

Contactors

Supplied alone or with protection (e.g. thermal relay), the contactor acts as a switch or a remote control element of an electric motor or other low voltage electrical equipment. The device can be suitable for many automation tasks with the help of different sensitive auxiliary contacts. Auxiliary contacts can be mounted both on the front and side of the device and timing element is also applicable on the front side. With their help, signalling or interlocking tasks in secondary circuits can be fulfilled.

These contactors are made only with alternate current operating coils with 5 different rated voltages. The contactors must be selected according to the purpose and category of application (see APPENDIX).

Range of type

Tracon Code	Type of contactor	Application category	Operating voltage U_n	Rated operating current I_n
TR1K	Mini	AC-1, AC-3, AC-15	24 V, 48 V, 110 V, 230 V, 400 V	6...12 A/AC-3
TR1D/F	For general purpose	AC-1, AC-3, AC-4	24 V, 48 V, 110 V, 230 V, 400 V	9...95 A/AC-3
TR1E	High current	AC-1, AC-3, AC-4	24 V, 48 V, 230 V, 400 V	115...620 A/AC-3
TR1C	Capacitor switch	AC-6b	230 V, 400 V	17...80 A/AC-6b



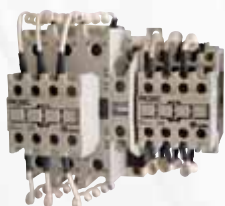
TR1E



TR1K



TR1D/F



TR1C

Technical data of auxiliaries

Rated thermal limit current I_{th} (A):	10 A
Short circuit shunt fuse	
• rated current:	10 A
• tripping characteristic:	gG
Rated operating current:	2 A, 230 V, AC-15
Max. switching frequency (AC-15):	3600 switching / hour
Mechanical life (Ie, AC-15, 380/400 V):	1×10^7 switching cycle
Electrical life (Ie, AC-15, 380/400 V):	1×10^6 switching cycle
Terminal capacity:	1...4 mm ²
Protection degree of terminals:	IP 20

The over current protection of low voltage electric equipments switched by contactors varies according to the type of contactor, as follows:

Type	Overload protection
TR1K	TR2HK type thermal overload relay
TR1D/F	TR2HD/F type thermal overload relay
TR1E	TFKV-AKA05 type over current relay + current transformers
TR1C	-

These devices are applicable to switch smaller loads. Their application is recommended in all places where the switchable load can be performed only by switching device of small dimensions.

Mini contactors



These devices are applicable to switch smaller loads. Their application is recommended in all places where the switchable load can be performed only by switching device with small dimensions.

Accessories

Tracon Code	Title	Side
TR5KN..	Accessories	G/40
TR2HK....	Thermal overload relays	G/42



General technical data

Operating voltage range:	0,85-1,1 U_n
Ambient temperature:	-25 °C ... +50 °C
Mounting position:	vertical, deviation max. $\pm 30^\circ$
Art of mounting:	on mounting plate, or clip-on 35x7,5 mm mounting rail, according to EN 50022

RELEVANT STANDARD

EN 60947-1
EN 60947-4-1

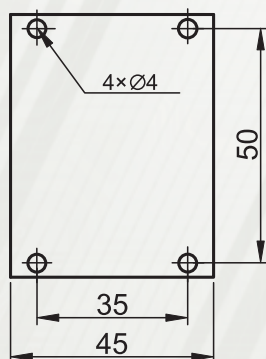
Remark: The compatibility table for TR1K type contactors and thermal overload relays is found on page G/44!

Contactors

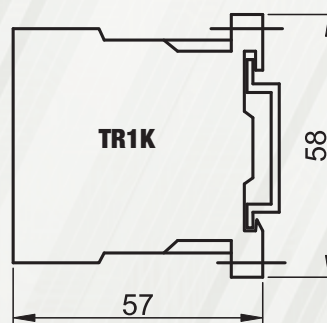
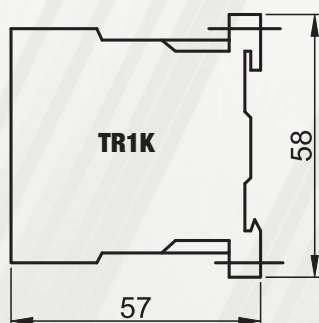
Technical data and range of type

Contacts	Marking of terminals	Operating voltage U _n	Tracon code		
			6A/AC-3	9A/AC-3	12A/AC-3
4 main		24 V~	-	TR1K0904B7	TR1K1204B7
		48 V~	-	TR1K0904E7	TR1K1204E7
		110 V~	-	TR1K0904F7	TR1K1204F7
		230 V~	-	TR1K0904	TR1K1204
		400 V~	-	TR1K0904V7	TR1K1204V7
3 main + auxiliary 1 closed(NO)		24 V~	TR1K0610B7	TR1K0910B7	TR1K1210B7
		48 V~	TR1K0610E7	TR1K0910E7	TR1K1210E7
		110 V~	TR1K0610F7	TR1K0910F7	TR1K1210F7
		230 V~	TR1K0610	TR1K0910	TR1K1210
		400 V~	TR1K0610V7	TR1K0910V7	TR1K1210V7
3 main + auxiliary 1 open (NC)		24 V~	TR1K0601B7	TR1K0901B7	TR1K1201B7
		48 V~	TR1K0601E7	TR1K0901E7	TR1K1201E7
		110 V~	TR1K0601F7	TR1K0901F7	TR1K1201F7
		230 V~	TR1K0601	TR1K0901	TR1K1201
		400 V~	TR1K0601V7	TR1K0901V7	TR1K1201V7
4 auxiliary 2 closed (NO) 2 open (NC)		24 V~	-	TR1K0908B7	-
		48 V~	-	TR1K0908E7	-
		110 V~	-	TR1K0908F7	-
		230 V~	-	TR1K0908	-
		400 V~	-	TR1K0908V7	-
Rated insulating voltage U _i (V)			690 V	690V	690 V
Rated operating voltage U _e (V)			660 V, 50 Hz	660 V, 50 Hz	660 V, 50 Hz
Rated thermal current (A)			20	20	20
Rated operating current I _e (A)	AC-1		20	20	20
	AC-3		6	9	12
	AC15		2	3	4
Max. switchable motor power P _e (kW)	220/230 V	AC-3	1,5	2,2	3
	380/400 V	AC-3	2,2	2,2	5,5
	415 V	AC-3	2,2	4	5,5
	500 V, 660/690 V	AC-3	3	4	4
Short circuit protection device	rated current (A)		10	10	16
	Tripping characteristic		aM	aM	aM
Max. Switching frequency (switch / hour, AC-3)			4800	4800	4800
Mechanical life (sc)			3×10 ⁶	3×10 ⁶	3×10 ⁶
Electrical life (sc)			1×10 ⁶	1×10 ⁶	1×10 ⁶
Terminal capacity (mm ²)			1...4	1...4	1...4
Protection degree of main / coin contacts			IP 20	IP 20	IP 20
Power consumption – pick-up / hold (VA)			30/4,5	30/4,5	30/4,5

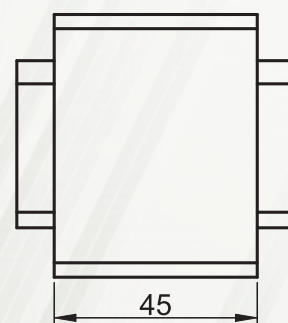
Dimensions



Fixed on mounting plate



Fixed on mounting rail (35×7,5 mm)





Contactors



TR1D/F type contactors for general purpose

The TR1D and TR1F type contactors are applicable for remote controlled on/off switching of low voltage electric units in 9-95 A current range. The two types are different only by design; their technical parameters are the same.



Accessories

Type	Title	Side
TR2HD/F....	Thermal overload relays	G/42
TR6DN..	Front auxiliary contact	G/40
TR7...	Timing units	G/41
TR8DN...	Side auxiliary contact (to TR1D/F65)	G/41
TR9....	Mechanical interlock	G/41



General technical data

Operating voltage range:	0,85-1,1 U _n
Ambient temperature:	-25 °C ... +50 °C
Mounting position:	vertical, deviation max. ±30°
Art of mounting:	on mounting plate or clip on 35×7,5 mm mounting rail

Remark:

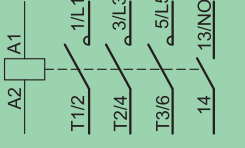
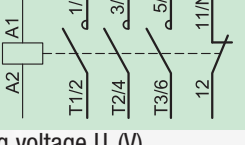
The compatibility table for TR1D/K type contactors and thermal overload relays is found on page G/44!

