CONTACTORS

Power Contactors (AC - DC)


FC06M
FC09M


FC09D
FC12D
FC18D


FC25D


FC32D


FC38D


FC40D
FC50D
FC65D


FC80D
FC95D


FC115D
FC150D


FC220D
FC245D
FC260D


FC300D


FC400D


FC475D


FC580D
FC650D


FC750D

Contactors for Capacitor Switching


FC09DK
FC12DK
FC18DK


FC25DK


FC32DK


FC38DK


FC40DK
FC50DK
FC65DK


FC80DK
FC95DK


FC115DK

High Current Contactors


EC300 ... EC2500

IEC / EN 60947-4-1
CE

Mounting Position	: Front face downwards
Altitude	: 2000 m (max)
Relative Humidity	: 90% (55°C)
Ambient Temperature	: between -25°C and +60°C
Pollution Degree	: III

All these given information are general. We have always right to change them.

CONTACTORS (IEC / EN 60947-4-1)






TYPE			FC06M	FC09M	FC09D	FC12D	FC18D	FC25D	FC32D	FC38D	FC40D	FC50D	FC65D
Number of Poles			3	3	3/4	3/4	3/4	3/4	3/4	3	3/4	3/4	3/4
Rated Thermal Current- I_{th}	≤ 55°C	A	16	16	25	25	32	36	50	55	60	70	80
Rated Operation Current – I_e (≤ 440V 50-60 Hz)	AC-3	A	6	9	9	12	18	25	32	38	40	50	65
	AC-5a	A	8	10	12	16	25	35	45	50	55	65	80
	AC-1	A	16	16	25	25	32	36	50	55	60	70	80
Rated Operation Current – I_e (≤ 250V DC - 3p seri)	DC-1	A	…	…	20	20	25	32	40	40	45	60	65
	DC-3, DC-5	A	…	…	8	8	8	32	40	40	45	60	65
Rated Insulation Voltage - U_i	50-60 Hz	V	800	800	800	800	800	800	800	800	800	800	800
Rated Impulse Withstand Voltage - U_{imp}		kV	8	8	8	8	8	8	8	8	8	8	8
Motor Control 3 ~ AC-3 Driving - Stopping	230 V	kW	1,5	2,2	2,2	3	4	5,5	7,5	9	11	15	18,5
	400 V	kW	2,2	4	4	5,5	7,5	11	15	18,5	18,5	22	30
	440 V	kW	2,2	4	4	5,5	9	11	15	18,5	22	25	37
	500 V	kW	3	4	5,5	7,5	10	15	18,5	18,5	22	30	37
	690 V	kW	3	4	5,5	7,5	10	15	18,5	18,5	22	33	37
Weight	3/4 Poles	kg	0,16	0,16	0,33/0,33	0,33/0,33	0,33/0,33	0,34/0,59	0,52/0,59	0,55	0,55	1,14/1,29	1,14/1,29
Number of Auxilary Contacts	3 Poles	Adet	1NO or 1NC	1NO or 1NC	1NO or 1NC	1NO or 1NC	1NO or 1NC	1NO or 1NC	1NO or 1NC	1NO or 1NC	1NO or 1NC	1NO + 1NC	1NO + 1NC
	4 Poles	Adet	1NO or 1NC	1NO or 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC
Coil Power Consumption (VA)	AC Coil Holding	VA	7,04	7	9,5	9,5	9,5	9,5	11	11	11	30	30
	AC Coil Pull	VA	50	50	75	75	75	75	110	110	110	225	225
	DC Coil	VA	--	--	9	9	9	9	11	11	11	20	20
Mechanical Life		Milion	10	10	10	10	10	10	8	8	8	5	5
Power Loss per Pole	(AC-3)	W	0,1	0,3	0,29	0,52	1,2	2,1	2,3	2,9	3,2	4,1	6,0
Min-Max Tightening Torque		Nm	1-1,5	1-1,5	1-1,5	1-1,5	1-1,5	1-1,5	1,2-2	1,5-2,5	1,5-2,5*	3,5-4,5	3,5-4,5
Dimensions	a (width)	mm	46	46	47/47	47/47	47/47	47/57	57/57	57	57	77/85	77/85
	b (height)	mm	58	58	76/76	76/76	76/76	76/86	86/86	86	86	129/129	129/129
	AC Tip c (depth)	mm	57	57	82/82	82/82	82/82	87/95	95/95	100	100	115/115	115/115
	DC Tip c (depth)	mm	--	--	116/116	116/116	116/116	120/130	130/130	135	135	175/174	175/174
Spare Coils			FCC-D0		FCC-D2				FCC-D4			FCC-D6	
Auxiliary Contact Block (Side Assembly) 1.Number: NO Number of Contacts 2.Number: NC Number of Contacts					FCBS-F11 FCBS-F20 FCBS-F02								
Auxiliary Contact Block (Front Assembly) 1.Number: NO Number of Contacts 2.Number: NC Number of Contacts					FCB-F02 FCB-F11 FCB-F20				FCB-F04 FCB-F13 FCB-F22 FCB-F31 FCB-F40				
Mechanical Lock													

NO: Normally open contact **NC:** Normally closed contact

Note-1: The standard auxiliary contact blocks are installed on the front surface of the contactor.

Note-2: Standard 1NO + 1NC auxiliary contact in 4-pole contactors from FC09D to FC95D and in 3-pole contactors from FC115D to FC150D are installed on the front of the product as a plug-in. C (depth) dimension increases by 33mm.

Note-3: Standard 1NO + 1NC auxiliary contact in 3 and 4 pole contactors from FC220D to FC750D is installed to the front of the product as a plug-in. C (depth) dimension does not change.

Note-4: FCC-D4 type coil is used for 4 poles FC25D contactor.

Note-5: FCC-D10 type coil is used for 4 poles FC115D-FC150D.

* Min.-max. tightening torque is 3.5-4.5 Nm for 4 poles FC40D contactor.

