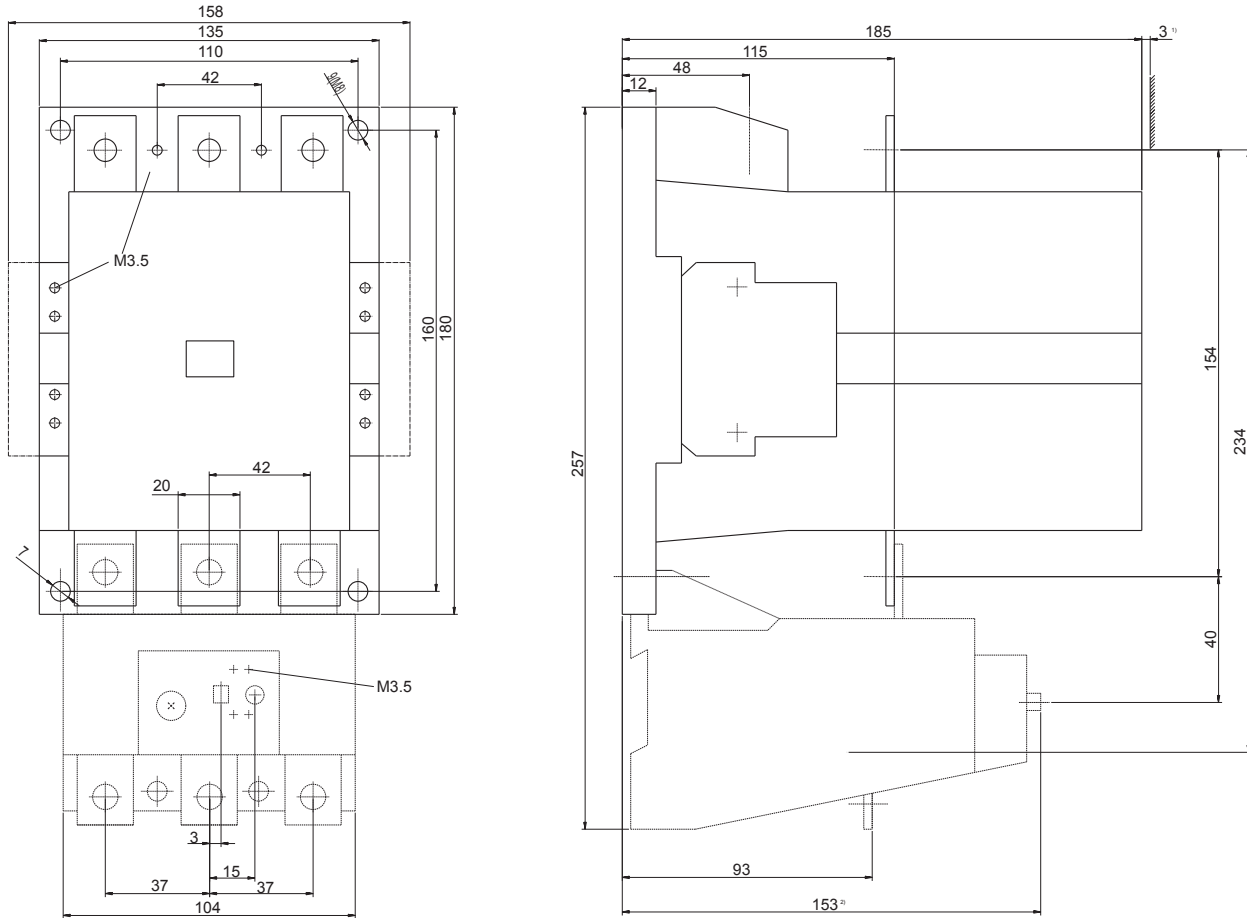


- ① Auxiliary switch block
- 1) Minimum clearance from the earthed parts.
- 2) Dimension for the square OFF-button (stroke 3 mm). Dimension for the round RESET-button (stroke 2.5 mm) less than 2.5 mm.

