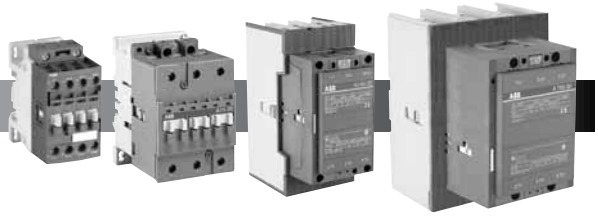
# Contactors
Index



## 1 - Contactors

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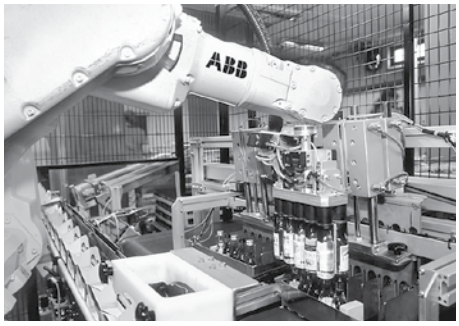
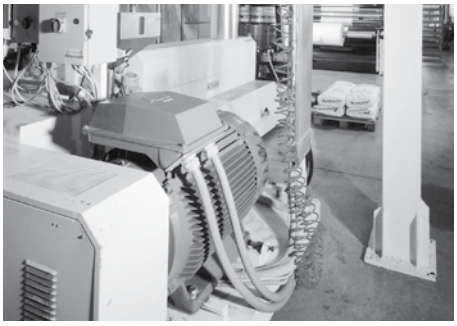
Panorama Motor protection & control

# Motor protection and control
## Panorama





**Miniature contactors for compact equipment up to 5 hp / 5.5 kW**
**Standard contactors for all industrial applications up to 2700 A**
**Motor starting up to 1150 hp / 900 kW**
**Contactors for heavy duty applications up to 5000 A, 1500V**

### Simple, sustainable integration

- Complete 3- & 4-pole ranges
- High performance and quality
- Ease of installation
- AF contactors with electronic coils:
  - Wide input ranges
  - Unified AC/DC voltages
  - Chatter-proof / hum-free
  - Dips withstand
  - Integral surge suppression
- Global certification and approvals

### Motor starting solutions

- Simple, compact assembly
- Close couplers, busbar and terminal accessories
- Systems concept:
  - Reduced panel space
  - Time / cost saving
  - Secure assembly

### The right choice for many applications

- Pumps & compressors
- HVAC equipment
- Power supplies and batteries
- Material handling
- Alternative energy
- Traction / rail
- Mobile equipment

## 3-pole contactors

| | | | | Mini contactors | | Contactors for all industrial applications and motor starting | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| **IEC** | **AC-3 Rated operational power** | $\theta \leq 55$ °C*, 400 V | **kW** | **4** | **5.5** | **4** | **5.5** | **7.5** | **4** | **5.5** | **7.5** | **11** | **15** | **18.5** |
| **UL/CSA** | **3-phase motor rating** | 480 V | **hp** | **3** | **5** | **5** | **7.5** | **10** | **5** | **7.5** | **10** | **15** | **20** | — |
| | AC Control supply | | Type | B6 | B7 | AS09 | AS12 | AS16 | AF09<br>AF09Z | AF12<br>AF12Z | AF16<br>AF16Z | AF26<br>AF26Z | AF30<br>AF30Z | AF38<br>AF30Z |
| | DC Control supply | | Type | BC6 | BC7 | ASL09 | ASL12 | ASL16 | AF09<br>AF09Z | AF12<br>AF12Z | AF16<br>AF16Z | AF26<br>AF26Z | AF30<br>AF30Z | AF38<br>AF38Z |
| | AC / DC Control supply | | Type | — | — | — | — | — | AF09<br>AF09Z | AF12<br>AF12Z | AF16<br>AF16Z | AF26<br>AF26Z | AF30<br>AF30Z | AF38<br>AF38Z |
| **IEC** | **AC-3 Rated operational current** | $\theta \leq 55$ °C*, 400 V | **A** | 9 | 12 | 9 | 12 | 15.5 | 9 | 12 | 18 | 26 | 32 | 38 |
| | **AC-1 Rated operational current** | $\theta \leq 40$ °C, 690 V | **A** | 16 | 20 | 22 | 24 | 24 | 25 | 28 | 30 | 45 | 50 | 50 |
| **UL/CSA** | **General use rating** | 600 V | **A** | 12 (300 V) | 16 | 20 | 20 | 20 | 25 | 28 | 30 | 45 | 50 | 50 |
| **NEMA** | **NEMA Size** | | | — | — | — | — | — | 00 | 0 | — | 1 | — | — |
| | | | | Pages 1.26...1.27 | | Pages 1.24...1.25 | | | Pages 1.14...1.17 | | | | | |

* $\theta \leq 60$ °C for AS(L)09 ... AS(L)16 and AF09 ... AF38 contactors

## Main accessories

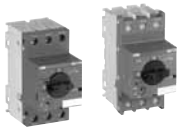
| | | | | | | |
|---|---|---|---|---|---|---|
| **Auxiliary contact blocks** Pages 1.46...1.51 | Front mounting | **CAF6** | **CA3-10** (1 x N.O.), **CA3-01** (1 x N.C.) | **CA4-10** (1 x N.O.), **CA4-01** (1 x N.C.) | | |
| | Side mounting | **CA6** | | **CAL4-11** (1 x N.O. + 1 x N.C.) | | |
| **Timers** Page 1.59 | Electronic | | **TEF3-ON, TEF3-OFF** | **TEF4-ON, TEF4-OFF** | | |
| **Interlocking units** (1) | Mechanical | | **VM3** | **VM4** | | |
| Pages 1.56...1.57 | Mechanical / Electrical | | | **VEM4** | | |
| **Connection kits** Page 1.62 | For reversing contactors | **BSM6-30** | **BER16C-3** | **BER16-4** | **BER38-4** | |
| **Surge suppressors** Pages 1.52...1.53 | Varistor (AC/DC) | **RV-BC6** | **RV5** (24...440 V) | | | |
| | RC type (AC) | | **RC5-1** (24...440 V) | | | |
| AF contactors have built-in surge protection | Transil diode (DC) | **RD7** | **RT5** (12...264 V) | | | |

(1) See available reversing contactors VB6, VB7 and VAS09 ... VAS16

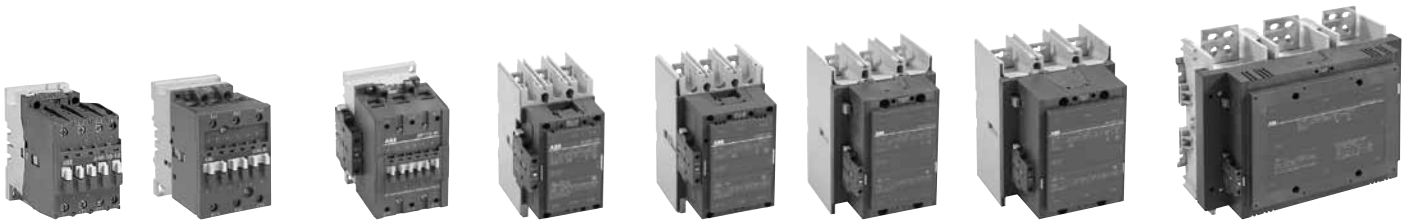
## Overload relays – Chapter 2

| | | | | | |
|---|---|---|---|---|---|
| **Thermal relays** | Class 10 (10A or 20 for TA42DU to TA80DU) | **T16** (0.10...16 A) | **T16** (0.10...16 A) | **TF42** (0.10...38 A) | |
| **Electronic relays** | Class 10E, 20E, 30E | **E16DU** (0.10...18.9 A) | | **EF19** (0.10...18.9 A) | **EF19** (0.10...18.9 A), **EF45** (9...45 A) |
| **Accessories for thermal overload relays** | Wall/separate mounting kit | **DB16** (T16 only), **DB16E** (E16DU only) | | **DB42** (TF42 only) | |

## Manual motor starters – Chapter 4



| | | | | | |
|---|---|---|---|---|---|
| | Thermal / magnetic protection, Class 10 | **MS116** for class 10A (0.16...32 A) | **MS116** for class 10A (0.16...32 A) | | |
| | | **MS132** (0.10...32 A) | **MS132** (0.10...32 A) | | |
| | Thermal / magnetic protection, Class 20 | | | | |
| | Magnetic only types | | **MO132** (0.10...32 A) | | |
| **Accessories** | For contactor mounting | **BEA7/132** | **BEA16-3** | **BEA16-4** | **BEA38-4** |
| | Auxiliary trip units, auxiliary contacts, busbars | **HKF1, HK1, UA1, AA1, PS1, S1, SK1, CK1** | **HKF1, HK1, UA1, AA1, PS1, S1, SK1, CK1** | | |



| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **18.5** | **22** | **30** | **37** | **45** | **55** | **75** | **90** | **110** | **140** | **160** | **200** | **250** | **315** | **400** | **—** | **475** | **560** | **—** |
| | **30** | **40** | **50** | **60** | **60** | **75** | **100** | **125** | **150** | **200** | **250** | **350** | **400** | **500** | **600** | **—** | **800** | **900** | **—** |
| | A40 | A50 | A63 | A75 | A95 | A110 | A145 | A185 | A210 | A260 | A300 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
| | AL40 | AE50 | AE63 | AE75 | AF95 | AF110 | AF145 | AF185 | AF210 | AF260 | AF300 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
| | — | AF50 | AF63 | AF75 | AF95 | AF110 | AF145 | AF185 | AF210 | AF260 | AF300 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
| | 37 | 50 | 65 | 75 | 96 | 110 | 145 | 185 | 210 | 260 | 305 | 400 | 460 | 580 | 750 | — | 860 | 1050 | — |
| | 60 | 100 | 115 | 125 | 145 | 160 | 250 | 275 | 350 | 400 | 500 | 600 | 700 | 800 | 1050 | 1260 | 1350 | 1650 | 2050 |
| | 60 | 80 | 90 | 105 | 125 | 150 | 230 | 250 | 300 | 350 | 400 | 550 | 650 | 750 | 900 | 1210 | 1350 | 1650 | 2100 |
| | — | 2 | — | 3 | — | — | 4 | — | — | 5 | — | — | 6 | — | 7 | — | — | 8 | — |

AF Series - pages 1.14...1.15; A Series - pages 1.18...1.19; AE Series - pages 1.20...1.21;
AL Series - pages 1.22...1.23; NEMA rated contactors - pages 1.28...1.31

**NEW!!**
AF2650
General use: 2700A
AC-1: 2650A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **CA5-10** (1 x N.O.), **CA5-01** (1 x N.C.) | | | | | | |
| | **CAL5-11** (1 x N.O. + 1 x N.C.) | | **CAL18-11** (1 x N.O. + 1 x N.C.) | | | | |
| | **TEF5-ON, TEF5-OFF** | | | | | | |
| | **VM5-1** | | **VM300H / VM300V** | | **VM750H / VM750V** | | **VM1650H** |
| | **VE5-1** | **VE5-2** | | | | | |
| | **BER40V** | **BEM75-30** | **BEM110-30** | **BEM185-30** | **BEM300-30** | **BEM460-30** | **BEM750-30** |
| | **RV5** (24...440 V) | | | | | | |
| | **RC5-1** (24...440 V) | **RC5-2** (24...440 V) | | **RC5-3** (250...440V) | | | |
| | **RT5** (12...264 V) | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **TA42DU** (18...42 A) | **TA75DU** (18...80 A) | **TA80DU** (29...80 A) **TA110DU** (65...110 A) | **TA200DU** (66...200 A) | **TA450DU/SU** (130...310 A) class 30 for SU | | |
| | **E45DU** (9...45 A) | **E80DU** (27...80 A) | **E140DU** (50...140 A) | **E200D-U** (60...200 A) | **E320DU** (100...320 A) | **E500DU** (150...500 A) | **E800DU** (250...800 A) | **E1250DU** (375...1250 A) |
| | **DB80, DB45E, DB80E** | | **DB80, DB200, D140E** | **DB200** | | | |

## **Circuit breakers** – Chapter 17

| | | |
|---|---|---|
| | **MS450** (28...50 A) | |
| | | **MS495** (28...100 A) |
| | **MS451** (28...50 A) | |
| | | **MS496** (28...100 A) |
| | **BEA40/450** | **BEA50/450, BEA75/495** |
| | **HK4, HKS4, UA4, AA4, PS4, S4, SK4** | |

**Tmax** Circuit breaker and accessories

## 4-pole contactors

## Mini contactors

| | | | | | |
|---|---|---|---|---|---|
| **IEC** | **AC-1 Rated operational current** | θ ≤ 40 °C, 690 V | **A** | **16** | **20** |
| **UL/CSA** | **General use rating** | 600 V | **A** | **12** (300 V) | **16** |
| | AC Control supply | | Type | B6 | B7 |
| | DC Control supply | | Type | BC6 | BC7 |
| | AC / DC Control supply | | Type | — | — |
| | | | | Page 1.34 | |

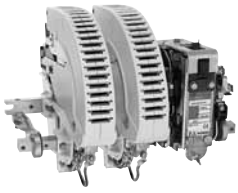
## Control relays
Chapter 6

## Mini control relays - Chapter 6

| | | | | | | |
|---|---|---|---|---|---|---|
| **IEC** | **AC-15 Rated operational current** | 400 V | **A** | **3** | | |
| **UL/CSA** | **Pilot duty** | | | **A 600** | | |
| | | | | 2 2 | 3 1 | 4 0 |
| | AC Control supply | | Type | K6-22Z | K6-31Z | K6-40E |
| | DC Control supply | | Type | KC6-22Z | KC6-31Z | KC6-0E |
| | AC / DC Control supply | | Type | — | — | — |

## Specialty contactors
Pages 1.167...1.224

## Bar contactors – Pages 1.215...1.224



DC-1 Rated current up to 5000 A
DC-3/DC-5 Rated current up to 2000 A
1500 V with poles in series

**IOR.. 63-..-CC** to **IOR.. 5100-..-CC**

AC-1 Rated current up to 5000 A
AC-3 Rated power up to 1500 kW
(1520 A - 440 V)
IOR.. 63-..-MT to IOR.. 5100-..-MT

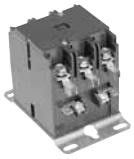
AC/DC Coupling: LOR.. contactors
Slip ring motor control: FOR .. contactors
Field discharge: AM(F)-CC-JORE contactors
AC/DC Switching (N.C./N.O. main poles): NOR & JOR contactors
Latching contactors for energy saving and safety requirements: AMA or AME contactors

## DC Circuit switching
Pages 1.207...1.214

100 A, 440 V, DC-1

**GA75**, **GAE75** types
275...2050A, 1000V, DC-1
**GAF185...GAF2050 types**

## Definite purpose
Pages 1.175...1.182



20...90 FLA

**DP20...DP90** types

## Contactors

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **25** | **30** | **45** | **55** | **70** | **100** | **125** | **200** | **250** | **300** | **350** | **550** | **800** | **1000** |
| **25** | **30** | **45** | **55** | **80** | **80** | **105** | **170** | **200** | **250** | **300** | **420** | **540** | **–** |
| AF09<br>AF09Z | AF16<br>AF16Z | AF26<br>AF26Z | AF38<br>AF38Z | A45 | A50 | A75 | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
| AF09<br>AF09Z | AF16<br>AF16Z | AF26<br>AF26Z | AF38<br>AF38Z | AE45 | AE50 | AE75 | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
| AF09<br>AF09Z | AF16<br>AF16Z | AF26<br>AF26Z | AF38<br>AF38Z | AF45 | AF50 | AF75 | – | – | – | – | – | – | – |
| Page 1.32 | | | | Page 1.32...1.33 | | | Page 1.32 | | | | | | |

## Control relays - Chapter 6

| | | | | | |
|---|---|---|---|---|---|
| **3** | | | **3** | | |
| **A 600, Q 300** | | | **A 600, Q 600** | | |
| 2 2 | 3 1 | 4 0 | 2 2 | 3 1 | 4 0 |
| NS22E | NS31E | NS40E | NF22E | NF31E | NF40E |
| NSL22E | NSL31E | NSL40E | NF22E | NF31E | NF40E |
| – | – | – | NF22E | NF31E | NF40E |

## Lighting contactors – Pages 1.195...1.200

For tungsten and ballast loads up to 400 A.

Up to 12 poles, open and enclosed (UL Type 1)

## Railway applications – Pages 1.201...1.206

Traction-specific (rail) devices with low-smoke plastic and ring-tongue termination

## Capacitive switching

Pages 1.167...1.174

12.5 to 80 kvar

**UA16..RA** to **UA110..RA** types
**UA16** to **UA110** types

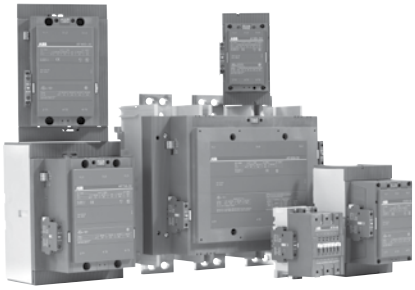
## Dynamic braking / DC drive – Pages 1.185...1.194

2 DC-rated N.O. power poles
with optional 3rd N.C. pole for dynamic braking

# Notes

# Across the line contactors
## General purpose and motor applications

Across the line
Contactors



### AF series contactors (9…2650)
- 3- & 4-pole contactors
- General purpose up to 2700 A
- Motor applications up to 1150 hp, 900 kW
- NEMA Sizes 00…8
- DC switching up to 600V
- Electronic AC/DC coil input voltages
- PLC interface (AF400…AF2650)
- Wide variety of accessories
- Systems concept coupling units & bus kits
- Additional ratings including definite purpose, elevator duty & capacitive switching

### AS / ASL contactors (9…16)
- 3-pole contactors
- For high-volume applications up to 10 hp
- Bulk packaging available
- AC or DC coil input voltages

### A-line contactors (9…300)
- 3- & 4-pole contactors
- General purpose up to 400 A
- Motor applications up to 300 hp, 250 kW
- NEMA Sizes 00…5
- Additional ratings including definite purpose & elevator duty
- AC or DC coil input voltages

### B / BC contactors
- 3 & 4 pole contactors
- Compact solutions up to 5 hp, 5.5 kW
- Quick-connect & PCB mount options
- AC or DC coil input voltages

### EK contactors
- 4-pole contactors
- AC-1 up to 1000 A
- AC or DC coil input voltages

### 3-pole contactors

| Standards & approvals | AF09(Z)… AF38(Z) | A/E/L9… A/E/L40 | A/E/F50… A/E/F75 | A/F95… A/F110 | A/F145… AF750, AF1350, AF1650 | AF1250, AF2050, AF2650 | AS/L09… AS/L16 | B/C6… B/C7 |
|---|---|---|---|---|---|---|---|---|
| UL | E312527 | E312527 | E312527 | E312527 | E36588 | E73397 | E312527 | E191658 |
| CSA | c UL us | LR56745 | LR56745 | c UL us | c UL us | c UL us | c UL us | LR16332 |
| CE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CCC | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Note: B/C6...7 quick-connect and PCB-mount are UL recognized.

### 4-pole contactors

| Standards & approvals | AF09(Z)… AF38(Z) | A/E/L9… A/E/L26 | A/E/F45… A/E/F75 | EK110… EK550 | EK1000 | B/C6… B/C7 |
|---|---|---|---|---|---|---|
| UL | E319322 | E312527 | E312527 | E36588 | – | E191658 |
| CSA | c UL us | LR56745 | LR56745 | c UL us | – | LR15332 |
| CE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CCC | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Note: B/C6...7 quick-connect and PCB-mount are UL recognized.

# General information
## Technical terms and definitions

### 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 coordination
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 occurred, 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.

# General information
## IEC 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. Power factor 0.7 - 0.8 (slightly inductive). |
| | AC-2 | Slip-ring motors: starting, switching-off. |
| | AC-3 | Squirrel-cage motors: starting, switching-off motors during running. Power factor 0.4 - 0.5 (AC-3). |
| | 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.

# General information
## Motor ratings

### Horsepower to full-load Amperes for AC induction motors

| Horse-power (hp) | Full Load Amperes (FLA) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 110…120 v ac | | 200 v ac | | 208 v ac | | 220…240 v ac | | 380…415 v ac | | 440…480 v ac | | 550…600 v ac | |
| | Single phase | Three phase | Single phase | Three phase | Single phase | Three phase | Single phase | Three phase | Single phase | Three phase | Single phase | Three phase | Single phase | Three phase |
| 1/10 | 3.0 | - | - | - | - | - | 1.5 | - | 1.0 | - | - | - | - | - |
| 1/8 | 3.8 | - | - | - | - | - | 1.9 | - | 1.2 | - | - | - | - | - |
| 1/6 | 4.4 | - | 2.5 | - | 2.4 | - | 2.2 | - | 1.4 | - | - | - | - | - |
| 1/4 | 5.8 | - | 3.3 | - | 3.2 | - | 2.9 | - | 1.8 | - | - | - | - | - |
| 1/3 | 7.2 | - | 4.1 | - | 4.0 | - | 3.6 | - | 2.3 | - | - | - | - | - |
| 1/2 | 9.8 | 4.4 | 5.6 | 2.5 | 5.4 | 2.4 | 4.9 | 2.2 | 3.2 | 1.3 | 2.5 | 1.1 | 2.0 | 0.9 |
| 3/4 | 13.8 | 6.4 | 7.9 | 3.7 | 7.6 | 3.5 | 6.9 | 3.2 | 4.5 | 1.8 | 3.5 | 1.6 | 2.8 | 1.3 |
| 1 | 16.0 | 8.4 | 9.2 | 4.8 | 8.8 | 4.6 | 8.0 | 4.2 | 5.1 | 2.3 | 4.0 | 2.1 | 3.2 | 1.7 |
| 1-1/2 | 20.0 | 12.0 | 11.5 | 6.9 | 11.0 | 6.6 | 10.0 | 6.0 | 6.4 | 3.3 | 5.0 | 3.0 | 4.0 | 2.4 |
| 2 | 24.0 | 13.6 | 13.8 | 7.8 | 13.2 | 7.5 | 12.0 | 6.8 | 7.7 | 4.3 | 6.0 | 3.4 | 4.8 | 2.7 |
| 3 | 34.0 | 19.2 | 19.6 | 11.0 | 18.7 | 10.6 | 17.0 | 9.6 | 10.9 | 6.1 | 8.5 | 4.8 | 6.8 | 3.9 |
| 5 | 56.0 | 30.4 | 32.2 | 17.5 | 30.8 | 16.7 | 28.0 | 15.2 | 17.9 | 9.7 | 14.0 | 7.6 | 11.2 | 6.1 |
| 7-1/2 | 80.0 | 44.0 | 45.0 | 25.3 | 44.0 | 24.2 | 40.0 | 22.0 | 27.0 | 14.0 | 21.0 | 11.0 | 16.0 | 9.0 |
| 10 | 100.0 | 56.0 | 57.5 | 32.2 | 55.0 | 30.8 | 50.0 | 28.0 | 33.0 | 18.0 | 26.0 | 14.0 | 20.0 | 11.0 |
| 15 | 135.0 | 84.0 | - | 48.3 | - | 46.2 | 68.0 | 42.0 | 44.0 | 27.0 | 34.0 | 21.0 | 27.0 | 17.0 |
| 20 | - | 108.0 | - | 62.1 | - | 59.4 | 88.0 | 54.0 | 56.0 | 34.0 | 44.0 | 27.0 | 35.0 | 22.0 |
| 25 | - | 136.0 | - | 78.2 | - | 74.8 | 110.0 | 68.0 | 70.0 | 44.0 | 55.0 | 34.0 | 44.0 | 27.0 |
| 30 | - | 160.0 | - | 92.0 | - | 88.0 | 136.0 | 80.0 | 87.0 | 51.0 | 68.0 | 40.0 | 54.0 | 32.0 |
| 40 | - | 208.0 | - | 120.0 | - | 114.0 | 176.0 | 104.0 | 112.0 | 66.0 | 88.0 | 52.0 | 70.0 | 41.0 |
| 50 | - | 260.0 | - | 150.0 | - | 143.0 | 216.0 | 130.0 | 139.0 | 83.0 | 108.0 | 65.0 | 86.0 | 52.0 |
| 60 | - | - | - | 177.0 | - | 169.0 | - | 154.0 | - | 103.0 | - | 77.0 | - | 62.0 |
| 75 | - | - | - | 221.0 | - | 211.0 | - | 192.0 | - | 128.0 | - | 96.0 | - | 77.0 |
| 100 | - | - | - | 285.0 | - | 273.0 | - | 248.0 | - | 165.0 | - | 124.0 | - | 99.0 |
| 125 | - | - | - | 359.0 | - | 343.0 | - | 312.0 | - | 208.0 | - | 156.0 | - | 125.0 |
| 150 | - | - | - | 414.0 | - | 396.0 | - | 360.0 | - | 240.0 | - | 180.0 | - | 144.0 |
| 200 | - | - | - | 552.0 | - | 528.0 | - | 480.0 | - | 320.0 | - | 240.0 | - | 192.0 |
| 250 | - | - | - | - | - | - | - | 604.0 | - | 403.0 | - | 302.0 | - | 242.0 |
| 300 | - | - | - | - | - | - | - | 722.0 | - | 482.0 | - | 361.0 | - | 289.0 |
| 350 | - | - | - | - | - | - | - | 828.0 | - | 560.0 | - | 414.0 | - | 336.0 |
| 400 | - | - | - | - | - | - | - | 954.0 | - | 636.0 | - | 477.0 | - | 382.0 |
| 450 | - | - | - | - | - | - | - | 1030.0 | - | - | | 515.0 | - | 412.0 |
| 500 | - | - | - | - | - | - | - | 1180.0 | - | 786.0 | - | 590.0 | - | 472.0 |

Full-load motor-running currents in Amperes corresponding to various AC horsepower ratings as published in Table 50.1 of UL 508.