CONTACTORS (IEC / EN 60947-4-1)








FC80D	FC95D	FC115D	FC150D	FC220D	FC245D	FC260D	FC300D	FC400D	FC475D	FC580D	FC650D	FC750D
3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
125	125	200	200	300	310	315	400	600	650	750	850	1000
80	95	115	150	220	245	260	300	400	475	580	650	750
100	115	140	180	260	280	300	350	470	560	680	760	880
110	120	160	200	300	310	315	400	600	650	750	850	1000
100	100	160	200	260	280	300	360	430	500	650	750	850
100	100	160	200	180	220	250	300	350	420	500	600	700
800	800	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
8	8	8	8	8	8	8	8	8	8	8	8	8
22	25	30	40	60	70	80	90	110	140	180	200	220
37	45	55	75	110	130	140	160	200	250	315	355	400
45	45	59	80	129	140	150	160	220	250	315	355	450
55	55	75	90	132	160	180	200	257	290	360	410	470
45	45	80	100	160	180	200	250	280	375	470	530	650
1,38/1,54	1,38/1,54	2,1/4,3	2,1/4,5	4,7/5,7	4,7/5,7	4,7/5,7	8,5/10	8,5/10	10,8/12,9	17,4/20,5	17,5/20,5	19/22,4
1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC
1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC	1NO + 1NC
30	30	22/55	22/55	55	55	55	13	20	24	22	22	22
225	225	300	300	750	750	750	1100	1100	1250	1600	1600	1600
20	20	--	--	--	--	--	--	--	--	--	--	--
3	3	3	3	3	3	3	3	3	3	3	3	3
7,7	10,9	10	17	24	30	33	35	44	37	37	46	62
6-10	6-10	8-12	8-12	15-20	15-20	15-20	20-25	20-25	20-25	30-40	30-40	30-40
87/97	87/97	120/204	120/204	172/211	172/211	172/211	215/261	210/261	235/288	310/389	310/389	310/389
129/129	129/129	154/163	154/163	197/197	197/197	197/197	210/210	210/210	240/240	302/302	302/302	302/302
127/127	127/127	121/172	121/172	183/183	183/183	183/183	223/223	223/223	235/235	257/257	257/257	257/257
183/180	183/180	--	--	--	--	--	--	--	--	--	--	--


FCC-D6



FCC-D8 (3P) FCC-D9 (4P)


FCC-D10


FCC-D11


FCC-D12


FCC-D13


FCC-D14


FCC-D14

FCBS-F02
FCBS-F11
FCBS-F20


FCB-F02
FCB-F11
FCB-F20


FCB-F04
FCB-F13
FCB-F22
FCB-F31
FCB-F40





Give coil voltages of the contactors in accordance with the table below

	24V	42V	48V	110V	220V	230V	240V	380V	415V	440V	500V
AC	A	B	E	H	K	N	R	S	T	U	V
DC	A6		E6	H6	K6					U6	

Example: 9DD-A5013-0018 means 24V coil voltage 18A (AC3) 1NC contactors

CONTACTORS (IEC / EN 60947-4-1)

Contactors allow remote-control of electrical facilities such as compensation, heating etc. and in particular, electrical motors via a cable. When they are used with thermal relays, they protect devices and facilities against overload currents. Federal contactors are manufactured in accordance with international IEC 60947-4-1, TS EN60947-4-1 standards and CE. Coil and auxiliary contact blocks can be easily mounted and demounted with primary and auxiliary contacts. FC-type contacts have three-end coil. In this way, connection flexibility is provided. Coils of the contactors can be controlled safety between 0.8 and 1.1 times more of rated coil voltage. They operate with full efficiency between ambient temperatures of -5°C and +55°C. Contactors' capability of being assembled on rail provides great ease during installation. They can resist 1000V voltage in terms of their material composition.

Major features of the contactor:
1- The contactor should bear high current values without being subject to any corruption or boiling. This depends on quality of contactors (contact surface technology and resource technology). Contactor selection is very important especially in AC-3 class and capacitor control.
2- While the contractor is closed, the current flowing over the contacts causes heating. This heating is limited in standards. According to IEC 60947-4-1, when continuous thermal current (Ith) passes through primary contacts for 8 hours, maximum heat increase in contactor terminals should not exceed 65K.
3- When the contactor breaks the current, it forms an electrical arc between separating contacts. The arc is the electron and ion current detaching from the contact material as a result of thermal impact. Arc temperature reaches thousands of degrees and this is higher than the temperature born by metals and conductors used in manufacture of breaking cells and contacts. Therefore, arc should be terminated as soon as possible. For this purpose, separators are used in contactors.

Acceptable continuous thermal current Ith:
Acceptable thermal current is the highest value of the test current to be used in heat increase test to be carried out in accordance with IEC 60947-4-1. This test is based on applying current to contact terminals through PVC-insulated copper conductors for 8 hours. In this case, heat change in contactor terminals should not exceed (ΔQ) 65 K.

Closing capacity:
The closing capacity is the current value, which the contactor can successfully close without any damage in contacts. Power factor and frequency of closing are factors affecting the closing capacity. In IEC60947-4-1, for AC3 utilization class; if Ie is the maximum motor operating current; the closing capacity should be 10 x Ie.

Breaking capacity:
The breaking capacity is the current value, which the contactor can successfully break without any damage in contacts and arc extinction cells. As the voltage value increases, the breaking capacity decreases. In IEC60947-4-1, for AC3 utilization class; if Ie is the maximum motor operating current; the closing capacity should be 8 x Ie.

Mechanical life:
Maximum number of openings + closings, which can be performed without any maintenance operation by supplying the coil only without passing any current through main poles of the contactor, determines mechanical resistance of the contactor.

Electrical life:
Electrical resistance is the maximum number of openings + closings without any maintenance operation while load current passes through poles of the contactor. Electrical resistance is determined as a result of tests carried out on typical currents specified for various utilization classes.

AC1: Resistive load,
Closing current=breaking current=Ie

AC3: Squirrel cage asynchronous motors,
Closing current = 6 Ie (drive)
Breaking current = Ie (Ie=In)

AC4: Discrete operation of squirrel cage or ring asynchronous motor and current breaking applications,
Closing current=breaking current=6 Ie.

Contactor Selection According to Utilization Classes
One of the most important points in contactor selection is to understand the load well and to determine instant load characteristic sizes well.
Important selection parameters:
Operating voltage (Ue), operating current (Ie), Coil voltage, current to be broken (Ic), utilization class, operating type and contact life.