- ① Dimension for the square OFF-button (stroke 3 mm) Dimension for the round RESET-button (stroke 2.5 mm) less than 2.5 mm.
- ② Minimum clearance from insulated components 3 mm Minimum clearance from earthed components 10 mm

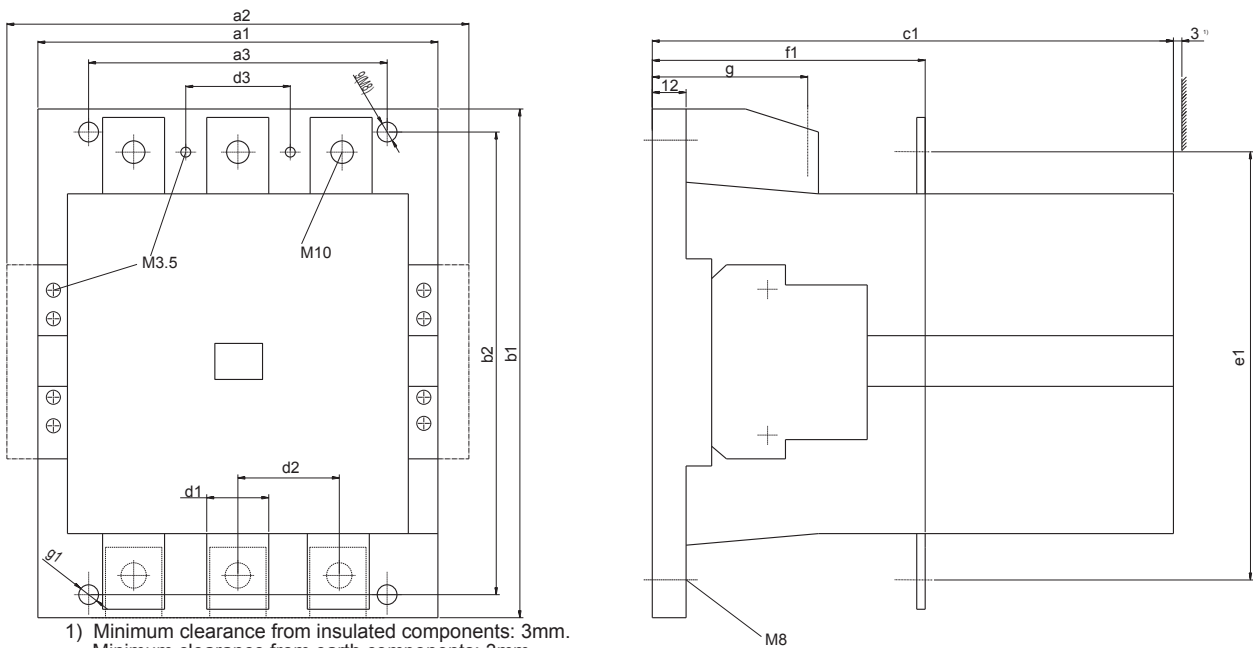
	a1	a2	a3	b1	b2	b3	c1	d1	d2	d3	e	e2	f1	f2	f3	g1	g2
CES 65	90	113	70	117	175	100	123	8	26.5	25	94	80	63	122	28	4.8	6.1 (M6)
CES 75																	
CES 85	100	123	80	133	194	110	140	8	26.5	25	107	89	63	122	39	5.5	6.1 (M6)
CES 105	100	123	80	133	194	110	140	10.5	26.5	25	116	89	63	122	39	5.5	6.1 (M6)
CES 140	120	143	100	150	232	130	150	20	42	37	139	40.5	93	80	146	6.3	9 (M)

CES 170 ... CES 205



- 1) Minimum clearance from insulated components: 3mm.
Minimum clearance from earth components: 3mm.
- 2) Dimension for the quqre OFF-button(stroke 3mm).
Dimension for the round RESET-button(Stroke 2.5mm) less 2.5mm.

CES 250 ... CES 400



- 1) Minimum clearance from insulated components: 3mm.
Minimum clearance from earth components: 3mm.
- 2) Dimension for the quqre OFF-button(stroke 3mm).
Dimension for the round RESET-button(Stroke 2.5mm) less 2.5mm.