RELEVANT STANDARD
EN 60947-1

TÜV MEEI TEST DOCUMENTATION
D0300V0704

RELEVANT STANDARD
EN 60947-4-1

Technical data and range of types from 9 A to 32 A

Contacts	Marking of terminals	Operating voltage U _n	Tracon code				
			9A/AC-3	12A/AC-3	18A/AC-3	25A/AC-3	32A/AC-3
3 main + auxiliary 1 closed (NO)		24 V~	TR1D/F0910B7	TR1D/F1210B7	TR1D/F1810B7	TR1D/F2510B7	TR1D/F3210B7
		48 V~	TR1D/F0910E7	TR1D/F1210E7	TR1D/F1810E7	TR1D/F2510E7	TR1D/F3210E7
		110 V~	TR1D/F0910F7	TR1D/F1210F7	TR1D/F1810F7	TR1D/F2510F7	TR1D/F3210F7
		230 V~	TR1D/F0910	TR1D/F1210	TR1D/F1810	TR1D/F2510	TR1D/F3210
		400 V~	TR1D/F0910V7	TR1D/F1210V7	TR1D/F1810V7	TR1D/F2510V7	TR1D/F3210V7
3 main + auxiliary 1 open (NC)		24 V~	TR1D/F0901B7	TR1D/F1201B7	TR1D/F1801B7	TR1D/F2501B7	TR1D/F3201B7
		48 V~	TR1D/F0901E7	TR1D/F1201E7	TR1D/F1801E7	TR1D/F2501E7	TR1D/F3201E7
		110 V~	TR1D/F0901F7	TR1D/F1201F7	TR1D/F1801F7	TR1D/F2501F7	TR1D/F3201F7
		230 V~	TR1D/F0901	TR1D/F1201	TR1D/F1801	TR1D/F2501	TR1D/F3201
		400 V~	TR1D/F0901V7	TR1D/F1201V7	TR1D/F1801V7	TR1D/F2501V7	TR1D/F3201V7
Rated insulating voltage U _i (V)			660 V	660 V	660 V	660 V	660 V
Rated operating voltage U _e (V)			660 V, 50 Hz	660 V, 50 Hz	660 V, 50 Hz	660 V, 50 Hz	660 V, 50 Hz
Rated operating current I _e (A)	AC-1		25	25	32	40	50
	AC-3		9	12	18	25	32
	AC-4		3,5	5	7,7	8,5	12
Max. switchable motor power P _e (kW)	220/230 V	AC-3	2,2	3	4	5,5	7,5
	380/400 V	AC-3	4	5,5	7,5	11	15
	380/400 V	AC-4	4	2,5	3	3,7	4,5
	415 V	AC-3	4	5,5	9	11	15
Short circuit protection device	500 V, 660/690 V	AC-3	5,5	7,5	10	15	18,5
	rated current (A)		10	16	20	32	40
	tripping characteristics		aM	aM	aM	aM	aM
Max. switching frequency (switch/hour, AC-3)			3600	3600	3600	3600	3600
Mechanical life (kj, I _e , AC-3, 380/400V)			3×10 ⁶	3×10 ⁶	3×10 ⁶	3×10 ⁶	3×10 ⁶
Electrical life (kj, I _e , AC-3, 380/400V)			1×10 ⁶	1×10 ⁶	1×10 ⁶	1×10 ⁶	1×10 ⁶
Terminal capacity (mm ²)			4	4	6	10	10
Protection degree of main / coil contacts			IP 20	IP 20	IP 20	IP 20	IP 20
Power consumption – pick-up / hold (VA)			60/7	60/7	60/7	90/7,5	90/7,5
Terminal capacity of coil terminal (mm ²)			1...4	1...4	1...4	1...4	1...4



Contactors

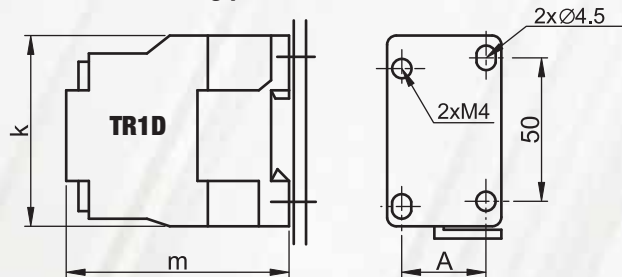


Technical data and range of types from 40 A to 95 A

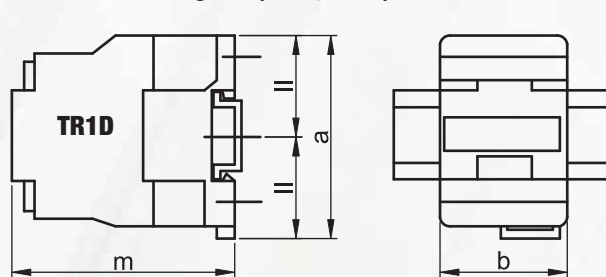
Contacts	Marking of terminals	Operating voltage U _n	Tracon code				
			40A/AC-3	50A/AC-3	65A/AC-3	80A/AC-3	95A/AC-3
3 main + auxiliary 1 closed (NO) 1 open (NC)		24 V~	TR1D/F4011B7	TR1D/F5011B7	TR1D/F6511B7	TR1D/F8011B7	TR1D/F9511B7
		48 V~	TR1D/F4011E7	TR1D/F5011E7	TR1D/F6511E7	TR1D/F8011E7	TR1D/F9511E7
		110 V~	TR1D/F4011F7	TR1D/F5011F7	TR1D/F6511F7	TR1D/F8011F7	TR1D/F9511F7
		230 V~	TR1D/F4011	TR1D/F5011	TR1D/F6511	TR1D/F8011	TR1D/F9511
		400 V~	TR1D/F4011V7	TR1D/F5011V7	TR1D/F6511V7	TR1D/F8011V7	TR1D/F9511V7
Rated insulating voltage U _i (V)			660 V	660 V	660 V	660 V	660 V
Rated operating voltage U _e (V)			660 V, 50 Hz	660 V, 50 Hz	660 V, 50 Hz	660 V, 50 Hz	660 V, 50 Hz
Rated current I _e (A)	AC-1		60	80	80	125	125
	AC-3		40	50	65	80	95
	AC-4		18,5	24	28	37	44
Max. switchable motor power P _e (kW)	220/230 V	AC-3	11	15	18,5	22	25
	380/400 V	AC-3	18,5	22	30	37	45
	380/400 V	AC-4	5,5	7,5	9	10	15
	415 V	AC-3	22	25	37	45	45
	500 V	AC-3	22	30	37	55	55
	660/690 V	AC-3	30	33	37	45	45
Short circuit shunt fuse	rated current (A)		50	50	63	80	100
	tripping characteristic		aM	aM	aM	aM	aM
Max. switching frequency (switch/h, AC-3)			3600	3600	3600	3600	3600
Mechanical life (sc, I _e , AC-3, 380/400V)			3×10 ⁶	3×10 ⁶	3×10 ⁶	3×10 ⁶	3×10 ⁶
Electrical life (sc, I _e , AC-3, 380/400V)			1×10 ⁶	1×10 ⁶	1×10 ⁶	1×10 ⁶	1×10 ⁶
Terminal capacity (mm ²)			25	25	25	50	50
Protection degree of main / coil contacts			IP 20	IP 20	IP 20	IP 20	IP 20
Power consumption – pick-up / hold (VA)			200/20	200/20	200/20	200/20	200/20
Terminal capacity of auxiliary and coil terminals (mm ²)			1...4	1...4	1...4	1...4	1...4

Dimensions

Fixed on mounting plate



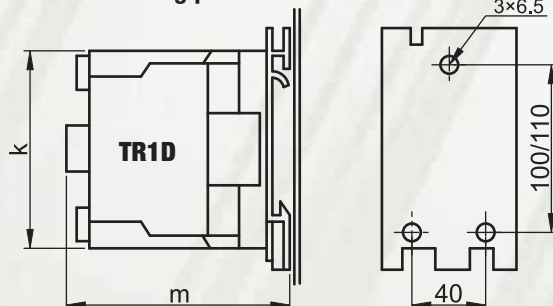
Fixed on mounting rail (35×7,5 mm)



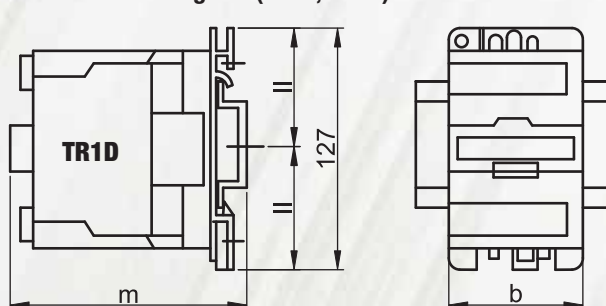
TR1...	D/F09	D/F12	D/F18	D/F25	D/F32
m (mm)	80	80	85	93	98
A (mm)	35	35	35	44	44
k (mm)	71	71	71	80	80

TR1...	D/F09	D/F12	D/F18	D/F25	D/F32
a (mm)	74	74	74	84	84
b (mm)	46	46	47	57	57
m (35×7,5)	82	82	87	95	100

Fixed on mounting plate



Fixed on mounting rail (35×7,5 mm)



TR1...	D/F40	D/F50	D/F65	D/F80	D/F95
m (mm)	114	114	114	125	125
k (mm)	107	107	107	123	123

TR1...	D/F40	D/F50	D/F65	D/F80	D/F95
b (mm)	75	75	75	85	85
m (35×7,5)	116	116	116	127	127

TEMS Motor starter combination in protective housing

The device includes a contactor (TR1F), a thermal overload relay (TR2HF), a green ON, a red OFF pushbuttons and a plastic or steel plate housing made of two parts. The admitted power of the deserved motor depends on the technical parameters of the contactor. The current protection level according to technical parameters of the motor to protect can be exactly adjusted on thermal overload relay. The ON/OFF pushbuttons are used to start and stop the motor. The housing secures mechanical protection of the unit and protection against accidental contact. The device can be easily fixed on a flat surface by holes made in the bottom part of the housing. Cable introduction is made through prepared holes on the sides and the bottom of the housing. The device is delivered with the actuating circle already wired; the contactor and the thermal relay are assembled together. Thus, after connection of the terminal cables the device is ready to operate. The device must be protected by outer short circuit protection!



