Contactor Relays 3TH30

Reliability and safety are pre-requisites in the choice of the control contactor. Siemens 3TH30 contactor relays satisfy these criteria and thus offer the right choice to the customer.

Applications

3TH30 are used in control circuits for switching and signaling purpose. Also they are used for interfacing with the electronic circuits.

Standards

Contactor relay conforms to IS /IEC 60947-5-1.

They also carry CE mark.

Range

Air break contactor relays are suitable for 10A, (AC15/AC14 rating) at 240V AC and 10A, (DC13 rating) at 24V DC.

Benefits and features

Flexibility

- **Choice of auxiliary contacts**

  3TH30 contactor relays comes with 4 contacts as a basic unit (4NO, 3NO+1NC, 2NO+2NC). However the contacts can be extended upto 8 contacts by adding maximum 4 auxiliary contact blocks to this basic unit. This offers flexibly in selection and configuration.

- **Choice of mounting**

  3TH30 can be mounted on 35mm DIN rail and they are also suitable for screw mounting.

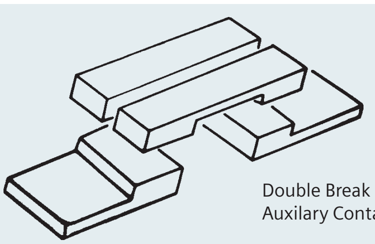
Long Life

Superior design of current carrying parts, contact system and the magnet system increases the reliability which also results into higher **electrical and mechanical endurance**.

High reliability

- **Double Break Parallel Bridge contact mechanism**

  This mechanism is available with 3TH30. Such contact mechanism ensures reliable contact at low voltage and low currents (5mA at 17V DC). It also offers unmatched reliability as well as capability to integrate directly into PLC or instrumentation circuits.



Double Break Parallel Bridge Auxilary Contacts

User friendliness and safety

- **Positively driven contacts**

  3TH30 auxiliary contactors satisfy the conditions **for positively driven operation** between NO and NC contacts. NO and NC contact do not close at the same time. This is extremely important when they are used in safety circuits of critical applications. This ensures operator safety even during abnormal condition.

- **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 auxiliary 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.

Selection and ordering data

Contacts in basic unit	MLFB - With AC coil	MLFB - With DC coil	Std. pkg. (nos.)
4NO	3TH30 40-0A..	3TH30 40-0B..	
3NO+1NC	3TH30 31-0A..	3TH30 31-0B..	1
2NO+2NC	3TH30 22-0A..	3TH30 22-0B..	

.. Please add coil voltage code

AC Coil voltages

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

DC Coil voltages

Coil voltage	24	42	48	110	220	250
Code	B4	D4	W4	F4	M4	N4

(Other coil voltages are also available.)

Technical data

Type		**3TH30**			**3TX40..**		
Standards		IS/IEC 60947-5-1					
Rated Operational Voltage		690V					
Rated Impulse withstand voltage		8kV					
Permissible ambient temp.	Storage Service	-50 to +80°C -25 to +55°C					
Mechanical endurance cycles		30 mill			10 mill		
Rated operating current Ie/AC12		16A			10A		
Rated operating current Ie/AC15/AC14 at operating voltage	230V 415V 690V	10A 4A 2A			5.6A 3.6A 1.8A		
Rated operating current Ie/DC13 at operating voltage		Current paths in series			Current paths in series		
		1	2	3	1	2	3
	24V 110V 220V 440V	10 A 0.9 A 0.45A 0.2 A	10A 2.5A 0.75A 0.5A	10A 10A 2A 0.9A	10 A 0.8 A 0.2 A 0.11A	10A 3.8A 0.85A 0.2A	10A 10A 2A 0.5A
Coil Voltage tolerance		0.8 to 1.1 x Ue					
Rated coil input AC operated, 50Hz DC operated Closing=when closed	 Closing VA/p.f. When closed VA/P.f. W	 68 / 0.82 10 / 0.29 6.2					
Frequency of operation at AC15/DC13 duty	cycles/hr	3600					
Short circuit protection HRC fuse-links Miniature circuit breakers, (C-char.)		 16A 16A			 16A 10A		
Degree of protection		IP 20					

For 3TH30

Operating time at 1.0*Us		AC	DC
Closing	Closing Delay NO	10-25 ms	30-70ms
	Opening Delay NC	7-20ms	28-56 ms
Opening	Opening Delay NO	5-18ms	10-20 ms
	Closing Delay NC	7-20ms	15-25 ms

Accessories and ordering data

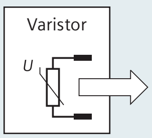
1. Surge suppressor

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 relay, 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

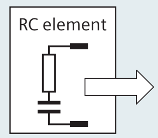
2. Add on blocks

Auxiliary Contact Block	Type Reference	Std. pkg. (nos.)
1NO	**3TX40 10 2A**	**10**
1NC	**3TX40 01 2A**	
1NO extended	**3TX40 10 4A**	
1NC extended	**3TX40 01 4A**	

Extended contacts (NO/NC) is *early make NO and late break NC* combination.



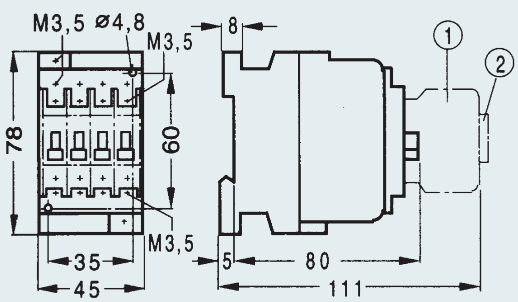
Surge Suppressor (Varistor)			
Coil voltage		MLFB	Std. pkg. (nos.)
AC	DC		
24 - 48 V	24 - 70 V	3TX7 402-3GY1	10
48 - 127 V	70 - 150 V	3TX7 402-3HY1	
127 - 240 V	150 - 250 V	3TX7 402-3JY1	
240 - 400 V	–	3TX7 402-3KY1	
400 - 460 V	–	3TX7 402-3LY1	



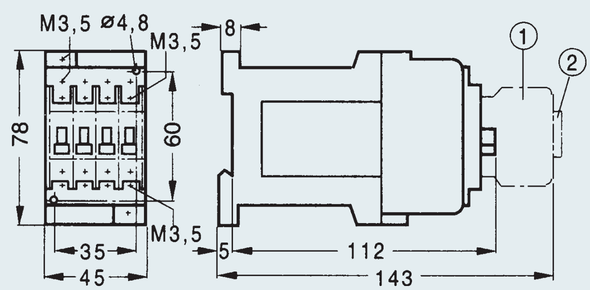
Surge Suppressor (RC Element)			
Coil voltage		MLFB	Std. pkg. (nos.)
AC	DC		
24 - 48 V	24 - 70 V	3TX7 402-3RY2	10
48 - 127 V	70 - 150 V	3TX7 402-3SY2	
127 - 240 V	150 - 250 V	3TX7 402-3TY2	
240 - 400 V	–	3TX7 402-3UY2	
400 - 460 V	–	3TX7 402-3VY2	

Dimensional drawings

3TH30 - 0A

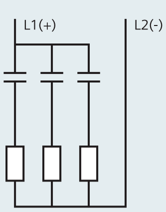


3TH30 - 0B

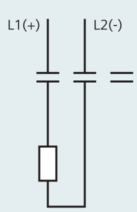


① Auxiliary Contact Block
② Identification tag

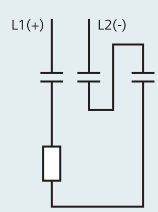
Useful technical information
Variety of connections for DC applications



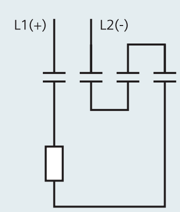
Single pole operation



Two poles in series



Three poles in series



Four poles in series

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

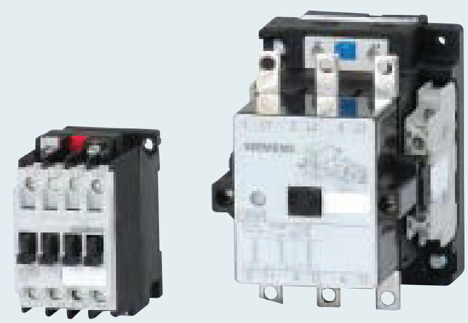
- **Choice of Auxiliary contacts**

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.