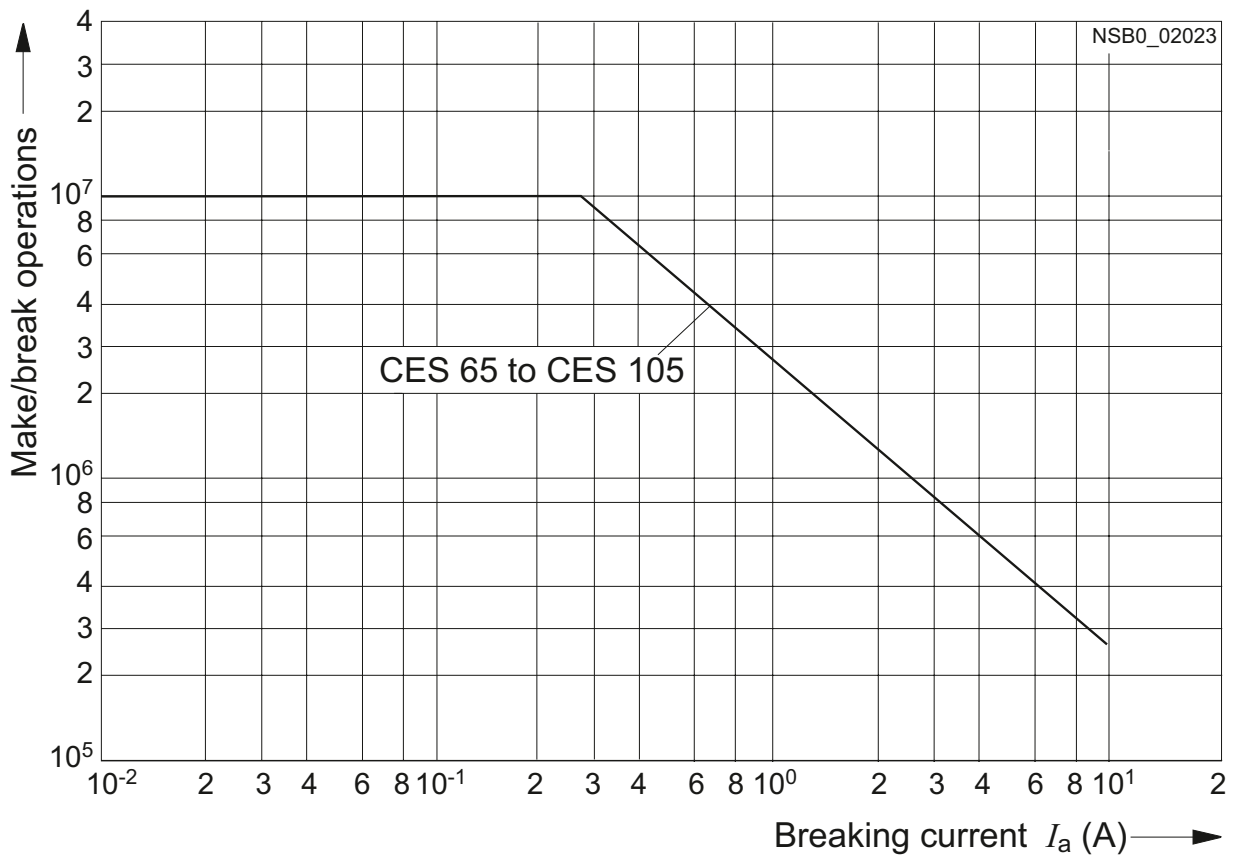
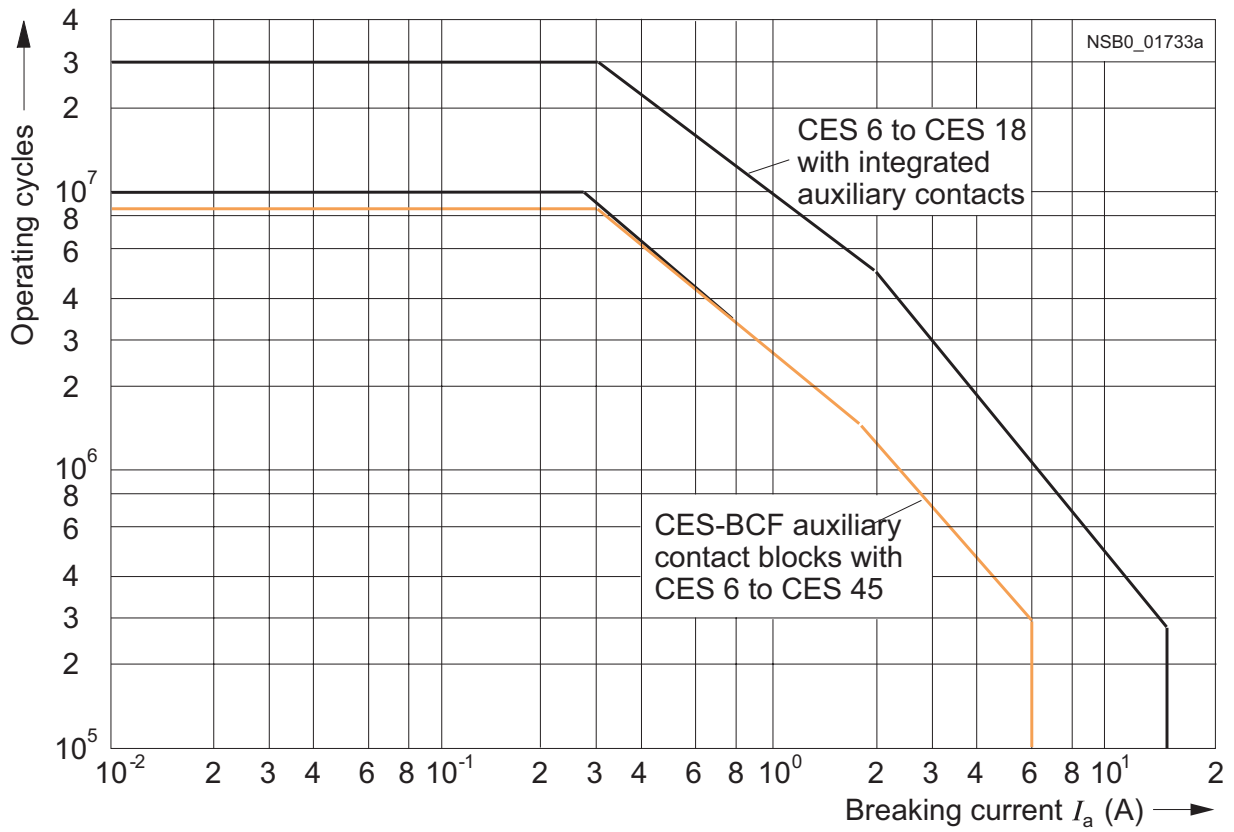
	a1	a2	a3	b1	b2	c1	d1	d2	d3	(c1) ¹	e1	f1	g	g1
CES 250 - CES 300	145	168	120	200	180	198	25	48	48	198	168	132	58	9
CES 400	160	183	130	200	180	222	25	48	48	222	178	150	65	9