General technical data

Rated insulation voltage:	660 V, 50 Hz	Rated operating temperature:	0...55 °C
Rated voltage:	400 V, 50 Hz	Protection degree of housing:	IP 55

Parts of the combinations

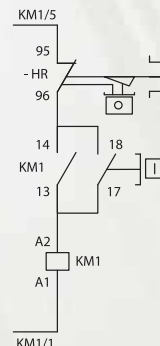
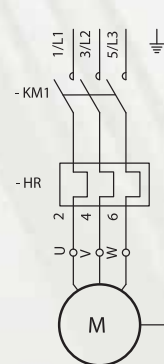
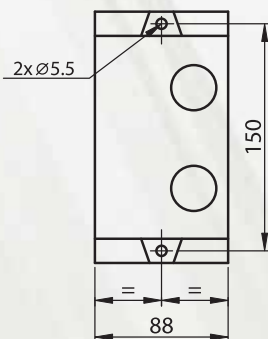
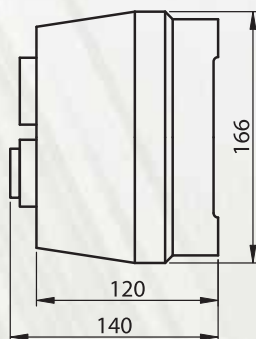
Tracon code	Switchable motor power* (kW), AC-3	(A), AC-3	Material of housing	Type of contactor	Type of thermal relay	Shunt fuse (aM)
TEMS1-091	1,5	3,5	plastic	TR1F0910V7	TR2HF1308 (2,5 – 4 A)	6 A
TEMS1-092	2,2	5	plastic	TR1F0910V7	TR2HF1310 (4 – 6 A)	10 A
TEMS1-093	3	6,3	plastic	TR1F0910V7	TR2HF1312 (5,5 – 8 A)	10 A
TEMS1-094	4	8,5	plastic	TR1F0910V7	TR2HF1314 (7 – 10 A)	16 A
TEMS1-121	5	11,5	plastic	TR1F1210V7	TR2HF1316 (9 – 13 A)	16 A
TEMS1-181	7,5	15,5	plastic	TR1F1810V7	TR2HF1321 (12 – 18 A)	20 A
TEMS2-251	11	22	plastic	TR1F2510V7	TR2HF1322 (17 – 25 A)	25 A
TEMS2-321	15	30	plastic	TR1F3210V7	TR2HF2353 (23 – 32 A)	40 A
TEMS3-401	18,5	37	metal	TR1F4011V7	TR2HF3355 (30 – 40 A)	40 A
TEMS3-501	22	44	metal	TR1F5011V7	TR2HF3357 (37 – 50 A)	63 A
TEMS3-651	30	60	metal	TR1F6511V7	TR2HF3359 (48 – 65 A)	80 A
TEMS3-801	37	72,5	metal	TR1F8011V7	TR2HF3363 (63 – 80 A)	80 A
TEMS3-951	45	85	metal	TR1F9511V7	TR2HF3365 (80 – 93 A)	100 A

* The data apply for three-phase squirrel-cage motors operated in delta circuit.

Technical data and type range of TEMS1 motor starter

These types have plastic enclosures; their contactors have 1 pc NO auxiliary contact for signaling or actuating applications. Connection of cables is possible trough cable glands to be installed into prepared holes on the top (2 pcs Pg13,5) and on the bottom (1 pc PG 16, 1 pc Pg 13,5) of the housing.

Technical data / Tracon code		TEMS1-091	TEMS1-092	TEMS1-093	TEMS1-094	TEMS1-121	TEMS1-181
Rated operating current (A), AC-3	400 V	3,5	5	6,3	8,5	11,5	15,5
	660 V	2,7	3,8	4,8	6,6	8,9	12
Rated thermal current (A)		400 V	25	25	25	25	32
Switchable motor power (kW), AC-3	400 V	1,5	2,2	3	4	5,5	7,5
	660 V	5,5	5,5	5,5	5,5	7,5	10
Mechanical life (sc, 10 ⁴)		600	600	600	600	600	600
Electrical life (sc, 10 ⁴)		100	100	100	100	100	80
Aux. contact	Rated thermal current (A)	6	6	6	6	6	6
	Actuating power (VA)DC-13	AC-15	300	300	300	300	300
		30	30	30	30	30	30





Contactors



Technical data and type range of TEMS2 motor starter

These types have plastic enclosures; their contactors have 1 pc NO auxiliary contact for signaling or actuating applications. Connection of cables is possible through cable glands installed into prepared holes on the top (2 pcs Pg 16), and on the bottom (1 pc Pg 16, 1 pc Pg 13,5) of the housing's base.

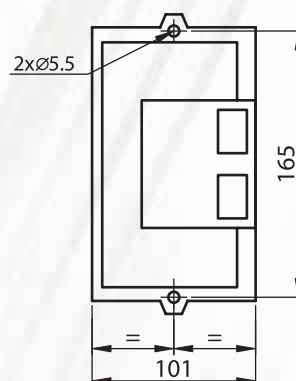
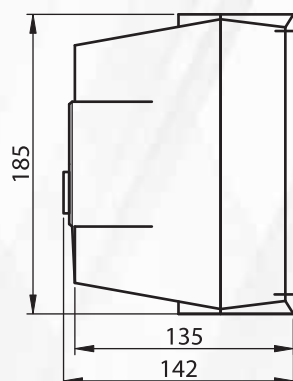
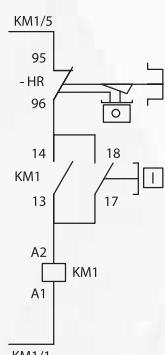
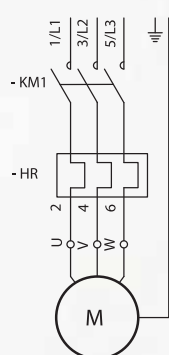
Technical data / Tracon code		TEMS2-251	TEMS2-321
Rated operating current (A), AC-3	400 V	22	30
	660 V	18	21,3
Rated thermal current (A)		400 V	40
			50
Switchable motor power (kW), AC-3	400 V	11	15
	660 V	15	18,5
Mechanical lifetime (sc, 10 ⁴)		600	600
Electrical lifetime (sc, 10 ⁴)		80	80
Aux. contact	Rated thermal current (A)	6	6
	Actuating power (VA)DC-13	AC-15	300
		30	30

RELEVANT STANDARDS

EN 60529
EN 60695-2-1

RELEVANT STANDARDS

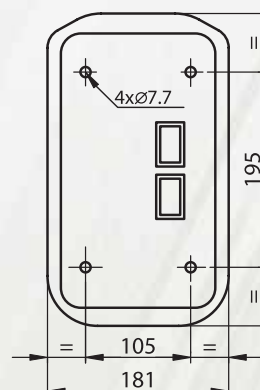
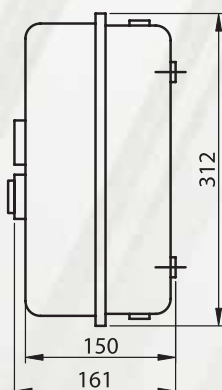
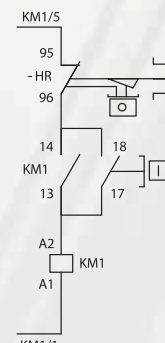
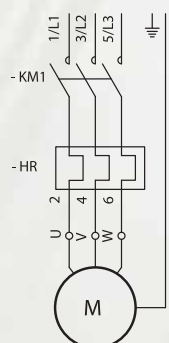
EN 60439
EN 60947-4-1



Technical data and type range of TEMS3 motor starter

These types have metallic enclosures; their contactors have 1 pc NO and 1 pc NC auxiliary contacts for signaling or actuating applications. The connection of cables is possible through cable glands screwed in into prepared holes on the top (1 pc Pg 29, 1 pc Pg 13,5), and on the bottom (2 pcs Pg 29, 1 pc Pg 13,5) of the housing.