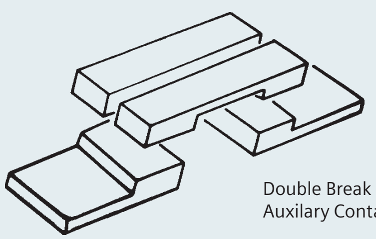
- **Long Life**
  Superior design of current carrying parts, contact system and the magnet system increases the reliability results into **higher electrical and mechanical endurance**.

- **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.

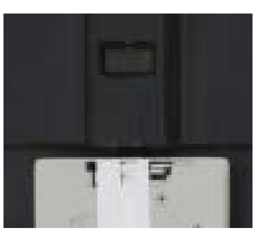
- **Double break parallel bridge contact mechanism**
  This mechanism is available for auxiliary contacts. Such contact mechanism ensures reliable contact at low voltage and low currents (5mA at 17VDC). It also offers unmatched reliability. (Chances of 2 mal-operations in 100 mill. operations as against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



Double Break Parallel Bridge
Auxilary Contacts

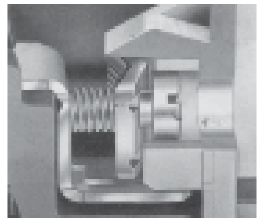
User friendliness and safety

- **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

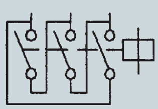
For Contactor	Description	Type	Std. pkg. (nos.)
3TF30 to 35	1NO 1NC 1NO ext 1NC ext	**3TX4 010-2A 3TX4 001-2A 3TX4 010-4A 3TX4 001-4A**	**10**
3TF46 to 57	Second 1NO+1NC Left Second 1NO+1NC Right	**3TY7 561-1K 3TY7 561-1L**	**1**

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** **Service**	°C °C	-55 to +80 -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 DC	Cycles Cycles	15×10^6 15×10^6				10×10^6 10×10^6	
Rating of contactors for AC loads								
AC-1 duty, switching resistive load								
Rated operational current ***Ie***	at 40°C upto 690V at 55°C upto 690V	A A	21 20		32 30		65 55	
Ratings of three-phase loads p.f.=1 at 55°C	at 415V 500V 690V	kW kW kW	13 17 22		19.7 26 34.		36 47.5 62.7	
AC-2 and AC-3 duty								
Rated operational current ***Ie***[2]	**upto 415V** 500V 690V	**A** A A	**9** 9 6.6	**12** 12 8.8	**16** 16 12.2	**22** 17 12.2	**32** 32 27	**38** 38 27.
Nominal rating of slipring or squirrel-cage motors at 50/60 Hz.	**at 415V** 500V 690V	**kW** kW kW	**4** 5.5 5.5	**5.5** 7.5 7.5	**7.5** 10 11	**11** 11 11	**15** 21 23	**18.5** 25 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 500V	kW kW	1.54 1.7	2.1 2.5	3.5 4.6	4 5.2	8.2 9.8	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 500V 690V	kVAR kVAR kVAR	4 4 4		7.5 7.5 7.5		16.7 16.7 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								

Rating of contactors for DC loads			Size 0			Size 1			Size 2		
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 x 10^6 3 x 10^6			10 x 10^6 3 x 10^6									
	90	100	100	120	120	170		230	240	325	325	425	600
	80	90	90	100	100	160		210	220	300	300	400	550
	52	52	52	66	66	105		132	138	195	195	262	381
	67	67	67	86	86	138		173	181	260	260	345	476
	91	91	91	114	114	183		228	240	340	340	457	657
	45	**63**	**70**	**75**	**85**	**110**	**140**	**170**	**205**	**250**	**300**	**400**	**475**
	45	63	70	75	85	110	140	170	205	250	300	400	475
	45	63	70	75	75	110	110	170	170	250	250	400	400
	22	**30**	**37**	**42**	**45**	**55**	**75**	**90**	**110**	**132**	**160**	**200**	**250**
	30	41.4	46	50.7	59	76.3	98	118	145	178	210	284	329
	40	57.2	60.1	70	70	105	105	163	163	245	245	392	392
	24	28	31	34	42	54	68	75	96	110	125	150	150
	13.1	15.3	16.9	18.6	23	29.5	38	42	54	63	72	88	88
	15.8	18.4	20.4	22.4	27	35.5	46	50	65	76	86	107	107
	21.8	25.4	28.2	30.9	38	49	63	69	90	105	119	147	147
	123	138	138	154		246		323	339	462		617	800
	98	110	110	122		195		256	268	367		490	670
	87	98	98	109		174		229	240	327		436	600
	80	90	90	100		160		210	220	300		400	550
	150	219	219	243		389		510	535	729		972	1336
	150	174	174	193		309		405	425	579		772	1061
	138	155	155	172		275		361	378	516		688	946
	126	142	142	158		253		332	348	474		632	869
	1500	1500	1500	2000		2000		2000	2000	2000		2000	2000
	750	750	750	1000		1000		1000	1000	1000		1000	1000
	30			50		60		100		150		200	
	35			62.5		80		130		190		265	
	30			50		60		100		150		200	
	360	500	500	800	800	880	1140	1360	1640	2500	2500	3400	4200
	3.5	6	6	7.5	10	10	14	14	20	16	23	40	40

	3			4			6			8			10			12		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
	80	80	80	100	100	100	160	160	160	200	200	200	300	300	300	400	400	400
	6	80	80	12	100	100	18	160	160	18	200	200	33	300	300	33	400	400
	1.2	7	80	2.5	13	100	3.4	20	160	3.4	20	200	3.8	300	300	3.8	400	400
	0.48	1.2	3	0.8	2.4	6	0.8	3.2	11.5	0.8	3.2	11.5	0.9	4	11	0.9	4	11
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
	5	80	80	6	100	100	160	160	160	200	200	200	300	300	300	400	400	400
	0.75	12.5	80	1.25	100	100	2.5	160	160	2.5	200	200	3	300	300	3	400	400
	0.2	1.1	3.5	0.35	1.75	4	0.6	2.5	160	0.6	2.5	200	0.6	2.5	300	0.6	2.5	400
	0.1	0.27	0.6	0.15	0.42	0.8	0.17	0.65	1.4	0.17	0.65	1.4	0.18	0.65	1.4	0.18	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 Supply frequency	Hz	50		50		50		50		
(cold coil 1.0 x Us)										
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								

