Power Contactors 3TF

For more than 110 years, Siemens has been developing and manufacturing industrial control products. We offer a wide product range which fulfills the demands of our customers regarding performance and reliability. Our aim is to make industrial operation easier ensuring flexible mounting, modular construction and high functionality. With 3TF contactors Siemens has been offering a tried tested trusted solution to control, switch and protect your motors upto 250kW.

Applications

3TF power contactors are suitable for switching and controlling squirrel cage and slip-ring motors as well as other AC loads, such as solenoids, capacitors, lighting loads, heating loads and transformer loads.

Standards

Contactors conform to IS/IEC 60947-4-1. They also carry the CE mark.

Coordinated feeder

Contactors and bi-relays have been tested for type-2 coordination at Iq = 50kA, 415V AC, 50Hz as per IS/IEC 60947-4-1, for both fuse protected as well as fuseless motor feeders.

Range

Air break contactors are available from 9 A to 475A in 3 pole version.

Also available in 2 pole AC version from 45A to 400A.

Benefits and features

Flexibility

- **Choice of Auxiliary contacts**

Contactor	Aux. contacts on basic unit	Permissible add-on contact blocks
9A / 12A	1 NO	Upto 4NO or 4NC
9A / 12A	1 NC	Upto 4NO or 2NC
16A/22A	-	Upto 4NO or 4NC
32A/38A	-	Upto 4NO or 4NC
45A to 475A	2NO+2NC	2 x (1NO+1NC)

The customer can order desired number of contacts thereby reducing the cost.

- **Choice of mounting**

  Contactor can be mounted on 35mm DIN and they are also suitable for screw mounting (9-38A – DIN / Screw mounting and 45-475A – Screw mounting).



- **Choice of coil voltages**

AC 50Hz coil code: 3TF30 to 3TF56

Coil voltage (V)	24	42	**110**	**230**	**415**
Code	B0	D0	**F0**	**P0**	**R0**

Wide band AC 50 Hz coil code: 3TF30 to 3TF35

Coil voltage (V)	70-140	150-280	260-460
Code	W110	W220	W415

AC 50/60 Hz coil code: 3TF57

Coil voltage (V)	110-132	220-240	380-460
Code	F7	M7	Q7

DC coil code: 3TF30 to 3TF57

Coil voltage (V)	**24**	42	48	**110**	**220**	**250+**
Code	**B4**	D4	W4	**F4**	**M4**	**N4**

+ For 3TF3 only

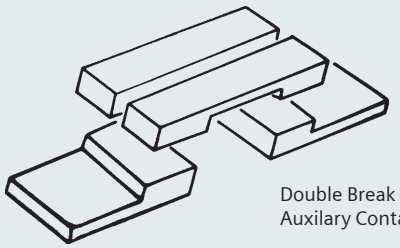
(Other coil voltages are also available.)

High performance

- **No duration upto 55°C**
  Contactors are suitable for operation in service temperature upto 55°C without derating. This avoids selection of higher rated contactor, thereby reducing cost.
- **Long Life**
  Superior design of current carrying parts, contact system and the magnet system increases the reliability results into **higher electrical and mechanical endurance**.
- **High short-time rating**
  Contactors have a high short-time rating, which makes them suitable for applications having high starting currents and long run-up times.

High reliability

- High insulation voltage and impulse withstand voltage capacity ensures reliable performance during occasional abnormal increase in supply voltage.
- **Double break parallel bridge contact mechanism**
  This mechanism is available for auxiliary contacts. Such contact mechanism ensures reliable contact at low voltage and low currents (5mA at 17VDC). It also offers unmatched reliability. (Chances of 2 mal-operations in 100 mill. operations as against 4460 for single bridge contacts)



Double Break Parallel Bridge
Auxilary Contacts

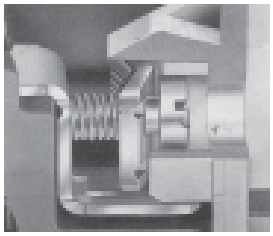
User friendliness and safety

- **Arc Chamber Interlock** (45A and above)
  It prevents the contactor from switching ON, if the arc chamber is not fitted properly. Thus avoids accidents to plant and personnel.



- **Positively driven contacts**
  3TF contactors satisfy the conditions **for positively driven operation** between the main power contacts and the NC contacts. NC contacts positively open before the main contact closes. This is extremely important when power contactors are used in safety circuits of critical applications.

- **SIGUT Termination**



  - **Figure touch proof terminals***
    It protects against accidental contact with live parts which ensures operator safety.
  - **Funnel shaped cable entries**
    Reduce wiring time by facilitating quick location of the connecting wire.
  - **Cable end-stop**
    It decides the insertion depth of the connecting wires. Since the insertion depth is predetermined, insulation of the cable can be cut accordingly and the possibility of insulation getting inadvertently caught under the terminal, is avoided.
  - **Captive Screws**
    This feature prevents the screws from falling down thereby facilitates the wiring. Hence, the contactors are delivered with untightened terminals. This eliminates the operation of untightening terminals before wiring.
  - **Lug less termination**
    This feature helps in reducing the termination time.

* Finger touch proof terminals are available upto 85 A

Selection and ordering data

Contactor size	Rated current (A) Ie AC3 at 415V, 50Hz, 3ph	Motor kW at 415V 50Hz, 3ph	Auxiliary contacts	**AC 50 Hz coil Type** Pl. fill in coil voltage code	**DC coil Type** Pl. fill in coil voltage code	**Std. pkg. (nos.)**
0	**9**	**4**	1NO [$] 1NC [$]	**3TF30 10-0A.. 3TF30 01-0A..**	**3TF30 10-0B.. 3TF30 01-0B..**	
	12	**5.5**	1NO [$] 1NC [$]	**3TF31 10-0A.. 3TF31 01-0A..**	**3TF31 10-0B.. 3TF31 01-0B..**	
1	**16**	**7.5**	–[$]	**3TF32 00-0A..**	**3TF32 00-0B..**	
	22	**11**	–[$]	**3TF33 00-0A..**	**3TF33 00-0B..**	
2	**32**	**15**	–[$]	**3TF34 00-0A..**	**3TF34 00-0B..**	
	38	**18.5**	–[$]	**3TF35 00-0A..**	**3TF35 00-0B..**	
3	**45**	**22**	2NO + 2NC [$]	**3TF46 02-0A..ZA01[@]**	**3TF46 02-0D..ZA01[@]**	
	63	**30**	2NO + 2NC [$]	**3TF47 02-0A..ZA01[@]**	**3TF47 02-0D..ZA01[@]**	
	70	**37**	2NO + 2NC [$]	**3TF47 72-0A..**	**3TF47 72-0D..**	**1**
4	**75**	**42**	2NO + 2NC [$]	**3TF48 22-0A..ZA01[@]**	**3TF48 22-0D..ZA01[@]**	
	85	**45**	2NO + 2NC [$]	**3TF49 22-0A..ZA01[@]**	**3TF49 22-0D..ZA01[@]**	
6	**110**	**55**	2NO + 2NC [$]	**3TF50 02-0A..**	**3TF50 02-0D..**	
	140	**75**	2NO + 2NC [$]	**3TF51 02-0A..**	**3TF51 02-0D..**	
8	**170**	**90**	2NO + 2NC [$]	**3TF52 02-0A..**	**3TF52 02-0D..**	
	205	**110**	2NO + 2NC [$]	**3TF53 02-0A..**	**3TF53 02-0D..**	
10	**250**	**132**	2NO + 2NC [$]	**3TF54 02-0A..**	**3TF54 02-0D..[1)]**	
	300	**160**	2NO + 2NC [$]	**3TF55 02-0A..**	**3TF55 02-0D..[1)]**	
12	**400**	**200**	2NO + 2NC [$]	**3TF56 02-0A..**	**3TF56 02-0D..[1)]**	
	475	**250**	2NO + 2NC [$]	**3TF57 02-0C..**	**3TF57 02-0D..[1)]**	

[1)] Please connect DC coil circuit as recommended on page 16

[$] For more auxiliary contacts please refer table below - "auxiliary contact blocks"

[@] For box type (SIGUT) terminal, order 2 nos. 3TX7 460-0E

Coil voltage code AC 50Hz: 3TF30 to 3TF56

Coil voltage	24	42	110	230	415
Code	B0	D0	F0	P0	R0

Coil voltage code AC 50/60 Hz: 3TF57

Coil voltage (V)	110-132	220-240	380-460
Code	F7	M7	Q7

Coil voltage code DC: 3TF30 to 3TF57

Coil voltage (V)	24	42	48	110	220	250[+]
Code	B4	D4	W4	F4	M4	N4

[+] For 3TF3 only

[2)] Coil voltage code AC 50Hz: 3TF (2 Pole AC Contactor)

Coil voltage	110	230	415
Code	F0	P0	R0

(Other coil voltages are also available)

Auxiliary contact blocks

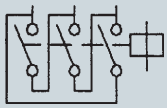
For Contactor	Description	Type	Std. pkg. (nos.)
3TF30 to 35	1NO 1NC 1NO ext 1NC ext	**3TX4 010-2A** **3TX4 001-2A** **3TX4 010-4A** **3TX4 001-4A**	**10**
3TF46 to 57	Second 1NO+1NC Left Second 1NO+1NC Right	**3TY7 561-1K** **3TY7 561-1L**	**1**