Contactor selection for motors:
Important selection parameters in contactor selection for motors;
- Operating voltage (Ue),
- Breaking current while motor is operating = Operating current (Ie),
- Motor start-up current (Ic=m x Ie),
- Start-up frequency (K),
- Operation number.

a. Cage asynchronous motors:
Motor rated power (kW), operating voltage and motor operating type (continuous, discrete, short-term etc.) are taken into consideration. While contactor is selected for motors operated at low power due to reasons such as high environmental temperature or increased safety, danger zone etc., motor operating current should be taken into consideration.

b. Ring asynchronous motors:
Separate selections are made for stator and rotor circuits. Selection of stator contactor is made according to Ith thermal current. Important criteria for selection in rotor circuit are operating status (start-up, adjustment), insulation (there is grounding or not), application type (intermediate contactor or final contactor).

c. Contactor selection in driving AC motors:
In direct driving; selection is made in AC3 utilization category according to motor nominal power. In unloaded star-triangle drives, since 1/3 of the motor nominal current shall pass through star contactor, the star contactor is selected at 1/3 of the nominal motor power according to AC3 utilization category. Since energy and triangle contactor is serially connected to motor coils, motor coil current passes through these contactors during operation. Therefore, these contactors are selected at 0.58 times more that is $1\sqrt{3}$ of the motor nominal power according to AC3 category. All the contactors are selected at 0.58 times more that is $1\sqrt{3}$ of the motor nominal power according to AC3 category in star-triangle drive of motors under load.

d. Contactor selection for DC current:
Extinction of arc in direct current is more difficult than alternative current. In this selection, time constant L/R of the load is a size as important as load voltage and current. Load constant (L/R) is approximately 1 ms in non-inductive loads, 7.5 ms in shunt motors, 10 ms in serial motors and 300 ms in electromagnets. Important parameters in inductive DC load switching are voltage, load type (Ohmic or inductive) and switching frequency.

e. Ohmic loads:
Ohmic loads are the most problem-free loads for enablement and disablement; because only rated current passes through the contactor. Closing current is equal to breaking current. It should be considered that the heat to be produced shall be higher as the switching

CONTACTORS (IEC / EN 60947-4-1)

Contactor selection in driving cage asynchronous motors	
Direct drive	Primary contactor current = Ie
Normal star-delta drive	Primary contactor : 0,58 Ie Delta contactor : 0,58 Ie Star contactor : 0,58 Ie Transition contactor : 0,30 Ie
Impedance drive	Primary contactor : Ie Start-up contactor : 0,7 Ie
Auto transformer drive	Primary contactor : Ie Transformer contactor : Ie Star contactor : 0,5 Ie

Contactor selection in direct driving squirrel cage asynchronous motors:

Threephase 380/400V		Thermal relay adjustment area (A)	Suitable FEDERAL Contactor
kW	In (A)		
0,37	1,03	1 - 1,6	FC09D
0,55	1,6	1,25 - 2	FC09D
0,75	2	1,6 - 2,5	FC09D
1,1	2,6	2,5 - 4	FC09D
1,5	3,5	2,8 - 4	FC09D
2,2	5	4,5 - 6,3	FC09D
3	6,6	5,5 - 8	FC09D
4	8,5	7 - 10	FC09D
5,5	11,5	9 - 12,5	FC12D
7,5	15,5	14 - 20	FC18D
9	18,5	17 - 22	FC25D
11	22	20 - 25	FC25D
15	30	23 - 32	FC32D
18,5	37	30 - 40	FC40D
22	44	37 - 50	FC50D
30	60	55 - 70	FC65D
37	72	63 - 80	FC80D
45	85	75 - 105	FC95D
55	105	95 - 125	FC115D
75	138	100 - 160	FC150D
90	170	125 - 200	FC220D
110	205	200 - 315	FC260D
132	245	200 - 315	FC260D
160	300	250 - 400	FC300D

Contactor selection in star-triangle driving squirrel cage asynchronous motors:

380/400V		Thermal relay adjustment area (A)	Suitable FEDERAL Contactor		
kW	In (A)		Line	Star	Delta
7,5	15,5	7-10	FC12D	FC12D	FC09D
9	18,5	9-12,5	FC12D	FC12D	FC09D
11	22	11-16	FC12D	FC12D	FC09D
15	30	14-20	FC18D	FC18D	FC09D
18,5	37	20-25	FC18D	FC18D	FC09D
22	44	23-32	FC32D	FC32D	FC18D
30	60	30-40	FC50D	FC40D	FC25D
37	72	38-50	FC50D	FC50D	FC32D
45	85	48-57	FC50D	FC50D	FC32D
55	105	57-66	FC65D	FC65D	FC50D
75	138	63-80	FC80D	FC80D	FC50D
90	170	75-105	FC150D	FC150D	FC80D
110	205	100-160	FC150D	FC150D	FC80D
132	245	100-160	FC220D	FC220D	FC150D
160	300	125-200	FC220D	FC220D	FC150D
200	370	200-315	FC260D	FC260D	FC220D
220	408	200-315	FC260D	FC260D	FC220D

frequency increases and calculation should be made by assuming lower rated current of the contactors selected according to AC1. 2 or 3 poles of 3-phase contactors, which are used for supplying heating circuits that are usually mono-phased, are connected serially. If two poles are serial, rated operating current should be calculated as 1,6xIe; if three poles are serial, it should be calculated as 2xIe.

f. Compensation applications:
Capacitors cause high frequency (1…5kHz) and high value temporary currents in the circuits they are connected to during start up. Switching of a single capacitor or a capacitor within a group of capacitors has different characteristics. Gradual start-up in group of capacitors is more difficult for the contactor. Because, while the capacitors in group of capacitors start up gradually, a circulating current is formed between parallel capacitor, in addition to drawing current of the battery and it forces the contactor. Therefore, special contactors and combinations have been developed for compensation applications. Where required, shock coil is used to limit the current. Contactors developed for controlling tri-phase capacitors have been developed with limit resistant transition contact blocks limiting the current value at start-up.

g. Illumination facility applications:
Impact voltages and currents, which occur in illumination applications from time to time, may force the contactor. It has been classified in terms of type behavior and closing-breaking operation for selection. While contactor is selected for illumination circuits, important factors are bulb type, connection, whether there is compensation or not, start-up and operating current and power factor. While the contactor is loaded up to 15 times of the lamp rated current during closing in filament lamps, breaking current is equal to rated current. Compensation is very important in discharge and florescent lamps. In high pressure mercury vapor lamps, a current occurs at two times of the operating current during pre-heating period (approximately 5 minutes). This regime period is about 10 minutes in halogen lamps and sodium vapor lamps.

CONTACTORS (IEC / EN 60947-4-1)

Utilization classes of contactor:

Accurate determination of the utilization class and selection in accordance with this class is the most important point for healthy operation of the contactor. The reason of many failures encountered in application is the failure to make the right selection according to utilization class of contactors.

