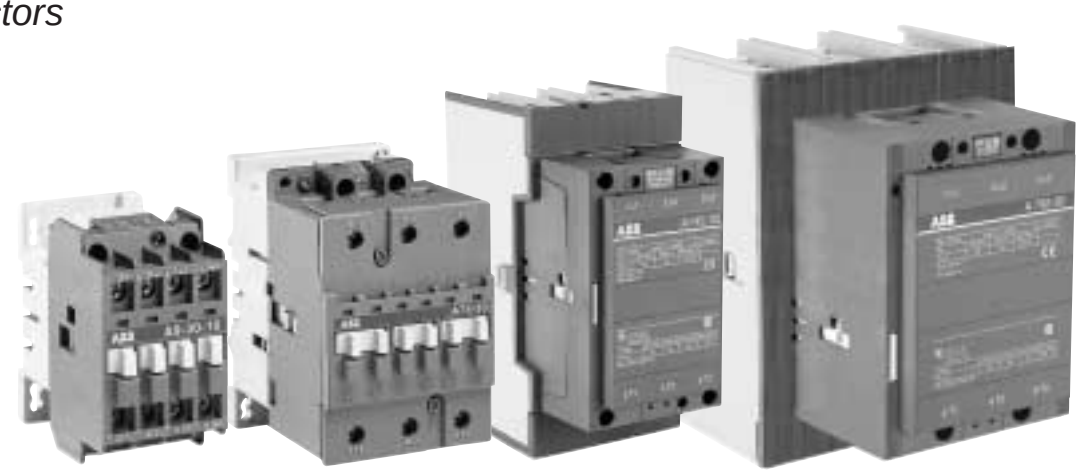
Extract from
Product Selector 1000

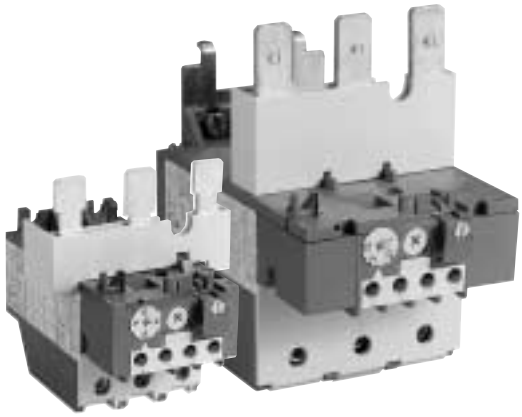
A-Line
Contactors
Overload relays

AC 1030.1

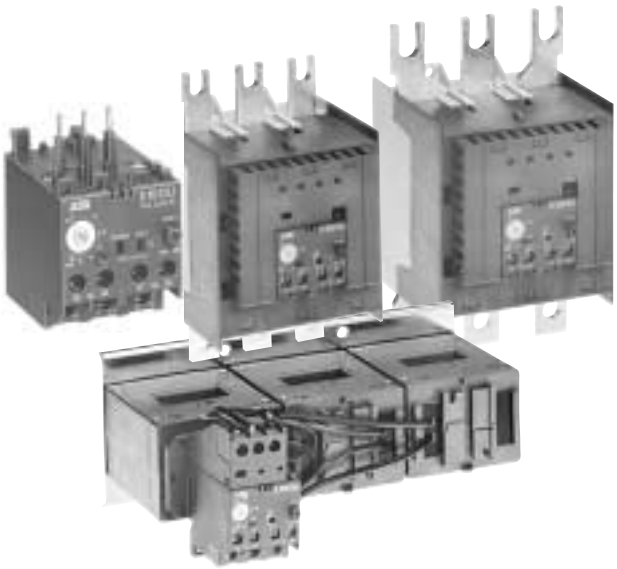
Contactors



Thermal overload relays



Electronic overload relays



Low Voltage Products and Systems

Contactors
Across the line, Type A/AF

Overload relays
Type TA, E

Terms & conditions

ABB Inc. terms and conditions govern all sales and shipments of products (including parts and accessories) as set forth in document AC 5020. ABB Inc. terms and conditions are subject to change with or without notice.

This publication is an extract of the AC 1000 Product Selector, to be released in 2002.

Table of contents
Contactors

Table of contents
Overload relays

Notes

Across the line
Contactors

Across the line contactors
A9 - AF750

A9 - A110

- Maximum UL/CSA horsepower ratings according to UL508 and CSA22.2 No. 14
- Includes NEMA sizes 00 - 3
- CE mark
- Compact space saving design
- Standard auxiliary contact configurations:
  - A9 - A40 1 NO or 1 NC
  - A50 - A110 1 NO & 1 NC
- Contactor sizes A50 - A110 can be supplied without auxiliaries
- Additional auxiliary contact blocks are available
- D.C. ratings & D.C. control operation available
- Fast, snap-on DIN rail mounting
- Double break contact design
- Snap-on front mounted accessories include mechanical latch, pneumatic timer, and 1 & 4 pole auxiliary contact blocks
- Contactors ensure positive safety between their auxiliary contact blocks.
- Easy coil change
- Captive terminal screws
- NEMA, UL, IEC, CSA, VDE and most other international standards
- Touch safe design: All connection terminals are protected against accidental touch
- Terminals supplied open for ease of wiring
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- Screwdriver guide holes
- UL File No: E39231 (A9 - A75); (AE9 - AE75); (BC9 - BC30); (AF50 - AF75)
- UL File No: E79416 (A95 - A110); (AE95 - AE110); (AF145 - AF750)
- CSA File No: LR56745 (A9 - A75); (AE9 - AE75); (B9 - BC30); (AF50 - AF75)
- CSA File No: LR19700 (A95 - A110); (AE95 - AE110); (AF145 - AF750)
- CSA approved for elevator service

A145 - AF750

- Maximum UL/CSA horsepower ratings according to UL508 and CSA22.2 No. 14
- Includes NEMA sizes 4 - 7
- CE mark
- 1 NO & 1 NC auxiliary contacts are standard and up to 6 additional auxiliary contacts may be added to provide a total of 8 (4 NO & 4 NC)
- Contactors ensure positive safety between their auxiliary contact blocks.
- D.C. ratings and D.C. control operation available
- Easy maintenance of main contacts and coil inspection
- Can be mounted in any position
- Operates over an extended voltage range of 85% to 110% of rated control voltage
- NEMA, UL, IEC, CSA, VDE and most other international standards
- UL File No: E79416
- CSA File No: LR19700

A9 - A300, AC operated
UL rated, 3 pole

Application

A-Line contactors are mainly used for controlling 3-phase motors and for controlling power circuits corresponding to their operating characteristics up to 690 and even 1000 VAC. and 440 VDC.

Description of 3 pole and 4 pole contactors A9 - A300

All A-Line contactors can be assembled side by side. The add-on or built-in auxiliary contacts are suitable for low level currents.

Control circuit types

- A-Line types: AC operated with laminated magnetic circuit.

Contactor types

- 3 pole contactors with NO or NC built in auxiliary contact for A9 - A40 contactors; factory assembled auxiliary contacts for A50 - A300 contactors
- 4 pole contactors: 4 NO or 2 NO & 2 NC without any auxiliary contacts. (A9 - A75)

Quick mounting on DIN rail: EN 50022 and EN 50023 standards:

35 x 7.5mm for A9 - A40

35 x 15mm for A9 - A75

75mm for A45 - A110

Location of side mounted accessories: on right or left hand side. Factory mounted on left hand side for CAL5 on A50 - A300

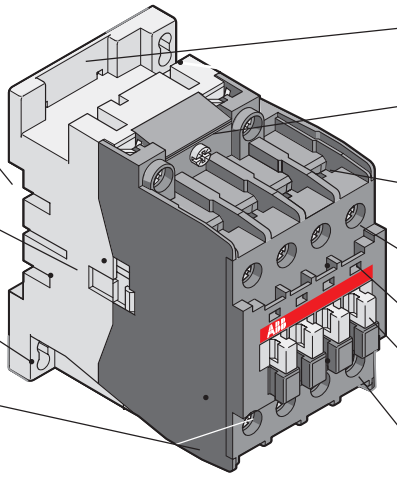
Holes for screw mounting (screws not supplied). Distance between holes according to EN 50003.

Terminals delivered in open position with captive screws (screws of unused terminals must be tightened).

Screwdriver guidance for all terminals makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 - Part. 100.

All A9 - A40 contactor terminals as well as A45 - A300 contactor auxiliary contact and coil terminals ensure IP20 degree of protection according to IEC 947-1.



A9 - A300

Location of surge suppressors.

Clear marking of coil voltages and frequencies.

Connecting point for control leads in top part of main terminals of A50 - A75 contactors. For A95 & A110 contactors these are additional power connections.

Terminal marking according to IEC 947-4-1, EN 50005, EN 50012 and NEMA standards.

Location of function marker.

Stops for attaching front mounted accessories.

Terminal screws:

- Posidrive (+,-) No 2 for all A9 - A75
- M8 hex threaded socket screw for A95 - A300 main terminals.

Catalog number explanation

A9-30-10-84

Frame size

Power pole

30 = 3 NO
40 = 4 NO
22 = 2 NO & 2 NC

Coil voltage
(see coil voltage selection chart)

Auxiliary contacts

10 = 1 NO & 0 NC
01 = 0 NO & 1 NC
11 = 1 NO & 1 NC
00 = No auxiliary provided
22 = 2 NO & 2 NC

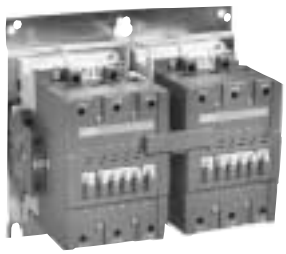
Coil voltage selection chart

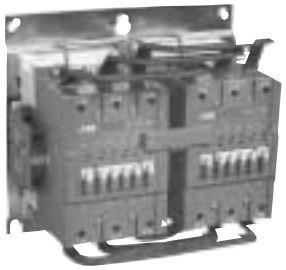
Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

A9 - A300, AC operated
UL rated, 3 pole


A26-30-10-84


A110M-30-11-84


A110R-30-11-84

General purpose current	UL motor switching current	Maximum motor horsepower ratings				Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		208V	240V	480V	575/600V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
AC1		UL rated											
21	9	2	2	5	7.5	1 0	0 1	A9-30-10-84 A9-30-01-84	**$ 78**	A9M-30-10-84 A9M-30-01-84	**$ 255**	A9R-30-10-84 A9R-30-01-84	**$ 315**
25	11	3	3	7.5	10	1 0	0 1	A12-30-10-84 A12-30-01-84	**84**	A12M-30-10-84 A12M-30-01-84	**315**	A12R-30-10-84 A12R-30-01-84	**375**
30	17	5	5	10	15	1 0	0 1	A16-30-10-84 A16-30-01-84	**102**	A16M-30-10-84 A16M-30-01-84	**345**	A16R-30-10-84 A16R-30-01-84	**413**
40	28	7.5	10	20	25	1 0	0 1	A26-30-10-84 A26-30-01-84	**183**	A26M-30-10-84 A26M-30-01-84	**405**	A26R-30-10-84 A26R-30-01-84	**480**
50	34	10	10	25	30	1 0	0 1	A30-30-10-84 A30-30-01-84	**252**	A30M-30-10-84 A30M-30-01-84	**548**	A30R-30-10-84 A30R-30-01-84	**623**
60	42	10	15	30	40	1 0	0 1	A40-30-10-84 A40-30-01-84	**297**	A40M-30-10-84 A40M-30-01-84	**639**	A40R-30-10-84 A40R-30-01-84	**750**
80	54	15	20	40	50	1	1	A50-30-11-84	**330**	A50M-30-11-84	**713**	A50R-30-11-84	**810**
90	65	20	25	50	60	1	1	A63-30-11-84	**372**	A63M-30-11-84	**870**	A63R-30-11-84	**1013**
105	80	25	30	60	75	1	1	A75-30-11-84	**413**	A75M-30-11-84	**1155**	A75R-30-11-84	**1298**
125	95	30	30	60	75	1	1	A95-30-11-84	**450**	A95M-30-11-84	**1230**	A95R-30-11-84	**1425**
140	110	30	40	75	100	1	1	A110-30-11-84	**480**	A110M-30-11-84	**1365**	A110R-30-11-84	**1628**
230	130	40	50	100	125	1	1	A145-30-11-84	**825**	A145M-30-11-84	**2235**	A145R-30-11-84	**2250**
250	156	50	60	125	150	1	1	A185-30-11-84	**1290**	A185M-30-11-84	**3360**	A185R-30-11-84	**3375**
300	192	60	75	150	200	1	1	A210-30-11-84	**1635**	A210M-30-11-84	**4035**	A210R-30-11-84	**4050**
350	248	75	100	200	250	1	1	A260-30-11-84	**1815**	A260M-30-11-84	**4485**	A260R-30-11-84	**4500**
400	302	100	100	250	300	1	1	A300-30-11-84	**1875**	A300M-30-11-84	**5460**	A300R-30-11-84	**5475**
550	414	125	150	350	400	1	1						
650	480	150	200	400	500	1	1						
750	590	200	250	500	600	1	1						
900	720	250	300	600	700	1	1						

See Type AF contactors, page 1.9

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-11-**80**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations. Only side-mounted blocks are allowed to be factory installed. If auxiliary contacts are not required for A50 - A300, subtract $ 40 from list price and change catalog number to “00” instead of “11.”

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A300 — mounted on common baseplate

Power wiring is not included.

The NC electrical interlock is provided with the mechanical interlock for A9 - A110 contactors.

Coil voltage selection chart

		Volts																
Hz	Cntr type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A300 — mounted on common baseplate

The NC electrical interlock is provided with the mechanical interlock for A9 - A110 contactors.

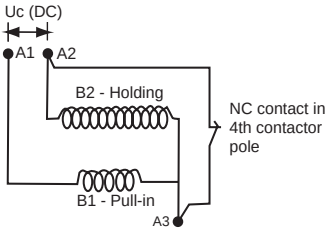
AE9 - AE110, DC operated
UL rated, 3 pole

Application

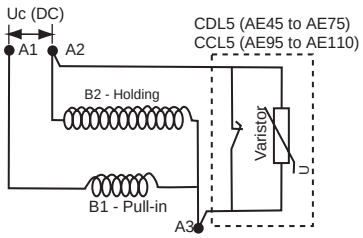
A-Line contactors are mainly used for controlling 3-phase motors and for controlling power circuits corresponding to their operating characteristics up to 690 and even 1000 VAC. and 440 VDC.

Control circuit types

AE types: with laminated magnetic circuit and double-winding coil fed from DC supply via a CDL5 insertion contact mounted on the device. The CDL5 has an NC lagging contact for insertion of the second winding. (See schematic.)



AE9 to AE40



AE45 to AE110

Quick mounting on DIN rail: EN 50022 and EN 50023 standards:

35 x 7.5mm for AE9 - AE40

35 x 15mm for AE9 - AE75

75mm for AE45 - AE110

Location of side mounted accessories: on right or left hand side. Factory mounted on left hand side for CAL5 on A50 - A300

- right hand side for CDL5/CCL5 on AE45 - AE110

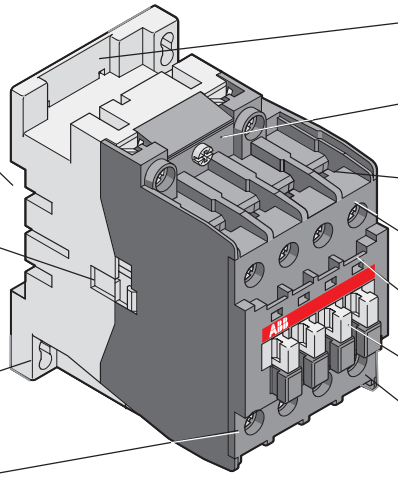
Holes for screw mounting (screws not supplied). Distance between holes according to EN 50003.

Terminals delivered in open position with captive screws (unused terminal screws must be tightened).

Screwdriver guidance for all terminals makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 - Part. 100.

All AE9 - AE40 contactor terminals as well as AE45 - AE110 contactor auxiliary contact and coil terminals ensure IP20 degree of protection according to IEC 947-1.



AE9 - AE110

Location of surge suppressors.

Clear marking of coil voltages and frequencies.

Connecting point for control leads in top part of main terminals of AE50 - AE75 contactors. For AE95 & AE110 contactors these are additional power connections.

Terminal marking according to IEC 947-4-1, EN 50005, EN 50012 and NEMA standards.

Location of function marker.

Stops for attaching front mounted accessories.

Terminal screws:

- Posidrive (+,-) No° 2 for all AE9 - AE75
- M8 hex threaded socket screw for AE95 & AE110

Catalog number explanation

AE9-30-00-81

Frame size

Power pole

30 = 3 NO
40 = 4 NO
22 = 2 NO & 2 NC

Coil voltage
(see coil voltage selection chart)

Auxiliary contacts

00 = No auxiliary provided
11 = 1 NO & 1 NC

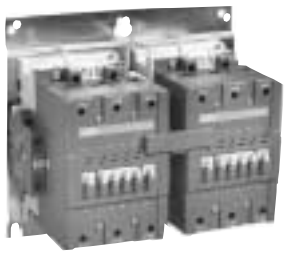
Coil voltage selection chart

Hz	Contr. type	Volts						
		12	24	48	110	125	220	240
DC	AE	80	81	83	86	87	88	89

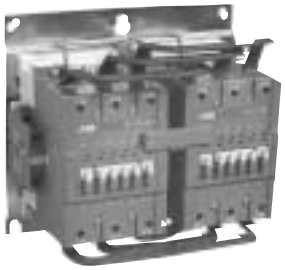
For other voltages, see page 1.26.

AE9 - AE110, DC operated
UL rated, 3 pole

AE26-30-11-81



AE110M-30-11-81



AE110R-30-11-81

General purpose current	UL motor switching current	Maximum motor horsepower ratings				Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		208V	240V	480V	575/600V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
AC1			UL rated										
21	9	2	2	5	7.5	1	1	AE9-30-11-81	**118**	AE9M-30-11-81	**335**	AE9R-30-11-81	**395**
25	11	3	3	7.5	10	1	1	AE12-30-11-81	**124**	AE12M-30-11-81	**395**	AE12R-30-11-81	**455**
30	17	5	5	10	15	1	1	AE16-30-11-81	**142**	AE16M-30-11-81	**425**	AE16R-30-11-81	**493**
40	28	7.5	10	20	25	1	1	AE26-30-11-81	**223**	AE26M-30-11-81	**485**	AE26R-30-11-81	**560**
50	34	10	10	25	30	1	1	AE30-30-11-81	**292**	AE30M-30-11-81	**628**	AE30R-30-11-81	**703**
60	42	10	15	30	40	1	1	AE40-30-11-81	**337**	AE40M-30-11-81	**719**	AE40R-30-11-81	**830**
80	54	15	20	40	50	1	1	AE50-30-11-81	**375**	AE50M-30-11-81	**803**	AE50R-30-11-81	**930**
90	65	20	25	50	60	1	1	AE63-30-11-81	**477**	AE63M-30-11-81	**1080**	AE63R-30-11-81	**1200**
105	80	25	30	60	75	1	1	AE75-30-11-81	**518**	AE75M-30-11-81	**1365**	AE75R-30-11-81	**1493**
125	95	30	30	60	75	1	1	AE95-30-11-81	**555**	AE95M-30-11-81	**1440**	AE95R-30-11-81	**1635**
140	110	30	40	75	100	1	1	AE110-30-11-81	**690**	AE110M-30-11-81	**1785**	AE110R-30-11-81	**2048**
230	130	40	50	100	125	1	1						
250	156	50	60	125	150	1	1						
300	192	60	75	150	200	1	1						
350	248	75	100	200	250	1	1						
400	302	100	100	250	300	1	1						
550	414	125	150	350	400	1	1						
650	480	150	200	400	500	1	1						
750	590	200	250	500	600	1	1						
900	720	250	300	600	700	1	1						

See AF contactors, page 1.9

Coil voltage selection

All DC operated catalog numbers include a 24VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 110V coil is required for an AE75 contactor: AE75-30-11-**86**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.4. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked ocntactors mounted as follows with line and load terminals:

- AE9 - AE16 — mounted on 35mm DIN rail
- AE26 - AE110 — mounted on common baseplate

Power wiring is not included.

The NC electrical interlock is provided with the mechanical interlock.

Coil voltage selection chart

Hz	Contr. type	Volts						
		12	24	48	110	125	220	240
DC	AE	80	81	83	86	87	88	89

For other voltages, see page 1.26.

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- AE9 - AE16 — mounted on 35mm DIN rail
- AE26 - AE110 — mounted on common baseplate

The NC electrical interlock is provided with the mechanical interlock.

BC9 - BC30, DC operated
UL rated, 3 pole

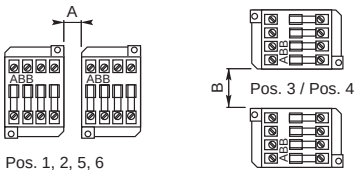
Application
Type BC contactors are used for controlling 3 phase motors and for controlling power circuits corresponding to their operating characteristics up to 690 VAC and 440 VDC.

Description
For BC type contactors, make sure that the mounting distance is maintained as described below.

The add-on or built in auxiliary contacts are suitable for low level currents.

Mounting distance

A dim	B dim	Ambient temperature °C	Max. switching frequency operating cycles/hr
2	20	≤20	1200
5	20	≤55	1200



Type of magnetic circuit
- Solid magnetic circuit with DC powered coil.

Contact types
- 3 pole contactors with built in NO or NC auxiliary contact for BC9 - BC30 contactors.
- 4 pole contactors: 4 NO or 2 NO & 2 NC without any auxiliary contacts.

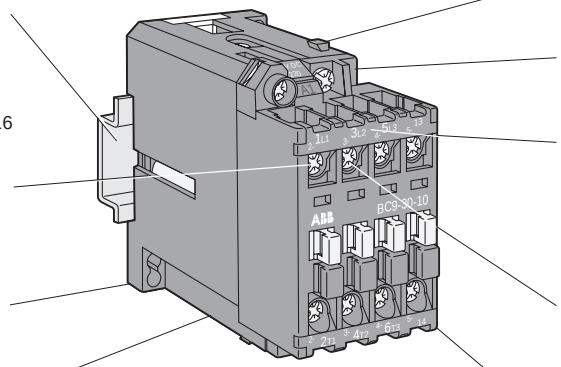
Contactors for specific applications
- DC operated TBC-types with large voltage range specific to the traction industry.

Quick mounting on mounting rail according to IEC 715 and EN 50022 standards:
- 35 x 7.5mm
- 35 x 15mm

Terminal screw types:
- Posidrive (+,-) No 2; M3.5 for all BC9 and BC16 terminals and BC25 - BC30 coil terminals.
- Posidrive (+,-) No 2; M4 for BC25 main terminals.
- Posidrive (+,-) No 2; M5 for BC30 main terminals.

Holes for screw mounting (screws not supplied). Distance between holes according to EN 50003.

Stops for attaching front mounted accessories.



BC9 - BC30

Dove tail anchoring for surge suppressor assembly.

Clear marking of coil DC voltage.

Terminal marking according to IEC 947-4-1, EN 50005, EN 50012 and NEMA standards.

Terminals delivered in open position with captive screws (screws of unused terminals must be tightened). Screwdriver guidance for all terminals makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106-Part. 100.

Location of function marker.

Catalog number explanation

BC9-30-10-01

Frame size

Power pole

30 = 3 NO
40 = 4 NO
22 = 2 NO & 2 NC

Coil voltage

(see coil voltage selection chart)

Auxiliary contacts

10 = 1 NO & 0 NC
01 = 0 NO & 1 NC

Coil voltage selection chart

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240
DC	BC	07	01	16	04		27		05	33

For other voltages, see page 1.26.

BC9 - BC30, DC operated
UL rated, 3 pole

BC16-30-10-01

BC25-30-01-04

BC Contactors

General purpose current	UL motor switching current	Maximum motor horsepower ratings (UL) (CSA)				Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		208V	240V	480V	575/600V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
AC1		UL rated											
21	9	2	2	5	7.5	1 0	0 1	BC9-30-10-01 BC9-30-01-01	**$ 123**	BC9M-30-10-01 BC9M-30-01-01	**$ 345**	BC9R-30-10-01 BC9R-30-01-01	**$ 405**
30	17	5	5	10	15	1 0	0 1	BC16-30-10-01 BC16-30-01-01	**147**	BC16M-30-10-01 BC16M-30-01-01	**435**	BC16R-30-10-01 BC16R-30-01-01	**503**
40	28	7.5	10	20	25	1 0	0 1	BC25-30-10-01 BC25-30-01-01	**228**	BC25M-30-10-01 BC25M-30-01-01	**495**	BC25R-30-10-01 BC25R-30-01-01	**570**
50	34	10	10	20	30	1 0	0 1	BC30-30-00-01 BC30-30-22-01	**267** **297**	BC30M-30-10-01 BC30M-30-01-01	**668**	BC30R-30-10-01 BC30R-30-01-01	**743**

Coil voltage selection

All DC operated catalog numbers include a 24VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 220V coil is required for an BC30 contactor: BC30-30-10-**05**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.6. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Coil voltage selection chart

Hz	Cntr type	Volts								
		12	24	48	110	120	125	208	220	240
DC	BC	07	01	16	04		27		05	33

For other voltages, see page 1.26.

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- BC9 & BC16 — mounted on 35mm DIN rail
- BC25 & BC30 — mounted on common baseplate

Power wiring is not included.

The NC electrical interlock is provided

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted with line and load terminals.

AF50 - AF750, AC & DC operated
UL rated, 3 pole

Application

A-Line contactors are mainly used for controlling 3-phase motors and for controlling power circuits corresponding to their operating characteristics up to 690 and even 1000 VAC. and 440 VDC.

Description of 3 pole contactors AF50 - AF750

All AF contactors can be assembled side by side. The add-on auxiliary contacts are suitable for low level currents.

Control circuit types

- AF types: AC/DC operated with laminated magnetic circuit.

Contact or types

- 3 pole contactors with 1 NO or 1 NC factory assembled auxiliary contacts for AF50 - AF750 contactors

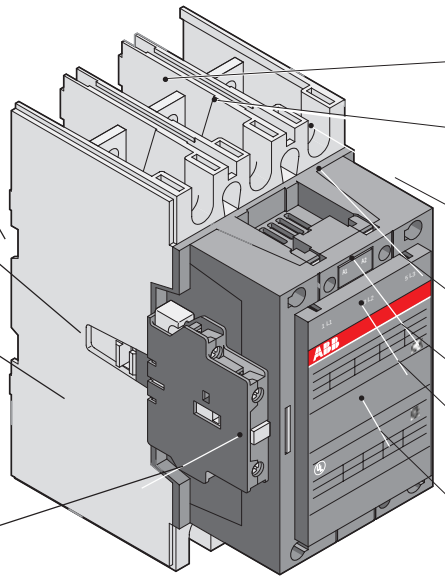
Quick mounting on DIN rail: EN 50022 and EN 50023 standards:

35 x 15mm for AF50 - AF75

75mm for AF50 - AF110

Location of side mounted accessories: on right or left hand side. Factory mounted on left hand side for CAL5 on AF50 - AF750

Holes for screw mounting (screws not supplied). Distance between holes according to EN 50003.



AF50 - AF750

Surge suppressors built in as standard on the printed circuit board.

Clear marking of coil voltages and frequencies.

Connecting point for control leads in top part of main terminals of AF50 - AF75 contactors. For AF95 & AF110 contactors these are additional power connections.

Terminal marking according to IEC 947-4-1, EN 50005, EN 50012 and NEMA standards.

Location of function marker.

Stops for attaching front mounted accessories.

Terminals delivered in open position with captive screws (screws of unused terminals must be tightened).

Screwdriver guidance for all terminals makes it possible to use motorized screwdrivers.

All terminals provide protection against accidental direct contact with live parts according to VDE0106 - Part. 100.

All AF50- AF110 contactor terminals as well as AF50 - AF750 contactor auxiliary contact and coil terminals ensure IP20 degree of protection according to IEC 947-1.

Terminal screws:

- Posidrive (+,-) No 2 for all AF50 – AF75
- M8 hex threaded socket screw for AF95 – AF750 main terminals.

Catalog number explanation

AF50-30-11-70

Frame size

Power pole

30 = 3 NO
40 = 4 NO
22 = 2 NO & 2 NC

Coil voltage
(see coil voltage selection chart)

Auxiliary contacts

11 = 1 NO & 1 NC
00 = No auxiliary provided
22 = 2 NO & 2 NC

Coil voltage selection – AF50 to AF750

AC/DC VOLTS, 40 - 60 HZ

24 - 60 DC	20 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC	200 - 500 AC/DC
68 ①	72 ②	69 ③	70	71 ③

① AF400 – AF750, DC only.
② AF50 – AF300, DC only.
③ Available 4th quarter, 2001.

AF50 - AF750, AC circuit switching
AC & DC operated
UL rated, 3 pole


AF63-30-11-70


AF95-30-11-70


AF400-30-11-70


AF750-30-11-70

3 Pole

General purpose current AC1	UL motor switching current	Maximum UL Listed motor horsepower ratings				Standard auxiliary contacts		Non-reversing		Mechanically interlocked		Reversing	
		208V	240V	480V	575/600V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
80	54	15	20	40	50	1	1	AF50-30-11-70	**$ 450**	AF50M-30-11-70	**$ 953**	AF50R-30-11-70	**$ 1050**
90	65	20	25	50	60	1	1	AF63-30-11-70	**495**	AF63M-30-11-70	**1116**	AF63R-30-11-70	**1259**
105	80	25	30	60	75	1	1	AF75-30-11-70	**535**	AF75M-30-11-70	**1399**	AF75R-30-11-70	**1542**
125	95	30	30	60	75	1	1	AF95-30-11-70	**570**	AF95M-30-11-70	**1470**	AF95R-30-11-70	**1665**
140	110	30	40	75	100	1	1	AF110-30-11-70	**600**	AF110M-30-11-70	**1605**	AF110R-30-11-70	**1868**
230	130	40	50	100	125	1	1	AF145-30-11-70	**1110**	AF145M-30-11-70	**2655**	AF145R-30-11-70	**2670**
250	156	50	60	125	150	1	1	AF185-30-11-70	**1635**	AF185M-30-11-70	**3870**	AF185R-30-11-70	**3885**
300	192	60	75	150	200	1	1	AF210-30-11-70	**1980**	AF210M-30-11-70	**4545**	AF210R-30-11-70	**4560**
350	248	75	100	200	250	1	1	AF260-30-11-70	**2235**	AF260M-30-11-70	**5055**	AF260R-30-11-70	**5070**
400	302	100	100	250	300	1	1	AF300-30-11-70	**2385**	AF300M-30-11-70	**6030**	AF300R-30-11-70	**6045**
550	414	125	150	350	400	1	1	AF400-30-11-70	**3120**	AF400M-30-11-70	**6705**	AF400R-30-11-70	**6720**
650	480	150	200	400	500	1	1	AF460-30-11-70	**4425**	AF460M-30-11-70	**13,275**	AF460R-30-11-70	**13,290**
750	590	200	250	500	600	1	1	AF580-30-11-70	**6900**	AF580M-30-11-70	**18,375**	AF580R-30-11-70	**18,390**
900	720	250	300	600	700	1	1	AF750-30-11-70	**7200**	AF750M-30-11-70	**19,725**	AF750R-30-11-70	**19,740**

Coil voltage selection – wide range AC/DC coils

All catalog numbers include a 100-250V AC/DC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for a AF110 contactor: AF110-30-11-**68**

Coil voltage selection – AF50 to AF750

AC/DC VOLTS, 40 - 60 HZ

24 - 60 DC	20 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC	200 - 500 AC/DC
68 ①	72 ②	69 ③	70	71 ③

① AF400 – AF750, DC only.
② AF50 – AF300, DC only.
③ Available 4th quarter, 2001.

Contactors for ring tongue termination
A/E9 - A/AE110, AC & DC operated
UL rated, 3 pole

AC circuit switching AC1	Motor switching current AC3	UL/CSA horsepower ratings 240V	480V	575/600V	Auxiliary contacts NO	NC	AC operated Catalog number	List price	DC operated Catalog number	List price
21	9	2	5	7.5	1 0	0 1	A93010RT-84 A93001RT-84	**$ 81**	AE93010RT-81 AE93001RT-81	**$ 91**
25	11	3	7.5	10	1 0	0 1	A123010RT-84 A123001RT-84	**87**	AE123010RT-81 AE123001RT-81	**97**
30	17	5	10	15	1 0	0 1	A163010RT-84 A163001RT-84	**106**	AE163010RT-81 AE163001RT-81	**116**
40	28	10	20	25	1 0	0 1	A263010RT-84 A263001RT-84	**189**	AE263010RT-81 AE263001RT-81	**199**
80	54	20	40	50	0	0	A503000RT-84	**311**	AE503000RT-81	**356**
90	65	25	50	60	0	0	A633000RT-84	**354**	AE633000RT-81	**459**
105	80	30	60	75	0	0	A753000RT-84	**396**	AE753000RT-81	**501**
125	95	30	60	75	0	0	A953000RT-84	**466**	AE953000RT-81	**571**
140	110	40	75	100	0	0	A1103000RT-84	**543**	AE1103000RT-81	**753**

Coil voltage selection – AC coils

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the AC coils Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A753000RT-80

Coil voltage selection – DC coils

All DC operated catalog numbers include a 24VDC coil. To select other coil voltages, substitute the code from the DC coils Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 110V coil is required for an AE75 contactor: AE753000RT-86

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations. Only side-mounted blocks are allowed to be factory installed.

Auxiliary contact block with ring tongue termination

Positioning	Maximum number of contact blocks	Contact description	Catalog number	List price
Front mounting (C4-pole)	1 block A9 – A110	2 NO & 2 NC 3 NO & 1 NC 4 NO	CA5-22ERT CA5-31ERT CA5-40ERT	**$ 35**

Coil voltage selection chart – AC coils

Hz	Cntr type	Volts 12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection chart – DC coils

Hz	Contr. type	Volts 24	48	110	125	220	240
DC	AE	81	83	86	87	88	89

For other voltages, see page 1.26.

A9 – AF750, AC operated
NEMA rated, 3 pole


A26N1-30-10-84


A145N4-30-11-84


AF400N6-30-11-70

NEMA size	Continuous current	Maximum motor horsepower ratings (UL) (CSA)			Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		200V	230V	460/575V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
		NEMA rated										
00	9	1.5	1.5	2	1	0	A9N00-30-10-84	**$ 78**	A9N00M-10-84	**$ 255**	A9N00R-10-84	**$ 315**
0	18	3	3	5	1	0	A16N0-30-10-84	**102**	A16N0M-10-84	**345**	A16N0R-10-84	**413**
1	27	7.5	7.5	10	1	0	A26N1-30-10-84	**183**	A26N1M-10-84	**405**	A26N1R-10-84	**480**
2	45	10	15	25	1	1	A50N2-30-11-84	**330**	A50N2M-11-84	**713**	A50N2R-11-84	**810**
3	90	25	30	50	1	1	A75N3-30-11-84	**413**	A75N3M-11-84	**1155**	A75N3R-11-84	**1298**
4	135	40	50	100	1	1	A145N4-30-11-84	**825**	A145N4M-11-84	**2235**	A145N4R-11-84	**2250**
5	270	75	100	200	1	1	A260N5-30-11-84	**1815**	A260N5M-11-84	**4485**	A260N5R-11-84	**4500**
6	540	150	200	400	1	1	AF460N6-3011-70	**4425**	AF460N6M-11-70	**13,275**	AF460N6R-11-70	**13,290**
7	810	—	300	600	1	1	AF750N7-3011-70	**7200**	AF750N7M-11-70	**19,725**	AF750N7R-11-70	**19,740**

Coil voltage selection – A contactors

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-11-**80**

Coil voltage selection – wide range AC/DC coils

All catalog numbers include a 100-250V AC/DC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for a AF145 contactor: AF145N4-30-11-**68**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A750 — mounted on common baseplate

Power wiring is not included.

For A9 - A110 contactors the NC electrical interlock is provided with the mechanical interlock.

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A750 — mounted on common baseplate

For A9 - A750 contactors the NC electrical interlock is provided with the mechanical interlock.

Coil voltage selection chart – A contactors

Hz	Cntr type	Volts																
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection – AF50 to AF750

AC/DC VOLTS, 40 - 60 HZ

24 - 60 DC	20 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC	200 - 500 AC/DC
68 ①	72 ②	69 ③	70	71 ③

① AF400 – AF750, DC only.
② AF50 – AF300, DC only.
③ Available 4th quarter, 2001.

AE9 – AF750, DC operated
BC9 – BC25, DC operated
NEMA rated, 3 pole


AE26N1-30-11-81


AF145N4-30-11-68


AF460N6R-11-68

AE & AF Contactors

NEMA size	Continuous current	Maximum motor horsepower ratings (UL CSA)			Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		200V	230V	460/575V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
		NEMA rated										
00	9	1.5	1.5	2	1	0	AE9N00-30-11-81	**$ 118**	AE9N00M-11-81	**$ 335**	AE9N00R-11-81	**$ 395**
0	18	3	3	5	1	0	AE16N0-30-11-81	**142**	AE16N0M-11-81	**425**	AE16N0R-11-81	**493**
1	27	7.5	7.5	10	1	0	AE26N1-30-11-81	**223**	AE26N1M-11-81	**485**	AE26N1R-11-81	**560**
2	45	10	15	25	1	1	AE50N2-30-11-81	**375**	AE50N2M-11-81	**803**	AE50N2R-11-81	**930**
3	90	25	30	50	1	1	AE75N3-30-11-81	**518**	AE75N3M-11-81	**1365**	AE75N3R-11-81	**1493**
4	135	40	50	100	1	1	AF145N4-3011-68	**1110**	AF145N4M-11-68	**2655**	AF145N4R-11-68	**2670**
5	270	75	100	200	1	1	AF260N5-3011-68	**2235**	AF260N5M-11-68	**5055**	AF260N5R-11-68	**5070**
6	540	150	200	400	1	1	AF460N6-3011-68	**4425**	AF460N6M-11-68	**13,275**	AF460N6R-11-68	**13,290**
7	810	—	300	600	1	1	AF750N7-3011-68	**7200**	AF750N7M-11-68	**19,725**	AF750N7R-11-68	**19,740**

BC Contactors

NEMA size	Continuous current	Maximum motor horsepower ratings (UL CSA)			Standard Aux. contacts		Non-reversing		Mechanically interlocked		Reversing	
		208V	240V	460/575V	NO	NC	Catalog number	List price	Catalog number	List price	Catalog number	List price
		NEMA rated										
00	9	1.5	1.5	2	1	0	BC9N00-30-10-01	**$ 123**	BC9N00M-10-01	**$ 345**	BC9N00R-10-01	**$ 405**
0	18	3	3	5	1	0	BC16N0-30-10-01	**147**	BC16N0M-10-01	**435**	BC16N0R-10-01	**503**
1	27	7.5	7.5	10	1	0	BC25N1-30-10-01	**228**	BC25N1M-10-01	**495**	BC25N1R-10-01	**570**

Coil voltage selection – A contactors

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-11-**80**

Coil voltage selection – wide range AC/DC coils

All catalog numbers include a 100-250V AC/DC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for a AF145 contactor: AF145N4-30-11-**68**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Mechanical interlock

Mechanically interlocked contactors are designed for reversing, 2 speed, reduced voltage, etc. type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A110 — mounted on common baseplate

Power wiring is not included.

For A9 - A110 contactors the NC electrical interlock is provided with the mechanical interlock.

Reversing

Reversing contactors are designed for reversing type starter applications. The complete assembly consists of two mechanically and electrically interlocked contactors mounted as follows with line and load terminals:

- A9 - A16 — mounted on 35mm DIN rail
- A26 - A110 — mounted on common baseplate

For A9 - A110 contactors the NC electrical interlock is provided with the mechanical interlock.

Coil voltage selection – AF50 to AF750

AC/DC VOLTS, 40 - 60 HZ

24 - 60 DC	20 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC	200 - 500 AC/DC
68 ①	72 ②	69 ③	70	71 ③

Coil voltage selection chart – BC contactors

Hz	Cntr type	Volts								
		12	24	48	110	120	125	208	220	240
DC	BC	07	01	16	04		27		05	33

Coil voltage selection chart – AE contactors

Hz	Contr. type	Volts						
		12	24	48	110	125	220	240
DC	AE	–	81	83	86	87	88	89
DC	BC	07	01	16	04	27	05	33

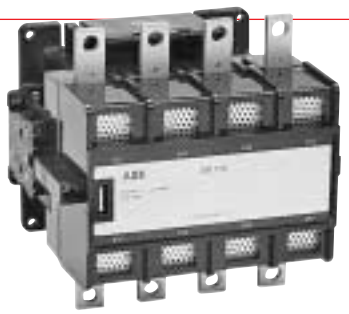
① AF400 – AF750, DC only.
② AF50 – AF300, DC only.
③ Available 4th quarter, 2001.

Discount schedule AA - A9 - A110
Discount schedule AEA - A145 - AF750

A9 – A/AE75 , EK110 – EK1000, BC9 – BC25
AC & DC operated
UL rated, 4 pole


A9-40-00


A26-40-00


EK175C4P-PL

4 Pole – 4 NO power poles

UL general purpose current		AC operated		DC operated	
AC operated	DC operated	Catalog number	List price	Catalog number	List price
21	21	A9-40-00-84	**$ 120**	BC9-40-00-04	**$ 165**
30	21	A16-40-00-84	**165**	BC16-40-00-04	**210**
40	30	A26-40-00-84	**228**	BC25-40-00-04	**273**
65	65	A45-40-00-84	**360**	AE45-40-00-86	**420**
80	80	A50-40-00-84	**413**	AE50-40-00-86	**473**
105	105	A75-40-00-84	**525**	AE75-40-00-86	**570**
150	150	EK110C4P-1L	**743**	EK110C4P-PL	**953**
200	200	EK150C4P-1L	**1013**	EK150C4P-PL	**1238**
250	250	EK175C4P-1L	**1763**	EK175C4P-PL	**1988**
300	300	EK210C4P-1L	**2025**	EK210C4P-PL	**2280**
400	400	EK370C4P-1L	**4650**	EK370C4P-PL	**5010**
600	600	EK550C4P-1L	**6510**	EK550C4P-PL	**7005**
1000 ①	1000 ①	EK1000C4P-1L	**9000**	EK1000C4P-PL	**9700**

4 Pole – 4 NC power poles

UL general purpose current	AC operated	
AC operated	Catalog number	List price
30	A16-04-00-84	**$ 165**

4 Pole - 2 NO & 2 NC power poles

UL general purpose current		AC operated		DC operated	
AC operated	DC operated	Catalog number	List price	Catalog number	List price
21	21	A9-22-00-84	**$ 120**	BC9-22-00-04	**$ 165**
30	21	A16-22-00-84	**165**	BC16-22-00-04	**210**
40	30	A26-22-00-84	**228**	BC25-22-00-04	**273**
65	65	A45-22-00-84	**360**	AE45-22-00-04	**420**
105	105	A75-22-00-84	**525**	AE75-22-00-04	**570**

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. All DC operated catalog numbers include a 110VDC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 240V coil is required for an A75 contactor: A75-30-00-**80**

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $ 20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Accessories for EK

Please consult factory.