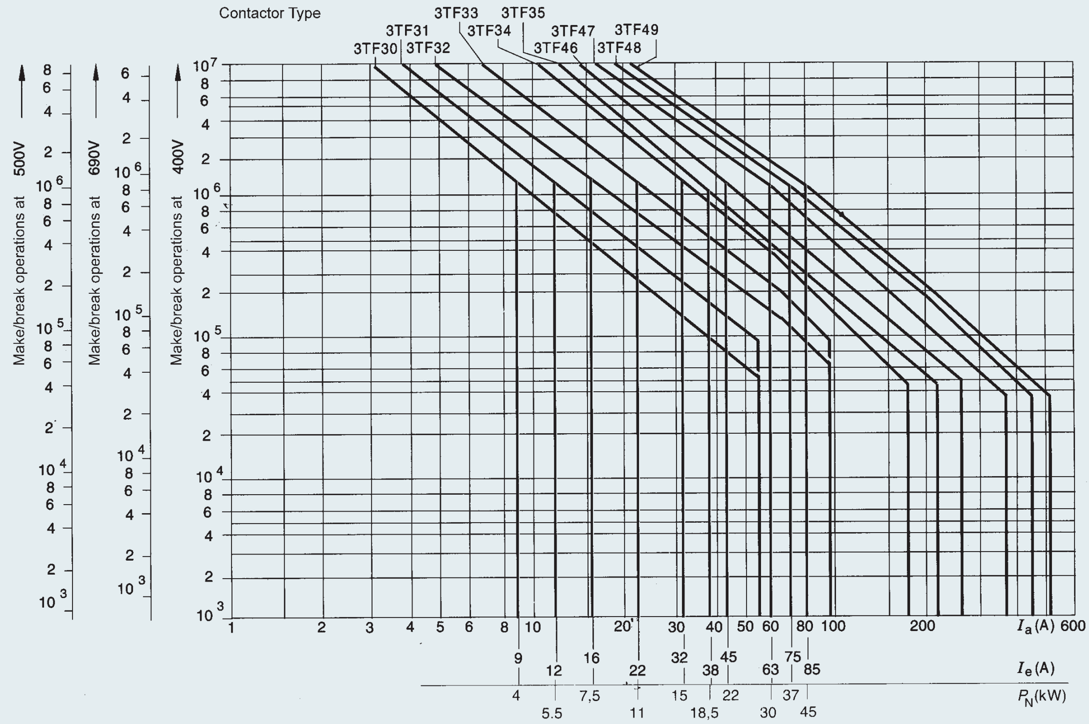
5) With AC coil. With DC coil: 1000 oprs/hr.
6) Including switching contactor.
7) Rated value of the control voltage.

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 (0.5 to 1, 1 to 2.5)				2 x (0.5 to 1, 1 to 2.5)		
2 x (0.75 to 2.5)				2 x (0.75 to 2.5)				2 x (0.75 to 2.5)		
1 x (1 to 2.5)				1 x (1 to 2.5)				1 x (1 to 2.5)		
2 x (18 to 12)				2 x (18 to 12)				2 x (18 to 12)		
0.8 to 1.4				0.8 to 1.4				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	

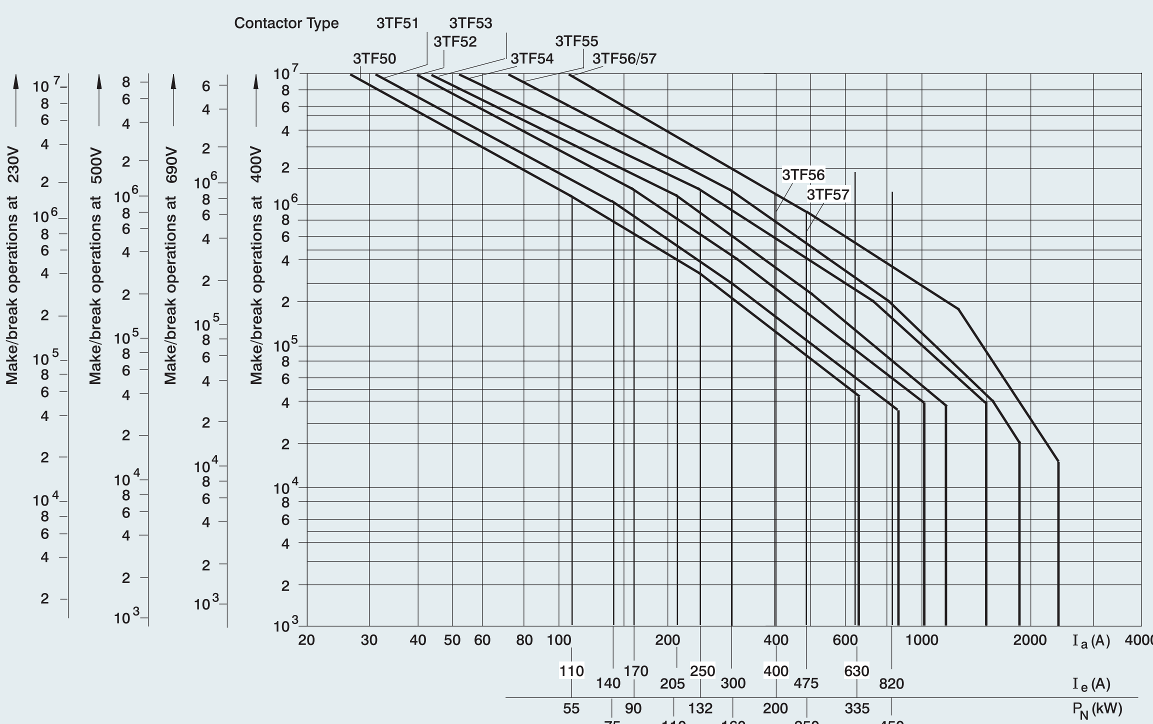
8) The opening time delay increases when the contactor coil is protected against voltage peaks. (e.g. Varistor: +2 to +5ms)

Electrical Life Curves

3TF30 to 3TF49 contactors

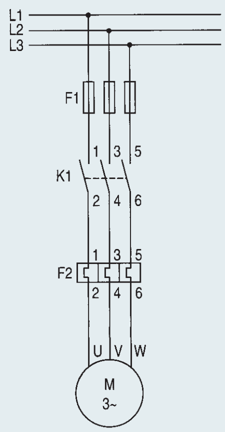


3TF50 to 3TF57 contactors

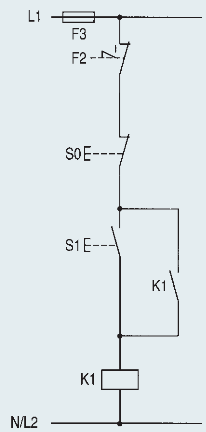


Typical Circuit Diagrams

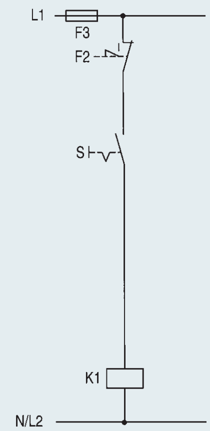
Direct On Line starter



a) Main circuit



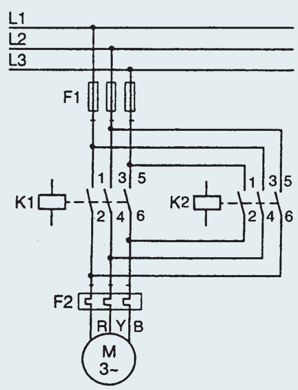
b) Control circuit for momentary-contact control



c) Control circuit for maintained-contact control

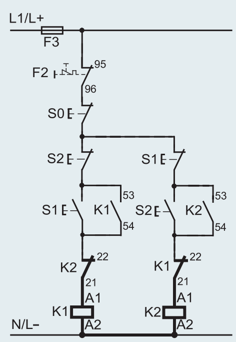
S0 = 'OFF' Push button
S1 = 'ON' Push button
S = Maintained command switch
K1 = Main contactor
F1 = Main circuit fuse
F2 = Overload relay
F3 = Control circuit fuse