Technical data / Tracon code		TEMS3-401	TEMS3-501	TEMS3-651	TEMS3-801	TEMS3-951
Rated operating current (A), AC-3	400 V	37	44	60	72,5	85
	660 V	34,6	39	42	49	49
Rated thermal current (A)		400 V	60	80	80	125
					125	125
Switchable motor power (kW), AC-3	400 V	18,5	22	30	37	45
	660 V	30	33	37	45	55
Mechanical life (sc, 10 ⁴)		600	600	600	600	600
Electrical life (sc, 10 ⁴)		60	60	60	60	60
Aux. contact	Rated thermal current (A)	6	6	6	6	6
	Actuating power (VA)DC-13	AC-15	300	300	300	300
		30	30	30	30	30





Contactors



High power contactors

These switching instruments are comfortable for industrial applications, like remote on/off switching of high power pump- and compressor motors, furnaces and other high power electric instruments in 115-620 A current range. Their performance makes possible to use auxiliary contacts; With their help many controlling, display, interlock, self-holding and timing functions can be performed. The overload protection of TR1E type contactors are found on page G/45!

Accessories

Type	Title	Side
TR6DN..	Front auxiliary contact	G/40
TR8DN...	Side auxiliary contact (only for TR1E115 and TR1E150 type)	G/41
TR7...	Timing units	G/41

General technical data

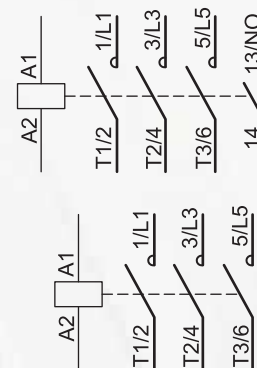
Rated insulating voltage U_i (V) 660 V
Operating voltage: 0,85-1,1 U_n

Ambient temperature: -25 °C ... +50 °C
Mounting position: vertical, deviation max. $\pm 30^\circ$
Mounting: on mounting plate or on 35x7,5 mm mounting rail

Technical data and type selection

Contacts	Operating voltage U_n	Tracon code		
		115A/AC-3	150A/AC-3	170A/AC-3
3 P	24 V~	TR1E115B7	TR1E150B7	TR1E170B7
	48 V~	TR1E115E7	TR1E150E7	TR1E170E7
	230 V~	TR1E115	TR1E150	TR1E170
	400 V~	TR1E115V7	TR1E150V7	TR1E170V7
AC1 I_e max. (A) (I_{th})		250	250	250
AC3 I_e max. (A)		115	150	170
AC4 I_e max. (A)		40	50	60
Switchable motor power P_e (kW)	220/230 V	30	40	55
	380/400 V	55	75	90
	415 V	59	80	100
	500 V	75	90	110
	660/690 V	80	100	110
	1000 V	65	65	100
Mechanical life (10^4 , kj)		300	300	300
Electrical life (10^4 , kj)		60	60	60
Power consumption (VA)	pick-up	550	550	805
	hold	45	45	55
Switching frequency		1800 switching/hour		
Terminal capacity (mm ²)		95	120	150

Marking of terminals



RELEVANT STANDARD

EN 60947-1
EN 60947-4-1

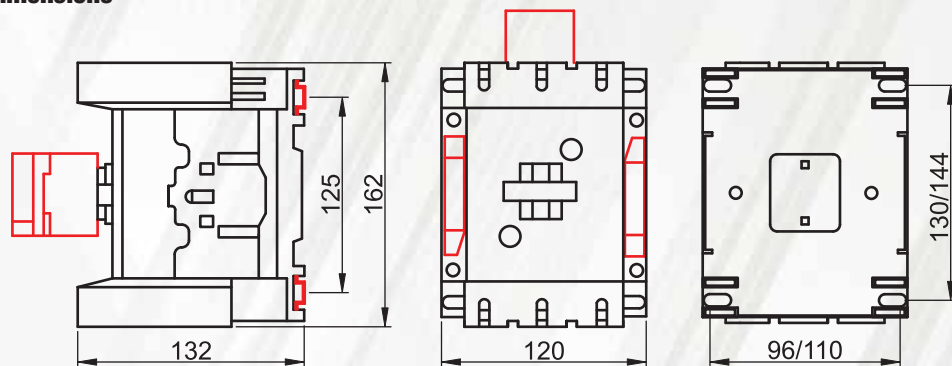
Contacts	Operating voltage U_n	Tracon code					
		205A/AC-3	245A/AC-3	300A/AC-3	410A/AC-3	475A/AC-3	620A/AC-3
3 P + 1 NO	24 V~	TR1E205B7	TR1E245B7	TR1E300B7	TR1E410B7	TR1E475B7	TR1E620B7
	48 V~	TR1E205E7	TR1E245E7	TR1E300E7	TR1E410E7	TR1E475E7	TR1E620E7
	230 V~	TR1E205	TR1E245	TR1E300	TR1E410	TR1E475	TR1E620
	400 V~	TR1E205V7	TR1E245V7	TR1E300V7	TR1E410V7	TR1E475V7	TR1E620V7
AC1 I_e max. (A) (I_{th})		275	315	400	500	700	1000
AC3 I_e max. (A)		205	245	300	410	475	620
AC4 I_e max. (A)		70	80	100	140	160	210
Switchable motor power P_e (kW)	220/230 V	63	75	100	110	147	200
	380/400 V	110	132	160	200	250	335
	415 V	110	132	180	220	280	375
	500 V	129	160	200	257	355	400
	660/690 V	129	160	220	280	335	450
	1000 V	100	147	160	185	335	450
Mechanical life (10^4 , kj)		300	300	300	100	100	100
Electrical life (10^4 , kj)		50	50	50	30	30	20
Power consumption (VA)	pick-up	805	600-700	600-700	1000-1150	1050-1150	1500-1730
	hold	55	8-10	8-10	12-18	16-20	20-25
Switching frequency		1800 switching/hour			900 switching/hour		
Terminal capacity (mm ²)		185	240	240	2x150	2x240	2x60x5