AC1 class:
It covers the alternative current loads with a power factor at least 0,95. The most common example of this is heating applications.

AC3 class:
This is the most common application class. It covers cage asynchronous motors disabled while in operation after driving. At closing, motor start-up current, which is 5…7 times more than rated current of the motor, passes through the contactor contacts. At start-up, the contactor shall break the rated current drawn by the motor. At that time, the voltage between contactor poles is about 20% of the nominal voltage. This is an easy breaking situation. Examples of this class are stator and stator control of all standard squirrel cage motors and ring asynchronous motors, elevators, escalators, conveyors, pumps, ventilators, mixers, air-conditioning devices, coolers and valves.

AC4 class:
This is related to discrete operation and reverse-current braking applications of cage or ring motors. Contactor opens and closes at driving current, which is 5…7 times more than rated current of the motor. Breaking is difficult at low speeds. Sample applications are pressing machines, wire and cable machines, discrete operating machine tools, metallurgy, lifting, electro valves, couplers etc.

a.Contactor utilization classes according to IEC 60947-4-1:

Current type	Class	Area of utilization
Alternative current	AC - 1	Non-inductive or low-inductive loads, resistance furnaces
	AC - 3	Squirrel cage motors, driving, motor stop in operation
	AC - 4	Squirrel cage motors, driving, reversing operation, stepping operation
	AC - 5a	Electrical discharge lamp control mechanism switching
	AC - 6b	Switching of capacitor groups

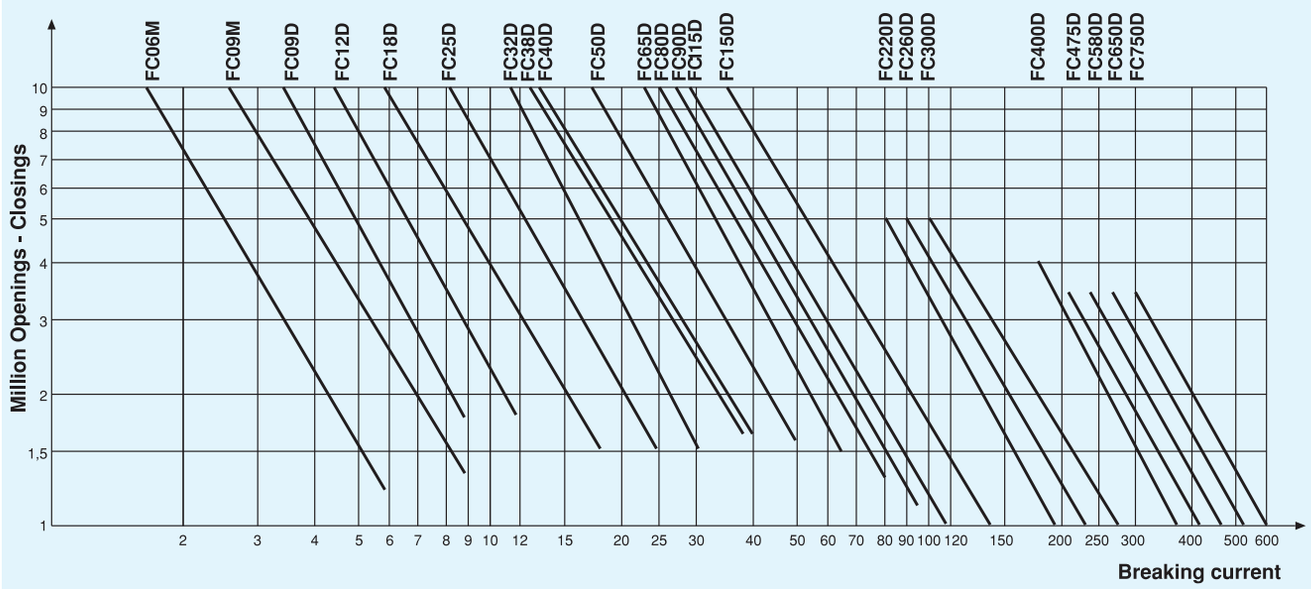


Fig-1 Electrical life values of contactors according to breaking current (Ue≤440V, 50Hz for AC-3 class)

CONTACTORS (IEC / EN 60947-4-1)

Contactor failures and impacts:
If the contactors are not used in accordance with the technical data present in the catalogues or if there are failures in the supply network, failures may occur.

Possible disablement reasons of contactors:
In general, contactors are actually devices which are not subject to failures quite easily. If selection has been made correct and if operating conditions are accurate, a contactor may perform millions of safe openings - closings. Below are the failures frequently encountered in contactors and reasons and solutions of these failures.
- Too long control (coil) circuit cables may cause some problems. Whereas significant voltage decrease throughout long cables makes closing difficult, too big section cable capacitance hinders opening. If control cable is longer than the recommended value, it is recommended to utilize a lower coil voltage or to connect a parallel resistance or inductive impedance to the coil.
- Existence of dust or foreign objects in the contactor, sever atmosphere conditions and corrosion may hinder closing of the contactor especially with remote-control. When such a fault is encountered, the contactor should be cleaned with a strong clean air flow against dust and dirt, housing should be made more closed and protected, the circuit should be checked and any factor corrupting conductivity should be eliminated.
- The contactor coil may burn due to low or high voltage. Voltage regulator should be used in cases where network voltage fluctuates too much. Moreover, dust and foreign objects in air gap facilitate it. When coil is burnt, first voltage and frequency should be checked and a stable control voltage should be ensured.
- Another incident hindering opening other than the capacitive impact is adherence of the contacts. Reason of this adherence might be switching in high current, short circuit or fault in star-delta transition. If there is a short circuit, first of all reason of the short circuit should be found out.
- Incidents causing noisy operation of the contactor are presence of foreign objects such as dust etc. in the air gap, failure of nucleus surface due to long-time operation and inappropriate voltage and frequency. In order to avoid them, nucleus surface should be kept clean and coil should be replaced according to voltage and frequency if required.

Coil replacement:
Screws on both sides of the contactor are removed, top parts are separated, coil in the bottom is pulled out of its slot and new coil is mounted. Top part is placed and contactor is closed. However, attention should be paid to secure the spring during assembly.