Forward / Reverse starter (Electrical Interlocking)



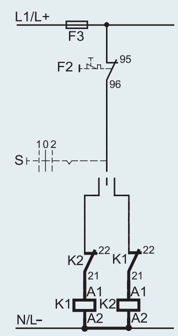
Main circuit

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)

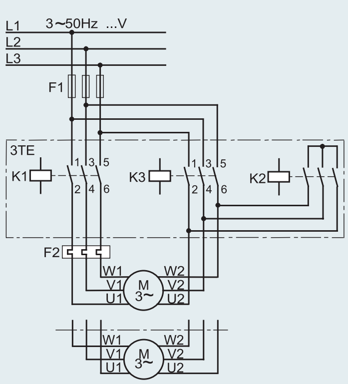
K1 : Clockwise contactor
K2 : Anti-clockwise contactor



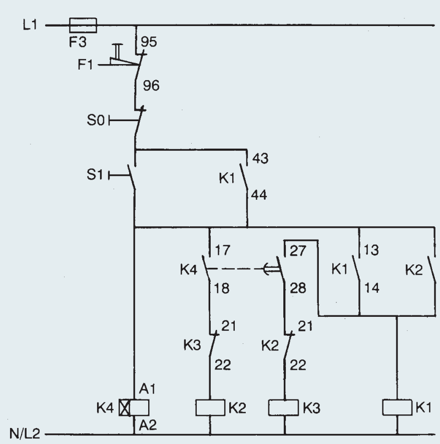
Selector switch control (command needs to be maintained)

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

Star Delta starter



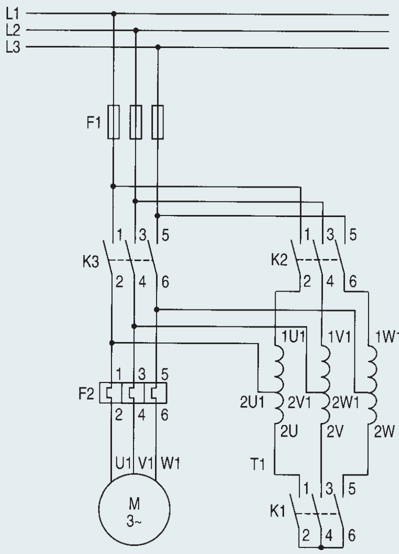
Main circuit



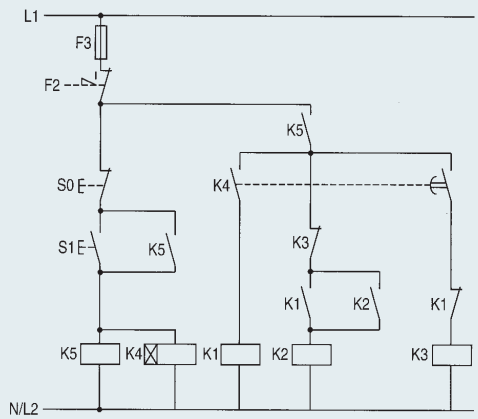
Control circuit for push button control (momentary command)

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

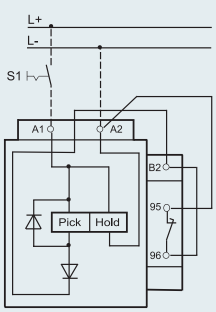


b) Auxiliary circuit for momentary-contact control

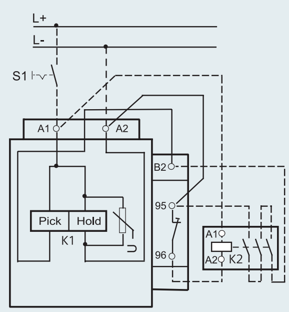
S0	=	'OFF' Push button
S1	=	'ON' Push button
K1	=	Star contactor
K2	=	Transformer contactor
K3	=	Main contactor
K5	=	Contactor relay (2NO + 2NC)
K4	=	Time relay (7PU6020)
F1	=	Main circuit fuses
F2	=	Overload relay
F3	=	Control circuit fuse

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

Internal connection diagram for DC coil circuits

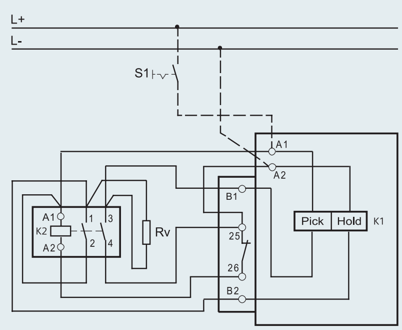


K1 : Sizes 3 to 6, 3TF46 to 3TF51



K1 : Sizes 8 to 12 3TF52 to 3TF56

K2 : 3TF30 10 OB.. for 3TF52-55 3TF32 00-OB.. for 3TF56

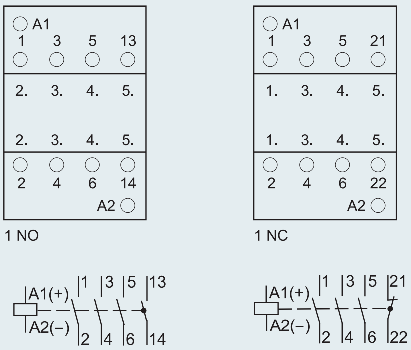


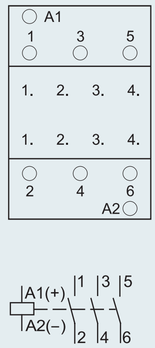
K1 : Size 12 3TF57

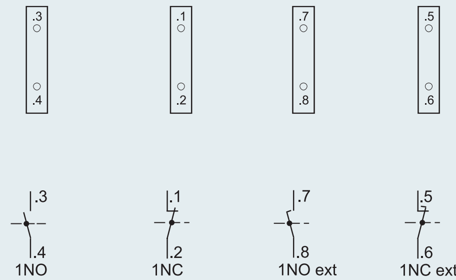
K2 : 3TC44 17 4A..

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

Terminal Designation



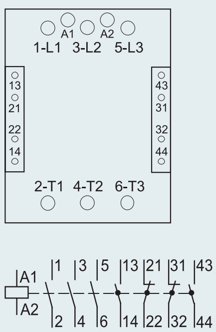


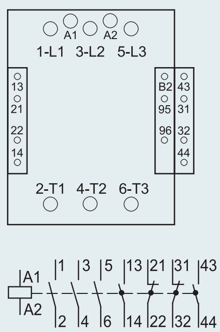


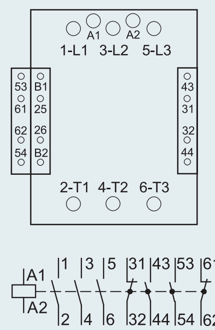
Size 0, 3TF30/31
AC and DC Coil

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

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





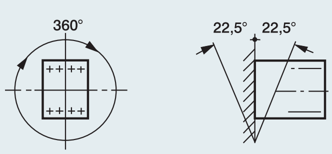


Size 3 to 12, 3TF46 to 3TF57
AC Coil

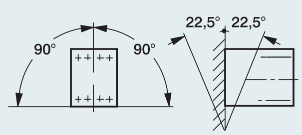
Size 3 to 12, 3TF46 to 3TF56
DC Coil

Size 12, 3TF57
DC Coil

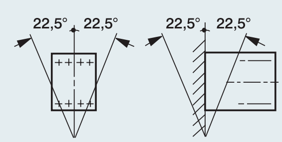
Permissible Mounting Position



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.