# General information

## Pilot duty ratings and overload trip classes

### Pilot duty ratings for AC control circuit contacts

| Contact rating designation | Continuous thermal, test current (A) | Maximum current, 50/60 Hz (A) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 120 v ac | | 240 v ac | | 480 v ac | | 600 v ac | | Volt-amperes | |
| | | Make | Break | Make | Break | Make | Break | Make | Break | Make | Break |
| A150 | 10 | 60 | 6.00 | - | - | - | - | - | - | 7200 | 720 |
| A300 | 10 | 60 | 6.00 | 30 | 3.00 | - | - | - | - | 7200 | 720 |
| A600 | 10 | 60 | 6.00 | 30 | 3.00 | 15 | 1.50 | 12 | 1.20 | 7200 | 720 |
| B150 | 5 | 30 | 3.00 | - | - | - | - | - | - | 3600 | 360 |
| B300 | 5 | 30 | 3.00 | 15 | 1.50 | - | - | - | - | 3600 | 360 |
| B600 | 5 | 30 | 3.00 | 15 | 1.50 | 7.5 | 0.75 | 6 | 0.60 | 3600 | 360 |
| C150 | 2.5 | 15 | 1.5 | - | - | - | - | - | - | 1800 | 180 |
| C300 | 2.5 | 15 | 1.5 | 7.5 | 0.75 | - | - | - | - | 1800 | 180 |
| C600 | 2.5 | 15 | 1.5 | 7.5 | 0.75 | 3.75 | 0.375 | 3.00 | 0.30 | 1800 | 180 |
| D150 | 1.0 | 3.60 | 0.60 | - | - | - | - | - | - | 432 | 72 |
| D300 | 1.0 | 3.60 | 0.60 | 1.80 | 0.30 | - | - | - | - | 432 | 72 |
| E150 | 0.5 | 1.80 | 0.30 | - | - | - | - | - | - | 216 | 36 |

Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

### Pilot duty ratings for DC control circuit contacts

| Contact rating designation | Continuous thermal, test current (A) | Maximum current, 50/60 Hz (A) | | | |
|---|---|---|---|---|---|
| | | 120 v dc | 250 v dc | 301 to 600 v dc | Volt-amperes |
| | | Make / Break | Make / Break | Make / Break | Make / Break |
| N150 | 10 | 2.2 | - | - | 275 |
| N300 | 10 | 2.2 | 1.1 | - | 275 |
| N600 | 10 | 2.2 | 1.1 | 0.40 | 275 |
| P150 | 5.0 | 1.1 | - | - | 138 |
| P300 | 5.0 | 1.1 | 0.55 | - | 138 |
| P600 | 5.0 | 1.1 | 0.55 | 0.20 | 138 |
| Q150 | 2.5 | 0.55 | - | - | 69 |
| Q300 | 2.5 | 0.55 | 0.27 | - | 69 |
| Q600 | 2.5 | 0.55 | 0.27 | 0.10 | 69 |
| R150 | 1.0 | 0.22 | - | - | 28 |
| R300 | 1.0 | 0.22 | 0.11 | - | 28 |

Mechanical switching ratings and test values as published in Table 1-4-1 of NEMA ICS 5-2000 (R2005, R2010)

### Overload trip classes

| Trip class | Tripping time $T_p$ (seconds) |
|---|---|
| 10A | $2 < T_p \leq 10$ |
| 10 | $4 < T_p \leq 10$ |
| 20 | $6 < T_p \leq 20$ |
| 30 | $9 < T_p \leq 30$ |

Trip classes as published in Table 2 of UL 60947-4-1A.

## Pilot duty rating explanation

A - 600

**Max. thermal current**

**Max. voltage**

# General information
## AF Series contactors
## AF09 - AF110

### Application
AF series contactors (9...110) are primarily used for controlling single and three phase motors and switching power circuits up to 600V AC, 240V DC

### Description
AF series contactors are provided in either three or four power pole configurations with a variety of accessories including auxiliary contacts, close coupling adaptors, interlocks, and busbars.

### Control circuit types
AF series contactor coils are designed to utilize both AC (50/60 Hz) and DC control circuit inputs ranging from 12…500V. Surge suppression is included.

### Contactor types

| | |
|---|---|
| 3 NO pole: | AF09…AF110 |
| 4 NO pole: | AF09…AF75 |
| 2 NO / 2 NC pole: | AF09…AF75 |

Mounting hole pattern identical from AF09…AF38. Only three different patterns for contactors AF09…AF110

Quick DIN-rail mount & dismount (no tools required AF09…AF38)
- 35 x 7.5mm for AF09…AF38
- 35 x 15mm for AF09…AF75
- 75mm for AF45…AF110

Integral surge suppression AF09…AF110

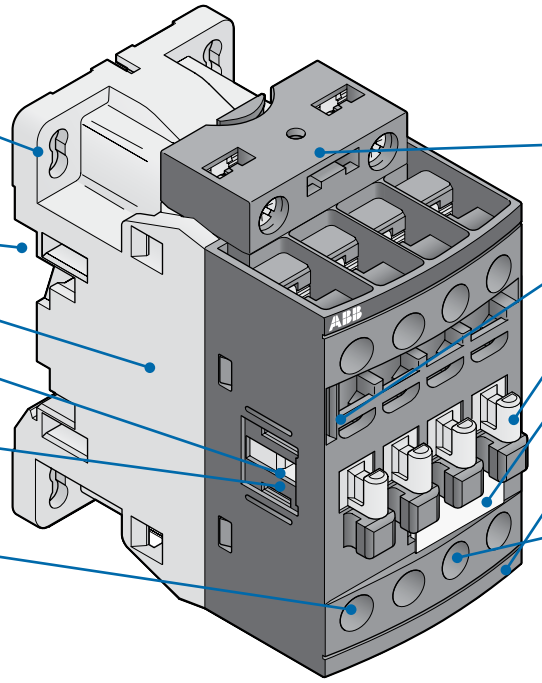
Actuator for side-mount accessories

Mechanical interlocks with no additional width for AF09…AF38

Contoured sides for easy access to panel mounting holes

Terminals on AF09…AF110 contactors are delivered in open position with captive screws (screws of unused terminals must be tightened)

IP20 degree protection according to IEC/EN 60947-1; protection from live parts according to VDE0106 Part. 100.




Detachable coil terminals (AF09…AF38)
- Can be pre-wired prior to installation
- Can easily be rotated from top (standard) to bottom

Front-mount coil termination available

Stops for attaching front-mount accessories

Function markers included as standard on AF09...AF38; available as accessory AF50…AF110

Clear indication of coil voltages and frequencies

Terminal screws:
- Posidrive (+,-) No 2 AF09…AF75
- M8 hex threaded socket screw for AF95…AF110

## Catalog number explanation
For reference only – not all combinations will produce valid catalog numbers

AF09 - 30 -10 - 13

**Contactor series & frame size**

**Power pole configuration**
- 30 = 3 NO
- 40 = 4 NO
- 22 = 2 NO / 2 NC

**Coil voltage code**
(see product selection pages)

**Auxiliary pole configuration**
- 00 - No auxiliary provided
- 10 = 1 NO
- 01 = 1 NC
- 11 = 1 NO / 1 NC
- 22 = 2 NO / 2 NC

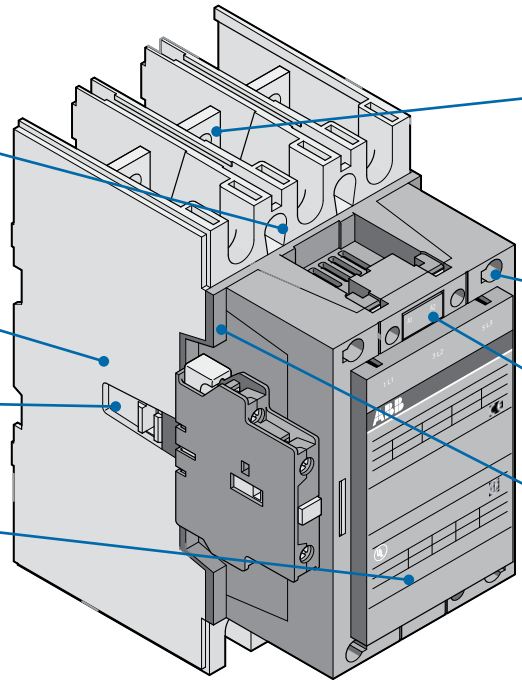
# General information
## AF Series contactors
## AF145 - AF2650

### Application
AF series contactors (145...2650) are primarily used for controlling single and three phase motors and switching power circuits up to 1000V AC, 600V DC.

### Description
AF series contactors are provided in a three power pole configuration with a variety of accessories including auxiliary contacts, close coupling adaptors, interlocks, and busbars.

### Control circuit types
AF series contactor coils are designed to utilize both AC (50/60 Hz) and DC control circuit inputs ranging from 24…500V. Surge suppression is included.

### Contactor types
3 NO pole: AF145…AF2650




## Catalog number explanation
For reference only – not all combinations will produce valid catalog numbers

AF2650 - 30 -11 - 70

**Contactor series & frame size**

**Power pole configuration**
- 30 = 3 NO

**Auxiliary pole configuration**
- 00 - No auxiliary provided
- 11 = 1 NO / 1 NC
- 22 = 2 NO / 2 NC

**Coil voltage code**
(see product selection pages)

# AF non-reversing, 3-pole

## For applications up to 1150 hp, 900 kW
## Electronic AC/DC operated coils

AF09…AF16

AF95…AF110

AF210…AF300

AF1350…AF2650

## Electrical ratings ①

## Non-reversing

| IEC/EN 60947-4-1 | | | | | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | | | | | | Standard auxiliary contacts ③ | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current $I_e$, AC-1, AC-3 (A) | | Rated operational power $P_e$, AC-3, 55°C (kW) ② | | | AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | | | |
| AC-1 40°C | AC-3 55°C ② | 220… 240V | 380... 400V | 690V | 600V | | 200... 208V | 220... 240V | 440… 480V | 550… 600V | NO | NC | |
| 25 | 9 | 2.2 | 4 | 5.5 | 25 | 9 | 2 | 2 | 5 | 7.5 | 1 | - | AF09-30-10-Δ |
| | | | | | | | | | | | - | 1 | AF09-30-01-Δ |
| 28 | 12 | 3 | 5.5 | 7.5 | 28 | 11 | 3 | 3 | 7.5 | 10 | 1 | - | AF12-30-10-Δ |
| | | | | | | | | | | | - | 1 | AF12-30-01-Δ |
| 30 | 18 | 4 | 7.5 | 9 | 30 | 17 | 5 | 5 | 10 | 15 | 1 | - | AF16-30-10-Δ |
| | | | | | | | | | | | - | 1 | AF16-30-01-Δ |
| 45 | 26 | 6.5 | 11 | 15 | 45 | 24.2 | 7.5 | 7.5 | 15 | 20 | - | - | AF26-30-00-Δ |
| 50 | 32 | 9 | 15 | 18.5 | 50 | 30.8 | 10 | 10 | 20 | 25 | - | - | AF30-30-00-Δ |
| 50 | 38 | 11 | 18.5 | 22 | 50 | - | - | - | - | - | - | - | AF38-30-00-Δ |
| 100 | 50 | 15 | 22 | 30 | 80 | 54 | 15 | 20 | 40 | 50 | 1 | 1 | AF50-30-11-Δ |
| 115 | 65 | 18.5 | 30 | 37 | 90 | 68 | 20 | 25 | 50 | 60 | 1 | 1 | AF63-30-11-Δ |
| 125 | 75 | 22 | 37 | 40 | 105 | 80 | 25 | 30 | 60 | 75 | 1 | 1 | AF75-30-11-Δ |
| 145 | 96 | 25 | 45 | 55 | 150 | 88 | 30 | 30 | 60 | 75 | 1 | 1 | AF95-30-11-Δ |
| 160 | 110 | 30 | 55 | 75 | 150 | 104 | 30 | 40 | 75 | 100 | 1 | 1 | AF110-30-11-Δ |
| 250 | 145 | 45 | 75 | 110 | 230 | 130 | 40 | 50 | 100 | 125 | 1 | 1 | AF145-30-11-Δ |
| 275 | 185 | 55 | 90 | 132 | 250 | 156 | 50 | 60 | 125 | 150 | 1 | 1 | AF185-30-11-Δ |
| 350 | 210 | 59 | 110 | 160 | 300 | 192 | 60 | 75 | 150 | 200 | 1 | 1 | AF210-30-11-Δ |
| 400 | 260 | 80 | 140 | 200 | 350 | 248 | 75 | 100 | 200 | 250 | 1 | 1 | AF260-30-11-Δ |
| 500 | 305 | 90 | 160 | 250 | 400 | 302 | 100 | 100 | 250 | 300 | 1 | 1 | AF300-30-11-Δ |
| 600 | 400 | 110 | 200 | 315 | 550 | 414 | 125 | 150 | 350 | 400 | 1 | 1 | AF400-30-11-Δ |
| 700 | 460 | 132 | 250 | 355 | 650 | 480 | 150 | 200 | 400 | 500 | 1 | 1 | AF460-30-11-Δ |
| 800 | 580 | 160 | 315 | 500 | 750 | 604 | 250 | 250 | 500 | 600 | 1 | 1 | AF580-30-11-Δ |
| 1050 | 750 | 220 | 400 | 600 | 900 | 722 | 250 | 300 | 600 | 700 | 1 | 1 | AF750-30-11-Δ |
| 1260 | - | - | - | - | 1210 | - | - | - | - | - | 1 | 1 | AF1250-30-11-Δ |
| 1350 | 860 | 257 | 475 | 750 | 1350 | 954 | - | 400 | 800 | 1000 | 1 | 1 | AF1350-30-11-Δ |
| 1650 | 1050 | 315 | 560 | 900 | 1650 | 1050 | - | 450 | 900 | 1150 | 1 | 1 | AF1650-30-11-Δ |
| 2050 | - | - | - | - | 2100 | - | - | - | - | - | 1 | 1 | AF2050-30-11-Δ |
| 2650 | - | - | - | - | 2700 | - | - | - | - | - | 1 | 1 | AF2650-30-11-Δ |

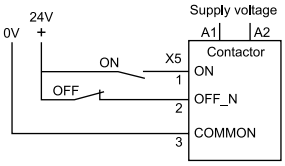
## Coil voltage selection chart (Δ)

| Rated control circuit voltage $U_c$ ④ | AF09… AF38 | AF50… AF300 | AF400… AF750 | AF1250 | AF1350… AF2650 |
|---|---|---|---|---|---|
| 20...60V DC | 11 | 72 | - | - | - |
| 24...60V AC | 11 | - | - | - | - |
| 24...60V DC | - | - | 68 | 68 | - |
| 48...130V AC/DC | 12 | 69 | 69 | 69 | - |
| 100...250V AC/DC | 13 | 70 | 70 | 70 | 70 |
| 250...500V AC/DC | 14 | - | 71 | - | - |

Example(s):
24V DC input voltage: AF16-30-10-11
120V AC input voltage: AF300-30-11-70

## Control inputs

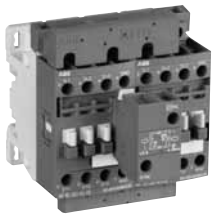
AF400...AF2650 are equipped with integral low voltage inputs, allowing for direct PLC control:



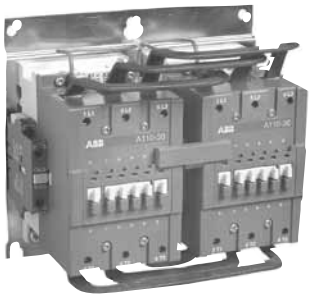

① For selection purposes; for complete electrical ratings, see Technical Data.
② AF09... AF38 at 60°C.
③ Auxiliary contacts integral for AF09…AF16; all others side-mount.
④ AC coil input voltage(s) at 50/60 Hz unless specified.

# AF mechanically interlocked, reversing, 3-pole

## For applications up to 700 hp, 600 kW
## Electronic AC/DC operated coils



AF09R…AF16R



AF95R…AF110R

### Electrical ratings ①②

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07

| AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | Mechanically interlocked | | | Reversing | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Standard auxiliary contacts | | Catalog number ③ | Standard auxiliary contacts | | Catalog number ③ |
| 600V | | 200...208V | 220...240V | 440...480V | 550...600V | NO | NC | | NO | NC | |
| 25 | 9 | 2 | 2 | 5 | 7.5 | 2 | 2 | AF09M-30-22-Δ | 2 | 2 | AF09R-30-22-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 28 | 11 | 3 | 3 | 7.5 | 10 | 2 | 2 | AF12M-30-22-Δ | 2 | 2 | AF12R-30-22-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 30 | 17 | 5 | 5 | 10 | 15 | 2 | 2 | AF16M-30-22-Δ | 2 | 2 | AF16R-30-22-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 45 | 24.2 | 7.5 | 7.5 | 15 | 20 | - | 2 | AF26M-30-02-Δ | - | 2 | AF26R-30-02-Δ |
| 50 | 30.8 | 10 | 10 | 20 | 25 | - | 2 | AF30M-30-02-Δ | - | 2 | AF30R-30-02-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 80 | 54 | 15 | 20 | 40 | 50 | 2 | 2 | AF50M-30-11-Δ | 2 | 2 | AF50R-30-11-Δ |
| 90 | 68 | 20 | 25 | 50 | 60 | 2 | 2 | AF63M-30-11-Δ | 2 | 2 | AF63R-30-11-Δ |
| 105 | 80 | 25 | 30 | 60 | 75 | 2 | 2 | AF75M-30-11-Δ | 2 | 2 | AF75R-30-11-Δ |
| 150 | 88 | 30 | 30 | 60 | 75 | 2 | 2 | AF95M-30-11-Δ | 2 | 2 | AF95R-30-11-Δ |
| 150 | 104 | 30 | 40 | 75 | 100 | 2 | 2 | AF110M-30-11-Δ | 2 | 2 | AF110R-30-11-Δ |
| 230 | 130 | 40 | 50 | 100 | 125 | 2 | 2 | AF145M-30-11-Δ | 2 | 2 | AF145R-30-11-Δ |
| 250 | 156 | 50 | 60 | 125 | 150 | 2 | 2 | AF185M-30-11-Δ | 2 | 2 | AF185R-30-11-Δ |
| 300 | 192 | 60 | 75 | 150 | 200 | 2 | 2 | AF210M-30-11-Δ | 2 | 2 | AF210R-30-11-Δ |
| 350 | 248 | 75 | 100 | 200 | 250 | 2 | 2 | AF260M-30-11-Δ | 2 | 2 | AF260R-30-11-Δ |
| 400 | 302 | 100 | 100 | 250 | 300 | 2 | 2 | AF300M-30-11-Δ | 2 | 2 | AF300R-30-11-Δ |
| 550 | 414 | 125 | 150 | 350 | 400 | 2 | 2 | AF400M-30-11-Δ | 2 | 2 | AF400R-30-11-Δ |
| 650 | 480 | 150 | 200 | 400 | 500 | 2 | 2 | AF460M-30-11-Δ | 2 | 2 | AF460R-30-11-Δ |
| 750 | 604 | 250 | 250 | 500 | 600 | 2 | 2 | AF580M-30-11-Δ | 2 | 2 | AF580R-30-11-Δ |
| 900 | 722 | 250 | 300 | 600 | 700 | 2 | 2 | AF750M-30-11-Δ | 2 | 2 | AF750R-30-11-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - |

### Coil voltage selection chart (Δ)

| Rated control circuit voltage $U_c$ ④ | AF09…AF30 | AF50…AF300 | AF400…AF750 |
|---|---|---|---|
| 20...60V DC | 11 | 72 | - |
| 24...60V AC | 11 | - | - |
| 24...60V DC | - | - | 68 |
| 48...130V AC/DC | 12 | 69 | 69 |
| 100...250V AC/DC | 13 | 70 | 70 |
| 250...500V AC/DC | 14 | - | 71 |

Example(s):
24V DC input voltage: AF16M-30-22-11
120V AC input voltage: AF300R-30-11-70

### Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes; for complete electrical ratings, see Technical Data.
② For ratings according to IEC/EN 60947-4-1, refer to AF non-reversing selection table or Technical Data.
③ AF09R(M)…AF30R(M) assembled using connection clips, AF50R(M)…AF750R(M) mounted on common baseplate.
④ AC coil input voltage(s) at 50/60 Hz unless specified.

# AFZ non-reversing, 3-pole

## For applications up to 25 hp, 22 kW
## Low power consumption, electronic AC/DC operated coils

AF09Z... AF16Z

AF26Z... AF38Z

### Electrical ratings ①

### Non-reversing

| IEC/EN 60947-4-1 CE | | | | | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 c UL us | | | | | | Standard auxiliary contacts ② | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current Ie AC-1, AC-3 (A) | | Rated operational power Pe, AC-3, 60°C (kW) | | | AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | | | |
| AC-1, 40°C | AC-3, 60°C | 220… 240V | 380… 400V | 690V | 600V | | 200... 208V | 220… 240V | 440… 480V | 550… 600V | NO | NC | |
| 25 | 9 | 2.2 | 4 | 5.5 | 25 | 9 | 2 | 2 | 5 | 7.5 | 1 | - | AF09Z-30-10-Δ |
| | | | | | | | | | | | - | 1 | AF09Z-30-01-Δ |
| 28 | 12 | 3 | 5.5 | 7.5 | 28 | 11 | 3 | 3 | 7.5 | 10 | 1 | - | AF12Z-30-10-Δ |
| | | | | | | | | | | | - | 1 | AF12Z-30-01-Δ |
| 30 | 18 | 4 | 7.5 | 9 | 30 | 17 | 5 | 5 | 10 | 15 | 1 | - | AF16Z-30-10-Δ |
| | | | | | | | | | | | - | 1 | AF16Z-30-01-Δ |
| 45 | 26 | 6.5 | 11 | 15 | 45 | 24.2 | 7.5 | 7.5 | 15 | 20 | - | - | AF26Z-30-00-Δ |
| 50 | 32 | 9 | 15 | 18.5 | 50 | 30.8 | 10 | 10 | 20 | 25 | - | - | AF30Z-30-00-Δ |
| 50 | 38 | 11 | 18.5 | 22 | 50 | - | - | - | - | - | - | - | AF38Z-30-00-Δ |

### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ③ | AF09Z… AF38Z |
|---|---|
| 12…20V DC | 20 |
| 24...60V AC | 21 |
| 20...60V DC | 21 |
| 48...130V AC/DC | 22 |
| 100...250V AC/DC | 23 |

Example(s):
24V DC input voltage: AF16Z-30-10-21
120V AC input voltage: AF30Z-30-00-23

① For selection purposes, for complete electrical ratings, see Technical Data
② Auxiliary contacts integral for AF09Z... AF16Z
③ AC coil input voltage(s) at 50/60 Hz unless specified.

# AFZ mechanically interlocked, reversing, 3-pole

## For applications up to 25 hp, 18.5 kW
## Low power consumption, electronic AC/DC operated coils

AF09ZR... AF16ZR

### Electrical ratings ①②

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07

| AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | Mechanically interlocked: Standard auxiliary contacts | | Mechanically interlocked: Catalog number ③ | Reversing: Standard auxiliary contacts | | Reversing: Catalog number ③ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 600V | | 200... 208V | 220... 240V | 440... 480V | 550... 600V | NO | NC | | NO | NC | |
| 25 | 9 | 2 | 2 | 5 | 7.5 | 2 | 2 | AF09MZ-30-22-Δ | 2 | 2 | AF09RZ-30-22-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 28 | 11 | 3 | 3 | 7.5 | 10 | 2 | 2 | AF12MZ-30-22-Δ | 2 | 2 | AF12RZ-30-22-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 30 | 17 | 5 | 5 | 10 | 15 | 2 | 2 | AF16MZ-30-22-Δ | 2 | 2 | AF16RZ-30-22-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 45 | 24.2 | 7.5 | 7.5 | 15 | 20 | - | 2 | AF26MZ-30-02-Δ | - | 2 | AF26RZ-30-02-Δ |
| 50 | 30.8 | 10 | 10 | 20 | 25 | - | 2 | AF30MZ-30-02-Δ | - | 2 | AF30RZ-30-02-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |

### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ④ | AF09Z… AF38Z |
|---|---|
| 12…20V DC | 20 |
| 24...60V AC | 21 |
| 20...60V DC | 21 |
| 48...130V AC/DC | 22 |
| 100...250V AC/DC | 23 |

Example(s):
24V DC input voltage: AF16ZM-30-22-21
120V AC input voltage: AF30ZR-30-02-23

### Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data
② For ratings according to IEC/EN 60947-4-1, refer to AFZ non-reversing selection table or Technical Data.
③ AF09ZR(M)…AF30ZR(M) assembled using connection clips.
④ AC coil input voltage(s) at 50/60 Hz unless specified.