Coil voltage selection chart – BC contactors

Hz	Cntr type	Volts								
		12	24	48	110	120	125	208	220	240
DC	BC	07	01	16	04		27		05	33

For other voltages, see page 1.26.

Coil voltage selection chart – A contactors

Hz	Cntr type	Volts															
		12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Coil voltage selection chart – EK contactors

Hz	Contr. type	Volts															
		24	48	110	120	125	208	220	240	277	380	415	440	480	500	600	
60	EK	F	G		1		B		2	C	Z		3	4		6	
50	EK	N		1				J			3	M			5		
DC	EK	Y	W	P		Q		R					T				

- For other voltages, consult factory.
- 24 & 48VAC coils are not available for sizes EK550. For these applications, use an interposing control relay.

Coil voltage selection chart – AE contactors

Hz	Contr. type	Volts						
		12	24	48	110	125	220	240
DC	AE	–	81	83	86	87	88	89

For other voltages, see page 1.26.

① Not UL Listed. IEC value AC1 for 40°C.

AF45 - AF75, AC circuit switching
AC & DC operated
UL rated, 4 pole

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.8. Add $ 20 to the list price for each additional auxiliary and see page 1.18 for available combinations. If auxiliary contacts are required for AF50 – AF750 contactors, add $ 40 to the list price and change the 8th & 9th digits in the catalog number from "00" to "11".

4 Pole — 4 NO power poles

General purpose AC1	Auxiliary contacts NO	Auxiliary contacts NC	Catalog number	List price
65	0	0	AF45-40-00-70	**$ 385**
80	0	0	AF50-40-00-70	**435**
105	0	0	AF75-40-00-70	**645**

4 Pole — 2 NO - 2 NC power poles

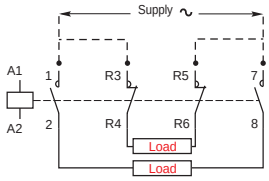
General purpose AC1	Auxiliary contacts NO	Auxiliary contacts NC	Catalog number	List price
65	0	0	AF45-22-00-70	**$ 385**
105	0	0	AF75-22-00-70	**645**

These contactors (2 NO & 2 NC power poles) can be used for controlling either 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with 1 single supply (see diagrams below).

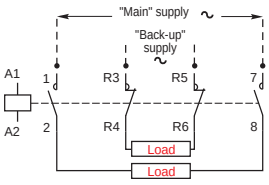
When the contactor operates, there is no mechanical overlapping between the NO main poles and NC main poles: Break before Make.

These contactors (2 NO & 2 NC power poles) are not suitable for a reversing starter or a wye-delta starter or for controlling a single load from 2 separate supplies.

1 single supply and 2 separate loads



2 separate supplies and 2 separate loads



Coil voltage selection – wide range AC/DC coils

All catalog numbers include a 100-250V AC/DC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Ex.: A 24V coil is required for a AF45 contactor: AF45-22-00-**72**

Coil voltage selection – AF50 to AF75

AC/DC VOLTS, 40 - 60 HZ				
24 - 60 DC	20 - 60 DC	48 - 130 AC/DC	100 - 250 AC/DC	200 - 500 AC/DC
68 ①	72 ②	69 ③	70	71 ③

① AF400 – AF750, DC only.
② AF50 – AF300, DC only.
③ Available 4th quarter, 2001.

UA26 – UA110, AC operated
for 3 phase capacitor switching, 3 pole


UA75-30-00-84


UA95-30-00-84

Max kvar switching capacity			Standard auxiliary contacts		Catalog number	List price
240V	480V	575/600V	NO	NC		
12.5	25	30	1	0	UA26-30-10-84	**$ 225**
16	32	40	1	0	UA30-30-10-84	**338**
20	40	50	0 1	0 1	UA50-30-00-84 UA50-30-11-84	**345** **375**
27.5	55	70	0 1	0 1	UA75-30-00-84 UA75-30-11-84	**450** **480**
35	70	75	0 1	0 1	UA95-30-00-84 UA95-30-11-84	**465** **495**
40	80	85	0 1	0 1	UA110-30-00-84 UA110-30-11-84	**525** **570**

For 3 phase capacitors carrying out single bank or stepped bank compensation.
Max. peak current Î: 100 times the capacitor nominal r.m.s. current at U_e ≤500V or 90 times for U_e>500V
Electrical durability: 100,000 operating cycles.

Power in kvar

Contactor	208V	240V	480V	600V	Max amps	Peak current
UA26	10.5	12.5	25	30	30.1	3000
UA30	13.5	16.0	32	40	38.4	3500
UA50	17.0	20.0	40	50	48.0	5000
UA75	24.0	27.5	55	70	67.0	7500
UA95	30.0	35.0	70	75	84.2	9300
UA110	35.0	40.0	80	85	96.2	10500
A145	45.0	50.0	90	110	126	4000
A185	55.0	60.0	115	135	126.0	5000
A210	65.0	75.0	135	160	151	6500
A260	75.0	85.0	155	200	176.0	8000
A300	85.0	100.0	180	240	201.1	8000
AF400	Consult factory					10000
AF460						10000
AF580						12000
AF750						12000

A/AF contactors max peak current Î 30 times the capacitor nominal r.m.s. current.

Coil voltage selection

All AC operated catalog numbers include a 120VAC coil. To select other coil voltages, substitute the code from the Coil Voltage Selection Chart for the two digits after the last dash in the catalog number.

Auxiliary contact blocks

For additional auxiliary contact blocks, see catalog number explanation on page 1.2. Add $20 to list price for each additional auxiliary, and see page 1.18 for available combinations.

Coil voltage selection chart

		Volts																
Hz	Cntr type	12	24	48	110	120	125	208	220	240	277	380	415	440	480	500	600
60	A		81	83	84	84		34	36	80	42		86	86	51	53	55
50	A		81	83	84				80			85	86			55	

For other voltages, see page 1.26.

Accessories
for A/AF/BC & AE contactors

CAL5-11

CA5-10

Auxiliary contact blocks – Standard

Positioning	Maximum number of contact blocks	Contact Description	Catalog number	List price
Front mounting (single pole)	4 blocks: A9 – A26 AE9 – AE30 BC9 – BC30 5 blocks: A30, A40 6 blocks: A45 – A110 AE45 - AE110	1 N.O. 1 N.C. 1 N.O. Early make 1 N.C. Late break	CA5-10 CA5-01 CC5-10 CC5-01	$ 15
Front mounting (4 pole)	1 block: A9 – A26-40-00 A30 – A110 AE9 – AE110 BC9 – BC30	4 N.O. 3 N.O. & 1 N.C. 2 N.O. & 2 N.C. 4 N.C. 2 N.O./2 N.C.①	CA5-40E CA5-31E CA5-22E CA5-04E CA5-11/11E	30
	1 block: A9 – A40-30-10 BC9 – BC25-30-10	3 N.O. & 1 N.C. 2 N.O. & 2 N.C. 4 N.C. 2 N.O./2 N.C.①	CA5-31M CA5-22M CA5-04M CA5-11/11M	
Side mounting (2 pole)	2 blocks: A9 – A110 1 block: AE9 – AE110	1 N.O. & 1 N.C.	CAL5-11	
	2 blocks: A145 – AF750 2 blocks: A145 – AF750	1 N.O. & 1 N.C. (inside L or R) 1 N.O. & 1 N.C. (outside, L or R)	CAL5-11 CAL5-11B	

Auxiliary contact blocks – Front mounting, switching low voltage and low current

Positioning	Maximum number of contact blocks	Contact Description	Degree of protection	Catalog number	List price
Front mounting (single pole)	4 blocks: A9 – A26 AE9 – AE30 BC9 – BC30	1 N.O. 1 N.C. 1 N.O. 1 N.C.	IP40 IP40 IP40 IP40	CE5-10D0.1 CE5-01D0.1 CE5-10D2 CE5-01D2	$ 38
	5 blocks: A30, A40 6 blocks: A45 – A110 AE45 - AE110	1 N.O. 1 N.C. 1 N.O. 1 N.C.	IP67 IP67 IP67 IP67	CE5-10W0.1 CE5-01W0.1 CE5-10W2 CE5-01W2	42

① Includes 1 N.O. & 1 N.C. overlapping

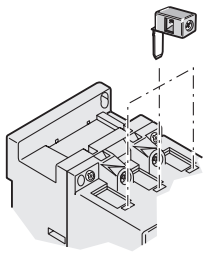
Accessories
for A/AF/BC & AE contactors


TP40DA


VE5-1


VM300H


LK75-A LK75-A1 LK110



Pneumatic timers

Mounting on	Timing range	Contacts N.O.	Contacts N.C.	Catalog number	List price
A9 – A75 AE9 – AE75	On delay 0.1 – 40 s On delay 10 – 180 s Off delay 0.1 – 40 s Off delay 10 – 180 s	1 1 1 1	1 1 1 1	TP40DA TP180DA TP40IA TP180IA	$ 108

Interlocks for two horizontally mounted contactors – A9 - A110, BC contactors

Feature	Mounting on	Contacts N.O.	Contacts N.C.	Catalog number	List price
Mechanical/electrical	A9 – A40	—	2	VE5-1	$ 45
Mechanical/electrical	A45 – A110	—	2	VE5-2	45
Mechanical	A9 – A40	—	—	VM5-1	21
Mechanical/electrical	BC9 – BC30	—	2	VBC30	27

Note: Use type VE 5-2 for mechanical and electrical interlocking between contactors A40 and A50.

Interlocks for two horizontally mounted contactors – A95 - AF750 contactors

Feature	Left/Right contactors	Left/Right contactors	Catalog number	List price
Mechanical	A95 – A300	A145 – A300	VM300H	$ 110
Mechanical	A210 – A300	AF400 – AF460	VM300/460H	130
Mechanical	AF400 – AF750	AF400 – AF750	VM750H	150

Interlocks for two vertically mounted contactors – A95 - AF750 contactors

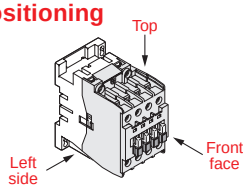
Feature	Top contactor	Bottom Contactor	Catalog number	List price
Mechanical	A95 – A300	A145 – A300	VM300V	$ 205
Mechanical	A210 – A300	AF400 – AF460	VM300/460V	250
Mechanical	AF400 – AF750	AF400 – AF750	VM750V	270

Auxiliary lead terminals

Connections	Mounting on	Catalog number	List price
Connects from side	A50 – A75	LK75-A	$ 15
Connects from top	A50 – A75	LK75-A1	15
Connects from side	A95 – A110	LK110	23

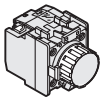
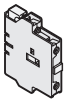
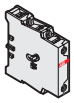
Accessories
Possible accessory combinations for A contactors

Positioning



Accessories — Front face mounting			Accessories — Side mounting		
Auxiliary contacts 1 – pole	Auxiliary contacts 4 – pole	Pneumatic timers	Auxiliary contacts	Electrical or mechanical interlock①	
CA5-10 or CA5-01	CA5-40 or CA5-22 or CA5-31	TP – D or TP – I	CAL 5-11 CAL5-11B	VE5-1 or VM 5-1	VE 5-2 VM300H VM300/460H VM750H

Configurations of accessories are different depending on whether front or side mounted.

N Contactor relays A and AE Contactors			Accessories — Front mounting				Accessories — Side mounting		
			Auxiliary contact blocks		TP - A Pneumatic timer block		Auxiliary contact Blocks		Interlock units
Type	Main poles	Built-in auxiliary contacts	1-pole CA5-	4-pole CA5-			2-pole CAL5-11		
									
A9 – A26	– 3 0	– 1 0	1 to 4 **CA5-** 1-pole blocks	or 1 **CA5-** 4-pole block	or 1 **TP - A** block	+	1 to 2 **CAL5-11** blocks	or	1 $V^{M}/_{E}$ **5-1** block + 1 **CAL5-11** block
A9 – A26	– 3 0	– 0 1 ①							
A9 – A26	– 4 0	– 0 0							
A9 – A26	– 2 2	– 0 0 ①							
A9 – A16	– 3 0	– 2 2	—	—	—	+	1 to 2 **CAL5-11** blocks	or	1 $V^{M}/_{E}$ **5-1** block + 1 **CAL5-11** block
A9 – A26	– 3 0	– 3 2							
A30, A40	– 3 0	– 1 0	1 to 5 **CA5-** 1-pole blocks	or 1 **CA5-** 4-pole block + 1 **CA5-** 1-pole block	or 1 **TP - A** block + 1 **CA5-** 1-pole block	+	1 to 2 **CAL5-11** blocks	or	1 $V^{M}/_{E}$ **5-1** block + 1 **CAL5-11** block
A30, A40	– 3 0	– 0 1							
A30, A40	– 3 0	– 3 2	1 **CA5-** 1-pole block	—	—	+	1 to 2 **CAL5-11** blocks	or	1 $V^{M}/_{E}$ **5-1** block + 1 **CAL5-11** block
A50 – A75	– 3 0	– 0 0	1 to 6 **CA5-** 1-pole blocks	or 1 **CA5-** 4-pole block + 2 **CA5-** 1-pole blocks	or 1 **TP - A** block + 2 **CA5-** 1-pole blocks —	+	1 to 2 **CAL5-11** blocks	or	1 **VE5-2** block + 1 **CAL5-11** block
A45 – A75	– 4 0	– 0 0							
A45, A75	– 2 2	– 0 0 ②							
A95, A110	– 3 0	– 0 0							
A50 – A75	– 3 0	– 2 2	2 **CA5-** 1-pole blocks	—	—	+	1 to 2 **CAL5-11** blocks	or	1 **VE5-2** block + 1 **CAL5-11** block
A95, A110	– 3 0	– 2 2							
AE50 – AE75	– 3 0	– 0 0	1 to 6 **CA5-** 1-pole blocks	or 1 **CA5-** 4-pole block + 2 **CA5-** 1-pole blocks	or 1 **TP - A** block + 2 **CA5-** 1-pole blocks —	+	1 **CAL5-11** block	or	1 **VE5-2** block
AE45 – AE75	– 4 0	– 0 0							
AE45, AE75	– 2 2	– 0 0 ②							
AE95, AE110	– 3 0	– 0 0							
A50 – A75	– 3 0	– 1 1	1 to 6 **CA5-** 1-pole blocks	or 1 **CA5-** 4-pole block + 2 **CA5-** 1-pole blocks	or 1 **TP - A** block + 2 **CA5-** 1-pole blocks —	+	1 **CAL5-11** block — 1 **CAL5-11** block —	or	1 **VE5-2** block — or 1 **VE5-2** block —
AE50, AE75	– 3 0	– 1 1							
A95, A110	– 3 0	– 1 1							
AE95, AE110	– 3 0	– 1 1							
A145 – AF750	– 3 0	– 0 0	—	—	—		1 to 2 **CAL5-11** blocks + 1 to 2 **CAL5-11B** blocks	or	1 **CAL5-11** block + 1 **CAL5-11B** block + **VM300H** or **VM300/750H** or **VM750H** interlock

Contactor mounting configurations (standard from factory)

Auxiliary contacts are mounted on the contactor in the following order:

Left – 1st
Right – 2nd
Top – 3rd (L to R)

① In mounting position 5 (see page 1.36), there should be no more than 2 "N.C." front-mounted auxiliary contacts – The **CAL 5-11** side-mounted blocks offer additional "N.C." contacts.
② Whatever the mounting position (see page 1.36), there should be no more than 2 "N.C." front-mounted auxiliary contacts – The **CAL 5-11** side-mounted blocks offer additional "N.C." contacts.

Accessories
Auxiliary contact block technical data
CA5/CAL5-11/CC5

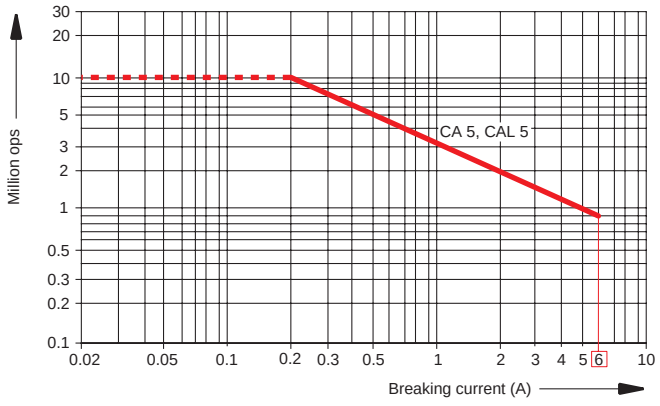
Types			1-pole **CA5**, 4-pole **CA5** 2-pole **CAL5-11** and 1-pole **CC5**
Standards			IEC 947-5-1 and EN 60947-5-1
Rated insulation voltage U_i			
according to IEC 947-5-1		**V**	690
according to UL/CSA		**V**	600
Rated operational voltage U_e		**~ V**	24 to 690
Conventional thermal current I_{th}		**A**	16
Rated operational current I_e			
in AC-15 acc. to IEC 947-5-1	24 to 127 V	**A**	6
	220 to 240 V	**A**	4
	380 to 440 V	**A**	3
	500 to 690 V	**A**	2
in DC-13 acc. to IEC 947-5-1	24 V	**A**	6
	48 V	**A**	2.8
	72 V	**A**	1
	125 V	**A**	0.55
	250 V	**A**	0.3
Connecting terminals (delivered in open position. Screws of unused terminals should be tightened).			M 3.5 (+,-) pozidriv 2 screw with cable clamp
Connecting capacity			
• **Rigid solid**	**1 or 2 x mm²**		1 to 4
• **Flexible with cable end**	**1 x mm²**		0.75 to 2.5
	2 x mm²		0.75 to 2.5
Mechanical durability		cycles	10 million
Max. switching frequency		cycles/h	3600
Electrical durability			See curve below
Max. switching frequency		cycles/h	1200
Rated making capacity			10 x I_e AC-15
Rated breaking capacity			10 x I_e AC-15
Rated short-time withstand current I_{cw}	1 s	**A**	100
q = 40 °C	0.1 s	**A**	140
Min. switching capacity			17 V / 5 mA
Short-circuit protection - gG (gl) fuses		**A**	10
Power loss per pole at 6 A		**W**	0.15
Degree of protection according to IEC 529, IEC 144, DIN 40 050 and NFC 20-010			IP 20

Electrical durability

AC-15 according to IEC 947-5-1
making current: 10 x I_e where cos φ = 0.7 and U_e
breaking current: I_e where cos φ = 0.4 and U_e

The curves opposite show the electrical durability of the auxiliary contact blocks according to breaking current I_c.

These curves have been plotted for resistive and inductive loads up to 690 V, 40 to 60 Hz.



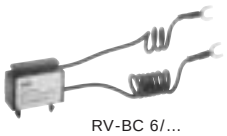
Accessories
Auxiliary contact block technical data
CE5

Auxiliary contact blocks for switching low level voltage and current

Types			CE5-10D0.1 CE5-01D0.1 CE5-10W0.1 CE5-01W0.1 Version 100 mA	CE5-10DZ CE5-01DZ CE5-10WZ CE5-01WZ Version 2 A
Standards			IEC 947-5-1 and EN 60947-5-1	
Approvals			UL / CSA	
Rated insulation voltage U_i				
according to IEC 947-5-1		**V**	250	250
according to UL/CSA		**V**	125	250
Rated operational voltage U_e		**V**	125	250
Rated operational current I_e				
in AC-15 or AC-14 acc. to IEC 947-5-1		**A**	0.1	2
in DC-12 acc. to IEC 947-5-1	24 V	**A**	0.1	2
	60 V	**A**	0.1	0.5
	110 V	**A**	0.1	0.2
	220 V	**A**	0.1	0.1
Minimal switching			3 V / 1 mA	17 V / 5 mA
Reliability for the minimal switching			10^{-8}	
Connecting terminals			M3.5 (+,-) posidriv 2 screw with cable clamp	
Connecting capacity				
• Rigid solid			1 ou 2 (1...4) mm^2	
• Flexible with cable end			1 ou 2 (0.75... 2.5) mm^2	
Short circuit protection			100 mA	10 A
Degree of protection				
according to IEC529, IEC 144, DIN 40 050, NFC 20-010			IP 20	
Mounting			Front mounting on contactors: A, AE, TAE9...110, BC, TBC, AF, GA, N, NE KC and TKC with the same limitations than those of CA5-01	
Dimensions			Identical to those of CA5 single pole	

Accessories
Surge suppressors for A/AE/BC/EK contactors


RT 7/...


RV-BC 6/...

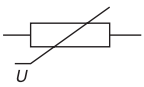
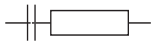
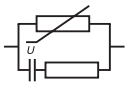

RV 5/50


RC 5-1/150

Surge suppression device

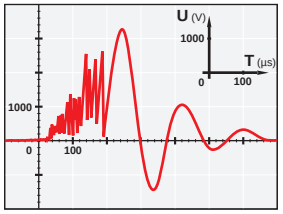
Mounting on	Voltage range	Catalog number	List price
BC9 to BC30	12 – 32 VDC	RT7/32	$ 26
	25 – 65 VDC	RT7/65	
	50 – 90 VDC	RT7/90	
	77 – 150 VDC	RT7/150	
	150 – 264 VDC	RT7/264	
BC9 to BC30	24 – 60 VDC	RV-BC6/60	
	50 – 127 VDC	RV-BC6/127	
	110 – 250 VDC	RV-BC6/250	
	200 – 420 VDC	RV-BC6/380	
AE9 to AE110	12 – 32 VDC	RT5/32	30
	25 – 65 VDC	RT5/65	
	50 – 90 VDC	RT5/90	
	77 – 150 VDC	RT5/150	
	150 – 264 VDC	RT5/264	
A9 to A110 and AE9 to AE110	24 – 50 VAC/VDC	RV5/50	
	50 – 133 VAC/VDC	RV5/133	
	110 – 250 VAC/VDC	RV5/250	
	250 – 440 VAC/VDC	RV5/440	
A9 to A40	24 – 50 VAC	RC5-1/50	
	50 – 133 VAC	RC5-1/133	
	110 – 250 VAC	RC5-1/250	
	250 – 440 VAC	RC5-1/440	
A45 to A300	24 – 50 VAC	RC5-2/50	
	50 – 133 VAC	RC5-2/133	
	110 – 250 VAC	RC5-2/250	
	250 – 440 VAC	RC5-2/440	
EK110 to EK210	24 – 48 VAC	RC-EH250/48	26
	110 – 415 VAC	RC-EH250/415	
EK370 to EK550	48 – 110VAC	RC-EH800/110	
EK110 to EK550	24 – 125VAC	RC-EH800/110	
EK370 to EK550	220 – 600VAC	RC-EH800/600	

Technical data

Type		Control circuit	Opening time growth factor	Residual overvoltage or clipping voltage	Remarks	
RT 7 or RT 5 /... transil diode					Advantages	• Good energy absorption
	32	DC		50 V		• Unpolarized system
	65	DC		100 V		• Simple, reliable system
	90	DC	2.5 to 3	150 V	Drawback	• A certain delay on drop out which does not however reduce contactor breaking capacity.
	150	DC		210 V		
	264	DC		390 V		
Varistor	**RV-BC 6 /...**				Advantages	• High energy absorption: good damping
	60	DC		137 V		• Unpolarized system
	127	DC	1.1 to 1.5	305 V		
	250	DC		510 V		
	380	DC		730 V	Drawback	• Clipping as from U_{vdr}*, thus voltage front up to this point.
	RV 5/...					
	50	AC/DC		132 V		
	133	AC/DC	1.1 to 1.5	270 V		
	250	AC/DC		480 V		
	440	AC/DC		825 V		
RC 5-1/... or RC 5-2/... **RC-EH 300/...** }	see table above	AC	1.2 to 3	2 to 3 x U_C	Advantages	• Very fast clipping • Attenuation of steep fronts and thus of high frequencies • No operating delays
						
Varistor + RC	**RC-EH ...**				Advantages	• High energy absorption: good damping
	800/110	AC/DC	1.1 to 1.5	205 V		• Unpolarized system
	800/600	AC		1100 V		• The RC system damps the voltage front under the U_{vdr}* threshold.

*U_{vdr} = Varistor operating voltage (voltage dependent resistor), tolerance ± 10%

Accessories
Surge suppressors for A/AE/BC/EK contactors



General

The operation of inductive circuits causes overvoltages, in particular on opening of the contactor coil.

The electromagnetic energy stored by the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components.

The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42V/50Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope a damped oscillation emerges with a peak value of 3500V.

Overvoltage factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value $\hat{U}_S$ to the peak value $\hat{U}_C$ of the coil rated control voltage U_C:

$$k = \frac{\hat{U}_s \text{ max.}}{\hat{U}_c}$$ in DC: $$k = \frac{\hat{U}_s \text{ max.}}{U_c}$$ or in AC: $$k = \frac{\hat{U}_s \text{ max.}}{U_c\sqrt{2}}$$

For example the following is obtained for the above graph: $$k = \frac{3500}{42\sqrt{2}} \approx 60$$

Surge suppressors

To guard against the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

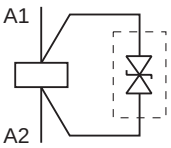
Each case is different, but the technical data tolerances and the generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

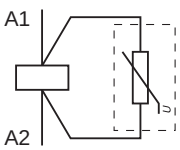
Note: A varistor is a resistor whose value increases to a very large extent when a certain voltage is applied at its terminals.

Wiring diagrams

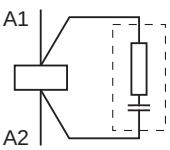
Transil diode



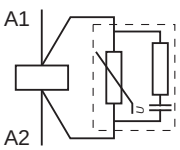
Varistor (only)



RC type



Varistor + RC



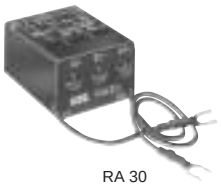
General technical data

The housings and impregnation resins of the surge suppressors are made of flame-resistant materials in accordance with the UL 94 standard.

These systems are not polarized, i.e. d.c. operated devices do not have to be connected in a specific direction.

- Operating temperature: -20 to +70 °C
- Connection to the coil terminals (parallel mounting)
  - For **RT 7**, **RV-BC 6** and **RC-EH**: flexible, accessible leads, equipped with forked lugs. Except for the **RV-BC 6 F** variant: 2.8mm faston.
  - For **RT 5**, **RV 5**, **RC 5-1** and **RC 5-2**: clip-on for both fixing and connection.
- Mounting:
  - **RV-BC 6** and **RT 7**: dovetail mounting on both the top and bottom part of the contactor base. Alternatively, they can be clipped onto the front part of the contactor head.
  - **RT 5**, **RV 5** and **RC 5**: clipped onto the top part of the contactor base. This mounting method prevents any projections and change in contactor dimensions.
  - **RC-EH**: glued to the top part of the contactor base.

Accessories
Interface relays
for A/BC contactors



RA 30

BC 9-30-10 + RA 30

RA 5

Interface relays

Mounting on contactor types	Coil voltages	Catalog number	List price
KC, BC9 – BC30 N, A9 – A110	12 – 250VDC 24 – 250V, 50, 60 Hz	RA30 RA5	$ 75

Description

RA30 and RA5 interface relays are designed to receive 24 V d.c. signals delivered by PLCs or other sources with a low output power and to restore them with sufficient power to operate the coils of the relevant contactors

Types

- RA30 for combination with BC9 to BC30 contactors and KC contactor relays.
- RA5 for combination with A9 – A110 contactors and N contactor relays.

Description

RA30 and RA5 interface relays are made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V d.c. coil.

The interface relay coil is controlled by the PLC while the N.O. contact ensures switching of the power contactor.

Coil switching gives rise to overvoltages which have adverse effects on the electronic devices, insulators and, more generally, on component lifetime. The RA 30 and RA 5 are equipped with surge suppressors:

– on the 24 V d.c. relay coil via a diode

– on the power contactor coil via a varistor.

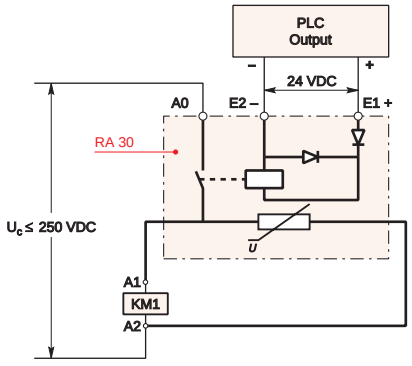
Furthermore, the RA30 and RA5 are protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

Connection

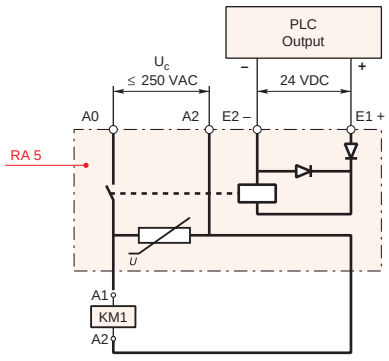
The "E1+" and "E2–" input terminals must be connected, according to their polarity, to the PLC output.

- The RA30 has two leads to be connected to the A1 and A2 terminals of the contactor coil. This coil is supplied between its own A2 terminal and the A0 terminal of the RA 30.
- The RA 5 is equipped with two terminal pads for connection to the A1 and A2 terminals of the contactor coil. This coil is supplied between the A0 and A2 terminals of the RA 5.

RA 30 interface relay for the BC 9 – BC 30 contactors and KC contactor relays



RA 5 interface relay for the A 9 – A 110 contactors and N contactor relays



Mounting

- RA30: dovetail mounting at the top of the contactor base.
- RA5: terminal pads clamped inside the contactor coil terminals.

Accessories
Interface relay technical data

General technical data

Standards		IEC 255-5	
Rated insulation voltage U_i acc. to IEC 947-4-1 and VDE 0110	VAC	250	
Permissible ambient temperature			
• For free air operation:			
– at U_e = 24VDC (between E1 & E2)	°C	-25 to + 70	
– from 0.85 to 1.1 U_e	°C	-25 to +55	
• For storage	°C	-40 to +70	
Climatic withstand		Complies with that of associated contactors	
Mounting position		No limitation	
Operating height	meters	≤ 3000	
Mounting		Dovetail mounting in the top part of the contactors	Using the contactor A1 and A2 terminal connecting points
Connecting terminals (open on delivery)		Cable clamps and M 3.5 (+, –) pozidriv screws (2)	
Cable cross-sectional area:			
• Rigid solid	2 x mm^2	1 to 4	
• Flexible	2 x mm^2	0.75 to 2.5	
Degree of protection		Protection against direct contact acc. to VDE 0106, Part 100	

Construction data

Surge suppression:			
• For contactor coil		Varistor	
• For interface relay coil		Diode	
Protection against polarity reversal between terminals E1 and E2		Diode	
Use on contactors with coils:			
• 24 to 250V/50, 60 Hz	types	–	N, A9 – A110
• 12 to 250VDC	types	KC, BC9 – BC30	–
Interface relay operating time	ms	Closing and drop-out ≤10	
Total operating time, interface relay + contactor			
• Between energization and:			
– NO contact opening	ms	59 to 84	19 to 36
– NC contact opening	ms	54 to 79	16 to 32
• Between de-energization and:			
– NO contact opening	ms	25 to 40	15 to 25
– NC contact opening	ms	27 to 42	18 to 28

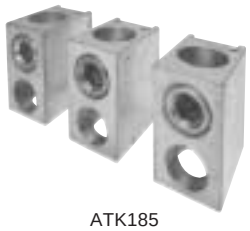
Electrical input data

Control voltage (E1 and E2 terminals) U_c:		
• Rated value	VDC	24
• Maximum range	VDC	17 to 30
Max. consumption for U_c = 24 VDC, Ø=20°C	W	0.3
"0" status (relay open)		
• For U_c	VDC	≤ 2.4
• For I_c	mA	≤1
"1" status (relay closed) for U_c	VDC	≥ 17
Max. short supply interruption immunity time	ms	4

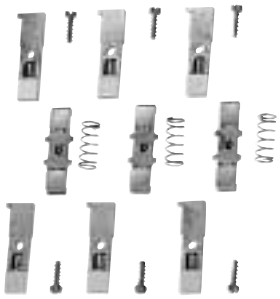
Electrical output data

Switching voltage (A0 and A2 terminals)	VAC	–	≤ 250
	VDC	≤ 250	–
Electrical lifetime	millions of operations	10 (1200 ops./h)	4 (600 ops.h) on A9 – A40
		–	2 (600 ops./h) on A45 – A110

Accessories
for A/AE/AF contactors



ATK185



ZL75

WB75A-04

BA5-50

Terminal lug kits

Wire range	For contactor	Catalog number	List price
6 – 250 MCM	A145 – A185	ATK185	**$ 45**
4 – 400 MCM	A210 – A300	ATK300	**68**
(2) 4-500 MCM	A210 – A300	ATK300/2	**110**
(2) 2/0 – 500 MCM	AF400 – AF580	ATK580/2	**150**
(3) 2/0 – 500 MCM	AF400 – AF750	ATK750/3	**225**

Contact kits

	For contactors	Catalog number	List price
3 Pole			
	A/AE/AF50	ZL50	**$ 113**
	A/AE/AF63	ZL63	**135**
	A/AE/AF75	ZL75	**158**
	A/AE/AF95	ZL95	**225**
	A/AE/AF110	ZL110	**255**
	A/AF145	ZL145	**300**
	A/AF185	ZL185	**420**
	A/AF210	ZL210	**525**
	A/AF260	ZL260	**855**
	A/AF300	ZL300	**1020**
	AF400	ZL400	**1716**
	AF460	ZL460	**2434**
	AF580	ZL580	**3795**
	AF750	ZL750	**3960**
4 Pole			
	A/AE45	ZLT45	**150**
	A/AE50	ZLT50	**150**
	A/AE75	ZLT75	**210**

Mechanical latches

For contactors	Catalog number	List price
A9 - A75 & AE45 -AE75	WB75A-★	**$ 84**

★ - Coil voltage suffix. Refer to Coil Voltage Selection chart and substitute the desired coil voltage suffix for the ★.

Coil voltage selection chart — mechanical latches for A & AE contactors

50 Hz	60 Hz	Voltage code
24	24 – 28	**01**
42	42 – 48	**02**
48	48 – 55	**03**
110	110 – 127	**04**
220 – 230	220 – 255	**06**
230 – 240	230 – 277	**05**
380 – 415	380 – 440	**07**
415 – 440	440 – 480	**08**

Range: WB75A for contactors A9 – A75, AC9 – AC30, AE45 – AE75 and control relays N and KC.

Description: WB75A block: contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

Captive screw type connecting terminals, built-in cable clamps, M 3.5 (=, -) posidrive 1 screw with screwdriver guidance, delivered untightened and protected against accidental direct contact.

Operation: After closing, the contactor continues to be held in the closed position by the latching mechanisim should the supply voltage fail at the contact coil terminals.

Contactor opening can be controlled:

- Electrically by an impulse* (AC or DC) on the WB75A block coil. The coil is not designed to permanently energized.
- Manually by pressing the pushbutton on the front face of the WB75A block.

Mounting: WB75A is clipped onto the front face of the contactor.

Identification marker

Mounting on	Coil voltage	Catalog number	List price
A9 – A110	Pack of 50	BA5-50	**$ 15**

Accessories
for A/AE/AF contactors
Coils & coil voltage codes

ZA16-81

Coils — AC operated

For contactors	Catalog number	List price
A9 – A16	ZA16-★	$ 24
A26 – A40	ZA40-★	30
A45 – A75	ZA75-★	57
A95 – A110	ZA110-★	60
A145 – A185	ZA185-★	150
A210 – A300	ZA300-★	180

Coils — DC operated

AE9 – AE16	ZAE16-★	24
AE26 – AE40	ZAE40-★	30
AE45 – AE75	ZAE75-★	57
AE95 – AE110	ZAE110-★	90
BC9 – BC30	KBC30G-★	36
Auxiliary including an insertion contact and a varistor for DC operated contactors		
AE45 – AE75	CDL5-01	45
AE95 – AE110	CCL5-01	

Coils — AC/DC operated

AF45 – AF75	ZAF75-★	120
AF95, AF110	ZAF110-★	165
AF145 – AF185	ZAF185-★	200
AF210 – AF300	ZAF300-★	240
AF400, AF460	ZAF460-★	450
AF580, AF750	ZAF750-★	525

★ – Coil voltage suffix. Refer to Coil Voltage Selection charts below and substitute the desired coil voltage code for the ★.

Coil voltage selection — AC operated
for A9 – A300; UA26 – UA110

VAC (50Hz)	VAC (60Hz)	Voltage Code
24	24	81
26	28	16
28	32	17
42	42	82
48	48	83
60	60	73
100	100 – 110	74 ②
110	110 – 120	84
110 – 115	115 – 127	89 ③
120	140	29
125 – 127	150	30
175	208	34
190	220	36
200	200 – 220	75 ②
220 – 230	230 – 240	80
230 – 240	240 – 260	88
230 – 240	277	42
230/400	—	62 ①
—	230/400	63 ①
380 – 400	400 – 415	85
400 – 415	415 – 440	86
—	480	51
440	500	53
500	600	55
550	—	56
660 – 690	—	58

Coil voltage selection — DC operated
for AE contactors

VDC	Voltage code AE contactors
12	80
24	81
42	82
48	83
50	21
60	84
75	85
110	86
125	87
220	88
240	89
250	38

Coil voltage selection — DC operated
for BC contactors

VDC	Voltage code AE contactors
12	07
24	01
42	02
48	16
50	17
60	03
75	22
110	04
125	27
220	05
240	33
250	34

Coil voltage selection — AC/DC operated for AF50 – AF750

VAC & VDC 40-60 Hz	Suffix Code
24 – 60 VDC	68 ④
20 – 60 VDC	72 ⑤
48 – 130 VAC/VDC	69
100 – 250 VAC/VDC	70
200 – 500 VAC/VDC	71

① Only for A9 – A16.
② Not for A145 – A300
③ A145 – A300 at 60 Hz, 115V only.
④ AF400 – AF750.
⑤ AF145 – AF300.

Accessories
for EK contactors
Coils & coil voltage codes

Coils for EK contactors

Contactor size	AC Coils		DC Coils	
	Catalog number	List price	Catalog number	List price
EK110, EK150	KH210-★	**$ 100**	KH210-★	**$ 130**
EK175, EK210	KH300-★	**120**	KH300-★	**160**
EK370, EK550	KH800-★	**290**	KH800-★	**350**

★ – Coil voltage suffix. Refer to the Coil Voltage Selection chart and substitute the desired coil voltage suffix for the ★. AC and DC operated contactors DO NOT have the same magnet structure. Therefore, DC coils will not fit on an AC magnet structure and vice versa.

Coil voltage selection — AC operated
for EK110 – EK550

VAC (50Hz)	VAC (60Hz)	Voltage Code
–	24	**F**
24	–	**N**
–	48	**G**
110	120	**1**
–	208	**B**
–	240	**2**
220 – 230	–	**J**
–	380	**Z**
380 – 400	440	**3**
400 – 415	–	**M**
–	480	**4**
500	–	**5**
–	600	**6**

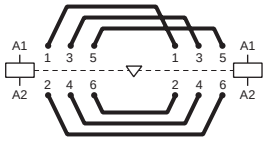
Consult factory if other voltages are required.

Coil voltage selection — DC operated
for EK110 – EK550

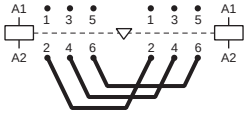
VDC	Voltage Code
24	**Y**
48	**W**
110	**P**
125	**Q**
220	**R**
440	**T**

Consult factory if other voltages are required.

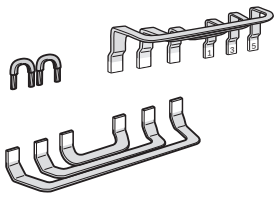
Accessories
for A/AE/AF contactors



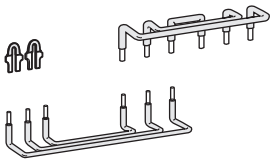
BEM circuit diagram



BES110 connection diagram



BED40U



BED75U

Connection kits for reversing

Mounting on 3 pole contactors	Catalog number	List price
A/AE9 – A/AE16	BEM16-30	$ 23
A/AE26	BEM26-30	30
A/AE30, A/AE40	BEM40-30	45
A/AE/AF50 – A/AE/AF75	BEM75-30	165
A/AE/AF95, A/AE/AF110	BEM110-30	180
A/AF145 – A/AF185	BEM185-30	260
A/AF210 – A/AF300	BEMA300-30	470
AF400 – AF460	BEM460-30	850
AF580 – AF750	BEM750-30	1200
BC9, BC16	BSM16-30	23
BC25	BSM25-30BC	30
BC30	BSM30-30BC	45

Application
Connections between the main poles of **two 3 pole contactors** mounted side by side so that they operate as reversing contactors.

Description
The connection kits for reversing contactors are made up of three reversing connections and three phase to phase connections.

BEM16-30 — Insulated, solid, rigid copper wires
BEM26 and 40-30 — Insulated, stranded, rigid copper wires
BEM75 and 110-30 — Insulated, solid copper bars
BSM16-30, BSM25 and 30-30BC — Insulated, solid, rigid copper wires

Connection kits for phase to phase

Mounting on 3 pole contactors	Catalog number	List price
A/AE/AF50, A/AE/AF75	BES75-30	$ 75
A/AE/AF95, A/AE/AF110	BES110-30	90
A/AF145 – A/AF185	BES185-30	130
A/AF210 – A/AF300	BESA300-30	200
AF400 – AF460	BES460-30	425
AF580 – AF750	BES750-30	650

Description
The connection kit for phase to phase contactors is made up of three phase to phase bus bars.

Connection kits for wye-delta starters

Mounting on contactors		Catalog number	List price
Line and delta contactor	Wye contactor		
A30 A40	A26 A26	BED40U	$ 53
A50 A63	A30 A40	BED50U	165
A75	A50	BED75U	180
A95	A75	BED95U	195
A110	A95	BED110U	225
A145	A110	BED145U	250
A185	A145	BED185U	290
A210	A185	BED210U	375
A260/A300	A210	BED300U	500
AF400/AF460	A260/A300	BED400U	850
AF460	AF400	BED460U	900
AF580	AF400/AF460	BED580U	1250
AF750	AF580	BED750U	1450

Application
Connections between the main poles of a wye-delta starter.

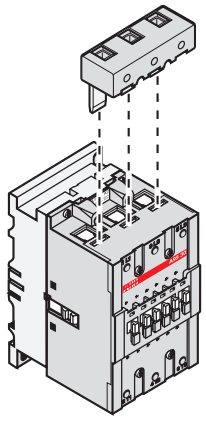
Description
The connection kits for wye-delta starters are made up of:
- Three line contactor/wye contactor connections — line side.
- Three wye contactor/delta contactor connections — load side.
- The shorting connection for the “S” contactor.

BED40U – Insulated, stranded, rigid copper wires.

BED50U thru BED750U — Insulated, solid copper bars.