Auxiliary contacts for CES contactors Technical Data						
Type		CES 6 ... CES 32 ¹⁾	CES 6 ... CES 18 ²⁾	CES 40, CES 45 ¹⁾	CES 65 ... CES 400	
Rated insulation voltage U_i (pollution degree 3)	V	690	690	690	1000	
Conventional free-air thermal current I_{th} = rated operational current I_e	A	10	10	10	10	
AC duty Rated operational current I_e / AC-15/AC-14 at rated operational voltage U_e	24 V	A	6	10	10	10
	110 V	A	6	10	10	10
	125 V	A	6	10	10	10
	220 V	A	6	10	6	6
	230 V	A	5,6	9,6	5,6	5,6
	380 V	A	4	6	4	4
	400 V	A	3,8	5,5	3,6	3,6
	500 V	A	2,5	4	2,5	2,5
	660 V	A	2	2	2,5	2,5
DC duty Rated operational current I_e/DC-12 at rated operational voltage U_e	24 V	A	10	10	--	--
	48 V	A	10	10	--	--
	110 V	A	5,5	2,1	--	--
	125 V	A	--	--	--	--
	220 V	A	1,2	0,8	--	--
	440 V	A	0,28	0,6	--	--
	600 V	A	0,14	0,6	--	--
Rated operational current I_e/DC-13 at rated operational voltage U_e	24 V	A	10	10	--	--
	48 V	A	4,6	5	--	--
	110 V	A	0,8	0,9	--	--
	125 V	A	--	--	--	--
	220 V	A	0,3	0,45	--	--
	440 V	A	0,11	0,25	--	--
	600 V	A	0,08	0,2	--	--

¹⁾ Mountable auxiliary contact blocks.

²⁾ Integrated auxiliary contacts.