# A non-reversing, 3-pole
## For applications up to 300 hp, 250 kW
## AC operated coils

A30... A40

A50... A75

A145... A185

## Electrical ratings ①

## Non-reversing

| IEC/EN 60947-4-1 | | | | | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | | | | | | Standard auxiliary contacts ② | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current Ie AC-1, AC-3 (A) | | Rated operational power Pe, AC-3, 55°C (kW) | | | AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | | | |
| AC-1, 40°C | AC-3, 55°C | 220…240V | 380…400V | 690V | 600V | | 200…208V | 220…240V | 440…480V | 550…600V | NO | NC | |
| 25 | 9 | 2.2 | 4 | 5.5 | 21 | 9 | 2 | 2 | 5 | 7.5 | 1 | - | ▼A9-30-10-Δ |
| | | | | | | | | | | | - | 1 | ▼A9-30-01-Δ |
| 27 | 12 | 3 | 5.5 | 7.5 | 25 | 11 | 3 | 3 | 7.5 | 10 | 1 | - | ▼A12-30-10-Δ |
| | | | | | | | | | | | - | 1 | ▼A12-30-01-Δ |
| 30 | 17 | 4 | 7.5 | 9 | 30 | 17 | 5 | 5 | 10 | 15 | 1 | - | ▼A16-30-10-Δ |
| | | | | | | | | | | | - | 1 | ▼A16-30-01-Δ |
| 45 | 26 | 6.5 | 11 | 15 | 40 | 28 | 7.5 | 10 | 20 | 25 | 1 | - | ▼A26-30-10-Δ |
| | | | | | | | | | | | - | 1 | ▼A26-30-01-Δ |
| 55 | 32 | 9 | 15 | 18.5 | 50 | 34 | 10 | 10 | 25 | 30 | 1 | - | A30-30-10-Δ |
| | | | | | | | | | | | - | 1 | A30-30-01-Δ |
| 60 | 37 | 11 | 18.5 | 22 | 60 | 42 | 10 | 15 | 30 | 40 | 1 | - | A40-30-10-Δ |
| | | | | | | | | | | | - | 1 | A40-30-01-Δ |
| 100 | 50 | 15 | 22 | 30 | 80 | 54 | 15 | 20 | 40 | 50 | 1 | 1 | A50-30-11-Δ |
| 115 | 65 | 18.5 | 30 | 37 | 90 | 68 | 20 | 25 | 50 | 60 | 1 | 1 | A63-30-11-Δ |
| 125 | 75 | 22 | 37 | 40 | 105 | 80 | 25 | 30 | 60 | 75 | 1 | 1 | A75-30-11-Δ |
| 145 | 96 | 25 | 45 | 55 | 150 | 88 | 30 | 30 | 60 | 75 | 1 | 1 | A95-30-11-Δ |
| 160 | 110 | 30 | 55 | 75 | 150 | 104 | 30 | 40 | 75 | 100 | 1 | 1 | A110-30-11-Δ |
| 250 | 145 | 45 | 75 | 110 | 230 | 130 | 40 | 50 | 100 | 125 | 1 | 1 | A145-30-11-Δ |
| 275 | 185 | 55 | 90 | 132 | 250 | 156 | 50 | 60 | 125 | 150 | 1 | 1 | A185-30-11-Δ |
| 350 | 210 | 59 | 110 | 160 | 300 | 192 | 60 | 75 | 150 | 200 | 1 | 1 | A210-30-11-Δ |
| 400 | 260 | 80 | 140 | 200 | 350 | 248 | 75 | 100 | 200 | 250 | 1 | 1 | A260-30-11-Δ |
| 500 | 305 | 90 | 160 | 250 | 400 | 302 | 100 | 100 | 250 | 300 | 1 | 1 | A300-30-11-Δ |

▼ Planned legacy product; recommend AF series contactors.

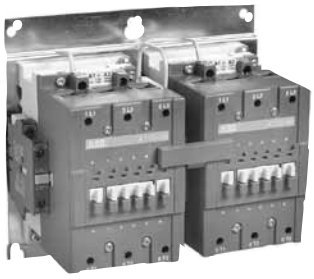
## Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ③ | A9…A300 |
|---|---|
| 24V AC | 81 |
| 48V AC | 83 |
| 110…120V AC, 60 Hz | 84 |
| 230…240V AC, 60 Hz | 80 |
| 480V AC, 60 Hz | 51 |
| 600V AC, 60 Hz | 55 |

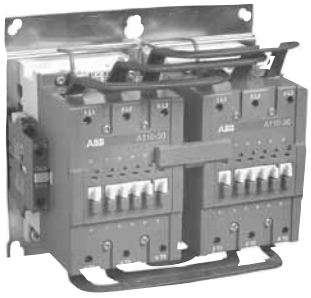
Example(s):
24V AC input voltage: A16-30-10-81
120V AC input voltage: A300-30-11-84

① For selection purposes, for complete electrical ratings, see Technical Data
② Auxiliary contacts integral for A9... A40
③ AC coil input voltage(s) at 50/60 Hz unless specified. For additional coil voltages, see page 1.35.

# A mechanically interlocked, reversing, 3-pole
## For applications up to 300 hp, 250 kW
## AC operated coils



A95M... A110M



A95R... A110R

### Electrical ratings ①②

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07

| AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | Mechanically interlocked: Standard auxiliary contacts | | Mechanically interlocked: Catalog number ③ | Reversing: Standard auxiliary contacts | | Reversing: Catalog number ③ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 600V | | 200…208V | 220…240V | 440…480V | 550…600V | NO | NC | | NO | NC | |
| 21 | 9 | 2 | 2 | 5 | 7.5 | 2 | 2 | ▼A9M-30-10-Δ | 2 | 2 | ▼A9R-30-10-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 25 | 11 | 3 | 3 | 7.5 | 10 | 2 | 2 | ▼A12M-30-10-Δ | 2 | 2 | ▼A12R-30-10-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 30 | 17 | 5 | 5 | 10 | 15 | 2 | 2 | ▼A16M-30-10-Δ | 2 | 2 | ▼A16R-30-10-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 40 | 28 | 7.5 | 10 | 20 | 25 | 2 | 2 | ▼A26M-30-10-Δ | 2 | 2 | ▼A26R-30-10-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 50 | 34 | 10 | 10 | 25 | 30 | 2 | 2 | A30M-30-10-Δ | 2 | 2 | A30R-30-10-Δ |
| - | | - | - | - | - | - | - | - | - | - | - |
| 60 | 42 | 10 | 15 | 30 | 40 | 2 | 2 | A40M-30-10-Δ | 2 | 2 | A40R-30-10-Δ |
| - | | - | - | - | - | - | - | - | - | - | - |
| 80 | 54 | 15 | 20 | 40 | 50 | 2 | 2 | A50M-30-11-Δ | 2 | 2 | A50R-30-11-Δ |
| 90 | 68 | 20 | 25 | 50 | 60 | 2 | 2 | A63M-30-11-Δ | 2 | 2 | A63R-30-11-Δ |
| 105 | 80 | 25 | 30 | 60 | 75 | 2 | 2 | A75M-30-11-Δ | 2 | 2 | A75R-30-11-Δ |
| 150 | 88 | 30 | 30 | 60 | 75 | 2 | 2 | A95M-30-11-Δ | 2 | 2 | A95R-30-11-Δ |
| 150 | 104 | 30 | 40 | 75 | 100 | 2 | 2 | A110M-30-11-Δ | 2 | 2 | A110R-30-11-Δ |
| 230 | 130 | 40 | 50 | 100 | 125 | 2 | 2 | A145M-30-11-Δ | 2 | 2 | A145R-30-11-Δ |
| 250 | 156 | 50 | 60 | 125 | 150 | 2 | 2 | A185M-30-11-Δ | 2 | 2 | A185R-30-11-Δ |
| 300 | 192 | 60 | 75 | 150 | 200 | 2 | 2 | A210M-30-11-Δ | 2 | 2 | A210R-30-11-Δ |
| 350 | 248 | 75 | 100 | 200 | 250 | 2 | 2 | A260M-30-11-Δ | 2 | 2 | A260R-30-11-Δ |
| 400 | 302 | 100 | 100 | 250 | 300 | 2 | 2 | A300M-30-11-Δ | 2 | 2 | A300R-30-11-Δ |

▼ Planned legacy product; recommend AF series contactors.

### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ④ | A9…A300 |
|---|---|
| 24V AC | 81 |
| 48V AC | 83 |
| 110…120V AC, 60 Hz | 84 |
| 230…240V AC, 60 Hz | 80 |
| 480V AC, 60 Hz | 51 |
| 600V AC, 60 Hz | 55 |

Example(s):
24V AC input voltage: A16M-30-10-81
120V AC input voltage: A300R-30-11-84

### Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data
② For ratings according to IEC/EN 60947-4-1, refer to A non-reversing selection table or Technical Data.
③A9R(M)…A16R(M) mounted on 35mm DIN rail, A26R(M)…A300R(M) mounted on common baseplate.
④ AC coil input voltage(s) at 50/60 Hz unless specified. For additional coil voltages, see page 1.35.

# AE non-reversing, 3-pole

## For applications up to 75 hp, 40 kW
## DC operated, double-wound coils

A50... AE75

### Electrical ratings ①

### Non-reversing

| IEC/EN 60947-4-1 | | | | | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | | | | | | Standard auxiliary contacts ② | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current Ie AC-1, AC-3 (A) | | Rated operational power Pe, AC-3, 55°C (kW) | | | AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | | | |
| AC-1, 40°C | AC-3, 55°C | 220… 240V | 380… 400V | 690V | 600V | | 200... 208V | 220… 240V | 440… 480V | 550… 600V | NO | NC | |
| 25 | 9 | 2.2 | 4 | 5.5 | 21 | 9 | 2 | 2 | 5 | 7.5 | 1 | 1 | ▼ AE9-30-11-Δ |
| 27 | 12 | 3 | 5.5 | 7.5 | 25 | 11 | 3 | 3 | 7.5 | 10 | 1 | 1 | ▼ AE12-30-11-Δ |
| 30 | 17 | 4 | 7.5 | 9 | 30 | 17 | 5 | 5 | 10 | 15 | 1 | 1 | ▼ AE16-30-11-Δ |
| 45 | 26 | 6.5 | 11 | 15 | 40 | 28 | 7.5 | 10 | 20 | 25 | 1 | 1 | ▼ AE26-30-11-Δ |
| 55 | 32 | 9 | 15 | 18.5 | 50 | 34 | 10 | 10 | 25 | 30 | 1 | 1 | AE30-30-11-Δ |
| 60 | 37 | 11 | 18.5 | 22 | 60 | 42 | 10 | 15 | 30 | 40 | 1 | 1 | AE40-30-11-Δ |
| 100 | 50 | 15 | 22 | 30 | 80 | 54 | 15 | 20 | 40 | 50 | 1 | 1 | AE50-30-11-Δ |
| 115 | 65 | 18.5 | 30 | 37 | 90 | 68 | 20 | 25 | 50 | 60 | 1 | 1 | AE63-30-11-Δ |
| 125 | 75 | 22 | 37 | 40 | 105 | 80 | 25 | 30 | 60 | 75 | 1 | 1 | AE75-30-11-Δ |

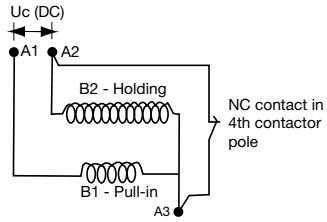
▼ Planned legacy product; recommend AF series contactors.

### Coil voltage selection chart (Δ)

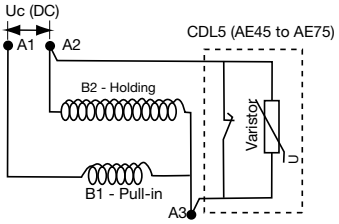
| Rated control circuit voltage Uc ③ | AE9…AE75 |
|---|---|
| 12V DC | 80 |
| 24V DC | 81 |
| 48V DC | 83 |
| 125V DC | 87 |
| 220V DC | 88 |
| 240V DC | 89 |

Example: 125V DC input voltage: AE75-30-11-87

### Double wound coils




AE9 to AE40

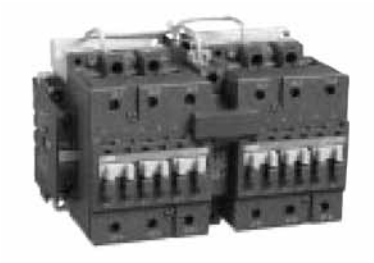



AE45 to AE75

① For selection purposes, for complete electrical ratings, see Technical Data
② All auxiliary contacts are side-mount.
③ For additional coil voltages, see page 1.35.

# AE mechanically interlocked, reversing, 3-pole

## For applications up to 75 hp, 40 kW
## DC operated, double-wound coils



AE50M... AE75M

AE50R...AE75R

### Electrical ratings ①②

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07

| AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | Mechanically interlocked | | | Reversing | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Standard auxiliary contacts | | Catalog number ③ | Standard auxiliary contacts | | Catalog number ③ |
| 600V | | 200…208V | 220…240V | 440…480V | 550…600V | NO | NC | | NO | NC | |
| 21 | 9 | 2 | 2 | 5 | 7.5 | 2 | 2 | ▼ AE9M-30-11-Δ | 2 | 2 | ▼ AE9R-30-11-Δ |
| 25 | 11 | 3 | 3 | 7.5 | 10 | 2 | 2 | ▼ AE12M-30-11-Δ | 2 | 2 | ▼ AE12R-30-11-Δ |
| 30 | 17 | 5 | 5 | 10 | 15 | 2 | 2 | ▼ AE16M-30-11-Δ | 2 | 2 | ▼ AE16R-30-11-Δ |
| 40 | 28 | 7.5 | 10 | 20 | 25 | 2 | 2 | ▼ AE26M-30-11-Δ | 2 | 2 | ▼ AE26R-30-11-Δ |
| 50 | 34 | 10 | 10 | 25 | 30 | 2 | 2 | AE30M-30-11-Δ | 2 | 2 | AE30R-30-11-Δ |
| 60 | 42 | 10 | 15 | 30 | 40 | 2 | 2 | AE40M-30-11-Δ | 2 | 2 | AE40R-30-11-Δ |
| 80 | 54 | 15 | 20 | 40 | 50 | 2 | 2 | AE50M-30-11-Δ | 2 | 2 | AE50R-30-11-Δ |
| 90 | 68 | 20 | 25 | 50 | 60 | 2 | 2 | AE63M-30-11-Δ | 2 | 2 | AE63R-30-11-Δ |
| 105 | 80 | 25 | 30 | 60 | 75 | 2 | 2 | AE75M-30-11-Δ | 2 | 2 | AE75R-30-11-Δ |

▼ Planned legacy product; recommend AF series contactors.

### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ④ | AE9…AE75 |
|---|---|
| 12V DC | 80 |
| 24V DC | 81 |
| 48V DC | 83 |
| 125V DC | 87 |
| 220V DC | 88 |
| 240V DC | 89 |

Example: 125V DC input voltage: AE75R-30-11-87

### Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data
② For ratings according to IEC/EN 60947-4-1, refer to AE non-reversing selection table or Technical Data.
③ AE9R(M)…AE16R(M) mounted on 35mm DIN rail, AE26R(M)…AE75R(M) mounted on common baseplate.
④ For additional coil voltages, see page 1.35.

# AL non-reversing, 3-pole

## For applications up to 40 hp, 18.5 kW
## Low power consumption, DC operated coils

AL9-30-10-81

AL26-30-10-81

AL40-30-10-81

### Electrical ratings ①

### Non-reversing & reversing

| IEC/EN 60947-4-1 | | | | | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | | | | | | Standard auxiliary contacts ② | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current Ie AC-1, AC-3 (A) | | Rated operational power Pe, AC-3, 55°C (kW) | | | AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | | | |
| AC-1, 40°C | AC-3, 55°C | 220… 240V | 380… 400V | 690V | 600V | | 200... 208V | 220… 240V | 440… 480V | 550… 600V | NO | NC | |
| 25 | 9 | 2.2 | 4 | 5.5 | 21 | 9 | 2 | 2 | 5 | 7.5 | 1 | - | ▼AL9-30-10-Δ |
| | | | | | | | | | | | - | 1 | ▼AL9-30-01-Δ |
| 27 | 12 | 3 | 5.5 | 7.5 | 25 | 11 | 3 | 3 | 7.5 | 10 | 1 | - | ▼AL12-30-10-Δ |
| | | | | | | | | | | | - | 1 | ▼AL12-30-01-Δ |
| 30 | 17 | 4 | 7.5 | 9 | 30 | 17 | 5 | 5 | 10 | 15 | 1 | - | ▼AL16-30-10-Δ |
| | | | | | | | | | | | - | 1 | ▼AL16-30-01-Δ |
| 45 | 26 | 6.5 | 11 | 11 | 40 | 28 | 7.5 | 10 | 20 | 25 | 1 | - | ▼AL26-30-10-Δ |
| | | | | | | | | | | | - | 1 | ▼AL26-30-01-Δ |
| 55 | 32 | 9 | 15 | 15 | 50 | 34 | 10 | 10 | 25 | 30 | 1 | - | AL30-30-10-Δ |
| | | | | | | | | | | | - | 1 | AL30-30-01-Δ |
| 60 | 37 | 11 | 18.5 | 18.5 | 60 | 42 | 10 | 15 | 30 | 40 | 1 | - | AL40-30-10-Δ |
| | | | | | | | | | | | - | 1 | AL40-30-01-Δ |

▼ Planned legacy product; recommend AF series contactors.

### Coil voltage selection chart (Δ)

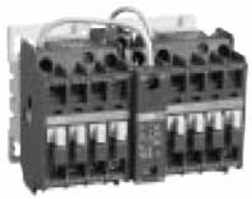
| Rated control circuit voltage Uc ③ | AL9… AL40 |
|---|---|
| 12V DC | 80 |
| 24V DC | 81 |
| 48V DC | 83 |
| 125V DC | 87 |
| 220V DC | 88 |
| 240V DC | 89 |

Example(s):
24V DC input voltage: AL30-30-10-81
125V DC input voltage: AL40-30-10-87

① For selection purposes, for complete electrical ratings, see Technical Data
② Auxiliary contacts integral for AL9... AL40.
③ For additional coil voltages, see page 1.35.

# AL mechanically interlocked, reversing, 3-pole

## For applications up to 40 hp, 18.5 kW
## Low power consumption, DC operated coils



AL9M...AL16M

AL9R...AL16R

### Electrical ratings ①②

UL 508, 60947-4-1A
CSA C22.2 No.14, 60947-4-1-07

| AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | Mechanically interlocked | | | Reversing | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Standard auxiliary contacts | | Catalog number | Standard auxiliary contacts | | Catalog number |
| 600V | | 200... 208V | 220... 240V | 440... 480V | 550... 600V | NO | NC | | NO | NC | |
| 21 | 9 | 2 | 2 | 5 | 7.5 | 2 | 2 | ▼AL9M-30-10-Δ | 2 | 2 | ▼AL9R-30-10-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 25 | 11 | 3 | 3 | 7.5 | 10 | 2 | 2 | ▼AL12M-30-10-Δ | 2 | 2 | ▼AL12R-30-10-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 30 | 17 | 5 | 5 | 10 | 15 | 2 | 2 | ▼AL16M-30-10-Δ | 2 | 2 | ▼AL16R-30-10-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 40 | 28 | 7.5 | 10 | 20 | 25 | 2 | 2 | ▼AL26M-30-10-Δ | 2 | 2 | ▼AL26R-30-10-Δ |
| - | - | - | - | - | - | - | - | - | - | - | - |
| 50 | 34 | 10 | 10 | 25 | 30 | 2 | 2 | AL30M-30-10-Δ | 2 | 2 | AL30R-30-10-Δ |
| - | | - | - | - | - | - | - | - | - | - | - |
| 60 | 42 | 10 | 15 | 30 | 40 | 2 | 2 | AL40M-30-10-Δ | 2 | 2 | AL40R-30-10-Δ |
| - | | - | - | - | - | - | - | - | - | - | - |

▼ Planned legacy product; recommend AF series contactors.

### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ④ | AL9… AL40 |
|---|---|
| 12V DC | 80 |
| 24V DC | 81 |
| 48V DC | 83 |
| 125V DC | 87 |
| 220V DC | 88 |
| 240V DC | 89 |

Example(s):
24V DC input voltage: AL30M-30-10-81
125V DC input voltage: AL40R-30-10-87

### Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data
② For ratings according to IEC/EN 60947-4-1, refer to AL non-reversing selection table or Technical Data.
③ AL9R(M)…AL16R(M) mounted on 35mm DIN rail, AL26R(M)…AL40R(M) mounted on common baseplate.
④ For additional coil voltages, see page 1.35.

# AS / ASL non-reversing, reversing 3-pole

## For applications up to 10 hp, 7.5 kW
## AC or DC operated coils, bulk packaged for high volume

AS(L)09...AS(L)16 single stack

AS(L)09...AS(L)16 double stack

VAS(L)09...VAS(L)

## Electrical ratings ①

## Non-reversing and reversing

| IEC/EN 60947-4-1 | | | | | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | | | | | | Standard auxiliary contacts ② | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current Ie AC-1, AC-3 (A) | | Rated operational power Pe, AC-3, 60°C (kW) | | | AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | | | |
| AC-1, 40°C | AC-3, 60°C | 220… 240V | 380… 400V | 690V | 600V | | 200... 208V | 220… 240V | 440… 480V | 550… 600V | NO | NC | |
| **Type AS, AC controlled, non-reversing** | | | | | | | | | | | | | |
| 22 | 9 | 2.2 | 4 | 4 | 20 | 9 | 2 | 2 | 5 | 7.5 | 1 | - | AS09-30-10-ΔM |
| | | | | | | | | | | | - | 1 | AS09-30-01-ΔM |
| | | | | | | | | | | | 3 | 2 | AS09-30-32-ΔM |
| 24 | 12 | 3 | 5.5 | 5.5 | 20 | 11 | 2 | 3 | 7.5 | 10 | 1 | - | AS12-30-10-ΔM |
| | | | | | | | | | | | - | 1 | AS12-30-01-ΔM |
| | | | | | | | | | | | 3 | 2 | AS12-30-32-ΔM |
| 24 | 15.5 | 4 | 7.5 | 7.5 | 20 | 15.2 | 3 | 5 | 10 | 10 | 1 | - | AS16-30-10-ΔM |
| | | | | | | | | | | | - | 1 | AS16-30-01-ΔM |
| | | | | | | | | | | | 3 | 2 | AS16-30-32-ΔM |
| **Type ASL, DC controlled, non-reversing** | | | | | | | | | | | | | |
| 22 | 9 | 2.2 | 4 | 4 | 20 | 9 | 2 | 2 | 5 | 7.5 | 1 | - | ASL09-30-10-ΔM |
| | | | | | | | | | | | - | 1 | ASL09-30-01-ΔM |
| | | | | | | | | | | | 3 | 2 | ASL09-30-32-ΔM |
| 24 | 12 | 3 | 5.5 | 5.5 | 20 | 11 | 2 | 3 | 7.5 | 10 | 1 | - | ASL12-30-10-ΔM |
| | | | | | | | | | | | - | 1 | ASL12-30-01-ΔM |
| | | | | | | | | | | | 3 | 2 | ASL12-30-32-ΔM |
| 24 | 15.5 | 4 | 7.5 | 7.5 | 20 | 15.2 | 3 | 5 | 10 | 10 | 1 | - | ASL16-30-10-ΔM |
| | | | | | | | | | | | - | 1 | ASL16-30-01-ΔM |
| | | | | | | | | | | | 3 | 2 | ASL16-30-32-ΔM |
| **Type AS, AC controlled, reversing** | | | | | | | | | | | | | |
| 22 | 9 | 2.2 | 4 | 4 | 20 | 9 | 2 | 2 | 5 | 7.5 | - | 2 | VAS09EM-ΔM |
| 24 | 12 | 3 | 5.5 | 5.5 | 20 | 11 | 2 | 3 | 7.5 | 10 | - | 2 | VAS12EM-ΔM |
| 24 | 15.5 | 4 | 7.5 | 7.5 | 20 | 15.2 | 3 | 5 | 10 | 10 | - | 2 | VAS16EM-ΔM |
| **Type ASL, DC controlled, reversing** | | | | | | | | | | | | | |
| 22 | 9 | 2.2 | 4 | 4 | 20 | 9 | 2 | 2 | 5 | 7.5 | - | 2 | VASL09EM-ΔM |
| 24 | 12 | 3 | 5.5 | 5.5 | 20 | 11 | 2 | 3 | 7.5 | 10 | - | 2 | VASL12EM-ΔM |
| 24 | 15.5 | 4 | 7.5 | 7.5 | 20 | 15.2 | 3 | 5 | 10 | 10 | - | 2 | VASL16EM-ΔM |

## Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ③ | AS09… AS16 | ASL09… ASL16 | VAS09… VAS16 | VASL09… VASL16 |
|---|---|---|---|---|
| 12V DC | - | 80 | - | - |
| 24V AC | 20 | - | 20 | - |
| 24V DC | - | 81 | - | 81 |
| 48V DC | - | 83 | - | 83 |
| 115V AC | 24 | - | 24 | - |
| 120V AC, 60 Hz | 16 | - | 16 | - |
| 125V DC | - | 87 | - | 87 |
| 220V DC | - | 88 | - | 88 |
| 230V AC | 26 | - | 26 | - |
| 400V AC | 28 | - | 28 | - |

Example(s):

24V DC input voltage: ASL09-30-10-81M; 115V AC input voltage: AS16-30-01-24M

## Standard bulk pack quantities (M)

| Contactors | Quantity |
|---|---|
| AS(L)09…16-30-10 | 40 |
| AS(L)09…16-30-01 | 40 |
| AS(L)09…16-30-32 | 20 |
| VAS09…VAS16 | 18 |

① For selection purposes, for complete electrical ratings, see Technical Data
② 3/2 auxiliary configurations include 1 NO integral contact with permanently attached 2/2 front-mount accessory.
③ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