The above connection sets allow a mechanical interlock unit to be mounted between the wye and delta contactors if required.

Accessories
for A/AE/AF contactors



LD110

BEXT-75

ZL145

LT185-AC

LT185-AL

Additional terminal block

Mounting on 3 pole contactors	Catalog number	List price
A/AE/AF75	LD-75	**$ 28**
A/AE/AF95 and A/AE/AF110	LD-110	**30**

Application

The LD110 terminal block is designed to increase the connection capacity of the contactor on which it is mounted: A(E)95 or A(E)110.

Description

Block housing three connectors: 1 per phase. Each connector is equipped with an HC, M8 socket head screw and has the following connection details:

- Stranded conductor (1) 6–2/0 OR (2) 4–1/0
- Busbar max. width 12 mm

Mounting

The LD110 terminal block can be mounted in the terminal slots located on line or load side of contactor.

Terminal extensions

Mounting on contactors	Catalog number	List price
A/AE/AF50 – A/AE/AF75	BEXT-75	**$ 15**
A/AE/AF95, A/AE/AF110	LW-110	**15**
A/AF145 – A/AF185	LX185	**90**
A/AF210 – A/AF300	LX300	**140**
AF400 – AF460	LX460	**195**
AF580 – AF750	LX750	**225**

Application

They are designed to increase the width of the contactor terminal pads to allow larger connectors to be mounted.

Description

Terminal extension sets contain 3 bars.

Terminal shrouds — two pieces

For contactor	Catalog number	List price
A/AF145 – A/AF185 for flush mount	LT185-AC	
A/AF145 – A/AF185 for extended mount	LT185-AL	
A/AF145 – A/AF185 for shorting bar LY...between A(F)145 / A(F)185 & TA200DU	LT185-AY	**$ 10**
A/AF210 – A/AF300 for flush mount	LT300-AC	
A/AF210 – A/AF300 for extended mount	LT300-AL	
A/AF210 – A/AF300 for shorting bar LY300	LT300-AY	
AF400 – AF460 for flush mount	LT460-AC	
AF400 – AF460 for extended mount	LT460-AL	**20**
AF580 – AF750 for flush mount	LT750-AC	
AF580 – AF750 for extended mount	LT750-AL	

Terminal enlargements

For contactor	Catalog number	List price
A/AF145 – A/AF185	LW185	**$ 120**
A/AF210 – A/AF300	LW300	**130**

Accessories
for A/AE/AF contactors

BEA185/S3/S4

LP185

Vertical connection bars between contactor and MCCB — three bars

MCCB	For contactor	Catalog number	List price
S3, S4	A/AF145 – A/AF185	BEA185/S3/S4	$ 60
S4	A/AF210 – A/AF300	BEA210/S4	70
S5	A/AF210 – A/AF300	BEA300/S5	75
S5	AF400 – AF460	BEA400/S5	95
S6	AF400 – AF750	BEA750/S6	115

Vertical connection bars between contactor and MCCB — three bars

MCCB	For contactor	Catalog number	List price
S3, S4	A/AF145 – A/AF185	BEA185D/S3/S4	$ 70
S4	A/AF210 – A/AF300	BEA210D/S4	80
S5	A/AF210 – A/AF300	BEA300D/S5	85
S5	AF400 – AF460	BEA400D/S5	105
S6	AF400 – AF750	BEA750D/S6	125

To be used when power take off is needed (IP00) or with other bus bars. (EX: Reversing, IP20)

Horizontal connection busbars between contactor and MCCB — three bars

MCCB	For contactor	Catalog number	List price
S3, S4	A/AF145 – A/AF185	BEA185H/S4	$ 150
S4	A/AF210 – A/AF300	BEA210H/S4	220
S5	A/AF210 – A/AF300	BEA300H/S5	220
S5	AF400 – AF460	BEA400H/S5	435
S6	AF400 – AF460	BEA460H/S6	660
S6	AF580 – AF750	BEA750H/S6	670

Shorting bars, 2 pole

For contactor	Catalog number	List price
A/AF145 – A/AF185	LP185	$ 35
A/AF210 – A/AF300	LP300	50
AF400 – AF460	LP460	50
AF580 – AF750	LP750	50

Shorting bars, 3 pole

For contactor	Catalog number	List price
A/AE45 – A/AE/AF75	LF75	$ 40
A/AE/AF95 – A/AE/AF110	LY110	40
A/AE/AF145 – A/AE/AF185	LY185	40
A/AE/AF210 – A/AE/AF300	LYA300	60
AF400 – AF460	LY460	60
AF580 – AF750	LY750	60

Vertical connection bars between contactor and disconnect switch

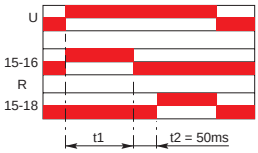
Disconnect switch	For contactor	Catalog number	List price
OS160	A/AF145	OSZA15	$ 200
OESA250	A/AF185	BEF185V/OESA250	260
OESA250 - OESA400	A/AF210 - A/AF300	BEF300V/OESA400	270
OESA400	AF400 - AF460	BEF460V/OESA400	300
OESA630 - OESA800	AF460 - AF750	BEF750V/OESA800	320

Horizontal connection bars between contactor and disconnect switch

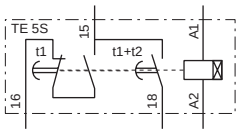
Disconnect switch	For contactor	Catalog number	List price
OESA250	A/AF145 - A/AF185	BEF185H/OESA250	$ 515
OESA250 - OESA400	A/AF210 - A/AF300	BEF300H/OESA400	595
OESA400	AF400 - AF460	BEF460H/OESA400	615

Accessories
for A contactors
TE5S electronic timer for wye-delta starters

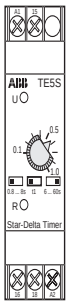
TE5S-*



Chart



Equivalent diagram



Front face

Electronic timer

For contactors	Rated control voltage U_c V	Packing piece	Unit weight kg	Catalog number	List price
A9 – AF750	24 AC/DC 110 – 115 AC 220 – 230 AC	1 1 1	0.080 0.080 0.080	TE5S-24 TE5S-115 TE5S-230	**$ 120**

Application

Utilization

When used in wye-delta starters, the **TE5S** lags the wye connection and provides a lapse of 50 ms before the switchover to the delta connection.

Description

According to the type of device chosen, the electronic circuit has a 24 VAC/VDC, 110 – 120 VAC or 220 – 230 VAC supply. An output relay with reversing contact ensures high current switching. A two-position switch allows selection of one of the two time delay ranges: 0.8 to 8 s or 6 to 60 s. The 0.1 to 1.0 adjustable knob allows an initial setting without steps within the previously selected range which can then be adjusted using a stopwatch.

Note: We recommend that you allow for temperature drift for the final adjustment of the time delay setting. Drift: – 0.2% per °C. For example, a setting made at 20 °C will yield a time delay shorter by 7% at 55 °C in an enclosure. (– 0.2% per °C i.e. – 0.2 x 35 = – 7%).

The TE5S, which is not affected by these settings, establishes a fixed “lapse” of 50 ms between the opening of contact 15 – 16 and the closing of contact 15 – 18. It is this time delay that prevents from arc short-circuit during wye to delta switching.

Operation

On energization, the green U indicator light (voltage applied) comes on. Contact 15 – 16 then immediately moves to the closed position.

Count-down of the programmed time immediately commences.

When the time delay has elapsed, contact 15 – 16 opens and at the same time the 50 ms lapse, t2, begins after which contact 15 – 18 moves to the closed position. The yellow R indicator light comes on.

On de-energization, the U and R indicator lights go out and, after the 250 ms resetting time, the device is ready for a new cycle.

Mounting

Mounts on 35mm DIN rail.

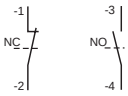
Accessories
for A contactors
TE5S electronic timer for wye-delta starters

Technical data

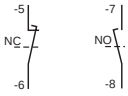
Type			TE5S-24	TE5S-115	TE5S-230
Compliance with standards			IEC 947-5-1, EN 60947-5-1 and VDE 0435		
Rated insulation voltage U_i according to IEC 947-5-1		V	250		
Rated supply voltage U_c		VDC VAC	24 24	— 110 – 115	— 220 – 230
Rated frequency limits		Hz	48 – 63		
Supply voltage range			0.85 – 1.1 U_c		
Overvoltage protection			Built-in varistor		
Load factor		%	100		
Average consumption	in DC in AC	W VA	0.7 1.5	— 3.5	— 6.5
Time delay range (t_1) selected by switch		S	0.8 – 8 and 6 – 60		
Temperature drift		% per °C	- 0.2		
Mechanical setting accuracy			± 15% of the setting range		
On-load reiteration accuracy under constant conditions			± 2% after 1 million operations		
Minimum time lapse (t_2)		ms	50		
Min. time lapse after 1 million operations		ms	40		
Resetting time (maximum)		ms	250		
Front panel display:	green indicator light yellow indicator light		Energization Output relay activated		
Rated operational voltage U_e acc. to IEC 947-5-1		VDC VAC	24 24 – 230		
Conventional free air thermal current I_{th}		A	10		
Rated operational current I_e acc. to IEC 947-5-1					
DC-13	24 VDC	A	4		
AC-15	24 – 115 VAC 220 – 230 VAC	A A	5 4		
Permissible air temperature					
for operation		°C	-25 … +60		
for storage		°C	-40 … +85		
Mechanical durability in millions of operations			5		
Electrical durability in millions of operations			1		
On-load maximum switching frequency		ops./h	720		
Shock and vibration withstand			on request		
Fixing on mounting rail according to EN 50022			35 x 7.5 or 35 x 15		
Connecting terminals			(+,-) pozidriv 1 screw		
Tightening torque		N.m	0.6 – 0.8 max.		
Connecting capacity					
Rigid solid		1 or 2 x mm^2	1 – 2.5		
Flexible without cable end		1 or 2 x mm^2	0.75 – 2.5		
Degree of protection acc. to IEC 529, IEC 947-1 and EN 60 529					
Housing			IP 50		
Terminals			IP 20		

Accessories
Terminal marking and positioning
CA/CC/CAL/CCL auxiliary contacts

One pole auxiliary contacts

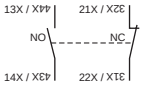


CA5-01 **CA5-10**

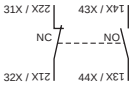


CC5-01 **CC5-10**

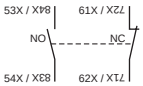
Two pole auxiliary contacts



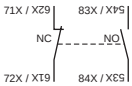
CAL5-11 (L. h. s. mounted)



CAL5-11 (R. h. s. mounted)

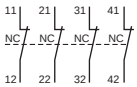


CAL5-11B (L. h. s. mounted)

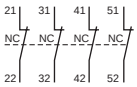


CAL5-11B (R. h. s. mounted)

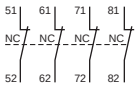
Four pole auxiliary contacts



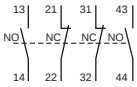
CA5-04E



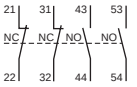
CA5-04M



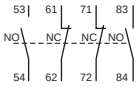
CA5-04N



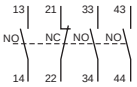
CA5-22E



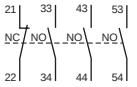
CA5-22M



CA5-22N

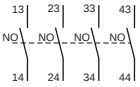


CA5-31E



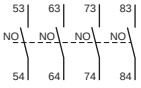
CA5-31M

—

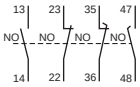


CA5-40E

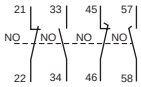
—



CA5-40N



CA5-11/11E

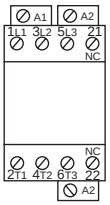


CA5-11/11M

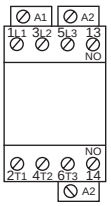
—

Accessories
Terminal marking & positioning for A/UA contactors

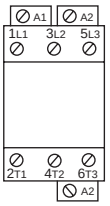
Standard devices without addition of auxiliary contacts



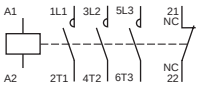
A9 – A40-30-01



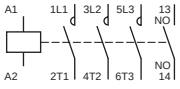
A9 – A40-30-10



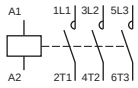
A50 – A110-30-00
UA50 – UA110-30-00



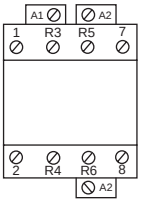
A9 – A40-30-01



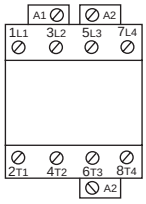
A9 – A40-30-10



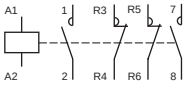
A50 – A110-30-00
UA50 – UA110-30-00



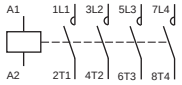
A9 – A26-22-00
A45 – A75-22-00



A9 ... A26-40-00
A45 ... A75-40-00

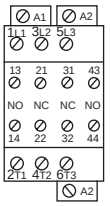


A9 – A26-22-00
A45 – A75-22-00

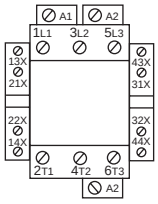


A9 – A26-40-00
A45 – A75-40-00

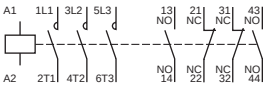
Standard 3 pole devices with factory mounted auxiliary contacts



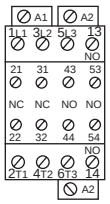
A9 – A16-30-22



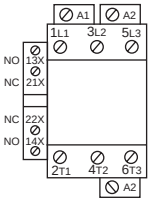
Combination 22



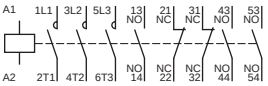
A9 – A16-30-22
A50 – A110-30-22



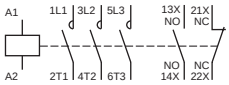
A9 – A40-30-32



A50 ... A110-30-11
UA50 ... UA110-30-11

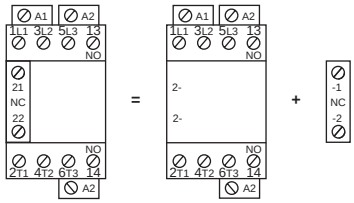


A9 – A40-30-32

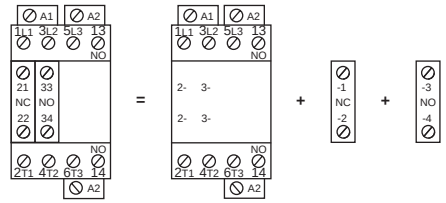


A50 – A110-30-11
UA50 – UA110-30-11

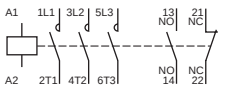
Other possible contact combinations with auxiliary contacts added by the user



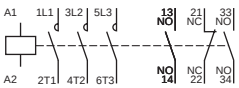
Combination 11 = A9 – A40-30-10 + CA5-01



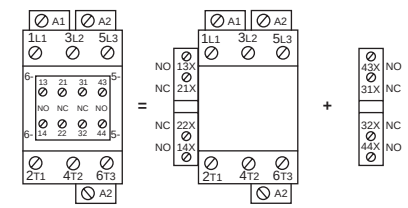
Combination 21 = A9 – A40-30-10 + CA5-01 + CA5-10



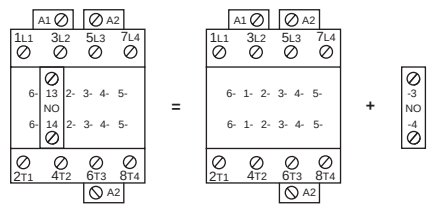
Combination 11



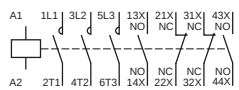
Combination 21



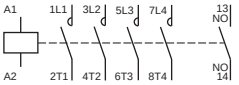
A50 – A110-30-22 = A50 – A75-30-11 + CAL5-11



Combination 10 = A45 – A75-40-00 + CA5-10



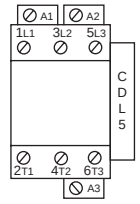
Combination 22

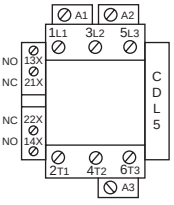


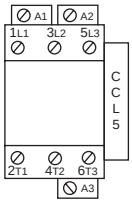
Combination 10

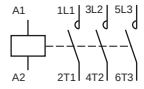
Accessories
Terminal marking and positioning for AE/AC contactors

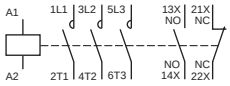
AE Contactors — D.C. operated

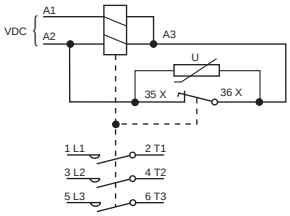

AE50 – AE75-30-00

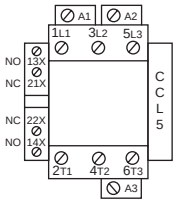

AE50 – AE75-30-11

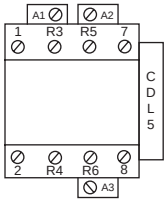

AE95 – AE110-30-00

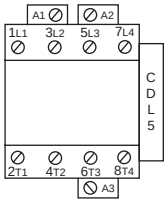

AE50 – AE110-30-00

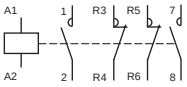

AE50 – AE110-30-11

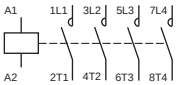

Coil wiring

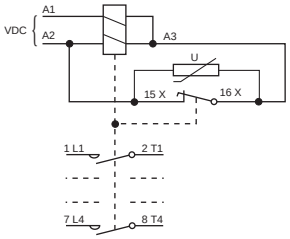

AE95 – AE110-30-11


AE45 – AE75-22-00

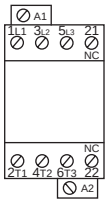

AE45 – AE75-40-00

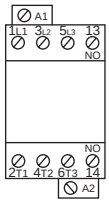

AE45 – AE75-22-00

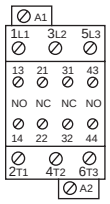

AE45 – AE75-40-00

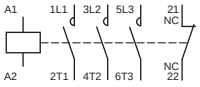

Coil wiring

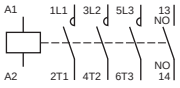
AC Contactors — D.C. operated
Standard devices without addition of auxiliary contacts

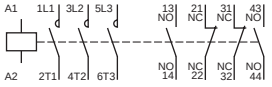

BC9 – BC25-30-01

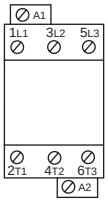

BC9 – BC25-30-10

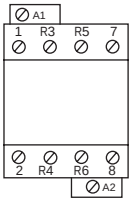

BC30-30-22

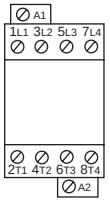

BC9 – BC25-30-01

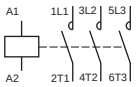

BC9 – BC25-30-10

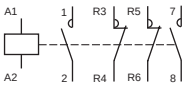

BC30-30-22

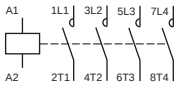

BC30-30-00


BC9 – BC25-22-00

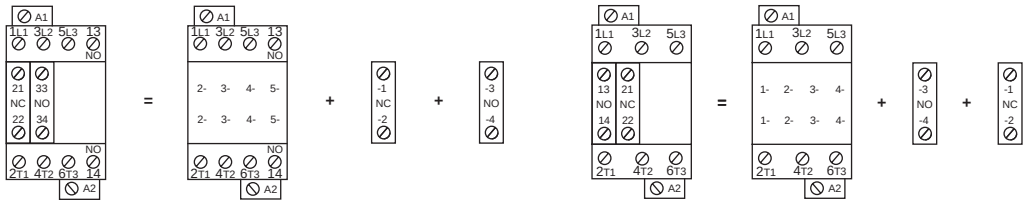

BC9 – BC25-40-00


BC30-30-00

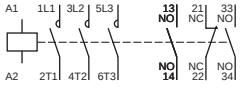

BC9 – BC25-22-00

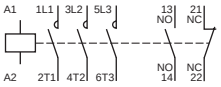

BC9 – BC25-40-00

Other possible contact combinations with auxiliary contacts added by the user


Combination 21 = BC9 – BC25-30-10 + CA5-01 + CA5-10

Combination 11 = BC30-30-00 + CA5-10 + CA5-01

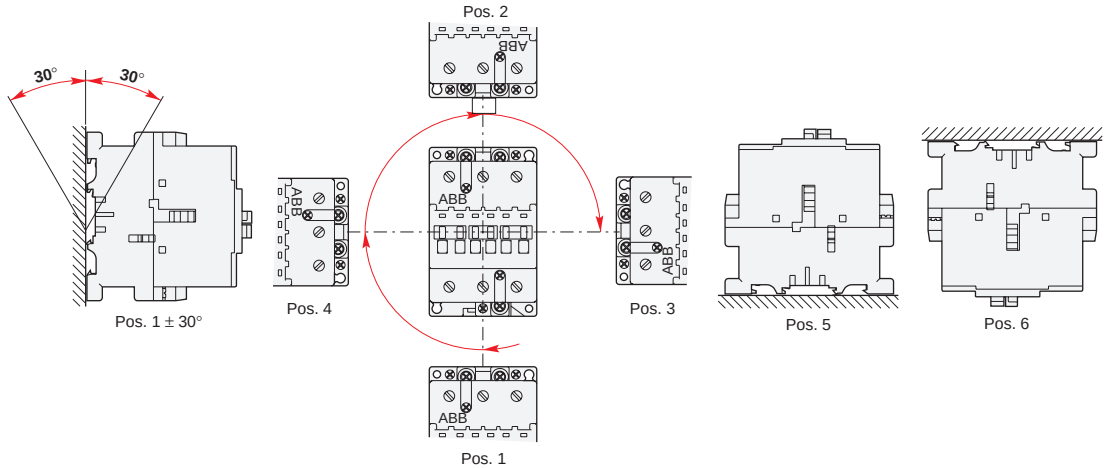

Combination 21


Combination 11

UL & CSA Technical data
A/AE9 – A/AE/AF110
AC & DC operated

ABB contactor frame size		A/AE 9	A/AE 12	A/AE 16	A/AE 26	A/AE 30	A/AE 40	A/AE/AF 45	A/AE/AF 50	A/AE/AF 63	A/AE/AF 75	A/AE/AF 95	A/AE/AF 110
NEMA size		00	—	0	1	1P	—	—	2	—	3	—	—
Number of poles		3 OR 4	3	3 OR 4	3 OR 4	3	3	4	3 OR 4	3	3 OR 4	3	3
AC rating information													
NEMA cont. amp rating	thermal current	9	—	18	27	36	—	—	45	—	90	—	—
NEMA maximum H.P. ratings	1 phase												
115	VAC	1/3	—	1	2	3	—	—	3	—	—	—	—
230	VAC	1	—	2	3	5	—	—	7.5	—	—	—	—
NEMA maximum H.P. ratings	3 phase												
200	VAC	1.5	—	3	7.5	—	—	—	10	—	25	—	—
230	VAC	1.5	—	3	7.5	—	—	—	15	—	30	—	—
460/575	VAC	2	—	5	10	—	—	—	25	—	50	—	—
U.L. general purpose current	40°C	21	25	30	40	50	60	65	80	90	105	125	140
Max. 3 Ph Switching motor loads	A	9	11	17	28	34	42	54	65	80	95	110	
U.L. maximum H.P. ratings	1 phase												
115	VAC	1/2	3/4	1	2	3	3	—	3	5	7.5	7.5	10
230	VAC	2	2	3	5	7.5	7.5	—	7.5	10	15	20	25
U.L. maximum H.P. ratings	3 phase												
200-208	VAC	2	3	5	7.5	10	10	—	15	20	25	30	30
220-240	VAC	2	3	5	10	10	15	—	20	25	30	30	40
440-480	VAC	5	7.5	10	20	25	30	—	40	50	60	60	75
550-600	VAC	7.5	10	15	25	30	40	—	50	60	75	75	100
U.L. maximum H.P. ratings													
120	VDC	1	1.5	2	3	3	5	—	7.5	10	10	—	—
240	VDC	2	3	3	5	7.5	10	—	15	20	25	—	—
Lighting — ballast and incandescent	600VAC	15	15	20	35	50	60	65	65	85	105	—	—
Resistive heating applications	600VAC	15	15	20	35	50	60	65	65	85	105	—	—
CSA Elevator ratings													
220 – 240VAC	3 phase	—	—	5	—	—	10	—	15	—	20	—	—
440 – 480VAC	3 phase	—	—	10	—	—	20	—	30	—	30	—	—
550 – 600VAC	3 phase	—	—	10	—	—	20	—	30	—	40	—	—
230VAC	1 phase	—	—	2	—	—	5	—	7.5	—	10	—	—
Auxiliary contacts													
NEMA rating	AC	A600	A600	A600	A600	A600	A600	—	A600	A600	A600	A600	A600
AC rated voltage	VAC	600	600	600	600	600	600	—	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	—	10	10	10	10	10
AC maximum volt-ampere making	VA	7200	7200	7200	7200	7200	7200	—	7200	7200	7200	7200	7200
AC maximum volt-ampere breaking	VA	720	720	720	720	720	720	—	720	720	720	720	720
NEMA rating	DC	P600	P600	P600	P600	P600	P600	—	P600	P600	P600	P600	P600
DC rated voltage	VDC	600	600	600	600	600	600	—	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5	—	5	5	5	5	5
DC Maximum make-break	A	0.2	0.2	0.2	0.2	0.2	0.2	—	0.2	0.2	0.2	0.2	0.2
Approximate weight													
Contactor	lbs.	0.7	0.7	0.7	1.01	1.2	2.25	2.25	2.25	2.25	2.25	3.5	5
Starter	lbs.	1.04	1.04	1.04	1.35	1.54	3	—	3	3	3	6	7
Terminal wire range	AWG	18-10	18-10	18-10	12-8	8-4	8-4	8-1	8-1	8-1	8-1	6-2/0	6-2/0
Number of wires per phase		2	2	2	2	2	2	1	1	1	1	1	1
Maximum short circuit ratings													
MCCB,MCP,Amps/kA	480VAC	50/35	50/35	50/35	100/35	150/65	150/65	—	150/85	250/85	250/85	250/85	250/85
MCCB,MCP,Amps/kA	600VAC	10/35	10/35	—	100/35	150/25	150/25	—	—	—	—	250/35	250/35
Fuse,Amps — type/kA	600VAC	30J/200	30J/200	30J/200	60J/200	60J/200	100J/200	—	100J/200	200J/200	200J/200	200J/200	200J/200

Mounting positions



UL & CSA Technical data
A/AF145 – AF750
AC & DC operated

ABB contactor frame size		A/AF 145	A/AF 185	A/AF 210	A/AF 260	A/AF 300	AF 400	AF 460	AF 580	AF 750
NEMA size		4	—	—	5	—	—	6	—	7
Number of poles		3	3	3	3	3	3	3	3	3
AC rating information										
NEMA maximum H.P. ratings	3 phase									
200	VAC	40	—	—	75	—	—	150	—	—
230	VAC	50	—	—	100	—	—	200	—	300
460/575	V	100	—	—	200	—	—	400	—	600
U.L. general purpose current	40°C	230	250	300	350	400	550	650	750	900
Max. 3 Ph switching motor loads	Amps	130	156	192	248	302	414	480	590	720
U.L. maximum H.P. ratings	1 phase									
115	VAC	10	15	—	—	—	—	—	—	—
230	VAC	25	30	40	50	—	—	—	—	—
U.L. maximum H.P. ratings	3 phase									
200—208	VAC	40	50	60	75	100	125	150	200	250
220—240	VAC	50	60	75	100	100	150	200	250	300
440—480	VAC	100	125	150	200	250	350	400	500	600
550—600	VAC	125	150	200	250	300	400	500	600	700
Auxiliary contacts										
NEMA rating	AC	A600	A600	A600	A600	A600	A600	A600	A600	A600
AC rated voltage	VAC	600	600	600	600	600	600	600	600	600
AC thermal rated current	A	10	10	10	10	10	10	10	10	10
AC maximum volt—ampere making	VA	7200	7200	7200	7200	7200	7200	7200	7200	7200
AC maximum volt—ampere breaking	VA	720	720	720	720	720	720	720	720	720
NEMA rating	DC	P600	P600	P600	P600	P600	P600	P600	P600	P600
DC rated voltage	VDC	600	600	600	600	600	600	600	600	600
DC thermal rated current	A	5	5	5	5	5	5	5	5	5
DC Maximum make—break	A	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Approximate weight										
Contactor	lbs.	7.1	7.1	13	13	13	26	26	33	33
Starter	lbs.	9.11	9.11	17.67	17.67	17.67	35	35	45	45
Terminal wire range	AWG	6—250MCM	6—250MCM	4—400MCM	4—400MCM	4—500MCM	250—500MCM	250—500MCM	2/0—500MCM	2/0—500MCM
Number of wires per phase		1	1	1	1	2	2	2	2	3
Maximum short circuit ratings										
MCCB,MCP,amps/kA	480VAC	400/85	400/85	800/85	800/85	800/85	800/80	800/80	1200/42	1200/42
MCCB,MCP,amps/kA	600VAC	400/35	400/35	800/35	800/35	800/35	800/42	800/42	—	—
Fuse, amps—Type/kA	600VAC	400J/200	400J/200	600J/200	600J/200	600J/200	1000L/80	1000L/80	1200L/80	1200L/80

IEC Technical data
A/AE9 – A/AE/AF110
AC & DC operated

Type			A/AE 9	A/AE 12	A/AE 16	A/AE 26	A/AE 30	A/AE 40	A/AE/AF 45	A/AE/AF 50	A/AE/AF 63	A/AE/AF 75	A/AE/AF 95	A/AE/AF 110
Number of poles			3 or 4	3	3 or 4	3 or 4	3	3	4	3 or 4	3	3 or 4	3	3
Insulation characteristics														
Rated insulation voltage U_i														
according to IEC947-4-1 and VDE0110 (Gr. C)		V	1000											
according to UL/CSA		V	600											
Rated impulse withstand voltage $U_{imp.}$			8 kV											
Main pole utilization characteristics														
Rated operational voltage U_e		V	690			690			1000				1000	
Conventional free-air thermal current I_{th}														
acc. to IEC947-4-1, open contactors	θ ≤ 40°C	A	26	28	30	45	65	65	100	100	125	125	145	160
with conductor cross-sectional area		mm²	4	4	4	6	16	16	35	35	50	50	50	70
Rated operational current I_e/AC-1 for air temperature close to contactor														
	θ ≤ 40°C	A	25	27	30	45	55	60	70	100	115	125	145	160
	θ ≤ 55°C	A	22	25	27	40	55	60	60	85	95	105	135	145
	θ ≤ 70°C	A	18	20	21	32	39	42	50	70	80	85	115	130
with conductor cross sectional area		mm²	2.5	4	4	6	10	16	25	35	50	50	50	70
Utilization category AC-3 for air temperature close to contactor ≤ 55°C														
Rated operational current I_e/AC-3 (1)														
3-phase motors	220-230-240 V	A	9	12	17	26	33	40	40	53	65	75	96	110
	380-400 V	A	9	12	17	26	32	37	37	50	65	75	96	110
	415 V	A	9	12	17	26	32	37	37	50	65	72	96	110
	440 V	A	9	12	16	26	32	37	37	45	65	70	93	100
	500 V	A	9	12	14	22	28	33	33	45	55	65	80	100
	690 V	A	7	9	10	17	21	25	25	35	43	46	65	82
	1000 V	A	—	—	—	—	—	—	—	23	25	28	30	30
Rated operational power AC-3 (1)														
1500 r.p.m. - 50 Hz	220-230-240 V	kW	2.2	3	4	6.5	9	11	11	15	18.5	22	25	30
1800 r.p.m. - 60 Hz	380-400 V	kW	4	5.5	7.5	11	15	18.5	18.5	22	30	37	45	55
3-phase motors	415 V	kW	4	5.5	9	11	15	18.5	18.5	25	37	40	55	59
	440 V	kW	4	5.5	9	15	18.5	22	22	25	37	40	55	59
	500 V	kW	5.5	7.5	9	15	18.5	22	22	30	37	45	55	59
	690 V	kW	5.5	7.5	9	15	18.5	22	22	30	37	40	55	75
	1000 V	kW	—	—	—	—	—	—	—	30	33	37	40	40
DC operated AE contactors														
Coil operating limits acc. to IEC 947-4-1: 0.85 to 1.1 x U_e			0 ≤ 55°C										0 ≤ 70°C	
Drop-out voltage % of U_e			10 – 30%			10 – 30%			approx. 15 – 40%				approx. 15 – 40%	
Coil consumption (average value)														
• pull-in, from cold state		W	90			110			200				400	
• holding, from warm state		W	2			2.5			4				2.4	
Rated control circuit voltage U_e														
• open		L/R ms	40			40			15				6	
• closed		L/R ms	90			90			25				30 – 40	
		V	12 – 240			12 – 240			12 – 250				12 – 250	
Operating time														
Between coil energization and:														
• N.O. contact closing		ms	10 – 16			13 – 21			13 – 30				15 – 25	
• N.C. contact opening		ms	8 – 12			11 – 16			10 – 27				12 – 22	
Between coil de-energization and:														
• N.O. contact closing		ms	5 – 14			6 – 12			5 – 15				15 – 20	
• N.C. contact opening		ms	11 – 17			8 – 16			8 – 18				18 – 23	

* The use of surge suppressors increases the opening time on a scale of 1.1 to 1.5 for a varistor suppressor and on a scale of 4 to 8 for a diode suppressor.

AC operated A contactors														
Coil operating limits acc. to IEC 947-4-1: 0.85 to 1.1 x U_e			0 ≤ 55°C										0 ≤70°C	
Drop-out voltage % of U_e			roughly 40 – 65%											
Coil consumption (average value)														
• pull-in, from cold state														
50 Hz		VA	70			120			180				350	
60 Hz		VA	80			140			210				450	
50/60 Hz (voltage codes 80 to 88, see page 1.26)		VA	74/70			125/120			190/180				410/365	
• holding, from warm state														
50 Hz		VA/W	8/2			12/3			18/5.5				22/6.5	
60 Hz		VA/W	8/2			12/3			18/5.5				26/8	
50/60 Hz		VA/W	8/2			12/3			18/5.5				27/7.5	
Rated control circuit voltage U_e														
• 50 Hz		V	20 – 690											
• 60 Hz		V	24 – 600											
Operating time														
Between coil energization and:														
• N.O. contact closing		ms	10 – 26			8 – 21			8 – 27				10 – 25	
• N.C. contact opening		ms	7 – 21			6 – 18			7 – 22				7 – 22	
Between coil de-energization and:														
• N.O. contact closing		ms	4 – 11			4 – 11			4 – 11				7 – 15	
• N.C. contact opening		ms	9 – 16			7 – 14			7 – 14				10 – 18	

IEC Technical data
A/AE9 – A/AE/AF110
AC & DC operated

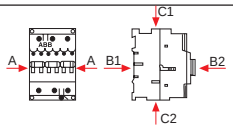
Type			A/AE 9	A/AE 12	A/AE 16	A/AE 26	A/AE 30	A/AE 40	A/AE/AF 45	A/AE/AF 50	A/AE/AF 63	A/AE/AF 75	A/AE/AF 95	A/AE/AF 110
Rated frequency limits		Hz	25 – 400											
Mechanical durability in millions of operating cycles														
A contactors			10										10	
AE contactors			5										5	
Max. mechanical switching frequency		cycles/h	3600										3600	
Max. electrical switching frequency														
A contactors	for AC-1	cycles/h	600	600	600	600	600	600	600	600	600	600	300	300
	for AC-3	cycles/h	1200	1200	1200	1200	1200	1200	600	600	600	600	300	300
	for AC-2, AC-4	cycles/h	300	300	300	300	300	300	150	150	150	150	150	150
AE contactors	for AC-1	cycles/h	600	600	600	600	600	600	300	300	300	300	300	300
	for AC-3	cycles/h	600	600	600	600	600	600	300	300	300	300	300	300
	for AC-2, AC-4	cycles/h	300	300	300	300	300	300	150	150	150	150	150	150
Electrical durability			see pages 1.50 - 1.53											
Rated making capacity AC-3 according to IEC947-4-1			10 x I_e AC-3										10 x I_e AC-3	
Rated breaking capacity AC-3 according to IEC947-4-1			8 x I_e AC-3										8 x I_e AC-3	
Max. breaking capacity cos φ = 0.45	at 440 V	A	250	250	250	420	820	820	900	900	900	900	1160	1160
(cos φ = 0.35 for I_e > 100 A)	at 690 V	A	100	100	100	170	340	340	490	490	490	490	800	800
Short-circuit protection for contactors														
without thermal O/L relays - Motor protection excluded①														
U_e ≤ 500 V a.c. – gG (gl) type fuses		A	25	32	32	50	63	63	80	100	125	160	160	200
Rated short-time withstand current I_{cw}	1 s	A	250	280	300	400	600	600	1000	1000	1000	1000	1320	1320
at 40°C ambient temp., in free air,	10 s	A	100	120	140	210	400	400	650	650	650	650	800	800
from a cold state	30 s	A	60	70	80	110	225	225	370	370	370	370	500	500
	1 min	A	50	55	60	90	150	150	250	250	250	250	350	350
	15 min	A	26	28	30	45	65	65	100	100	100	100	160	175
Heat dissipation per pole	I_e/AC-1		0.8	1	1.2	1.8	2.5	3	2.5	5	6.5	7	6.5	7.5
	I_e/AC-3	W	0.1	0.2	0.35	0.6	0.9	1.3	0.65	1.3	1.5	2	2.7	3.6

① Please consult us for the protection of motor starters against short circuits.

IEC Technical data
A/AE9 – A/AE/AF110
AC & DC operated

Type	A/AE 9	A/AE 12	A/AE 16	A/AE 26	A/AE 30	A/AE 40	A/AE/AF 45	A/AE/AF 50	A/AE/AF 63	A/AE/AF 75	A/AE/AF 95	A/AE/AF 110
Number of poles	3 or 4	3	3 or 4	3 or 4	3	3	4	3 or 4	3	3 or 4	3	3

General technical data

Standards	Devices complying with international standards IEC947-1 / 947-4-1 and European standards EN60 947-1 / 60 947-4-1 Electromagnetic compatibility (EMC) according to amendment A11 to IEC947-1; EN60 947-1 and amendment 2 to IEC947-4-1											
Air temperature close to contactor												
— fitted with thermal O/L relay °C	— 25 to + 55 (0.85 – 1.1 U_c)										– 25 to +55 (0.85–1.1U_c)	
— without thermal O/L relay °C	— 40 to + 55 (0.85 – 1.1 U_c) / – 40 to + 70 (U_c)										– 25 to +70 (0.85 –1.1U_c)	
— for storage °C	— 60 to + 80										– 40 to +70	
Climatic withstand	acc. to IEC 68-2-30 and 68-2-11 – UTE C 63-100 specification II										acc. to IEC 68-2-30	
Mounting positions: (see diagram, page 1.36)	Positions 1 to 5 — Ambient temperature ≤ 55°C and control voltage 0.85 – 1.1 U_c — Ambient temperature 55 – 70°C and control voltage equal to U_c Position 6 — Ambient temperature ≤ 55°C and control voltage 0.95 – 1.1 U_c — Ambient temperature > 55°C unauthorized											
Operating altitude m	≤ 3000											
Shock withstand acc. to IEC68-2-27 and EN60068-2-27 Mounting position 1 (See page 1.36)	 1/2 sinusoidal shock for 11ms: no change in contact position Shock direction: A, C1, C2 : 20 g B1 : 5 g B2 : 15 g Note: only on plate for A95 and A110											
Mounting • on mounting rail	acc. to IEC715 and EN50 022 35 x 7.5 mm 35 x 15 mm						acc. to IEC715 35 x 15 EN50 022 75 x 25 EN50 023				acc. to IEC715 and EN50 023 75 x 25	
• by screws (not supplied)	2 x M4						2 x M6					
Connecting terminals (delivered in open position) — Main poles	(+,–) pozidriv 2screw											
	M 3.5 with cable clamp			M 4 with clamp	M 5 with 2x(5.6x6.5mm) double connect.		M 8 slotted screw head with single connector 13 x 10 mm				HC, M 8 hexagon socket screw with single connector 14 x 14 mm	
— Coil terminals	M 3.5 (+,-) pozidriv 2 screws with cable clamp											
— Built in aux. terminals	(+,-) pozidriv 2 screw and cable clamp											
	M 3.5			M 4	M 3.5							
Connecting capacity												
Main conductors (poles)	min. – max.			min.– max.	min. – max.		min. – max.				min. – max.	
Rigid solid (≤4 mm²) / rigid stranded (≥6 mm²) 1 x mm²	1 – 4			1.5 – 6	2.5 – 16		6 – 50				6 – 95	
2 x mm²	1 – 4			1.5 – 6	2.5 – 16		6 – 25				6 – 35	
Flexible without cable end 1 x mm²	0.75 – 2.5			1 – 4	2.5 – 10		6 – 35				6 – 70	
2 x mm²	0.75 – 2.5			1 – 4	2.5 – 10		6 – 16				6 – 35	
Bars or lugs: max. width mm ≤	8			10	—		—				30	
hole Ø mm >	3.7			4.2	—		—				6	
Auxiliary conductors (built in aux. terminals + coil terminals)	min. - max.											
Rigid solid 1 or 2 x mm²	1 - 4										0.75 – 2.5	
Flexible without cable end 1 x mm²	0.75 – 2.5			①	0.75 – 2.5		1 – 2.5				0.75 – 2.5	
2 x mm²	0.75 – 2.5			①	0.75 – 2.5		0.75 – 2.5				0.75 – 2.5	
Degree of protection acc. to IEC529, IEC947-1 and EN60529	Protection against direct contact acc. to VDE0106 — Part. 100											
— Main terminals	IP20						IP10					
— Coil terminals	IP20											
— Auxiliary terminals	IP20											

① 1 or 2 times 0.75 – 2.5 mm² but with 0.75 and 1 mm² cable end.