Contact endurance of the auxiliary contacts



Thermal overload relays, CLASS 10A

According to IEC 60947-4-1

Type		CES-RT0	CES-RT1	CES-RT2	CES-RT3
General data					
Trip class		CLASS 10A ($2s < t_a \leq 10s$ at $7.2 \times I_n$ from cold state)			
Phase failure sensitivity by differential phase shift		✓	✓	✓	✓
Changeover to automatic reset		✓	✓	✓	✓
RESET button with trip-free feature		✓	✓	✓	✓
Temperature compensation		✓	✓	✓	✓
Switch position indicator		✓	✓	✓	✓
Test button actuates the NO and NC contacts		✓	✓	✓	✓
Terminal for contactor coil		✓	✓	✓	✗ ¹⁾
Permissible ambient temperature	°C	-25 ... +55			
Degree of protection acc. to IEC 60947-1		IP00/open or IP20			
Shock resistance	g/ms	8/10			
Main circuit					
Rated insulation voltage U_i (Pollution degree 3)	AC/DC V	690			
Rated impulse withstand voltage U_{imp}	kV	6			
Type of current, frequency range		DC; AC ≤ 400 Hz			
Conductor cross-sections					
Terminal screw		M4	M5	M4	M5
solid or stranded	mm ²	2.5 ... 6	1.5 ... 25	1.5 ... 25	2.5 ... 35
finely stranded with end sleeve	mm ²	1.5 ... 4	1 ... 16	1 ... 16	1.5 ... 25
Flat bars	mm	--	--	--	--
Tightening torque	Nm	1 ... 1.5	2.5 ... 3	2.5 ... 3	2.5 ... 3
	lb.in	9 ... 13	22 ... 26.5	22 ... 26.5	22 ... 26.5
Power loss per conduction path (max.)					
at lowest value	W (VA)	0.9	1.2	1.2	2.6
at highest value of the setting range	W (VA)	2.25	3	3	4
Auxiliary circuit					
Auxiliary contacts		1 NO + 1 NC			
Conductor cross-sections					
Terminal screw		M3.5			
solid or stranded	mm ²	2 x (0.5 ... 1)/2 x (1 ... 2.5)			
finely stranded with end sleeve	mm ²	2 x (0.5 ... 1)/2 x (0.75 ... 2.5)			
Tightening torque	Nm	0.8 ... 1.4			
	lb.in	7 ... 12			
Rated insulation voltage U_i (pollution degree 3)		Unequal potential (NO + NC)	Equal potential (NO + NC connected as changeover contact)	Unequal potential (NO + NC)	Equal potential (NO + NC connected as changeover contact)
	V	400	690	400	690
Rated impulse withstand voltage U_{imp}	kV	6			
Switching capacity					
AC-15:					
Rated operational voltage U_e	V	24; 60; 125; 230; 400; 500; 690;			
Rated operational current I_e	A	2; 1.5; 1.25; 1.15; 1.1; 1; 0.8			
Conventional thermal current I_{th}	A	6			
Short-circuit protection		Fuses, utilization category gG 6A or miniature circuit-breaker with C-characteristics 3A			

Main circuit		CES-RT4								
Current setting [Suggested]		A	90-120	110-135	120-150	135-160	150-180	170-205	160-250	250-400
Tripping class		Class	10A							
Protection functions	Tripping due to overload		✓							
	Tripping due to phase unbalance		✓							
	Tripping due to phase failure		✓							
	Phase failure sensitivity by differential phase shift		✓ (according to IEC60947-4-1)							
	Temperature compensation		✓							
Functions	Test button		✓							
	Reset button		Manual and Automatic RESET							
	Switch position indicator		✓							
	Terminal A2 for contactor coil connection		✗							
Functions	Operation	°C	-25 ... +55							
	Storage/transport	°C	-25 ... +70							
	Temperature compensation	°C	≤ 70							
Altitude without derating		m	≤2000							
Rated insulation voltage Ui (pollution degree 3)		V	1000							
Rated impulse withstand voltage Uimp		kV	6							
Type of current, frequency range			DC, AC ≤ 400Hz							
Degree of protection			IP00							
Touch protection			Finger-safe (with accessories)							
Resistance to extreme climates - air humidity		%	< 90%, 25° C; < 50%, 40° C							
Mounting			stand-alone mounting (the terminal busbar should fit contactor terminal)							
Terminals	Main current terminals		Busbar - Hex head							
	Auxiliary contact terminal		Remain as existing							
Max. wire diameter size	Single wire	mm ²	50 ... 120						≤200 A: 185, >200 :240	
	Stranded wire	mm ²								
	finely stranded with end sleeve	mm ²	25 ... 95						----	
	Terminal size	[mm x mm]	20 x 3						20 x 3 / 2 x 30 x 5	
Auxiliary circuit										
Number of NO contacts			1	1	1	1	1	1	1	1
Number of NC contacts			1	1	1	1	1	1	1	1
Rated insulation voltage Ui (pollution degree 3)		V	≥400							
Rated impulse withstand voltage Uimp		kV	6							
Conventional thermal current Ith		A	6							
Rated operational current Ie AC-15		A	Ue=220V, Ie=1.15A; Ue=380V, Ie=1.1A							
Dimensions H / B / T ; Width		mm	≤ 104mm		≤ 104mm		≤ 150mm			
Certificates & Standards			CE, RoHS							