# AS / ASL non-reversing, spring-terminated, 3 pole

## For applications up to 10 hp, 7.5 kW
## AC or DC operated coils, bulk packaged for high volume

AS(L)09...AS(L)16 spring terminated, single stack

AS(L)09...AS(L)16 spring terminated, double stack

## Electrical ratings ①

## Non-reversing

| IEC/EN 60947-4-1 | | | | | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | | | | | | Standard auxiliary contacts ② | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current Ie AC-1, AC-3 (A) | | Rated operational power Pe, AC-3, 60°C (kW) | | | AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | | | |
| AC-1, 40°C | AC-3, 60°C | 220… 240V | 380… 400V | 690V | 600V | | 200... 208V | 220… 240V | 440… 480V | 550… 600V | NO | NC | |
| **Type AS, AC controlled, spring-terminated, non-reversing** | | | | | | | | | | | | | |
| 20 | 9 | 2.2 | 4 | 4 | 12 | 9 | 2 | 2 | 5 | 7.5 | 1 | - | AS09-30-10S-ΔM |
| | | | | | | | | | | | - | 1 | AS09-30-01S-ΔM |
| | | | | | | | | | | | 3 | 2 | AS09-30-32S-ΔM |
| 22 | 12 | 3 | 5.5 | 5.5 | 12 | 11 | 2 | 3 | 7.5 | 10 | 1 | - | AS12-30-10S-ΔM |
| | | | | | | | | | | | - | 1 | AS12-30-01S-ΔM |
| | | | | | | | | | | | 3 | 2 | AS12-30-32S-ΔM |
| 22 | 15.5 | 4 | 7.5 | 7.5 | 15.2 | 15.2 | 3 | 5 | 10 | 10 | 1 | - | AS16-30-10S-ΔM |
| | | | | | | | | | | | - | 1 | AS16-30-01S-ΔM |
| | | | | | | | | | | | 3 | 2 | AS16-30-32S-ΔM |
| **Type ASL, DC controlled, spring-terminated, non-reversing** | | | | | | | | | | | | | |
| 20 | 9 | 2.2 | 4 | 4 | 12 | 9 | 2 | 2 | 5 | 7.5 | 1 | - | ASL09-30-10S-ΔM |
| | | | | | | | | | | | - | 1 | ASL09-30-01S-ΔM |
| | | | | | | | | | | | 3 | 2 | ASL09-30-32S-ΔM |
| 22 | 12 | 3 | 5.5 | 5.5 | 12 | 11 | 2 | 3 | 7.5 | 10 | 1 | - | ASL12-30-10S-ΔM |
| | | | | | | | | | | | - | 1 | ASL12-30-01S-ΔM |
| | | | | | | | | | | | 3 | 2 | ASL12-30-32S-ΔM |
| 22 | 15.5 | 4 | 7.5 | 7.5 | 15.2 | 15.2 | 3 | 5 | 10 | 10 | 1 | - | ASL16-30-10S-ΔM |
| | | | | | | | | | | | - | 1 | ASL16-30-01S-ΔM |
| | | | | | | | | | | | 3 | 2 | ASL16-30-32S-ΔM |

## Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ③ | AS09… AS16 | ASL09… ASL16 |
|---|---|---|
| 12V DC | - | 80 |
| 24V AC | 20 | - |
| 24V DC | - | 81 |
| 48V DC | - | 83 |
| 115V AC | 24 | - |
| 120V AC, 60 Hz | 16 | - |
| 125V DC | - | 87 |
| 220V DC | - | 88 |
| 230V AC | 26 | - |
| 400V AC | 28 | - |

Example(s):
24V DC input voltage: ASL09-30-10S-81M
115V AC input voltage: AS16-30-01S-24M

## Standard bulk pack quantities (M)

| Contactors | Quantity |
|---|---|
| AS(L)09…16-30-10 | 40 |
| AS(L)09…16-30-01 | 40 |
| AS(L)09…16-30-32 | 20 |
| VAS09…VAS16 | 18 |

① For selection purposes, for complete electrical ratings, see Technical Data
② 3/2 auxiliary configurations include 1 NO integral contact with permanently attached 2/2 front-mount accessory.
③ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

# B miniature non-reversing, mechanically interlocked, 3-pole

## For applications up to 5 hp, 5.5 kW
## AC operated coils, screw, quick-connect & PCB mount termination

B6...B7

B6(-F)...B7(-F)

B6(-P)...B7(-P)

VB6...VB7

### Electrical ratings ①

### Non-reversing & mechanically interlocked

| IEC/EN 60947-4-1 | | | | | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | | | | | | Standard auxiliary contacts | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current Ie AC-1, AC-3 (A) | | Rated operational power Pe, AC-3, 55°C (kW) | | | AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | | | |
| AC-1, 40°C | AC-3, 55°C | 220…240V | 380…400V | 690V | 600V | | 200…208V | 220…240V | 440…480V | 550…600V | NO | NC | |
| **Type B, screw terminated, non-reversing** | | | | | | | | | | | | | |
| 20 | 8 | 2.2 | 4 | 3 | 12 ② | 6.8 | 1 | 2 | 3 | 1 | 1 | - | B6-30-10-Δ |
| | | | | | | | | | | | - | 1 | B6-30-01-Δ |
| 20 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 1 | - | B7-30-10-Δ |
| | | | | | | | | | | | - | 1 | B7-30-01-Δ |
| **Type B, quick-connect (flat pin), non-reversing** | | | | | | | | | | | | | |
| 16 | 8 | 2.2 | 4 | 3 | 12 ② | 6.8 | 1 | 2 | 3 | 1 | 1 | - | B6-30-10-FΔ |
| | | | | | | | | | | | - | 1 | B6-30-01-FΔ |
| 16 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 1 | - | B7-30-10-FΔ |
| | | | | | | | | | | | - | 1 | B7-30-01-FΔ |
| **Type B, printed circuit board mount (solder pin), non-reversing** | | | | | | | | | | | | | |
| 12 | 8 | 2.2 | 4 | 3 | 8 ② | 6.8 | 1 | 2 | 3 | 1 | 1 | - | B6-30-10-PΔ |
| | | | | | | | | | | | - | 1 | B6-30-01-PΔ |
| 12 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 1 | - | B7-30-10-PΔ |
| | | | | | | | | | | | - | 1 | B7-30-01-PΔ |
| **Type B, screw terminated, mechanically interlocked** | | | | | | | | | | | | | |
| 20 | 8 | 2.2 | 4 | 3 | 12 ② | 6.8 | 1 | 2 | 3 | 1 | 2 | - | VB6-30-10-Δ |
| | | | | | | | | | | | - | 2 | VB6-30-01-Δ |
| 20 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 2 | - | VB7-30-10-Δ |
| | | | | | | | | | | | - | 2 | VB7-30-01-Δ |
| **Type B, quick-connect (flat pin), mechanically interlocked** | | | | | | | | | | | | | |
| 16 | 8 | 2.2 | 4 | 3 | 12 ② | 6.8 | 1 | 2 | 3 | 1 | 2 | - | VB6-30-10-FΔ |
| | | | | | | | | | | | - | 2 | VB6-30-01-FΔ |
| 16 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 2 | - | VB7-30-10-FΔ |
| | | | | | | | | | | | - | 2 | VB7-30-01-FΔ |
| **Type B, printed circuit board mount (solder pin), mechanically interlocked** | | | | | | | | | | | | | |
| 12 | 8 | 2.2 | 4 | 3 | 8 ② | 6.8 | 1 | 2 | 3 | 1 | 2 | - | VB6-30-10-PΔ |
| | | | | | | | | | | | - | 2 | VB6-30-01-PΔ |
| 12 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 2 | - | VB7-30-10-PΔ |
| | | | | | | | | | | | - | 2 | VB7-30-01-PΔ |

NOTE: Quick-connect and PCB mount versions are UL recognized only.

### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ③ | (V)B6…(V)B7 |
|---|---|
| 24V AC | 01 |
| 48V AC | 03 |
| 110…127V AC | 84 |
| 220…240V AC | 80 |
| 380…415V AC | 85 |

Example(s):

24V AC input voltage: B6-30-10-01

120V AC input voltage: VB7-30-10-84

① For selection purposes, for complete electrical ratings, see Technical Data
② 300V AC max.
③ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

# BC miniature non-reversing, mech. interlocked, 3 pole

## For applications up to 5 hp, 5.5 kW

## DC operated coils, screw, quick-connect & PCB mount termination

BC6...BC7

BC6(-F)...BC7(-F)

BC6(-P)...BC7(-P)

VBC6(-P)...VBC7(-P)

### Electrical ratings ①

### Non-reversing & mechanically interlocked

| IEC/EN 60947-4-1 | | | | | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | | | | | | Standard auxiliary contacts | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current Ie AC-1, AC-3 (A) | | Rated operational power Pe, AC-3, 55°C (kW) | | | AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | | | |
| AC-1, 40°C | AC-3, 55°C | 220… 240V | 380… 400V | 690V | 600V | | 200… 208V | 220… 240V | 440… 480V | 550… 600V | NO | NC | |
| **Type BC, screw terminated, non-reversing** | | | | | | | | | | | | | |
| 20 | 8 | 2.2 | 4 | 3 | 12 ② | 6.8 | 1 | 2 | 3 | 1 | 1 | - | BC6-30-10-Δ |
| | | | | | | | | | | | - | 1 | BC6-30-01-Δ |
| 20 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 1 | - | BC7-30-10-Δ |
| | | | | | | | | | | | - | 1 | BC7-30-01-Δ |
| **Type BC, quick-connect (flat pin), non-reversing** | | | | | | | | | | | | | |
| 16 | 8 | 2.2 | 4 | 3 | 12 ② | 6.8 | 1 | 2 | 3 | 1 | 1 | - | BC6-30-10-FΔ |
| | | | | | | | | | | | - | 1 | BC6-30-01-FΔ |
| 16 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 1 | - | BC7-30-10-FΔ |
| | | | | | | | | | | | - | 1 | BC7-30-01-FΔ |
| **Type BC, printed circuit board mount (solder pin), non-reversing** | | | | | | | | | | | | | |
| 12 | 8 | 2.2 | 4 | 3 | 8 ② | 6.8 | 1 | 2 | 3 | 1 | 1 | - | BC6-30-10-PΔ |
| | | | | | | | | | | | - | 1 | B6C-30-01-PΔ |
| 12 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 1 | - | BC7-30-10-PΔ |
| | | | | | | | | | | | - | 1 | BC7-30-01-PΔ |
| **Type BC, screw terminated, mechanically interlocked** | | | | | | | | | | | | | |
| 20 | 8 | 2.2 | 4 | 3 | 12 ② | 6.8 | 1 | 2 | 3 | 1 | 2 | - | VBC6-30-10-Δ |
| | | | | | | | | | | | - | 2 | VBC6-30-01-Δ |
| 20 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 2 | - | VBC7-30-10-Δ |
| | | | | | | | | | | | - | 2 | VBC7-30-01-Δ |
| **Type BC, quick-connect (flat pin), mechanically interlocked** | | | | | | | | | | | | | |
| 16 | 8 | 2.2 | 4 | 3 | 12 ② | 6.8 | 1 | 2 | 3 | 1 | 2 | - | VBC6-30-10-FΔ |
| | | | | | | | | | | | - | 2 | VBC6-30-01-FΔ |
| 16 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 2 | - | VBC7-30-10-FΔ |
| | | | | | | | | | | | - | 2 | VBC7-30-01-FΔ |
| **Type BC, printed circuit board mount (solder pin), mechanically interlocked** | | | | | | | | | | | | | |
| 12 | 8 | 2.2 | 4 | 3 | 8 ② | 6.8 | 1 | 2 | 3 | 1 | 2 | - | VBC6-30-10-PΔ |
| | | | | | | | | | | | - | 2 | VBC6-30-01-PΔ |
| 12 | 12 | 3 | 5.5 | 3 | 16 | 9.6 | 2 | 3 | 5 | 5 | 2 | - | VBC7-30-10-PΔ |
| | | | | | | | | | | | - | 2 | VBC7-30-01-PΔ |

NOTE: Quick-connect and PCB mount versions are UL recognized only.

### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ③ | (V)BC6…(V)BC7 |
|---|---|
| 12V DC | 07 |
| 24V DC | 01 |
| 48V DC | 16 |
| 110…125V DC | 04 |
| 220…240V DC | 05 |

Example(s):

24V DC input voltage: BC6-30-10-01

125V DC input voltage: VBC7-30-10-04

① For selection purposes, for complete electrical ratings, see Technical Data
② 300V AC max.
③ For addtional coil voltages, see page 1.35.

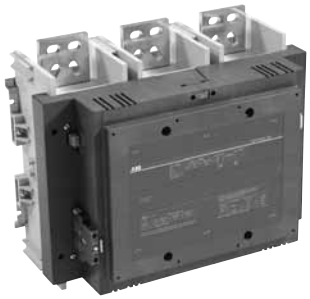
# AF / AFZ NEMA rated, non-reversing, 3-pole

## Class A controllers Sizes 00…8
## Electronic AC/DC operated coils

AF26N1(Z)

AF50N2...AF75N3

AF260N5



AF1650N

### Electrical ratings ①

### Non-reversing

| NEMA size | Continous current rating (A) | NEMA ICS 2-2000 (R2005) AC motor ratings, breaking all lines (hp) | | | | | | | Standard auxiliary contacts ② | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Single phase, 50/60 Hz | | Three phase, 60 Hz | | | | | | | |
| | | 120V | 230V | 200V | 230V | 380…415V ③ | 460V | 575V | NO | NC | |
| **Type AF** | | | | | | | | | | | |
| 00 | 9 | 1/3 | 1 | 1.5 | 1.5 | 1.5 | 2 | 2 | 1 | - | AF09N00-30-10-Δ |
| | | | | | | | | | - | 1 | AF09N00-30-10-Δ |
| 0 | 18 | 1 | 2 | 3 | 3 | 5 | 5 | 5 | 1 | - | AF12N0-30-10-Δ |
| | | | | | | | | | - | 1 | AF12N0-30-10-Δ |
| 1 | 27 | 2 | 3 | 7.5 | 7.5 | 10 | 10 | 10 | - | - | AF26N1-30-00-Δ |
| 2 | 45 | 3 | 7.5 | 10 | 15 | 25 | 25 | 25 | 1 | 1 | AF50N2-30-11-Δ |
| 3 | 90 | - | - | 25 | 30 | 50 | 50 | 50 | 1 | 1 | AF75N3-30-11-Δ |
| 4 | 135 | - | - | 40 | 50 | 75 | 100 | 100 | 1 | 1 | AF145N4-3011-Δ |
| 5 | 270 | - | - | 75 | 100 | 150 | 200 | 200 | 1 | 1 | AF260N5-3011-Δ |
| 6 | 540 | - | - | 150 | 200 | 300 | 400 | 400 | 1 | 1 | AF460N6-3011-Δ |
| 7 | 810 | - | - | - | 300 | - | 600 | 600 | 1 | 1 | AF750N7-3011-Δ |
| 8 | 1215 | - | - | - | 450 | - | 900 | 900 | 1 | 1 | AF1650N83011-Δ |
| **Type AFZ, low-consumption coils** | | | | | | | | | | | |
| 00 | 9 | 1/3 | 1 | 1.5 | 1.5 | 1.5 | 2 | 2 | 1 | - | AF09N00Z-30-10-Δ |
| | | | | | | | | | - | 1 | AF09N00Z-30-01-Δ |
| 0 | 18 | 1 | 2 | 3 | 3 | 5 | 5 | 5 | 1 | - | AF12N0Z-30-10-Δ |
| | | | | | | | | | - | 1 | AF12N0Z-30-01-Δ |
| 1 | 27 | 2 | 3 | 7.5 | 7.5 | 10 | 10 | 10 | - | - | AF26N1Z-30-00-Δ |

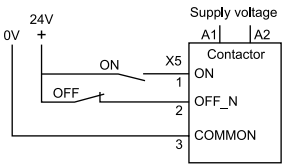
### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ③ | AF09N00… AF26N1 | AF09N00Z… AF26N1Z | AF50N2… AF260N5 | AF460N6… AF750N7 | AF1650N8 |
|---|---|---|---|---|---|
| 12…20V DC | - | 20 | - | - | - |
| 20...60V DC | 11 | 21 | 72 | - | - |
| 24...60V AC | 11 | 21 | - | - | - |
| 24...60V DC | - | - | - | 68 | - |
| 48...130V AC/DC | 12 | 22 | 69 | 69 | - |
| 100...250 V AC/DC | 13 | 23 | 70 | 70 | 70 |
| 250...500 V AC/DC | 14 | - | - | 71 | - |

Example(s):
24V DC input voltage: AF26N1-30-00-11
120V AC input voltage: AF750N7-3011-70

### Control inputs

AF460N6...AF1650N8 are equipped with integral low voltage inputs, allowing for direct PLC control.




① For selection purposes, for complete electrical ratings, see Technical Data.
② Auxiliary contacts integral for AF09N00...AF16N0; side-mount for AF50N2...AF1650N8
③ 50 Hz.
④ AC coil input voltage(s) at 50/60 Hz unless specified.

# AF / AFZ NEMA rated, mech. interlocked, reversing, 3P

## Class A controllers Sizes 00…7
## Electronic AC/DC operated coils

AF09N00R…AF16N0R

| Electrical ratings ①② NEMA ICS 2-2000 (R2005) | | | | | Mechanically interlocked | | | Reversing | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NEMA size | Continous current rating (A) | AC motor ratings, breaking all lines, Three phase, 60 Hz (hp) | | | Standard auxiliary contacts | | Catalog number ② | Standard auxiliary contacts | | Catalog number ② |
| | | 200V | 230V | 460…575V | NO | NC | | NO | NC | |
| **Type AF** | | | | | | | | | | |
| 00 | 9 | 1.5 | 1.5 | 2 | 2 | 2 | AF09N00M-3022-Δ | 2 | 2 | AF09N00R-3022-Δ |
| | | | | | - | - | - | - | - | - |
| 0 | 18 | 3 | 3 | 5 | 2 | 2 | AF12N0M-3022-Δ | 2 | 2 | AF12N0R-3022-Δ |
| | | | | | - | - | - | - | - | - |
| 1 | 27 | 7.5 | 7.5 | 10 | - | 2 | AF26N1M-3002-Δ | - | 2 | AF26N1R-3002-Δ |
| 2 | 45 | 10 | 15 | 25 | 2 | 2 | AF50N2M-3011-Δ | 2 | 2 | AF50N2R-3011-Δ |
| 3 | 90 | 25 | 30 | 50 | 2 | 2 | AF75N3M-3011-Δ | 2 | 2 | AF75N3R-3011-Δ |
| 4 | 135 | 40 | 50 | 100 | 2 | 2 | AF145N4M-11-Δ | 2 | 2 | AF145N4R-11-Δ |
| 5 | 270 | 75 | 100 | 200 | 2 | 2 | AF260N5M-11-Δ | 2 | 2 | AF260N5R-11-Δ |
| 6 | 540 | 150 | 200 | 400 | 2 | 2 | AF460N6M-11-Δ | 2 | 2 | AF460N6R-11-Δ |
| 7 | 810 | - | 300 | 600 | 2 | 2 | AF750N7M-11-Δ | 2 | 2 | AF750N7R-11-Δ |
| **Type AFZ, low-consumption coils** | | | | | | | | | | |
| 00 | 9 | 1.5 | 1.5 | 2 | 2 | 2 | AF09N00MZ-3022-Δ | 2 | 2 | AF09N00RZ-3022-Δ |
| | | | | | - | - | - | - | - | - |
| 0 | 18 | 3 | 3 | 5 | 2 | 2 | AF12N0MZ-3022-Δ | 2 | 2 | AF12N0RZ-3022-Δ |
| | | | | | - | - | - | - | - | - |
| 1 | 27 | 7.5 | 7.5 | 10 | - | 2 | AF26N1MZ-3002-Δ | - | 2 | AF26N1RZ-3002-Δ |

### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc 3 | AF09N00… AF26N1 | AF09N00Z… AF26N1Z | AF50N2… AF260N5 | AF460N6… AF750N7 |
|---|---|---|---|---|
| 12…20V DC | - | 20 | - | - |
| 20...60V DC | 11 | 21 | 72 | - |
| 24...60V AC | 11 | 21 | - | - |
| 24...60V DC | - | - | - | 68 |
| 48...130V AC/DC | 12 | 22 | 69 | 69 |
| 100...250 V AC/DC | 13 | 23 | 70 | 70 |
| 250...500 V AC/DC | 14 | - | - | 71 |

Example(s):

24V DC input voltage: AF26N1R-3002-11
120V AC input voltage: AF750N7R-11-70

### Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data.
② For ratings according to IEC/EN 60947-4-1, refer to AF NEMA rated, non-reversing selection table or Technical Data.
③ AF09N00R(M)…AF26N1R(M) assembled using connection clips, AF50N2R(M)…AF750N7R(M) mounted on common baseplate.
④ AC coil input voltage(s) at 50/60 Hz unless specified.

# A, AL, AE NEMA rated, non-reversing, 3-pole

## Class A controllers Sizes 00…5
## AC or DC operated coils

A26N1

A145N4

### Electrical ratings ①

### Non-reversing

| NEMA size | Continous current rating (A) | NEMA ICS 2-2000 (R2005) AC motor ratings, breaking all lines (hp) | | | | | | | Standard auxiliary contacts ② | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Single phase, 50/60 Hz | | Three phase, 60 Hz | | | | | | | |
| | | 120V | 230V | 200V | 230V | 380…415V ③ | 460V | 575V | NO | NC | |
| **Type A, AC operated coils** | | | | | | | | | | | |
| 00 | 9 | 1/3 | 1 | 1.5 | 1.5 | 1.5 | 2 | 2 | 1 | - | ▼ A9N00-30-10-Δ |
| 0 | 18 | 1 | 2 | 3 | 3 | 5 | 5 | 5 | 1 | - | ▼ A16N0-30-10-Δ |
| 1 | 27 | 2 | 3 | 7.5 | 7.5 | 10 | 10 | 10 | 1 | - | ▼ A26N1-30-10-Δ |
| 2 | 45 | 3 | 7.5 | 10 | 15 | 25 | 25 | 25 | 1 | 1 | A50N2-30-11-Δ |
| 3 | 90 | - | - | 25 | 30 | 50 | 50 | 50 | 1 | 1 | A75N3-30-11-Δ |
| 4 | 135 | - | - | 40 | 50 | 75 | 100 | 100 | 1 | 1 | A145N4-30-11-Δ |
| 5 | 270 | - | - | 75 | 100 | 150 | 200 | 200 | 1 | 1 | A260N5-30-11-Δ |
| **Type AL, DC operated coils** | | | | | | | | | | | |
| 00 | 9 | 1/3 | 1 | 1.5 | 1.5 | 1.5 | 2 | 2 | 1 | - | ▼ AL9N00-30-10-Δ |
| 0 | 18 | 1 | 2 | 3 | 3 | 5 | 5 | 5 | 1 | - | ▼ AL16N0-30-10-Δ |
| 1 | 27 | 2 | 3 | 7.5 | 7.5 | 10 | 10 | 10 | 1 | - | ▼ AL26N1-30-10-Δ |
| **Type AE, double-wound DC operated coils** | | | | | | | | | | | |
| 00 | 9 | 1/3 | 1 | 1.5 | 1.5 | 1.5 | 2 | 2 | 1 | - | ▼ AE9N00-30-11-Δ |
| 0 | 18 | 1 | 2 | 3 | 3 | 5 | 5 | 5 | 1 | - | ▼ AE16N0-30-11-Δ |
| 1 | 27 | 2 | 3 | 7.5 | 7.5 | 10 | 10 | 10 | 1 | - | ▼ AE26N1-30-11-Δ |
| 2 | 45 | 3 | 7.5 | 10 | 15 | 25 | 25 | 25 | 1 | 1 | AE50N2-30-11-Δ |
| 3 | 90 | - | - | 25 | 30 | 50 | 50 | 50 | 1 | 1 | AE75N3-30-11-Δ |

▼ Planned legacy product; recommend AF series contactors.

### Coil voltage selection chart (Δ)

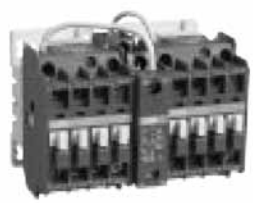
| Rated control circuit voltage Uc ④ | A9N00…A260N5 | AL9N00…AL26N1 | AE9N00…AE75N3 |
|---|---|---|---|
| 12V DC | - | 80 | 80 |
| 24V AC | 81 | - | - |
| 24V DC | - | 81 | 81 |
| 110…120V AC, 60Hz | 84 | - | - |
| 125V DC | - | 87 | 87 |
| 220V DC | - | 88 | 88 |
| 230..240V AC, 60 Hz | 80 | - | - |
| 240V DC | - | 89 | 89 |
| 480V AC, 60 Hz | 51 | - | - |
| 600V AC, 60 Hz | 55 | - | - |

Example(s):
24V DC input voltage: AL26N1-30-10-81
120V AC input voltage: A260N5-3011-84

① For selection purposes, for complete electrical ratings, see Technical Data.
② Auxiliary contacts integral for A9N00...A26N1 & AL9N00...AL26N1; side-mount for A50N2...A260N5 & AE9N00...AE75N3.
③ 50 Hz.
④ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

# A, AL, AE NEMA rated, mech. interlocked, reversing

## Class A controllers Sizes 00…5; AC or DC operated coils



A9N00M...A16N0

A/E50N2...A/E75N3

| Electrical ratings ①② NEMA ICS 2-2000 (R2005) | | | | | Mechanically interlocked | | | Reversing | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NEMA size | Continous current rating (A) | AC motor ratings, breaking all lines, Three phase, 60 Hz (hp) | | | Standard auxiliary contacts | | Catalog number ② | Standard auxiliary contacts | | Catalog number ② |
| | | 200V | 230V | 460…575V | NO | NC | | NO | NC | |
| **Type A, AC operated coils** | | | | | | | | | | |
| 00 | 9 | 1.5 | 1.5 | 2 | 2 | 2 | ▼ A9N00M-10-Δ | 2 | 2 | ▼ A9N00R-10-Δ |
| 0 | 18 | 3 | 3 | 5 | 2 | 2 | ▼ A16N0M-10-Δ | 2 | 2 | ▼ A16N0R-10-Δ |
| 1 | 27 | 7.5 | 7.5 | 10 | 2 | 2 | ▼ A26N1M-10-Δ | 2 | 2 | ▼ A26N1R-10-Δ |
| 2 | 45 | 10 | 15 | 25 | 2 | 2 | A50N2M-11-Δ | 2 | 2 | A50N2R-11-Δ |
| 3 | 90 | 25 | 30 | 50 | 2 | 2 | A75N3M-11-Δ | 2 | 2 | A75N3R-11-Δ |
| 4 | 135 | 40 | 50 | 100 | 2 | 2 | A145N4M-11-Δ | 2 | 2 | A145N4R-11-Δ |
| 5 | 270 | 75 | 100 | 200 | 2 | 2 | A260N5M-11-Δ | 2 | 2 | A260N5R-11-Δ |
| **Type AL, DC operated coils** | | | | | | | | | | |
| 00 | 9 | 1.5 | 1.5 | 2 | 2 | 2 | ▼ AL9N00M-10-Δ | 2 | 2 | ▼ AL9N00R-10-Δ |
| 0 | 18 | 3 | 3 | 5 | 2 | 2 | ▼ AL16N0M-10-Δ | 2 | 2 | ▼ AL16N0R-10-Δ |
| 1 | 27 | 7.5 | 7.5 | 10 | 2 | 2 | ▼ AL26N1M-10-Δ | 2 | 2 | ▼ AL26N1R-10-Δ |
| **Type AE, double-wound DC operated coils** | | | | | | | | | | |
| 00 | 9 | 1.5 | 1.5 | 2 | 2 | 2 | ▼ AE9N00M-11-Δ | 2 | 2 | ▼ AE9N00R-11-Δ |
| 0 | 18 | 3 | 3 | 5 | 2 | 2 | ▼ AE16N0M-11-Δ | 2 | 2 | ▼ AE16N0R-11-Δ |
| 1 | 27 | 7.5 | 7.5 | 10 | 2 | 2 | ▼ AE26N1M-11-Δ | 2 | 2 | ▼ AE26N1R-11-Δ |
| 2 | 45 | 10 | 15 | 25 | 2 | 2 | AE50N2M-11-Δ | 2 | 2 | AE50N2R-11-Δ |
| 3 | 90 | 25 | 30 | 50 | 2 | 2 | AE75N3M-11-Δ | 2 | 2 | AE75N3R-11-Δ |

▼ Planned legacy product; recommend AF series contactors.

## Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ④ | A9N00…A260N5 | AL9N00…AL26N1 | AE9N00…AE75N3 |
|---|---|---|---|
| 12V DC | - | 80 | 80 |
| 24V AC | 81 | - | - |
| 24V DC | - | 81 | 81 |
| 110…120V AC, 60Hz | 84 | - | - |
| 125V DC | - | 87 | 87 |
| 220V DC | - | 88 | 88 |
| 230..240V AC, 60 Hz | 80 | - | - |
| 240V DC | - | 89 | 89 |
| 480V AC, 60 Hz | 51 | - | - |
| 600V AC, 60 Hz | 55 | - | - |

Example(s):
24V DC input voltage: AL26N1M-10-81
120V AC input voltage: A260N5R-11-84

## Reversing vs. mechanically interlocked

Full voltage reversing contactors are pre-assembled using two (2) contactors, a mechanical interlock, an electrical interlock, and reversing busbars. Mechanically interlocked contactors are offered less the reversing bus.

① For selection purposes, for complete electrical ratings, see Technical Data.
② For ratings according to IEC/EN 60947-4-1, refer to A, AL, AE NEMA rated, non-reversing selection table or Technical Data.
③ A(E)(L)9N00R(M)…A(E)(L)16N0R(M) mounted on 35mm DIN rail, A(E)(L)26N1R(M)…A260N5R(M) mounted on common baseplate.
④ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

# AF, AFZ, and EK 4-pole

## For resistive & slightly inductive applications up to 1000 A AC & DC control

AF09(Z)...AF16(Z)

AF26(Z)...AF38(Z)

AF45...AF75

EK175...EK210

## Electrical ratings ①

## 4-pole (4 NO & 2 NO / 2 NC)

| IEC/EN 60947-4-1 CE | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | Main (power) pole configuration ② | | Standard auxiliary contacts | | Catalog number |
|---|---|---|---|---|---|---|
| Rated operational current Ie, AC-1 (A) | AC general purpose ratings, 600V (A) | NO | NC | NO | NC | |
| **Type AF, electronic AC/DC controlled** | | | | | | |
| 25 | 25 | 4 | - | - | - | AF09-40-00-Δ |
| | | 2 | 2 | - | - | AF09-22-00-Δ |
| 30 | 30 | 4 | - | - | - | AF16-40-00-Δ |
| | | 2 | 2 | - | - | AF16-22-00-Δ |
| 45 | 45 | 4 | - | - | - | AF26-40-00-Δ |
| | | 2 | 2 | - | - | AF26-22-00-Δ |
| 55 | 55 | 4 | - | - | - | AF38-40-00-Δ |
| | | 2 | 2 | - | - | AF38-22-00-Δ |
| 70 | 65 | 4 | - | - | - | AF45-40-00-Δ |
| | | 2 | 2 | - | - | AF45-22-00-Δ |
| 100 | 80 | 4 | - | - | - | AF50-40-00-Δ |
| 125 | 105 | 4 | - | - | - | AF75-40-00-Δ |
| | | 2 | 2 | - | - | AF75-22-00-Δ |
| **Type EK, AC or DC controlled** | | | | | | |
| 200 | 170 | 4 | - | 1 | 1 | EK110C4P-ΔL |
| 250 | 200 | 4 | - | 1 | 1 | EK150C4P-ΔL |
| 300 | 250 | 4 | - | 1 | 1 | EK175C4P-ΔL |
| 350 | 300 | 4 | - | 1 | 1 | EK210C4P-ΔL |
| 550 | 420 | 4 | - | 1 | 1 | EK370C4P-ΔL |
| 800 | 540 | 4 | - | 1 | 1 | EK550C4P-ΔL |
| 1000 | - | 4 | - | 1 | 1 | EK1000C4P-ΔL |
| **Type AFZ, electronic AC/DC controlled, low consumption** | | | | | | |
| 25 | 25 | 4 | - | - | - | AF09Z-40-00-Δ |
| | | 2 | 2 | - | - | AF09Z-22-00-Δ |
| 30 | 30 | 4 | - | - | - | AF16Z-40-00-Δ |
| | | 2 | 2 | - | - | AF16Z-22-00-Δ |
| 45 | 45 | 4 | - | - | - | AF26Z-40-00-Δ |
| | | 2 | 2 | - | - | AF26Z-22-00-Δ |
| 55 | 55 | 4 | - | - | - | AF38Z-40-00-Δ |
| | | 2 | 2 | - | - | AF38Z-22-00-Δ |

## Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ③ | AF09… AF38 | AF09Z… AF38Z | AF45… AF75 | EK110… EK1000 |
|---|---|---|---|---|
| 12…20V DC | - | 20 | - | - |
| 20...60V DC | 11 | 21 | 72 | - |
| 24...60V AC | 11 | 21 | - | - |
| 24V AC, 60 Hz | - | - | - | F |
| 24V DC | - | - | - | Y |
| 48...130V AC/DC | 12 | 22 | 69 | - |
| 110V 50 Hz, 120V 60 Hz | - | - | - | 1 |
| 125V DC | - | - | - | Q |
| 100...250 VAC/DC | 13 | 23 | 70 | - |
| 220V DC | - | - | - | R |
| 240V AC, 60 Hz | - | - | - | 2 |
| 250...500 V AC/DC | 14 | - | - | - |
| 480V AC, 60 Hz | - | - | - | 4 |
| 600V AC, 60 Hz | - | - | - | 6 |

Example(s):
24V DC input voltage: EK110C4P-YL
120V AC input voltage: AF75-40-11-70

① For selection purposes, for complete electrical ratings, see Technical Data.
② 2 NO & 2 NC contactors are not suitable for a reversing starter or wye-delta starter or for controlling a single load from 2 separate supplies. Please see technical data.
③ AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.

# A, AL, and AE 4-pole

## For resistive & slightly inductive applications up to 125 A AC or DC control

A9...A16

A45...A75

### Electrical ratings ①

### 4-pole (4 NO & 2 NO / 2 NC)

| IEC/EN 60947-4-1 | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | Main (power) pole configuration ② | | Standard auxiliary contacts | | Catalog number |
|---|---|---|---|---|---|---|
| Rated operational current Ie, AC-1 (A) | AC general purpose ratings, 600V (A) | NO | NC | NO | NC | |
| **Type A, AC controlled** | | | | | | |
| 25 | 21 | 4 | - | - | - | ▼ A9-40-00-Δ |
| | | 2 | 2 | - | - | ▼ A9-22-00-Δ |
| 30 | 30 | 4 | - | - | - | ▼ A16-40-00-Δ |
| | | 2 | 2 | - | - | ▼ A16-22-00-Δ |
| | | - | 4 | - | - | A16-04-00-Δ |
| 45 | 40 | 4 | - | - | - | ▼ A26-40-00-Δ |
| | | 2 | 2 | - | - | ▼ A26-22-00-Δ |
| 70 | 65 | 4 | - | - | - | A45-40-00-Δ |
| | | 2 | 2 | - | - | A45-22-00-Δ |
| 100 | 80 | 4 | - | - | - | A50-40-00-Δ |
| 125 | 105 | 4 | - | - | - | A75-40-00-Δ |
| | | 2 | 2 | - | - | A75-22-00-Δ |
| **Type AL, DC controlled** | | | | | | |
| 25 | 21 | 4 | - | - | - | ▼ AL9-40-00-Δ |
| | | 2 | 2 | - | - | ▼ AL9-22-00-Δ |
| 30 | 30 | 4 | - | - | - | ▼ AL16-40-00-Δ |
| | | 2 | 2 | - | - | ▼ AL16-22-00-Δ |
| 45 | 40 | 4 | - | - | - | ▼ AL26-40-00-Δ |
| | | 2 | 2 | - | - | ▼ AL26-22-00-Δ |
| **Type AE, DC controlled** | | | | | | |
| 70 | 65 | 4 | - | - | - | AE45-40-00-Δ |
| | | 2 | 2 | - | - | AE45-22-00-Δ |
| 100 | 80 | 4 | - | - | - | AE50-40-00-Δ |
| 125 | 105 | 4 | - | - | - | AE75-40-00-Δ |
| | | 2 | 2 | - | - | AE75-22-00-Δ |

▼ Planned legacy product; recommend AF series contactors.

### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ③ | A9…A75 | AL9…AL26 | AE9…AE75 |
|---|---|---|---|
| 12V DC | - | 80 | 80 |
| 24V AC | 81 | - | - |
| 24V DC | - | 81 | 81 |
| 110…120V AC, 60Hz | 84 | - | - |
| 125V DC | - | 87 | 87 |
| 220V DC | - | 88 | 88 |
| 230..240V AC, 60 Hz | 80 | - | - |
| 240V DC | - | 89 | 89 |
| 480V AC, 60 Hz | 51 | - | - |
| 600V AC, 60 Hz | 55 | - | - |

Example(s):
24V DC input voltage: AL26-40-00-81
120V AC input voltage: A75-40-00-84

① For selection purposes, for complete electrical ratings, see Technical Data.
② 2 NO & 2 NC contactors are not suitable for a reversing starter or wye-delta starter or for controlling a single load from 2 separate supplies. Please see technical data.
③ AC coil input voltage(s) at 50/60 Hz unless specified. For additional voltages, see page 1.35.

# B, BC miniature, 4-pole

## For resistive & slightly inductive applications up to 20 A AC or DC control

B(C)6...B(C)7

B(C)6(-F)...B(C)7(-F)

B(C)6(-P)...B(C)7(-P)

### Electrical ratings ①

| IEC/EN 60947-4-1 | UL 508, 60947-4-1A CSA C22.2 No.14, 60947-4-1-07 | Main (power) pole configuration | | 4-pole (4 NO & 2 NO / 2 NC) Standard auxiliary contacts | | Catalog number |
|---|---|---|---|---|---|---|
| Rated operational current Ie, AC-1 (A) | AC general purpose ratings, 600V (A) | NO | NC | NO | NC | |
| **Type B, AC controlled, screw terminated** | | | | | | |
| 20 | 12 ③ | 4 | - | - | - | B6-40-00-Δ |
| | | 2 | 2 | - | - | B6-22-00-Δ |
| 20 | 16 | 4 | - | - | - | B7-40-00-Δ |
| | | 2 | 2 | - | - | B7-22-00-Δ |
| **Type B, AC controlled, quick-connect (flat pin)** | | | | | | |
| 16 | 12 ③ | 4 | - | - | - | B6-40-00-FΔ |
| | | 2 | 2 | - | - | B6-22-00-FΔ |
| 16 | 16 | 4 | - | - | - | B7-40-00-FΔ |
| | | 2 | 2 | - | - | B7-22-00-FΔ |
| **Type B, AC controlled, printed circuit board mount (solder pin)** | | | | | | |
| 12 | 8 ③ | 4 | - | - | - | B6-40-00-PΔ |
| | | 2 | 2 | - | - | B6-22-00-PΔ |
| 12 | 16 | 4 | - | - | - | B7-40-00-PΔ |
| | | 2 | 2 | - | - | B7-22-00-PΔ |
| **Type BC, DC controlled, screw terminated** | | | | | | |
| 20 | 12 ③ | 4 | - | - | - | BC6-40-00-Δ |
| | | 2 | 2 | - | - | BC6-22-00-Δ |
| 20 | 16 | 4 | - | - | - | BC7-40-00-Δ |
| | | 2 | 2 | - | - | BC7-22-00-Δ |
| **Type BC, DC controlled, quick-connect (flat pin)** | | | | | | |
| 16 | 12 ③ | 4 | - | - | - | BC6-40-00-FΔ |
| | | 2 | 2 | - | - | BC6-22-00-FΔ |
| 16 | 16 | 4 | - | - | - | BC7-40-00-FΔ |
| | | 2 | 2 | - | - | BC7-22-00-FΔ |
| **Type BC, DC controlled, printed circuit board mount (solder pin)** | | | | | | |
| 12 | 8 ③ | 4 | - | - | - | BC6-40-00-PΔ |
| | | 2 | 2 | - | - | BC6-22-00-PΔ |
| 12 | 16 | 4 | - | - | - | BC7-40-00-PΔ |
| | | 2 | 2 | - | - | BC7-22-00-PΔ |

NOTE: Quick connect and PCB mount versions are UL recognized only.

### Coil voltage selection chart (Δ)

| Rated control circuit voltage Uc ② | B6…B7 | BC6…BC7 |
|---|---|---|
| 12V AC | - | 07 |
| 24V AC | 01 | - |
| 24V DC | - | 01 |
| 48V AC | 03 | - |
| 48V DC | - | 16 |
| 110…127V AC | 84 | - |
| 110…125V DC | - | 04 |
| 220…240V AC | 80 | - |
| 220…240V DC | - | 05 |
| 380…415V AC | 85 | - |

Example(s):
24V DC input voltage: BC6-40-00-01
120V AC input voltage: B7-22-00-84

① For selection purposes, for complete electrical ratings, see Technical Data.
② AC coil input voltage(s) at 50/60 Hz unless specified. Additional voltages pg. 1.35.
③ 300V AC max.

# Additional coil voltages
## 3 & 4 pole contactors
## AC & DC operated coils

### Coils for AC operated contactors (Δ)

| For contactors | AC voltages V - 50 Hz | AC voltages V - 60 Hz | Coil code |
|---|---|---|---|
| A9…A300, A9N00… A260N5 | 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 |
| | 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 |
| | 400…415 | 480 | 51 |
| | 415…440 | 440…460 | 87 |
| | 440 | 500 | 53 |
| | 500 | 600 | 55 |
| | 550 | - | 56 |
| | 660…690 | - | 58 |

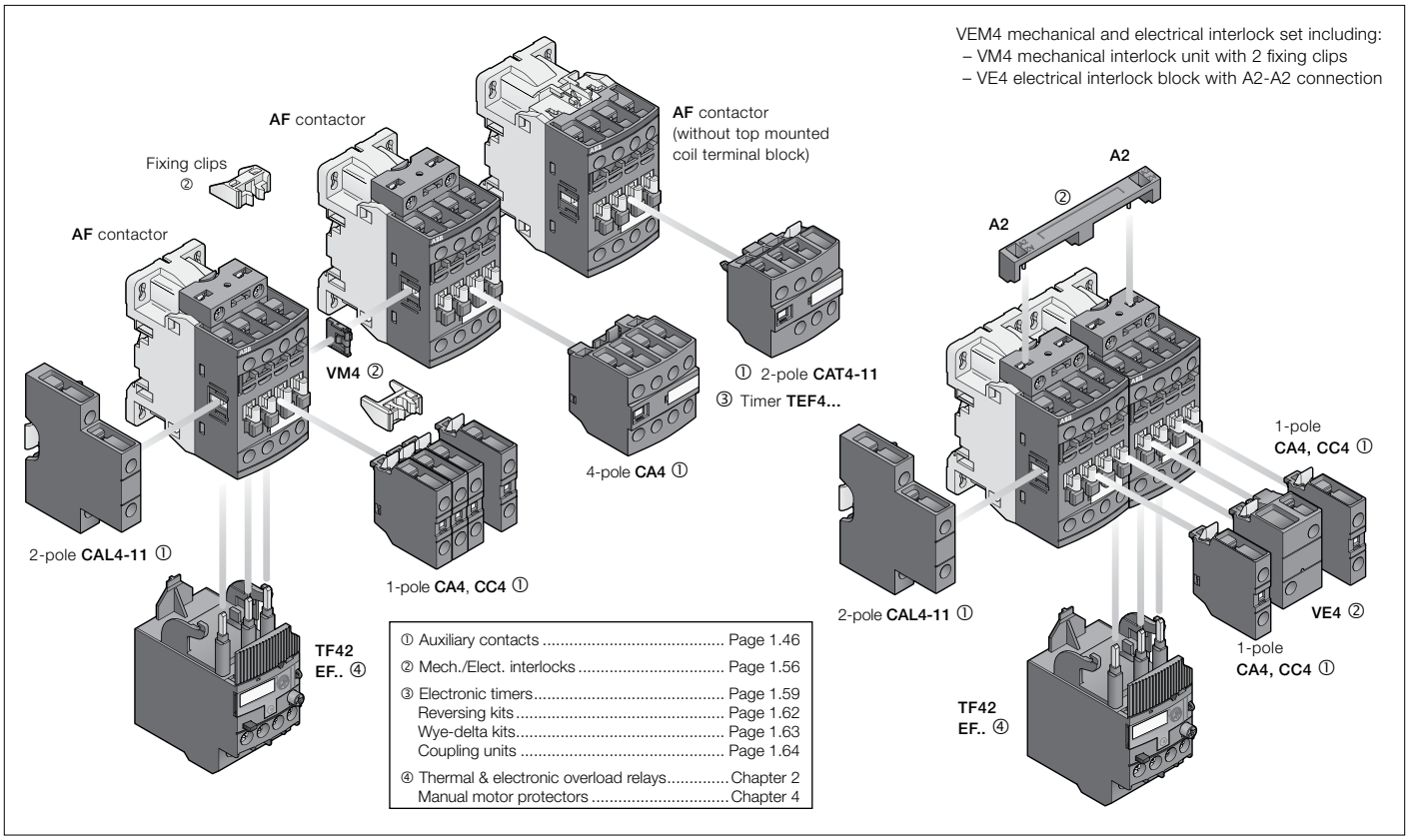
| For contactors | AC voltages V - 50 Hz | AC voltages V - 60 Hz | Coil code |
|---|---|---|---|
| (V)B6… (V)B7 | 24 | 24 | 01 |
| | 42 | 42 | 02 |
| | 48 | 48 | 03 |
| | 110...127 | 110...127 | 84 |
| | 220…240 | 220…240 | 80 |
| | 380…415 | 380…415 | 85 |
| EK110… EK1000 | - | 24 | F |
| | 24 | - | 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 |
| (V)AS09… (V)AS16 | 24 | 24 | 20 |
| | 42 | 42 | 21 |
| | 48 | 48 | 22 |
| | 110 | 110 | 23 |
| | 115 | 115 | 24 |
| | - | 120 | 16 |
| | 220 | 220 | 25 |
| | 230 | 230 | 26 |
| | 240 | 240 | 27 |
| | - | 277 | 17 |
| | 380 | - | 13 |
| | 400 | 400 | 28 |
| | 415 | 415 | 29 |

### Coils for DC operated contactors (Δ)

| For contactors | DC voltages V - DC | Coil code |
|---|---|---|
| AE9…AE75, AE9N00… AE75N3, AL9…AL40, AL9N00… AL26N1 | 12 | 80 |
| | 24 | 81 |
| | 42 | 82 |
| | 48 | 83 |
| | 50 | 21 |
| | 60 | 84 |
| | 75 | 85 |
| | 110 | 86 |
| | 125 | 87 |
| | 220 | 88 |
| | 240 | 89 |
| | 250 | 38 |
| (V)BC6… (V)BC7 | 12 | 07 |
| | 24 | 01 |
| | 42 | 02 |
| | 48 | 16 |
| | 60 | 03 |
| | 110…125 | 04 |
| | 220…240 | 05 |
| EK110… EK1000 | 24 | Y |
| | 48 | W |
| | 110 | P |
| | 125 | Q |
| | 220 | R |
| | 440 | T |
| (V)ASL09… (V)ASL16 | 12 | 80 |
| | 24 | 81 |
| | 48 | 83 |
| | 60 | 84 |
| | 110 | 86 |
| | 125 | 87 |
| | 220 | 88 |
| | 240 | 89 |

# AF09(Z)...AF38(Z), AF09N00(Z)...AF26N1(Z), 3-pole
## Accessory fitting details

### Contactor and main accessories (other accessories available)




### Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories: Auxiliary contact blocks & electronic timers: 1-pole CA4 / CC4 | | 2-pole CAT4-11 | | TEF4... or 4-pole CA4 | | Electrical and mechanical interlock set (between 2 contactors): VEM4 | | Side-mounted accessories: Auxiliary contact blocks: Left side 2-pole CAL4-11 | | Right side |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Max. N.C. built-in and add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5 | | | | | | | | | | |
| AF09 ... AF16 Sz. 00...0 | 3 0 | 0 1 | 4 max. | or | 1 | or | 1 | | – | + | 1 | | – |
| | | | 2 max. | | – | | – | | – | + | 1 | + | 1 |
| | | | 3 max. | | – | | – | + | 1 | + | 1 | or | 1 |
| AF09 ... AF16 | 3 0 | 1 0 | 4 max. | or | 1 | or | 1 | | – | + | 1 | | – |
| AF26 ... AF38 Sz. 00...1 | 3 0 | 0 0 | 2 max. | or | 1 | | – | | – | + | 1 | + | 1 |
| | | | 3 max. | | – | | – | + | 1 | + | 1 | or | 1 |

NOTE: Fitting details same for AF...Z contactors

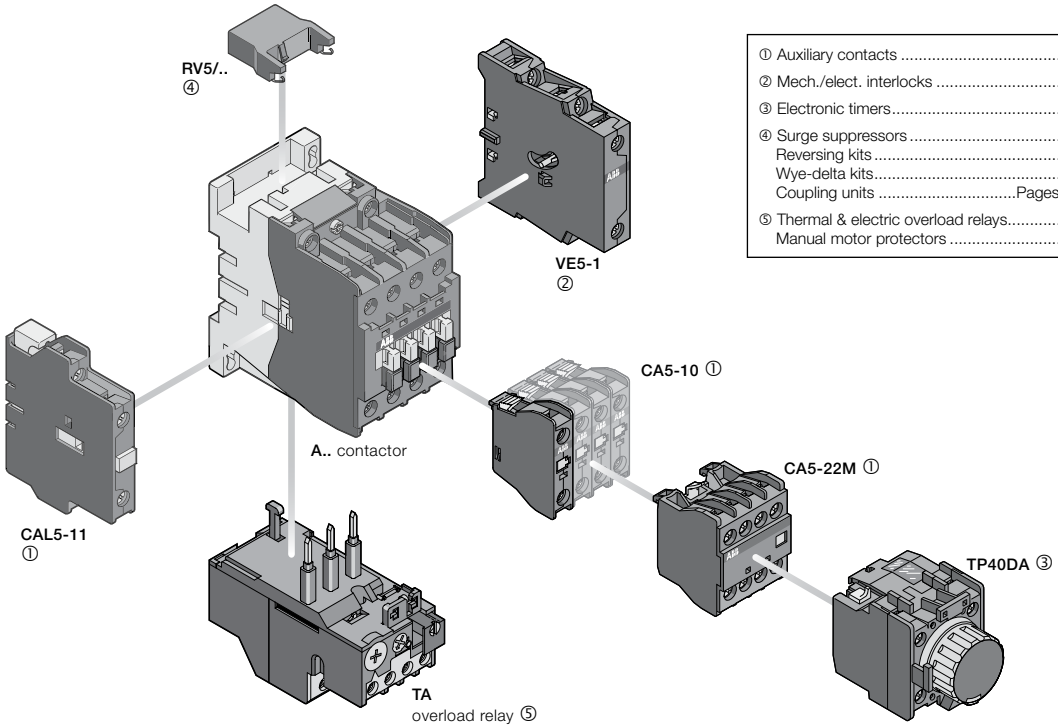
### Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AF09 ... AF38, Sz. 00...1 | TF42 (0.10...38 A) | EF19 (0.10...18.9 A) |
| AF26 ... AF38, Sz. 1 | – | EF45 (9...38 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

# A/E/L30...A/E/L40; A/E/F50...A/E/F75; A/E/F50NZ...A/E/F75N3
# 3-pole contactors
## Accessory fitting details

### Contactor and main accessories (other accessories available)





① Auxiliary contacts ..... Page 1.48
② Mech./elect. interlocks ..... Page 1.57
③ Electronic timers..... Page 1.59
④ Surge suppressors ..... Page 1.52
Reversing kits ..... Page 1.62
Wye-delta kits..... Page 1.63
Coupling units .....Pages 1.64...1.65
⑤ Thermal & electric overload relays.....Chapter 2
Manual motor protectors .....Chapter 4


### Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories: Auxiliary contact blocks: 1-pole CA5-.. | | 4-pole CA5-.. | | Electronic timer: TEF5 | | Side-mounted accessories: Auxiliary contact blocks: 2-pole CAL5-11 | | Interlock unit: VM5-.. or VE5-.. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A30...A40 | 3 0<br>3 0 | 1 0<br>0 1 (2) | 1 to 5 x CA5-.. | or | 1 x CA5-.. (4-pole)<br>+ 1 x 1-pole CA5-.. | or | 1 x TEF5<br>+ 1 x CA5-.. (1-pole) | + | 1 to 2 x CAL5-11 | or | 1 x VM5-1 or VE5-1<br>+1 x CAL5-11 |
| A50 ... A75<br>Sz. 2...3 | 3 0 | 0 0 | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole)<br>+ 2 x 1-pole CA5-.. | or | 1 x TEF5<br>+ 2 x CA5-.. (1-pole) | + | 1 to 2 x CAL5-11 | or | 1 x VE5-2<br>+1 x CAL5-11 |
| AL30...AL40 | 3 0<br>3 0 | 1 0<br>0 1 | 1 to 5 x CA5-.. (2) | or | 1 x CA5-.. (4-pole) (2)<br>+ 1 x 1-pole CA5-.. | | – | or | 1 x CAL5-11 (3) | + | 1 x VM5-1 or VE5-1 (1) |
| AE50 ... AE75<br>Sz. 2...3 | 3 0 | 0 0 | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole)<br>+ 2 x 1-pole CA5-.. | or | 1 x TEF5<br>+ 2 x CA5-.. (1-pole) | + | 1 x CAL5-11 | or | 1 x VE5-2 |
| AF50 ... AF75<br>Sz. 2...3 | 3 0 | 0 0 | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole)<br>+ 2 x 1-pole CA5-.. | or | 1 x TEF5<br>+ 2 x CA5-.. (1-pole) | + | 1 to 2 x CAL5-11 | or | 1 x VE5-2<br>+1 x CAL5-11 |

(1) With VE5-1 interlock unit, a maximum of 3 N.O. auxiliary contacts are permitted. VE5-1, VM5-1 not allowed in mounting position 1 ±30°.
(2) 2 N.C. CA5-.. auxiliary contacts maximum in mounting position 5.
(3) CAL5-11 not allowed in mounting position 1±30°.