2 Pole AC contactors - 3TF

For single phase and 2 phase applications with AC coils

Contactor Size	Rated current Ie (A) AC3, 415V	Type[2)]	Std. pkg. (nos.)
3	45	**3TF46 02-0A..ZB01**	
3	63	**3TF47 02-0A..ZB01**	
3	70	**3TF47 72-0A..ZB01**	
6	110	**3TF50 02-0A..ZB01**	
6	140	**3TF51 02-0A..ZB01**	**1**
8	170	**3TF52 02-0A..ZB01**	
8	205	**3TF53 02-0A..ZB01**	
10	250	**3TF54 02-0A..ZB01**	
10	300	**3TF55 02-0A..ZB01**	
12	400	**3TF56 02-0A..ZB01**	

Technical data

Contactor		Size	0		1		2	
		Type	3TF30	3TF31	3TF32	3TF33	3TF34	3TF35
Permissible ambient temperature	**Storage**	°C	-55 to +80					
	Service	°C	-25 to +55					
Maximum operating voltage		V	690					
Rated insulation voltage *Ui* (At Pollution Degree 3)[1]		V	690					
Rated impulse strength *Uimp*		kV	8					
Mechanical endurance (make/break operations)	AC	Cycles	15×10^6				10×10^6	
	DC	Cycles	15×10^6				10×10^6	
Rating of contactors for AC loads								
AC-1 duty, switching resistive load								
Rated operational current ***Ie***	at 40°C upto 690V	A	21		32		65	
	at 55°C upto 690V	A	20		30		55	
Ratings of three-phase loads								
p.f.=1 at 55°C	at 415V	kW	13		19.7		36	
	500V	kW	17		26		47.5	
	690V	kW	22		34.		62.7	
AC-2 and AC-3 duty								
Rated operational current ***Ie***[2]	**upto 415V**	**A**	**9**	**12**	**16**	**22**	**32**	**38**
	500V	A	9	12	16	17	32	38
	690V	A	6.6	8.8	12.2	12.2	27	27.
Nominal rating of slipring or squirrel-cage motors at 50/60 Hz.	**at 415V**	**kW**	**4**	**5.5**	**7.5**	**11**	**15**	**18.5**
	500V	kW	5.5	7.5	10	11	21	25
	690V	kW	5.5	7.5	11	11	23	23.
AC-4 duty (contact endurance approx. 2×10^5 make-break operations at Ia=6Ie)								
Rated operational current ***Ie***	upto 690V	A	3.3	4.3	7.7	8.5	15.6	18.5
Rating of squirrel-cage motors at 50/60Hz.	at 415V	kW	1.54	2.1	3.5	4	8.2	9.8
	500V	kW	1.7	2.5	4.6	5.2	9.8	11.8
Max. permitted rated operational current Ie/AC-4 = Ie/AC-3 upto 500V. Ref. life curve for the life.	690V	kW	2.54	3.45	6	6.6	13	15.5
Used as stator contactor (upto 690V) (AC-2 duty)								
Stator currents ***Ies***	20%	A	20	20	25(46*)		85	
On-load factor (ED)[3] with intermittent duty	40%	A	20	20	25(37*)		67	
	60%	A	20	20	25(33*)		60	
* Applicable up to 500V	80%	A	20	20	25(30*)		55	
Used as rotor contactor (upto 690V) (AC-2 duty)								
Rotor current ***Ier*** 	20%	A	31		73		125	
On-load factor (ED)[3]	40%	A	31		58		106	
with intermittent duty	60%	A	31		52		95	
	80%	A	31		47		87	
Locked rotor voltage Uer	Starting	V	1320		1320		1320	
	Plugging / Control	V	660		660		660	
AC-6b duty, switching low-inductance individual three-phase capacitors at 50/60Hz[4] (we also offer special capacitor duty contactors)	415V	kVAR	4		7.5		16.7	
	500V	kVAR	4		7.5		16.7	
	690V	kVAR	4		7.5		16.7	
Thermal loading	10 s current	A	90	96	130	176	400	400
Power loss per current path at Ie/AC-3		W	0.6	1.1	1	1.6	2	2.5
Rating of contactors for DC loads								
DC-1 duty, switching resistive load (L/R < 1mS)								
Rated operational current ***Ie*** (at 55°C)								
Number of current paths in series connection			1 2 3		1 2 3		1 2 3	
	at 24V	A	20 20 20		30 30 30		55 55 55	
	110V	A	2.1 12 20		4.5 30 30		6 55 55	
	220V	A	0.8 1.6 20		1 5 30		1 6 45	
	440V	A	0.6 0.8 1.3		0.4 1 2.9		0.4 1.1 2.9	
DC-3 and DC-5 duty, shunt & series motors (L/R < 15mS)								
Rated operational current ***Ie*** (at 55°C)								
Number of current paths in series connection			1 2 3		1 2 3		1 2 3	
	at 24V	A	20 20 20		20 30 30		20 55 55	
	110V	A	0.15 0.35 20		0.75 7 30		0.75 7 55	
	220V	A	- - 1.75		0.2 1 3.5		0.2 1 3.5	
	440V	A	- - 0.2		0.09 0.27 0.6		0.1 0.27 0.6	

1) As per IS/IEC 60947-1
2) Ratings at 1000V AC - upon enquiry.
3) On-load factor (ED) in % = $\frac{\text{ontime} \times 100}{\text{cycle time}}$
Max. switching freq. z = 50 per hour. Ratings at higher frequency upon enquiry.

3			4		6		8		10		12	
3TF46	3TF47	3TF47 7	3TF48	3TF49	3TF50	3TF51	3TF52	3TF53	3TF54	3TF55	3TF56	3TF57
			-55 to +80 -25 to +55									
1000			1000									
1000			1000									
8			8									
10×10^6 3×10^6			10×10^6 3×10^6									
90 80	100 90	100 90	120 100	120 100	170 160		230 210	240 220	325 300	325 300	425 400	600 550
52 67 91	52 67 91	52 67 91	66 86 114	66 86 114	105 138 183		132 173 228	138 181 240	195 260 340	195 260 340	262 345 457	381 476 657
45 45 45	**63** 63 63	**70** 70 70	**75** 75 75	**85** 85 75	**110** 110 110	**140** 140 110	**170** 170 170	**205** 205 170	**250** 250 250	**300** 300 250	**400** 400 400	**475** 475 400
22 30 40	**30** 41.4 57.2	**37** 46 60.1	**42** 50.7 70	**45** 59 70	**55** 76.3 105	**75** 98 105	**90** 118 163	**110** 145 163	**132** 178 245	**160** 210 245	**200** 284 392	**250** 329 392
24 13.1 15.8 21.8	28 15.3 18.4 25.4	31 16.9 20.4 28.2	34 18.6 22.4 30.9	42 23 27 38	54 29.5 35.5 49	68 38 46 63	75 42 50 69	96 54 65 90	110 63 76 105	125 72 86 119	150 88 107 147	150 88 107 147
123 98 87 80	138 110 98 90	138 110 98 90	154 122 109 100		246 195 174 160		323 256 229 210	339 268 240 220	462 367 327 300		617 490 436 400	800 670 600 550
150 150 138 126 1500 750	219 174 155 142 1500 750	219 174 155 142 1500 750	243 193 172 158 2000 1000		389 309 275 253 2000 1000		510 405 361 332 2000 1000	535 425 378 348 2000 1000	729 579 516 474 2000 1000		972 772 688 632 2000 1000	1336 1061 946 869 2000 1000
30 35 30			50 62.5 50		60 80 60		100 130 100		150 190 150		200 265 200	
360 3.5	500 6	500 6	800 7.5	800 10	880 10	1140 14	1360 14	1640 20	2500 16	2500 23	3400 40	4200 40
1	2	3	1	2 3	1	2 3	1	2 3	1	2 3	1	2 3
80 6 1.2 0.48	80 80 7 1.2	80 80 80 3	100 12 2.5 0.8	100 100 100 100 13 100 2.4 6	160 18 3.4 0.8	160 160 160 160 20 160 3.2 11.5	200 18 3.4 0.8	200 200 200 200 20 200 3.2 11.5	300 33 3.8 0.9	300 300 300 300 300 300 4 11	400 33 3.8 0.9	400 400 400 400 400 400 4 11
1	2	3	1	2 3	1	2 3	1	2 3	1	2 3	1	2 3
5 0.75 0.2 0.1	80 12.5 1.1 0.27	80 80 3.5 0.6	6 1.25 0.35 0.15	100 100 100 100 1.75 4 0.42 0.8	160 2.5 0.6 0.17	160 160 160 160 2.5 160 0.65 1.4	200 2.5 0.6 0.17	200 200 200 200 2.5 200 0.65 1.4	300 3 0.6 0.18	300 300 300 300 2.5 300 0.65 1.4	400 3 0.6 0.18	400 400 400 400 2.5 400 0.65 1.4

4) Ratings for capacitor - banks in parallel - upon enquiry. Minimum inductance of 6µH required between parallel connected capacitors.