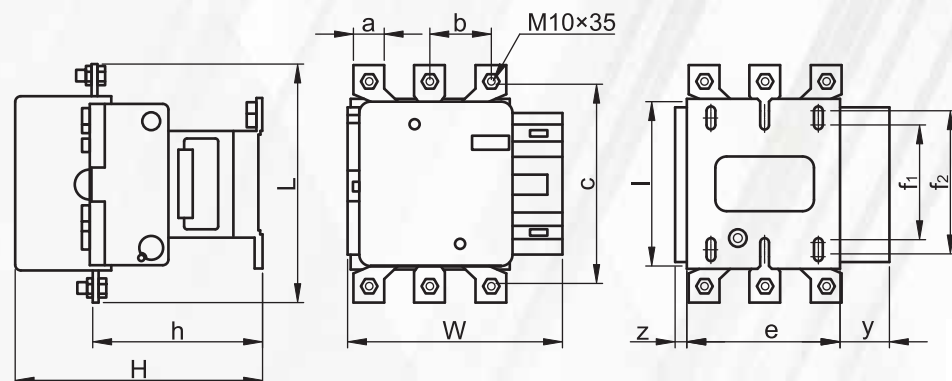
Contactors



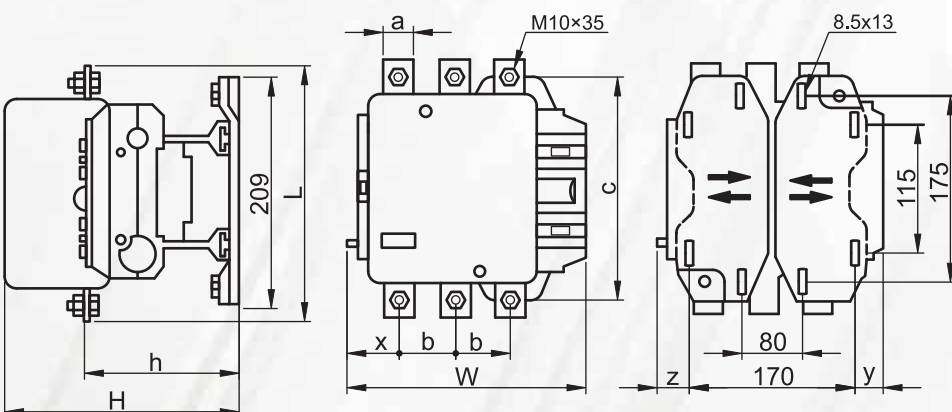
Dimensions



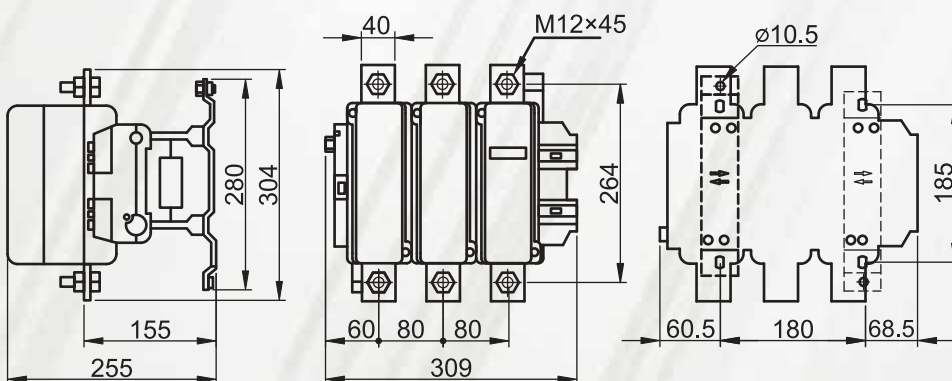
TR1E115 ... TR1E170



TR1E205 ... TR1E300



TR1E410, TR1E475



TR1E620



Tracon code	W	H	L	a	b	c	l	e	x	f1	f2	h	y	z
TR1E205	170	181	175	20	40	156	137	80	-	106	120	114	44	15
TR1E245	170	182	196	25	48	172	137	80	-	106	120	113	44	15
TR1E300	215	217	205	25	48	180	145	96	-	110	122	145	38	20,5
TR1E410	215	222	205	25	48	180	-	-	45	-	-	148	23,5	15
TR1E475	235	225	235	30	55	210	-	-	43	-	-	140	44	15

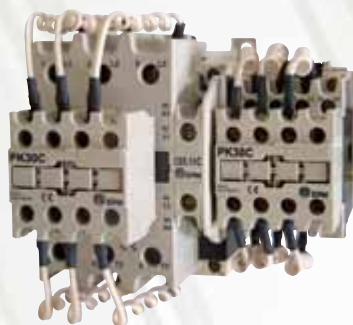


Contactors



Contactors for switching capacitive loads

The TR1C contactor family was especially designed for switching capacitors. The device switches on the capacitor with the help of an auxiliary contact through a resistance which reduces the switch-on transient. When the transient has run down, the auxiliary contact bridges over the resistance. The AC-6b application category raises special claims against the contacts, to avoid fusion caused by switch-on transients. In order to minimise these negative effects, the contactors switch on in two steps. First, the auxiliary contacts switch on the capacitors via the resistance wire (for limiting the transients). In the second step, the main contactor bridges over the resistance.



RELEVANT STANDARD

EN 60947-4-1

RELEVANT STANDARD

EN 60947-4-3

In AC networks working under high inductive load, phase correction is necessary. The phase corrector controls the value of the power factor ($\cos\varphi$), and switches ON/OFF the corrector capacitor battery of the centrally compensated network, according to the reactive power load. The basic requirement for reactive power compensation in operating network is to maintain the power factor ($\cos\varphi$) value between 0.95 and 1.00.

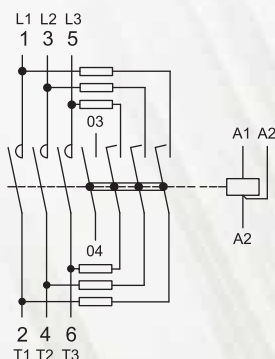
Phase correctors: see chapter II

Technical data

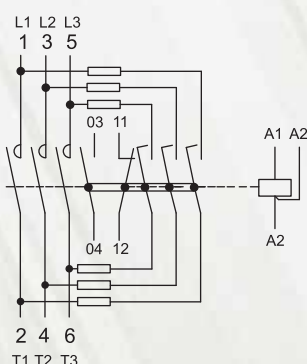
Main contactor	Auxiliary contact		Operating voltage	Tracon code											
	NO	NC													
3	1	-	230 V AC	TR1C1710A			-			-			-		
			400 V AC	TR1C1710B			-			-			-		
3	-	1	230 V AC	TR1C1701A			-			-			-		
			400 V AC	TR1C1701B			-			-			-		
3	1	1	230 V AC	-			TR1C3211A			TR1C6511A			TR1C8011A		
			400 V AC	-			TR1C3211B			TR1C6511B			TR1C8011B		
Maximal switchable reactive power at concrete ambient temperature (°C) (AC-6b)				≤ 40	≤ 55	≤ 70	≤ 40	≤ 55	≤ 70	≤ 40	≤ 55	≤ 70	≤ 40	≤ 55	≤ 70
at 220-230V (kVAr)				10	10	9	15	15	12,5	30	30	25	35	35	30
at 380-400V (kVAr)				12,5	12,5	11	25	25	22	50	50	40	60	60	50
Rated insulation voltageU _i (V)				690			690			690			690		
Rated thermal current: I _{th} (A)				25			32(50)			85			85		
Electrical life (sw. cycle)				0,1×10 ⁶			0,1×10 ⁶			0,1×10 ⁶			0,1×10 ⁶		
Mechanical life (sw. cycle)				3×10 ⁶			3×10 ⁶			3×10 ⁶			3×10 ⁶		
Ambient temperature				-25 °C . . . +50 °C											
Protection degree				IP20/IP10			IP20/IP10			IP20/IP10			IP20/IP10		
Weight [kg]				0,36			0,61			0,95			0,95		
Art of mounting				on mounting plate with screw or clip on 35×7,5 mm mounting rail											

*In case of $I_{th} = 50$ and 85 A thermal current the average ambient temperature cannot be more, than 35 °C in 24 h.

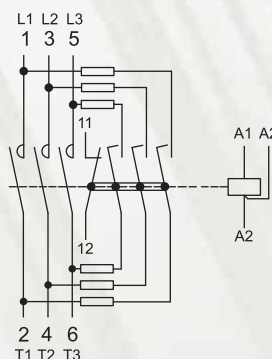
Marking of terminals



TR1C..10



TR1C..11



TR1C..01

RELEVANT STANDARD

EN 60947-4-1

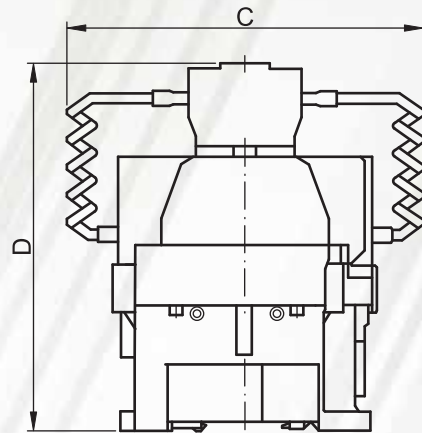
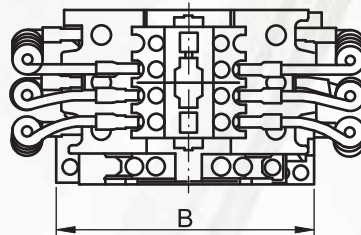
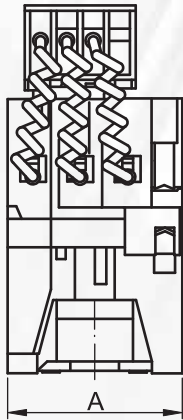
Contactors

Dimensions

Tracon code	A (mm)	B (mm)	C (mm)	D (mm)
TR1C1710..	45	78,5	90	105
TR1C3211..	56	90	105	122,5
TR1C6511..	70	106,5	120	147
TR1C8011..	70	106,5	120	147

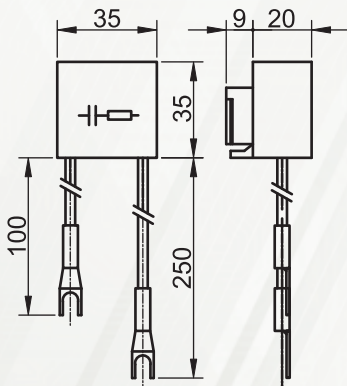
RELEVANT STANDARD

EN 60947-4-1



TBO clarifier

This device is used for filtering the actuating circuit of the contactor. It can be clipped to the top of contactor, with two flexible and with an aretation ear.



RELEVANT STANDARD

EN 60947-1

RELEVANT STANDARD

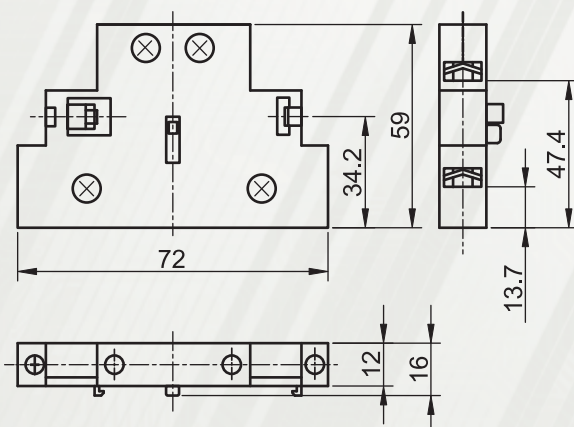
EN 60947-4-1



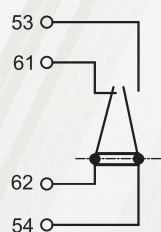
Tracon code	Operating voltage range of coil (V)	C (nF)	R (Ω)	Applied capacitor U _{max} (V _{eff})	Un (V _{ss})
TBO	110...230	470	680	250	1000

Side auxiliary contact

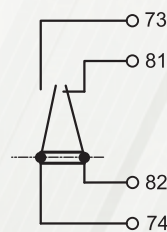
The side auxiliary contact unit can be placed both on the left and right side of contactor. The allocations of terminals are according to orientation: see below picture.