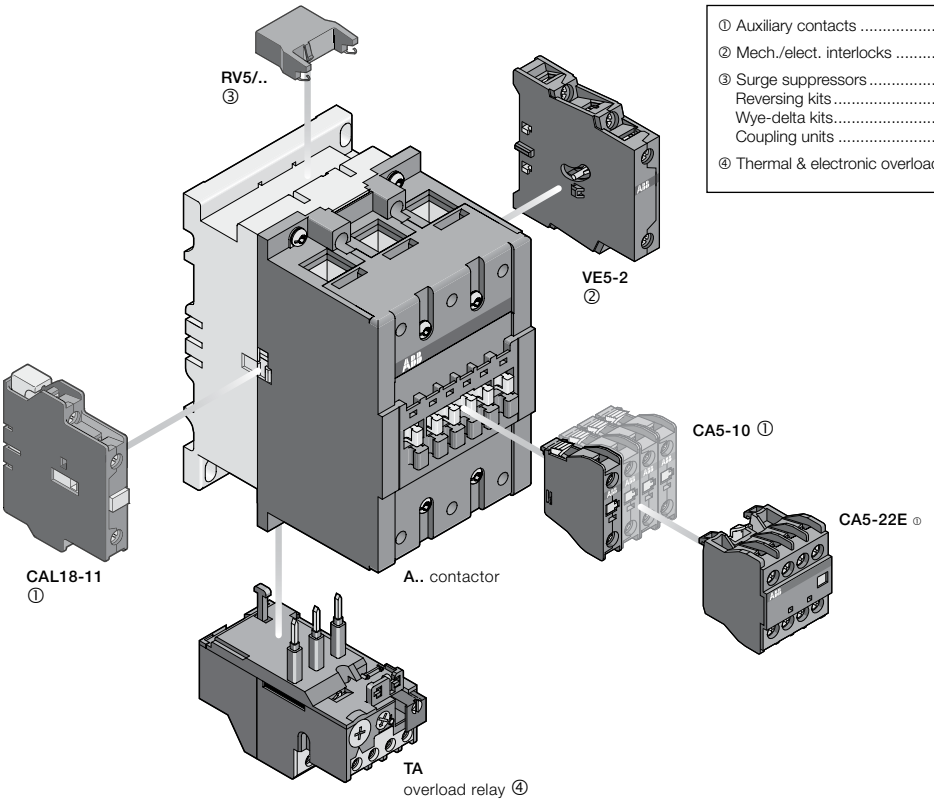
### Overload relays fitting details (4)

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| A30...A40, AL30...AL40 | TA25DU (0.1...32 A) or TA42DU (18...42 A) | E45DU (9...45 A) |
| A50 ... A75, AE50 ... AE75, AF50 ... AF75, Sz. 2...3 | TA75DU (18...80 A) | E80DU (27...80 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(4) Direct mounting - No kit required.

# A/F95...A/F110, 3-pole
## Accessory fitting details

### Contactor and main accessories (other accessories available)





① Auxiliary contacts ..... Page 1.48
② Mech./elect. interlocks ..... Page 1.57
③ Surge suppressors ..... Page 1.52
Reversing kits ..... Page 1.62
Wye-delta kits ..... Page 1.63
Coupling units ..... Pages 1.64...1.65
④ Thermal & electronic overload relays ..... Chapter 2


### Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | | Available auxiliary contacts | | Front-mounted accessories<br>Auxiliary contact blocks<br>1-pole CA5- .. | | 4-pole CA5- .. | | Side-mounted accessories<br>Auxiliary contact blocks<br>2-pole CAL.. | | Interlock unit<br>VE5-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A95, A110 | 3 | 0 | 0 | 0 | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole)<br>+ 2 x 1-pole CA5-.. | + | 1 to 2 x CAL18-11 | or | 1 x VE5-2<br>+1 x CAL18-11 |
| AF95, AF110 | 3 | 0 | 0 | 0 | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole)<br>+ 2 x 1-pole CA5-.. | + | 1 to 2 x CAL18-11 | or | 1 x VE5-2<br>+1 x CAL18-11 |

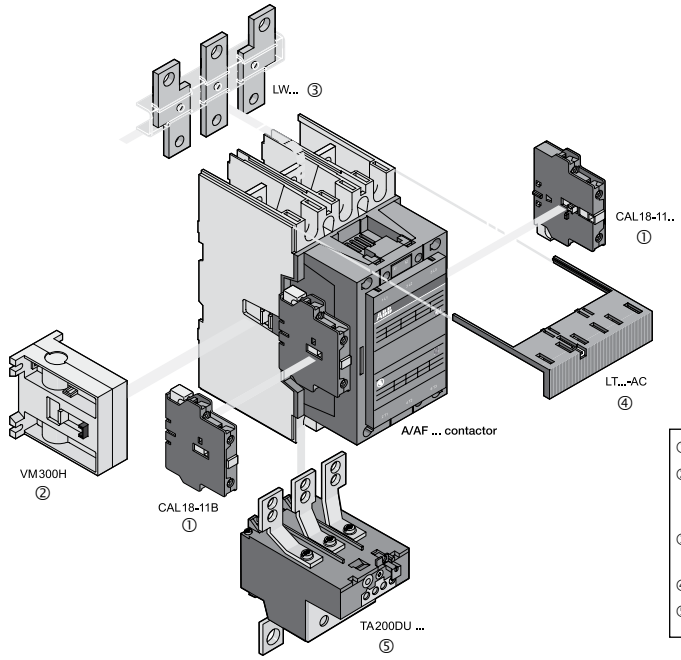
### Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| A95, A110<br>AF95, AF110 | TA80DU (29...80 A) or TA110DU (65...110 A) | E140DU (50...140 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

# A/F145...AF2050; A/F145N4...AF1650N8, 3-pole
## Accessory fitting details

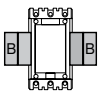
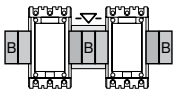
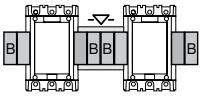
### Main accessories (other accessories available) AF185 shown on picture





① Auxiliary contacts ..... Page 1.48
② Mechanical interlocks ..... Page 1.57
Reversing kits ..... Page 1.62
Wye-delta kits ..... Page 1.63
③ Coupling units ..... Page 1.64...1.65
Lug kits ..... Page 1.67
④ Terminal shrouds ..... Page 1.68
⑤ Thermal & electronic overload relays .....Chapter 2


### Main accessory fitting details

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories<br>Add-on auxiliary contact blocks<br>CAL18-11, CAL18-11B (3) | | | Mechanical interlock units<br>(for two horizontal mounted contactors) | Mounting and positioning<br>Factory mounted auxiliary contacts<br>Add-on CAL18-11 auxiliary contacts<br>Add-on CAL18-11B auxiliary contacts |
|---|---|---|---|---|---|---|---|
| **Contactors + auxiliary contact blocks** | | | | | | | |
| A145 ... A300<br>AF145 ... AF2050<br>Sz. 4...8 | 3 0 | 1 1 | 1 x CAL18-11 | + | 2 x CAL18-11B | – |  |
| **Contactors with mechanical interlocking + auxiliary contact blocks** | | | | | | | |
| A145 ... A185<br>AF145 ... AF185<br>Sz. 4 | 3 0 | 1 1 | 2 x CAL18-11 (1) | + | 3 x CAL18-11B (1) | + VM...H (2) |  |
| A210 ... A300<br>AF210 ... AF2050<br>Sz. 5...8 | 3 0 | 1 1 | 2 x CAL18-11 (1) | + | 4 x CAL18-11B (1) | + VM...H (2) |  |

(1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL18-.. auxiliary contact blocks can replace the CAL18-11 and CAL18-11B. Though, no auxiliary contact block can be mounted outside the CEL18-..

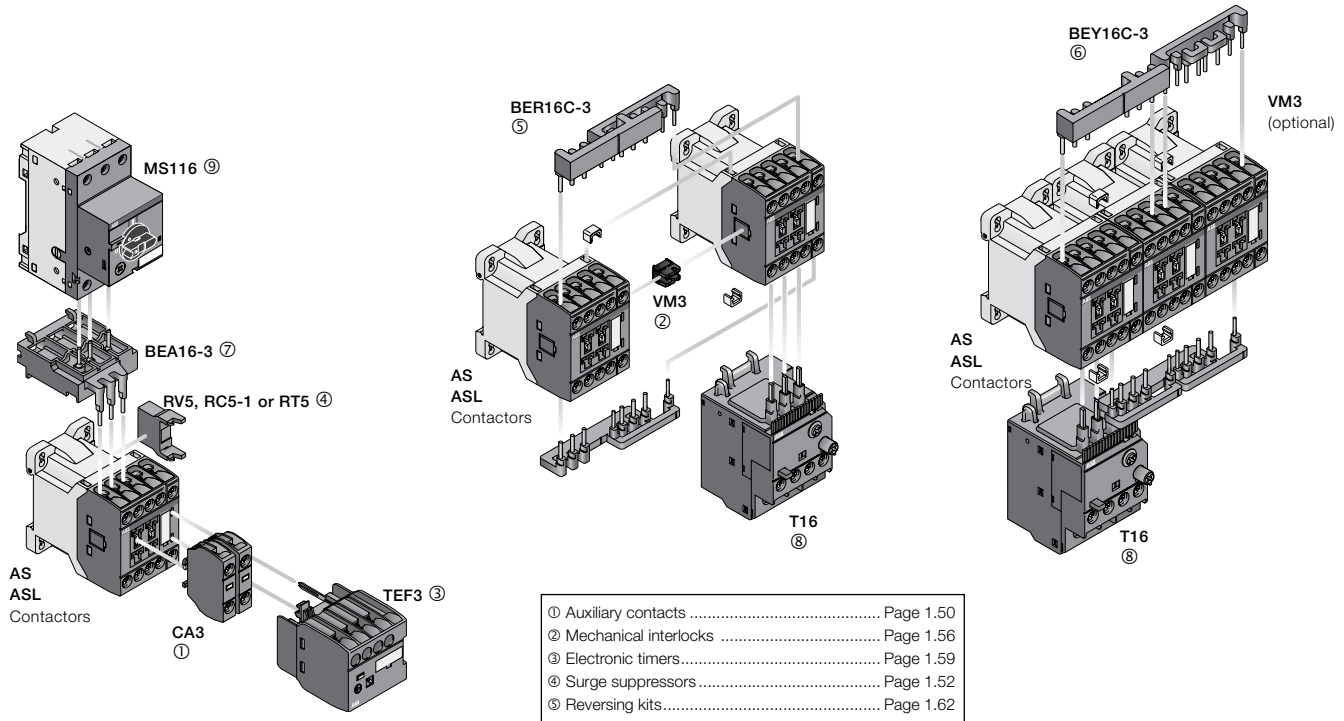
### Overload relays fitting details

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| A145, A185, Sz. 4 | TA200DU (80...200 A) (4) | E200DU (60...200 A) (4) |
| A210, A300, Sz. 5 | TA450DU (100...310 A) (4) or TA450SU (130...310 A) (5) | E320DU (100...320 A) (4) |
| AF400, AF460, Sz. 6 | – | E500DU (150...500 A) (5) |
| AF580, AF750, Sz. 7 | – | E800DU (250...800 A) (5) |
| AF1350, AF1650, Sz. 8 | – | E1250DU (375...1250 A) (5) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(4) Direct mounting - No kit required.
(5) Mounting kit required (see "Motor protection").

# AS/L09...AS/L16, 3 pole, w/screw terminals
## Accessory fitting details

### Contactor and main accessories (other accessories available)




| | |
|---|---|
| ① Auxiliary contacts | Page 1.50 |
| ② Mechanical interlocks | Page 1.56 |
| ③ Electronic timers | Page 1.59 |
| ④ Surge suppressors | Page 1.52 |
| ⑤ Reversing kits | Page 1.62 |
| ⑥ Wye delta kits | Page 1.63 |
| ⑦ Coupling units | Page 1.64 |
| ⑧ Thermal overload relays | Chapter 2 |
| ⑨ Manual motor protectors | Chapter 4 |

### Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories: Auxiliary contact blocks 1-pole CA3 | | Electronic timer TEF3 | | Mechanical interlock unit (between 2 contactors) VM3 | | Side-mounted accessories: Surge suppressors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AS09 ... AS16 | 3 0<br>3 0 | 1 0<br>0 1 | 2 max. | or | 1 | + | 1 | + | RV5 | or | RC5-1 |
| AS09 ... AS16 | 3 0 | 3 2 | – | | – | | 1 | + | RV5 | or | RC5-1 |
| ASL09 ... ASL16 | 3 0<br>3 0 | 1 0<br>0 1 | 2 max. | or | 1 | + | 1 | + | RV5 | or | RT5 |
| ASL09 ... ASL16 | 3 0 | 3 2 | – | | – | | 1 | + | RV5 | or | RT5 |

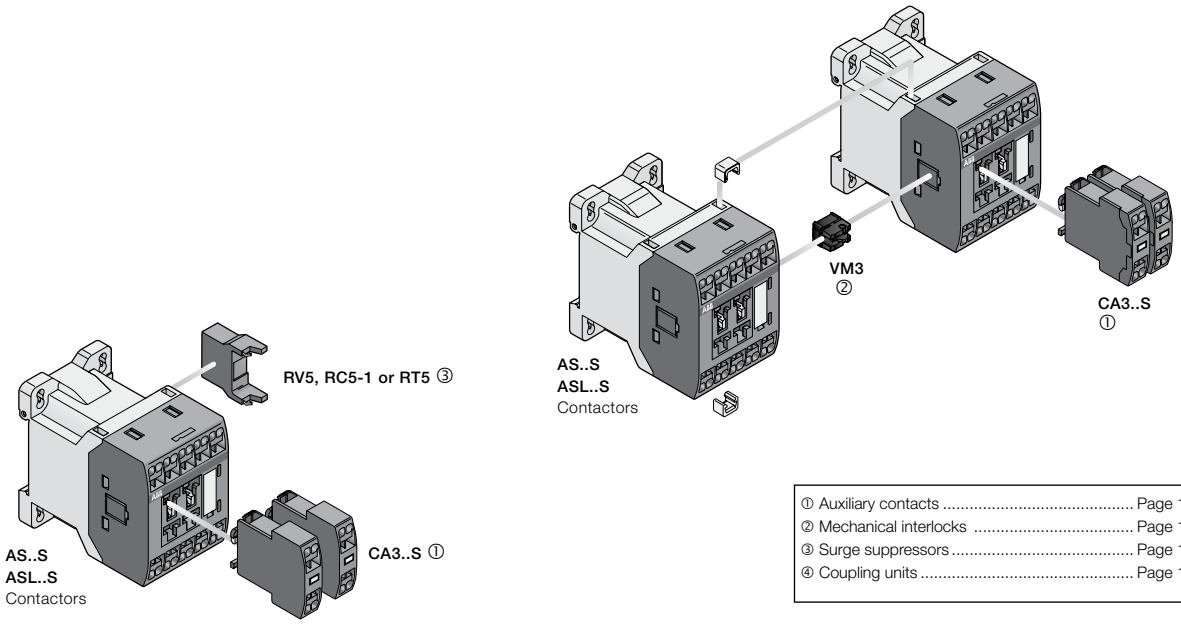
### Overload relays fitting details (1)

| Contactor types | Thermal overload relays |
|---|---|
| AS09 ... AS16<br>ASL09 ... ASL16 | T16 (0.10...16 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

# AS/L09...AS/L16, 3-pole w/spring terminals
## Accessory fitting details

### Contactor and main accessories (other accessories available)





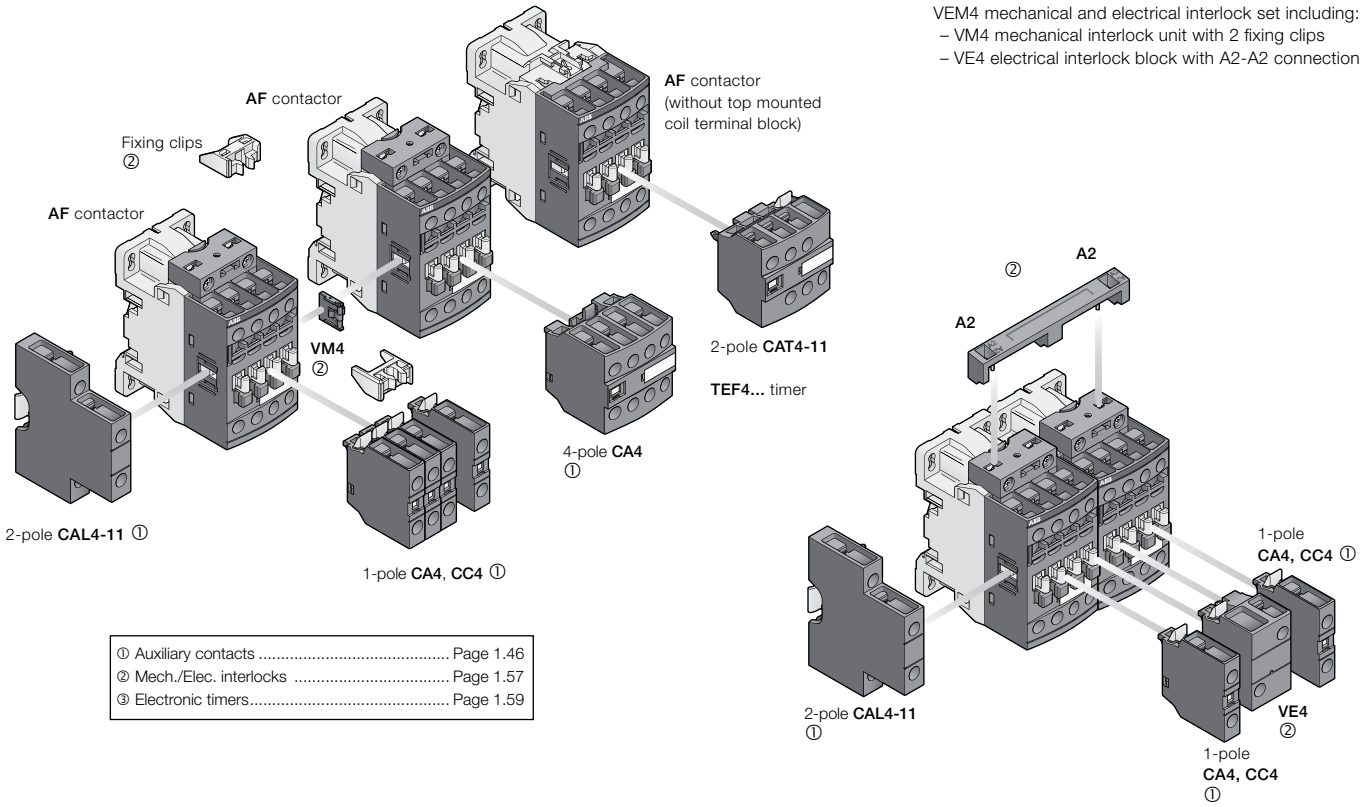
① Auxiliary contacts ..... Page 1.50
② Mechanical interlocks ..... Page 1.56
③ Surge suppressors ..... Page 1.52
④ Coupling units ..... Page 1.64


### Main accessory fitting details

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories: Auxiliary contact blocks 1-pole CA3..S | | Mechanical interlock unit (between 2 contactors) VM3 | | Side-mounted accessories: Surge suppressors | | |
|---|---|---|---|---|---|---|---|---|---|
| AS09..S ... AS16..S | 3 0 | 1 0 | 2 max. | + | 1 | + | RV5 | or | RC5-1 |
| AS09..S ... AS16..S | 3 0 | 0 1 | | | | | | | |
| AS09..S ... AS16..S | 3 0 | 3 2 | – | | 1 | + | RV5 | or | RC5-1 |
| ASL09..S ... ASL16..S | 3 0 | 1 0 | 2 max. | + | 1 | + | RV5 | or | RT5 |
| ASL09..S ... ASL16..S | 3 0 | 0 1 | | | | | | | |
| ASL09..S ... ASL16..S | 3 0 | 3 2 | – | | 1 | + | RV5 | or | RT5 |

# AF09(Z)...AF38(Z), 4-pole
## Accessory fitting details

### Contactor and main accessories (other accessories available)




### Main accessory fitting details

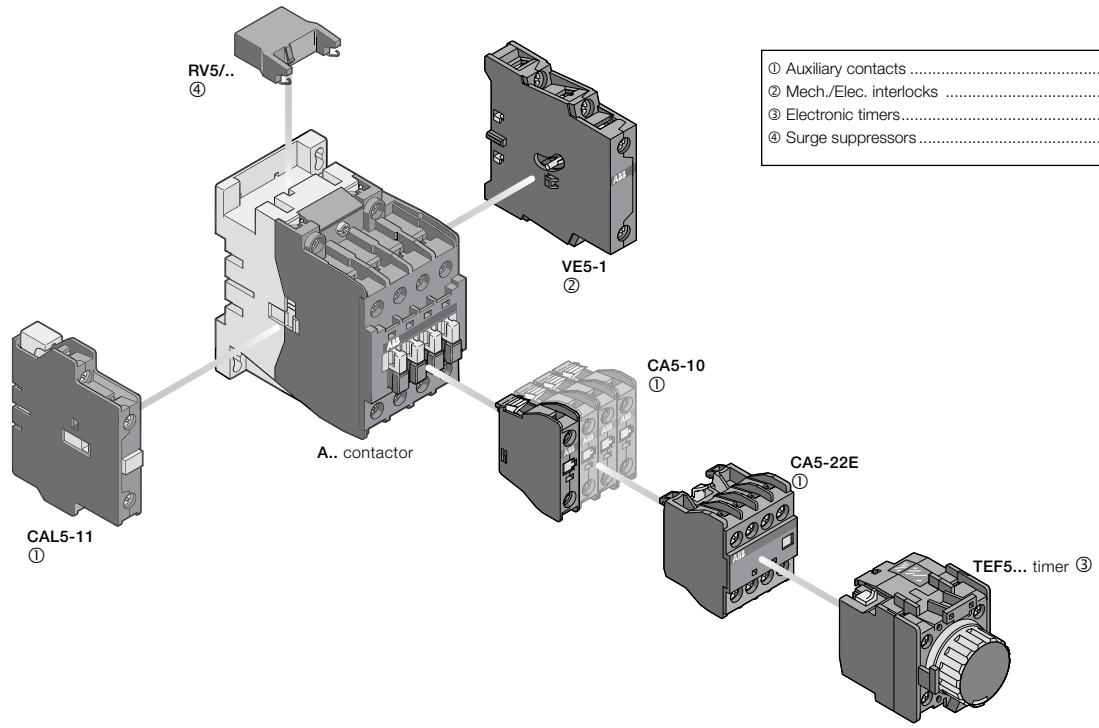
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories: Auxiliary contact blocks & electronic timers | | | | | | | Electrical and mechanical interlock set (between 2 contactors) | | Side-mounted accessories: Auxiliary contact blocks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-pole CA4 / CC4 | | 2-pole CAT4-11 | | TEF4... or 4-pole CA4 | | | VEM4 | | 2-pole CAL4-11 Left side | | Right side |
| Max. add-on N.C. auxiliary contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5 | | | | | | | | | | | | | | |
| AF09, AF16 | 4 0 | 0 0 | 4 max. | or | 1 | or | 1 | | | – | + | 1 | | – |
| | | | 2 max. | or | 1 | | – | | | – | + | 1 | + | 1 |
| | | | 3 max. | | – | | – | + | | 1 | + | 1 | or | 1 |
| Max. add-on N.C. auxiliary contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5 | | | | | | | | | | | | | | |
| AF26, AF38 | 4 0 | 0 0 | 4 max. | or | 1 | or | 1 | | | – | + | 1 | | – |
| | | | 2 max. | or | 1 | | – | | | – | + | 1 | + | 1 |
| | | | 3 max. | | – | | – | + | | 1 | + | 1 | or | 1 |
| AF09, AF16 | 2 2 | 0 0 | 4 max. | or | 1 | or | 1 | | | – | + | 1 | | – |
| AF26, AF38 | 2 2 | 0 0 | 2 max. | or | 1 | | – | | | – | + | 1 | + | 1 |

NOTE: Fitting details same for AF...Z contactors.