IEC Technical data
A9 – A40
AC operated

Characteristics of A9 – A40 contactor built in auxiliary contacts
(for additional auxiliary contact blocks: see page 1.19)

Rated operational voltage U_e			V	690
Conventional free air thermal current I_{th} - θ ≤ 40°C A				16
Rated operational current	24 – 127 V	50/60 Hz	A	6
I_e /AC-15 acc. to IEC947-5-1	220 – 240 V	50/60 Hz	A	4
	380 – 440 V	50/60 Hz	A	3
	500 V	50/60 Hz	A	2
	690 V	50/60 Hz	A	2
I_e /DC-13 acc. to IEC947-5-1	24 V	DC	A/W	6 / 144
	48 V	DC	A/W	2.8 / 134
	72 V	DC	A/W	2 / 144
	125 V	DC	A/W	1.1 / 138
	250 V	DC	A/W	0.55 / 138
Operational current frequency			Hz	25 – 400
Rated making capacity	acc. to IEC 947-5-1			10 x I_e/AC-15
Rated breaking capacity	acc. to IEC 947-5-1			10 x I_e/AC-15
Short circuit protection – gG (gl) type fuses			A	10
Rated short time withstand current I_{cw}			for 1.0 s	100A
			for 0.1 s	140A
Insulating resistance at 500 V d.c.				after durability test: 5MΩ
Min. switching capacity				17V/ 5 mA
Non overlapping time between N.O. and N.C. contacts			ms	≥ 2
Heat dissipation per pole at 6 A			W	0.10

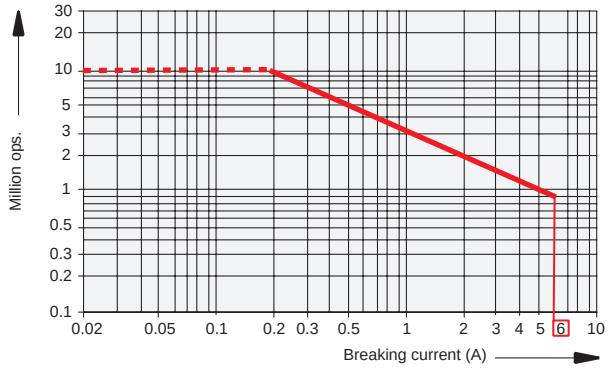
Electrical durability

Max. switching frequency 1200 cycles/h

AC-15 according to IEC947-5-1
making current: 10 x I_e with cos φ = 0.7 and U_e
breaking current: I_e with cos φ = 0.4 and U_e

The curve opposite shows the electrical durability of the built in auxiliary contacts with respect to the breaking current.

This curve has been drawn for resistive and inductive loads up to 690 V, 40 – 60 Hz.



IEC Technical data
A/AF145 – AF750
AC & DC operated

Type			A/AF 145	A/AF 185	A/AF 210	A/AF 260	A/AF 300	AF 400	AF 460	AF 580	AF 750
Number of Poles			3	3	3	3	3	3	3	3	3
Insulation characteristics											
Rated Insulation voltage U_1											
according to IEC947-4-1 and VDE0110 (Gr.C)		V	1000	1000	1000	1000	1000	1000	1000	1000	1000
according to UL/CSA		V	600	600	600	600	600	600	600	600	600
Rated impulse withstand voltage $U_{imp.}$		KV	8	8	8	8	8	8	8	8	8
Main pole utilization characteristics											
Rated operational voltage U_e		V	1000	1000	1000	1000	1000	1000	1000	1000	1000
Conventional free-air thermal current I_{th}											
acc. To IEC947-4-1 open contactors	0 ≤ 40°C	A	250	275	350	400	450	550	650	800	1000
with conductor cross sectional area		mm^2	120	150	185	240	300	2 x 185	2 x 240	2 x 240	2 x 80 x 5
Rated operational current I/AC-for	0 ≤ 40°C	A	250	275	350	400	500	600	700	800	1050
air temperature close to contactor	0 ≤ 55°C	A	230	250	300	350	400	500	600	700	800
	0 ≤ 70°C	A	180	180	240	290	325	400	480	580	720
with conductor cross sectional area		mm^2	120	150	185	240	300	2 x 185	2 x 240	2 x 240	2 x 80 x 5
Utilization category AC-3 for air temperature close to contactor ≤55°C											
Rated operational current, Ie/AC-3(1)											
	220 – 240V	A	145	185	210	260	305	400	460	580	750
	380 – 400V	A	145	185	210	260	305	400	460	580	750
	415V	A	145	185	210	260	300	400	460	580	750
3-Phase Motors	440V	A	145	185	210	240	280	370	460	580	750
	500V	A	145	170	210	240	280	370	460	580	750
	690V	A	120	170	210	220	280	370	400	500	650
Rated operational power											
AC-3(1)	220 – 240V	kW	45	55	59	80	90	110	132	160	220
1500 r.p.m. — 50Hz	380 – 400V	kW	75	90	110	140	160	200	250	315	400
1800 r.p.m. — 60Hz	415V	kW	75	90	110	140	160	220	250	355	425
3-Phase Motors	440V	kW	75	90	110	140	160	220	250	355	450
	500V	kW	90	110	132	1800	200	250	315	400	520
	690V	kW	110	132	160	200	250	315	355	500	600
Magnet system characteristics											
Coil operating limits acc.to IEC947-4-1:0.85 – 1.1xU_e			-30°C – +70°C								
Drop out voltage in % of U_e			approx. 45% – 65%								
Coil consumption											
A145-A300 contactors											
Average pull in value (A contactors)											
50Hz		VA	550	550	1350	1350	1350	—	—	—	—
60Hz		VA	600	600	1550	1550	1550	—	—	—	—
50/60Hz		VA/VA	700/650	700/650	1700/1550	1700/1550	1700/1550	—	—	—	—
Average holding value											
50Hz		VA/W	35/11	35/11	60/16	60/16	60/16	—	—	—	—
60Hz		VA/W	40/12	40/12	65/19	65/19	65/19	—	—	—	—
50/60Hz		VA/W	44/13	44/13	80/21	80/21	80/21	—	—	—	—
AF145-AF750											
Pull in AC		VA/W	250/250	250/250	400/400	400/400	400/400	800/800	800/800	600/600	600/600
Pull in DC		W	350	350	450	450	450	900	900	700	700
Holding AC		VA/W	2.5/2.5	2.5/2.5	2.5/2.5	2.5/2.5	2.5/2.5	4/4	4/4	3.3/3.3	3.3/3.3
Holding DC		W	3	3	1	1	1	4.5	4.5	4	4
Rated control circuit voltage Ue											
at 50Hz		V	20 - 690								
at 60Hz		V	24 - 600								
A Contactors											
Operating time	Between coil energization and:										
	N.O. contact closing	ms	13-27	13-27	17-35	17-35	17-35	—	—	—	—
	N.C. contact opening	ms	80-22	80-22	12-30	12-30	12-30	—	—	—	—
	Between coil deenergization and:										
	N.O. contact closing	ms	5-10	5-10	7-13	7-13	7-13	—	—	—	—
	N.C. contact opening	ms	9-13	9-13	10-16	10-16	10-16	—	—	—	—
AF Contactors											
Operating time	Between coil energization and:										
	N.O. contact closing	ms	50-90	50-90	50-90	50-90	50-90	50-120	50-120	50-120	50-120
	N.C. contact opening	ms	45-85	45-85	45-85	45-85	45-85	45-115	45-115	45-115	45-115
	Between coil deenergization and:										
	N.O. contact opening	ms	40-50	40-50	40-50	40-50	40-50	45-55	45-55	45-70	45-70
	N.C. contact closing	ms	43-53	43-53	43-53	43-53	43-53	48-58	48-58	53-73	53-73
Rated frequency limits		Hz	25-400								

① Values given in watts. These coils are both AC & DC.

IEC Technical data
A/AF145 – AF750
AC & DC operated

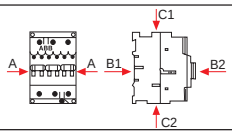
Type			A/AF 145	A/AF 185	A/AF 210	A/AF 260	A/AF 300	AF 400	AF 460	AF 580	AF 750
Mechanical durability in millions of operating cycles			5	5	5	5	5	3	3	3	3
Max. mechanical switching frequency	cycles/h		3600	3600	3600	3600	3600	300	300	300	300
Max. electrical switching frequency	cycles/h	AC1	300	300	300	300	300	300	300	300	300
	cycles/h	AC3	300	300	300	300	300	300	300	300	300
	cycles/h	AC4	150	150	150	150	150	60	60	60	60
Electrical durability			See pages 1.50 – 1.53								
Rated making capacity AC-3 according to IEC947-4-1			10 x I_e								
Rated breaking capacity AC-3 according to IEC947-4-1			8 x I_e								
Short-circuit protection for contactors without thermal O/L relays — Motor protection excluded U_e ≤500V a.c. — gG(gl) type fuses			315	355	400	500	500	630	800	1000	1000
Rated short-time withstand current Icw	1s	A	1800	2000	2500	3500	3500	4600	4600	7000	7000
"at 40°C ambient temp., in free air,"	10s	A	1200	1500	1700	2400	2400	4400	4400	6400	6400
from a cold state	30s	A	800	1000	1200	1500	1500	3100	3100	4500	4500
1 min	1m	A	600	800	1000	1100	1100	2500	2500	3500	3500
15 min	15m	A	280	320	400	500	500	840	840	1300	1300
Heat dissipation per pole	I_e/AC-1	W	13	16	18	25	32	30.25	42.25	32	50
	I_e/AC-3	W	5	8	9	14	18	16	21.2	16.8	28.2

IEC Technical data
BC9 – BC30
DC operated

Type			BC9	BC16	BC25	BC30
Number of poles			3 or 4	3 or 4	3 or 4	3
Insulation characteristics						
Rated insulation voltage U_i						
according to IEC947-4-1 and VDE0110 (Gr. C)		V	690	1000		
according to UL/CSA		V	600	600		
Rated impulse withstand voltage $U_{imp.}$		kV	6			
Main pole utilization characteristics						
Rated operational voltage U_e		V	690			
Conventional free air thermal current I_{th}						
acc. to IEC947-4-1, open contactors	θ ≤ 40°C	A	26	28	45	65
with conductor cross sectional area		mm^2	4	4	6	10
Rated operational current Ie/AC–1 for air temperature close to contactor	θ ≤ 40°C	A	22	28	45	55
	θ ≤ 55°C	A	20	25	40	45
	θ ≤ 70°C	A	17	23	32	36
with conductor cross sectional area		mm^2	2.5	4	6	6
Utilization category AC-3 for air temperature close to contactor ≤ 55°C						
Rated operational current I_e/AC-3 (1)						
3 phase motors	220 – 230 – 240 V	A	9	16	25	33①
	380 – 400 V	A	9	16	25	30
	415 V	A	9	16	25	30
	440 V	A	9	16	20	27
	500 V	A	7	13	17	23
	690 V	A	6	8	13	18
	1000 V	A	—	—	—	—
Rated operational power AC-3 (1)						
1500 r.p.m. – 50 Hz or 1800 r.p.m. – 60 Hz 3 phase motors	220 – 230 – 240 V	kW	2.2	4	6.5②	9
	380 – 400 V	kW	4	7.5	11	15
	415 V	kW	4	7.5	11	15
	440 V	kW	4	7.5	11	15
	500 V	kW	4	7.5	11	15
	690 V	kW	4	5.5	11	15
	1000 V	kW	—	—	—	—
Rated frequency limits		Hz	25 – 400			
Mechanical durability in millions of operating cycles			—	10		
Max. mechanical switching frequency		cycles/h	—	6000	3000	
Max. electrical switching frequency	for AC-1	cycles/h	—	600	600	
	for AC-3	cycles/h	—	1200	600	
	for AC-2, AC-4	cycles/h	—	300	150	
Electrical durability			see page 1.50 – 1.53			
Rated making capacity AC-3 according to IEC947-4-1			10 x I_e / AC-3			
Rated breaking capacity AC-3 according to IEC947-4-1			8 x I_e / AC-3			
Max. breaking capacity with cos j = 0.45	at 440V	A	200		315	380
(cos j = 0.35 for I_e > 100 A)	at 690V	A	120		210	290
Short-circuit protection for contactors without thermal O/L relay – Motor protection excluded③						
U_e ≤ 500 V a.c. – gG (gl) type fuses		A	25	32/35	50	63
Rated short-time withstand current I_{cw}	1 s	A	200	280	350	400
	10 s	A	90	130	200	250
at 40°C ambient temperature, in free air,	30 s	A	50	70	110	150
from cold state	1 min	A	40	50	90	120
	15 min	A	22	28	45	55
Heat dissipation per pole	I_e/AC-1	W	0.55	1.5	2.4	2.2
	I_e/AC-3	W	0.10	0.4	0.6	0.6

① 32 A at 240V
② 7.5 kW at 240V
③ For the protection of motor starters against short circuits, please consult us.

IEC Technical data
BC9 – BC30
DC operated

Type			BC9	BC16	BC25	BC30
Number of poles			3 or 4	3 or 4	3 or 4	3
General technical data						
Standards			Devices complying with international standards IEC947-1 / 947-4-1 and European standards EN60 947-1 / 60 947-4-1 Electromagnetic compatibility (EMC) according to amendment A11 to IEC947-1; EN60 947-1 and amendment 2 to IEC947-4-1			
Air temperature close to contactor						
– with a thermal O/L relay mounted		°C	-25 to +50 (0.85 to 1.1 U_c)			
– without thermal O/L relay mounted		°C	-40 to +55 (0.85 to 1.1 U_c) / +55 to +70 (U_c)			
– for storage		°C	-60 to +80			
Climatic withstand			according to IEC 68-2-30 and 68-2-11 – UTE C 63-100 specification II			
Mounting positions: (see drawing page 1.36)			Positions 1,3 ,4 -θ ≤ 55 °C: 0.85 to 1.1 U_c; -θ = 55 to 70 °C: — U_c — Positions 1 to 5 - θ ≤ 55 °C: 0.85 to 1.1 U_c; - θ = 55 to 70 °C: — U_c — Positions 2,6 -θ ≤ 55 °C: 0.95 to 1.1 U_c; -θ > 55 °C: not acceptable — Position 6 - θ ≤ 55 °C: 0.95 to 1.1 U_c; - θ > 55 °C: not acceptable — Position 5: see tables p. 1.36			
Operating altitude		m	≤ 3000			
Shock withstand acc. to IEC68-2-27 and EN60068-2-27 Mounting position 1 (See page 1.36)			1/2 sinusoidal shock for 11ms: no change in contact position — Shock direction: A, C1, C2: 20 g; B1 : 5 g; B2 : 15 g — Note: only on plate for A95 and A110			
Mounting	• on mounting rail		according to IEC715 and EN50 022 35 x 7.5 mm 35 x 15 mm			
	• by screws (not supplied)		2 x M 4			
Connecting terminals (delivered in open position)	– Main poles		(+,-) pozidriv 2 screw with cable clamp			
			M 3.5		M 4	M 5
	– Coil terminals		M 3.5 (+,-) pozidrive 2 screw with cable clamp			
	– Built in aux. terminals		(+,-) pozidriv 2 screw with cable clamp			
			M 3.5		M 4	—
Connecting capacity						
Main conductors (poles)			min. – max.		min. – max.	min. – max.
Rigid solid (≤ 4 mm²) / rigid stranded (≥ 6 mm²)		**1 x** mm²	1 – 4		1.5 – 6	2.5 – 10
		2 x mm²	1 – 4		1.5 – 6	2.5 – 10
Flexible without cable end		**1 x** mm²	1 – 2.5		1.5 – 4	2.5 – 6
		2 x mm²	0.75 – 2.5		1.5 – 4	2.5 – 6
Bars or lugs: max. width		mm ≤	8		10	13
hole Ø		mm >	3.7		4	5
Auxiliary conductors (built in auxiliary terminals + coil terminals)			min. – max.			
Rigid solid		**1 or 2 x** mm²	1 – 4			
Flexible without cable end①		**1 x** mm²	1 – 2.5			
		2 x mm²	0.75 – 2.5			
Degree of protection acc. to IEC529, IEC947-1 and EN60529			Protection against direct contact according to VDE 0106 – Part. 100			
– Main terminals			IP10			
– Coil terminals			IP20			
– Auxiliary terminals			IP10			

① Except auxiliary built into AC25: 0.75 – 4 mm²

IEC Technical data
BC9 – BC30
DC operated

Magnet system characteristics

Type			BC9	BC16	BC25	BC30
Number of poles			3 or 4	3 or 4	3 or 4	3
Coil operating limits acc. to IEC947-4-1: 0.85 to 1.1 x $\mathbf{U_c}$			≤ 55°C			
Drop out voltage % of U_c			roughly 15 – 40 %			
Coil consumption (average value)						
	— pull in, from cold state	W	7			
	— holding, from warm state	W	7			
Rated control circuit voltage U_c		V	6 – 250			
Operating time	Between coil energization and:					
	— N.O. contact closing	ms	50 – 75			
	— N.C. contact opening	ms	45 – 70			
	Between coil de-energization and:					
	— N.O. contact opening	ms	15 – 30*			
	— N.C. contact closing	ms	17 – 32*			
	*The use of surge suppressors increases the opening time on a scale of 1.1 to 1.5 for a varistor suppressor and on a scale of 4 to 8 for a diode suppressor.					

Characteristics of BC9 – BC25 contactor built in auxiliary contacts

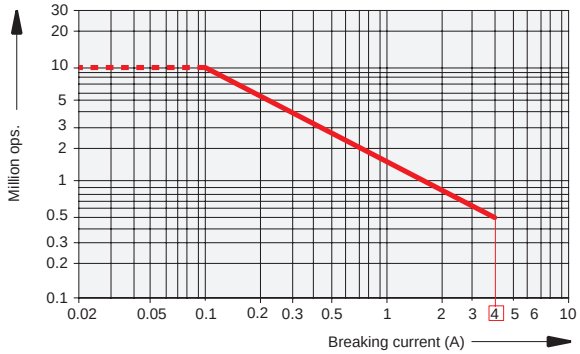
Rated operational voltage U_e			V	690
Conventional free air thermal current I_{th}			A	10
Rated operational current	24 – 127 V	50/60 Hz	A	6
I_e /AC-15 acc. to IEC947-5-1	220 – 240 V	50/60 Hz	A	4
	380 – 440 V	50/60 Hz	A	3
	500 V	50/60 Hz	A	2
	690 V	50/60 Hz	A	2
I_e /DC-13 acc. to IEC947-5-1	24 V	DC	A/W	6 / 144
	48 V	DC	A/W	2.8 / 134
	72 V	DC	A/W	2 / 144
	125 V	DC	A/W	1.1 / 138
	250 V	DC.	A/W	0.55 / 138
Operational current frequency			Hz	25 – 400
Rated making capacity		acc. to IEC947-5-1		10 x I_e/AC – 15
Rated breaking capacity		acc. to IEC947-5-1		10 x I_e/AC –15
Short circuit protection – gG (gl) type fuses			A	10
Rated short time withstand current I_{cw}			for 1.0 s	50 A
			for 0.1 s	100 A
Insulation resistance at 500 V d.c.				after durability test: 5 MΩ
Min. switching capacity				24V / 5 mA
Non overlapping time between N.O. and N.C. contacts		ms	≥ 2	
Heat dissipation per pole at 6 A			W	0.15

Electrical durability
Max. switching frequency 1200 cycles/h

AC-15 according to IEC947-5-1
making current: 10 x $\mathbf{I_e}$ with cos φ = 0.7 and $\mathbf{U_e}$
breaking current: $\mathbf{I_e}$ with cos φ = 0.4 and $\mathbf{U_e}$

The curve opposite shows the electrical durability of the built in auxiliary contacts with respect to the breaking current.

This curve has been drawn for resistive and inductive loads up to 690 V, 40 – 60 Hz.



IEC Technical data
A/AE, GA/GAE, DC circuit switching
AC & DC operated

General

The arc switching on d.c. is more difficult than on a.c.
- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≃ 1 ms), inductive loads such as shunt motors (L/R ≃ 2 ms) or series motors (L/R ≃ 7.5 ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

Technical data

- The tables indicate for the standard contactors the I_e max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 947-4-1 publication, the operating voltage U_e and the pole coupling details.

Ampere values quoted in the tables below are valid for a –25 … +70 °C temperature close to the contactors, as long as the AC-1 Ampere values for the corresponding ambient temperature are not exceeded.
- Max. switching frequency: 300 ops/h.
- For switching higher d.c. ratings, we recommend the use of bar mounted contactors, R series (63… 2000 A).

Type		A/AE 9	A/AE 12	A/AE 16	A/AE 26	A/AE 30	A/AE 40	A/AE/AF 45	A/AE/AF 50	A/AE/AF 63	A/AE/AF 75	GA/GAE 75
Utilization category DC-1, L/R ≤ 1 ms												
≤ 72 V	A	25	27	30	45	55	60	100	100	110	120	120
110 V	A	10	15	20	–	–	–	–	–	–	–	120
220 V	A	–	–	–	–	–	–	–	–	–	–	120
440 V	A	–	–	–	–	–	–	–	–	–	–	100
600 V	A	–	–	–	–	–	–	–	–	–	–	75
≤ 72 V	A	25	27	30	45	55	60	100	100	110	120	–
110 V	A	25	27	30	45	55	60	100	100	110	120	–
220 V	A	10	15	20	–	–	–	–	–	–	–	–
≤ 72 V	A	25	27	30	45	55	60	100	100	110	120	–
110 V	A	25	27	30	45	55	60	100	100	110	120	–
220 V	A	25	27	30	45	55	60	100	100	110	120	–
≤ 72 V	A	25	27	30	45	–	–	70	100	–	120	–
110 V	A	25	27	30	45	–	–	70	100	–	120	–
220 V	A	25	27	30	45	–	–	70	100	–	120	–
440 V	A	10	15	20	–	–	–	–	–	–	–	–
Utilization category DC-3, L/R ≤ 2 ms												
≤ 72 V	A	25	27	30	45	55	60	100	100	110	120	120
110 V	A	6	7	8	–	–	–	–	–	–	–	120
220 V	A	–	–	–	–	–	–	–	–	–	–	100
440 V	A	–	–	–	–	–	–	–	–	–	–	85
≤ 72 V	A	25	27	30	45	55	60	100	100	110	120	–
110 V	A	25	27	30	45	55	60	100	100	110	120	–
220 V	A	6	7	8	–	–	–	–	–	–	–	–
≤ 72 V	A	25	27	30	45	55	60	100	100	110	120	–
110 V	A	25	27	30	45	55	60	100	100	110	120	–
220 V	A	25	27	30	45	55	60	100	100	110	120	–
≤ 72 V	A	25	27	30	45	–	–	70	100	–	120	–
110 V	A	25	27	30	45	–	–	70	100	–	120	–
220 V	A	25	27	30	45	–	–	70	100	–	120	–
440 V	A	6	7	8	–	–	–	–	–	–	–	–
Utilization category DC-5, L/R ≤ 7.5 ms												
≤ 72 V	A	9	12	16	25	30	40	50	50	63	75	85
110 V	A	4	4	4	–	–	–	–	–	–	–	85
220 V	A	–	–	–	–	–	–	–	–	–	–	85
440 V	A	–	–	–	–	–	–	–	–	–	–	35
≤ 72 V	A	25	27	30	45	55	60	100	100	110	120	–
110 V	A	10	15	20	30	45	50	80	80	90	100	–
220 V	A	4	4	4	–	–	–	–	–	–	–	–
≤ 72 V	A	25	27	30	45	55	60	100	100	110	120	–
110 V	A	25	27	30	45	55	60	100	100	110	120	–
220 V	A	9	12	16	25	30	40	50	50	63	75	–
≤ 72 V	A	25	27	30	45	–	–	70	100	–	120	–
110 V	A	25	27	30	45	–	–	70	100	–	120	–
220 V	A	10	15	20	30	–	–	70	70	–	100	–
440 V	A	4	4	4	–	–	–	–	–	–	–	–

IEC Technical data
A/AE/AF, DC switching ratings
AC & DC operated

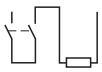
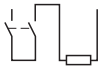
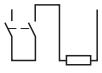
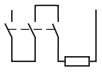
General

The arc switching on d.c. is more difficult than on a.c.
- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≃ 1 ms), inductive loads such as shunt motors (L/R ≃ 2 ms) or series motors (L/R ≃ 7.5 ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

Technical data

- The tables indicate for the standard contactors the I_e max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 947-4-1 publication, the operating voltage U_e and the pole coupling details.

Ampere values quoted in the tables below are valid for a –25 … +70 °C temperature close to the contactors, as long as the AC-1 Ampere values for the corresponding ambient temperature are not exceeded.
- Max. switching frequency: 300 ops/h.
- For switching higher d.c. ratings, we recommend the use of bar mounted contactors, R series (63… 2000 A).

	Type	A/AE/AF 95	A/AE/AF 110	A/AF 145	A/AF 185	A/AF 210	A/AF 260	A/AF 300	AF 400	AF 460	AF 580	AF 750
Utilization category DC-1, L/R ≤ 1 ms												
 110 V	A	–	–	–	–	–	–	–	600	700	800	1050
 110 V	A	145	160	250	275	350	400	450	600	700	800	1050
220 V	A	–	–	–	–	–	–	–	–	–	–	–
 110 V	A	145	160	250	275	350	400	450	600	700	800	1050
220 V	A	145	160	250	275	350	400	450	600	700	800	1050
440 V	A	–	–	–	–	–	–	–	600	700	800	1050
600 V	A	–	–	–	–	–	–	–	600	700	800	1050
Utilization category DC-3, L/R ≤ 2 ms												
 ≤ 110 V	A	–	–	–	–	–	–	–	600	700	800	1050
 110 V	A	145	160	250	275	350	400	450	600	700	800	1050
220 V	A	–	–	–	–	–	–	–	600	700	800	1050
 110 V	A	145	160	250	275	350	400	450	600	700	800	1050
220 V	A	145	160	250	275	350	400	450	600	700	800	1050
440 V	A	–	–	–	–	–	–	–	600	700	800	1050
600 V	A	–	–	–	–	–	–	–	600	700	800	1050
Utilization category DC-5, L/R ≤ 7.5 ms												
 110 V	A	–	–	–	–	–	–	–	600	700	800	1050
 110 V	A	145	160	250	275	350	400	450	600	700	800	1050
220 V	A	–	–	–	–	–	–	–	600	700	800	1050
 110 V	A	145	160	250	275	350	400	450	600	700	800	1050
220 V	A	145	160	250	275	350	400	450	600	700	800	1050
440 V	A	–	–	–	–	–	–	–	600	700	800	1050
600 V	A	–	–	–	–	–	–	–	600	700	800	1050

IEC Technical data
EK, DC circuit switching
AC & DC operated

General

The arc switching on d.c. is more difficult than on a.c.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≃ 1 ms), inductive loads such as shunt motors (L/R ≃ 2 ms) or series motors (L/R ≃ 7.5 ms).
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

Type		EK 110	EK 150	EK 175	EK 210	EK 370
Utilization category DC-1, L/R ≤ 1 ms						
≤ 72 V	A	120	145	210	210	370
110 V	A	120	145	210	210	370
≤ 72 V	A	200	200	300	300	550
110 V	A	200	200	300	300	550
220 V	A	200	200	300	300	550
≤ 72 V	A	200	200	300	300	550
110 V	A	200	200	300	300	550
220 V	A	200	200	300	300	550
440 V	A	–	–	210	210	450
600 V	A	–	–	–	–	450
≤ 72 V	A	200	200	260	300	–
110 V	A	200	200	260	300	–
220 V	A	200	200	260	300	–
440 V	A	200	200	260	300	–
600 V	A	–	–	260	300	–
Utilization category DC-3, L/R ≤ 2 ms						
≤ 72 V	A	120	145	210	210	370
≤ 72 V	A	135	135	210	210	450
110 V	A	135	135	210	210	450
220 V	A	135	135	210	210	450
≤ 72 V	A	135	135	210	210	450
110 V	A	135	135	210	210	450
220 V	A	135	135	210	210	450
440 V	A	–	–	210	210	450
600 V	A	–	–	–	–	450
≤ 72 V	A	135	135	170	210	–
110 V	A	135	135	170	210	–
220 V	A	135	135	170	210	–
440 V	A	135	135	170	210	–
600 V	A	–	–	170	210	–
Utilization category DC-5, L/R ≤ 7.5 ms						
≤ 72 V	A	135	135	210	210	450
110 V	A	135	135	210	210	450
220 V	A	135	135	210	210	450
≤ 72 V	A	135	135	210	210	450
110 V	A	135	135	210	210	450
220 V	A	135	135	210	210	450
440 V	A	–	–	210	210	450
600 V	A	–	–	–	–	450
≤ 72 V	A	135	135	210	210	450
110 V	A	135	135	210	210	450
220 V	A	135	135	210	210	450
440 V	A	–	–	210	210	450
600 V	A	–	–	–	–	450
≤ 72 V	A	135	135	170	210	–
110 V	A	135	135	170	210	–
220 V	A	135	135	170	210	–
440 V	A	135	135	170	210	–
600 V	A	–	–	170	210	–

Technical data

- The tables indicate for the standard contactors the I_e max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 947-4-1 publication, the operating voltage U_e and the pole coupling details.
- Ampere values quoted in the tables below are valid for a –25 … +70 °C temperature close to the contactors, as long as the AC-1 Ampere values for the corresponding ambient temperature are not exceeded.
- Max. switching frequency: 300 ops/h.
- For switching higher d.c. ratings, we recommend the use of bar mounted contactors, R series (63… 2000 A).

IEC Technical data
DC Circuit Switching
BC9 – BC 30

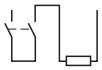
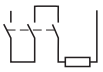
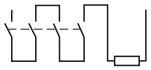
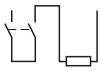
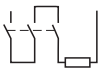
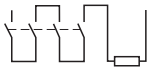
General

The arc switching on DC is more difficult than on AC.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≃ 1 ms), inductive loads such as shunt motors (L/R ≃ 2 ms) or series motors (L/R ≃ 7.5 ms).
  The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs.
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

Technical data

- The tables indicate for the standard contactors the I_e max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 947-4-1 publication, the operating voltage U_e and the pole coupling details.
  Ampere values quoted in the tables below are valid for a –25 … +70 °C temperature close to the contactors, as long as the **AC-1 Ampere values** (see page 1.44) for the corresponding ambient temperature are not exceeded.
- Max. switching frequency: 300 ops/h.
- For switching higher DC ratings, we recommend the use of bar mounted contactors, R series (63… 2000 A).

– d.c. operated contactors	Type		BC 9	BC 16	BC 25	BC 30
Utilization category DC-1, L/R ≤ 1 ms						
	≤ 72 V	A	22	28	45	55
	110 V	A	5	10	–	–
	≤ 72 V	A	22	28	45	55
	110 V	A	22	28	45	55
	220 V	A	5	10	–	–
	≤ 72 V	A	22	28	45	55
	110 V	A	22	28	45	55
	220 V	A	22	28	45	55
	≤ 72 V	A	22	28	45	–
	110 V	A	22	28	45	–
	220 V	A	22	28	45	–
	440 V	A	5	10	–	–
Utilization category DC-3, L/R ≤ 2 ms **Utilization category DC-5,** L/R ≤ 7.5 ms						
	≤ 72 V	A	5	9	15	25
	110 V	A	2	2	–	–
	≤ 72 V	A	9	18	25	30
	110 V	A	8	16	20	30
	220 V	A	2	2	–	–
	≤ 72 V	A	10	16	25	30
	110 V	A	10	16	25	30
	220 V	A	10	10	15	25
	≤ 72 V	A	10	16	25	–
	110 V	A	10	16	25	–
	220 V	A	10	16	20	–
	440 V	A	2	2	–	–

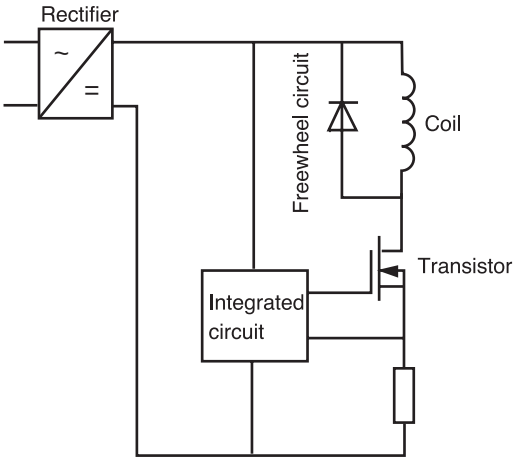
IEC Technical data
EK contactors, AC & DC operated

Type			EK 110	EK 150	EK 175	EK 210	EK 370	EK 550	EK1000
Number of poles			4	4	4	4	4	4	4
Insulation Characteristics									
Rated insulated voltage U_i									
according to IEC 947-4-1 and VDE 0110 (Gr.C)		V	1000	1000	1000	1000	1000	1000	1000
according to UL/CSA		V	600	600	600	600	600	600	-
Rated impulse voltage $U_{imp.}$		kV	8	8	8	8	8	8	8
Main Pole Characteristics									
Conventional free air thermal current I_{th}									
acc to IEC 947-4-1, open contactors $\theta \leq 40°C$		A	200	250	300	350	550	800	1000
with conductor cross-sectional area		mm^2	95	150	185	240	2 x 185	2 x 240	2 x 300
Rated operational current I_e/AC-1									
for air remperature									
	$\theta \leq 40°C$	A	200	250	300	350	550	800	1000
measured close to the contactor	$\theta \leq 55°C$	A	180	230	270	310	470	650	800
	$\theta \leq 70°C$	A	155	200	215	250	400	575	720
with conductor cross-sectional area		mm^2	95	150	185	240	2 x 185	2 x 240	2 x 300
Utilization category AC-3									
for air temperature – $\theta \leq 55°C$ close to the contactor									
Rated operational current									
I_e/AC-3 (1)									
	220-230-240 V	A	120	145	210	210	400	550	-
	380-400	V	A	120	145	210	210	400	550
-									
	415 V	A	120	145	210	210	400	550	
-									
	440 V	A	120	145	210	210	370	550	
-									
	500 V	A	120	145	210	210	370	550	
-									
	690 V	A	120	120	210	210	370	550	
-									
	1000 V	A	64	80	113	113	155	175	
-									
Rated short-time withstand current I_{cw}									
at 40°C ambient temperature	1 s	A	1700	1800	2300	2300	5500	5500	6800
in free air from cold state	10 s	A	900	1200	1680	1680	5300	5300	6400
	30 s	A	600	700	1000	1000	3700	3700	4400
	1 min	A	450	550	800	800	3000	3000	3400
	15 min	A	210	250	320	320	1000	1000	1200
Heat dissipation per pole									
	I_e/AC-1	W	10	13	18	18	40	60	80
	I_eAC-3	W	3	5	9	9	15	25	—
UL/CSA data									
Continous amp - rating		A	170	200	250	300	420	540	—

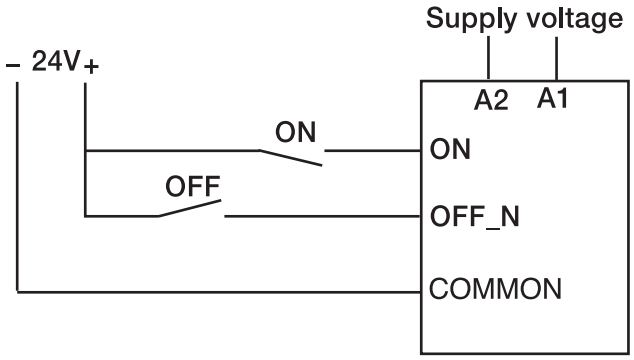
IEC Technical data
EK contactors, AC & DC operated

Type			EK 110	EK 150	EK 175	EK 210	EK 370	EK 550	EK1000
Number of poles			4	4	4	4	4	4	4
Magnet System Characteristics									
Coil operating limits acc. to IEC 947-4-1			0.85 - 1.1 x U_c at an ambient temp. of max 70°C						
Drop-out voltage in % of U_c									
		a.c. d.c.	45-65% 15-50%	45-65% 15-50%	45-65% 15-50%	45-65% 15-50%	45-65% 15-50%	45-65% 15-50%	45-65% 15-50%
Coil consumption									
Coil code A:									
Average pull-in value	50 Hz	VA	800	800	1100	1100	3500	3500	3500
	60 Hz	VA	900	900	1200	1200	4000	4000	4000
Average holding value	50 Hz	VA/W	44/15	44/15	52/18	52/18	125/50	125/50	125/50
	60 Hz	VA/W	52/18	52/18	65/22	65/22	140/60	140/60	140/60
Coil code E:									
Average pull-in value	50/60 Hz	VA/VA	500	500	630	630	3800/3400	3800/3400	3800/3400
Average holding value		VA/W	2.5	2.5	2.5	2.5	140/60	140/60	140/60
DC coil code D:									
Average pull-in value		W	500	500	630	630	1100	1100	1100
Average holding value		W	2.5	2.5	2.5	2.5	20	20	20
Operating times									
AC coil, code A:									
From coil energization to									
closing of the NO contact	ms		20-40	20-40	20-40	20-40	30-60	30-60	30-60	30-60
opening of the NC contact	ms		15-35	15-35	15-35	15-35	25-55	25-55	25-55	25-55
From coil de-energization to									
opening of the NO contact	ms		7-15	7-15	7-15	7-15	10-20	10-20	10-20	10-20
closing of the NC contact	ms		10-18	10-18	10-18	10-18	13-23	13-23	13-23	13-23
AC coil code E:									
From coil energization to									
closing of the NO contact	ms		30-50	30-50	30-50	30-50	30-60	30-60	30-60	30-60
opening of the NC contact	ms		25-45	25-45	25-45	25-45	25-55	25-55	25-55	25-55
From coil de-energization to									
opening of the NO contact	ms		95-120	95-120	95-120	95-120	10-20	10-20	10-20	10-20
closing of the NC contact	ms		100-125	100-125	100-125	100-125	13-23	13-23	13-23	13-23
DC coil code D :									
From coil energization to									
opening of the NO contact	ms		30-50	30-50	30-50	30-50	60-80	60-80	60-80	60-80
opening of the NC contact	ms		27-47	27-47	27-47	27-47	55-75	55-75	55-75	55-75
From coil de-energization to									
opening of the NO contact	ms		10-35	10-35	10-35	10-35	10-35	10-35	10-35	10-35
closing of the NC contact	ms		13-38	13-38	13-38	13-38	13-38	13-38	13-38	13-38

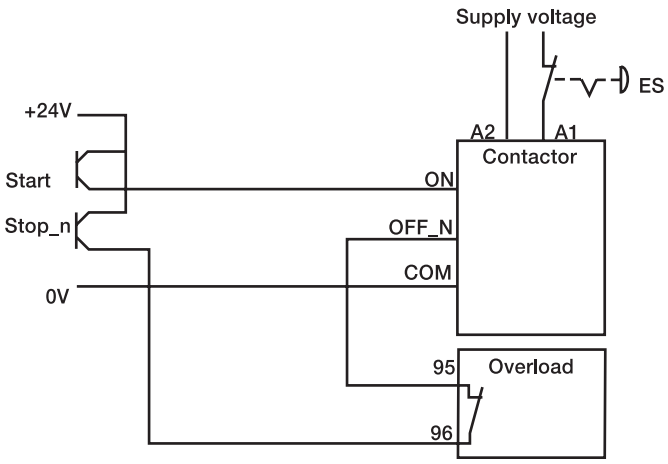
Circuit diagram



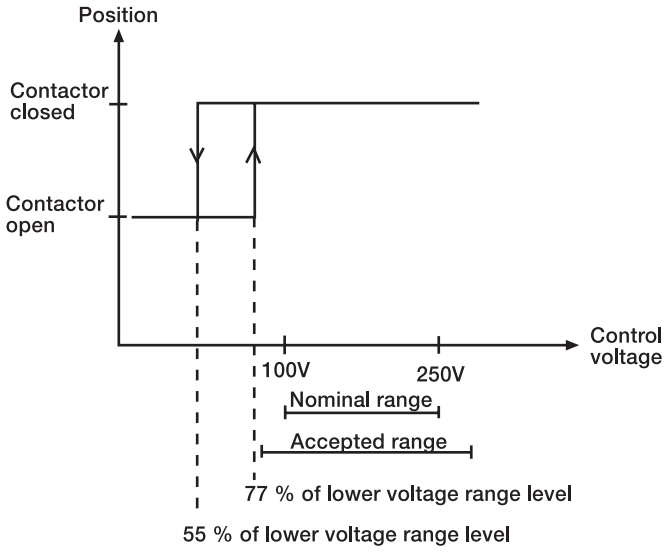
Control inputs AF 400...750



Control circuit diagram



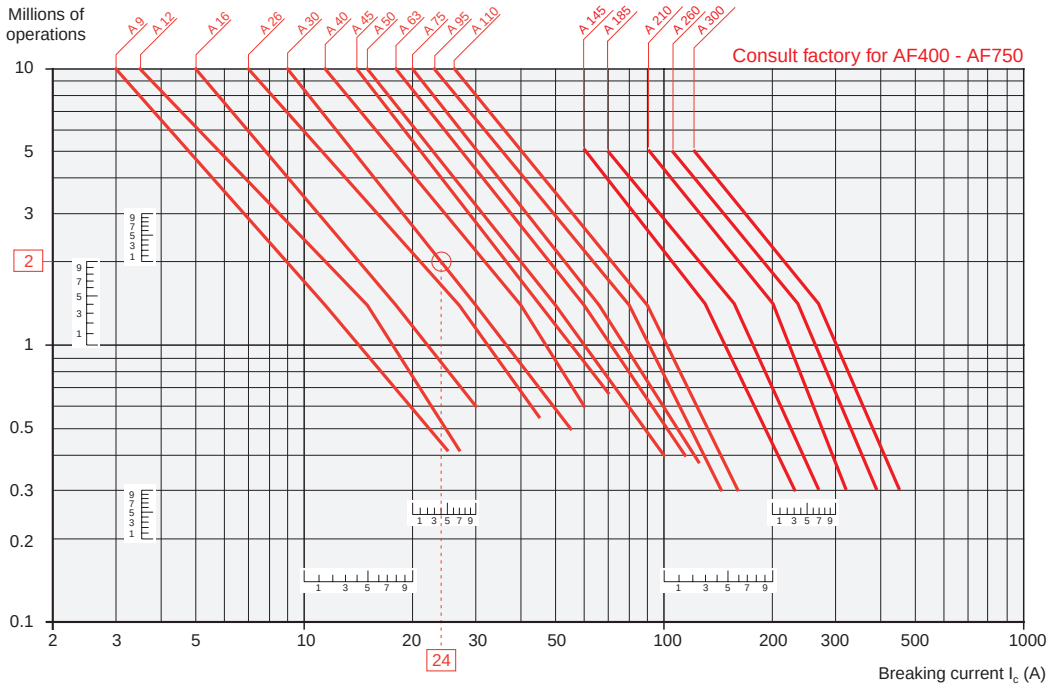
Operating diagram



Technical data
Contactor utilization categories & electrical durability
AC-1

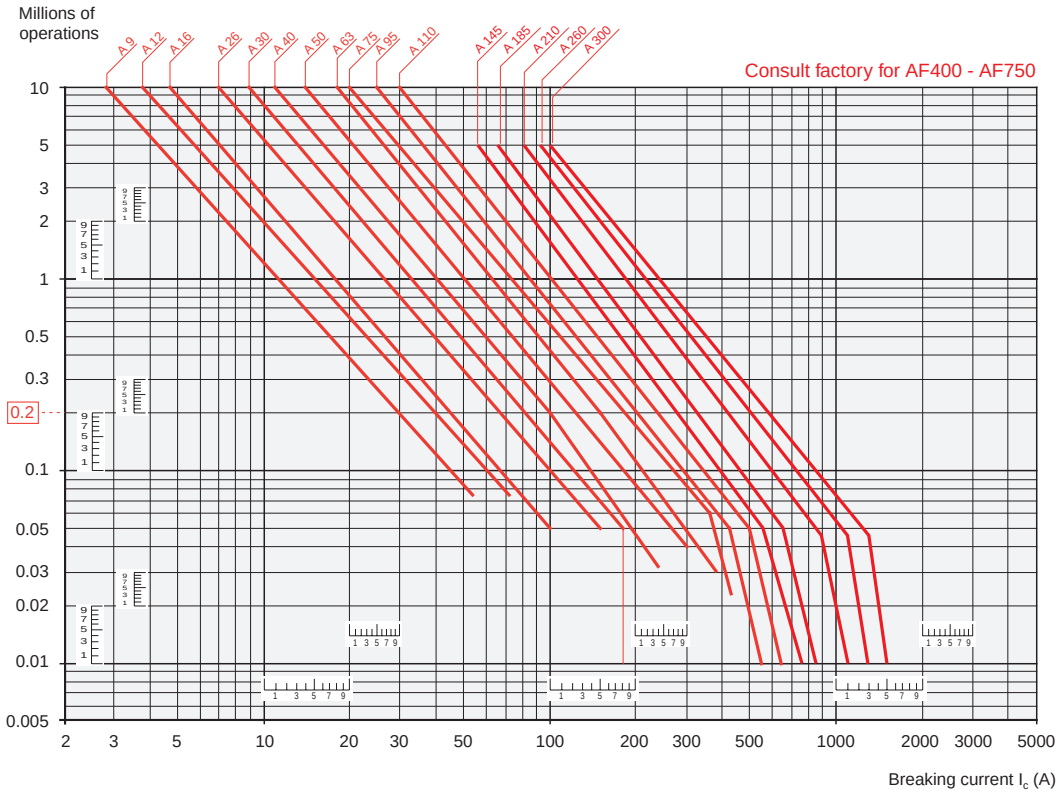
Electrical durability for AC-1 utilization category, ambient temperature ≤ 55°C

Switching non-inductive or slightly inductive loads. The breaking current I_e for AC-1 is equal to the rated operational current of the load.