Power Contactors Technical Data

Contactor		Size	0		1		2		3		
		Type	3TF30	3TF31	3TF32	3TF33	3TF34	3TF35	3TF46	3TF47	3TF47 7
Switching frequency *z* (Contactors without overload relay)		Operation									
No load	AC	Cycles/hr	10,000	10,000	5000	5000	5000	5000	5000	5000	5000
	DC	Cycles/hr	1,500	1,500	1,500	1,500	1,500	1,500	1,000	1,000	1,000
at AC-1		Cycles/hr	2,000	2,000	1,500	1,500	1,200	1,200	1,000	1,000	1,000
at AC-2		Cycles/hr	1,000	1,000	750	750	750	600	600	400	400
at AC-3		Cycles/hr	1,000	1,000	750	750	750	600	1200[5]	1000	1000
at AC-4		Cycles/hr	250	250	250	250	250	200	400	300	300
Coil ratings (cold coil 1.0 x Us)	Supply frequency	Hz	50		50		50		50		
AC operation 50Hz	Closing	VA	68		68		101		183		
	p.f.		0.79		0.82		0.83		0.6		
	Closed	VA	10		10		12.1		17		
	p.f.		0.29		0.29		0.28		0.29		
DC operation	Closing	W	6.2		6.2		11.7		400		
	Closed	W	6.2		6.2		11.7		2.1		
Coil voltage tolerance	Operation										
	AC/DC		0.8 to 1.1 x Us		0.8 to 1.1 x Us						
	at 24V DC		0.8 to 1.2 x Us								
Operating times at 1 x Us [8]											
AC operation	Closing	ms	10-25		10 - 25		13 - 32		17 - 30		
	Opening	ms	4-18		5 - 20		5 - 10		5 - 25		
DC operation	Closing	ms	30-70		40 - 80		58 -107		22 - 40		
	Opening	ms	12-20		10 - 20		13 - 17		105 - 115		
Auxiliary contacts											
Rated thermal current I_{th} = **rated operational current** *Ie* / AC-12		A	10				10				
Rated operational current ***Ie / AC-15/AC-14***											
at rated operational voltage *Ue*	upto 125V	A	10				10				
	220V	A	10				6				
	415V	A	5.5				3.6				
	500V	A	4				2.5				
Rated operational current ***Ie / DC12***											
at rated operational voltage *Ue*	upto 48V	A	10				10				
	110V	A	2.1				3.2				
	220V	A	0.8				0.9				
	440V	A	0.6				0.33				
Rated operational current ***Ie / DC13***											
at rated operational voltage *Ue*	upto 24V	A	10				10				
	48V	A	5				5				
	110V	A	0.9				1.14				
	220V	A	0.45				0.48				
	440V	A	0.25				0.13				
Conductor cross-sections											
Main conductor											
Solid		mm^2	2 x (0.5 to 1, 1 to 2.5), 1x4		2 x (2.5 to 6)		1 to 16		2 x (6 to 16)		
Finely stranded with end sleeve		mm^2	2 x (0.75 to 2.5)		2 x (1.5 to 4)		1 x (5 to 16, 2.5 to 10)		1 x (10 to 35), 2 x (10 to 25)		
Pin end connector		mm^2	1 x (1 to 2.5)		1 x (1 to 6)		2 x (1 to 6)		–		
Solid or stranded		AWG	2 x (18 to 12)		2 x (14 to 10)		2 x (14 to 6)		2 x (10 to 1/10)		
Tightening torque		Nm	0.8 to 1.4		1 to 1.5		2.5 to 3.0		4 to 6		
Finely stranded with cable lug		mm^2							10 to 35		
Terminal bar (max. width)		mm							12		
Solid or stranded		AWG							7 to 1/0		
Tightening torque		Nm							4 to 6		
Auxiliary conductor											
Solid		mm^2	2 x (0.5 to 1, 1 to 2.5), 1 x 4				2 x (0.5 to 1, 1 to 2.5), 1				
Finely stranded with end sleeve		mm^2	2 x (0.75 to 2.5)				2 x (0.75 to 2.5)				
Pin end connector		mm^2	1 x (1 to 2.5)				1 x (1 to 2.5)				
Solid or stranded		AWG	2 x (18 to 12)				2 x (18 to 12)				
Tightening torque		Nm	0.8 to 1.4				0.8 to 1.4				
Short-circuit protection											
Main circuit (Fuse type 3NA3)	Co-ordination										
	Type - 1	A	35	35	63	63	80	80	160	160	160
	Type - 2	A	25	25	32	32	80	80	125	125	160
Auxiliary circuits		A	16								
		A	6, if overload relay auxiliary contacts are in the contactor coil circuit								

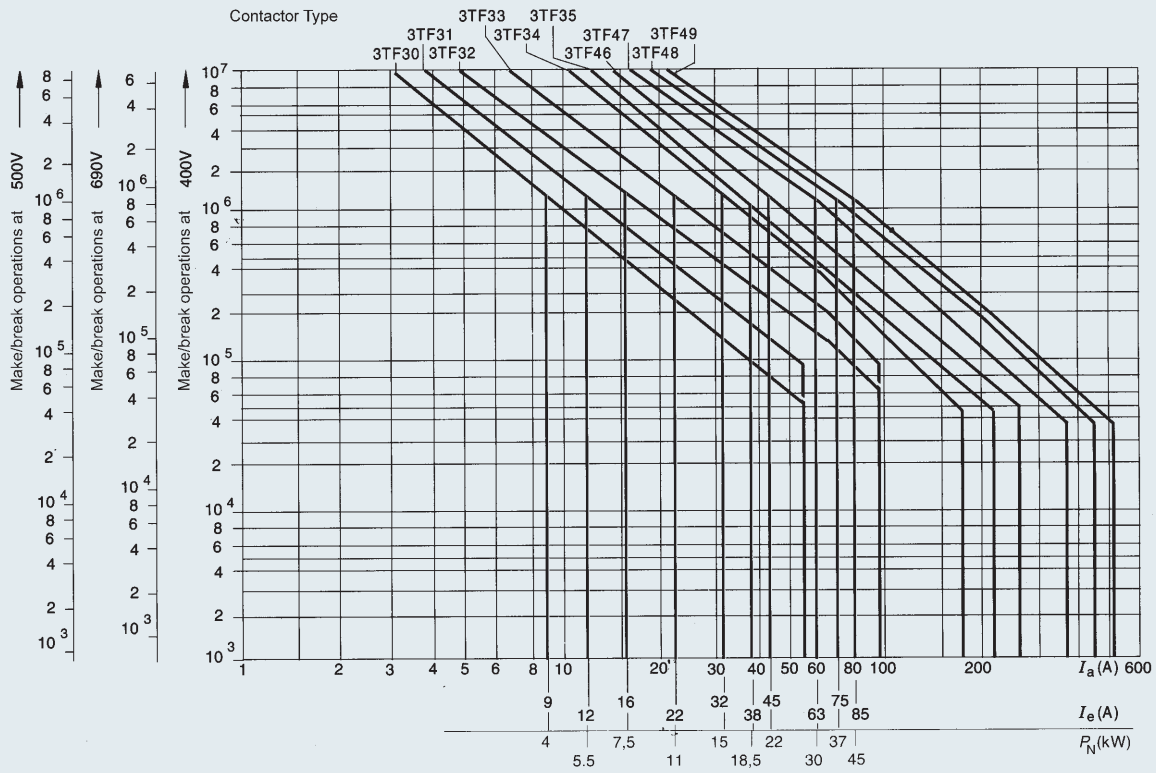
5) With AC coil. With DC coil: 1000 oprs/hr.
6) Including switching contactor.
7) Rated value of the control voltage.

	4		6		8		10		12		
	3TF48	3TF49	3TF50	3TF51	3TF52	3TF53	3TF54	3TF55	3TF56	3TF57	
	5000	5000	5000	5000	5000	5000	3000	3000	3000	2000	
	1,000	1,000	1000	1000	1000	1000	1000	1000	1000	1000	
	900	900	800	800	800	750	800	750	700	500	
	400	350	400	300	300	250	300	250	200	170	
	1000	850	1000	750	700	500	700	500	500	420	
	300	300	300	200	200	130	200	130	150	150	
	50		50		50		50		50	50/60	
										Lower[7]	Upper[7]
	330		550		910		1430		2450	1136	1900
	0.5		0.45		0.38		0.34		0.21	1	1
	32		39		58		84		115	16	45
	0.23		0.24		0.26		0.24		0.33	0.34	0.16
	420		500		876[6]		1216[6]		1306[6]	1110[6]	
	2.7		2.7		11[6]		13.3[6]		14[6]	24[6]	
	0.8 to 1.1 x Us										
	22 - 35		22 - 37		25 - 50		25 - 40		25 - 40	48 - 70	
	5 - 30		8 - 30		10 - 30		10 - 30		8 - 30	80 - 100	
	32 - 40		28 - 32		32 - 45		36 - 45		40 - 55	44 - 60	
	95 -105		185 - 195		10 - 20		10 - 20		10 - 20	12 - 15	
	10				10				10		
	10				10				10		
	6				6				6		
	3.6				3.6				3.6		
	2.5				2.5				2.5		
	10				10				10		
	3.2				3.2				3.2		
	0.9				0.9				0.9		
	0.33				0.33				0.33		
	10				10				10		
	5				5				5		
	1.14				1.14				1.14		
	0.48				0.48				0.48		
	0.13				0.13				0.13		
			16 to 70	35 to 95	35 to 95	50 to 240	50 to 240	50 to 240	50 to 240	50 to 240	
			15	20	20	25	25	25	25	30	
			3 to 2/0								
			6 to 8	10 to 14	10 to 14	14 to 24	14 to 24	14 to 24	14 to 24	14 to 24	
	2 x (0.5 to 1, 1 to 2.5), 1 x 4 2 x (0.75 to 2.5) 1 x (1 to 2.5) 2 x (18 to 12) 0.8 to 1.4				2 x (0.5 to 1, 1 to 2.5) 2 x (0.75 to 2.5) 1 x (1 to 2.5) 2 x (18 to 12) 0.8 to 1.4				2 x (0.5 to 1, 1 to 2.5) 2 x (0.75 to 2.5) 1 x (1 to 2.5) 2 x (18 to 12) 0.8 to 1.4		
	250	250	400	400	400	400	500	500	800		800
	160	160	200	250	250	250	400	400	500		500