Thermal overload relays, CLASS 10A

Short circuit protection with fuses for motor feeders with short-circuit currents up to 50 kA at 690V, 50/60 Hz¹⁾
 Permissible short-circuit fuses for motor starters consisting of overload relay and contactor, contactor assembly

Technical data according to IEC 60947-4-1					
Setting range	Fuse links				
	Fuses, utilization category gG		Fuses, utilization category aM	Fuses acc.to British Standards BS 88 Type T	
	Type of coordination ²⁾		Type of coordination ²⁾	Type of coordination ²⁾	
	"1"	"2"	"2"	"1"	"2"
A	A	A	A	A	A
CES-RT0					
0.1 ... 0.16	35	0.5 slow ³⁾	--	25	--
0.16 ... 0.25	35	1 ³⁾	--	25	
0.25 ... 0.4	35	1.6 ³⁾	--	25	
0.4 ... 0.63	35	2	--	25	2
0.63 ... 1	35	4	--	25	4
1 ... 1.6	35	6	--	25	6
1.6 ... 2.5	35	6	--	25	10
2.5 ... 4	35	10	--	25	10
4 ... 6.3	35	16	--	25	16
6.3 ... 10	35	25	--	25	20
8 ... 12.5	35	25	--	25	20
12.5 ... 18	35	25	--	25	25
CES-RT1					
6.3 ... 10	63	25		63	25
10 ... 16	63	35	20	63	35
16 ... 25	63	50	40	63	50
25 ... 32	63	50	50	63	50
Setting range	Fuse links				
	Fuses, utilization category gG		Fuses, utilization category aM	Fuses acc.to British Standards BS 88 Type T	
	Type of coordination ²⁾		Type of coordination ²⁾	Type of coordination ²⁾	
	"1"	"2"	"2"	"1"	"2"
A	A	A	A	A	A
CES-RT2					
16 ... 25	80	50		100	10
25 ... 36	80	80		100	10
36 ... 45	80	80	--	100	16
CES-RT3					
40 ... 57	160	125	63	160	100
57 ... 70	160	125	63	160	100
70 ... 88	250	160	100	160	125
88 ... 105	250	200	125	160	200
CES-RT4					
90 ... 120	315	224	125	315	224
110 ... 135	315	224	160	315	224
120 ... 150	315	224	160	315	224
135 ... 160	355	224	160	355	224
150 ... 180	355	224	200	355	224
160 ... 250	500	400	250	500	400
250 ... 400	800	500	400	800	500

¹⁾ Voltage tolerance +5 %.

²⁾ Coordination of short-circuit equipment according to IEC 60947-4-1:

Type of coordination "1":

The contactor or starter must not endanger persons or the installation in the event of a short-circuit.

They do not need to be suitable for further operation without repair and the renewal of parts.

Type of coordination "2":

The contactor or starter must not endanger persons or the installation and must be suitable for further use.

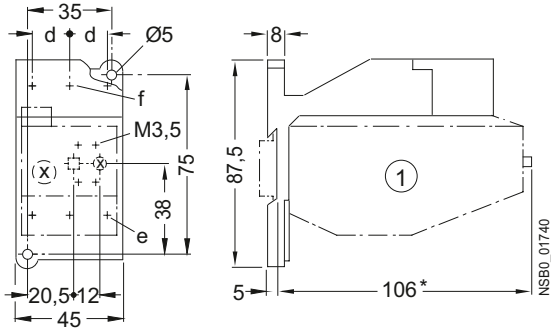
There is a danger of contact welding.