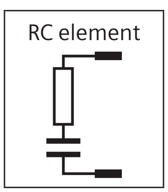
For Contactor		MLFB	Std. pkg. (nos.)
AC3 Rating	Contactor		
9 to 38A	3TF30 to 35	**3TX4 091-1A #**	**10**
45/63/70A	3TF46/47/47-7	**3TX7 466-1YA0**	**2**
75/85A	3TF48/49	**3TX7 486-1YA0**	**2**
110/140A	3TF50/51	**3TX7 506-1YA0**	**2**
170/205A	3TF52/53	**3TX7 526-1YA0**	**2**
250/300A	3TF54/55	**3TX7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

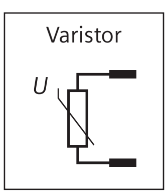
It is used to reduce the effect of switching overvoltages created during the opening of inductive circuits. Typically they are mounted outside the body of the contactor, and are connected in parallel with the coil terminals. Various techniques for the suppression of switching overvoltages can be employed.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

Size 0 (9-12A)	1NO / 1NC
Size 1 & 2 (16-38A)	–
Size 3-12 (45-745A)	2NO + 2NC

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

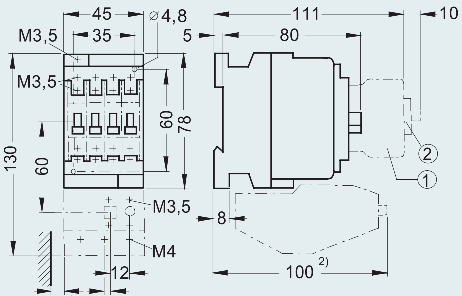
Coil voltage (V)	24	42	48	110	220	250+
Code	B4	D4	W4	F4	M4	N4

+ For 3TF3 only

(Other coil voltages are also available)

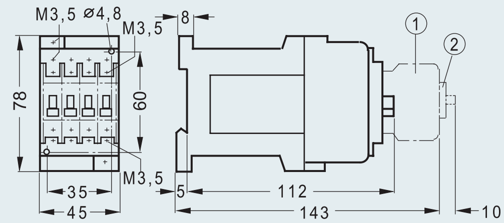
Dimensional drawing

3TF30/31 AC Coil



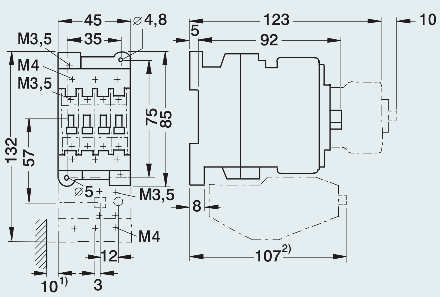
① Auxiliary contact block
② Identification tag

3TF30/31 DC Coil

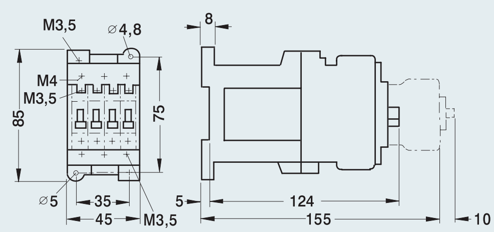


① Auxiliary contact block
② Identification tag

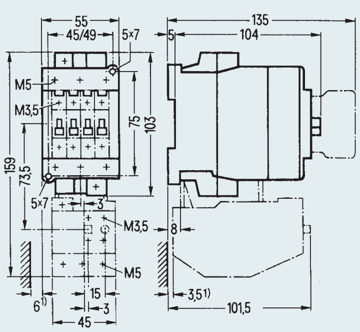
3TF32/33 AC Coil



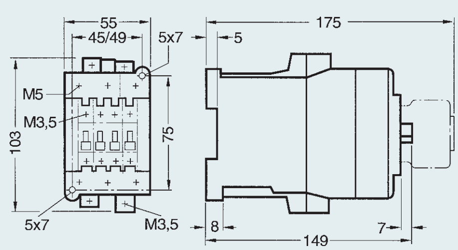
3TF32/33 DC Coil



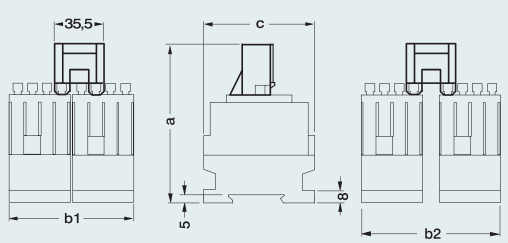
3TF34/35 AC Coil



3TF34/35 DC Coil



3TF30 to 3TF32, with mechanical interlock kit

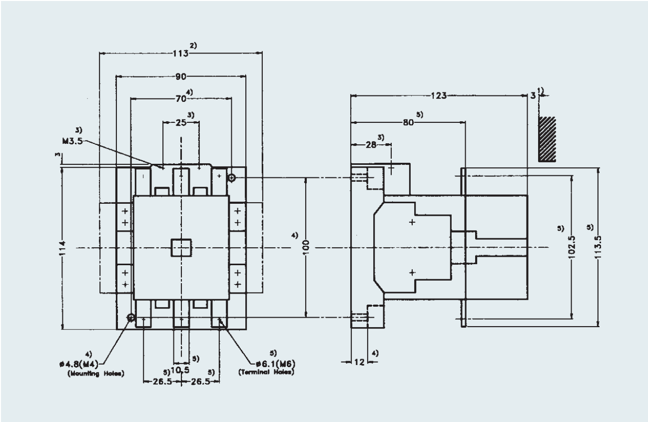


Type	a (AC coil)	a (DC coil)	b1	b2	c
3TF30/31	116	148	90	100	78
3TF32/33	127	159	91	101	85