Mounted on the left side



Mounted on the right side



Tracon code	Title	Contacts
TPKB11	Side auxiliary contact	1 NO +1 NC



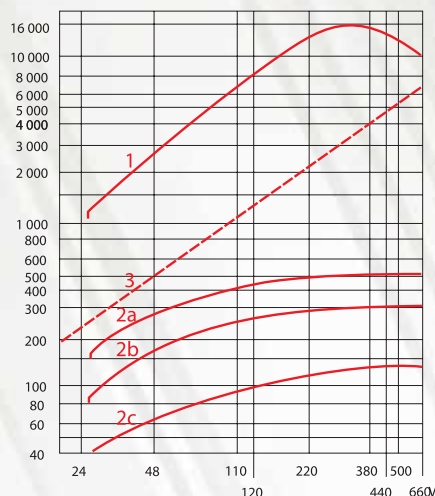
Contactors



Auxiliary contact units

The auxiliary contact is a mechanical switching device, suitable for controlling the operation of other switching or control equipments, including the indication of the status and electrical interlock of the contactor.

Breaking capacity (VA)



Technical data

Rated operating voltage:	660 V AC
Rated insulation voltage:	690 V AC
Rated thermal current:	10 A
Rated operating current:	2 A, 230 V, 50 Hz, AC15
Short circuit protection unit:	melting fuse gG 10 A
Protection degree:	IP 20
Terminal capacity:	1×1,0 mm ² ... 2×2,5 mm ²
Ambient temperature:	-25 °C ... +50 °C
Mechanical life:	1×10 ⁷ switching cycle
Switching frequency (AC15):	max. 3600 switching cycle /hour

Legend

1:	breaking capacity limit
2a:	10 ⁶ switching cycle
2b:	3×10 ⁶ switching cycle
2c:	10 ⁷ switching cycle
3:	heating limit

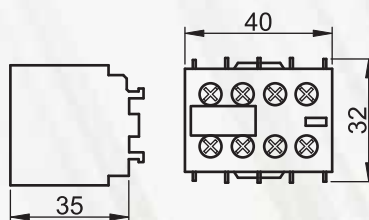
Electrical life according to switching capacity (AC15)

Switching cycle	Rated operating voltage						
	24 V	48 V	110/127 V	220/230 V	380/400 V	440 V	600 V
10 ⁶	150 VA	300 VA	400 VA	480 VA	500 VA	500 VA	500 VA
3×10 ⁶	80 VA	170 VA	250 VA	290 VA	320 VA	320 VA	320 VA
10 ⁷	30 VA	65 VA	90 VA	120 VA	130 VA	130 VA	130 VA

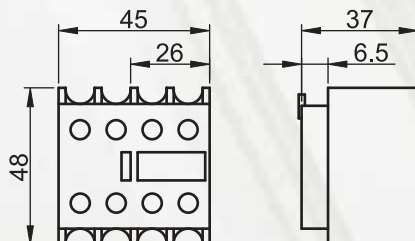
Front side auxiliary contacts

The auxiliary contact is a mechanical switching device, suitable for controlling the operation of other switching or control equipments, including the indication of the status and electrical interlock of the contactor. It is a two- or four-contact auxiliary unit, which can be snapped onto the front side

For TR1K mini contactors



For TR1D/F and TR1E contactors



Tracon code	Contacts
TR5KN02	2 NC
TR5KN04	4 NC
TR5KN11	1 NC + 1 NO
TR5KN13	3 NC + 1 NO
TR5KN20	2 NO
TR5KN22	2 NC + 2 NO
TR5KN31	1 NC + 3 NO
TR5KN40	4 NO

Tracon code	Contacts
TR6DN02	2 NC
TR6DN04	4 NC
TR6DN11	1 NC + 1 NO
TR6DN13	3 NC + 1 NO
TR6DN20	2 NO
TR6DN22	2 NC + 2 NO
TR6DN31	1 NC + 3 NO
TR6DN40	4 NO

TR6-DN40 TR5-KN40
54 53/NO
64 63/NO
74 73/NO
84 83/NO

TR6-DN31 TR5-KN31
54 53/NO
62 61/NC
74 73/NO
84 83/NO

TR6-DN22 TR5-KN22
54 53/NO
62 61/NC
72 71/NC
84 83/NO

TR6-DN13 TR5-KN13
54 53/NO
62 61/NC
72 71/NC
82 81/NC

TR6-DN04 TR5-KN04
52 51/NC
62 61/NC
72 71/NC
82 81/NC

TR6-DN20 TR5-KN20
54 53/NO
64 63/NO

TR6-DN11 TR5-KN11
54 53/NO
62 61/NC

TR6-DN02 TR5-KN02
52 51/NC
62 61/NC

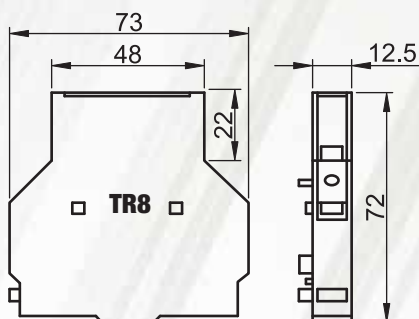
Contactors

Side auxiliary contact units for TR1D/F09...TR1D/F65 contactors

Side auxiliary contacts can be placed on both sides of the contactor, to be used in case there is not enough place to use front side auxiliary contacts, or for any other reasons.



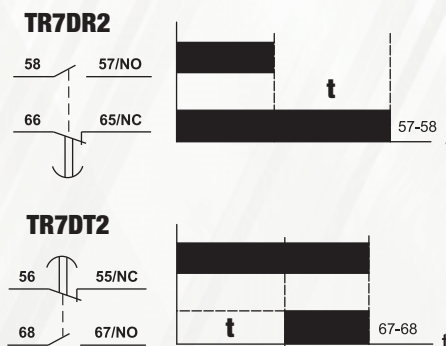
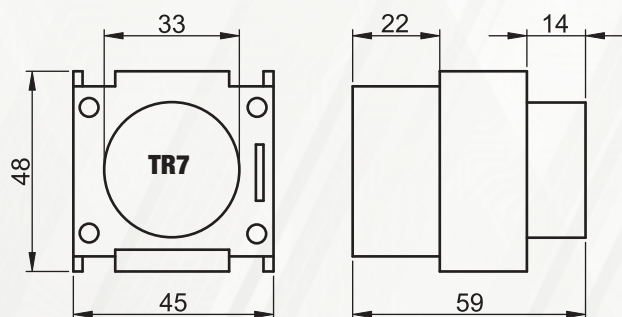
Tracon code	Contacts
TR8-DN20	2 NO
TR8-DN11	1 NO + 1 NC



Timing units for TR1D/F contactors

This timing unit can be snapped onto the front side of the contactor. The contacts operate with delay, i.e. the change between the on and off state occurs according to the time delay adjusted with the rotating button.

Tracon code	Contacts	Switching delay
TR7DT2	1 NC + 1 NO	With 0.1-30 s delay after pick-up
TR7DR2	1 NC + 1 NO	With 0.1-30 s delay after release

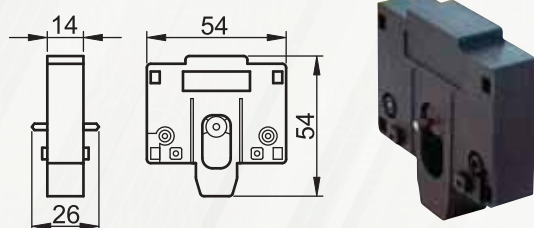


Mechanical interlock

After installing between two contactors it does not let to pick-up both coils at the same time. The device is applicable on direction changers without electric interlock, on security switching units with helping switch and in star-delta switches.