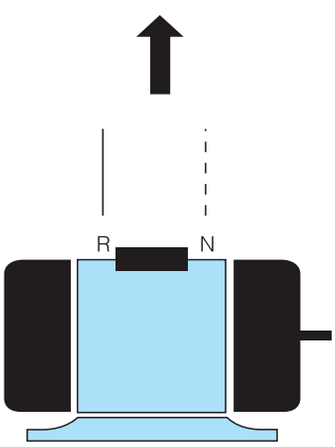
Contact life depending on opening current:
Contact melting loss at a particular switch device generally depends on opening current and contact lives are given in diagrams.
The most common area of utilization of the contactors is operation of motors. Different operating types of the motors are classified in IEC 60947-4-1.

Connection sections:

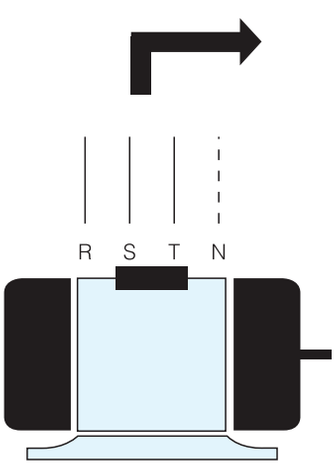
Min. and max. connection sections (mm^2)	Primary contact / Auxiliary contact	mm^2	mm^2	mm^2	mm^2	mm
FC09D, FC12D, FC18D		1...4	1...4+1...4	1...6	1...6+1...6	8
FC25D		1...2,5	1...2,5+1...2,5	1...2,5	1...2,5+1...2,5	8
		1,5...6	1,5...6+1,5...6	1,5...6	1,5...6+1,5...6	10
FC32D		1,5...10	1,5...6+1,5...6	1,5...10	1,5...6+1,5...6	10
FC38D		1...2,5	1...2,5+1...2,5	1...2,5	1...2,5+1...2,5	8
		2,5...10	4...10+4...10	2,5...10	2,5...10+2,5...10	12
FC40D, FC50D, FC65D		1...2,5	1...2,5+1...2,5	1...2,5	1...2,5+1...2,5	8
		2,5...2,5	2,5...16+2,5...16	2,5...2,5	4...16+4...16	—
FC80D, FC95D		1...2,5	1...2,5+1...2,5	1...2,5	1...2,5+1...2,5	8
		4...50	4...35+4...35	4...50	6...35+6...35	—
FC115D, FC150D		—	—	—	—	20
FC220D, FC260D		—	—	—	—	25
FC300D, FC400D		—	—	—	—	25
FC475D		—	—	—	—	30
FC580D, FC630D, FC750D		—	—	—	—	40

CONTACTORS (IEC / EN 60947-4-1)

Mono-phase motors				Threephase motors								
kW	HP	220 V A	240 V A	kW	HP	220-240 V A	380 V A	415 V A	440 V A	500 V A	660 V A	1000 V A
0,37	0,5	3,9	3,6	0,37	0,5	1,8	1,03	—	0,99	1	0,6	0,4
0,55	0,75	5,2	4,8	0,55	0,75	2,75	1,6	—	1,36	1,21	0,9	0,6
0,75	1	6,6	6,1	0,75	1	3,5	2	2	1,68	1,5	1,1	0,75
1,1	1,5	9,6	8,8	1,1	1,5	4,4	2,6	2,5	2,37	2	1,5	1
1,5	2	12,7	11,7	1,5	2	6,1	3,5	3,5	3,06	2,6	2	1,3
1,8	2,5	15,7	14,4	2,2	3	8,7	5	5	4,42	3,8	2,8	1,9
2,2	3	18,6	17,1	3	4	11,5	6,6	6,5	5,77	5	3,8	2,5
3	4	24,3	22,2	3,7	5	13,5	7,7	7,5	7,1	5,9	4,4	3
4	5	29,6	27,1	4	5,5	14,5	8,5	8,4	7,9	6,5	4,9	3,3
4,4	6	34,7	31,8	5,5	7,5	20	11,5	11	10,4	9	6,6	4,5
5,2	7	39,8	36,5	7,5	10	27	15,5	14	13,7	12	8,9	6
5,5	7,5	42,2	38,7	9	12	32	18,5	17	16,9	13,9	10,6	7
6	8	44,5	40,8	10	13,5	35	20	—	—	15	11,5	7,5
7	9	49,5	45,4	11	15	39	22	21	20,1	18,4	14	9
7,5	10	54,4	50	15	20	52	30	28	26,5	23	17,3	12
				18,5	25	64	37	35	32,8	28,5	21,3	14,5
				22	30	75	44	40	39	33	25,4	17
				25	35	85	52	47	45,3	39,4	30,3	20
				30	40	103	60	55	51,5	45	34,6	23
				33	45	113	68	60	58	50	39	25
				37	50	126	72	66	64	55	42	28
				40	54	134	79	71	67	60	44	30
				45	60	150	85	80	76	65	49	33
				51	70	170	98	90	83	75	57	38
				55	75	182	105	100	90	80	61	40
				59	80	195	112	105	97	85	66	43
				63	85	203	117	115	109	89	69	45
				75	100	240	138	135	125	105	82	53
				80	110	260	147	138	131	112	86	57
				90	125	295	170	165	146	129	98	65
				100	136	325	188	182	162	143	107	71
				110	150	356	205	200	178	156	118	78
				129	175	420	242	230	209	184	135	85
				132	180	425	245	240	215	187	140	90
				140	190	450	260	250	227	200	145	95
				147	200	472	273	260	236	207	152	100
				150	205	483	280	270	246	210	159	102
				160	220	520	300	280	256	220	170	115
				180	245	578	333	320	289	254	190	135
				185	250	595	342	325	295	263	200	138
				200	270	626	370	340	321	281	215	150
				220	300	700	408	385	353	310	235	160
				250	340	800	460	425	401	360	274	200
				257	350	826	475	450	412	365	280	203
				280	380	900	510	475	450	400	305	220
				295	400	948	546	500	473	416	320	227
				300	410	980	565	510	481	420	325	230
				315	430	990	584	535	505	445	337	239
				335	450	1100	620	550	518	472	355	250
				355	480	1150	636	580	549	500	370	262
				375	500	1180	670	610	575	527	395	273
				400	545	1250	710	650	611	540	410	288
				425	580	—	760	690	650	574	445	302
				445	600	—	790	730	680	595	455	317
				450	610	—	800	740	690	608	460	320
				175	645	—	850	780	730	645	485	335
				500	680	—	900	820	780	680	515	350