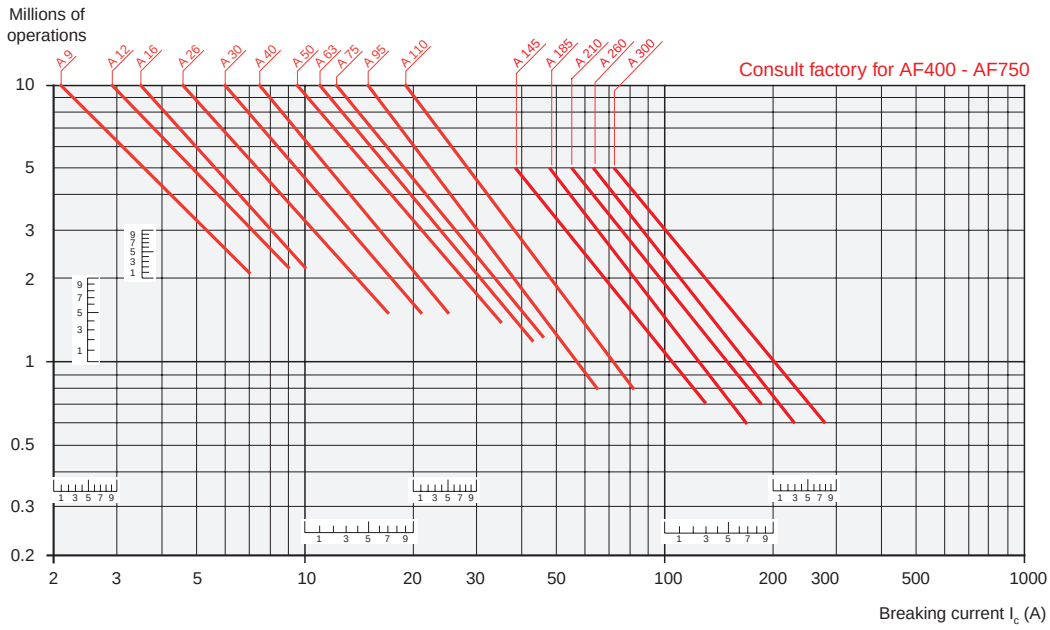
Electrical durability for utilization category AC-3 - $U_e \leq 440V$

Switching cage motors; starting and switching off running motors. The breaking current I_e for AC-3 is equal to the rated operational current I_e, (I_e = motor full load current)



Electrical durability for utilization category AC-3 - $440V < U_e \leq 690V$

Switching cage motors; starting and switching off running motors. The breaking current I_e for AC-3 is equal to the rated operational current I_e, (I_e = motor full load current)

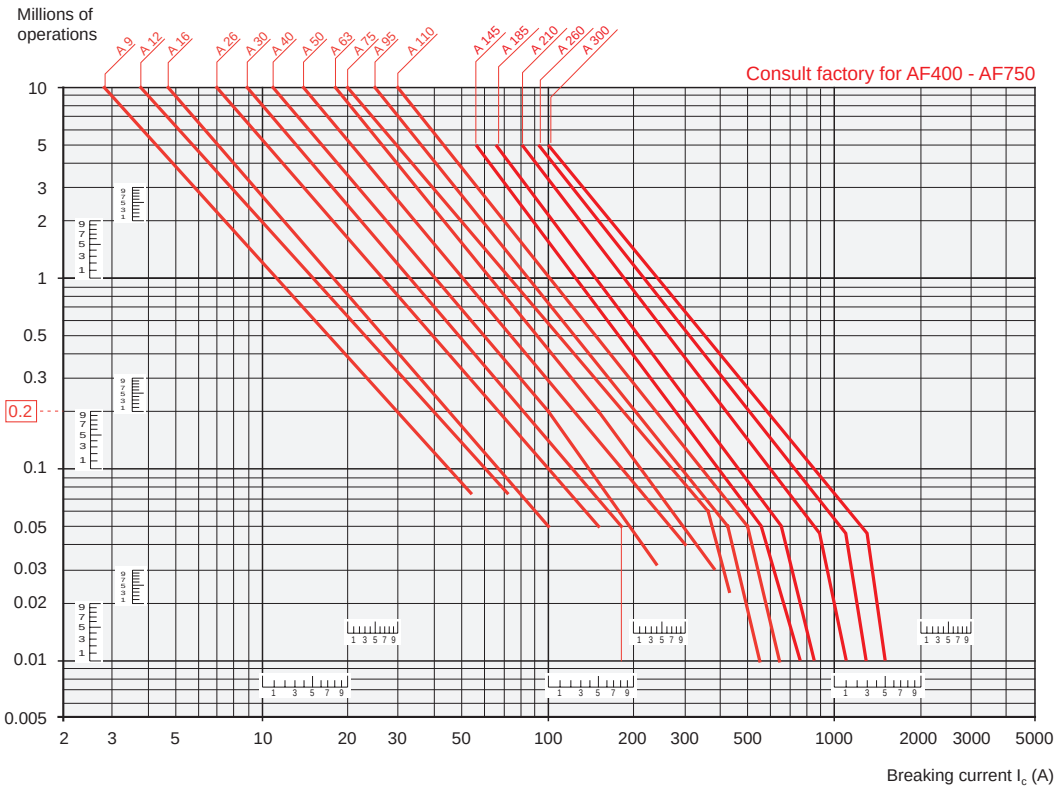


Technical data
Contactor utilization categories & electrical durability
AC-4

Electrical durability for utilization category AC-4 - $U_e \leq 440V$

Maximum number of AC-4 operations: 300 per hour for A9 - A110 contactors

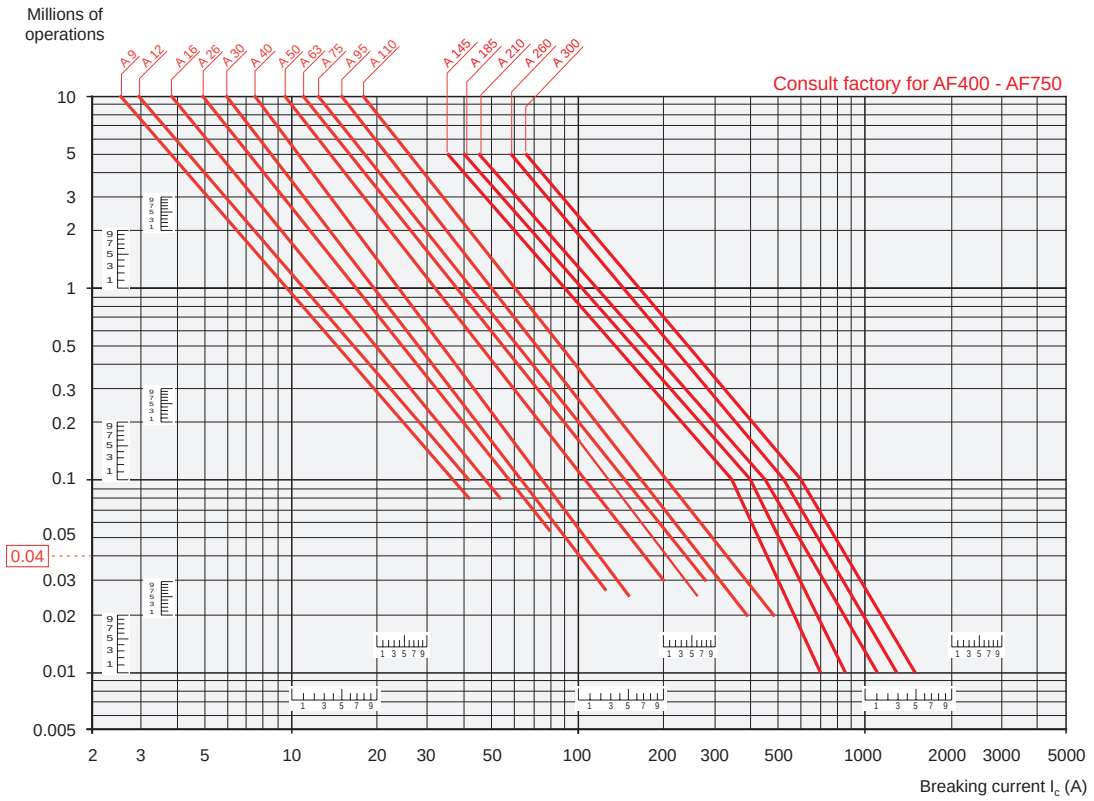
Switching cage motors; starting, reverse operation and step-by-step operation. The breaking current I_c is equal to 6 x I_e, where I_e is the motor rated operational current (I_e = motor full load current)



Electrical durability for utilization category AC-4 - 440V < U_e ≤ 690V

Maximum number of AC-4 operations: 300 per hour for A9 - A110 contactors

Switching cage motors; starting, reverse operation and step-by-step operation. The breaking current I_e is equal to 6 x I_e, where I_e is the motor rated operational current (I_e = motor full load current)



Technical data
Motor data

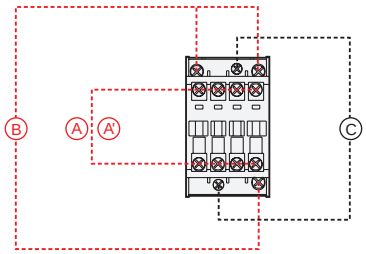
Ampere ratings of 3 phase, AC induction motors

	110 – 120V			200 – 208V			220 – 240V			380 – 415V①		440 – 480V			550 – 600V		
Horse power	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase	Single phase	Three phase	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase
1/10	3.0	—	—	1.65	—	—	1.5	—	—	1.0	—	—	—	—	—	—	—
1/8	3.8	—	—	2.1	—	—	1.9	—	—	1.2	—	—	—	—	—	—	—
1/6	4.4	—	—	2.4	—	—	2.2	—	—	1.4	—	—	—	—	—	—	—
1/4	5.8	—	—	3.2	—	—	2.9	—	—	1.8	—	—	—	—	—	—	—
1/3	7.2	—	—	4.0	—	—	3.6	—	—	2.3	—	—	—	—	—	—	—
1/2	9.8	4.0	4.4	5.4	2.2	2.4	4.9	2.0	2.2	3.2	1.3	2.5	1.0	1.1	2.0	0.8	0.9
3/4	13.8	4.8	6.4	7.6	2.6	3.5	6.9	2.4	3.2	4.5	1.8	3.5	1.2	1.6	2.8	1.0	1.3
1	16.0	6.4	8.4	8.8	3.6	4.6	8.0	3.2	4.2	5.1	2.3	4.0	1.6	2.1	3.2	1.3	1.7
1 1/2	20.0	9.0	12.0	11.0	5.0	6.6	10.0	4.5	6.0	6.4	3.3	5.0	2.3	3.0	4.0	1.8	2.4
2	24.0	11.8	13.6	13.2	6.5	7.5	12.0	5.9	6.8	7.7	4.3	6.0	3.0	3.4	4.8	2.4	2.7
3	34.0	16.6	19.2	18.7	9.2	10.6	17.0	8.3	9.6	10.9	6.1	8.5	4.2	4.8	6.8	3.3	3.9
5	56.0	26.4	30.4	30.8	14.5	16.8	28.0	13.2	15.2	17.9	9.7	14.0	6.6	7.6	11.2	5.3	6.1
7 1/2	80.0	38.0	44.0	44.0	21.0	24.2	40.0	19.0	22.0	27.0	14.0	21.0	9.0	11.0	16.0	8.0	9.0
10	100.0	48.0	56.0	55.0	26.4	30.8	50.0	24.0	28.0	33.0	18.0	26.0	12.0	14.0.	20.0	10.0	11.0
15	135.0	72.0	84.0	75.0	39.6	46.2	68.0	36.0	42.0	44.0	27.0	34.0	18.0	21.0	27.0	14.0	17.0
20	—	94.0	108.0	96.8	52.0	60.0	88.0	47.0	54.0	56.0	34.0	44.0	23.0	27.0	35.0	19.0	22.0
25	—	118.0	136.0	121.0	65.0	75.0	110.0	59.0	68.0	70.0	44.0	55.0	29.0	34.0	44.0	24.0	27.0
30	—	138.0	160.0	150.0	76.0	88.0	136.0	69.0	80.0	87.0	51.0	68.0	35.0	40.0	54.0	28.0	32.0
40	—	180.0	208.0	194.0	100.0	115.0	176.0	90.0	104.0	112.0	66.0	88.0	45.0	52.0	70.0	36.0	41.0
50	—	226.0	260.0	238.0	125.0	143.0	216.0	113.0	130.0	139.0	83.0	108.0	56.0	65.0	86.0	45.0	52.0
60	—	—	—	—	147.0	160.0	—	133.0	154.0	—	103.0	—	67.0	77.0	—	53.0	62.0
75	—	—	—	—	183.0	212.0	—	166.0	192.0	—	128.0	—	83.0	96.0	—	66.0	77.0
100	—	—	—	—	240.0	273.0	—	218.0	248.0	—	165.0	—	109.0	124.0	—	87.0	99.0
125	—	—	—	—	—	344.0	—	—	312.0	—	208.0	—	135.0	156.0	—	108.0	125.0
150	—	—	—	—	—	396.0	—	—	360.0	—	240.0	—	156.0	180.0	—	125.0	144.0
200	—	—	—	—	—	528.0	—	—	480.0	—	320.0	—	208.0	240.0	—	167.0	192.0
250	—	—	—	—	—	663.0	—	—	602.0	—	403.0	—	—	302.0	—	—	242.0
300	—	—	—	—	—	—	—	—	—	—	482.0	—	—	361.0	—	—	289.0
350	—	—	—	—	—	—	—	—	—	—	560.0	—	—	414.0	—	—	336.0
400	—	—	—	—	—	—	—	—	—	—	636.0	—	—	477.0	—	—	382.0
500	—	—	—	—	—	—	—	—	—	—	786.0	—	—	590.0	—	—	472.0

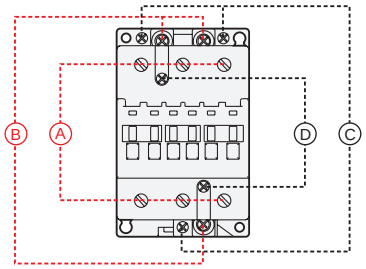
① To obtain full load currents for 265V and 277V motors, decrease corresponding 220 – 240V ratings by 13 percent and 17 percent.

Technical Data
Tightening torques for A/AE/BC contactors, N/KC control relays and accessories

Contactors:
B 9 - BC30
A9 - A40
Control relays:
N and KC



A/AE45 - A/AE110 Contactors



Type of contactors	Main poles Ⓐ		Built-in aux. poles Ⓐ'		Coil terminals Ⓑ		Housing assembly Ⓒ			Cover fixing Ⓓ		Contact screws	
	M3.5 ± poz. 2		**M3.5 ± poz.2**		**M3.5 ± poz.2**		**Ø 3.5**						
	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: **Screws**	recommended **Ncm/lb.in**	max. Ncm				
KC, BC9, BC16	**100/9**	120	**100/9**	120	**100/9**	120	± Poz.2	**160/14.4**	175				
N, A 9, A12, A16							± Poz.2	**120/10.5**	135				
	M4 ± poz. 2		**M4 ± poz.2**		**M3.5 ± poz.2**		**Ø 3.5**						
	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: **Screws**	recommended **Ncm/lb.in**	max. Ncm				
BC18, BC25	**170/15**	220	**170/15**	220	**100/9**	120	± Poz.2	**160/14.4**	175				
A26							± Poz.1	**120/10.5**	135				
	M5 ± poz. 2				**M3.5 ± poz.2**		**Ø 3.5 ± poz.2**			**M2.5 slotted screws**			
	Tightening torque: recommended **Ncm/lb.in**	max. Ncm			Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**		max. Ncm	Tightening torque: recommended **Ncm/lb.in**	max. Ncm		
BC30	**280/25**	320			100/9	120	**160/14.4**		175	**80/7.2**	90		
	M5 ± poz. 2		**M3.5 ± poz. 2**		**M3.5 ± poz.2**		**Ø 3.5 ± poz.1**						
	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**		max. Ncm				
A30, A40	**230/20**	260	**100/9**	120	**100/9**	120	**120/10.5**		135				
	M8 slotted screws for Ø 6.5				**M3.5 ± poz.2**		**Ø 3.5 ± poz.2**			**Ø 3.5 ± poz.2**		**Ø 3 ± poz.1**	
	Tightening torque: recommended **Ncm/lb.in**	max. Ncm			Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**		max. Ncm	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**	max. Ncm
A/AE45 - A/AE75	**400/35**	450			**100/9**	120	**120/10.5**		135	**100/9**	110	**60/5.4**	70
	HC, M8				**M3.5 ± poz.2**		**M 3.5 ± poz.2**			**Ø 3.5 ± poz.2**		**CBLX - M5 / T25**	
	Tightening torque: recommended **Ncm/lb.in**	max. Ncm			Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**		max. Ncm	Tightening torque: recommended **Ncm/lb.in**	max. Ncm	Tightening torque: recommended **Ncm/lb.in**	
A/AE 95 - A/AE110	**600/53**	650			**100/9**	120	**135/12**		150	**100/9**	120	**500/45**	

Accessories	Pole terminals	
CA5, CAL5, CC5 **CAL16, CCL16**	**M3.5 ± poz. 2**	
TP **LK75-A, LK75-A1** **VE5-1, VE5-2**	Tightening torque: recommended **Ncm**	max. Ncm
WB75 (± poz.1 screw)	**100**	120

Technical Data
Tightening torques for A/AF contactors
Lugs

Type of contactors	Main poles Ⓐ	Built-in aux. poles Ⓐ'	Coil terminals Ⓑ	
	M8		**M3.5 ± poz.2**	
	Tightening torque: recommended **Ncm/lb.in**		Tightening torque: recommended **Ncm/lb.in**	max. Ncm
A/AF 145-185	**900/80**		**100/9**	120
	M10		**M3.5 ± poz.2**	
	Tightening torque: recommended **Ncm/lb.in**		Tightening torque: recommended **Ncm/lb.in**	max. Ncm
A/AF 210-300	**1800/160**		**100/9**	120
	M10		**M3.5 ± poz.2**	
	Tightening torque: recommended **Ncm/lb.in**		Tightening torque: recommended **Ncm/lb.in**	max. Ncm
A/AF 400-460	**400/354**		**100/9**	120
	M12		**M3.5 ± poz.2**	
	Tightening torque: recommended **Ncm/lb.in**		Tightening torque: recommended **Ncm/lb.in**	max. Ncm
A/AF 580-750	**450/443**		**100/9**	120

Lugs

Lugs	Mounting torque (lb. in.)	Wire clamp (lb. in.)
ATK185	80	300
ATK300	160	375
ATK300/2	160	375
ATK580/2	88	275
ATK750/3	80	375

Altitude

Refers to the height of the site where the equipment is located, expressed in meters above the sea level.

Ambient temperature

Temperature of the air surrounding the unit.

Circuits

• Auxiliary circuit

All the conducting parts of a contactor, intended to be included in a circuit different from the main circuit and the control circuit of the contactor e.g. signalization, interlocking circuits etc …

• Control circuit

All the conducting parts of a contactor (other than the main circuit) included in a circuit used for the closing operation, or opening operation, or both, of the contactor.

• Main circuit

All the conducting parts of a contactor included in the circuit which it is designed to close or open.

Coil operating range

Expressed as a multiple of the rated control circuit voltage Uc for the lower and upper limits.

Cycle duration

Total time of the on-load + off-load period.

Endurance / durability

• Electrical endurance

Number of on-load operating cycles (i.e. with current on the main contacts) a contactor can achieve, varies depending on the utilization category.

• Mechanical endurance

Number of off-load operating cycles (i.e. without current on the main contacts) a contactor can achieve.

Inching

Energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.

Insulation class according to the VDE 0110 and NFC 20-040

Characterizes contactors suitability in accordance with environment and utilization conditions. A contactor can be classified depending on its own clearance and creepage distances in the insulation classes A, B, C, D which correspond to different insulation voltage values.

The insulation class C is applicable to most of the industrial applications. Equipment described in this catalogue correspond to insulation class C.

Intermittent duty

Duty in which the main contacts of a contactor remain closed for periods of time insufficient to allow the contactor to reach thermal equilibrium, the current-carrying periods being separated by off-load periods of sufficient duration to restore equality of temperature with the cooling medium.

Mounting positions

Stated by the manufacturer. Please note restrictions when applicable.

On-load factor

Ratio of the current flow time to the total time of the cycle x 100.

Plugging

Stopping or reversing a motor quickly by interchanging two supply leads whilst the motor is running.

Rated breaking capacity; Rated making capacity

Value of r.m.s current a contactor can break or make at a fixed voltage value, within the conditions specified by the standards, depending on the utilization category.

Rated control circuit voltage Uc

Control voltage value for which the control circuit of the unit is sized.

Rated insulation voltage U_i

Voltage value which designates the unit and to which dielectric tests, clearance and creepage distances are referred.

Rated impulse withstand voltage U_{imp}

The highest peak value of an impulse voltage of prescribed form 1.2/50, which does not cause breakdown under specified conditions of test.

Rated operating current I_e

Current value stated by the manufacturer and taking into account the rated operating voltage U_e, the rated frequency, the rated duty, the utilization category, the electrical contact life and the type of the protective enclosure.

Rated operating voltage U_e

Voltage value to which utilization characteristics of the contactor are referred, i.e. phase to phase voltage in 3 phase circuits.

Conventional thermal current I_{th}

Value of current the contactor can withstand with poles in closed position, in free air for an eight hour duty, without the temperature rise of its various parts exceeding the limits specified by the standards.

Resistance to shocks

Requirements applicable for instance to vehicles, crane operation or switchgear slide-in module systems.

At the quoted permissible «g» values, contactors must not undergo a change in switching state and O/L relays must not trip.

Resistance to vibrations

Requirements applicable to all the vehicles, vessels and other similar transport systems. At the quoted amplitude and vibration frequency values, the unit must be capable to achieve the required duty.

Short-circuit protection co-ordination

Achieved by using back-up protection devices such as circuit-breakers, H.R.C. fuses or standard fuses.

Co-ordination types a, b, c are defined in IEC 292-1 publication, VDE 0660, NFC 63-650 standards. Co-ordination types "1" and "2" are defined in IEC 947-4-1.

• Type 1 co-ordination

There has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable.

• Type 2 co-ordination

No damage to the overload relay or other parts has occured, except that welding of contactor or starter contacts is permitted, if they are easily separated.

Switching frequency

Number of operating cycles per hour.

Time

• Closing time

Time between energization of the coil until the moment the contacts of the first current path to be closed actually close.

• Opening time

Time from the beginning of state causing breaking until the moment when the contacts of the last current path to be opened are open.

• Minimal operation time

Shortest control duration to ensure complete closing or opening of a contactor.

• Short time current permissible

Value of current which the contactor can withstand in closed position for a short time period and within specified conditions.

• Time constant

Ratio of inductance to the resistance : L/R = mH/Ohm = ms.

Technical data
Standards, utilization categories

Standards

• IEC standards 158-1: “Contactors” and series IEC 292 :

“Motor-starters” have been revised and replaced by the new IEC 947-4-1 (1990-05): “Contactors and Motor-starters” referring to IEC 947-1 (1988): “General rules”

The new standards will constitute the basis of the future European and National standards, not yet revised.

Therefore the ratings indicated in this catalog are established according to the former and the future standards.

• Main changes and additions in the new standards are:

• Revision and extension of the utilization categories (see hereafter)

• Replacement of the coordination classes types a, b, c by new types: “1” (approximately equivalent to former class “a”) and “2” (approximately equivalent to former class “c”) with additional requirements.

• Classification of the thermal overload relays in tripping classes: 10 A; 10; 20 and 30 depending on their tripping times, at 1.5 and 7.2 times their setting current, in order to cover motor applications depending on their starting times. Class 10 A is adapted for motors according to IEC 34-1.

• Introduction of tests to verify the connecting capability and the mechanical strength of terminals.

Utilization categories

A contactor duty is characterized by the utilization category plus indication of the rated operating voltage and the rated operating current (see at Rated …), or the motor characteristics.

Utilization categories for contactors according to IEC 947-4-1

Alternating current:	AC-1	Non-inductive or slightly inductive loads, resistance furnaces.
	AC-2	Slip-ring motors: starting, switching-off.
	AC-3	Squirrel-cage motors: starting, switching-off motors during running.
	AC-4	Squirrel-cage motors: starting, plugging, inching.
	AC-5a	Switching of electric discharge lamp controls.
	AC-5b	Switching of incandescent lamps.
	AC-6a	Switching of transformers.
	AC-6b	Switching of capacitor banks
	AC-8a	Hermetic refrigerant compressor motor control with manual resetting of overload releases
	AC-8b	Hermetic refrigerant compressor motor control with automatic resetting of overload releases.
Direct current:	DC-1	Non-inductive or slightly inductive loads, resistance furnaces.
	DC-3	Shunt motors: starting, plugging, inching. Dynamic breaking of d.c. motors.
	DC-5	Series motors: starting, plugging, inching. Dynamic breaking of d.c. motors.
	DC-6	Switching of incandescent lamps

Utilization categories for contactor relays according to IEC 947-5-1

Alternating current:	AC-12	Control of resistive loads and solid state loads with isolation by opto couplers.
	AC-13	Control of solid state loads with transformer isolation.
	AC-14	Control of small electromagnetic loads (≤ 72 VA).
	AC-15	Control of electromagnetic loads (> 72 VA).
Direct current:	DC-12	Control of resistive loads and solid state loads with isolation by opto couplers.
	DC-13	Control of electromagnets.
	DC-14	Control of electromagnetic loads having economy resistors in circuit.

Utilization categories AC-1, AC-2, AC-3, AC-4 and DC-1, DC-3, DC-5 are maintained with slightly more severe tests.

Other categories have been added in order to standardize specific applications. In fact some contactor applications and the specific criteria characterizing the types of load controlled can modify the recommended utilization characteristics. These major applications are, for example :

Switching of capacitor banks

This application is characterized by high current peaks when switching-on the contactor and presence of harmonic currents on uninterrupted duty. For this application, IEC 947-4-1 has defined an utilization category AC-6b. Practical ratings have to be defined according to tests or, in absence of tests, by a calculation indicated in IEC 947-4-1.

Switching of transformers

This application is characterized by high current peaks on contactor closing due to magnetization phenomena. The corresponding utilization category according to IEC 947-4-1 is AC-6a. Ratings are derived from test-values for AC-3 or AC-4 according to formula given in IEC 947-4-1.

Switching of lighting circuits

The current peaks on contactor closing and power factor vary depending on the type of lamps, the switching method used and if compensation systems are fitted or not.

IEC 947-4-1 contains two standard utilization categories

AC-5a for switching of the electric discharge lamps.
AC-5b for switching of incandescent lamp.

Switching of slip-ring motors

Contactors used for short-circuiting the rotor resistances can be used at operating voltages greater than their own rated insulation voltage.
This application is characterized by easy making and breaking conditions, the on-load factor is generally low.
Utilization is also a function of the switching diagram.

Switching of DC power circuits

On d.c. the arc breaking is more difficult than on a.c. particularly when the time constant is of a high value. This makes it necessary to connect several poles in series to improve the breaking conditions.

Switching of higher currents in AC circuits

Contactor performances can be increased by connecting the poles in parallel.

Switching of circuits in temporary or intermittent duties

For these applications, greater operating currents are permissible. Up-rating factors are quoted in this catalog.

Influence of long control leads in coil control circuits

Depending on operation voltages, conductor cross-sections, coil consumption, control wiring details, nuisance caused by wire resistance and capacitance may occur on contactor closing or opening.

Conditions for making and breaking corresponding to utilization categories

Utilization category	Standard duty						Occasional duty					
	Making conditions			Breaking conditions			Making conditions			Breaking conditions		
	I/I_e	U/U_e	Cos. j or L/R (ms)	I/I_e	U/U_e	Cos. j or L/R (ms)	I_c/I_e	U_r/U_e	Cos. j or L/R (ms)	I_c/I_e	U_r/U_e	Cos. j or L/R (ms)
Contactors for AC circuit switching												
AC-1	1	1	0.95	1	1	0.95	1.5	1.05	0.8	1.5	1.05	0.8
AC-2	2.5	1	0.65	2.5	1	0.65	4	1.05	0.65	4	1.05	0.65
AC-3 $I_e \leq$ 17 A	6	1	0.65	1	0.17	0.65	10	1.05	0.45	8	1.05	0.45
17 < $I_e \leq$ 100 A	6	1	0.35	1	0.17	0.35	10	1.05	0.45	8	1.05	0.45
I_e > 100 A	6	1	0.35	1	0.17	0.35	10	1.05	0.35	8	1.05	0.35
AC-4 $I_e \leq$ 17 A	6	1	0.65	6	1	0.65	12	1.05	0.45	10	1.05	0.45
17 < $I_e \leq$ 100 A	6	1	0.35	6	1	0.35	12	1.05	0.45	10	1.05	0.45
I_e > 100 A	6	1	0.35	6	1	0.35	12	1.05	0.35	10	1.05	0.35
Contactors for DC circuit switching												
DC-1	1	1	1	1	1	1	1.5	1.05	1	1.5	1.05	1
DC-3	2.5	1	2	2.5	1	2	4	1.05	2.5	4	1.05	2.5
DC-5	2.5	1	7.5	2.5	1	7.5	4	1.05	15	4	1.05	15
Contactor relays for AC circuit switching												
AC-14 (≤ 72 VA)	6	1	0.3	1	1	0.3	6	1.1	0.7	6	1.1	0.7
AC-15 (> 72 VA)	10	1	0.3	1	1	0.3	10	1.1	0.3	10	1.1	0.3

Contactor relays for DC circuit switching

	Standard duty						Occasional duty					
	Making conditions			Breaking conditions			Making conditions			Breaking conditions		
	I/I_e	U/U_e	Cos. j or L/R (ms)	I/I_e	U/U_e	Cos. j or L/R (ms)	I_c/I_e	U_r/U_e	Cos. j or L/R (ms)	I_c/I_e	U_r/U_e	Cos. j or L/R (ms)
DC-13	1	1	6 P ①	1	1	6 P ①	1.1	1.1	6 P ①	1.1	1.6	6 P ①
DC-14	10	1	15 ms	1	1	15 ms	10	1.1	15 ms	10	1.1	15 ms

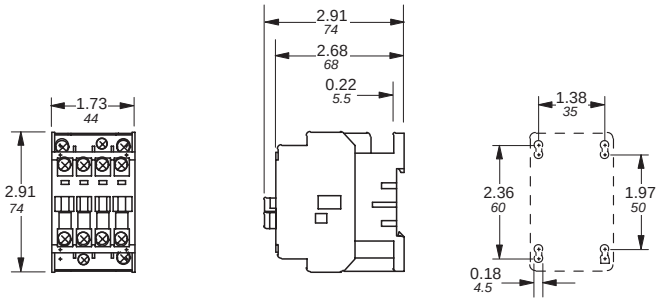
Legend :
U (I) = applied voltage (current)
U_r = recovery voltage
L/R = time constant of test circuit
U_e (I_e) = rated operational voltage (current)
I_c = current made or broken d.c. or a.c. r.m.s.
$T_{0.95}$ = time to reach 95 % of the steady state current in milliseconds

① The value "6 P" results from an empirical relationship which is found to represent most d.c. magnetic loads to an upper limit of P = 50 W.
Loads having power consumption greater than 50 W are assumed to consist of smaller loads in parallel.
Therefore, the value 6 x P = 300 ms is to be an upper limit, irrespective of the power consumption value.

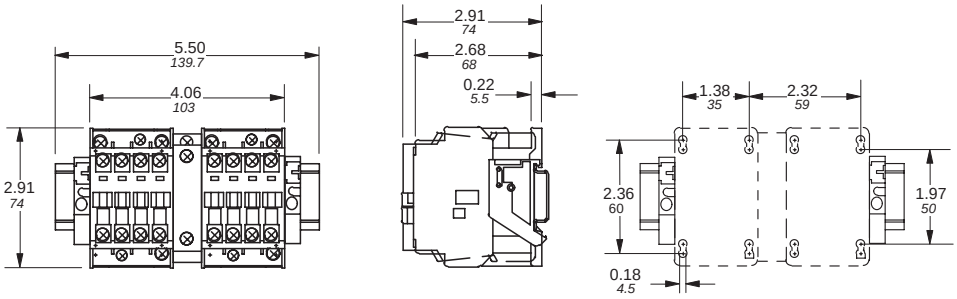
Approximate dimensions
3 pole contactors, A/AE9 – A/AE26

00.00 Inches
00.00 Millimeters

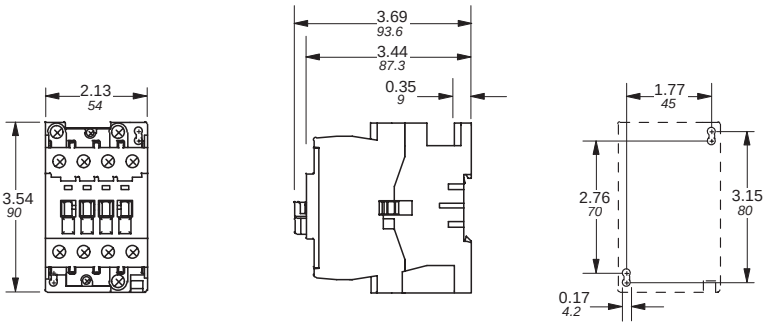
A/AE9 – A/AE16 — Contactor, 3 pole, AC operated



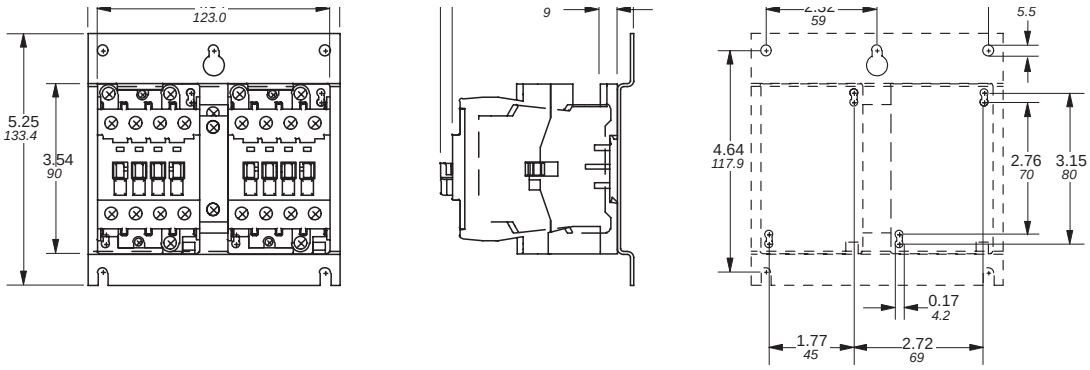
A/AE9 – A/AE16 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole, AC operated



A/AE26 — Contactor, 3 pole, AC operated



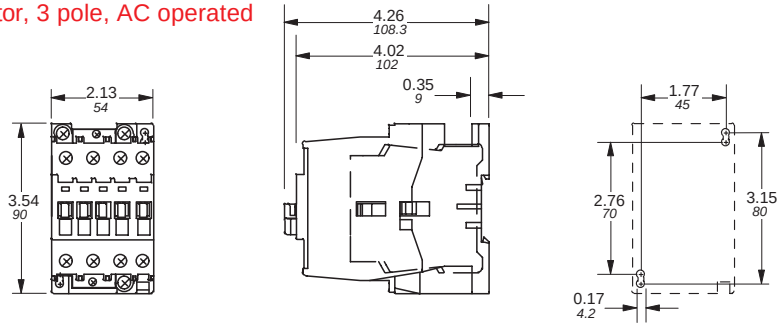
A/AE26 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole, AC operated



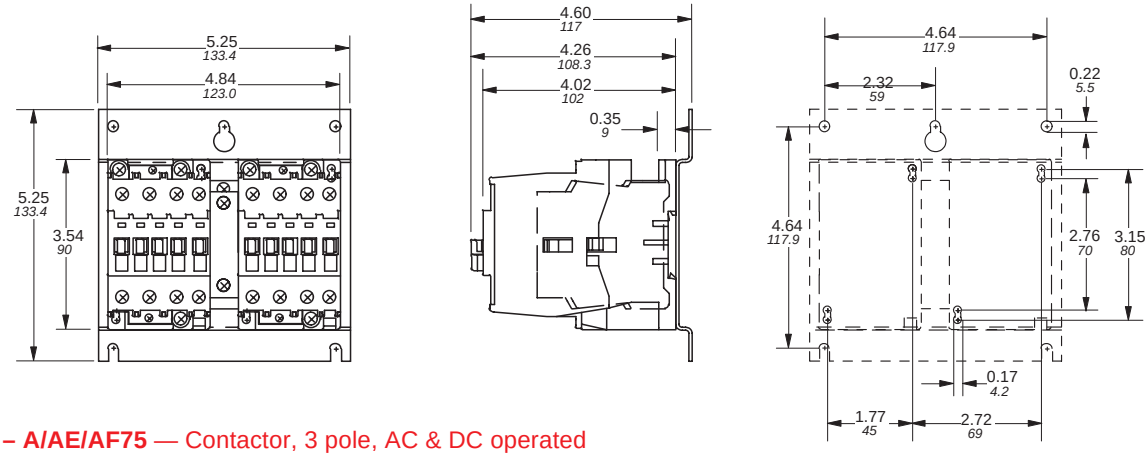
Approximate dimensions
3 pole , A/AE30 – A/AE/AF75

00.00 / *00.00* Inches / *Millimeters*

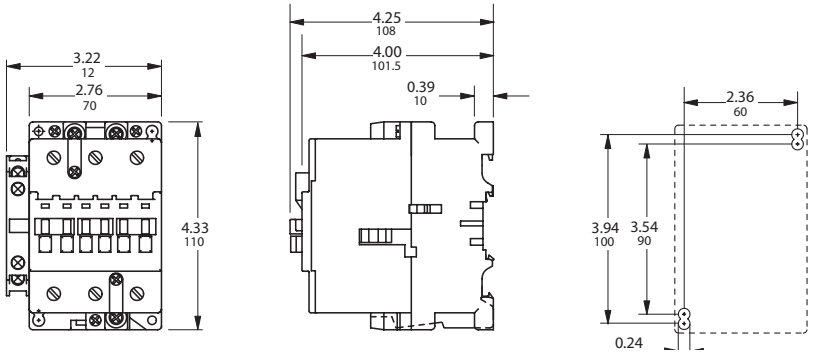
A/AE30 & A/AE40 — Contactor, 3 pole, AC operated



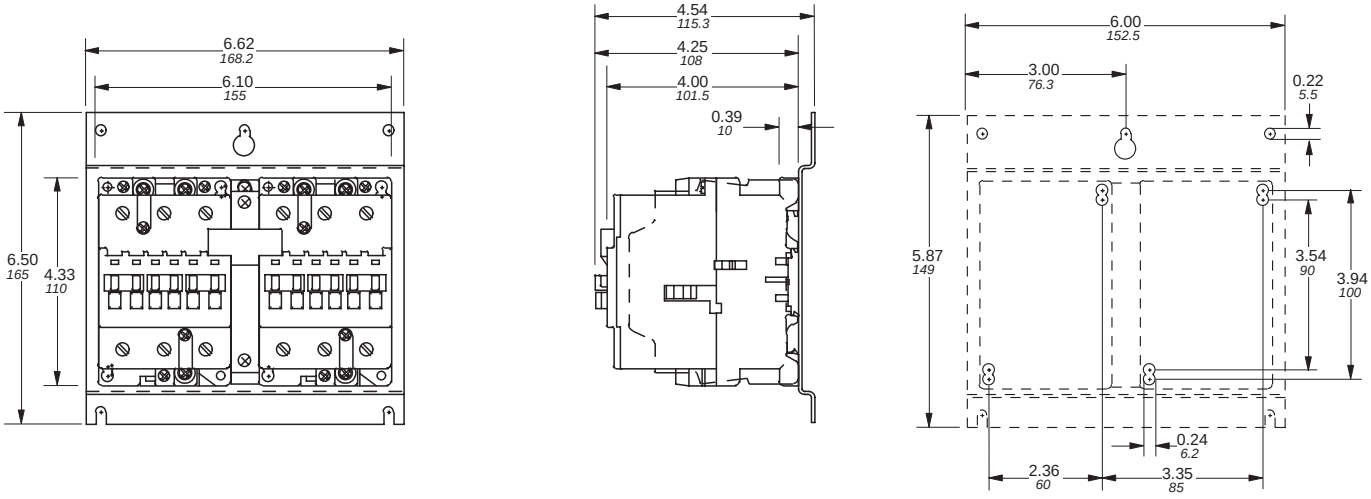
A/AE30 & A/AE40 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole, AC operated