³⁾ D-fuse links $U_N = 500$ V

Thermal overload relays, CLASS 10A

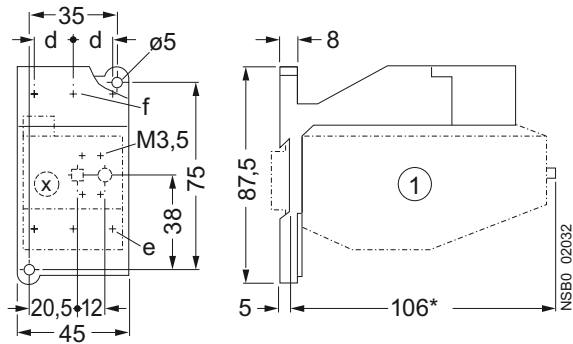
Dimensional drawings

CES-RT0, CES-RT1, with stand-alone adapter



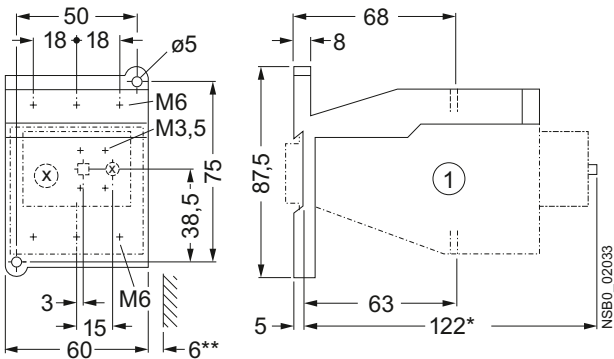
	d	e	f
CES-RT0 & CES-AD-RT0	10	M4	M3.5
CES-RT1 & CES-AD-RT1	14.3	M5	M4

CES-RT2 with CES-AD-RT2 stand-alone adapter

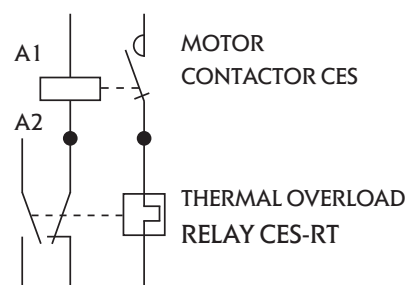


	d	e	f
CES-RT2 % CES-AD-RT2	18.5	M5	M5

CES-RT3 with CES-AD-RT3 stand-alone adapter

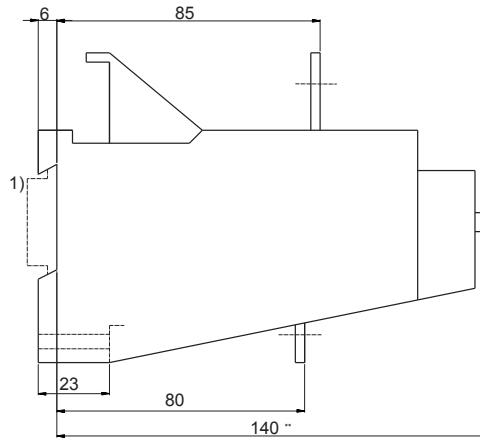
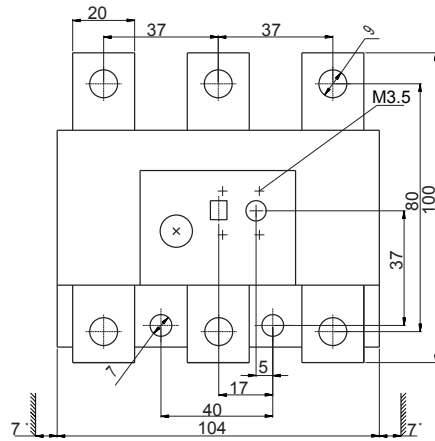


APPLICATION NOTE:



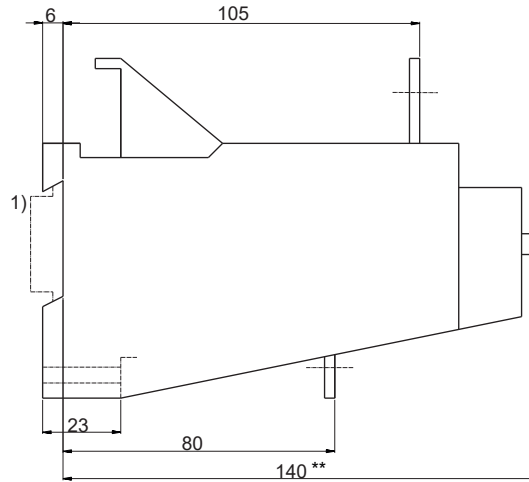
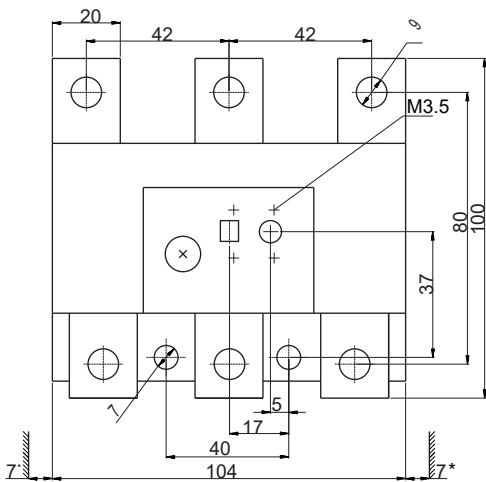
Technical data

CES-RT4 120, 135, 150



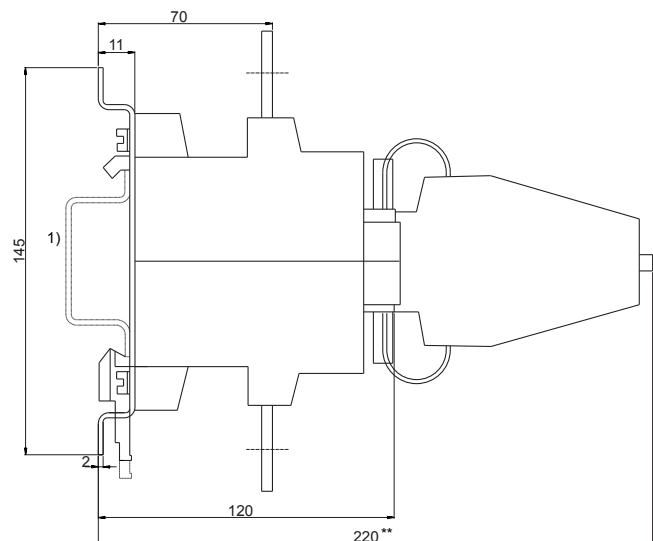
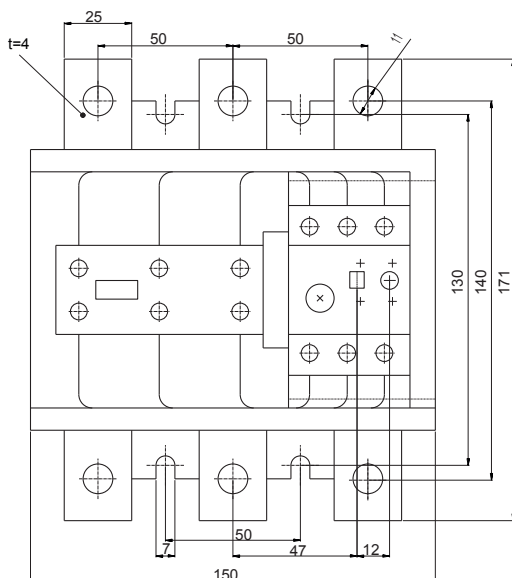
- * Dimension for the ground engaging component
- ** Dimension for the square OFF-button (stroke 3mm)
Dimension for the round RESET-button (Stroke 2.5mm) less 2.5mm
- 1) For 35mm standard (DIN) mounting rail

CES-RT4 160, 180



- * Dimension for the ground engaging component
- ** Dimension for the square OFF-button (stroke 3mm)
Dimension for the round RESET-button (Stroke 2.5mm) less 2.5mm
- 1) For 35mm standard (DIN) mounting rail

CES-RT4 250, 400



- ** Dimension for the square OFF-button (stroke 3mm)
Dimension for the round RESET-button (Stroke 2.5mm) less 2.5mm
- 1) For 75mm standard (DIN) mounting rail