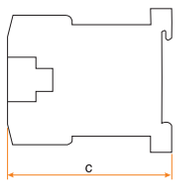


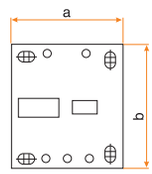
Monophase motors



Threephase motors

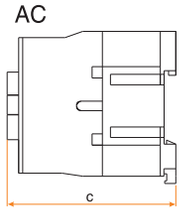
Type	a	b	c
FC06M	45.5	58	57
FC09M	45.5	58	57



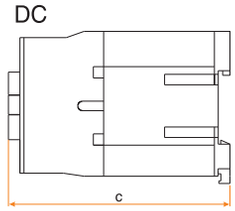


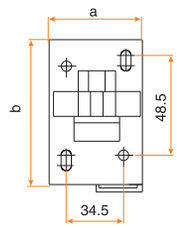
Type	Pole	a	b	c	
				AC	DC
FC09D	3	47	76	82	116
FC09D	4	47	76	82	116
FC12D	3	47	76	82	116
FC12D	4	47	76	82	116
FC18D	3	47	76	82	116
FC18D	4	47	76	82	116

AC



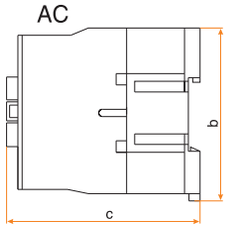
DC



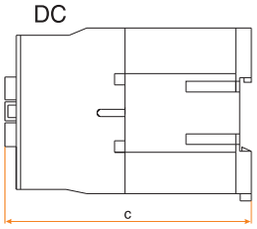


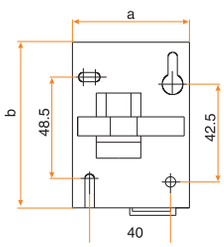
Type	Pole	a	b	c	
				AC	DC
FC25D	3	47	76	87	120
FC25D	4	57	86	95	130
FC32D	3	57	86	95	130
FC32D	4	57	86	95	130
FC38D	3	57	86	100	135

AC



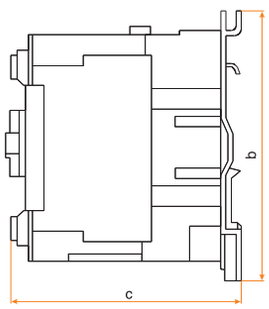
DC



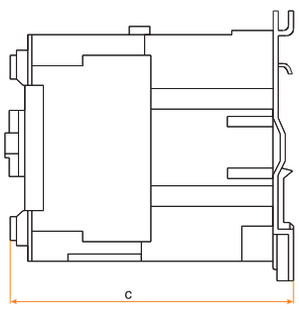


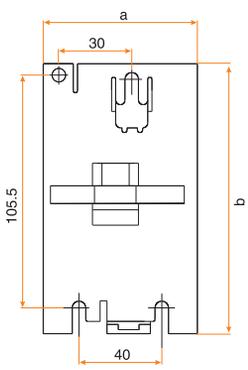
Type	Pole	a	b	c	
				AC	DC
FC40D	3	77	129	115	175
FC40D	4	85	129	115	174
FC50D	3	77	129	115	175
FC50D	4	85	129	115	174
FC65D	3	77	129	115	175
FC65D	4	85	129	115	174
FC80D	3	87	129	127	183
FC80D	4	97	129	127	180
FC95D	3	87	129	127	183
FC95D	4	97	129	127	180

AC

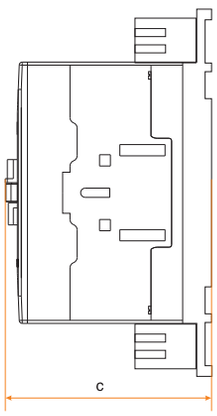


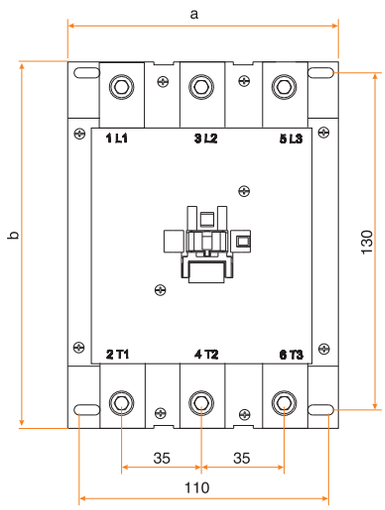
DC



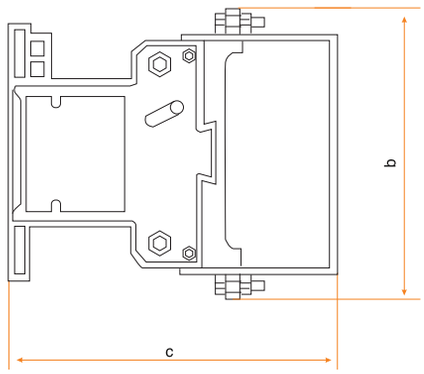


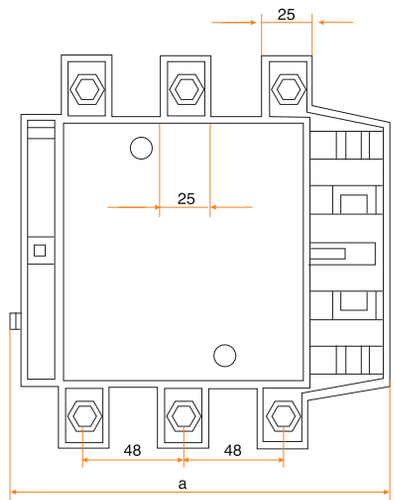
Type	Pole	a	b	c
FC115D	3	120	154	124
FC115D	4	204	163	172
FC150D	3	120	154	124
FC150D	4	204	171	172