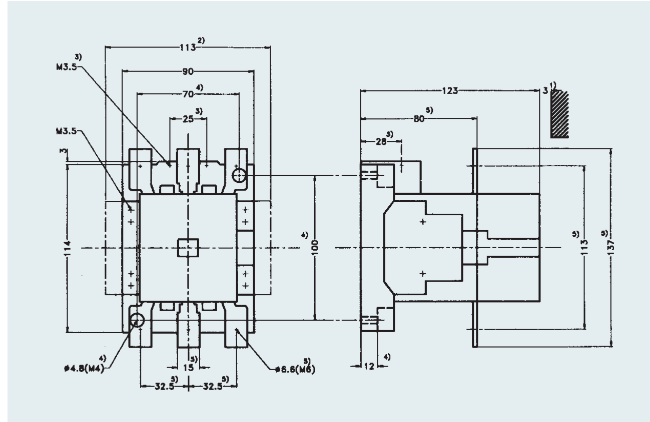
Notes

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

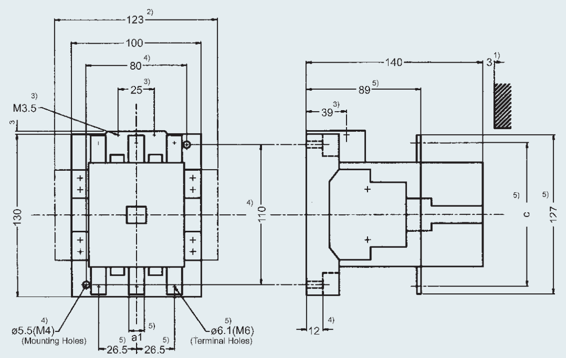
3TF46 and 3TF47



3TF47 7

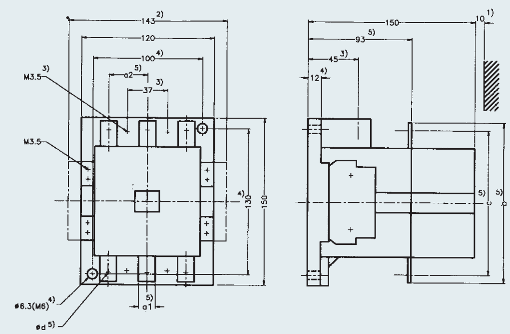


3TF48 and 3TF49



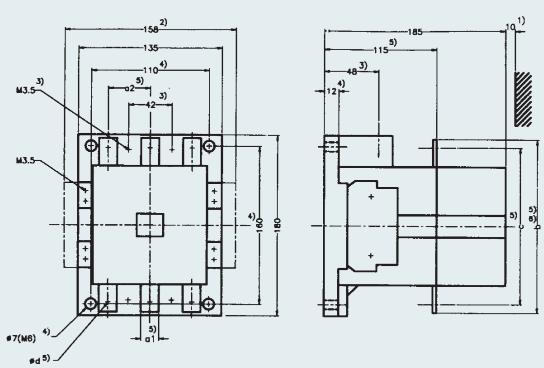
Type	a1	c
3TF48	8	107
3TF49	10.5	116

3TF50 and 3TF51



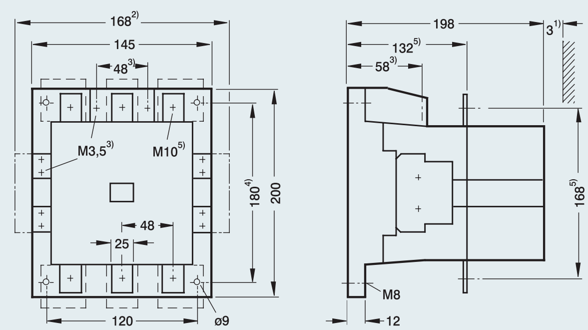
Type	a1	a2	b	c	ϕd
3TF50	15	37	149	134	6.6(M6)
3TF51	20	42	159	139	9(M8)

3TF52 and 3TF53



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

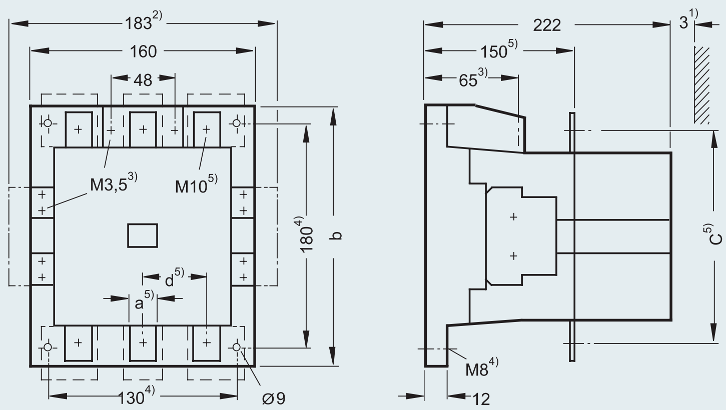
3TF54/55



Notes

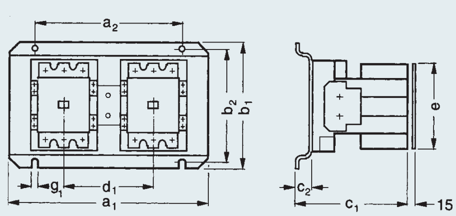
1) Minimum clearance from insulated components = 3mm
   Minimum clearance from earthed components = 10mm
2) Dimension with second auxiliary contact block on both sides
3) Dimension for coil terminal.
4) Dimension for mounting.
5) Dimension for power terminal.
6) 3TF53 The conductor bars protrude over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

3TF56/57



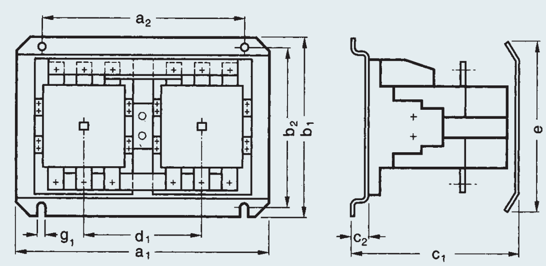
Type	a	b	c	d
3TF56	25	200	178	48
3TF57	30	209.5	182	52

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



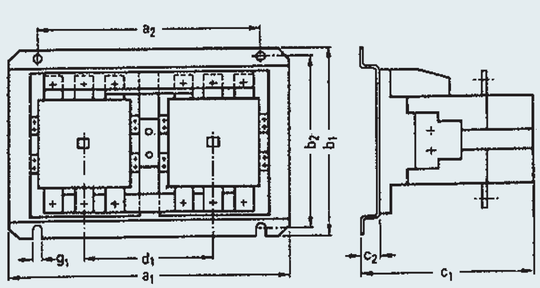
For Contactor	a_1	a_2	b_1	b_2	c_1	c_2	d_1	e	g_1
3TF46/47/477	240	180	165	145	141	18	117	150	7 (M6)
3TF48/49	260	200	175	155	158	18	127	160	7 (M6)