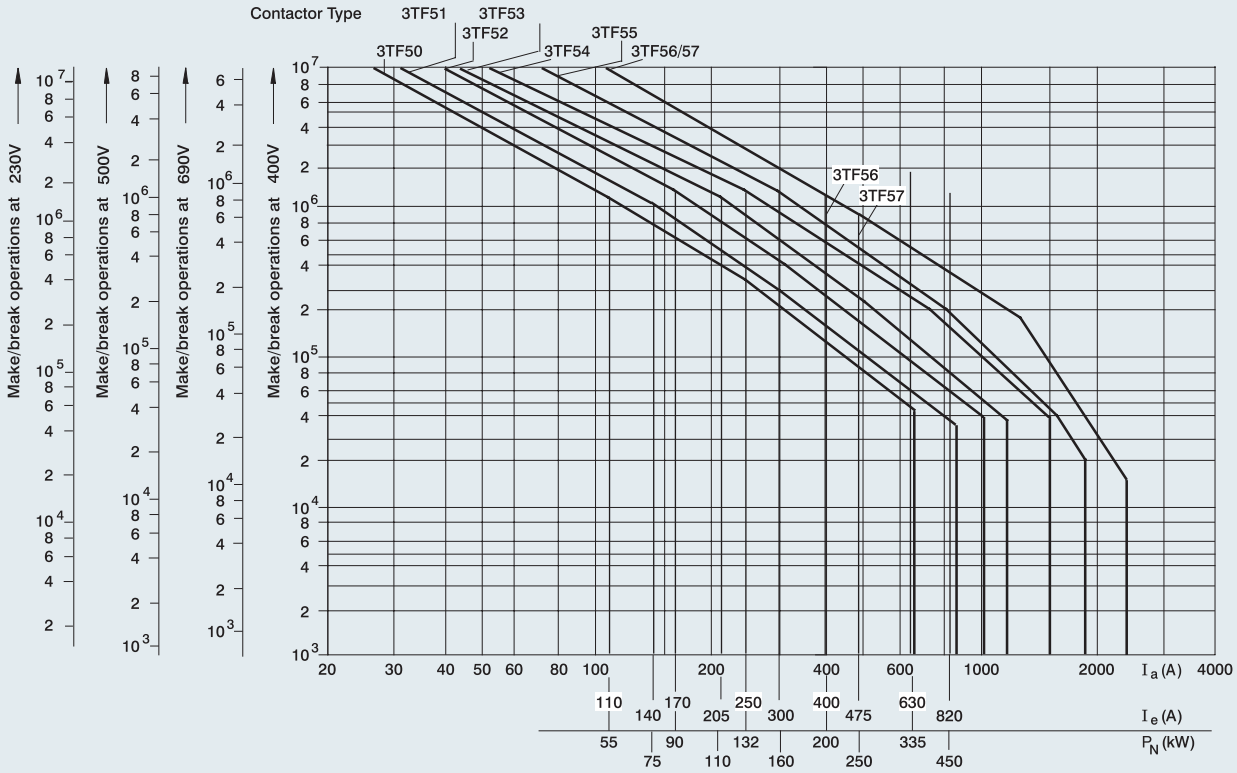
8) The opening time delay increases when the contactor coil is protected against voltage peaks. (e.g. Varistor: +2 to +5ms)

Electrical Life Curves

3TF30 to 3TF49 contactors

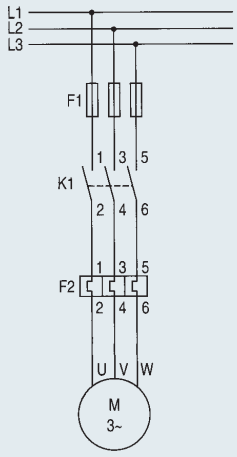


3TF50 to 3TF57 contactors

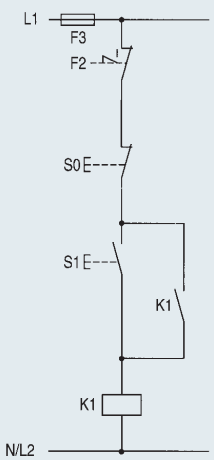


Typical Circuit Diagrams

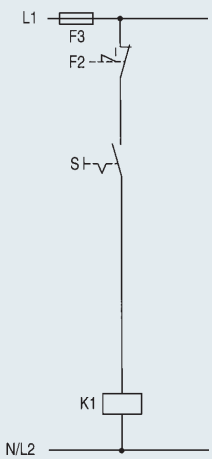
Direct On Line starter



a) Main circuit



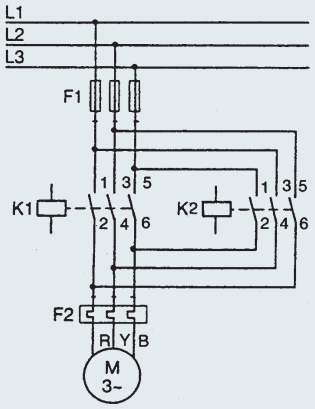
b) Control circuit for momentary-contact control



c) Control circuit for maintained-contact control

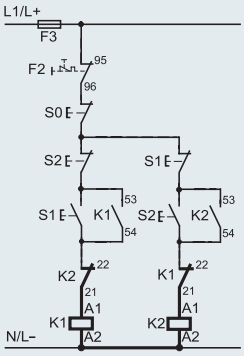
S0 = 'OFF' Push button
S1 = 'ON' Push button
S = Maintained command switch
K1 = Main contactor
F1 = Main circuit fuse
F2 = Overload relay
F3 = Control circuit fuse

Forward / Reverse starter (Electrical Interlocking)



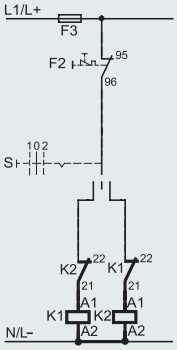
Main circuit

S0 : 'OFF' Push button
S1 : 'ON Clockwise' Push button
S2 : 'ON Anti-clockwise' Push button
S : Selector Switch 'Clockwise - OFF - Anti-clockwise'



Push button control (momentary command)

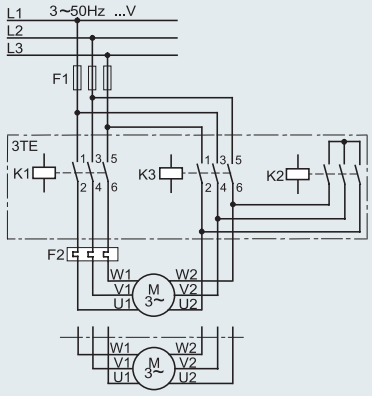
K1 : Clockwise contactor
K2 : Anti-clockwise contactor



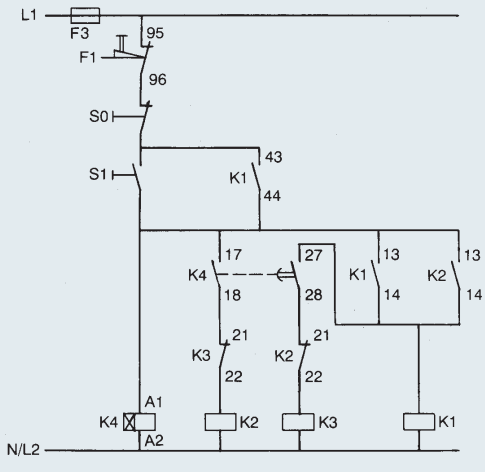
Selector switch control (command needs to be maintained)

F1 : Main circuit fuses
F2 : Overload relay
F3 : Control circuit fuse

Star Delta starter



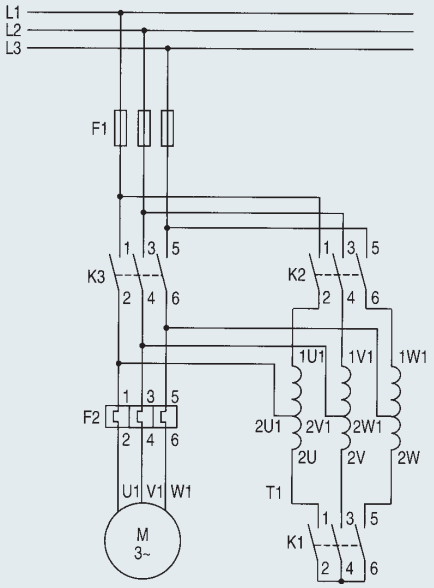
Main circuit



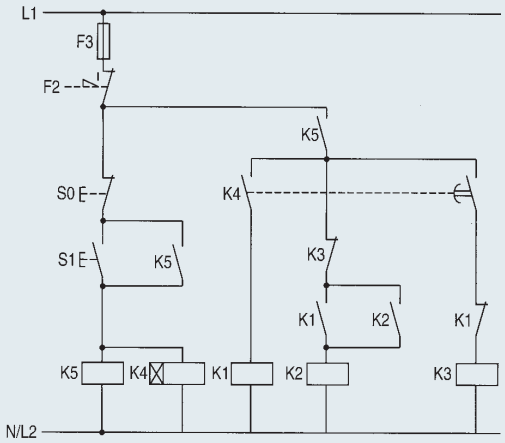
Control circuit for push button control (momentary command)