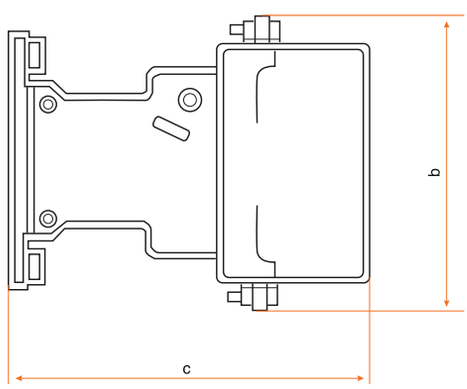


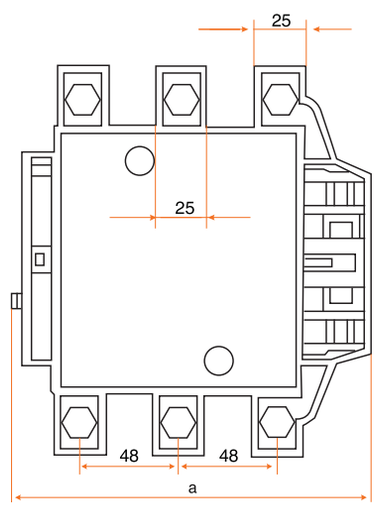
Type	Pole	a	b	c
FC220D	3	170	175	183
FC220D	4	211	175	183
FC260D	3	170	175	183
FC260D	4	211	175	183
FC300D	3	218	210	223
FC300D	4	261	210	223



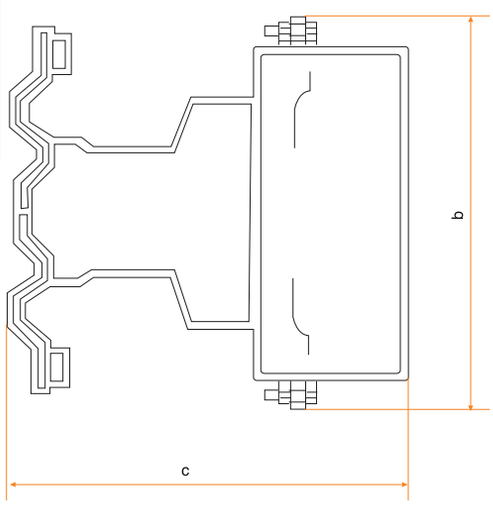


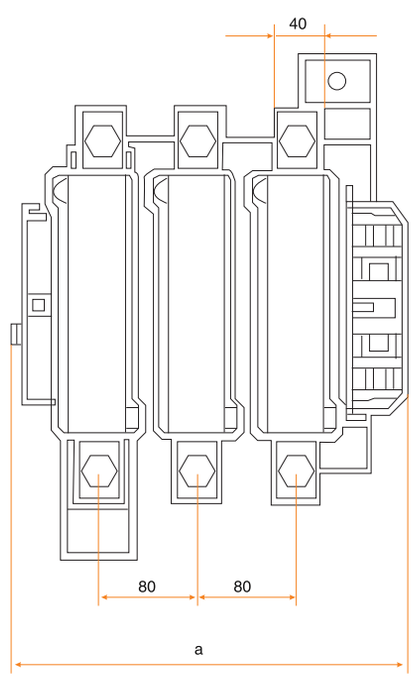
Type	Pole	a	b	c
FC400D	3	218	210	223
FC400D	4	261	210	223
FC475D	3	235	240	235
FC475D	4	288	240	235



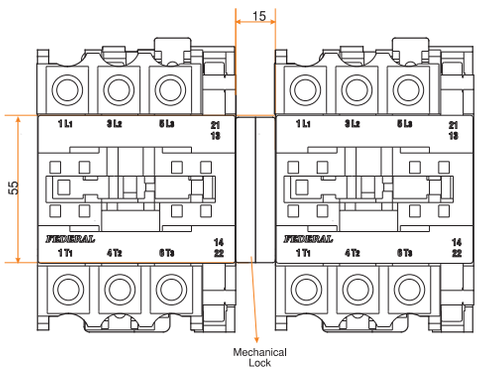


Type	Pole	a	b	c
FC580D	3	310	304	257
FC580D	4	389	304	257
FC650D	3	310	304	257
FC650D	4	389	304	257
FC750D	3	310	304	257
FC750D	4	389	304	257

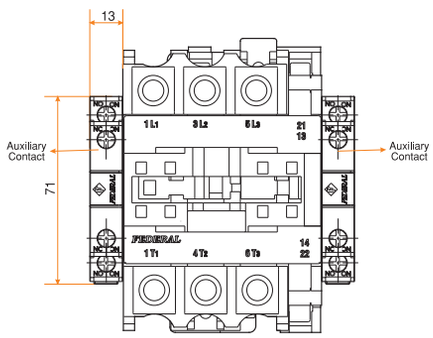




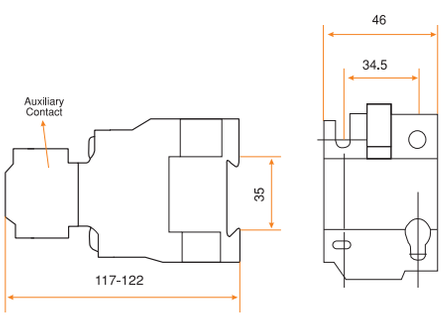
Mechanical lock



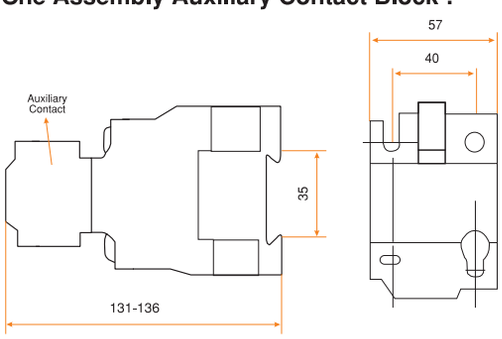
Side assembled contact block



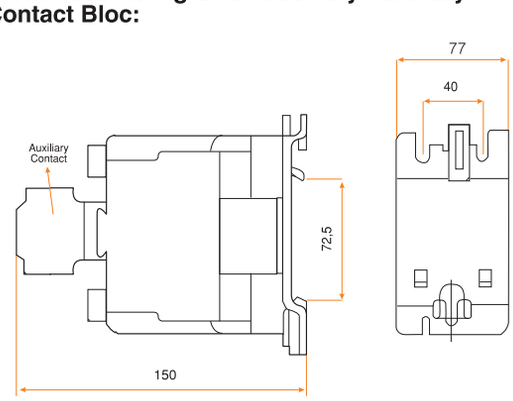
FC12D / FC18D Front Assembling One Assembly Auxiliary Contact Block :