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

<table>
<tr><th>AC3 rating 415V, 50Hz</th><th>Size</th><th>Discontinued contactor</th><th>Discontinued bi-relay</th><th>Size</th><th>Contactor</th><th>Bi-relay</th><th>Motor kW 415V, 50Hz, 3ph.</th></tr>
<tr><td>7.8A</td><td rowspan="5">1</td><td>3TA67
3TA76</td><td rowspan="5">3UA1911</td><td rowspan="3">0</td><td rowspan="2">3TF30</td><td rowspan="3">3UA5000</td><td>3.8</td></tr>
<tr><td>9A</td><td rowspan="3">3TA21</td><td>4</td></tr>
<tr><td>12A</td><td>3TF31</td><td>5.5</td></tr>
<tr><td>16A</td><td rowspan="2">1</td><td>3TF32</td><td rowspan="2">3UA5200</td><td>7.5</td></tr>
<tr><td>22A</td><td>3TA11</td><td>3TF33</td><td>11</td></tr>
<tr><td>30A</td><td rowspan="3">2</td><td>3TA22</td><td rowspan="4">3UA1928</td><td rowspan="3">2</td><td rowspan="2">3TF34</td><td rowspan="3">3UA5500#</td><td>15</td></tr>
<tr><td>32A</td><td rowspan="2">3TA13</td><td>18.5</td></tr>
<tr><td>38A</td><td>3TF35</td><td>20</td></tr>
<tr><td>45A</td><td rowspan="4">4</td><td rowspan="3">3TA24 1)</td><td rowspan="3">3</td><td>3TF46-Z</td><td rowspan="2">3UA5800-Z1</td><td>22</td></tr>
<tr><td>63A</td><td rowspan="6">3UA1938</td><td>3TF47-Z</td><td>30</td></tr>
<tr><td>70A</td><td>3TF47-7</td><td>3UA5800-Z2</td><td>37</td></tr>
<tr><td>105A</td><td>3TA16</td><td>4</td><td>3TF48/49</td><td>3UA5800-Z1</td><td>45</td></tr>
<tr><td>110A</td><td rowspan="4">8</td><td rowspan="3">3TA28-Y</td><td rowspan="2">6</td><td>3TF50</td><td>3UA5830</td><td>55</td></tr>
<tr><td>140A</td><td>3TF51</td><td rowspan="6">3UA6230</td><td>75</td></tr>
<tr><td>170A</td><td rowspan="2">8</td><td>3TF52</td><td>95</td></tr>
<tr><td>200A</td><td>3TA28</td><td>3UA66</td><td>3TF53</td><td>110</td></tr>
<tr><td>250A</td><td rowspan="3">12</td><td rowspan="3">3TB56</td><td rowspan="3">3UA66</td><td rowspan="2">10</td><td>3TF54</td><td>132</td></tr>
<tr><td>300A</td><td>3TF55</td><td>160</td></tr>
<tr><td>400A</td><td rowspan="2">12</td><td>3TF56</td><td>220</td></tr>
<tr><td>475A</td><td>–</td><td>–</td><td>–</td><td>3TF57</td><td>3UA6830</td><td>250</td></tr>
</table>

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)

Technical Information

A. Recommended selection of contactors for hoisting duty

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%	
3TF50 00 0A	100	88	78	65	150	130	115	95	1000
3TF52 00 0A	145	130	115	95	220	195	170	150	1000
3TF54 00 0A	225	200	180	160	340	300	270	240	1000
3TF56 00 0A	355	325	290	250	530	490	435	375	1000

When 3 conducting paths are connected in parallel, the maximum load current rises to 2.5 times the value given in this table. When 2 conducting paths are connected in parallel, it rises to 1.8 times the value given in this table.

B. Selection of contactors for contact endurance: with normal and inching operation

Contactors suffer more erosion during inching operation than when stopping motors from a steady speed, i.e. normal operation. With slipring motors the starting current can be up to 2.5 times the rated current of the motor which means that this current has to be broken when inching is taking place. During normal operation, on the other hand, only the rated current has to be broken under full-load; under part-load it is even less. Determining contact endurance from AC-2 duty (Ic = 2.5 x Ie) will only give correct results when 100% inching operation is involved.

Max. permissible current and attainable contact endurance when braking starting current given below PF ≥ 0.4 (2.5 x Ie)		Contact life when breaking the stator contactor load currents for S3-100% duty, Ic = Ie, no inching		Contactor Type
A	Operating cycles Approx.	A	Approx. Operating cycles	
275	280,000	65	3,500,000	3TF5000
425	250,000	95	3,100,000	3TF5200
625	250,000	160	2,700,000	3TF5400
1000	150,000	250	2,500,000	3TF5600

The maximum permitted current (e.g. locked-rotor current of motor) must not exceed the values given in the "Max. starting current and attainable contact endurance" column. The values cannot be increased by paralleling pole assemblies.

C. Selection of contactors for contact endurance: with mixed operation

When mixed operation is involved, i.e. primarily breaking of the motor rated current but with some breaking of higher currents due to inching, the endurance of the contacts can be calculated approximately from the following equation:

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

Where

X = Contact endurance with mixed operation cycles.

A = Contact endurance with normal operation (Ia = Ie) in operating cycles, from Fig. 1.

B = Contact endurance with inching operation (Ia = Multiple of Ie) in operating cycles, from Fig. 2, Breaking current Ia/AC-2 = 2.5xIe.

C = Proportion of inching in total operating Cycles in %.

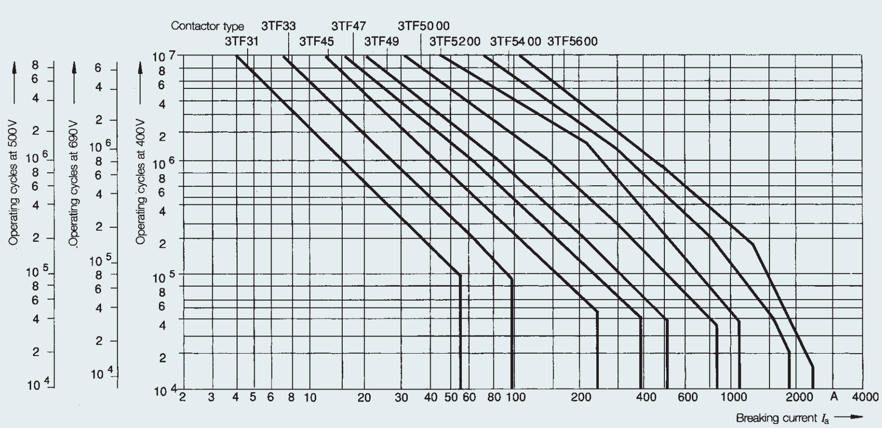


Fig. 1 Contact endurance of 3TF contactors as a function of breaking current when switching resistive and inductive AC loads.

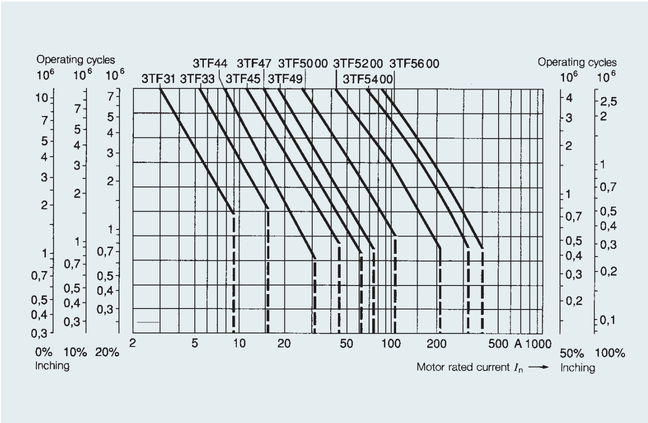


Fig. 2 Contact endurance for mixed operation as a function of motor rated current. Motor on rated load, inching at 2.5 times motor rated current (slipring motor).

The contact endurance as a function of the motor rated current with mixed operation can be determined from Fig. 2 for proportions of inching of 0, 10, 20, 50 and 100%. The values obtained are only applicable if rated motor load is used continuously. In practice therefore, the contact endurance should be greater.

Example 1

Motor rated current 150A. Selected contactor: **3TF5600**

Contact endurance in operating cycles at 400V With inching of				
0%	10%	20%	50%	100%
5.4 x 106	4.6 x 106	3.9 x 106	2.3 x 106	1.4 x 106

Example 2

Maximum permitted motor rated current for a contact endurance of 2,000,000 operating cycles at 400V.