S0 = 'OFF' Push button
S1 = 'ON' Push button
K1 = Line contactor
K2 = Star contactor
K3 = Delta contactor
K4 = Star delta timer (7PU60 20)
F2 = Overload relay
F1 = Backup fuse
F3 = Control circuit fuse

Auto Transformer starter



a) Main Circuit

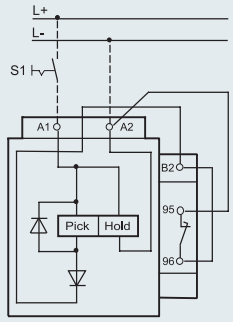


b) Auxiliary circuit for momentary-contact control

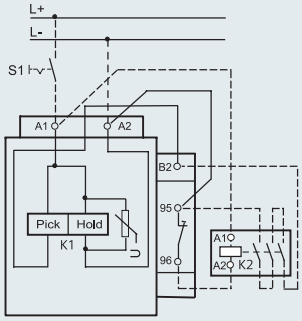
S0 = 'OFF' Push button
S1 = 'ON' Push button
K1 = Star contactor
K2 = Transformer contactor
K3 = Main contactor
K5 = Contactor relay (2NO + 2NC)
K4 = Time relay (7PU6020)
F1 = Main circuit fuses
F2 = Overload relay
F3 = Control circuit fuse

Please refer page no. 70 for selection of switchgear for autotransformer starting method

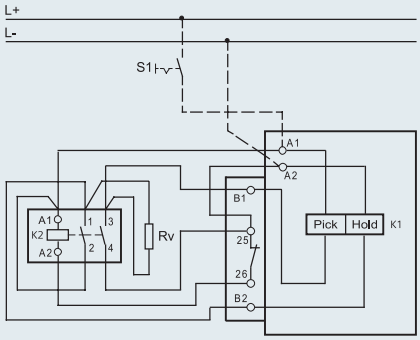
Internal connection diagram for DC coil circuits



K1 : Sizes 3 to 6,
3TF46 to 3TF51



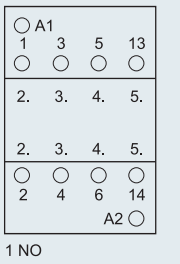
K1 : Sizes 8 to 12
3TF52 to 3TF56
K2 : 3TF30 10 OB.. for 3TF52-55
3TF32 00-OB.. for 3TF56

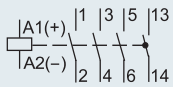


K1 : Size 12
3TF57
K2 : 3TC44 17 4A..

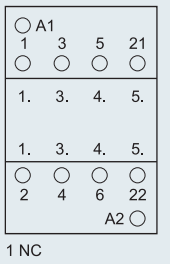
The control circuits indicated by dotted lines are to be wired by customer.

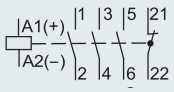
Terminal Designation

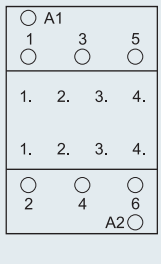


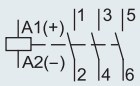


Size 0, 3TF30/31
AC and DC Coil

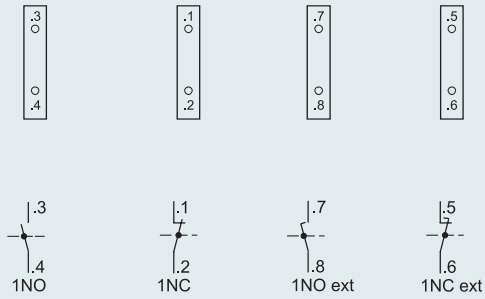




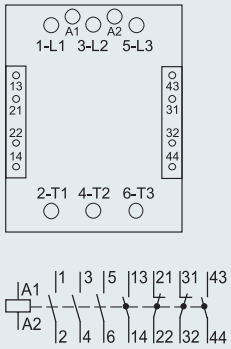




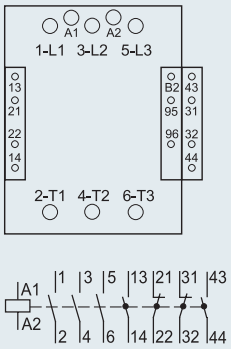
Size 2, 3TF32/33/34/35
AC and DC Coil



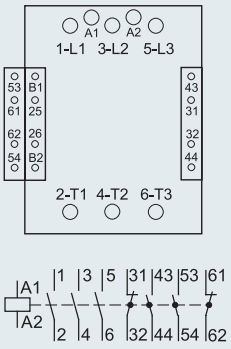
Add-on contact block for 3TF30/31/32/33



Size 3 to 12, 3TF46 to 3TF57
AC Coil

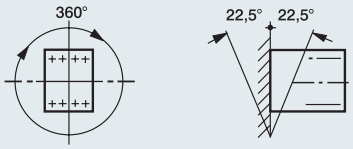


Size 3 to 12, 3TF46 to 3TF56
DC Coil

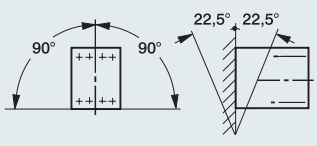


Size 12, 3TF57
DC Coil

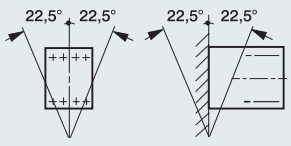
Permissible Mounting Position



3TF30 to 3TF33 - AC operation



3TF30 to 3TF33 - DC operation
3TF34 to 3TF57 - AC operation
3TF46 to 3TF57 - DC operation



3TF34/35 - DC operation

Accessories and ordering data

1. Mechanical interlocking kit

Mechanical interlock is required when the supply from two different sources is available. Also the same is required for the application involving reversing of motor. Here two contactors are mechanically interlocked with the help of mechanical interlock kit. This ensures closing of only one contactor at a time. Thus prevents a short circuit upon load changeover from one contactor to another.

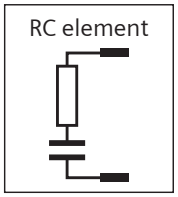
For Contactor		MLFB	Std. pkg. (nos.)
AC3 Rating	Contactor		
9 to 38A	3TF30 to 35	**3TX4 091-1A #**	**10**
45/63/70A	3TF46/47/47-7	**3TX7 466-1YA0**	**2**
75/85A	3TF48/49	**3TX7 486-1YA0**	**2**
110/140A	3TF50/51	**3TX7 506-1YA0**	**2**
170/205A	3TF52/53	**3TX7 526-1YA0**	**2**
250/300A	3TF54/55	**3TX7 546-1YA0**	**2**
400 A	3TF56	**3TX7 566-1YA0**	**2**
110/170 A	3TF50/52	**3TX7 526-1YA09**	**1**
170/250 A	3TF52/54	**3TX7 546-1YA09**	**1**

#: W/O base plate (not required)

2. Surge suppressor

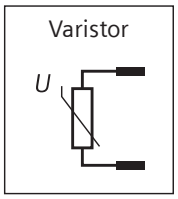
It is used to reduce the effect of switching overvoltages created during the opening of inductive circuits. Typically they are mounted outside the body of the contactor, and are connected in parallel with the coil terminals. Various techniques for the suppression of switching overvoltages can be employed. For example: RC element, Varistor etc.

RC Element:



The effective increase in the capacitance of the coil circuit reduces the amplitude and rate of rise of switch off overvoltage spikes to such an extend that no rapid restriking occur.

Varistor:



Varistor limit the maximum value of the overvoltage because they become highly conductive above a threshold value. Until this threshold value is reached shower discharge occurs for small duration.

Selection table:

Surge suppressor (Varistor) for 3TF30-3TF35

Coil Voltage		Type	Std. pkg. (nos.)
AC	DC		
24 - 48 V	24 - 70V	**3TX7 402-3GY1**	**10**
48 - 127V	70 - 150V	**3TX7 402-3HY1**	
127 - 240V	150 - 250V	**3TX7 402-3JY1**	
240 - 400V	–	**3TX7 402-3KY1**	
400 - 600V	–	**3TX7 402-3LY1**	

Surge suppressor (Varistor) for 3TF46-56

Coil Voltage		Type	Std. pkg. (nos.)
AC	DC		
Less than 48V	24 - 70V	**3TX7 462-3GY1**	**10**
48 - 127V	70 - 150V	**3TX7 462-3HY1**	
127 - 240V	150 - 250V	**3TX7 462-3JY1**	
240 - 400V	–	**3TX7 462-3KY1**	
400 - 600V	–	**3TX7 462-3LY1**	

Surge suppressor (RC Element) for 3TF30-3TF35

Coil Voltage		Type	Std. pkg. (nos.)
AC	DC		
24 - 48V	24 - 70V	**3TX7 402-3RY2**	**10**
48 - 127V	70 - 150V	**3TX7 402-3SY2**	
127 - 240V	150 - 250 V	**3TX7 402-3TY2**	
240 - 400V	–	**3TX7 402-3UY2**	
400 - 460V	–	**3TX7 402-3VY2**	

3. Connector

The 3TS90 **connector** is used to mount the motor protection circuit breaker 3VU on the contactor 3TF with screw terminals. It enables mechanical and electrical connection between contactor and motor protection circuit breaker.