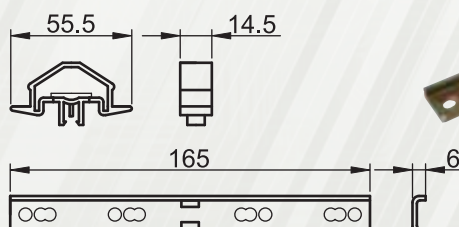
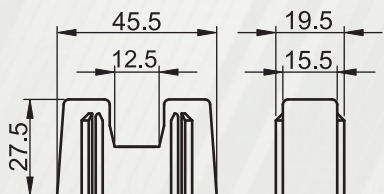
Tracon code	Contactor
TR9-D09978	9-32 A
TR9-D50978	40-95 A

RELEVANT STANDARD
EN 60947-4-1



For currents between 9 ... 32 A: stable contact between two contactors can be established with a distance holder, by sliding it into the side openings of the contactors.

For currents between 40 ... 95 A: reliable connection by distance holder clipped on the auxiliary rail. The rail can be fixed by screws onto the mounting plate at the bottom of the contactor.





Contactors



Thermal overload relays

The thermal overload relays (or heat relays) are used for protection of electrical motors of machines and equipments against damage due to their overloading. The operation of this protective relay is a so called inverse kind – the larger the current in the motor circuit, the shorter the time before switch-off.

The 1L1, 3L2 and 5L3 type contacts of these protective relays are round, copper males which should be connected to the 2T1, 4T2 and 6T3 type terminals of the contactor.

The adjustment of the heat relay can be executed by the adjusting the front side button below the transparent cover plate. The TEST button is used for checking the proper operation of the relay circuit and for selection between manual or automatic adjustment. The red STOP button outside of the cover switches the relay off.

The thermal over-current relay is supplied with an opening (NC) and an electrically independent closing (NO) terminal as well as an optical position indicator to show the break status.

For TR1K contactors

Tracon code	Adjustable current range (A)
TR2HK0301	0.1 – 0.16
TR2HK0302	0.16 – 0.25
TR2HK0303	0.25 – 0.4
TR2HK0304	0.4 – 0.63
TR2HK0305	0.63 – 1
TR2HK0306	1 – 1.6
TR2HK0307	1.6 – 2.5
TR2HK0308	2.5 – 4
TR2HK0310	4 – 6
TR2HK0312	5.5 – 8
TR2HK0314	7 – 10
TR2HK0316	9 – 13

For TR1D/F contactors (9-25 A)

Tracon code	Adjustable current range (A)
TR2HD/F1304	0,4 – 0,63
TR2HD/F1305	0,63 – 1
TR2HD/F1306	1 – 1,6
TR2HD/F1307	1,6 – 2,5
TR2HD/F1308	2,5 – 4
TR2HD/F1310	4 – 6
TR2HD/F1312	5,5 – 8
TR2HD/F1314	7 – 10
TR2HD/F1316	9 – 13
TR2HD/F1321	12 – 18
TR2HD/F1322	17 – 25

For TR1D/F contactors (23-95 A)

Tracon code	Adjustable current range (A)
TR2HF2353	23 – 32
TR2HF2355	28 – 36
TR2HD/F3353	23 – 32
TR2HD/F3355	30 – 40
TR2HD/F3357	37 – 50
TR2HD/F3359	48 – 65
TR2HD/F3361	55 – 70
TR2HD/F3363	63 – 80
TR2HD/F3365	80 – 93



Technical data

Protection degree (according to IEC 529):

IP 20

Ambient temperature

normal operation:

-30 °C ... +55 °C

store:

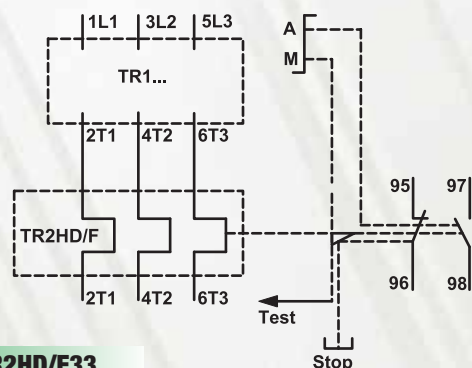
-60 °C ... +70 °C

Mounting position:

free

Data of the main circuit

	TR2HK...	TR2HD/F13...	TR2HD/F33...
Rated insulation voltage (V):	690	690	690
Rated impulse withstand voltage (kV):	6	6	6
Rated operating frequency (Hz):	0-400	0-400	0-400
Breaking class:	10 A	10 A	10 A
Adjustable current range (A):	0.1-13	0,4-25	23-93
Terminal capacity (mm ²):			
Solid:	1.5-4	2.5-10	4-35
Flexible:	0.75-4	1.5-10	4-35
Flexible with cord-end terminal:	0.5-2.5	1-6	4-35



A: Automatic return
M: Manual return

RELEVANT STANDARD

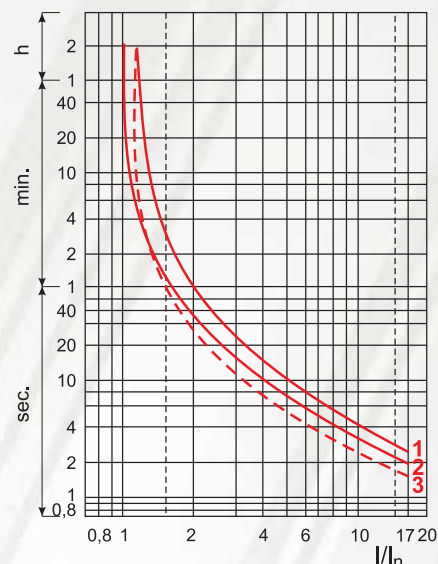
EN 60947-1
EN 60947-4-1

Contactors

The electrical data of the relay contacts

Rated insulation voltage:	690 V
Rated impulse withstand voltage:	6 kV
Rated operating frequency:	50...60 Hz
Rated thermal current:	6 A
Rated operating current:	2 A, 230 V, 50 Hz, AC15
Application class:	AC 15
Terminal capacity:	1×1 mm ² ... 2×2,5 mm ² solid or flexible Cu

Tripping characteristic

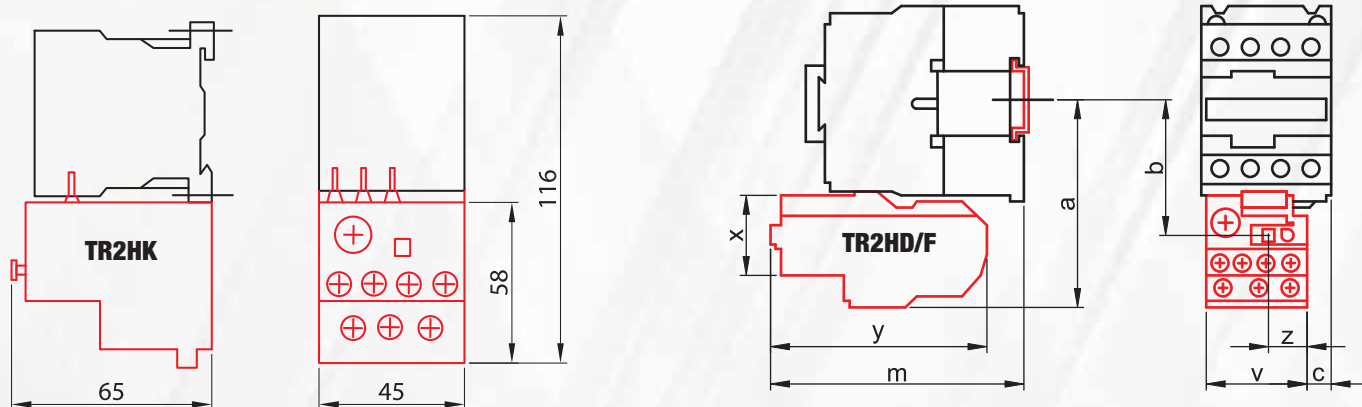


Rated operating voltage:	24V	48V	110V	230V	400V
Switchable power:	100VA	200VA	400VA	600VA	600VA

Legend

- 1:** 3 phase load, starting from cold state
- 2:** 2 phase load, starting from cold state
- 3:** 3 phase load, after long, continuous load (warm state)

Dimensions



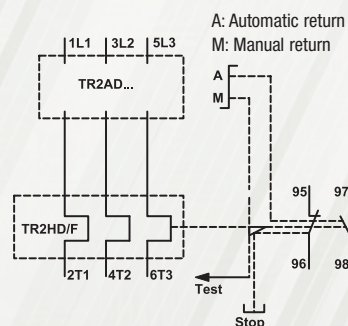
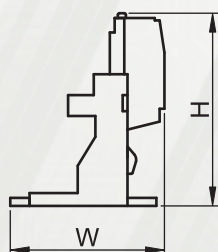
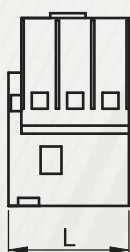
Tracon code	a (mm)	b (mm)	c (mm)	m (mm)	x (mm)	y (mm)	v (mm)	z (mm)
TR1D/F09...D/F18	81	50	0	98	47	92	44	17
TR1D/F25	86	55	10.7	108	47	92	44	17
TR1D/F32	86	55	8.1	109	47	92	44	17
TR1D/F40...D/F65	111	72.4	4.5	119	54	109	70	30
TR1D/F80... D/F95	115.5	76.9	9.5	124	54	109	70	30

Adaptor for thermal relays

By using this adaptor, heat relays can be installed into the control circuit without using a contactor. The relays are installable on mounting plate or on mounting rail EN 50022.