# A/E/F45...A/E/F75, 4-Pole
## Accessory fitting details

### Contactor and main accessories (other accessories available)





① Auxiliary contacts ..... Page 1.48
② Mech./Elec. interlocks ..... Page 1.57
③ Electronic timers..... Page 1.59
④ Surge suppressors ..... Page 1.52


### Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

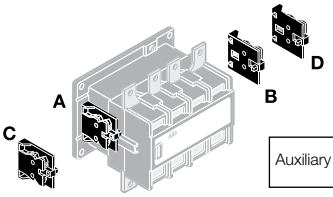
| Contactor types | Main poles | Available auxiliary contacts | Front-mounted accessories: Auxiliary contact blocks: 1-pole CA5-.. | | 4-pole CA5-.. | | Electronic timer: TP.. A | | Side-mounted accessories: Auxiliary contact blocks: 2-pole CAL5-11 | | Interlock unit: VE5-.. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A45 ... A75 | 4 0 | 0 0 | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-.. | or | 1 x TEF5... + 2 x CA5-.. (1-pole) | + | 1 to 2 x CAL5-11 | or | 1 x VE5-2 + 1 x CAL5-11 |
| | 2 2 | 0 0 (1) | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-.. | or | 1 x TEF5... + 2 x CA5-.. (1-pole) | + | 1 to 2 x CAL5-11 | | – |
| AE45 ... AE75 | 4 0 | 0 0 | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-.. | or | 1 x TEF5... + 2 x CA5-.. (1-pole) | + | 1 x CAL5-11 | or | 1 x VE5-2 |
| | 2 2 | 0 0 (1) | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-.. | or | 1 x TEF5... + 2 x CA5-.. (1-pole) | + | 1 x CAL5-11 | | – |
| AF50 ... AF75 | 4 0 | 0 0 | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-.. | or | 1 x TEF5... + 2 x CA5-.. (1-pole) | + | 1 to 2 x CAL5-11 | or | 1 x VE5-2 + 1 x CAL5-11 |
| | 2 2 | 0 0 (1) | 1 to 6 x CA5-.. | or | 1 x CA5-.. (4-pole) + 2 x 1-pole CA5-.. | or | 1 x TEF5... + 2 x CA5-.. (1-pole) | + | 1 to 2 x CAL5-11 | | – |

(1) 2 x N.C. CA 5-.. auxiliary contacts maximum.

# EK110... EK1000, 4-pole
## Accessory fitting details

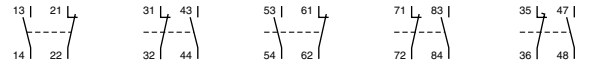
### Main accessory fitting details

**Mounting positions of the auxiliary contact**




Auxiliary contacts..... Page 1.48

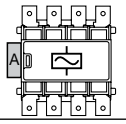
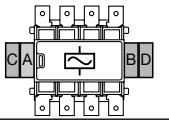
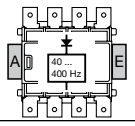
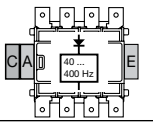
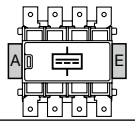
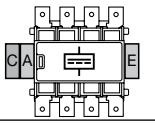
**Auxiliary contact types and connecting diagrams**



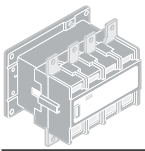
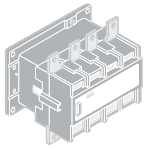
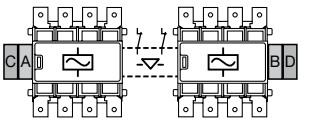
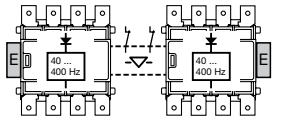
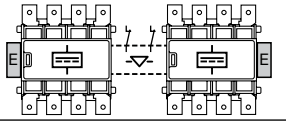

CAL16-11 A | CAL16-11 B | CAL16-11 C | CAL16-11 D | CCL16-11 E (1)

(1) Contact 35-36 used for some types of EK... contactors

### EK... 4-pole contactors

| Contactor types | Main poles | Available auxiliary contacts | | Add-on auxiliary contact blocks<br>2-pole CAL16-11 ... | Mounting and positioning<br>Factory mounted auxiliary contacts<br>Add-on CAL16-11 auxiliary contacts |
|---|---|---|---|---|---|
| **AC operated, 50 Hz, 60 Hz or 50/60 Hz** | | | | | |
| EK110 ... EK1000 | 4 0 | 1 1 |  | + 1 x CAL16-11B<br>+ 1 x CAL16-11C<br>+ 1 x CAL16-11D |  |
| **AC operated, 40...400 Hz** | | | | | |
| EK110 ... EK210 | 4 0 | 2 1 |  | + 1 x CAL16-11C |  |
| **DC operated** | | | | | |
| EK110 ... EK1000 | 4 0 | 2 1 |  | + 1 x CAL16-11C |  |

### EK ... 4-pole reversing contactors with VH... mechanical and electrical interlock units

| "Left hand" contactors | Interlocking | "Right hand" contactors | | Add-on auxiliary contact blocks<br>2-pole CAL16-11 ... | Mounting and positioning<br>Factory mounted auxiliary contacts<br>Add-on CAL16-11 auxiliary contacts |
|---|---|---|---|---|---|
|  | |  | | | |
| **AC operated, 50 Hz, 60 Hz or 50/60 Hz** | | | | | |
| EK110 ... EK150<br>EK175, EK210<br>EK370 ... EK1000 | VH145<br>VH300<br>VH800 | EK110, EK150<br>EK175, EK210<br>EK370 ... EK1000 | + | 1 x CAL16-11C<br>1 x CAL16-11D |  |
| **AC operated, 40...400 Hz** | | | | | |
| EK110 ... EK150<br>EK175, EK210<br>EK370 ... EK1000 | VH145<br>VH300<br>VH800 | EK110, EK150<br>EK175, EK210<br>EK370 ... EK1000 | | – |  |
| **DC operated, 50 Hz, 60 Hz or 50/60 Hz** | | | | | |
| EK110 ... EK150<br>EK175, EK210<br>EK370 ... EK1000 | VH145<br>VH300<br>VH800 | EK110, EK150<br>EK175, EK210<br>EK370 ... EK1000 | | – |  |

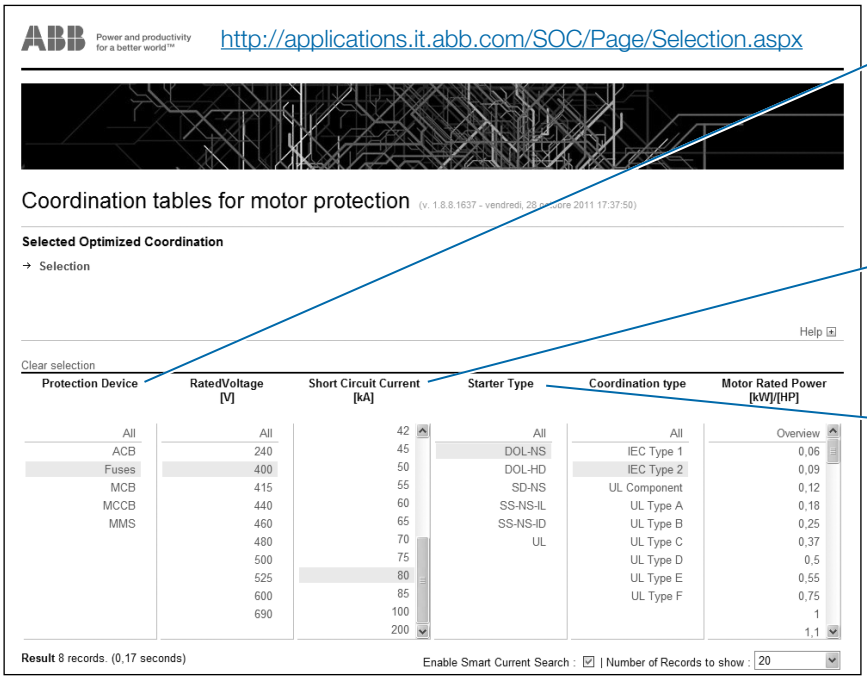
# Coordination with short-circuit protection devices

A motor starter is typically made up of a switching device (contactor) and an overload protection device (see opposite page "Basic functions").

These two devices **must** be coordinated with an equipment capable of providing protection against short circuit (SCPD: Short-Circuit Protection Device).

A complete data base of coordination tables, according to **IEC 60947-4-1** (EN 60947-4-1) **or UL 508 / UL 60947-4-1**, is available on the ABB Website: see below.

## Selection




**Short-circuit protection devices**

- Air circuit breakers
- Fuses
- Miniature circuit breaker
- Moulded case circuit breaker
- Manual motor starter

**Starter type**

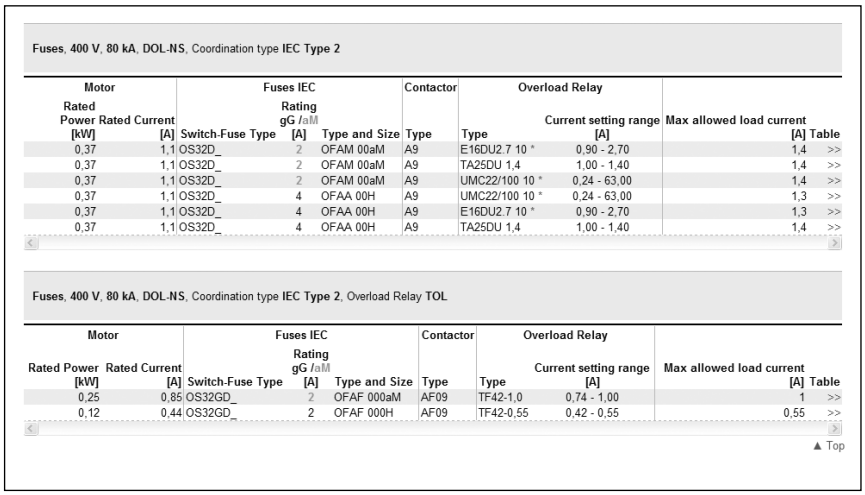
- Direct-on-line normal start
- Direct-on-line heavy duty
- Star-delta normal start
- Soft starter normal start

**Coordination**

- IEC type 1 or type 2
- UL type A to Type F

## Results

- Search results displayed at the bottom of the selection page.
- Only the most appropriate solutions to your application, will be displayed at the bottom of the page.
  "Enable Smart Current Search" function featured for the short-circuit current where "near to" selected values also are included in the result.
- Possible to print the page to a pdf file or from your printer.
- "Clear selection" function to deselect all selected.



**Fuses, 400 V, 80 kA, DOL-NS**, Coordination type **IEC Type 2**

| Motor | | Fuses IEC | | | Contactor | Overload Relay | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated Power [kW] | Rated Current [A] | Switch-Fuse Type | Rating gG /aM [A] | Type and Size | Type | Type | Current setting range [A] | Max allowed load current [A] | Table |
| 0,37 | 1,1 | OS32D_ | 2 | OFAM 00aM | A9 | E16DU2.7 10 * | 0,90 - 2,70 | 1,4 | >> |
| 0,37 | 1,1 | OS32D_ | 2 | OFAM 00aM | A9 | TA25DU 1,4 | 1,00 - 1,40 | 1,4 | >> |
| 0,37 | 1,1 | OS32D_ | 2 | OFAM 00aM | A9 | UMC22/100 10 * | 0,24 - 63,00 | 1,4 | >> |
| 0,37 | 1,1 | OS32D_ | 4 | OFAA 00H | A9 | UMC22/100 10 * | 0,24 - 63,00 | 1,3 | >> |
| 0,37 | 1,1 | OS32D_ | 4 | OFAA 00H | A9 | E16DU2.7 10 * | 0,90 - 2,70 | 1,3 | >> |
| 0,37 | 1,1 | OS32D_ | 4 | OFAA 00H | A9 | TA25DU 1,4 | 1,00 - 1,40 | 1,4 | >> |

**Fuses, 400 V, 80 kA, DOL-NS**, Coordination type **IEC Type 2**, Overload Relay **TOL**

| Motor | | Fuses IEC | | | Contactor | Overload Relay | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rated Power [kW] | Rated Current [A] | Switch-Fuse Type | Rating gG /aM [A] | Type and Size | Type | Type | Current setting range [A] | Max allowed load current [A] | Table |
| 0,25 | 0,85 | OS32GD_ | 2 | OFAF 000aM | AF09 | TF42-1,0 | 0,74 - 1,00 | 1 | >> |
| 0,12 | 0,44 | OS32GD_ | 2 | OFAF 000H | AF09 | TF42-0,55 | 0,42 - 0,55 | 0,55 | >> |

▲ Top

## Access

To find the coordination tables for motor protection, please see:

**www.abb.com/lowvoltage** then go to the right menu: "Support", select: "**Online Product Selection Tools**" then select "**Coordination Tables for motor protection**"

# Auxiliary contact blocks
## AF09(Z)...AF38(Z); AF09N00(Z)...AF26N1(Z)

CA4-10

CAL4-11

CA4-22M

CAT4-11E

### Ordering details (1)

| For contactors | Auxiliary contacts | | | | Catalog number |
|---|---|---|---|---|---|
| **Front-mounted instantaneous auxiliary contact blocks** | | | | | |
| AF09 ... AF38<br>4-pole NF | 1 | 0 | – | – | CA4-10 |
| | 0 | 1 | – | – | CA4-01 |
| AF09 ... AF16..-30-10 | 2 | 2 | – | – | CA4-22M |
| | 3 | 1 | – | – | CA4-31M |
| | 1 | 3 | – | – | CA4-13M |
| | 0 | 4 | – | – | CA4-04M |
| AF26 ... AF38..-30-00<br>AF09 ... AF38..-40-00<br>AF09 ... AF38..-22-00 | 2 | 2 | – | – | CA4-22E |
| | 3 | 1 | – | – | CA4-31E |
| | 4 | 0 | – | – | CA4-40E |
| AF26 ... AF38..-30-00<br>AF09 ... AF16..-40-00 | 0 | 4 | – | – | CA4-04E |
| AF09 ... AF16..-30-01 | 2 | 2 | – | – | CA4-22U |
| | 3 | 1 | – | – | CA4-31U |
| | 4 | 0 | – | – | CA4-40U |
| 4-pole NF | 4 | 0 | – | – | CA4-40N |
| | 3 | 1 | – | – | CA4-31N |
| | 2 | 2 | – | – | CA4-22N |
| | 1 | 3 | – | – | CA4-13N |
| NF..40E | 0 | 4 | – | – | CA4-04N |
| **Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact** | | | | | |
| AF09 ... AF38<br>4-pole NF | – | – | 1 | 0 | CC4-10 |
| | – | – | 0 | 1 | CC4-01 |
| **Side-mounted instantaneous auxiliary contact blocks** | | | | | |
| AF09 ... AF38, NF | 1 | 1 | – | – | CAL4-11 |
| **Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks** | | | | | |
| AF09 ... AF16..-30-10 | 1 | 1 | – | – | CAT4-11M |
| AF26 ... AF38..-30-00<br>AF09 ... AF38..-40-00<br>AF09 ... AF38..-22-00 | 1 | 1 | – | – | CAT4-11E |
| AF09 ... AF16..-30-01 | 1 | 1 | – | – | CAT4-11U |

(1) For each contactor or contactor relay type, refer to "Accessory fitting details" table.

**Note:** CAT4 not fittable on AF..Z contactors with DC control voltage 12…20 V DC.
Auxiliary contacts same for AF...Z contactors

# Auxiliary contact blocks

## AF09(Z)... AF38(Z); AF09N00(Z)...AF26N1(Z)

## Technical data

| Types | | 1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4 |
|---|---|---|
| **Contact utilization characteristics according to IEC** | | |
| Standards | | IEC 60947-5-1 and EN 60947-5-1 |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | 690 V |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated operational voltage Ue max. | | 24...690 V |
| Conventional thermal current Ith - ϑ ≤ 40 °C | | 16 A |
| Rated frequency limits | | 25…400 Hz |
| Ie / Rated operational current AC-15 | 24-127 V 50/60 Hz | 6 A |
| acc. to IEC 60947-5-1 | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity acc. to IEC 60947-5-1 | | 10 x Ie AC-15 |
| Breaking capacity acc. to IEC 60947-5-1 | | 10 x Ie AC-15 |
| Ie / Rated operational current DC-13 | 24 V DC | 6 A / 144 W |
| acc. to IEC 60947-5-1 | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| | 400 V DC | 0.15 A / 60 W |
| | 500 V DC | 0.13 A / 65 W |
| | 600 V DC | 0.1 A / 60 W |
| Short-circuit protection device gG type fuse | | 10 A |
| Rated short-time withstand current Icw | for 1.0 s | 100 A |
| ϑ = 40 °C | for 0.1 s | 140 A |
| Minimum switching capacity | | 12 V / 3 mA |
| with failure rate acc. to IEC 60947-5-4 | | 10-7 |
| Heat dissipation per pole at 6 A | | 0.1 W |
| Mechanical durability Number of operating cycles | | 10 million operating cycles |
| Max. switching frequency | | 3600 cycles/h |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contact acc. to annex L of IEC 60947-5-1 | | Yes for N.O. and N.C. contacts |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Yes for N.C. contacts |
| **Contact utilization characteristics according to UL / CSA** | | |
| Standards | | UL 508, CSA C22.2 N°14 |
| Max. operational voltage | | 600 V AC, 600 V DC |
| Pilot duty | | A600, Q600 |
| AC thermal rated current | | 10 A |
| AC maximum volt-ampere making | | 7200 VA |
| AC maximum volt-ampere breaking | | 720 VA |
| DC thermal rated current | | 2.5 A |
| DC maximum volt-ampere making-breaking | | 69 VA |
| **Connecting characteristics** | | |
| Screw terminals (Delivered in open position, screws of unused terminals must be tightened) | | |
| All terminals | | M3.5 |
| Connection capacity (min…max.) | | |
| Rigid solid | 1 x | 1...2.5 mm² |
| | 2 x | 1...2.5 mm² |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² |
| | 2 x | 0.75...2.5 mm² |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² |
| | 2 x | 0.75…1.5 mm² |
| Lug | L ≤ | 8 mm |
| | l > | - |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18…14, solid / stranded |
| Stripping length | | 10 mm |
| Degree of protection | | |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |
| Tightening torque | | 1.2 Nm / 11 lb.in |

# Auxiliary contact blocks

## A/E/L9...A/E/L40; A/E/F50...AF2050; A/E/F50N2... AF1650N8

CA5-10

### Ordering details

| For contactors | Number of blocks (1) | Auxiliary contacts | | | | Catalog number |
|---|---|---|---|---|---|---|
| A9...A40, T/AL9...T/AL40 | 1-5 | 1 | 0 | – | – | CA5-10 |
| A45 ... A110 | 1-6 | 0 | 1 | – | – | CA5-01 |
| AF45, AF110 | 1-6 | – | – | 1 | 0 | CC5-10 |
| AE45 ... AE75, TAE45 ... TAE75 | 1-6 | – | – | 0 | 1 | CC5-01 |

### Front-mounted instantaneous auxiliary contact blocks, 1-pole

CA5-40E

### Front-mounted instantaneous auxiliary contact blocks, 4-pole

| | | | | | | |
|---|---|---|---|---|---|---|
| A45 ... A110<br>AE45 ... AE75<br>AF45 ... AF110<br>TAE45 ... TAE75 | 1 | 4 | 0 | – | – | CA5-40E |
| | | 3 | 1 | – | – | CA5-31E |
| | | 2 | 2 | – | – | CA5-22E |
| | | 0 | 4 | – | – | CA5-04E |
| | | 1 | 1 | 1 | 1 | CA5-11/11E |
| A40-30-10<br>AL40-30-10<br>TAL40-30-10 | 1 | 3 | 1 | – | – | CA5-31M |
| | | 2 | 2 | – | – | CA5-22M |
| | | 1 | 3 | – | – | CA5-13M |
| | | 0 | 4 | – | – | CA5-04M |
| | | 1 | 1 | 1 | 1 | CA5-11/11M |
| A40-30-10<br>AL40-30-10<br>TAL40-30-10 | 1 | 4 | 0 | – | – | CA5-40U |
| | | 3 | 1 | – | – | CA5-31U |
| | | 2 | 2 | – | – | CA5-22U |
| | | 0 | 4 | – | – | CA5-04U |

CAL5-11

### Side-mounted instantaneous auxiliary contact blocks, 2-pole

| | | | | | | |
|---|---|---|---|---|---|---|
| A9...A75<br>T/AL9...T/AL40<br>AE9...T/AE75<br>AF45 ... AF75<br>UA16 ... UA75 | 1-2<br>1<br>1<br>1-2<br>1-2 | 1 | 1 | – | – | CAL5-11 |
| A95 ... A300<br>AF95 ... AF2050<br>UA95, UA110 | 1-2 | 1 | 1 | – | – | CAL18-11 |
| A145 ... A300 | 1-2(2) | 1 | 1 | – | – | CAL18-11B |
| AF145 ... AF2050 | | 1 | 1 | – | – | |

CAL18-11

(1) For each contactor type, refer to "Accessory fitting details" table.
(2) 2 blocks CAL18-11 + 2 blocks CAL18-11B.

**Note:**

– The front-mounted auxiliary contact blocks provided for the A... contactors can be used for the UA..., GA... and GAE... types

– The CAL... auxiliary contact blocks can be used for GA... contactors:

GA75-10-00: 2 x CAL5-11 blocks
GA75-10-11: 1 x CAL5-11 block
GAE75-10-00: 1 x CAL5-11 block
GAE75-10-11: no add-on block.

– The CAL... auxiliary contact blocks can be used for UA..RA contactors. See "Accessory fitting details" for this contactor type.

### Low-energy side-mounted contact blocks, 1-pole

| | | | | | | |
|---|---|---|---|---|---|---|
| A145...A300 | 1-2 | 1 | 0 | – | – | CEL18-10 |
| AF145...AF2050 | 1-2 | 0 | 1 | – | – | CEL18-01 |

# Auxiliary contact blocks

## A/E/L9...A/E/L40; A/E/F50...AF2050; A/E/F50N2...AF1650N8

## Technical data

| Types | | 1-pole CA5, 4-pole CA5, 1-pole CC5, 2-pole CAL5 | 2-pole CAL18 | 1-pole CEL18 |
|---|---|---|---|---|
| **Contact utilization characteristics according to IEC** | | | | |
| Standards | | IEC 60947-5-1 and EN 60947-5-1 | | |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | 690 V | | 250 V |
| Rated impulse withstand voltage Uimp | | 6 kV | | - |
| Rated operational voltage Ue max. | | 24...690 V | | 125 V |
| Conventional thermal current Ith - θ ≤ 40 °C | | 16 A | | 0.1 |
| Rated frequency limits | | Consult factory | | |
| Ie / Rated operational current AC-15 | 24-127 V 50/60 Hz | 6 A | | 0.1 A (AC-14) |
| acc. to IEC 60947-5-1 | 220-240 V 50/60 Hz | 4 A | | - |
| | 400-440 V 50/60 Hz | 3 A | | - |
| | 500 V 50/60 Hz | 2 A | | - |
| | 690 V 50/60 Hz | 2 A | | - |
| Making capacity acc. to IEC 60947-5-1 | | 10 x Ie AC-15 | | 10 x Ie AC-14 |
| Breaking capacity acc. to IEC 60947-5-1 | | 10 x Ie AC-15 | | 10 x Ie AC-14 |
| Ie / Rated operational current DC-13 | 24 V DC | 6 A / 144 W | | 0.1 A (DC-12) |
| acc. to IEC 60947-5-1 | 48 V DC | 2.8 A / 134 W | | 0.1 A (DC-12) |
| | 72 V DC | 1 A / 72 W | | 0.1 A (DC-12) |
| | 110 V DC | 0.55 A / 60 W | | 0.1 A (DC-12) |
| | 125 V DC | 0.55 A / 69 W | | - |
| | 220 V DC | 0.27 A / 60 W | | - |
| | 250 V DC | 0.27 A / 68 W | | - |
| Short-circuit protection device gG type fuse | | 10 A | | 0.1 (FF type HRC fuses) |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | | - |
| θ = 40 °C | for 0.1 s | 140 A | | - |
| Minimum switching capacity | | 17 V / 1 mA (24 V / 50 mA for A/F95…110) | 24 V / 50 mA (0.5M of operating cycles) | 3 V / 1 mA |
| with failure rate acc. to IEC 60947-5-4 | | 10-7 | - | - |
| Heat dissipation per pole at 6 A | | 0.1 W | 0.15 W | 0.15 W |
| Mechanical durability Number of operating cycles | | 10 million (3M for A/F95…110) | "5M (A/F95…185), 3M (A/F210…750), 0.5M (AF1350…2050)" | 1 million |
| Max. switching frequency | | 3600 cycles/h | | 1200 cycles per hour |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | | 1200 cycles per hour (AC-14) |
| | DC-13 | 900 cycles/h | | - |
| Mechanically linked contact acc. to annex L of IEC 60947-5-1 | | Yes for N.O. and N.C. contacts | | - |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Yes for N.C. contacts | | - |
| **Contact utilization characteristics according to UL / CSA** | | | | |
| Standards | | UL 508, CSA C22.2 N°14 | | |
| Max. operational voltage | | 600 V AC, 250 V DC | | 125 V AC, 24 V DC |
| Pilot duty | | A600, Q300 | | 0.1 A (AC), 5 mA (DC) |
| AC thermal rated current | | 10 A | | 0.1 A |
| AC maximum volt-ampere making | | 7200 VA | | 12.5 VA |
| AC maximum volt-ampere breaking | | 720 VA | | 12.5 VA |
| DC thermal rated current | | 2.5 A | | 5 mA |
| DC maximum volt-ampere making-breaking | | 69 VA | | 1.2 VA |
| **Connecting characteristics** | | | | |
| Screw terminals (Delivered in open position, screws of unused terminals must be tightened) | | | | |
| All terminals | | M3.5 | | |
| Connection capacity (min…max.) | | | | |
| Rigid solid | 1 x | 1…4 mm² | | |
| | 2 x | 1…4 mm² | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75…2.5 mm² | | |
| Flexible with insulated ferrule | 1 x | - | | |
| | 2 x | - | | |
| L Lugs | L ≤ | 8 mm | | |
| | l > | 3.7 mm | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18…12, solid / stranded | | |
| Stripping length | | 10 mm | | |
| Degree of protection | | IP20 | | |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | |
| Tightening torque | | 1 Nm / 9 lb.in | | |

# Auxiliary contact blocks
## (V)AS/L09...(V)AS/L16; (V)B/C6...(V)B/C7; EK

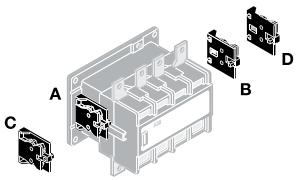
### Ordering details

CA3-10

| For contactors | For contactor relays | Contact blocks | | Catalog number |
|---|---|---|---|---|
| **1-pole auxiliary contact blocks with screw terminals** | | | | |
| AS09 ... AS16<br>ASL09 ... ASL16 | NS, NSL | 1 | – | CA3-10 |
| | | – | 1 | CA3-01 |

CA3-10S

| For contactors | For contactor relays | Contact blocks | | Catalog number |
|---|---|---|---|---|
| **1-pole auxiliary contact blocks with spring terminals** | | | | |
| AS09..S ... AS16..S | NS..S, NSL..S | 1 | – | CA3-10S |
| ASL09..S ... ASL16..S | | – | 1 | CA3-01S |



Mounting positions of the CAL16-11

| For contactors | Number of blocks | Auxiliary contacts | | | | Catalog number |
|---|---|---|---|---|---|---|
| **2-pole auxiliary contacts N.O. + N.C.** | | | | | | |
| EK | 1 | 1 | 1 | – | – | CAL16-11A |
| | 1 | 1 | 1 | – | – | CAL16-11B |
| | 1 | 1 | 1 | – | – | CAL16-11C |
| | 1 | 1 | 1 | – | – | CAL16-11D |
| | 1 | 1 | – | – | 1 | CCL16-11E (1) |

(1) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK... contactors are equipped with one CCL16-11E on the right side.