Range:

Size of connector	MPCB		Contactor		MLFB of Connector	Std. pkg. (nos.)
	MLFB	Current Rating	MLFB	AC3 Current Rating		
I	**3VU13**	0.16 to 20A	**3TF30 / 31**	9 / 12 A	**3TS90 01-8K**	**1**
II	**3VU13**	6 to 25A	**3TF32 / 33**	16 / 22A	**3TS90 02-8K**	**1**

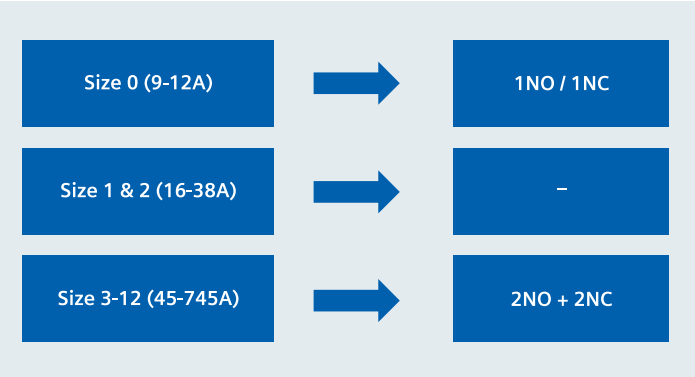
Benefits:

Direct mounting of 3VU MPCB on 3TF contactor eliminates the need of power wiring and ensures secure connection. In addition, the assembly time and size of the feeder is reduced which results in cost saving. The overall assembly also looks contemporary.

Spares and ordering data

1. Auxiliary Contact Blocks

In-built contact configuration



Add – on Contact Blocks:

For Contactor	Add on contact blocks	Type	Std. pkg. (nos.)
3TF30-35	1NO 1NC 1NO ext 1NC ext	**3TX40 10-2A** **3TX40 01-2A** **3TX40 10-4A** **3TX40 01-4A**	**10**
3TF46-57	1NO+1NC Left 1NO+1NC Right 1NO + 1NC (Extd) Right	**3TY7 561-1A** **3TY7 561-1B** **3TY7 561-1E**	**1**
3TF46-57	Second 1NO+1NC Left Second 1NO+1NC Right	**3TY7 561-1K** **3TY7 561-1L**	**1**
3TF46/47/477	Special block for DC Coil Circuit	**3TY7 461-1F**	**1**
3TF48 to 57	Special block for DC Coil Circuit	**3TY7 481-1F**	**1**

2. Main contact kits / arc chambers / AC-DC coils

For contactor type (AC3 rating)	Main contact kits (6 fixed & 3 moving contacts)	Arc chambers	AC coils[1)]	DC coils[1)]	Std. pkg. (nos.)
3TF30 (9A)	–	–	**3TY7 403-0A..**	**3TY4 803-0B..**	**1**
3TF31 (12A)	–	–			
3TF32 (16A)	**3TY7 420-0A**	–			
3TF33 (22A)	**3TY7 430-0A**	–			
3TF34 (32A)	**3TY7 340-0C**	**3TY7 342-0C**	**3TY7 443-0A..**	**3TY7 443-0B..**	
3TF35 (38A)	**3TY7 350-0C**	**3TY7 352-0C**			
3TF46 (45A)	**3TY7 460-0YA**	**3TY7 462-0YA**	**3TY7 463-0A..**	**3TY7 463-0D..**	
3TF47 (63A)	**3TY7 470-0YA**	**3TY7 472-0YA**			
3TF477 (70A)	**3TY7 477-0YA**	**3TY7 477-0YD**			
3TF48 (75A)	**3TY7 480-0A**	**3TY7 482-0A**	**3TY7 483-0A..**	**3TY7 483-0D..**	
3TF49 (85A)	**3TY7 490-0A**	**3TY7 492-0A**			
3TF50 (110A)	**3TY7 500-0YA**	**3TY7 502-0YA**	**3TY7 503-0A..**	**3TY7 503-0D..**	
3TF51 (140A)	**3TY7 510-0YA**	**3TY7 512-0YA**			
3TF52 (170A)	**3TY7 520-0YA**	**3TY7 522-0YA**	**3TY7 523-0A..**	**3TY7 523-0D..**	
3TF53 (205A)	**3TY7 530-0YA**	**3TY7 532-0YA**			
3TF54 (250A)	**3TY7 540-0YA**	**3TY7 542-0YA**	**3TY7 543-0A..**	**3TY7 543-0D..**	
3TF55 (300A)	**3TY7 550-0YA**	**3TY7 552-0YA**			
3TF56 (400A)	**3TY7 560-0YA**	**3TY7 562-0YA**	**3TY7 563-0A..**	**3TY7 563-0D..**	
3TF57 (475A)	**3TY7 570-0YA**	**3TY7 572-0YA**	**3TY7 573-0C**	**3TY7 573-0D..**	

[1)] Please fill in coil voltage code from table below

Coil voltage code AC 50Hz: 3TF30 to 3TF56

Coil voltage	24	42	110	230	415
Code	B0	D0	F0	P0	R0

Coil voltage code AC 50/60 Hz: 3TF57

Coil voltage (V)	110-132	220-240	380-460
Code	F7	M7	Q7

Coil voltage code DC: 3TF30 to 3TF57

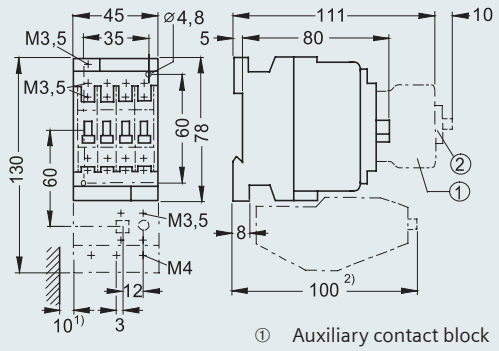
Coil voltage (V)	24	42	48	110	220	250[+]
Code	B4	D4	W4	F4	M4	N4

[+] For 3TF3 only

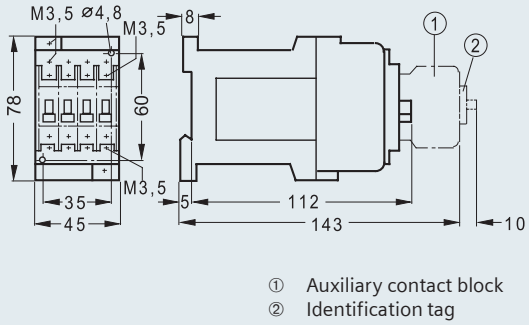
(Other coil voltages are also available)

Dimensional drawing

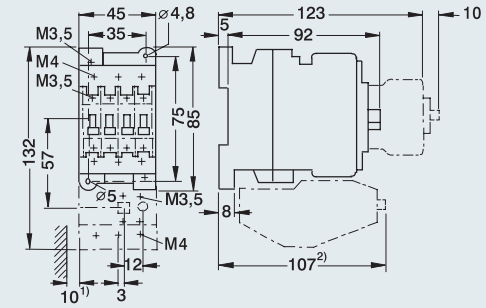
3TF30/31 AC Coil



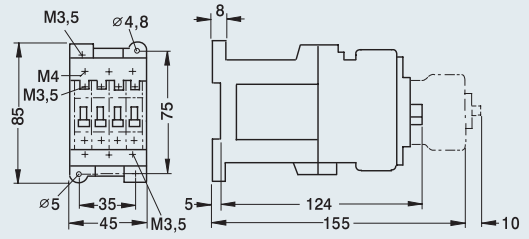
3TF30/31 DC Coil



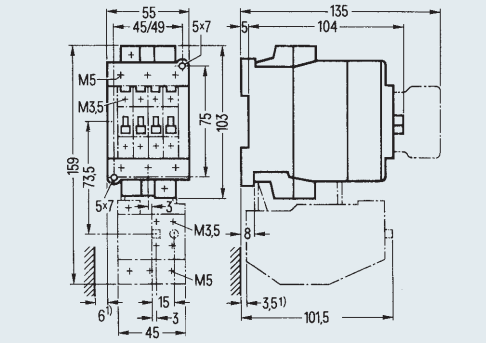
3TF32/33 AC Coil



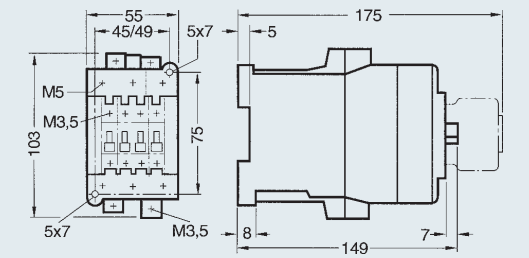
3TF32/33 DC Coil



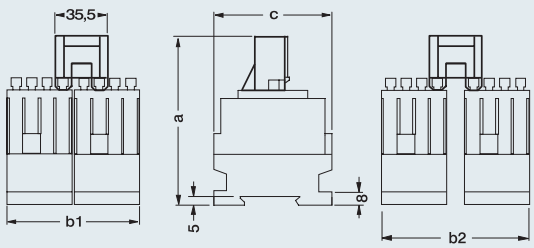
3TF34/35 AC Coil



3TF34/35 DC Coil



3TF30 to 3TF32, with mechanical interlock kit

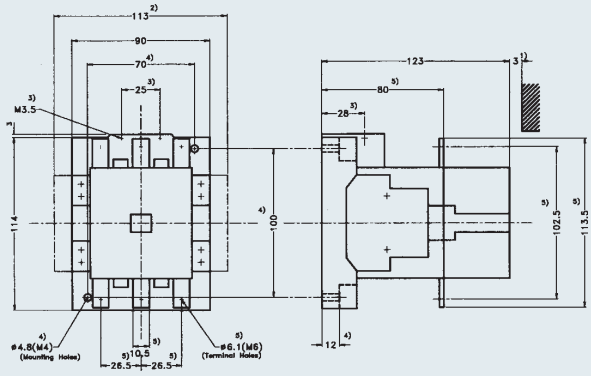


Type	a (AC coil)	a (DC coil)	b1	b2	c
3TF30/31	116	148	90	100	78
3TF32/33	127	159	91	101	85