A/AE/AF50 – A/AE/AF75 — Contactor, 3 pole, AC & DC operated



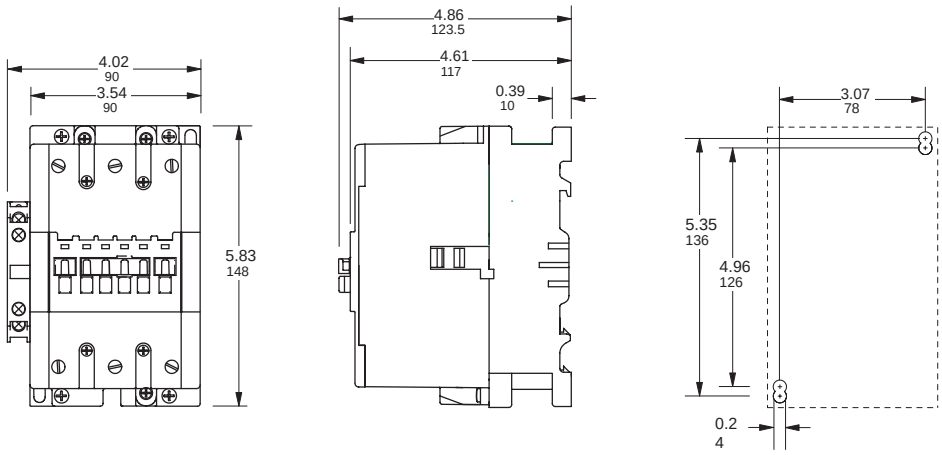
A/AE/AF50 – A/AE/AF75 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole, AC & DC operated



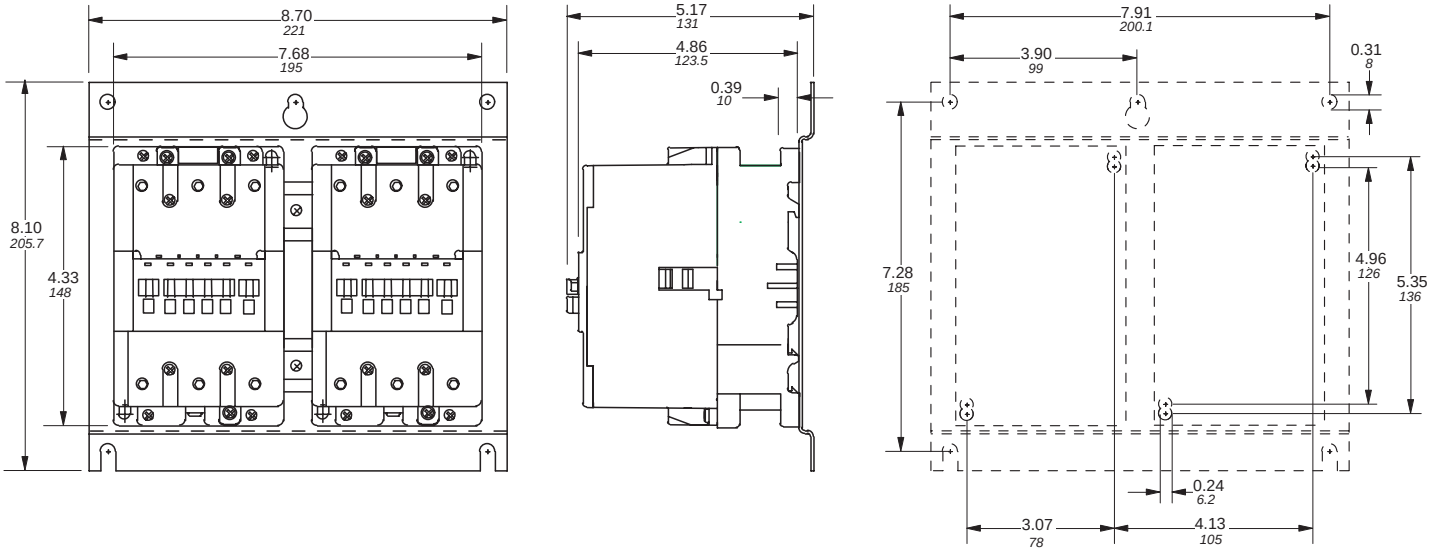
Approximate dimensions
3 pole, A/AE/AF95 & A/AE/AF110

00.00 Inches
00.00 Millimeters

A/AE/AF95 & A/AE/AF110 — Contactor, 3 pole, AC & DC operated



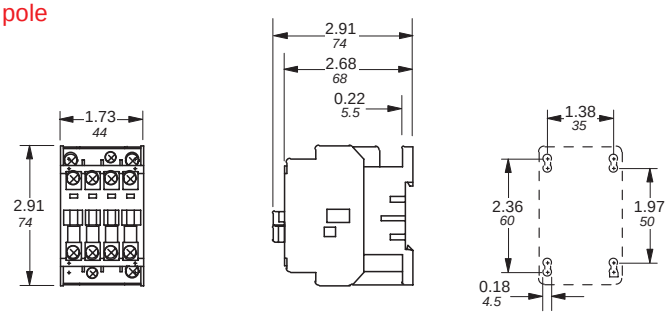
A/AE/AF95 & A/AE/AF110 + VE5 — Mechanically interlocked contactor, 3 pole, AC & DC operated



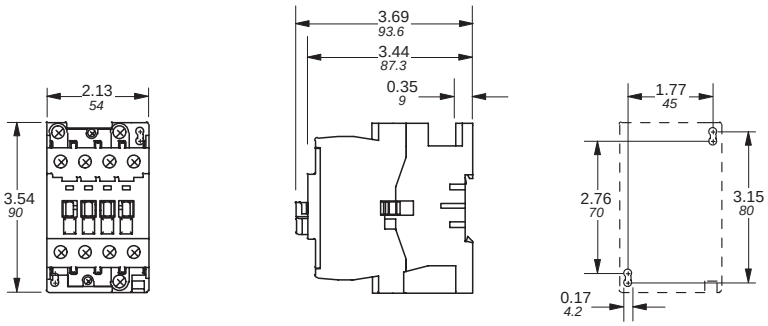
Approximate dimensions
4 pole contactors, A/AE9 – A/AE/AF75

00.00 Inches
00.00 Millimeters

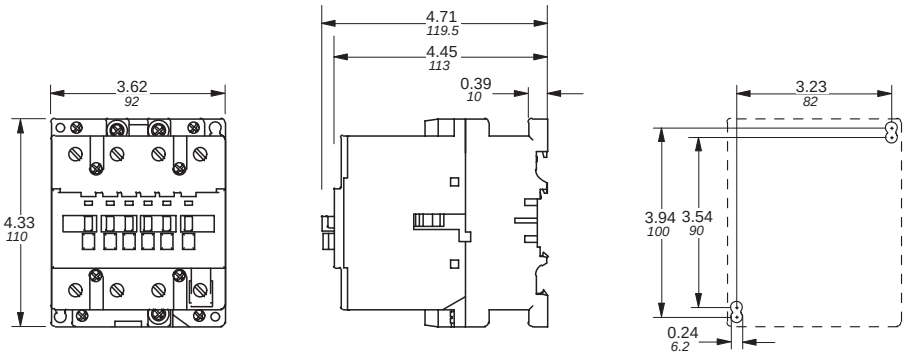
A/AE9 – A/AE16 — Contactor, 4 pole



A/AE26 — Contactor, 4 pole



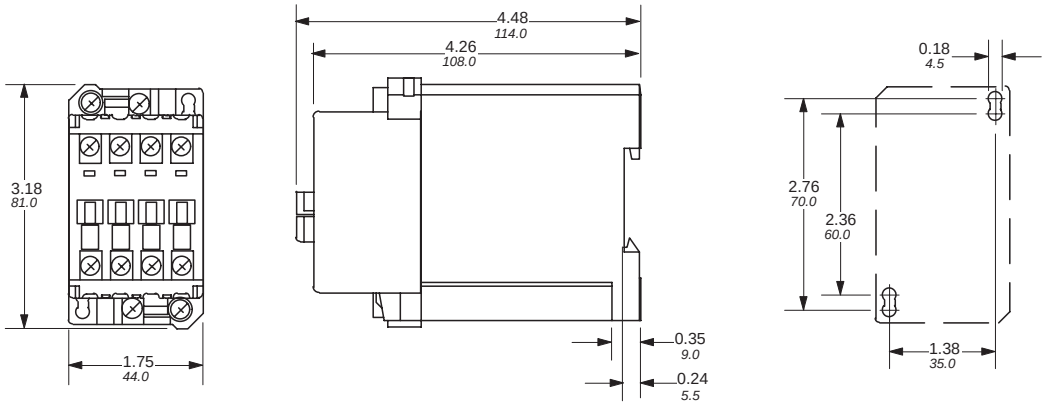
A/AE/AF45 – A/AE/AF75 — Contactor, 4 pole



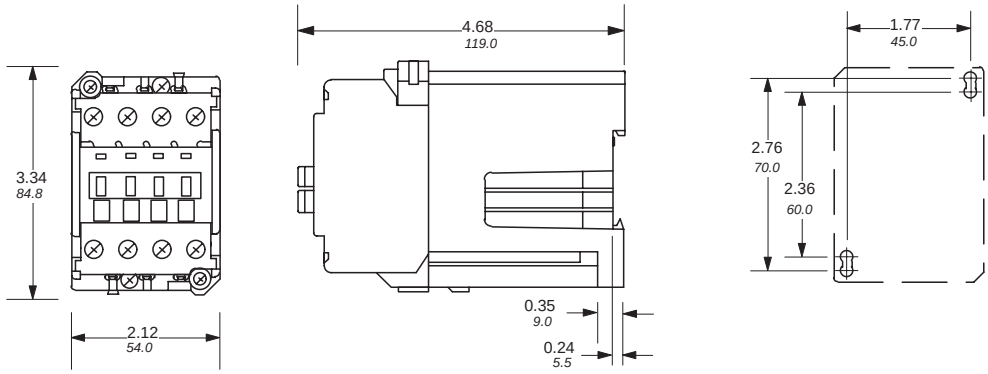
Approximate dimensions
3 & 4 pole contactors, BC9 – BC30

00.00 Inches
00.00 Millimeters

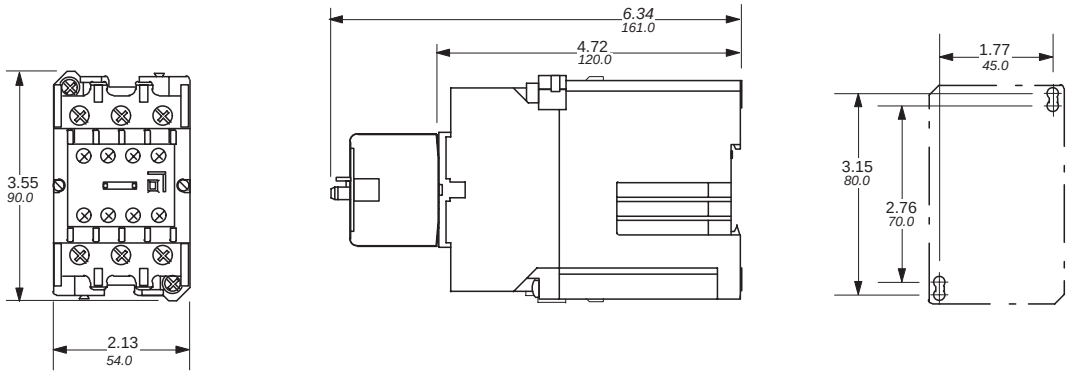
BC9 & BC16 — Contactor, 3 & 4 pole, DC operated



BC25 — Contactor, 3 & 4 pole, DC operated



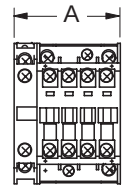
BC30 — Contactor, 3 pole, DC operated



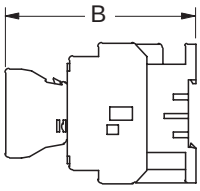
Approximate dimensions
Accessories for A/AE9 – A/AE/AF110; BC9 – BC30

00.00 Inches
00.00 Millimeters

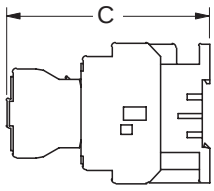
A/AE9 – A/AE40
A/AE/AF50 – A/AE/AF110
BC9 – BC30



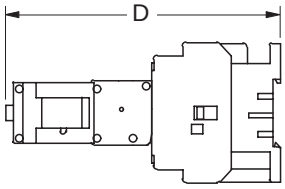
SIDE MOUNTED AUXILIARY



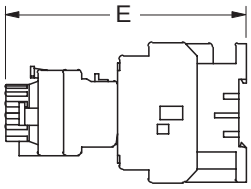
SINGLE POLE TOP MOUNTED AUXILIARY



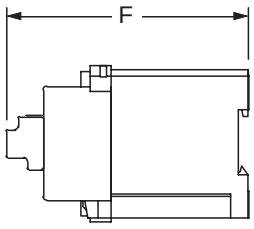
FOUR POLE TOP MOUNTED AUXILIARY



ON-POSITION LATCH



PNEUMATIC TIMER



MECH INTERLOCK D.C. OPERATED

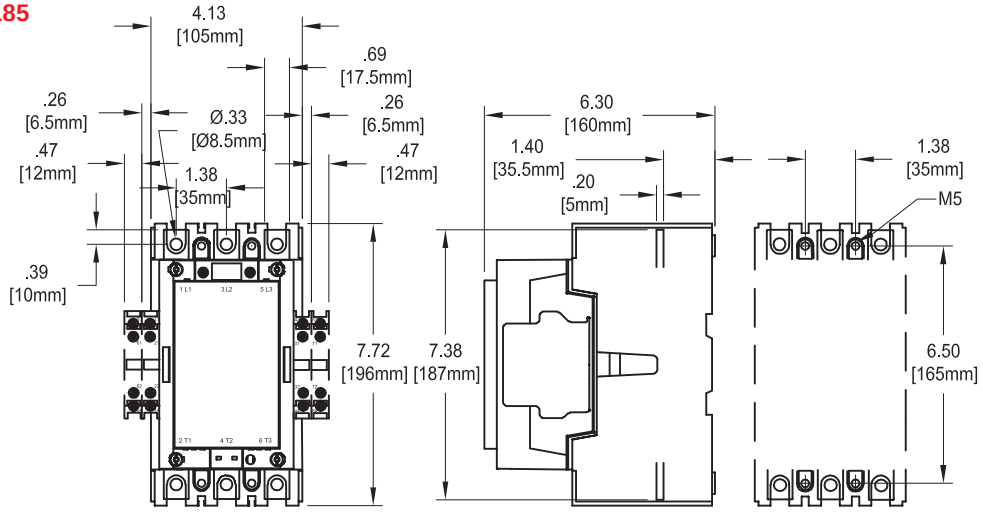
TYPE		A	B	C	D	E	F
A/AE9-16	IN	2.20	3.96	4.21	5.71	5.00	–
	MM	*56*	*100.5*	*107*	*145*	*127*	–
A/AE26	IN	2.20	4.72	4.97	6.47	5.76	–
	MM	*56*	*119.8*	*126.3*	*164.3*	*146.3*	–
A/AE30-40	IN	2.20	5.30	5.55	7.05	6.34	–
	MM	*56*	*134.5*	*141*	*179*	*161*	–
A/AE/AF50-75	IN	3.23	5.27	5.52	7.03	6.32	–
	MM	*82*	*133.9*	*140.3*	*178.5*	*160.4*	–
A/AE/AF45	IN	4.09	5.73	5.98	7.48	6.77	–
	MM	*104*	*145.5*	*152*	*190*	*172*	–
A/AE/AF95-110	IN	4.02	5.91	6.16	–	–	–
	MM	*102*	*150*	*156.5*	–	–	–
BC9 BC16	IN	–	5.53	5.79	7.28	6.58	5.04
	MM	–	*140.5*	*147*	*185*	*167*	*128*
BC25	IN	–	5.77	6.02	7.52	6.81	*5.28*
	MM	–	*146.5*	*153*	*191*	*173*	*134*
BC30	IN	–	–	–	–	–	*5.51*
	MM	–	–	–	–	–	*140*

Approximate dimensions
A/AF145 – A/AF185

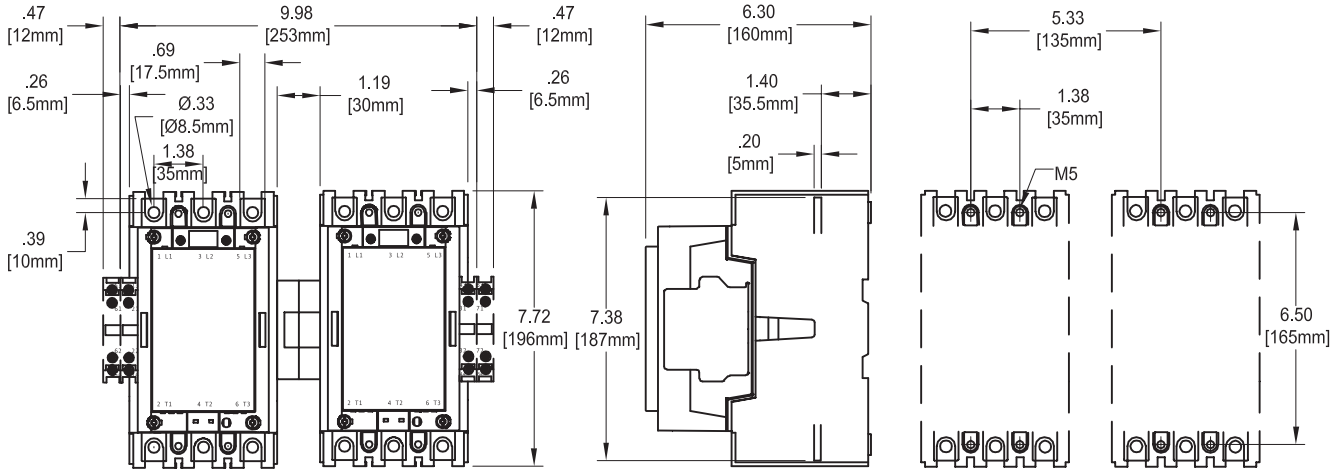
00.00 / *00.00* Inches / *Millimeters*

1

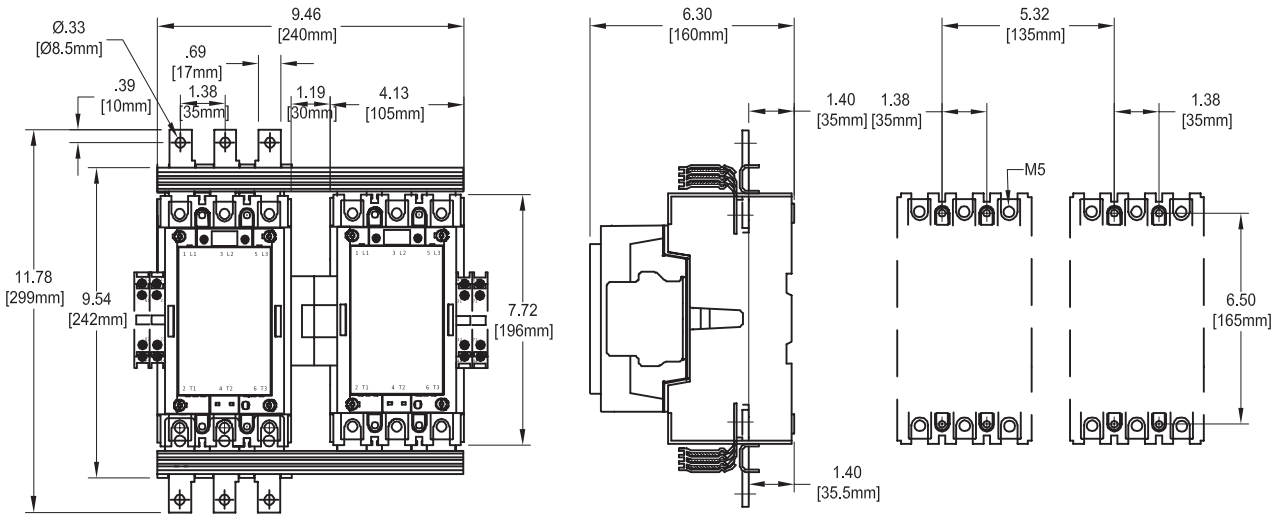
A/AF145 & A/AF185



A/AF145, A/AF185 with mechanical interlock



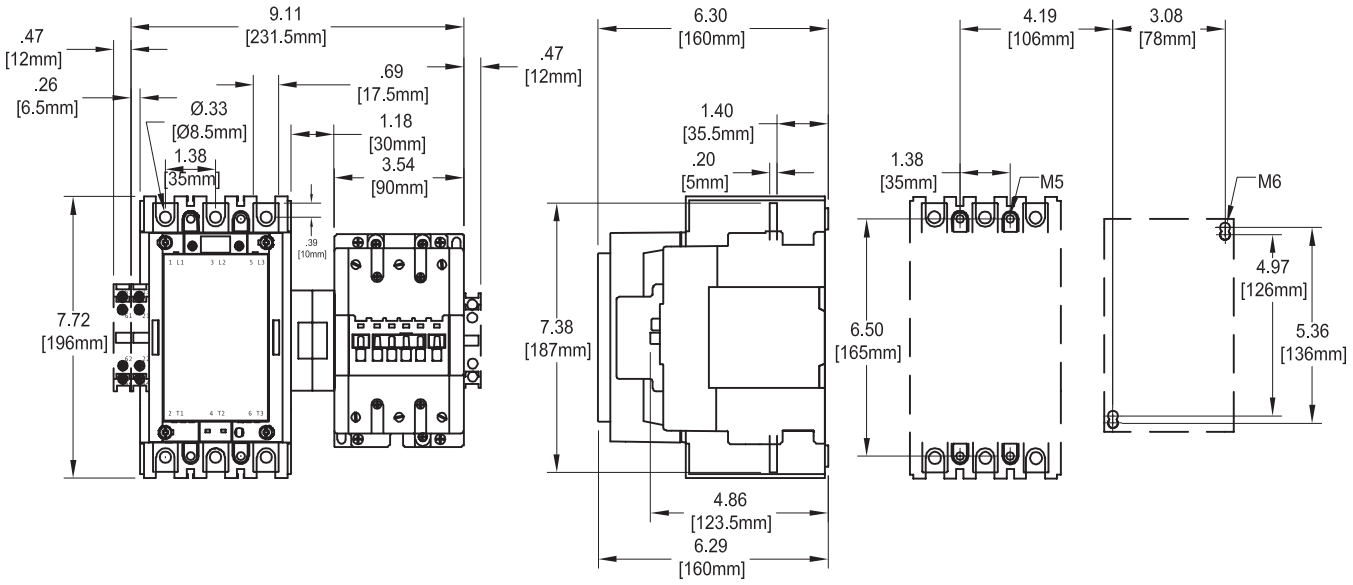
A/AF145, A/AF185 reversing



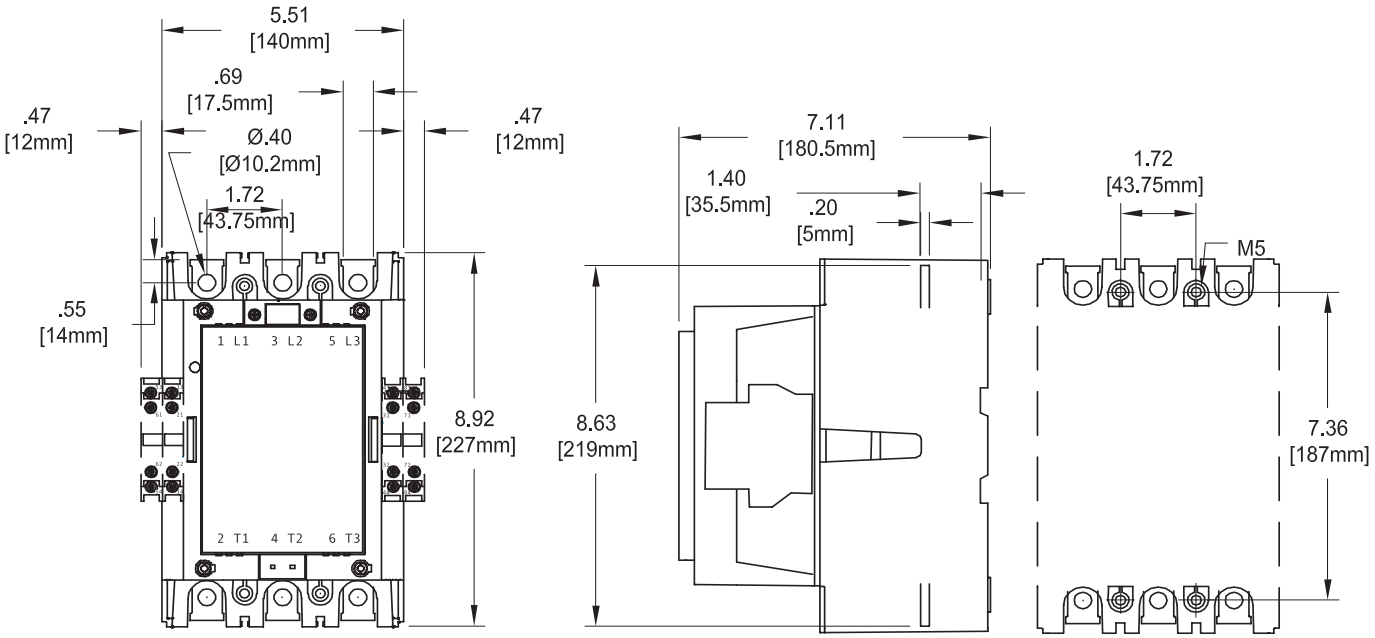
Approximate dimensions
A/AF145 – A/AF300

00.00 Inches
00.00 Millimeters

A/AF145 – A/AE/AF95-110 mechanically interlocked



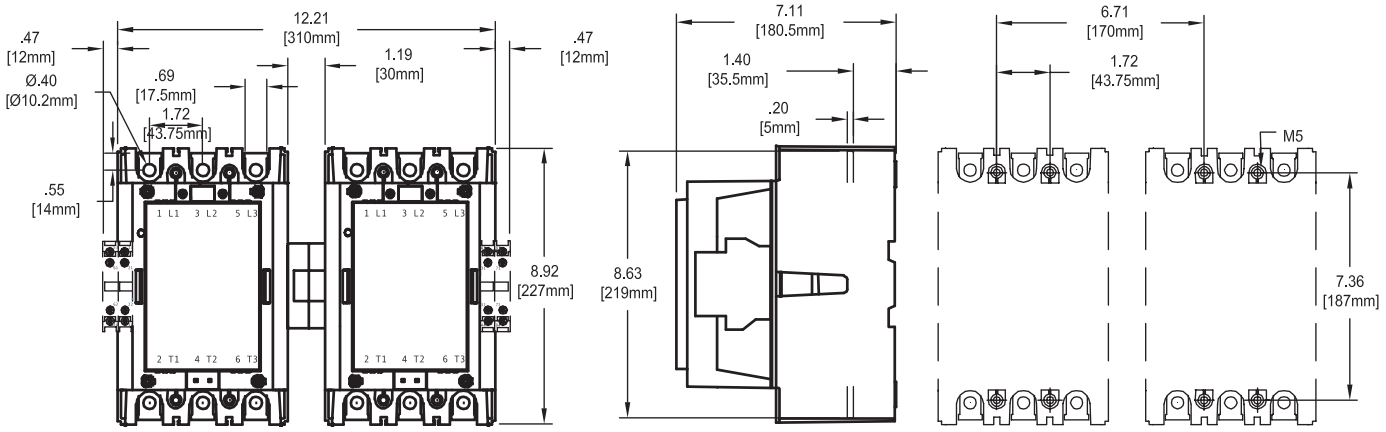
A/AF210, A/AF260, A/AF300



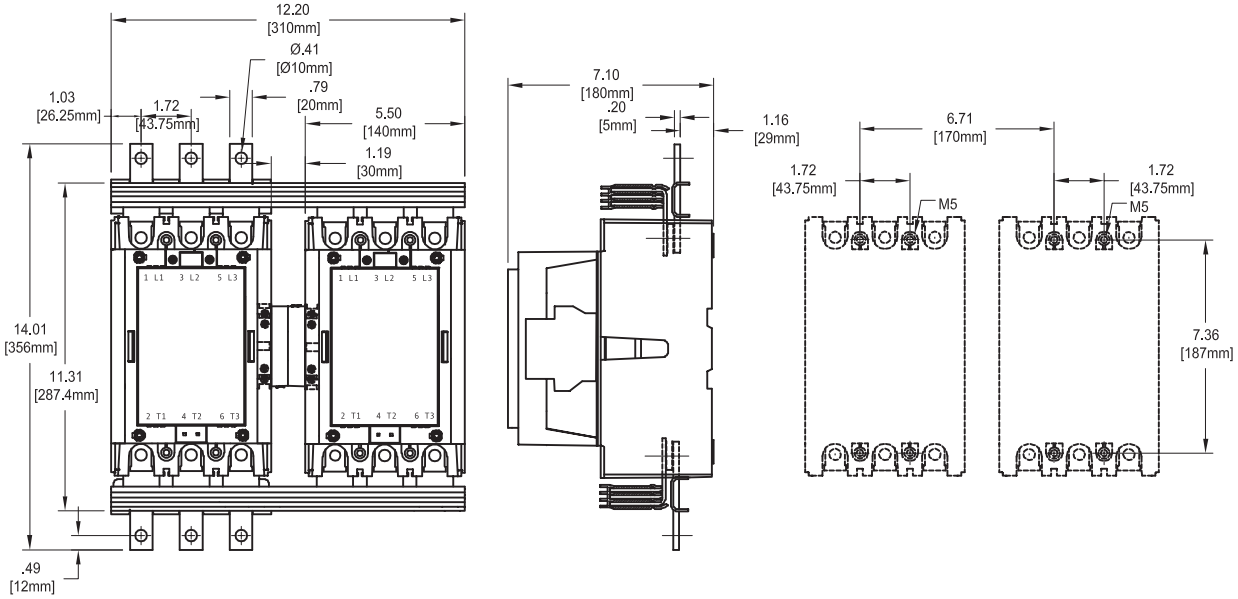
Approximate dimensions
A/AF210 – A/AF300

00.00 Inches
00.00 Millimeters

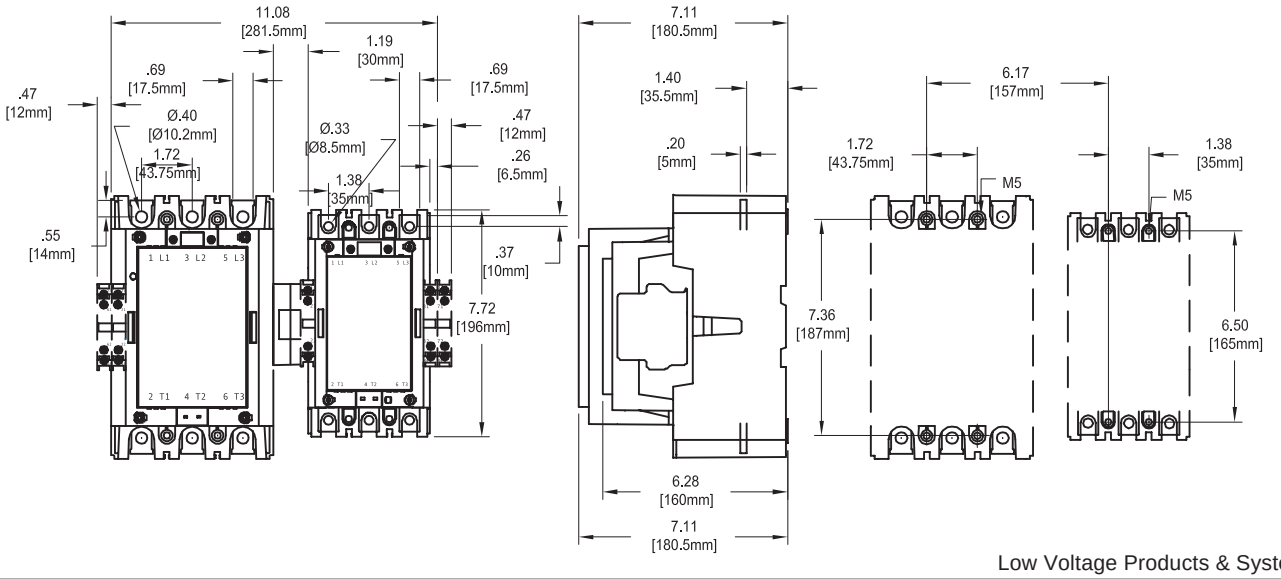
A/AF210, A/AF260, A/AF300 with mechanical interlock



A/AF210, A/AF260, A/AF300 reversing +TA450



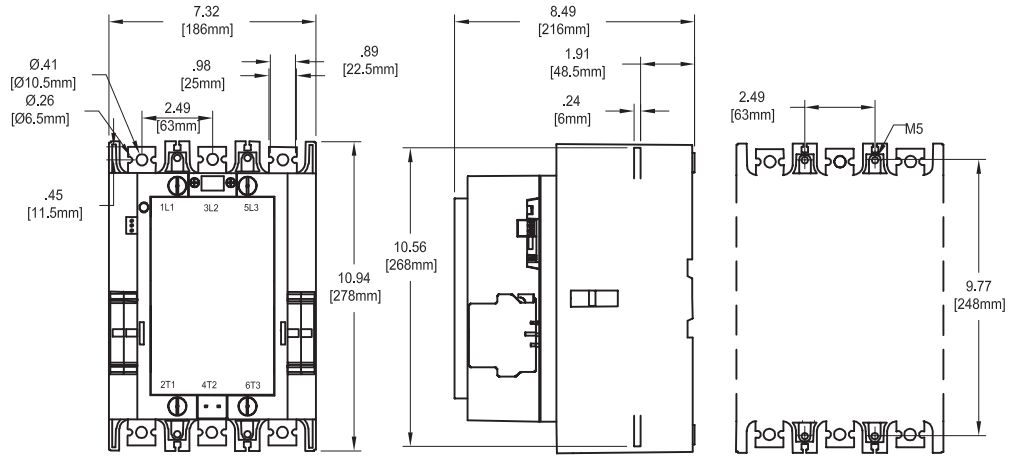
A/AF210, A/AF145 with mechanical interlock



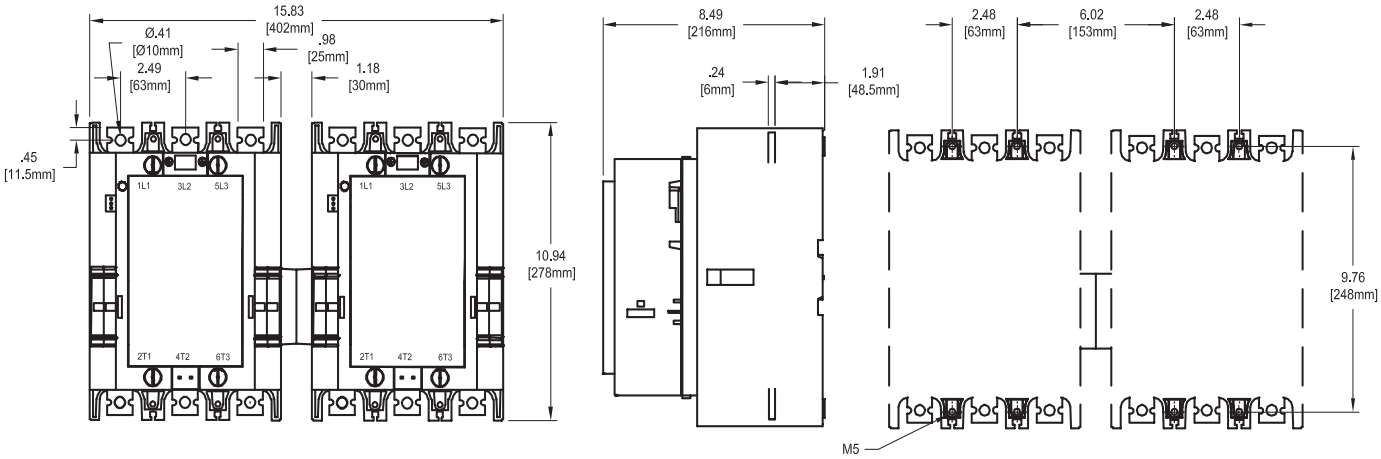
Approximate dimensions
AF400 – AF460

00.00 Inches
00.00 Millimeters

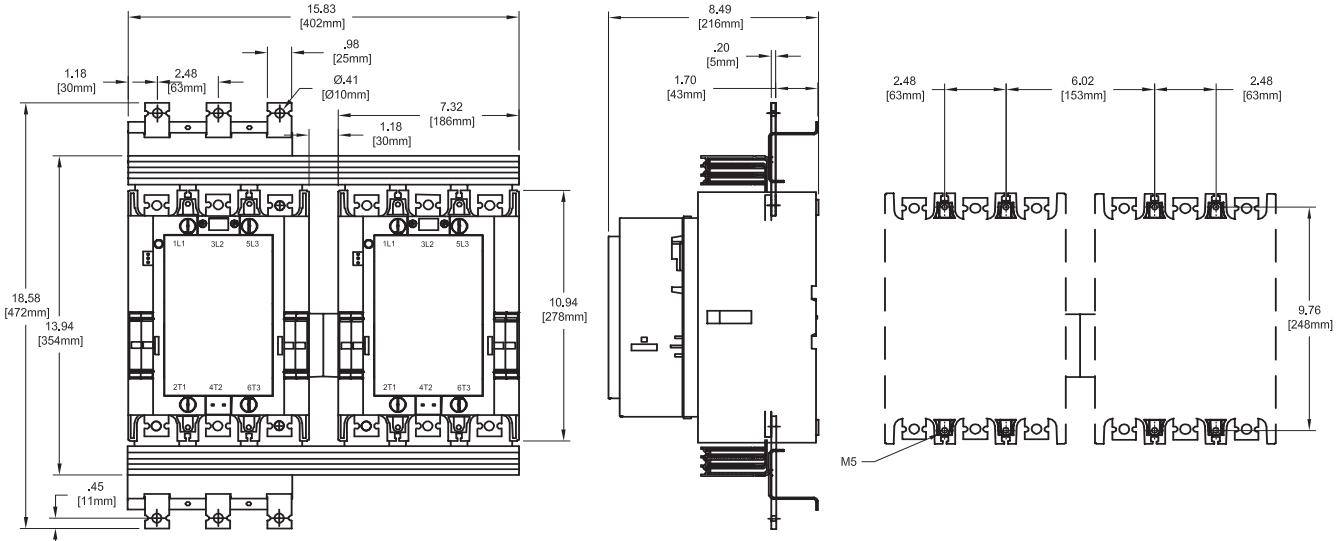
AF400, AF460



AF400, AF460 with mechanical interlock



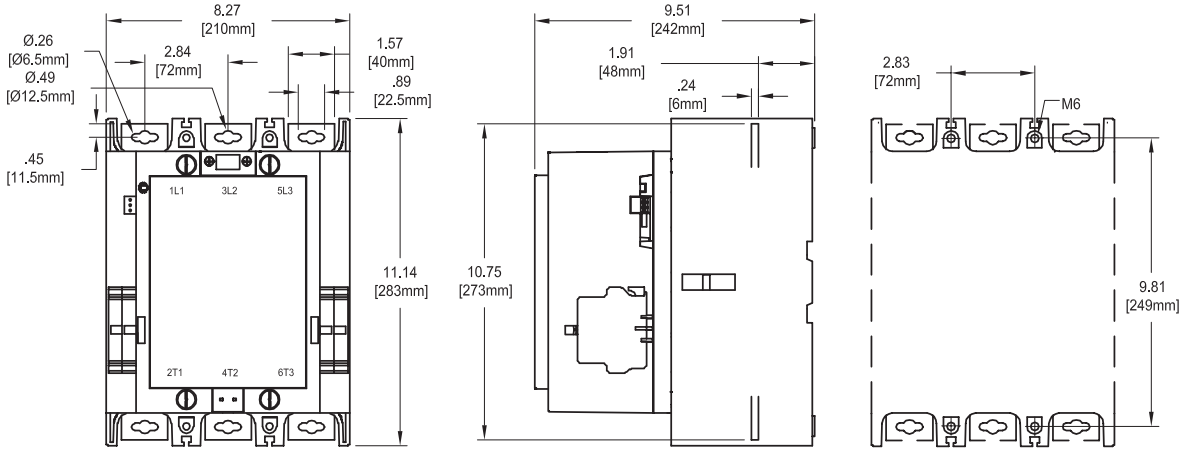
AF400, AF460 reversing



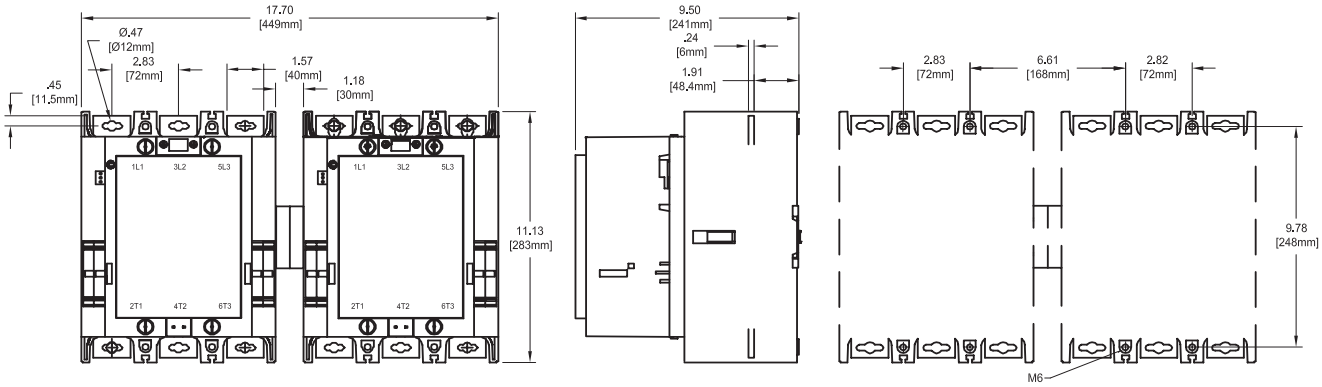
Approximate dimensions
AF580 – AF750

00.00 *00.00* Inches *Millimeters*

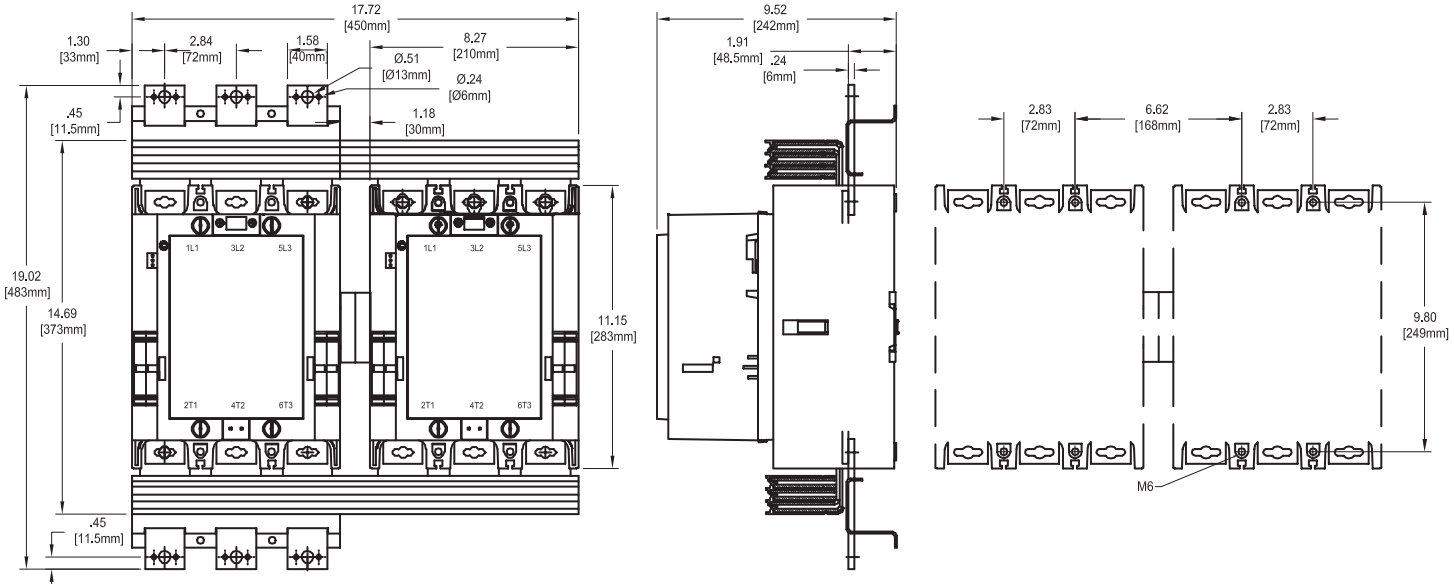
AF580 – AF750



AF580 – AF750 with mechanical interlock

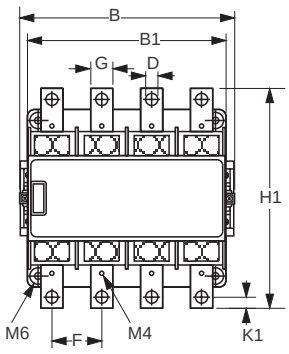


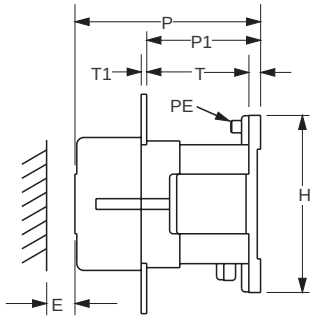
AF580 – AF750 reversing

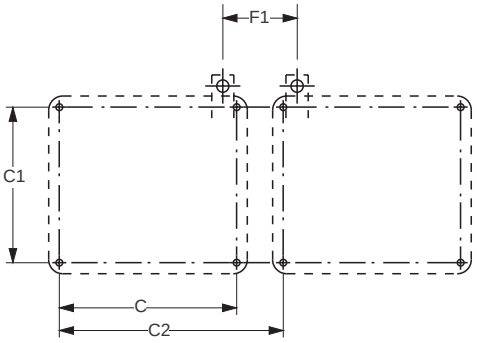


Approximate dimensions
EK110 – EK550, 4 pole, non-reversing

00.00 Inches
00.00 Millimeters





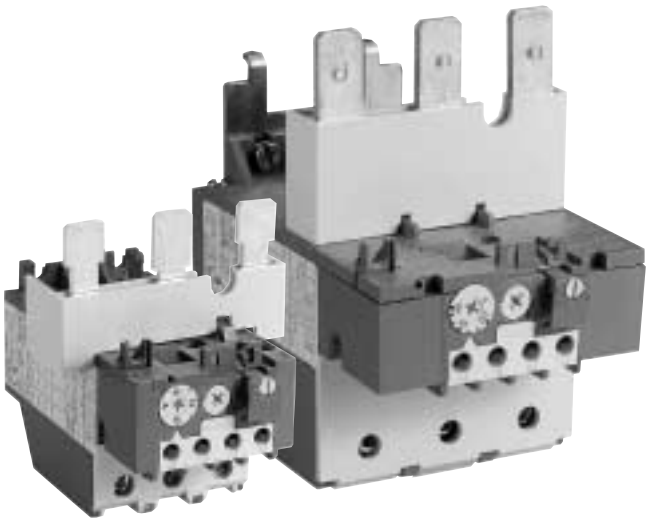


		B	B1	C	C1	D	E	F	F1	G	H	H1	K1	P	P1	T	T1
EK 110	in	6.50	5.35	4.72	5.51	0.26	1,57	1.61	1.69	0.59	6.14	6.14	0.30	6.08	4.03	0.39	0.16
	mm	*165*	*136*	*120*	*140*	*6.6*	*40*	*41*	*43*	*15*	*156*	*156*	*7.5*	*154.5*	*102.3*	*10*	*4*
EK 150	in	6.50	5.35	4.72	5.51	0.43	1.57	1.65	1.65	0.79	6.14	6.77	0.39	6.08	4.03	0.39	0.16
	mm	*165*	*136*	*120*	*140*	*11*	*40*	*42*	*42*	*20*	*156*	*172*	*10*	*154.5*	*102.3*	*10*	*4*
EK 175	in	7.91	6.93	6.30	5.51	0.43	0.59	1.77	2.64	0.79	6.14	7.80	0.39	6.77	4.20	0.39	0.20
	mm	*201*	*176*	*160*	*140*	*11*	*15*	*45*	*67*	*20*	*156*	*198*	*10*	*172*	*106.7*	*10*	*5*
EK 210	in	7.91	6.93	6.30	5.51	0.43	0.59	1.77	2.64	0.79	6.14	7.80	0.39	6.77	4.20	0.39	0.20
	mm	*201*	*1 76*	*160*	*140*	*11*	*15*	*45*	*67*	*20*	*156*	*198*	*10*	*172*	*106.7*	*10*	*5*
EK 370	in	10.51	9.61	8.66	7.87	0.43	1.57	2.64	2.76	0.98	8.78	10.71	0.49	8.88	5.49	0.91	0.24
	mm	*267*	*244*	*220*	*200*	*11*	*40*	*67*	*70*	*25*	*223*	*272*	*12.5*	*225.5*	*139.5*	*23*	*6*
EK 550	in	10.51	9.61	8.66	7.87	0.43	1.57	2.64	2.76	0.98	8.78	10.71	0.49	8.88	5.49	0.91	0.24
	mm	*267*	*1 76*	*220*	*200*	*11*	*40*	*67*	*70*	*25*	*223*	*272*	*12.5*	*225.5*	*139.5*	*23*	*6*