Tracon code	Title	LxWxH (mm)
TR2AD1	Adaptor for TR2HD/F13.. thermal relays	46x78x86
TR2AD3	Adaptor for TR2HD/F33.. thermal relays	73x103x120



RELEVANT STANDARD

EN 60947-1

RELEVANT STANDARD

EN 60947-4-1



Contactors



Compatibility tables for contactors and thermal relays

The tables below help to choose the right contactor and thermal relay for motors applied for three-phase motors in delta operation mode. The motor power- and current values in the tables apply for three-phase motors in delta operation mode. Application category: AC-3.

Examples for compatibility between TR1K type contactor and TR2HK type thermal overload relay

Technical data of protected device $U_e=230/400V$		Contactor	Thermal relay	Adjustable current range (A)	Shunt fuse (A)	
(kW)	(A)				aM	gG (gL)
-	0,1	TR1K06	TR2HK0301	0,1 – 0,16	1	2
0,06	0,16	TR1K06	TR2HK0302	0,16 – 0,25	1	2
0,08	0,25	TR1K06	TR2HK0303	0,25 – 0,4	1	2
0,1	0,4	TR1K06	TR2HK0304	0,4 – 0,63	2	4
0,3	1,0	TR1K06	TR2HK0305	0,63 – 1	2	4
0,4	1,0	TR1K06	TR2HK0306	1 – 1,6	2	4
0,8	2,0	TR1K06	TR2HK0307	1,6 – 2,5	4	6
1,1	2,6	TR1K06	TR2HK0308	2,5 – 4	6	10
1,5	3,5	TR1K06	TR2HK0308	2,5 – 4	6	10
2,2	5,0	TR1K06	TR2HK0310	4 – 6	10	16
3,0	6,3	TR1K06	TR2HK0312	5,5 – 8	10	16
4,0	8,5	TR1K09	TR2HK0314	7 – 10	10	20
5,0	11	TR1K12	TR2HK0316	9 – 13	16	25

Examples for compatibility between TR1D type contactor and TR2HK type thermal overload relay

Technical data of protected device $U_e=230/400V$		Contactor	Thermal relay	Adjustable current range (A)	Shunt fuse (A)	
(kW)	(A)				aM	gG (gL)
0,1	0,4	TR1D/F09	TR2HD/F1304	0,4-0,63	2	4
0,3	1,0	TR1D/F09	TR2HD/F1305	0,63-1	2	4
0,4	1,0	TR1D/F09	TR2HD/F1306	1-1,6	2	4
0,8	2,0	TR1D/F09	TR2HD/F1307	1,6-2,5	4	6
1,1	2,6	TR1D/F09	TR2HD/F1308	2,5-4,0	6	10
1,5	3,5	TR1D/F09	TR2HD/F1308	2,5-4,0	6	10
2,2	5,0	TR1D/F09	TR2HD/F1310	4,0-6,0	10	16
3,0	6,3	TR1D/F09	TR2HD/F1312	5,5-8	10	16
4,0	8,5	TR1D/F09	TR2HD/F1314	7,0-10,0	10	20
5,0	11,0	TR1D/F12	TR2HD/F1316	9-13,0	16	25
7,5	15,5	TR1D/F18	TR2HD/F1321	12,0-18,0	20	35
9,0	18,0	TR1D/F18	TR2HD/F1321	12,0-18,0	25	35
11,0	22,0	TR1D/F25	TR2HD/F1322	17,0-25,0	25	50
15,0	30,0	TR1D/F40	TR2HD/F3353	23,0-32,0	40	63
18,0	40,0	TR1D/F40	TR2HD/F3355	30-40,0	50	63
22,0	44,0	TR1D/F50	TR2HD/F3357	37,0-50,0	63	80
25,0	57,0	TR1D/F65	TR2HD/F3359	48-65,0	80	100
30,0	60,0	TR1D/F65	TR2HD/F3361	55,0-70,0	80	100
37,0	72,0	TR1D/F80	TR2HD/F3363	63,0-80,0	80	125
45,0	93,0	TR1D/F95	TR2HD/F3365	80-93,0	100	125

Motor starter combination

By using the TR1D/F contactors, auxiliary contacts, timing and heat relay, some different combinations can be formed, like the star-triangle automatic motor switch or motor starter. The Y-Δ motor starter consists of 3 contactors, 2 auxiliary contacts, 1 timing unit and 1 heat relay. In the appendix, design advice for the assembly, connection and wiring of the necessary elements is provided.



Contactors



Overload protection for electric devices controlled by high power contactors

The overload protection for electrical devices controlled by high power contactors for industrial applications can be performed directly by overload protection combination. The detector-operator part of the unit is one protective relay per phase with adjustable protection current in 0-5 A range. The secondary coil of CT has to be connected onto the current detector input. If the eligible auxiliary contacts of overload relays on all phases are connected in series and any of phase current values exceeds the adjusted threshold level, even the protecting relay in the failed phase picks up and breaks the actuating contact of power contactor, so secures the protection of the electrical device.

Description: This solution does not follow the standardized motor protection characteristic!

Marking of terminals

L, N	Power supply
k, I	Terminals for CT
1	NO close contact
2	CO common contact
3	NC open contact

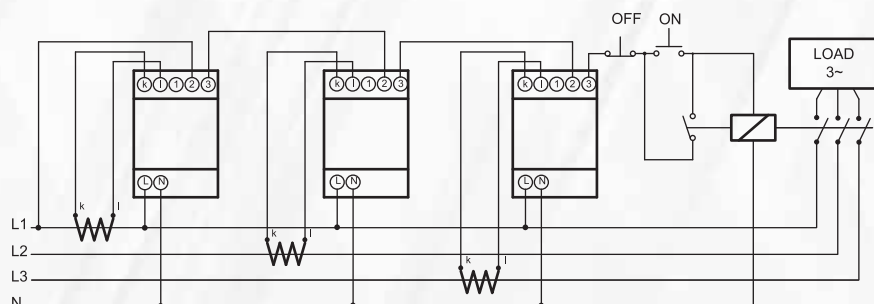


Elements of overload protection unit

Tracon code	Title	Pieces	Side
TFKV-AKA05	Overload relay	3 pcs (1 pc/phase)	H/53
AV, AVA	Current transformer with 5 A secondary current	3 pcs (1 pc/phase)	I/22-25

Description:

- The protection device does not allow the switch-on transient during the adjustable 0,5-8 s delay time range
- If the measured current value is different from the pre-adjusted value, than the relay's output will change state after the adjusted delay time
- If the secondary current of CT gets back to adjusted nominal value range during the adjusted 0,5-15 s delay time, then the relay's output will not change its state
- In the three-phase system the delay times must be synchronized in all phases to the same value



CT transfer ratio	Suggested contactor	Lowest value of adjustable range	Highest value of adjustable range	Tripping values of overload relay (A)					
				0,5	1	2	3	4	5
Protection relay		0,5 A	5 A	0,5 A	1 A	2 A	3 A	4 A	5 A
100/5A	TR1E115	10 A	100 A	10 A	20	40	60	80	100 A
120/5A	TR1E115	12 A	120 A	12 A	24	48	72	96	120 A
125/5A	TR1E150	12,5 A	125 A	12,5 A	25	50	75	100	125 A
150/5A	TR1E170	15 A	150 A	15 A	30	60	90	120	150 A
200/5A	TR1E205	20 A	200 A	20 A	40	80	120	160	200 A
250/5A	TR1E245	25 A	250 A	25 A	50	100	150	200	250 A
300/5A	TR1E300	30 A	300 A	30 A	60	120	180	240	300 A
400/5A	TR1E410	40 A	400 A	40 A	80	160	240	320	400 A
500/5A	TR1E475	50 A	500 A	50 A	100	200	300	400	500 A
600/5A	TR1E620	60 A	600 A	60 A	120	240	360	480	600 A
750/5A	-	70 A	700 A	70 A	140	280	420	560	700 A
800/5A	-	80 A	800 A	80 A	160	320	480	640	800 A
1000/5A	-	100 A	1000 A	100 A	200	400	600	800	1000 A
1500/5A	-	150 A	1500 A	150 A	300	600	900	1200	1500 A
2000/5A	-	200 A	2000 A	200 A	400	800	1200	1600	2000 A
2500/5A	-	250 A	2500 A	250 A	500	1000	1500	2000	2500 A
3000/5A	-	300 A	3000 A	300 A	600	1200	1800	2400	3000 A
4000/5A	-	400 A	4000 A	400 A	800	1600	2400	3200	4000 A
5000/5A	-	500 A	5000 A	500 A	1000	2000	3000	4000	5000 A