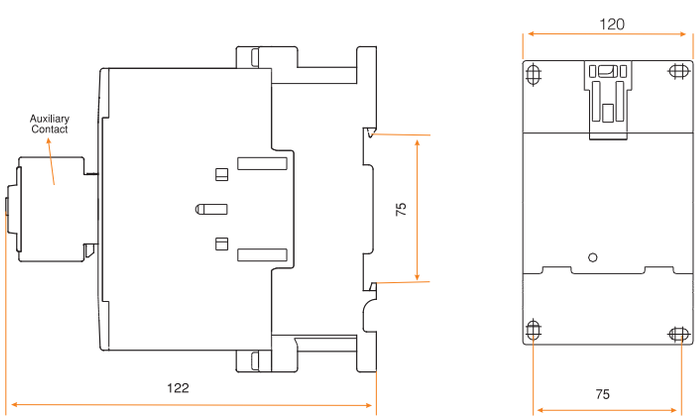
FC25D / FC32D / FC38D Front Assembling One Assembly Auxiliary Contact Block :



FC40D / FC50D / FC65D / FC80D / FC95D Front Aseembling One Assembly Auxiliary Contact Bloc:



FC115D / FC150D Front Assembling One Assembly Auxiliary Contact Block:



CAPACITOR CONTACTORS (IEC / EN 60947-4-1)

Order codes of auxiliary contact blocks

Top Assembly Type	Order code
FCB-F20	8DD-A0020-0000
FCB-F11	8DD-A0011-0000
FCB-F02	8DD-A0002-0000
FCB-F40	8DD-A0040-0000
FCB-F31	8DD-A0031-0000
FCB-F22	8DD-A0022-0000
FCB-F13	8DD-A0013-0000
FCB-F04	8DD-A0004-0000

Side Assembly Type	Order code
FCAB-F11	8DD-B0011-0000
FCAB-F20	8DD-B0020-0000
FCAB-F02	8DD-B0002-0000

Order codes of spare coils:

Type	Order code
FCC-D2	8DD -C□□20-0000
FCC-D4	8DD -C□□30-0000
FCC-D6	8DD -C□□40-0000
FCC-D8	8DD -C□□50-0000
FCC-D10	8DD -C□□60-0000
FCC-D12	8DD -C□□70-0000

□□ Indicates coil operating voltage

Order codes of spare primary contact sets:

Type	Order code
FC09 D	8DD-0000-0009
FC12 D	8DD-0000-0012
FC18 D	8DD-0000-0018
FC25 D	8DD-0000-0025
FC32 D	8DD-0000-0032
FC38 D	8DD-0000-0038
FC40 D	8DD-0000-0040
FC50 D	8DD-0000-0050
FC65 D	8DD-0000-0065
FC80 D	8DD-0000-0080
FC95 D	8DD-0000-0095
FC115 D	8DD-0000-0115
FC150 D	8DD-0000-0150
FC200 D	8DD-0000-0200
FC260 D	8DD-0000-0260
FC300 D	8DD-0000-0300
FC400 D	8DD-0000-0400
FC475 D	8DD-0000-0475
FC580 D	8DD-0000-0580
FC650 D	8DD-0000-0650
FC750 D	8DD-0000-0750

Descriptions of contactor type codes:

FC - 50 D 11 K5 (Sample contactor type)

- K5 → Coil voltage value
- 11 → Number of auxiliary contacts (1)
- D → Contactor type (2)
- 50 → Rated current (AC-3)
- FC → Federal contactor

(1) First figure indicates number of normally open (NO) contacts and second figure indicates number of normally closed (NC) contacts.

Sample
11=1NO + 1NC

(2) M : Mini contactor
D : Standard contactor
DK: Compensation contactor

Order codes of contactors :

Type	AC-3 Ie (A)	kW 400 V	Standard auxiliary contact	Order code
FC06M22*	6	2.2	2 NO + 2 NC	9DM -K3 223-0006
FC06M	6	2.2	1 NO 1 NC	9DM -□□ 103-0006 9DM -□□ 013-0006
FC09M	9	4	1 NO 1 NC	9DM -□□ 103-0009 9DM -□□ 013-0009
FC09D	9	4	1 NO 1 NC	9DD -□□ 103-0009 9DD -□□ 013-0009
FC12D	12	5,5	1 NO 1 NC	9DD -□□ 103-0012 9DD -□□ 013-0012
FC18D	18	7,5	1 NO 1 NC	9DD -□□ 103-0018 9DD -□□ 013-0018
FC25D	25	11	1 NO 1 NC	9DD -□□ 103-0025 9DD -□□ 013-0025
FC32D	32	15	1 NO 1 NC	9DD -□□ 103-0032 9DD -□□ 013-0032
FC38D	38	18,5	1 NO 1 NC	9DD -□□ 103-0038 9DD -□□ 013-0038
FC40D	40	18,5	1 NO + 1 NC	9DD -□□ 113-0040
FC50D	50	22	1 NO + 1 NC	9DD -□□ 113-0050
FC65D	65	30	1 NO + 1 NC	9DD -□□ 113-0065
FC80D	80	37	1 NO + 1 NC	9DD -□□ 113-0080
FC95D	95	45	1 NO + 1 NC	9DD -□□ 113-0095
FC115D	115	55	-	9DD -□□ 003-0115
FC150D	150	75	-	9DD -□□ 003-0150
FC220D	220	110	-	9DD -□□ 003-0220
FC260D	260	140	-	9DD -□□ 003-0260
FC300D	300	160	-	9DD -□□ 003-0300
FC400D	400	200	-	9DD -□□ 003-0400
FC475D	475	250	-	9DD -□□ 003-0475
FC580D	580	315	-	9DD -□□ 003-0580
FC650D	650	355	-	9DD -□□ 003-0650
FC750D	750	400	-	9DD -□□ 003-0750

□□Indicates coil operating voltage. *Auxiliary contactor.

Order codes of mechanical locks :

Type	Order code
FC09D...FC38D	8DD-MK000-0001
FC40D...FC95D	8DD-MK000-0002

Coil voltages :

Give coil voltages of the contactors in accordance with the table below.

□□	24V	42V	48V	110V	220V	230V	240V	380V	415V	440V	500V
AC	A5	D5	E5	H5	K5	N5	R5	S5	T5	U5	V5
DC	A6		E6	H6	K6					U6	

Sample1: For 220 V, 50/60 Hz coil voltage; K5.

Sample2: For AC3 class 32 A, normally closed, coil voltage 48 V 50/60 Hz contactor: FC - 32DO1 E5.

Sample3: For AC3 class 95 A, normally 3 closed and 1 open auxiliary contacts, coil voltage 220 V 50/60 Hz contactor

FC - 95D11K5 + FCB-F02 (Contactor and 1 FCB - F02 contact block shall be adequate.)