Notes

Thermal Overload relays

Thermal overload relays
Type TA
Class 10



Description

- Available for starter construction with A Line contactors and separate panel mounting
- Designed for close couple mounting
- Separate base mounting available for all overload relays
- Class 10 adjustable overload relays are standard with all ABB Line starters
- Reset can also be adjusted to function as a stop button
- Screwdriver guide holes
- All terminal screws are available from the front
- UL File No: E48139
- CSA File No: LR98336
- Trip indication
- Remote trip and reset option available
- Single phase and phase unbalance protection
- Isolated alarm circuit (N.O.) contact
- Ambient compensation: -25°C to +55°C (-13°F to +131°F)
- Manual test
- Manual or automatic reset
- Factory calibrated and tested
- Wide adjustment range

Tripping classes of the thermal overload relays

Standard classes in IEC 947-4-1 are classes: 10 A, 10, 20, 30. The tripping class indicates according to IEC 947-4-1 the maximum tripping time in seconds under specified conditions of test at 7.2 times the setting current and specifies tripping and non tripping times for 1.5 and 7.2 times the setting current. Mostly used class is 10 A.

Abstract from IEC 947-4-1

Tripping class		10 A	10	20	30
Max. tripping time at 1.5 x setting current (warm state)	(s)	120	240	480	720
Tripping time at 7.2 x setting current (cold state)	(s)	2 – 10	4 – 10	6 – 20	9 – 30
At 1.05 x setting current		no tripping			

Description

TA thermal overload relays are used with A Line contactors for the protection of motors having a nominal voltage of up to 600VAC max per UL/CSA (690VAC and 800VDC per IEC).

Product range

- **Standard relays:**

Types: TA25DU, TA42DU, TA75DU, TA80DU, TA110DU, TA200DU and TA450DU

– TA25 to TA110 and TA200 are directly connected in the motor circuit.
– TA450DU relays are fed through a linear type transformer

- **Special construction**

Thermal overload relays with different certifications and approvals.
Relays for protection EEx e motors.

Construction and function

- **General**

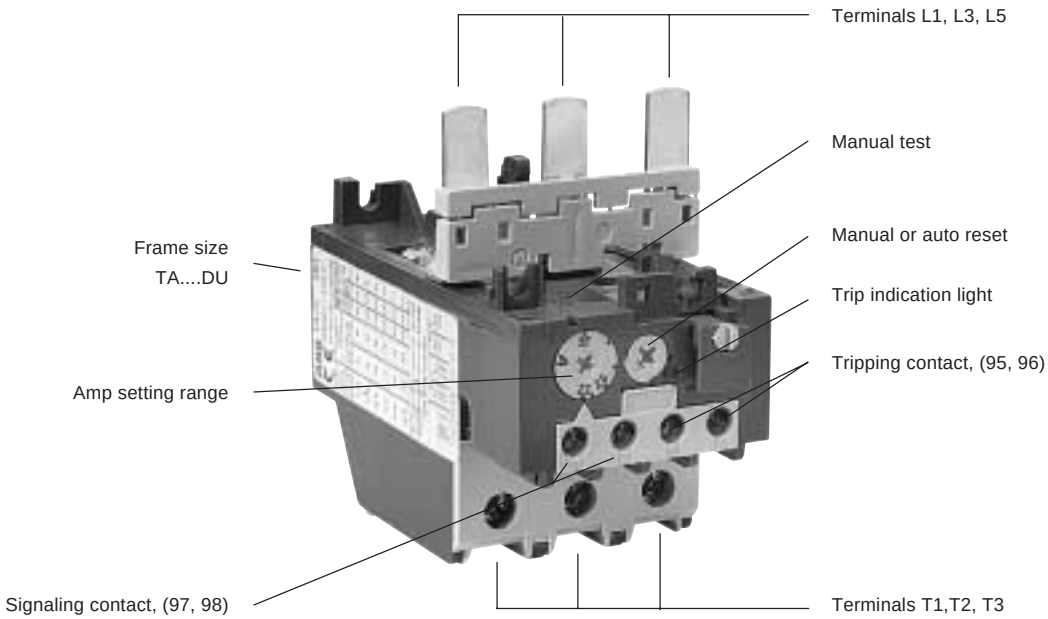
Thermal O/L relays and their accessories meet UL, CSA and most other important international standards (IEC), European standards (EN) and the most important national standards (DIN-VDE, NFC-UTE, BS, etc.). They meet the certification and approval directives required throughout the world.

Thermal overload relays are 3 pole. The motor current flows through their bimetals (1 per phase) which are indirectly heated. Under the effect of the heating, the bimetals bend, cause the relay to trip and the position of the auxiliary contacts to change.

The relay setting range is graduated in amps. In compliance with international and national standards, the setting current is the motor nominal current and not the tripping current (no tripping at 1.05 x setting current, tripping at 1.2 times setting current).

The tripping curves (cold or warm starting, 3 phases and 2 phases) are shown on page 2.14.

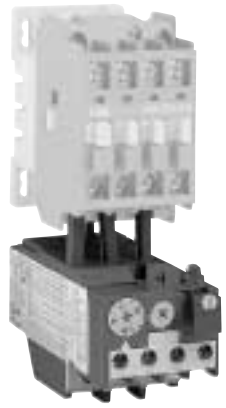
The relays are built to be self protecting in the event of an overload until the short circuit protection device is activated.



Catalog number explanation

TA25DU 0.16

Frame size — Amp rating



TA25DU

Application
Technical data

• **All the relays have:**

– Free tripping: the resetting button, even if held in, does not prevent tripping of the thermal overload relay in the event of a fault.
– Temperature compensation
– Phase failure protection according to IEC 947-4-1: Within the limits of the setting range, a reduced tripping time, and thus improved motor protection, is obrtained in case of a phase failure.
– Tripping class: 10A, for TA relays
– Test functions and resetting: see table below.

• **Auxiliary contacts**

The relays have two built in auxiliary contacts: NC marked 95-96; NO marked 97-98. Both contacts are physically separate and can thus be used for 2 different circuits (control circuit and indication circuit).

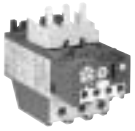
Function of TA25DU – TA450DU thermal O/L relays

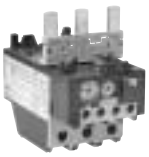
	Resetting / Contacts	**Relay tripped** { **95-96 Open** **97-98 Closed**		**Relay not tripped** { **95-96 Closed** **97-98 Open**
		Manual	Automatic	Both manual and automatic
Effect of blue button indexed on R (RESET ONLY)	Resetting	Yes	No	No
	95-96	Closed when the button is pressed	No effect	No effect
	97-98	Open when the button is pressed		
Effect of blue button indexed on R/O (RESET/OFF)	Resetting	Yes	No	No
	95-96	Closed when the button is released	No effect	Open when the button is pressed Closed when the button is released
	97-98	Open when the button is pressed		No effect

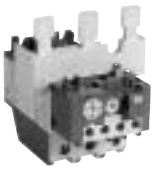
Selection guide
TA25DU – TA80DU

Types


TA25DU

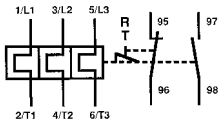

TA42DU


TA75DU


TA80DU

Main characteristics

Construction		3 pole with ambient temperature variation compensation. Protection against single phase operation. Built in auxiliary contacts: 1N.O. + 1N.C.			
Resetting		Convertible: Manual to Automatic			
Setting ranges	Number	18	3	6	4
	from to	0.1 – 0.16A 24 – 32A	18 – 25A 29 – 42A	18 – 25A 60 – 80A	29 – 42A 60 – 80A



Mounted with contactors

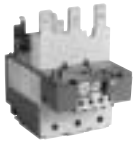
Mounting kit	No kit is required for mounting thermal O/L relays below contactors			
Types of contactors for combined mounting	A/AE9 BC9 A/AE12 A/AE16 BC16 BC18 A/AE26 BC25 A/AE30 BC30 A/AE40	A/AE30 A/AE40	A/AE/AF50 A/AE/AF63 A/AE/AF75	A/AE/AF95 A/AE/AF110

Mounted separately (i.e. separate from contactor)

Separate mounting kit	DB25	DB80
Accessories		
Tripping coil	DS25-A	
Resetting coil	DR25-A	
Terminal shroud	Terminals protected against direct contact (without the addition of terminal shrouds)	
Function markers	BA5-50	

Selection guide
TA110DU – TA450DU

Types


TA110DU


TA200DU


TA450DU

Main characteristics

Construction		3 pole with ambient temperature variation compensation. Protection against single phase operation. Built in auxiliary contacts: 1N.O. + 1N.C.			
Resetting		Convertible: manual to automatic			
Setting ranges	Number	2	6	3	
	from A to A	65 – 90 80 – 110	65 – 90 150 – 200	130 – 185 220 – 310	

Mounted with contactors

Mounting kit	No kit is required for mounting thermal O/L relays		See page 2.7.
Types of contactors for combined mounting	A/AE/AF95 A/AE/AF110	A/AF145 A/AF185	A/AF210 + DT450/A300 A/AF260 + DT450/A300 A/AF300 + DT450/A300
Mounted separately (i.e. separate from contactor)			
Separate mounting kit	DB200		No kit required for separate mounting of thermal O/L relays

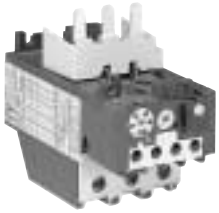
Accessories

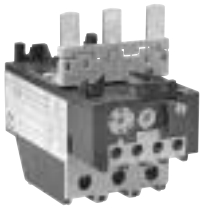
Tripping coil			
Resetting coil			
Terminal shroud	①	LT200 –	LT450 –
Function markers	BA5-50		

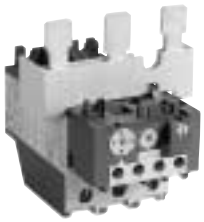
① Terminals protected against direct contact (without the addition of terminal shrouds)

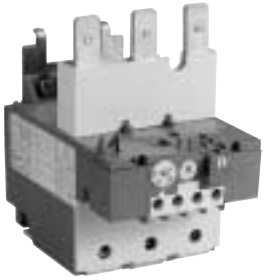
Type TA, Class 10
for Contactors A9 – A/AF300


TA25DU


TA42DU


TA75DU

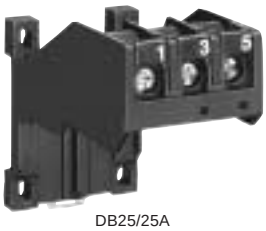

TA80DU


TA110DU

For contactor	Setting range A	Suffix Code	Catalog number	List price
A/AE9 – A/AE40 BC9 – BC30	0.1 – 0.16 0.16 – 0.25 0.25 – 0.4 0.4 – 0.63 0.63 – 1.0 1.0 – 1.4 1.3 – 1.8 1.7 – 2.4 2.2 – 3.1 2.8 – 4.0 3.5 – 5.0 4.5 – 6.5 6.0 – 8.5 7.5 – 11 10 – 14 13 – 19 18 – 25 24 – 32	A B C D E F G H J K L M N P Q R S T	TA25DU0.16 TA25DU0.25 TA25DU0.4 TA25DU0.63 TA25DU1.0 TA25DU1.4 TA25DU1.8 TA25DU2.4 TA25DU3.1 TA25DU4.0 TA25DU5.0 TA25DU6.5 TA25DU8.5 TA25DU11 TA25DU14 TA25DU19 TA25DU25 TA25DU32	**$ 63**
A/AE30 – A/AE40	18 – 25 22 – 32 29 – 42	A B C	TA42DU25 TA42DU32 TA42DU42	**78**
A/AE/AF50 – A/AE/AF75	18 – 25 22 – 32 29 – 42 36 – 52 45 – 63 60 – 80	A B C D E F	TA75DU25 TA75DU32 TA75DU42 TA75DU52 TA75DU63 TA75DU80	**102**
A/AE/AF95 – A/AE/AF110	29 – 42 36 – 52 45 – 63 60 – 80	C D E F	TA80DU42 TA80DU52 TA80DU63 TA80DU80	**135**
	65 – 90 80 – 110	A B	TA110DU90 TA110DU110	**165**
A/AF145 – A/AF185	65 – 90 80 – 110	A B	TA200DU90 TA200DU110	**165**
	100 – 135 110 – 150 130 – 175 150 – 200	C D E F	TA200DU135 TA200DU150 TA200DU175 TA200DU200	**225**
A/AF210 – A/AF300	130 – 185 165 – 235 220 – 310	A B C	TA450DU185 ① TA450DU235 TA450DU310	**488**
AF400 – AF750	See electronic overloads, pages 2.21			

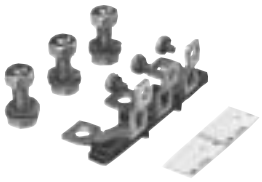
① TA450 overloads require mounting kits for installation.

Discount schedule TAA — TA25
Discount schedule TBA — TA42, TA75
Discount schedule TCA — TA80, TA110, TA200, TA450

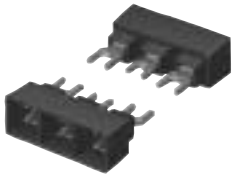


DB25/25A

DB80



DB200



LC26-B1

Separate mounting kits

For O/L relays	Amps	Catalog number	List price
TA25DU	0.1 – 25	DB25/25A	$ 30
TA25DU	24 – 32	DB25/32A	38
TA42DU, TA75DU, TA80DU	18 – 80	DB80	45
TA110DU, TA200DU	100 – 200	DB200	60

Flat pin terminal blocks

Mounting on:	Catalog number	List price
TA25DU relay	LC30-T	$ 6
DB25/25A or DB25/32A	LC26-B1	

Terminal block — AWG #8 cable

Mounting on:	Catalog number	List price
TA25DU (25A or less) or DB25/25A	DX25	$ 15

LC terminal blocks can be used to convert standard connections into Faston connections: 2 x 6.3mm or 4 x 2.8mm per pole. The connections are protected against accidental contact.

The LC30-T has a terminal block for the 3 power terminals and a second for the 4 auxiliary terminals of a TA25DU thermal O/L relay.

The LC26-B1 has two identical terminal blocks each for 3 power terminals. This block allows the power terminals to be mounted with two DB25 kits or a TA25DU thermal O/L relay and DB25 kit assembly.

NOTE: According to DIN 46429 part 1 and NFC 20-120 the max. capacity of a Faston connection is 25 A.

Mounting kit – for TA450 overload relay

For contactor	Catalog number	List price
A145 – A185	DT450/A185	$ 225
A210 – A300	DT450/A300	

Terminal shrouds – for contactors and overload relays

Contactor	Overload relay	Catalog number	List price
A9 – A16 A26 – A40	TA25DU	Included	—
A30 – A40	TA42DU	Included	–
A50 – A75	TA75DU	Included	–
A95 – A110	TA80DU TA110DU	Included	–
A145 – A185	TA200DU	LT185-AY	$ 50
A145 – A185	Load side of TA200DU	LT200A185	90

Terminal lug kits

Wire range	For overloads	Catalog number	List price
6 – 250MCM	TA200DU	EHTK210	$ 45
4 – 400MCM	TA450DU185	ATK300	68
(2) 4 – 500MCM	TA450DU310	ATK300/2	110

Accessories

DS25A

DR25A

Remote tripping coils

	U voltage at 50/60 Hz	Catalog number ①	List price
DS25-A remote tripping coil			
	24V	DS25-A-24	$ 60
	48V	DS25-A-48	
	110V	DS25-A-110	
	220/380V	DS25-A-220/380	
	500V	DS25-A-500	
DS25-A remote resetting coil			
	24V	DR25-A-24	
	48V	DR25-A-48	
	110V	DR25-A-110	
	220/380V	DR25-A-220/380	
	500V	DR25-A-500	

Application

• The DS25-A coil is used for remote electrical tripping of the TA25 DU thermal O/L relay and is connected to the relay's normally closed 95-96 auxiliary contact.

• The DR 25-A coil is used for remote electrical resetting of the TA25DU thermal O/L relay which is adjusted for "Manual resetting;" it is connected to the relay's normally open 97-98 auxiliary contact.

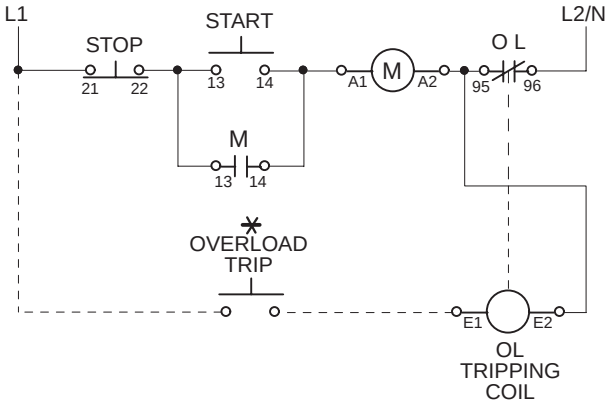
The coils are not designed for continuous duty. Impulse duration: 0.2 to 0.35 s.

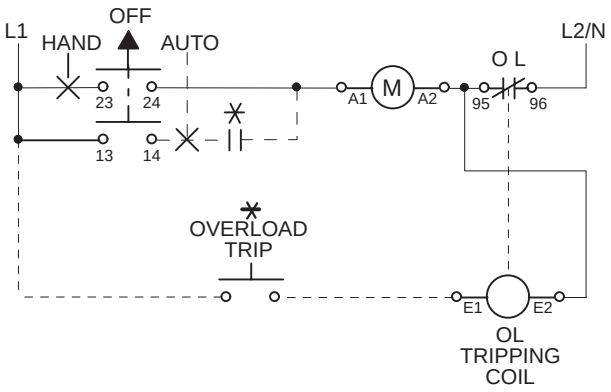
Set the button to "Man" (Manual resetting).

Mounting: clipped on to TA25DU thermal O/L relay.

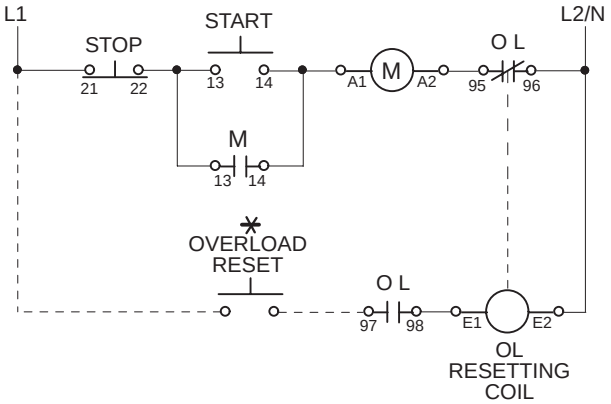
Installation diagrams

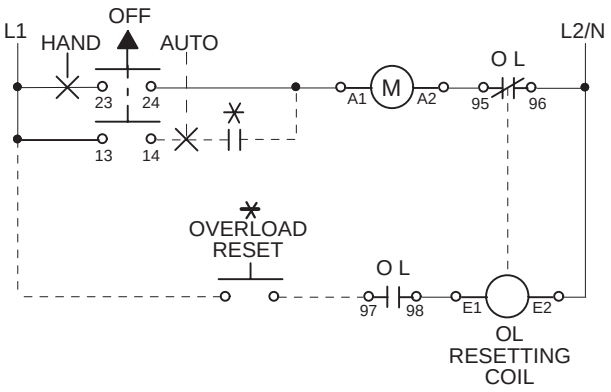
For connection of DS25-A to TA25DU relay





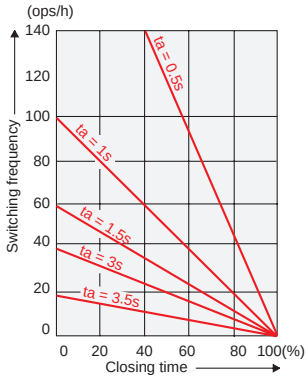
For connection of DR25-A to TA25DU relay



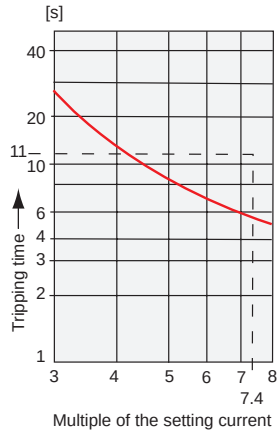


① Cannot be used with TA42, TA75, or TA200 overload relays.

Intermittent duty



Switching frequency
in relation to load factor.
t_a: motor starting time.



TA thermal O/L relay cold-state
tripping characteristics

Switching frequency:

To avoid untimely tripping, TA and T thermal O/L relays have been designed to withstand roughly 15 switching operations per hour with an approximately equal distribution between working and rest cycles.

In these conditions, the motor starting time must not exceed 1 second and the starting current must be lower than or equal to 6 times the motor $\mathbf{I}_n$.

For intermittent operations, the diagram opposite specifies relay operating limits.

Example: Motor starting time: 1 sec.
Load factor: 40 %
Switching frequency: 60 ops./h according to diagram

For a higher number of operations and for load variations (e.g. frequent starting and braking), it is advisable to use CUSTORAPID® protection.

For motors subject to particularly severe operating conditions (e.g. locked rotor) it is advisable to use protection combined with a thermal O/L relay and the CUSTORAPID® system.

Protection of motors with long starting time

See electronic overload relay section, pages 2.21 - 2.32.

Mounting position

On a support at an angle of ± 30° in relation to the vertical plane (standard position).

Other mounting positions possible, except mounting on a horizontal plane (in this case the tripping mechanism would be located above the bimetals).

Special version for EEx e motors

Consult factory.

Tripping limits at ambient temperatures varying by + 20°C

Ambient temperature compensation

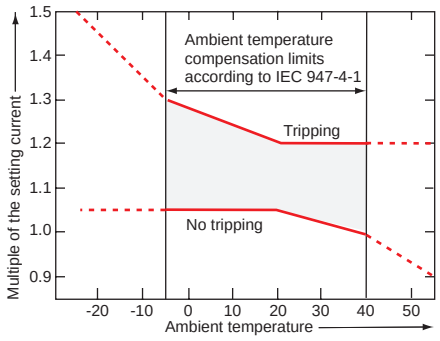
Thermal O/L relays are compensated against ambient temperature variations by a compensation bimetal which is sensitive to the ambient temperature.

Thermal O/L relays are designed to operate between –5 °C and +40 °C in compliance with standard IEC 947-4-1. For a wider range of –25° C to +55 °C consult the graph opposite.

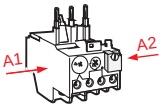
Example: tripping at –25 °C. Tripping takes place before 1.5 times the setting current.

Resetting: TA25DU – TA450 DU thermal O/L relays have convertible manual/automatic resetting.

Delivery: in manual resetting mode.



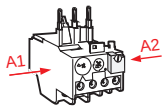
Technical data
TA25DU – TA80DU

Types		TA25DU	TA42DU	TA75DU	TA80DU
Standards: (international, European)		IEC 947-4-1, EN 60947-4-1			
Rated insulation voltage U_i according to IEC 947-4-1	V	690			
Rated impulse withstand voltage U_{imp} according to IEC 947-4-1	kV	6			
Permissible ambient temperature					
– for storage	°C	–40 to +70			
– for operation	°C	–25 to +55 with temperature compensation (maximum values: see page 2.9)			
Climatic withstand DIN 50017		Humidity in alternate climate KFW, 30 cycles			
Mounting positions		On a support at an angle of ±30° in relation to the vertical plane (standard position). Other positions possible except mounting on a horizontal plane (in this case the tripping mechanism would be located above the bimetals).			
Shock withstand at nominal I_e	shock duration ms	15			
Critical direction of shocks A1, A2	multiples of g	12			
Resistance to vibrations (±1 mm, 50 Hz)	multiples of g	8			
Mounting – on contactor		Latching below the contactor, screw fixing on main terminals			
– separate with DB - kit		Using screws: 2 x M4 or 35 mm EN 50022			
Terminals and cross-sectional areas for main conductors (motor side)			TA25DU setting ranges: from 0.1-0.16A 24-32 A to 18-25A		
• screw terminal					
– with cable clamp		M4	–		
– via tunnel connector		–	M5	M6	M6
– flat type for lug or bar		–	–	–	–
• conductor cross-sectional area					
– rigid solid or rigid stranded	mm^2	2 x 1.5 - 6	1 x 10	1 x 2.5 - 35 or 2 x 2.5 x 16	
– flexible with cable end	mm^2	2 x 1.5 - 4	2 x 0.75- 6	1 x 2.5 - 25 or 2 x 2.5 x 10	
– recommended bars	mm	–	–	–	–
Terminals and cross-sectional area for auxiliary conductors					
• screw terminal (screw size)					
– with cable clamp		M 3.5			
• conductor cross-sectional area					
– rigid solid or rigid stranded	2 x mm^2	0.75 - 4			
– flexible with cable end	2 x mm^2	0.75 - 2.5			
Degree of protection		All the terminals are protected against direct contact according to VDE 0106/Part. 100. (without additional terminal shrouds)			All the terminals are protected against direct
					direct contact according to VDE0106/part 100 (with additional terminal shrouds for the main terminals

Pole Technical Characteristics

Types		TA25 DU	TA42 DU	TA75 DU	TA80 DU	TA10 DU	TA200 DU	TA450 DU
Number of poles		3						
Setting ranges		see page 2.6						
Tripping class according to IEC 947-4-1, EN 60947-4-1		10 A						
Rated operational frequencies	Hz	0 - 400						50/60
Max. switching frequency without untimely tripping		Up to 15 starts/h or 60 starts/h with 40 % on-load factor when neither the starting current of 6 x I_n nor the starting time 1 s are exceeded.						
Resistance per phase in mΩ and heat dissipation in W		see page 2.13						

Technical data
TA110DU – TA450DU

Types		TA110DU	TA200DU	TA450DU
Standards: (international, European)		IEC 947-4-1, EN 60947-4-1		
Rated insulation voltage U_i according to IEC 947-4-1	V	690		1000
Rated impulse withstand voltage U_{imp} according to IEC 947-4-1	kV	6		8
Permissible ambient temperature – for storage – for operation	 °C °C	 –40 to +70 –25 to +55 with temperature compensation (maximum values: see page 2.9)		
Climatic withstand DIN 50017		Humidity in alternate climate KFW, 30 cycles		
Mounting positions		On a support at an angle of ±30° in relation to the vertical plane (standard position). Other positions possible except mounting on a horizontal plane (in this case the tripping mechanism would be located above the bimetals).		
Shock withstand at nominal I_e Critical direction of shocks A1, A2	shock duration ms multiples of g	15 12		
Resistance to vibrations (±1 mm, 50 Hz)	multiples of g	8		
Mounting – on contactor – separate with DB - kit		4 x M5 screws		
Terminals and cross-sectional areas for main conductors (motor side) • screw terminal – with cable clamp – via tunnel connector – flat type for lug or bar		 – HC, M8 –	 – – M10	 – – M10
• conductor cross-sectional area – rigid solid or rigid stranded – flexible with cable end – recommended bars	 mm^2 mm^2 mm	 16 – 35 16 – 35 12 x 3	 25 – 120 25 – 95 20 x 4	 2 x 240 2 x 240 20 x 4...5
Terminals and cross-sectional area for auxiliary conductors • screw terminal (screw size) – with cable clamp		 M 3.5		
• conductor cross-sectional area – rigid solid or rigid stranded – flexible with cable end	 2 x mm^2 2 x mm^2	 0.75 - 4 0.75 - 2.5		
Degree of protection		All the terminals are protected against direct contact according to VDE 0106/Part. 100. (with additional terminal shrouds)		

Technical characteristics of auxiliary contacts for thermal O/L relays: TA25DU to TA450DU

Auxiliary contacts		normally closed N.C.	normally open N.O.
Terminal marking		95-96	97-98
Rated operational voltage U_e	VAC	500	500
Conventional thermal current (in free air) I_{th}	A	10	6
Rated operational current I_e, AC-15 up to 240 V up to 440 V up to 500 V	 A A A	 3.0 1.9 1.0	 1.5 0.95 0.75
Rated operational current I_e DC-13 up to 250 V	 A	 0.12	 0.04
Protection against short circuits gG (gl) fuses (according to IEC 269) S 271/S 281circuit-breaker	 A A	 10 k3	 6 k1
Maximum potential difference between N.C. and N.O. auxiliary contacts	VAC VDC	500 440	500 440

Technical data
Motor protection; Choice of protective device

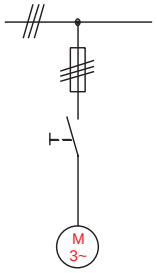
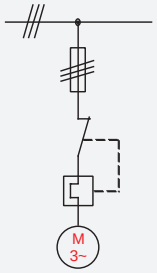
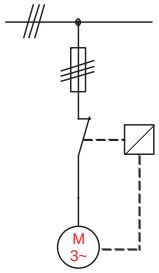
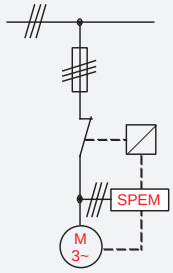
Motor Protection — general

It is very important to choose an adequate protective device for the safety of the motor during operation and for its durability.

The efficiency of protection methods varies according to the application. The overview below will help you to choose.

There is no general rule and we are available to advise you for special applications and especially in the case of difficult starting.

Protective devices and efficiency

	Protection in relation to current:		Protection in relation to temperature:	
	Fuses	Protective relay with phase fault protection	Motor protection via CUSTORAPID® thermistor	Motor protection via SPEM electronic relay
				

Causes of dangerous overloads for the motor windings

1 Overload with current 1.2 times the nominal current	□	●	●	●
2 S1-S8 nominal duties according to IEC 34-I	□	■	●	●
3 Operation with starting, braking, reversal in operating direction	□	■	●	●
4 Operation with starting rate at > 15 cycles/hour	□	■	●	●
5 Locked rotor	■	●	■ for motors with special rotor	●
6 Overloads due to phase failure	□	●	●	●
7 Network undervoltage or overvoltage	□	●	●	●
8 Fluctuation of network frequency	□	●	●	□
9 Ambient temperature too high	□	●	●	□
10 Overheating due to external cause (i.e. overheating of bearings)	□	□	●	□
11 Motor cooling disturbed	□	□	●	□
12				Undercurrent protection on drop in load
13				Protection of asymmetry: wrong phase direction rotation or asymmetrical load
14				Earth fault protection
15				Automatic disconnection for auxiliary load fault

Protection efficiency:

- □ unsuitable
- ■ very average efficiency
- ● perfectly efficient

Note: Fuses

Fuses do not protect motors against overloads. They are only used to protect installations and lines against short circuits.

To ensure efficient protection of a motor against short circuits, it is advisable to use aM type fuses in association with thermal OLR relays.

For the selection of fuses or circuit-breakers, refer to the indications given in this catalogue concerning contactors on the one hand and thermal O/L relays on the other.

In general, fuse protection for direct-on-line starting must be sized as follows:

– aM fuses: choose the fuse rating immediately above the full load value of the motor current.

– gG (gI) fuses: determine the fuse rating immediately above the motor current value and choose the next highest fuse rating.

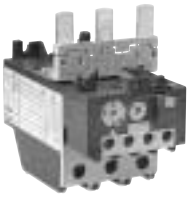
Resistance and Joule losses per phase, short circuit protection

Setting range current from – to A A	Resistance per phase mΩ	Joule losses per phase at max. setting W
TA25DU		
0.1 – 0.16	85850	2.2
0.16 – 0.25	85150	2.2
0.25 – 0.4	13750	2.2
0.4 – 0.63	5370	2.2
0.63 – 1.0	2190	2.2
1.0 – 1.4	1120	2.2
1.3 – 1.8	670	2.2
1.7 – 2.4	383	2.2
2.2 – 3.1	229	2.2
2.8 – 4.0	137	2.2
3.5 – 5.0	87.5	2.2
4.5 – 6.5	61	2.2
6.0 – 8.5	30.4	2.2
7.5 – 11	18.2	2.2
10 – 14	11.2	2.2
13 – 19	6.3	2.3
18 – 25	4.7	2.9
24 – 32	3.2	3.3
TA42DU		
18 – 25	5.5	3.43
22 – 32	2.89	2.91
29 – 42	1.84	3.24
TA75DU		
18 – 25	5.5	3.43
22 – 32	2.89	2.91
29 – 42	1.84	3.24
36 – 52	1.3	3.51
45 – 63	0.936	3.72
60 – 80	0.615	3.94
TA80DU		
29 – 42	1.84	3.24
36 – 52	1.3	3.51
45 – 63	0.936	3.72
60 – 80	0.615	3.94

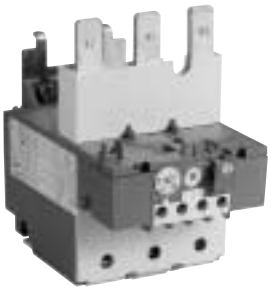
Setting range current from – to A A	Resistance per phase mΩ	Joule losses per phase at max. setting W
TA110DU		
80 – 110	0.378	3.78
TA200DU		
100 – 135	0.318	5.79
110 – 150	0.255	5.74
130 – 175	0.214	6.55
150 – 200	0.182	7.28
TA450DU		
130 – 185	—	2.5
165 – 235	—	2.5
220 – 310	—	2.5

Technical data
Tripping curves

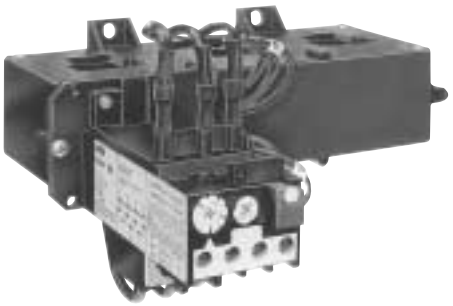
TA25DU



TA75DU



TA110DU/SU

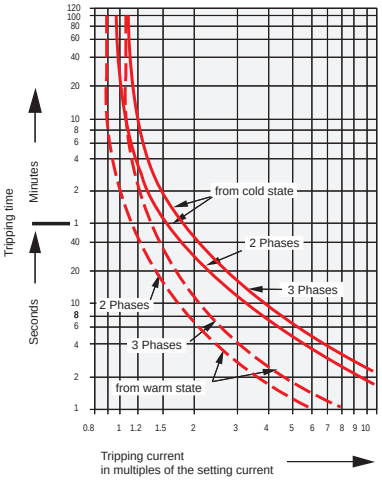


TA450DU

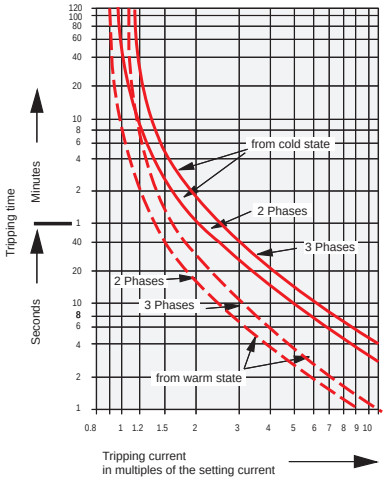
TA-DU thermal O/L relays are 3-pole with manual or automatic resetting mode selection.
The resetting button can also be used for stopping.
Built-in auxiliary contacts are physically separate and, consequently, can be used in different circuits (control circuit/indication circuit).
Each relay is temperature compensated and ensures phase failure protection.
Protective relays up to size TA75DU are protected against direct contact via the front face. Terminal shrouds are available for TA200DU to TA450DU size relays.
The connecting terminals are delivered in open position with (+,-) pozidriv screws and screwdriver guidance. It is advisable to tighten unused terminal screws.