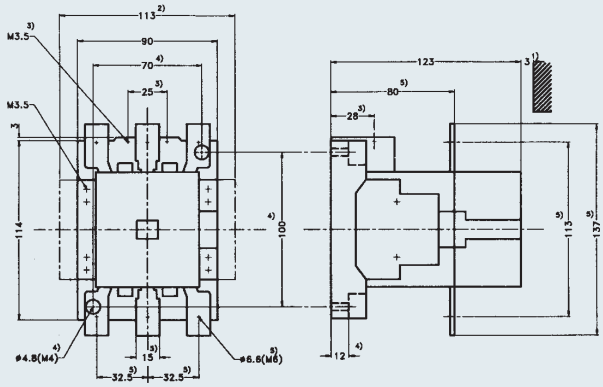
Notes

1) Dimensions for coil terminals
2) Dimensions for mounting terminals
   Minimum clearance from insulated components = 5mm
   Minimum clearance from earthed components = 10mm
3) size of power terminals
4) Size of auxiliary terminals

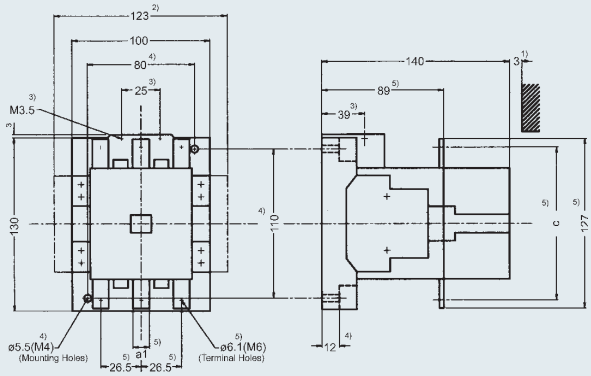
3TF46 and 3TF47



3TF47 7

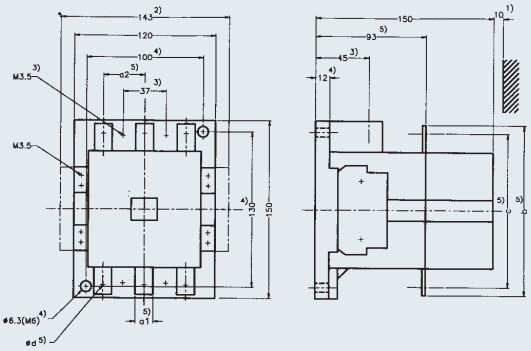


3TF48 and 3TF49



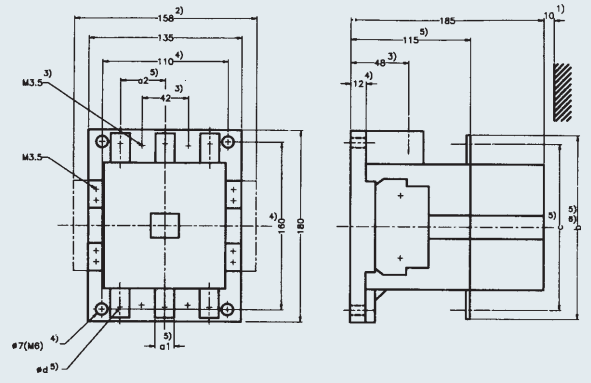
Type	a1	c
3TF48	8	107
3TF49	10.5	116

3TF50 and 3TF51



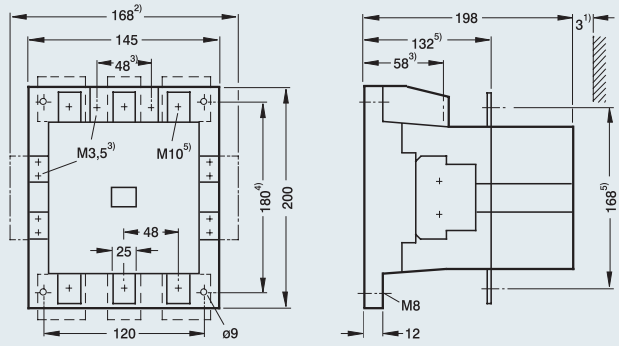
Type	a1	a2	b	c	ϕd
3TF50	15	37	149	134	6.6(M6)
3TF51	20	42	159	139	9(M8)

3TF52 and 3TF53



Type	a1	a2	b	c	ϕd
3TF52	20	42	174	154	6.6(M6)
3TF53	25	48	184	159	9(M8)

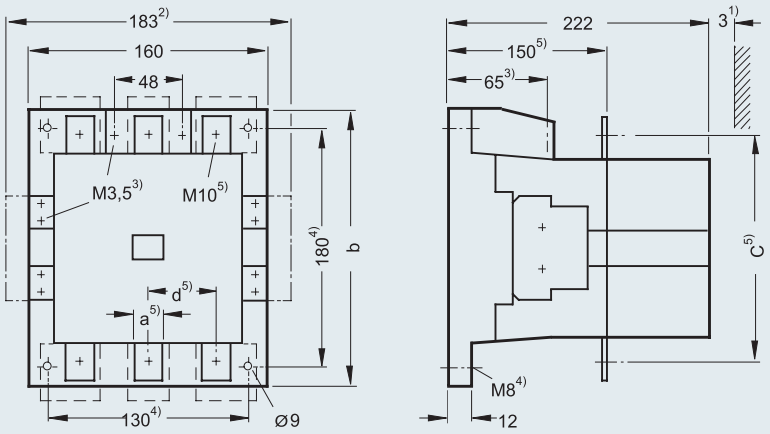
3TF54/55



Notes

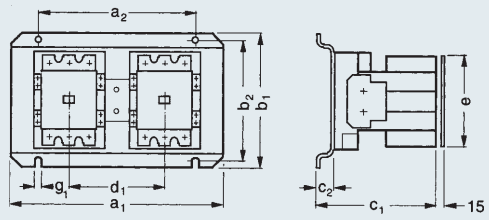
1) Minimum clearance from insulated components = 3mm
   Minimum clearance from earthed components = 10mm
2) Dimension with second auxiliary contact block on both sides
3) Dimension for coil terminal.
4) Dimension for mounting.
5) Dimension for power terminal.
6) 3TF53 The conductor bars protrude over the contactor edges on top and bottom by 2mm each.

3TF56/57



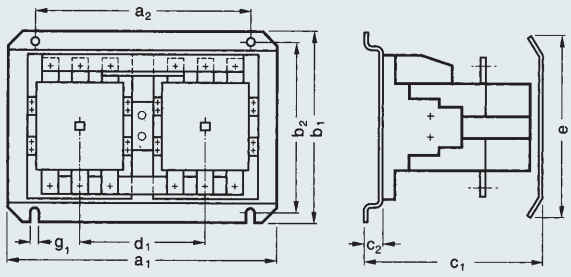
Type	a	b	c	d
3TF56	25	200	178	48
3TF57	30	209.5	182	52

3TF46/47/477/48/49 with Mechanical Interlock Kit



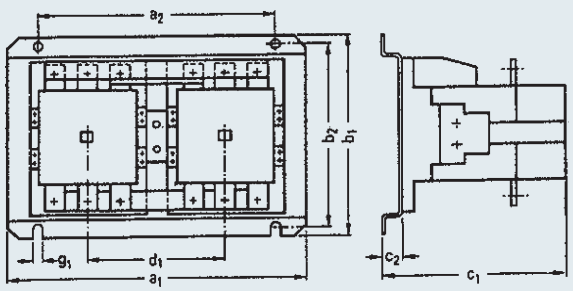
For Contactor	a_1	a_2	b_1	b_2	c_1	c_2	d_1	e	g_1
3TF46/47/477	240	180	165	145	141	18	117	150	7 (M6)
3TF48/49	260	200	175	155	158	18	127	160	7 (M6)

3TF50 to 3TF57 with Mechanical Interlock Kit



For Contactor	a_1	a_2	b_1	b_2	c_1	c_2	d_1	e	g_1
3TF50/51	300	240	210	185	160	18	147	260	9 (M8)
3TF52/53	330	270	240	215	203	18	162	315	9 (M8)
3TF54/55	350	290	265	240	219	21	172	375	11 (M10)
3TF56/57	380	310	265	240	243	21	187	385	11 (M10)

3TF50 and 3TF52 with Mechanical Interlock Kit
3TF52 and 3TF54 with Mechanical Interlock Kit



Type	a1	a2	b1	b2	c1	c2	d1	g1
3TF52 & 50	330	270	240	215	203	18	154.5	11
3TF54 & 52	350	290	265	240	219	21	167	11

Notes

1) Minimum clearance from insulated components = 3mm
   Minimum clearance from earthed components = 10mm
2) Dimension with second auxiliary contact block on both sides
3) Dimension for coil terminal.
4) Dimension for mounting.
5) Dimension for power terminal.