Stator contactor	Permitted rated current of slipring motor with inching			
Type	10% approx. A	20% approx. A	50% approx. A	100% approx. A
3TF50 00	75	68	48	33
3TF52 00	110	95	66	48
3TF54 00	175	160	125	80
3TF56 00	240	230	160	120

D. NOMOGREM

Apart from knowing the figure for **contact endurance in operating cycles**, users are also interested to know what **period of time** this amounts to before the contacts have to be changed. The value can be ascertained from the nomogram in Fig. 3. **using the Nomogram**

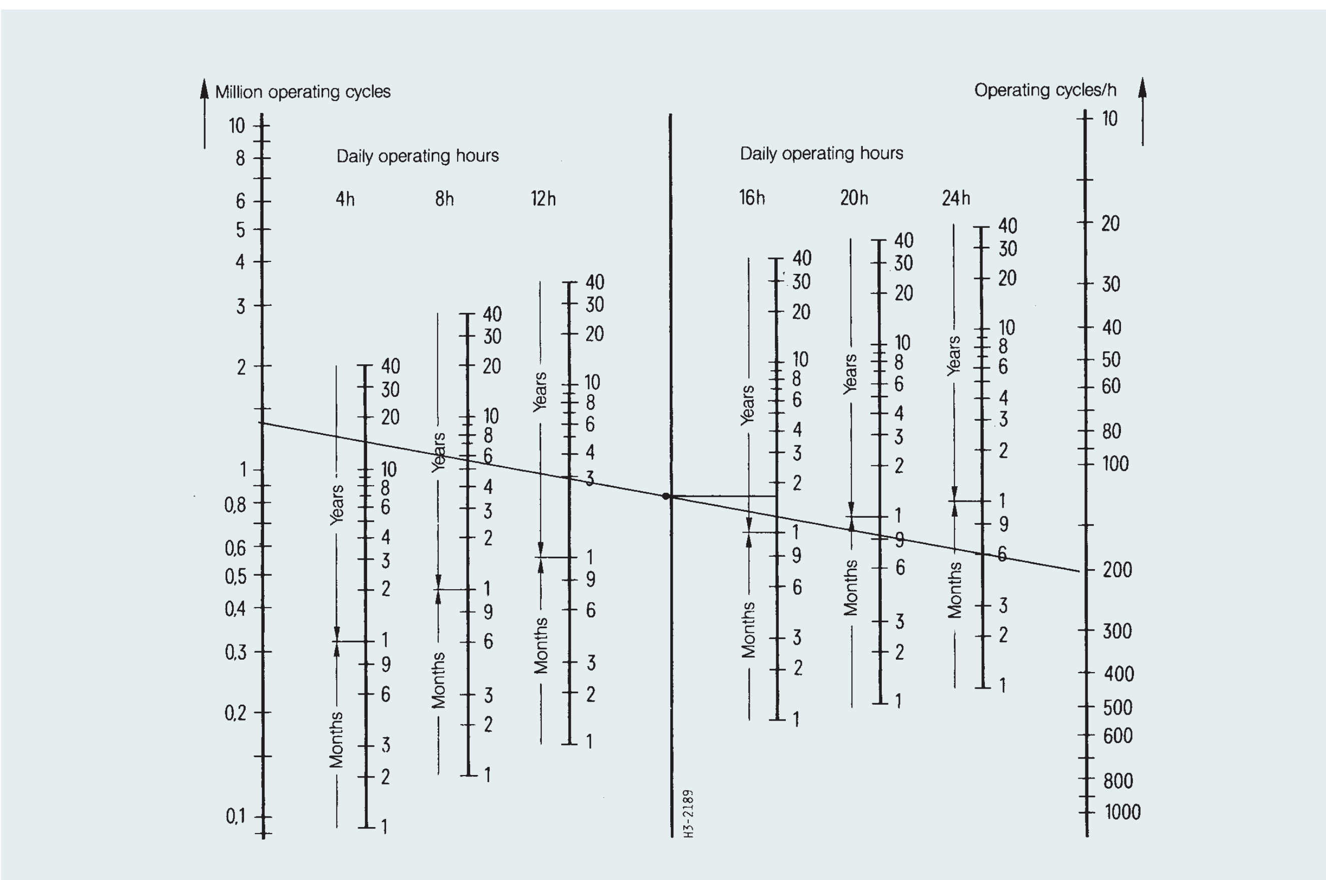


Fig. 3 Nomogram for determining contact endurance in year (250 working days) and months with daily operating hours of 4, 8, 12, 16, 20 and 24 h.

Draw a line from the point on the left-hand scale indicating the required number of operating cycles to the point on the right hand scale indicating the required number of operating cycles per hour. Then, from the point where this line intersects with the centre axis, draw a horizontal line to the left or right scale for the actual number of daily operating hours.

Note: If a figure of 365 days per annum is being employed instead of 250, the total operating time obtained from the nomogram must be multiplied by 0.68.

Example:

Service requirements: 1.4 million operating cycles endurance, 200 operating cycles per hour, 16 hours service per day.

Result:

Total operating time approx =18 months.

Accessories and ordering data:

AC Coils:

Spare coils for	Type[1]	Std. pkg. (nos.)
3TF50 00 0A..	**3TY7 503-0A ..0-0H**	**1**
3TF52 00 0A..	**3TY7 523-0A ..0-0H**	
3TF54 00 0A..	**3TY7 543-0A ..0-0H**	
3TF56 00 0A..	**3TY7 563-0A ..0-0H**	

[1] **Coil voltage code AC 50Hz:**

Coil voltage	110	230	415
Code	F0	P0	R0

(Other coil voltages are also available)

Spares and ordering data

Contact kits:

Spare contact kit for	Type	Std. pkg. (nos.)
3TF50 00 0A..	**3TY7 500-0ZA**	**1**
3TF52 00 0A..	**3TY7 520-0ZA**	
3TF54 00 0A..	**3TY7 540-0ZA**	
3TF56 00 0A..	**3TY7 560-0ZA**	

Dimensional drawing

The "Hoisting Duty" Contactors are mechanically similar to our existing 3TF power contactors. Therefore they have exactly same dimensions as the corresponding 3TF power contactors.

Please refer page nos. 21 and 22.

Useful technical information

Starting method of Slip ring motor (AC2 duty):

Three types of the contactors are used to control the three phase slip-ring motors: the stator contactor, the acceleration contactor and the rotor short circuit contactor.

Stator contactor

Initially the stator contactor (K1) is closed to energize the motor. None of the rotor contactor (K2 or K3) is closed yet. Hence all the resistances are present in the rotor circuit. The starting current can reach to 1.5 to 4 times of the rated operational current. The AC2 rating of the stator contactor is selected as per the load factor of the motor.

$$\text{Load factor} = \frac{\textbf{on time *100}}{\textbf{Cycle time (on time + rest time)}}$$

Acceleration contactor

Now acceleration contactor (K2) is closed which short circuits the resistances (R1). The sizing of this contactor (K2) is as per AC1 rated operational current. The current flow time per cycle and the number of cycles per hour has to be considered for the selection.

Rotor short circuit contactor

At the end, the rotor short circuit contactor (K3) closes, short circuiting the last resistance bank (R2) thus remove all the resistances from the rotor circuit. The starting period is hence completed. The duty of this contactors is characterized by the small closing stress. the decisive factor is the thermal stress. The duty factor is considered while finding out the permissible values of the rated operational rotor current for rotor contactors.

Picture below shows the acceleration (K2) and the rotor short circuiting contactor (K3) in the delta connection. If they are connected in star then the ratings are reduced by 35%.