Thermal O/L relay tripping curves

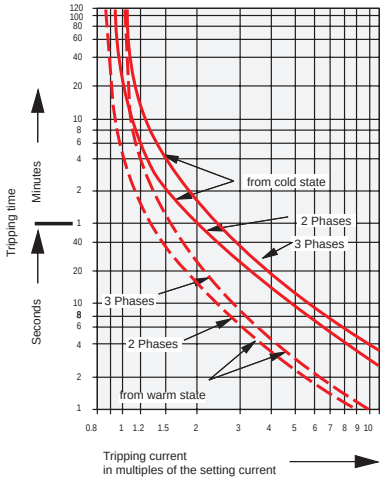
TA25DU
(tripping class 10A)



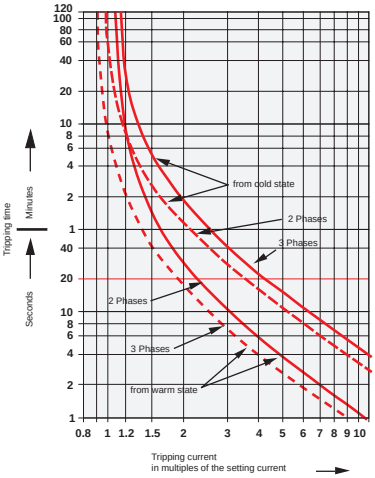
TA42DU, TA75DU and TA80DU
(tripping class 10A)



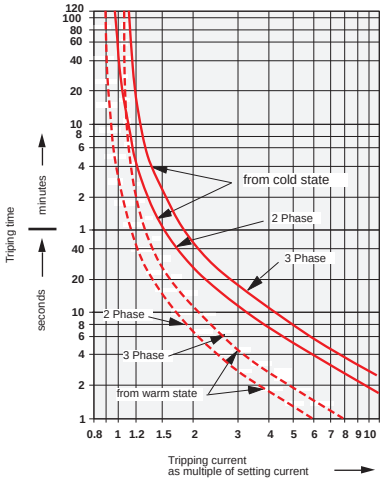
TA110DU
(tripping class 10A)



TA200DU
(tripping class 10A)



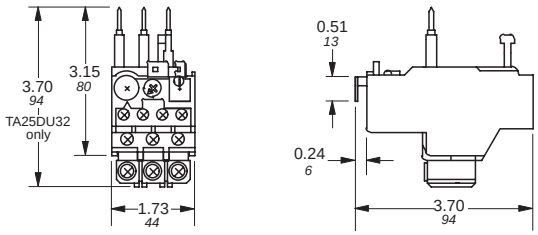
TA450DU
(tripping class 10A)



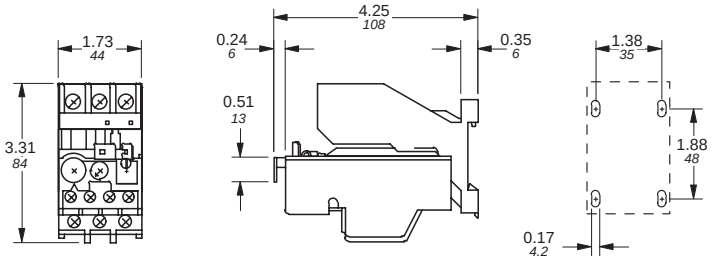
Approximate dimensions
T25DU – TA42DU

00.00 *00.00* Inches *Millimeters*

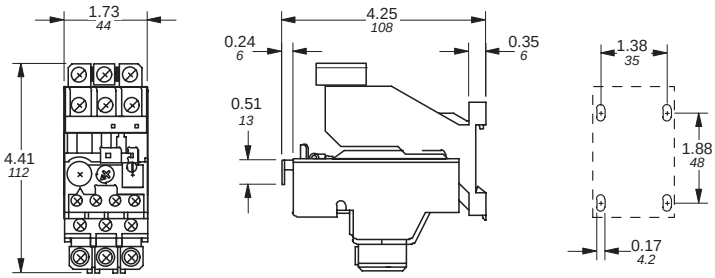
TA25DU



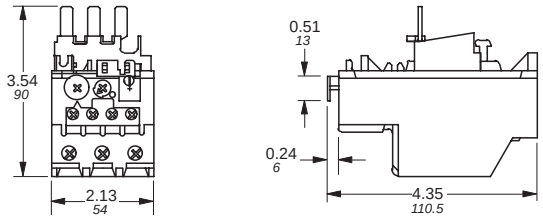
TA25DU & DB25



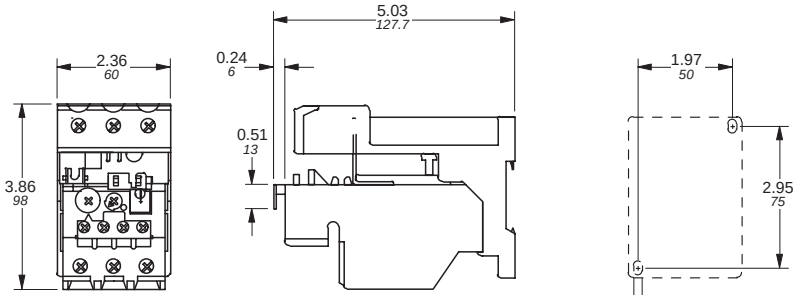
TA25DU & DB25/32



TA42DU



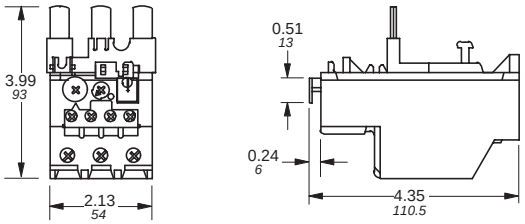
TA42DU / TA75DU & DB80



Approximate dimensions
TA75DU – TA200DU

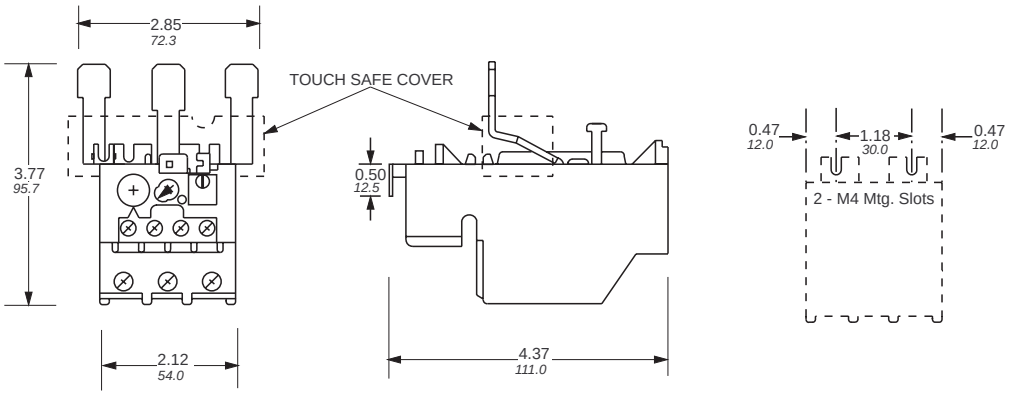
00.00 Inches
00.00 Millimeters

TA75DU

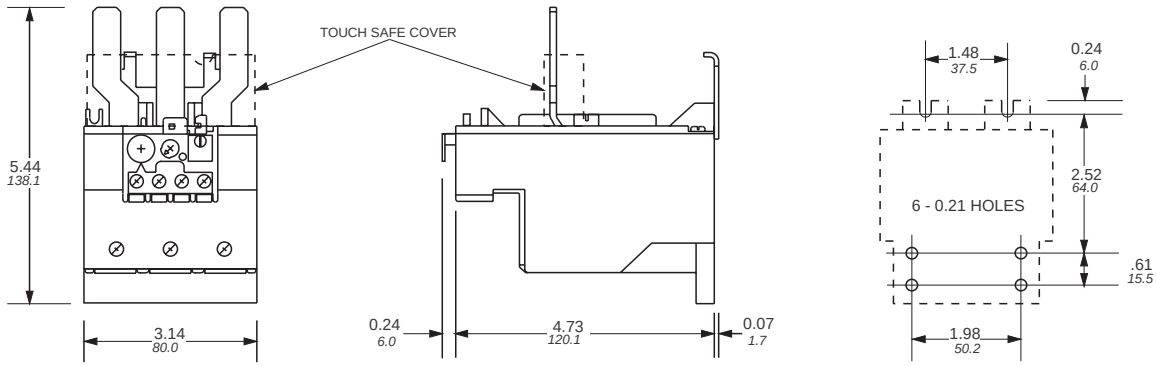


2

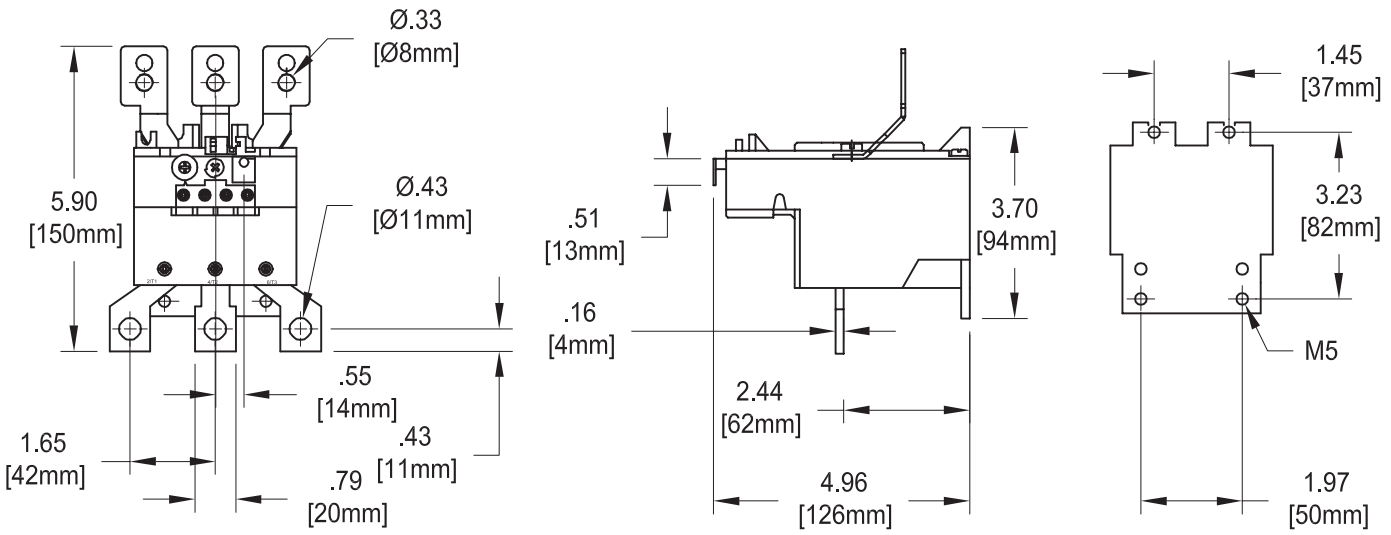
TA80DU



TA110DU



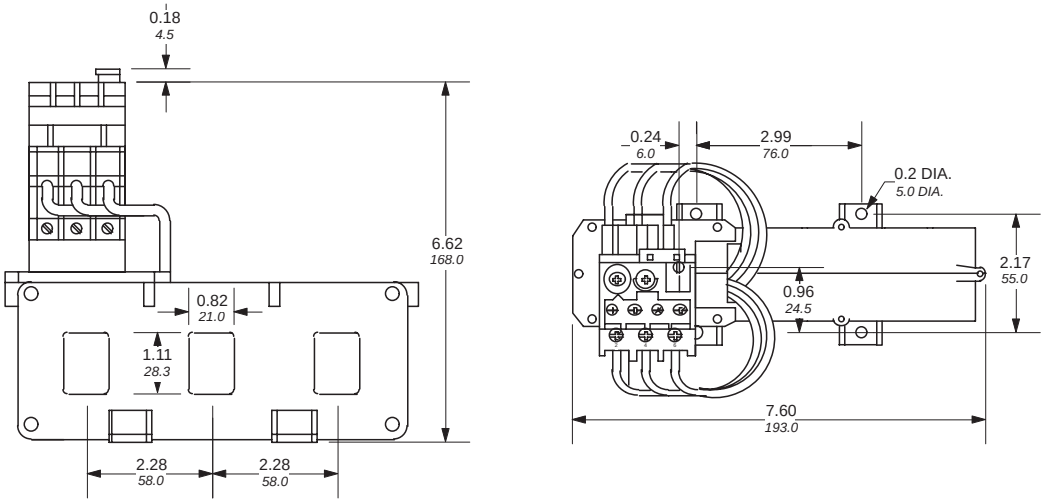
TA200DU



Approximate dimensions
TA450DU

00.00 Inches
00.00 Millimeters

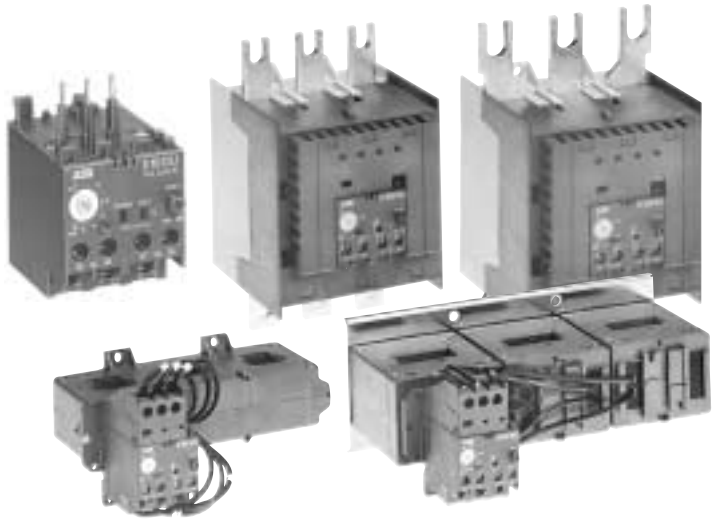
TA450DU



Notes

Electronic Overload relays

Electronic overload relays
E16DU – E800DU



Description

- Available for starter construction with A Line contactors and separate panel mounting
- Designed for close couple mounting
- Separate base mounting available for all overload relays
- E16DU Class 10, 20, & 30, factory selectable
- E200DU – E800DU Class 10, 20 & 30, field selectable
- Stop button
- Screwdriver guide holes
- All terminal screws are available from the front
- Single phase and phase unbalance protection
- Isolated alarm circuit (N.O.) contact
- Ambient compensation: -25°C to +70°C (-13°F to +158°F)
- Manual test
- Manual or automatic reset
- Factory calibrated and tested
- Wide adjustment range
- UL File No: E48139
- CSA File No: LR98336

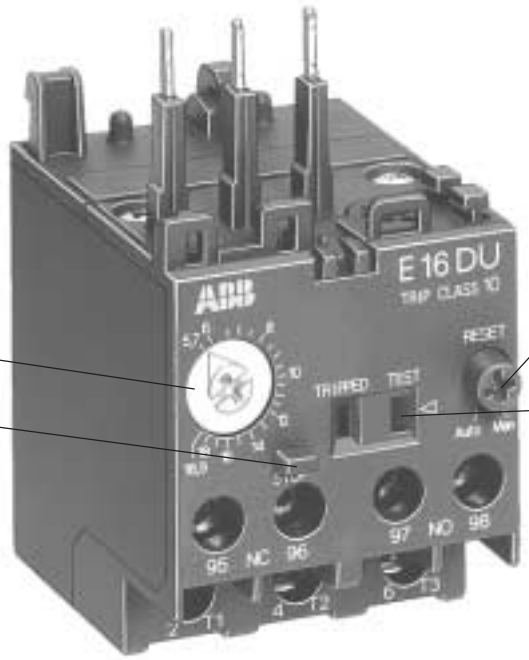
Tripping classes of the thermal overload relays

Standard classes in IEC 947-4-1 are classes: 10 A, 10, 20, 30. The tripping class indicates according to IEC 947-4-1 the maximum tripping time in seconds under specified conditions of test at 7.2 times the setting current and specifies tripping and non tripping times for 1.5 and 7.2 times the setting current. Mostly used class is 10 A.

Abstract from IEC 947-4-1

Tripping class		10 A	10	20	30
Max. tripping time at 1.5 x setting current (warm state)	(s)	120	240	480	720
Tripping time at 7.2 x setting current (cold state)	(s)	2 – 10	4 – 10	6 – 20	9 – 30
At 1.05 x setting current		no tripping			

Catalog number explanation



Nominal current setting

Stop button

Reset, manual or automatic

Trip indicator test function

Catalog number explanation

E16DU 1.0 10

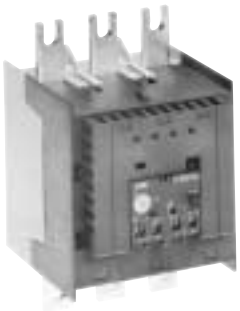
Frame size
E16DU
E200DU
E320DU
E500DU
E800DU

Class size
10
20
30

Amp rating
1.0
200
320
500
800

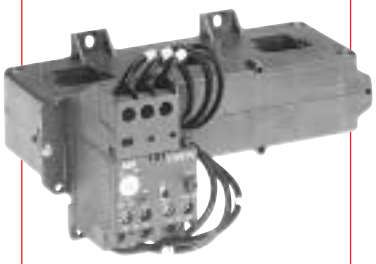
E16DU – E800DU
for contactors and mini contactors

E16DU

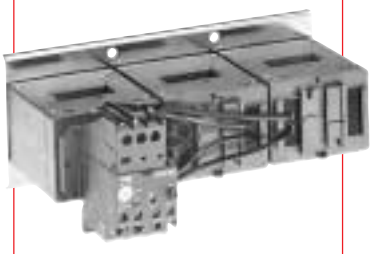


E200DU

E320DU



E500DU



E800DU

E16DU – Tripping Class 10

For contactor	Setting range	Suffix code	Catalog number ①	List price
B/BC6 – B/BC7 A/AE9 – A/AE16	0.1 – 0.32 0.3 – 1.0 0.9 – 2.7 2.0 – 6.3 5.7 – 18.9	A1 B1 C1 D1 E1	E16DU0.32-10 E16DU1.0-10 E16DU2.7-10 E16DU6.3-10 E16DU18.9-10	**$ 96**

E16DU – Tripping class 20

For contactor	Setting range	Suffix code	Catalog number ①	List price
B/BC6 – B/BC7 A/AE9 – A/AE16	0.1 – 0.32 0.3 – 1.0 0.9 – 2.7 2.0 – 6.3 5.7 – 18.9	A2 B2 C2 D2 E2	E16DU0.32-20 E16DU1.0-20 E16DU2.7-20 E16DU6.3-20 E16DU18.9-20	**$ 96**

E16DU – Tripping class 30

For contactor	Setting range	Suffix code	Catalog number ①	List price
B/BC6 – B/BC7 A/AE9 – A/AE16	0.1 – 0.32 0.3 – 1.0 0.9 – 2.7 2.0 – 6.3 5.7 – 18.9	A3 B3 C3 D3 E3	E16DU0.32-30 E16DU1.0-30 E16DU2.7-30 E16DU6.3-30 E16DU18.9-30	**$ 96**

E200DU – E800DU – Tripping class 10, 20 & 30

For contactor	Setting range	Suffix code	Catalog number	List price
A/AF145 – A/AF185	65 – 200	E2	E200DU200	**$ 325**
A/AF210 – A/AF300	105 – 320	E3	E320DU320	**775**
AF400 – AF460	170 – 500	E5	E500DU500	**865**
AF580 – AF750	270 – 800	E8	E800DU800	**950**

① Not suitable for single-phase motors and direct current (DC) motors.

Accessories

Mounting kits
for direct mounting on contactors AF400 – AF750

For overload relays	On contactor	Catalog number	List price
E500DU	AF400 – AF460	DT500/AF460	**395**
E800DU	AF580 – AF750	DT800/AF750	**415**

Separate mounting kits

For overload relays	Catalog number	List price
E16DU	DB16E	**$ 50**

Lug kits

Wire range	Electronic overload	Catalog number	List price
6 – 250 MCM	E200DU200	ATK185	**$ 45**
4 – 400 MCM	E320DU320	ATK300	**68**
(2) 4 – 500 MCM	E320DU320	ATK300/2	**110**
(2) 2/0 – 500 MCM	E500DU500	ATK580/2	**150**
(3) 2/0 – 500 MCM	E800DU800	ATK750/3	**225**

General technical data

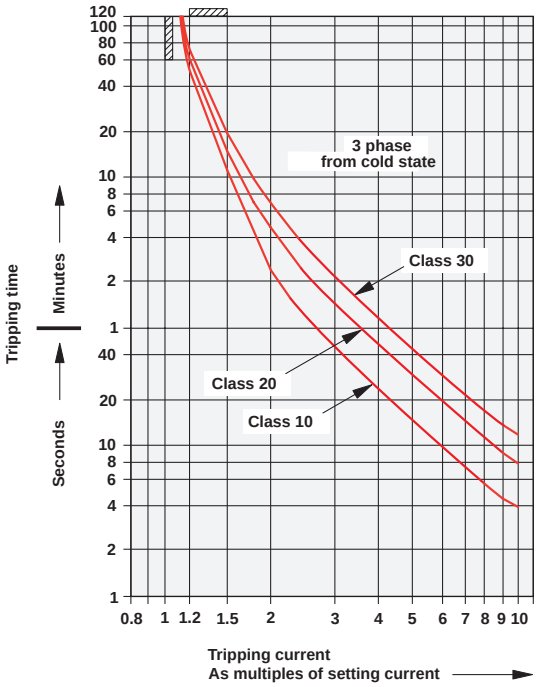
Type		E 16 DU
Standards:		UL508, IEC 60 947-4-1 / IEC 60 947-5-1 EN 60 947-4-1 / EN 60 947-5-1
Rated insulation voltage U_i	UL / IEC V	600 / 690
Rated operational voltage U_e	UL / IEC V	600 / 690
Impulse withstand voltage U_{imp}	kV	6
Permissible ambient temperature		
- for storage	°C	- 25 to 70
- with compensated operation	°C	- 25 to 70
Climatic resistance acc. to		IEC 68-2-1, IEC 68-2-2, IEC 68-2-14, IEC 68-2-30
Resistance to shock	Shock duration ms	11
	multiple of g	15
Resistance to vibrations (±1 mm, 10 ... 100 Hz)	multiple of g	5
Mounting - on contactor - with AB... kit		Direct to contactor's main terminal
Terminal types and connecting capacity of main conductors (on load side) /and auxiliary contacts.		
- Screw terminals (screw size)		
- with self-disengaging clamping piece		M3.5
- with terminal block		–
- with busbar or cable lugs		–
- Torque	lbin / Nm	7 / 1.0
- connection cross sections		
- copper stranded	AWG / mm^2	10 - 20 / 2X0.75...4
- flexible with connector sleeve	AWG / mm^2	10 - 20 / 2X0.75...4
Protection degree to IEC 947-1/EN 60 947-1		All terminals are safe from finger-touch and touch by the back of the hand in acc. with VDE 0106, Part 100
Weight	lbs / kg	.33 / .15

Technical data of the current paths

Type	E 16 DU
Number of paths	3
Setting ranges	see page 2.21
Tripping class acc. to IEC 947-4-1/EN 60 947-4-1	see page 2.21
Operating frequency Hz	50 and 60
Switching frequency without early tripping	up to 80 ops./h with 40 % continuous duty if starting current not higher than 6 x I_n and starting time not longer than 1s
Resistance per phase q and heat dissipation per phase in W acc. to max. setting current	see page 2.24
Required fuses for short circuit protection	see page 2.24

Technical data

Tripping characteristics



Resistance and power dissipation

Setting range	gL/gG	Short circuit protection UL/CSA 600V 5kA	UL/CSA 480V/50kA	Resistance per phase		Joule losses per phase at upper current setting
A – A	A	RK5	Class J	mΩ	q	W
0.1 – 0.32	1	2	2	970	0.97	0.1
0.3 – 1.0	4	2	2	113	0.113	0.11
0.9 – 2.7	10	4	4	14	0.014	0.1
2.0 – 6.3	20	15	15	2.4	0.0024	0.1
5.7 – 18.9	50	30	30	0.8	0.0008	0.29

Technical characteristics of auxiliary contacts

Type		N.C. 95-96	N.O. 97-98
Rated operational voltage U_e	V	500	
Conventional free air thermal current I_{th}	A	6	
Rated operational current I_{th}			
on AC-15, 230V	A	3	
on AC-15, 400V	A	1.1	
on AC-15, 500V	A	0.9	
on AC-15, 690V	A	0.7	
on DC-13, 24V	A	1.5	
on DC-13, 60V	A	0.5	
on DC-13, 110V	A	0.4	
on DC-13, 220V	A	0.2	
Short circuit protection gG (gf) fuses	A	6	

Type	E200DU	E320DU	E500DU	E800DU
Standards: (major international & European standards	IEC 60947-4-1, EN 60947-4-1, IEC 60947-5-1, EN 60947-5-1			
Approvals, certificates	UL, CSA			
Rated insulation voltage U_i V according to IEC 158-1, IEC 60947-4-1	690			
Impulse withstand voltage U_{imp} kV according to IEC 60947-4-1	6			
Permissible ambient temperature • for storage °C • with compensated operation °C	 -25 to +70 -25 to +70			
Climatic resistance according to:	IEC 68-2-1, IEC 68-2-2, IEC 68-2-14, IEC 68-2-30		IEC 68-2-1, IEC 68-2-2, IEC 68-2-30	
Mounting positions	multiple			
Resistance to shock (EN 61373) Shock duration ms multiple of g	30 5			
Resistance to vibrations (EN 61373)	Category 1, Class B			
Mounting • on contactor • single mounting	 2 x M4	 2 x M4	 2 x M4	 2 x M4
Terminal types and connecting capacity of auxiliary contacts • Screw terminals (screw size) • with self-disengaging clamping piece • Torque Nm	 M3.5 1.0			
Connection cross sections – Single core or stranded mm^2 – Flexible with connector sleeve mm^2	 2 x 0.75...4 2 x 0.75...4			
Terminal types and connecting capacity of main conductors • Screw terminals (screw size) • with busbar or cable lugs	 M8	 M10	 M10 (bars are accessories)	 M12 (bars are accessories)
Protection degree to IEC 947-1/EN 60 947-1	All auxiliary contact terminals are safe from finger touch and touch by the back of the hand in accordance with VDE 0106, Part 100. Main contact terminals are safe from finger touch only with appropriate terminal covers			
Number of current paths	3			
Setting ranges A	65 – 200	105 – 320	170 – 500	270 – 800
Tripping class according to IEC 947-4-1/EN 60 947-4-1	10, 20, 30			
Operating frequency Hz	50 and 60 for three phase current only			
Weight lb/kg	1.72 / .78	1.85 / .84	2.60 / 1.18	9.35 / 4.24

NOTE: • Installation and maintenance have to be performed according to the technical rules, codes and relevant standards by skilled electricians only.
• When using the “Auto” setting, remember that this means the overload will automatically reset after tripping and the motor may restart automatically. This automatic restart could cause harm to personnel and material.
• The overload relay mut be exchanged for a new one in case of mechanical and/or electrical damage to prevent harm to personnel and material.

Technical data
Terms and technical definitions

Altitude
Characterizes the place of use. It is expressed in meters above sea level.

Circuits
- Auxiliary circuit – all the conductive parts of a contactor designed to be inserted in a different circuit from the main circuit and the contactor control circuits.
- Control circuit – all the conductive parts of a contactor (other than the main circuit and the auxiliary circuit) used to control the contactor's closing operation or opening operation or both.
- Main circuit – all the conductive parts of a contactor designed to be inserted in the circuit that it controls.

Insulation Class according to NFC 20 040 and VDE 0110
Characterizes adaptation of the devices to ambient temperature and operating conditions. For given clearances and creepage distances, a device will have different insulating voltages depending on insulation classes A, B, C & D. Class C corresponds to most industrial applications. The devices in this catalog belong to Class C.

Coordination of equipment protections during a short circuit
This is the addition upstream of the contactor and thermal overload relay of a short circuit (SCPD) protection device such as a circuit breaker, a fuse with a high breaking capacity or other fuses.

IEC publication 947-4-1 defines coordination Types 1 & 2:
- Type 1 – Coordination requires that, in the event of a short circuit, the contactor or starter does not endanger persons or installations and will not be able to operate without being repaired or parts being replaced.
- Type 2 – Coordination requires that, in short circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts being welded is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

Rated operational current I_e
Current rated by the manufacturer. It is mainly based on the rated operational voltage U_e, the rated frequency, the utilization category, the rated duty and the type of protective enclosure, if necessary.

Conventional free air thermal current I_{th}
Current that the contactor can withstand in free air for a duty time of 8 hours without the temperature rise of its various parts exceeding the maximum values given by the standard.

Cycle time
Cycle time is the sum of the current flow time and the no-current time for given cycle.

Electrical durability
Number of on-load operations that the contactor is able to carry out; it depends on the utilization category.

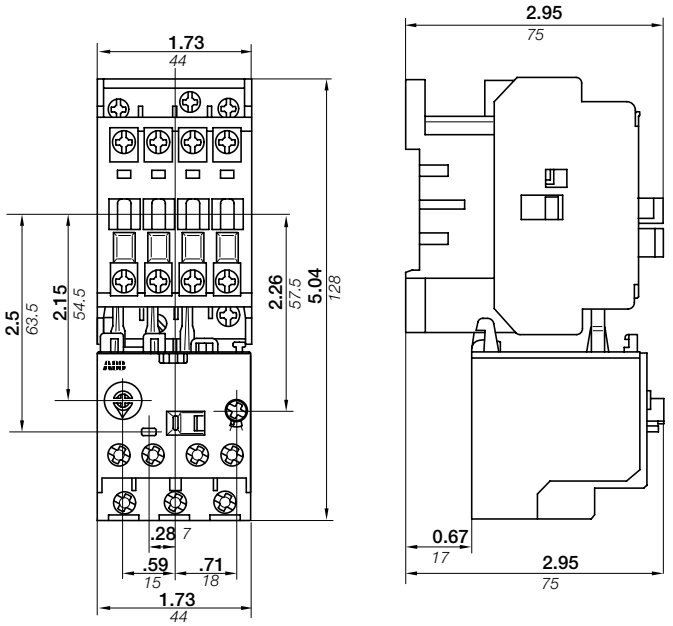
Mechanical durability
Number of no-current operations that a contactor is able to carry out.

Load factor
Ratio of the on-load operating time to the total cycle time x 100.

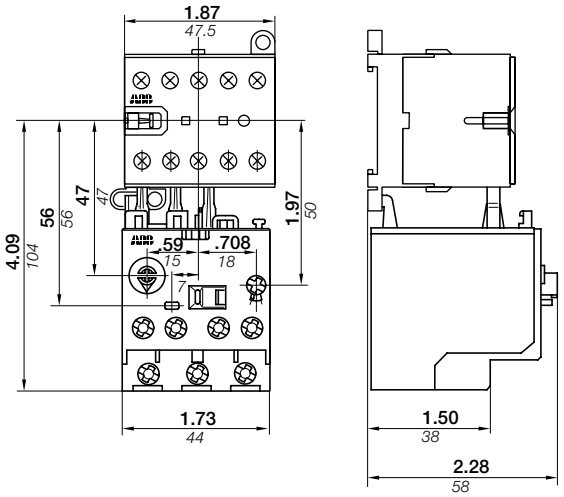
Switching frequency
Number of switching cycles per hour.

Approximate dimensions
E16DU – E200DU

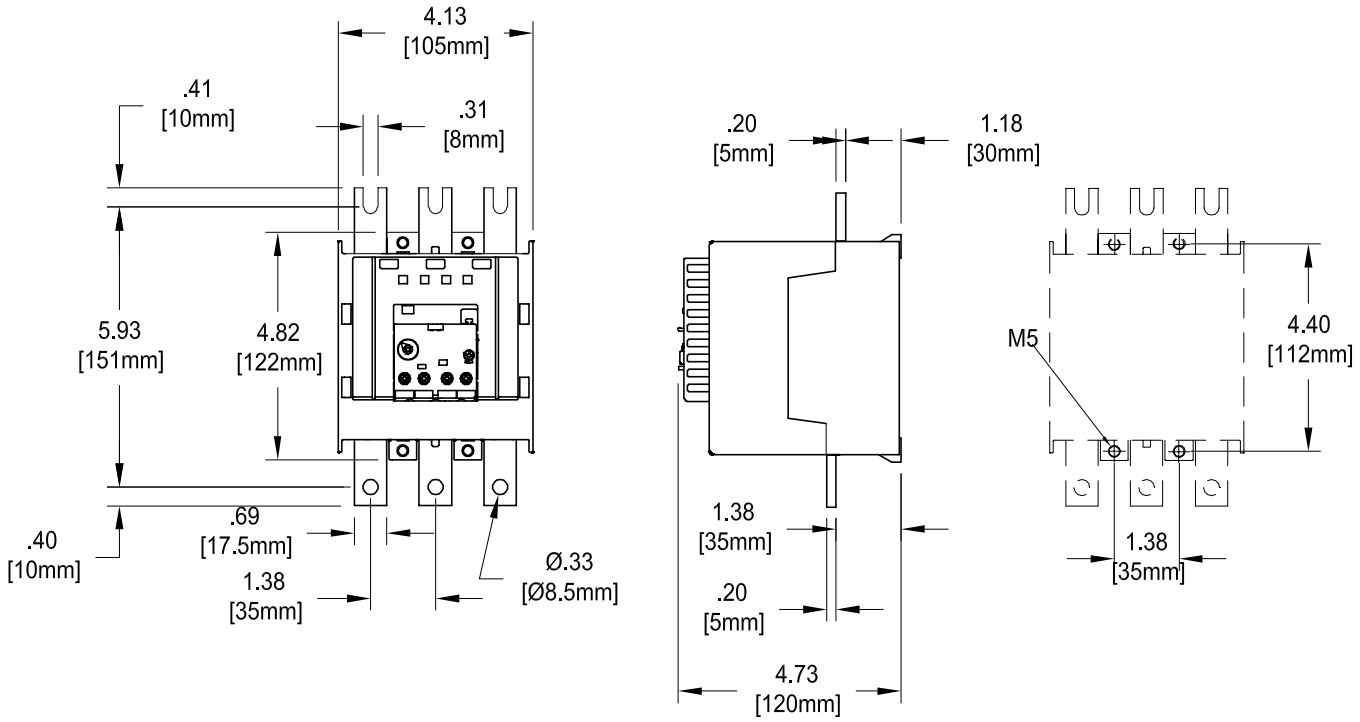
E16DU with A/AE9, A/AE12, A/AE16



E16DU with B/BC6, B/BC7

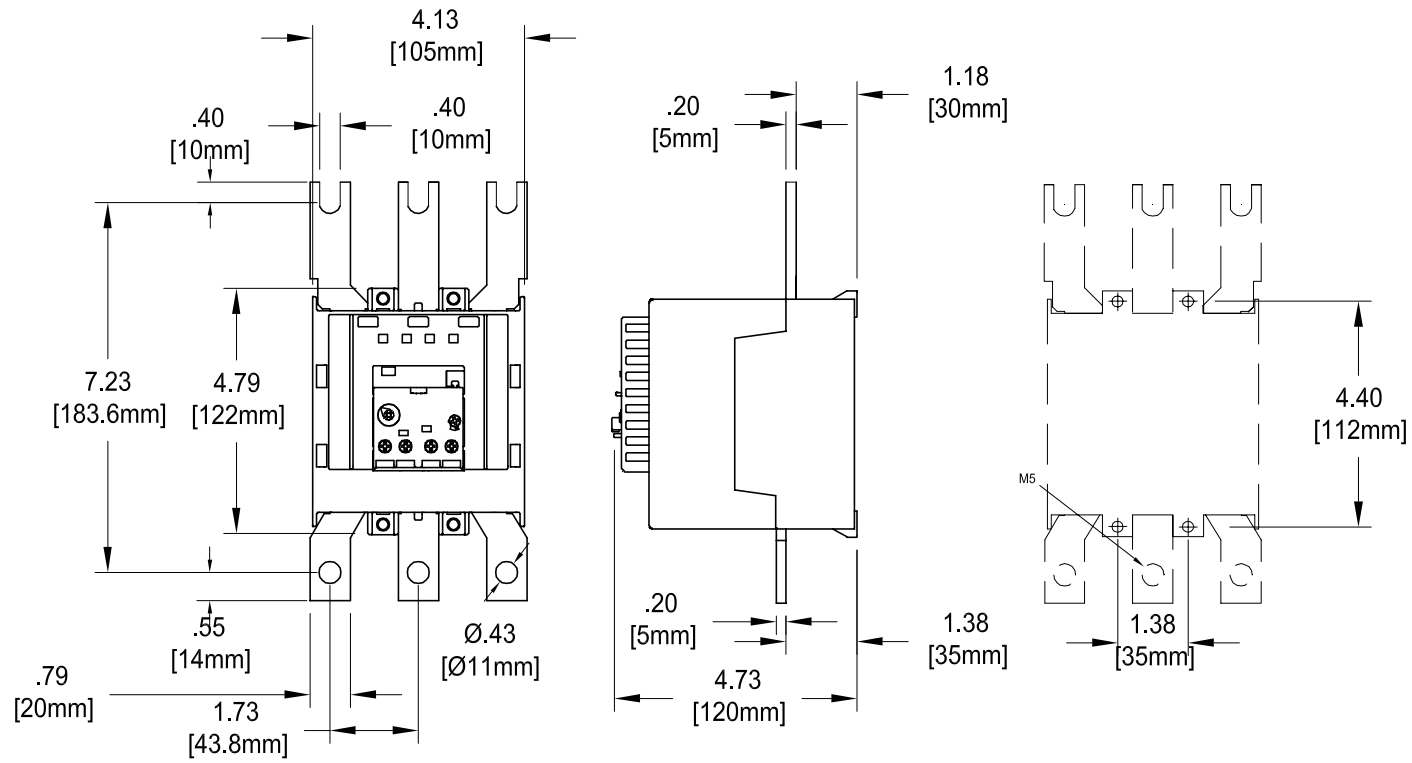


E200DU

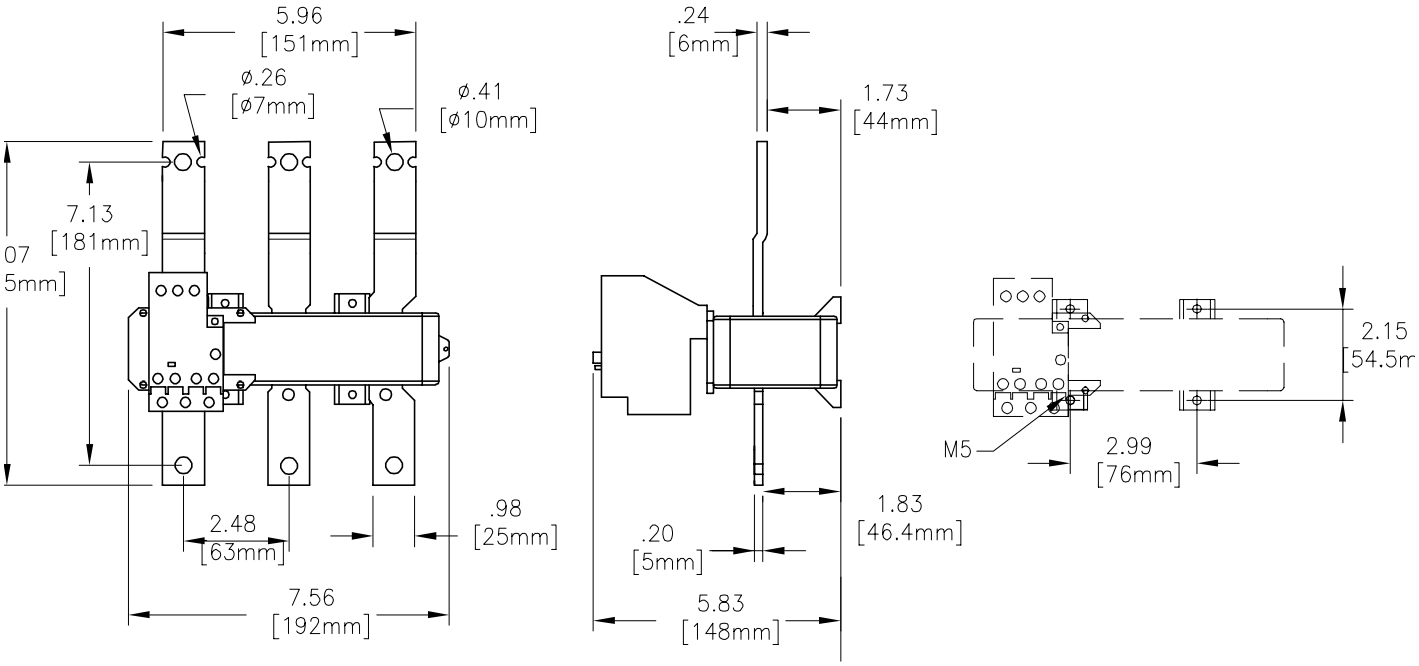


Approximate dimensions
E320DU – E500DU

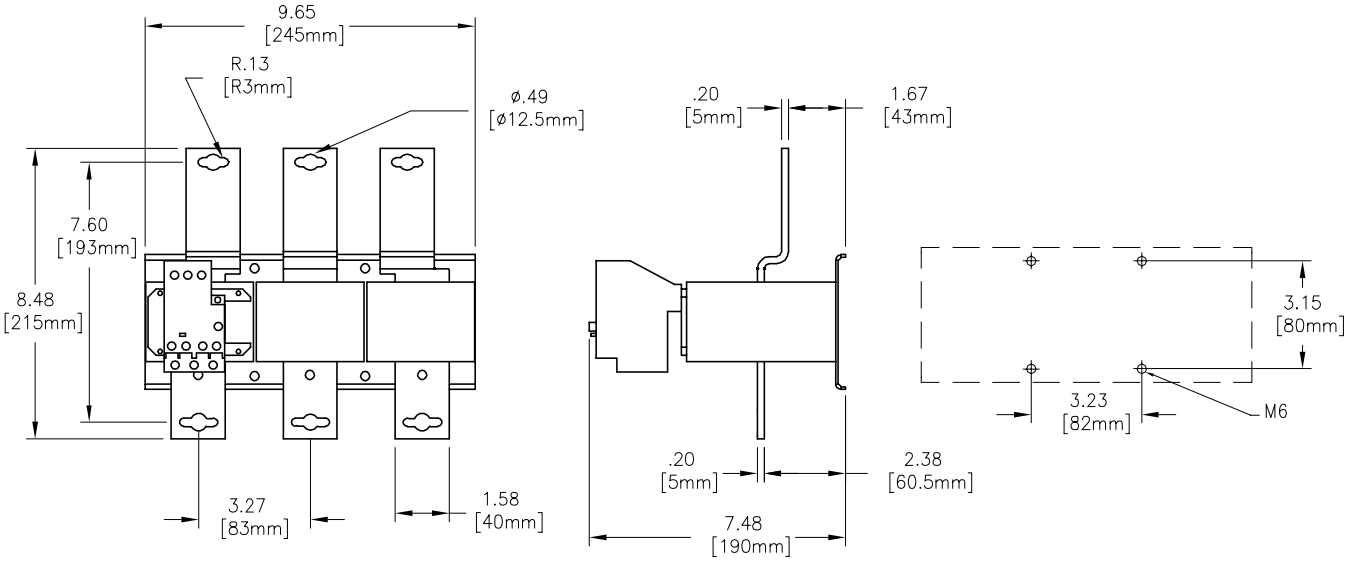
E320DU



E500DU



E800DU


9.65
[245mm]
R.13
[R3mm]
ø.49
[ø12.5mm]
7.60
[193mm]
8.48
[215mm]
3.27
[83mm]
1.58
[40mm]
.20
[5mm]
1.67
[43mm]
.20
[5mm]
2.38
[60.5mm]
7.48
[190mm]
3.15
[80mm]
3.23
[82mm]
M6

Notes

Notes

Low Voltage Products and Systems

ABB Inc.
1206 Hatton Road
Wichita Falls, TX 76302
Tel. 888-385-1221
940-397-7000
Fax 940-397-7085

AC 1030.1
December, 2001