Useful information

Categories of duty - as per IEC 947 / IS 13947

Current	Utilisation Categories	Typical Application
AC	AC1	Non-inductive or slightly inductive loads, resistance furnances
	AC2	Slipring motors; starting, switching off
	AC3	Squirrel-cage motors; starting, switching off motors during running(1)
	AC4	Squirrel-cage motors; starting, plugging, inching
	AC5a	Switching of electric discharge lamp controls
	AC5b	Switching of incandescent lamps
	AC6a	Switching of transformers
	AC6b	Switching of capacitor banks
	AC7a	Slightly inductive loads in household appliances and similar applications
	AC7b	Motorloads for household applications
	AC8a	Hermetic refrigerant compressor motor(2) control with manual resetting of overload releases
	AC8b	Hermetic refrigerant compressor motor(2) control with automatic resetting of overload releases
DC	DC1	Non-inductive or slightly inductive loads, resistance furnaces
	DC3	Shunt-motors: starting, plugging, inching, dynamic braking of d.c motors
	DC5	Series-motors: starting, plugging, inching, dynamic braking of d.c motors
	DC6	Switching of incandescent lamps

(1) AC3 category may be used for occasional inching (jogging) or plugging for limited time periods such as machine set-up; during such limited time periods the number of such operations should not exceed five per minute or more than ten in a 10-min period.

(2) Hermetic refrigent compressor motor is a combination consisting of a compressor and a motor, both of which are enclosed in the same housing, with no external shaft or shaft seals, the motor operating in the refrigent

(3) Selection of contactors for utilisation categories from AC-5a to AC-8b and DC6 upon enquiry.

Contact life calculation:

Contactors have bounce free operation. Electrical life is influenced by the breaking currents. For normal AC3 duty the breaking current is the rated operational current and for AC4 duty, the typical breaking current is 6 times the rated operational current. In case of mixed duty, the expected life is determined as under

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

Where

X = expected life for mixed duty

A = expected life for normal AC3 duty

B = expected life for 100% AC4 duty

C = proportion of inching operations as a percentage of total operations.

Recommended selection of contactors for hoisting duty (upto 85A)

In hoisting operation, slipring motors are generally used. For this typical hoisting duty, we recommend the contactors listed in the following table.

Contactor Type	Stator Protection Maximum load current with hoisting motor. For intermittent duty S3				Rotor Protection Maximum load current with hoisting motor(Delta circuit). For intermittent duty S3				Max rotor standstill voltage
	25%	40%	60%	100%	25%	40%	60%	100%	
	A	A	A	A	A	A	A	A	V
3TF31	10	10	9	8	15	14	13	12	660
3TF33	17	16	15	13	25	24	22	20	660
3TF45	28	25	23	20	42	38	35	30	660
3TF47	49	45	40	30	73	68	60	45	750
3TF49	68	62	54	45	100	95	80	68	1000

Recommended substitutes for discontinued 3TA/3UA19

For standard application (AC3 duty)

AC3 rating 415V, 50Hz	Size	Discontinued contactor	Discontinued bi-relay	Size	Contactor	Bi-relay	Motor kW 415V, 50Hz, 3ph.
7.8A	1	**3TA67 3TA76**	**3UA1911**	0	**3TF30**	**3UA5000**	3.8
9A		**3TA21**					4
12A					**3TF31**		5.5
16A				1	**3TF32**	**3UA5200**	7.5
22A		**3TA11**			**3TF33**		11
30A	2	**3TA22**	**3UA1928**	2	**3TF34**	**3UA5500#**	15
32A		**3TA13**					18.5
38A					**3TF35**		20
45A	4	**3TA24[1)]**		3	**3TF46-Z**	**3UA5800-Z1**	22
63A			**3UA1938**		**3TF47-Z**		30
70A					**3TF47-7**	**3UA5800-Z2**	37
105A		**3TA16**		4	**3TF48/49**	**3UA5800-Z1**	45
110A	8	**3TA28-Y**		6	**3TF50**	**3UA5830**	55
140A					**3TF51**	**3UA6230**	75
170A				8	**3TF52**		95
200A		**3TA28**	**3UA66**		**3TF53**		110
250A	12	**3TB56**	**3UA66**	10	**3TF54**		132
300A					**3TF55**		160
400A				12	**3TF56**		220
475A	–	–	–		**3TF57**	**3UA6830**	250

use 3UA50 + 3UX1418 to replace 3UA19 28 (upto 12A) use 3UA52 + 3UX1420 to replace 3UA19 28 (upto 25A)
[1)] For crane/hoisting/inching application, replace 3TA24 with 3TF48/49 contactors

For inching application (AC4 duty)

Discontinued contactor		New contactor	
Size	**Type 3TA**	**Size**	**Type 3TF**
1	3TA21	1	3TF32
1	3TA11	1	3TF33
2	3TA22	2	3TF34
2	3TA13	2	3TF35
4	3TA24	4	3TF48
4	3TA16	6	3TF50
8	3TA28	8	3TF52
12	3TB56	12	3TF56

Adaptor plate for replacing 3TA

Adaptor plates, to replace	Type
3TA61-0A by 3TH80/82-0A	**3TX6 406-0A**
3TA67/21 by 3TH80/82 3TA67/21 by 3TF30/31 & 3TA21/11 by 3TF32/33	**3TX21 43 1YA0**
3TA22/13 by 3TF32/33/44/45	**3TX22 42 1YA0**
3TA24 by 3TF46/47/477	**3TX24 46 1YA0**
3TA24/16 by 3TF48/49	**3TX16 48 1YA0**
3TA16 by 3TF50/51	**3TX16 50 1YA0**
3TA28 by 3TF50/51	**3TX28 50 1YA0**
3TA28 to 3TF52/53	**3TX28 52 1YA0**

For crane application (AC2 duty, S3 100% inching)

Discontinued contactor		New contactor	
Size	**Type 3TA**	**Size**	**Type 3TF**
1	3TA21/11	1	3TF33
2	3TA22/13	2	3TF35
4	3TA24	4	3TF49
8	**3TA28**	**8**	**3TF5200***
12	**3TB56**	**12**	**3TF5600***

* Hoisting duty contactors, designed specially for hoisting duty.

Contactors for Hoisting Duty

AC slipring motors are most commonly used for the hoisting applications. AC2 duty pertains to starting and switching off the slipring motors. In case of hoisting duty breaking current is the starting current and frequency of switching is high.

The table shows the making and breaking capacity at normal and at hoisting application where Ie indicates the rated full load current.

	Making	Breaking
During Normal operation at full load	2.5 * Ie	Ie
Hoisting application at full load	2.5 * Ie	2.5 * Ie
During Normal operation at partial load	less than 2.5 * Ie	Less than Ie

Application

AC-2 operation is the typical duty for starting and switching off fully-loaded slipring motors in the starting phase. The rating of the contactor, to switch the motors, is selected primarily on the basis of rated make & break capacity and desired electrical endurance.

Standard

The contactors comply with the "Regulations to low voltage switchgear" of DIN VDE 0660 and IS/IEC 60947-4-1.

Range

Hoisting duty contactors are available from 110A to 400A (AC2/AC3 rating).

Benefits and features

Long life

- "Hoisting Duty "Contactors are provided with new design of contacts ($AgSnO_2$ instead of AgCdO) resulting in **high electrical and mechanical life**.
- They are electrically superior in taking care of excessive stresses coming on contactors during their operations in crane applications.

Reliability

- The "Hoisting Duty" Contactors have vacuum impregnated coils which are suitable for high frequency switching and high vibrations. This helps in reducing coil failures.
- Side mounted auxiliary contact blocks are screw mounted and not snap fitted to withstand vibrations and high frequency operation.



Operator safety

- **Arc Chamber Interlock**
  It prevents the contactor from switching ON, if the arc chamber is not fitted properly. Thus avoids accidents to plant and personnel.
- **Finger touch proof terminals**
  It protects against accidental contact with live parts which ensures operator safety.

High performance

- **No duration upto 55°C**
  Contactors are suitable for operation in service temperature upto 55°C without derating. This avoids selection of higher rated contactor, thereby reducing cost.

Selection and ordering data

Hoisting duty contactors –
For high switching frequency / inching applications with AC coils, 2NO+2NC aux. contacts

Contactor size	Rated current Ie (A) AC2/AC3 at 415V	Type	Std. pkg. (nos.)
6	110	**3TF50 00-0A..**	**1**
8	170	**3TF52 00-0A..**	
10	250	**3TF54 00-0A..**	
12	400	**3TF56 00-0A..**	

Coil voltages:

Coil voltage - 50Hz	110V	230V	415V
Code	F0	P0	R0

(Other coil voltages are also available)