CA6-11E

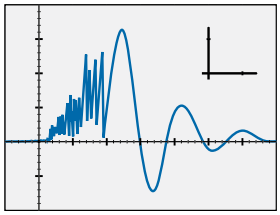
CA6-11E-P

| For contactors | Auxiliary contacts | | Catalog number |
|---|---|---|---|
| **Front-mounted instantaneous auxiliary contact blocks (not allowed for mounting on TBC, B6S, B7S, interface contactors) [1)]** | | | |
| B6-, B7-40-00, BC6-, BC7-40-00<br>VB6, VB7, VBC6, VBC7, VB6A, VB7A<br>VBC6A, VBC7A | 1 | 1 | CAF6-11E |
| | 2 | 0 | CAF6-20E |
| | 0 | 2 | CAF6-02E |
| B6-, B7-30-10, BC6-, BC7-30-10<br>VB6, VB7, VBC6, VBC7, VB6A, VB7A<br>VBC6A, VBC7A | 1 | 1 | CAF6-11M |
| | 2 | 0 | CAF6-20M |
| | 0 | 2 | CAF6-02M |
| B6-, B7-30-01, BC6-, BC7-30-01<br>VB6, VB7, VBC6, VBC7, VB6A, VB7A<br>VBC6A, VBC7A | 1 | 1 | CAF6-11N |
| | 2 | 0 | CAF6-20N |
| | 0 | 2 | CAF6-02N |
| **Side-mounted instantaneous auxiliary contact block [1)]** | | | |
| B6-, B7-40-00, BC6-, BC7-40-00 | 1 | 1 | CA6-11E |
| B6-, B7-30-10, BC6-, BC7-30-10 | 1 | 1 | CA6-11M |
| B6-, B7-30-01, BC6-, BC7-30-01 | 1 | 1 | CA6-11N |
| **Side-mounted instantaneous auxiliary contact block with soldering pins [1)]** | | | |
| B6-, B7-40-00-P, BC6-,BC7-40-00-P | 1 | 1 | CA6-11E-P |
| B6-, B7-30-10-P, BC6-, BC7-30-10-P | 1 | 1 | CA6-11M-P |
| B6-, B7-30-01-P, BC6-, BC7-30-01-P | 1 | 1 | CA6-11N-P |

# Auxiliary contact blocks
## (V)AS/L09...(V)AS/L16
## Technical data

| Types | | 1-pole CA3 | 1-pole CA3…S |
|---|---|---|---|
| **Contact utilization characteristics according to IEC** | | | |
| Standards | | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | 690 V | |
| Rated impulse withstand voltage Uimp | | 6 kV | |
| Rated operational voltage Ue max. | | 690 V | |
| Conventional thermal current Ith - ⊠ ≤ 40 °C | | 10 A | |
| Rated frequency limits | | 25…400 Hz | |
| Ie / Rated operational current AC-15 | 24-127 V 50/60 Hz | 6 A | |
| acc. to IEC 60947-5-1 | 220-240 V 50/60 Hz | 4 A | |
| | 400-440 V 50/60 Hz | 3 A | |
| | 500 V 50/60 Hz | 2 A | |
| | 690 V 50/60 Hz | 2 A | |
| Making capacity acc. to IEC 60947-5-1 | | 10 x Ie AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | | 10 x Ie AC-15 | |
| Ie / Rated operational current DC-13 | 24 V DC | 6 A / 144 W | |
| acc. to IEC 60947-5-1 | 48 V DC | 2.8 A / 134 W | |
| | 72 V DC | 1 A / 72 W | |
| | 110 V DC | 0.55 A / 60 W | |
| | 125 V DC | 0.55 A / 69 W | |
| | 220 V DC | 0.27 A / 60 W | |
| | 250 V DC | 0.27 A / 68 W | |
| | 400 V DC | - | |
| | 500 V DC | - | |
| | 600 V DC | - | |
| Short-circuit protection device gG type fuse | | 10 A | |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | |
| θ = 40 °C | for 0.1 s | 140 A | |
| Minimum switching capacity | | 12 V / 3 mA | |
| with failure rate acc. to IEC 60947-5-4 | | 10-7 | |
| Heat dissipation per pole at 6 A | | 0.1 W | |
| Mechanical durability Number of operating cycles | | 10 million operating cycles | |
| Max. switching frequency | | 3600 cycles/h | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | |
| | DC-13 | 900 cycles/h | |
| Mechanically linked contact acc. to annex L of IEC 60947-5-1 | | Yes for N.O. and N.C. contacts | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Yes for N.C. contacts | |
| **Contact utilization characteristics according to UL / CSA** | | | |
| Standards | | UL 508, CSA C22.2 N°14 | |
| Max. operational voltage | | 600 V AC, 250 V DC | |
| Pilot duty | | A600, Q300 | |
| AC thermal rated current | | 10 A | |
| AC maximum volt-ampere making | | 7200 VA | |
| AC maximum volt-ampere breaking | | 720 VA | |
| DC thermal rated current | | 2.5 A | |
| DC maximum volt-ampere making-breaking | | 69 VA | |
| **Connecting characteristics** | | | |
| Screw terminals (Delivered in open position, screws of unused termnials must be tightened) | | | |
| All terminals | | M3 | N/a - Spring terminals |
| Connection capacity (min…max.) | | 0.75...2.5 mm² | |
| Rigid solid | 1 x | | |
| | 2 x | 0.75...2.5 mm² | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | |
| | 2 x | 0.75...2.5 mm² | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | 0.75…1.5 mm² |
| | 2 x | 0.75…1.5 mm² | |
| Lugs | L ≤ | 7.7 mm | - |
| | l > | 3.2 mm | - |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18…14, solid / stranded | |
| Stripping length | | 9 mm | 10 mm |
| Degree of protection | | IP20 | |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | Flat Ø 3.5 |
| Tightening torque | | 1 Nm / 9 lb.in | - |

# Surge suppressors for contactor coils



## NOTE: AF Series contactors include integral surge suppressor

## Description

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

The electromagnetic energy stored in 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 42 V / 50 Hz 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 3500 V.

RV5

**Overvoltage Factor**

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value Ûs to the peak value Ûc of the coil rated control voltage Uc:

$$k = \frac{\hat{U}s\ max.}{\hat{U}c} \qquad \text{in DC: } k = \frac{\hat{U}s\ max.}{Uc} \qquad \text{or in AC: } k = \frac{\hat{U}s\ max.}{Uc\sqrt{2}}$$

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

RC5-1

To reduce 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 decreases to a very large extent when a certain voltage is applied at its terminals.

RT5

## Ordering details

| For contactors | Rated control circuit voltage Uc | | | Catalog number |
|---|---|---|---|---|
| | V | AC | DC | |
| AS09...AS16; A9 ... A110, AL9...AL40, ASL09...ASL16 AE9 ... AE75, TAL9...TAL40, TAE45 ... TAE75 | 24...50 | ● | ● | RV5/50 |
| | 50...133 | ● | ● | RV5/133 |
| | 110...250 | ● | ● | RV5/250 |
| | 250...440 | ● | ● | RV5/440 |
| AS09...AS16 A9...A40 | 24...50 | ● | – | RC5-1/50 |
| | 50...133 | ● | – | RC5-1/133 |
| | 110...250 | ● | – | RC5-1/250 |
| | 250...440 | ● | – | RC5-1/440 |
| A45 ... A110 | 24...50 | ● | – | RC5-2/50 |
| | 50...133 | ● | – | RC5-2/133 |
| | 110...250 | ● | – | RC5-2/250 |
| | 250...440 | ● | – | RC5-2/440 |
| A145 ... A300 | 250...440 | ● | – | RC5-3/440 |
| AL9...AL40 AE9 ... AE75, TAL9...TAL40, TAE45 ... TAE75 ASL09...ASL16 | 12...32 | – | ● | RT5/32 |
| | 25...65 | – | ● | RT5/65 |
| | 50...90 | – | ● | RT5/90 |
| | 77...150 | – | ● | RT5/150 |
| | 150...264 | – | ● | RT5/264 |
| EK110 ... EK210 | 24...48 | ● | – | RC-EH300/48 |
| | 110...415 | ● | – | RC-EH300/415 |
| EK370 ... EK1000 | 48...110 | ● | – | RC-EH800/110 |
| EK110 ... EK1000 | 24...125 | – | ● | RC-EH800/110 |
| EK370 ... EK1000 | 220...600 | ● | – | RC-EH800/600 |

RC-EH300/48

# Surge suppressors for contactor coils

RV-BC6/250

| For contactors | Rated control circuit voltage $U_C$ V DC | Connection type | Catalog number |
|---|---|---|---|
| **Surge suppressors for contactor coils** | | | |
| BC6, BC7 | 24 ... 60 | Cable lug | RV-BC6/60 |
| | | Flat pin, 2.8 mm | RV-BC6-F/60 |
| | 50 ... 250 | Cable lug | RV-BC6/250 |
| | | Flat pin, 2.8 mm | RV-BC6-F/250 |
| | 380 | Cable lug | RV-BC6/380 |
| | | Flat pin, 2.8 mm | RV-BC6-F/380 |

Note: Mini contactors for AC operation have an integrated protective circuit

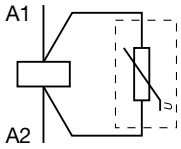
## Technical data

| Varistor | RV5/50 | RV5/133 | RV5/250 | RV5/440 |
|---|---|---|---|---|
| **Rated control circuit voltage Uc** | 24...50 V AC | 50...133 V AC | 110...250 V AC | 250...440 V AC |
| | 24...50 V DC | 50...133 V DC | 110...250 V DC | 250...440 V DC |
| **Residual overvoltage** (clipping voltage) | 132 V AC | 270 V AC | 480 V AC | 825 V AC |
| | 132 V DC | 270 V DC | 480 V DC | 825 V DC |
| **Opening time growth factor** | none | | | |
| **Operating temperature** | -20...+70 °C | | | |
| **Advantages** | High energy absorption: good damping - Unpolarized system. | | | |
| **Drawback** | Clipping as from Uvdr*, thus voltage front up to this point.<br>*Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %. | | | |

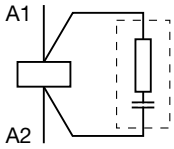
| RC type | RC5-1/50 | RC5-1/133 | RC5-1/250 | RC5-1/440 |
|---|---|---|---|---|
| **Rated control circuit voltage Uc** | 24...50 V AC | 50...133 V AC | 110...250 V AC | 250...440 V AC |
| **Residual overvoltage** (clipping voltage) | 2 to 3 x Uc max. | | | |
| **Opening time growth factor** | 2...3 | | | |
| **Operating temperature** | -20...+70 °C | | | |
| **Advantages** | Very fast clipping - Attenuation of steep fronts and thus of high frequencies. | | | |

| Transil diode | RT5/32 | RT5/65 | RT5/90 | RT5/150 | RT5/264 |
|---|---|---|---|---|---|
| **Rated control circuit voltage Uc** | 12...32 V DC | 25...65 V DC | 50...90 V DC | 77...150 V DC | 150...264 V DC |
| **Residual overvoltage** (clipping voltage) | 50 V DC | 100 V DC | 150 V DC | 210 V DC | 390 V DC |
| **Opening time growth factor** | 1.1...1.2 | | | | |
| **Operating temperature** | -20...+70 °C | | | | |
| **Advantages** | Good energy absorption - Unpolarized system - Simple, reliable system. | | | | |
| **Drawback** | Delay on drop out which does not however reduce contactor breaking capacity. | | | | |

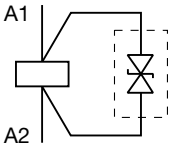
## Wiring diagrams




Varistor




RC type




Transil diode

# Interface relays
## A/E/L9...A110

A30-30-10 + RA 5

RA 5

### Interface relays

| Mounting on contactor types | Control voltage $U_c$ | Coil voltages | Catalog number |
|---|---|---|---|
| N, A9 – A110 | 24 VDC | 24 – 250V, 50, 60 Hz | RA5-1 |

NOTE: The interface relays provided for the A contactors can also b e used for UA, UA..., RA and GA types.

### Application

RA 5-1 interface relays are designed to receive 24 VDC signals delivered by PLC's or other sources with a low output power and restore them with sufficient power to operate the coils of the relevant A9 - A110 contactors or the N control relays.

- IEC only

### Description

RA5 interface relays are made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 VDC 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 5-1 is equipped with surge suppressors:

- on the 24 VDC relay coil via a diode
- on the power contactor coil via a varistor.

Furthermore, the RA 5-1 are protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

### Connection

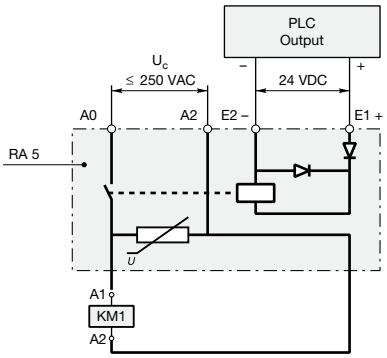
The "E1+" and "E2–" input terminals must be connected, according to their polarity, to the PLC output.

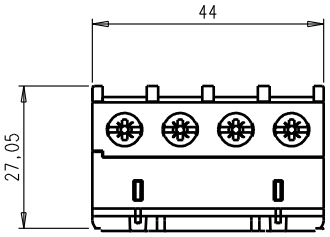
The RA 5 is equipped with two terminal pads for connection to the A1 and A2 terminals of the contactor coil. This coil is supplied between the A0 and A2 terminals of the RA 5.

### Mounting

- RA5: terminal pads clamped inside the contactor coil terminals.

**RA 5-1 interface relay for the A 9 – A 110 contactors and N control relays**



# Interface relays
## Technical data

## General technical data

| | | |
|---|---|---|
| **Compliance with standards** | | IEC 60255-5 |
| **Rated insulation voltage $U_i$** according to IEC 60947-4-1 | **V a.c.** | 250 |
| **Permissible ambient temperature:** | | |
| – for free air operation: | | |
| – at $U_c$ = 24 V d.c. (between E1 and E2) | **°C** | -25 ... +70 |
| – from 0.85 to 1.1 $U_c$ | **°C** | -25 ... +55 |
| – for storage | **°C** | -40 ... +70 |
| **Climatic withstand** | | Complies with that of associated contactors |
| **Operating altitude** | **m** | ≤ 3000 |
| **Mounting position** | | No limitation |
| **Fixing** | | Using the contactor A1 and A2 terminal connecting parts |
| **Connecting terminals** (delivered in open position) | | M3.5 (+,-) pozidriv 2 screws with cable clamp |
| **Connecting capacity** (min. ... max.) | | |
| – rigid solid | 2 x **mm²** | 1 ... 4 |
| – flexible with cable end | 2 x **mm²** | 0.75 ... 2.5 |
| **Tightening torque** | | |
| – recommended | **Nm** | 1.00 |
| – max. | **Nm** | 1.20 |
| **Degree of protection** according to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | Protection against direct contact in acc. with EN 50274 RA5-1 wired and mounted on the associated contactor |

## Working data

| | | |
|---|---|---|
| **Surge suppression:** | | |
| – for contactor coil | | Varistor |
| – for interface relay coil | | Diode |
| **Protection against polarity reversal between terminals E1 and E2** | | Diode |
| **Interface relay operating time** | **ms** | Closing and drop-out ≤ 10 |
| **Total operating time, interface relay + contactor:** | | |
| – between energization and: | | |
| N.O. contact closing | **ms** | 20 ... 37 |
| N.C. contact opening | **ms** | 17 ... 32 |
| – between de-energization and: | | |
| N.O. contact opening | **ms** | 17 ... 25 |
| N.C. contact closing | **ms** | 20 ... 28 |

## Electrical input data

| | | |
|---|---|---|
| **Control voltage** (E1and E2 terminals) $U_c$ | | |
| – rated value | **V d.c.** | 24 |
| – max. range at ambient temperature 20 °C | **V d.c.** | 19 ... 30 |
| **Max. consumption** for $U_c$ = 24 V d.c., θ = 20 °C | **W** | 0.3 |
| **"0" status** (relay open) for $U_c$ | **V d.c.** | ≤ 2.4 |
| or $I_c$ | **mA** | < 1 |
| **"1" status** (relay closed) for $U_c$ | **V d.c.** | ≥ 19 |
| **Max. short supply interruption immunity time** | **ms** | 2 |

## Electrical output data

| | | |
|---|---|---|
| **Switching voltage** (A0 and A2 terminals) | **V a.c.** | ≤ 250 |
| **Electrical durability** | **million of operating cycles** | 2 (600 cycles/h) on A 9 ... A 75 contactors or N... contactor relay<br>0.5 (600 cycles/h) on A 95 and A 110 contactors |

# Mechanical & electrical interlocks

## AF09(Z)...AF38(Z), AF09N00(Z)...AF26N1(Z); AS/L09...AS/L16

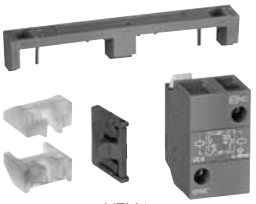
VM4

VM3

### Mechanical interlock unit

| For contactors | Catalog number |
|---|---|
| AF09 ... AF38..-30-..<br>AF09 ... AF38..-40-00 | VM4 |
| ASL | VM3 |

Note: Includes two fixing clips.

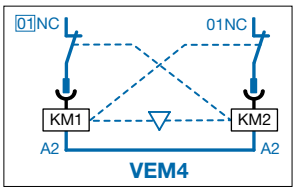


VEM4

### Mechanical and electrical interlock set

| For contactors | Auxiliary contacts | | Catalog number |
|---|---|---|---|
| AF09 ... AF16..-30-..<br>AF26 ... AF38..-30-00<br>AF09, AF16..-40-00<br>AF26, AF38..40-00 | 1 | 1 | VEM4 |

Note: VEM4 not fittable on AF..Z contactors with DC control voltage 12...20 V DC.




### Fixing clips

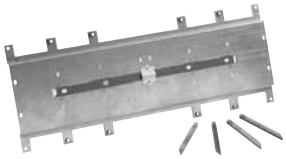
| For contactors | Catalog number |
|---|---|
| AF09 ... AF38 | BB4 |
| AS, ASL | BB3 |

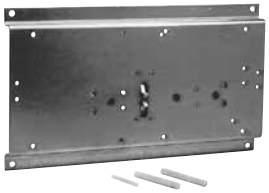
Note: Set of 50 pieces each

BB4

# Mechanical & electrical interlocks
## A/E/L9...A/E/L40; A/E/F50...AF2050 A/E/F50N2...AF1650N8; EK

VM300H

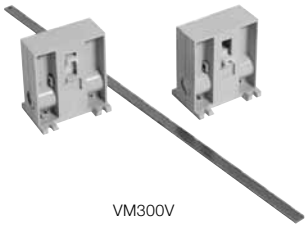

VM1650H


VH800

### Ordering details (1)

| Left side contactor | Right side contactor | Mounting | Catalog number |
|---|---|---|---|
| **Mechanical interlock units for two horizontal mounted contactors (1)** | | | |
| A9...A40 | A9,,,A40 | Rail mounting | VM5-1 |
| A30...A40 | A45 ... A110 | See table below with VE5-.. type | – |
| A45 ... A75 | A45 ... A110 | | – |
| A95 ... A185 | A45 ... A110 | | – |
| A95 ... A185 | A145 ... A300 | PN.. mounting plate to be ordered separately | VM300H |
| A210 ... A300 | A145 ... A300 | | VM300H |
| A210 ... A300 | AF400 ... AF460 | | VM300/460H |
| AF400 ... AF1250 | AF400 ... AF1250 | | VM750H |
| AF1350 ... AF2050 | AF1350 ... AF2050 | Plate included | VM1650H |
| EK370...EK1000 | EK370...EK1000 | Plate included | VH800 |

(1) Mechanical durability: VM5-1 = 5 millions cycles, VM300H ... VM750H = 1 million cycles.
The interlock units provided for A... contactors can be used for AF types, AE types & AL types.
The interlock units provided for A40.. contactors can be used for AL40.. and TAL40.. types.


VM300V

| Top contactor | Bottom contactor | Mounting | Catalog number |
|---|---|---|---|
| **Mechanical interlock units for two vertical mounted contactors (2)** | | | |
| A95 ... A185 | A145 ... A300 | Additional plate (not supplied) | VM300V |
| A210 ... A300 | A145 ... A300 | | VM300V |
| A210 ... A300 | AF400 ... AF460 | | VM300/460V |
| AF400 ... AF1250 | AF400 ... AF1250 | | VM750V |

(2) Mechanical durability: VM300V ... VM750V = 1 million cycles.

VE5-1

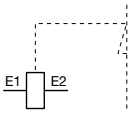
VH145

| Left side contactor | Right side contactor | Mounting | Catalog number |
|---|---|---|---|
| **Mechanical and electrical interlock units for two horizontal mounted contactors** | | | |
| A9...A40 | A9...A40 | Rail mounting | VE5-1 |
| A30 ... A75 | A45 ... A75 | | VE5-2 |
| A45 ... A75 | A30 ... A75 | | VE5-2 |
| A45 ... A75 | A95 ... A110 | PN.. mounting plate to be ordered separately | VE5-2 (3) |
| A95 ... A110 | A45 ... A75 | | VE5-2 (3) |
| A95 ... A110 | A95 ... A110 | | VE5-2 |
| EK110, EK150 | EK110, EK150 | | VH145 |
| EK175, EK210 | EK110, EK150 | | VH300 |

(3) The combination of A45 ... A75 contactors interlocked with A95, A110 contactors cannot be mounted on symmetrical rail
(75 mm, IEC/EN 60715).
The interlock units provided for A... contactors can be used for AE, TAE, AF, GA and GAE types.
The interlock units provided for A40.. contactors can be used for AL40.. and TAL40.. types.

# Mechanical latching unit
## AF(Z), AE & AL

WB75-A




Terminal marking

### Description

For converting standard contactors into latched contactors.

The WB75-A 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, M3.5 (+,-) pozidriv 2 screw with screw-driver 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 mechanism should the supply voltage fail at the contactor coil terminals.

Contactor opening can be controlled:

– electrically by an impulse* (AC or DC) on the WB75-A block coil.
  * the coil is not designed to be permanently energized.

– manually by pressing the pushbutton on the front face of the WB75-A block.

**Mounting**

The WB75-A block is clipped onto the front face of the 1-stack contactor where it takes up two slots. The two other slots may accept CA5... single pole auxiliary contacts (1 block on each side of the mechanical latch).

### Ordering details

| For contactors | Rated control circuit voltage Uc | | Catalog number |
|---|---|---|---|
| | V 50 Hz or DC | V 60 Hz | |
| A40 ... A75, AF45 ... AF75, AL40, AE45 ... AE75, TAL40, TAE45 ... TAE75, UA16 ... UA75, GA75, GAE75 AF09(Z)...AF38(Z) NF, NFZ | 24 | 24...28 | WB75A-01 |
| | 42 | 42...48 | WB75A-02 |
| | 48 | 48...55 | WB75A-03 |
| | 110 | 110...127 | WB75A-04 |
| | 220...230 | 220...255 | WB75A-06 |
| | 230...240 | 230...277 | WB75A-05 |
| | 380...415 | 380...440 | WB75A-07 |
| | 415...440 | 440...480 | WB75A-08 |

# Electronic timers

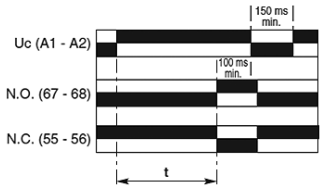
## AF09(Z)…AF38(Z), AS(L)09…AS(L)16, A/E/L40…A/E/F75

TEF3-ON

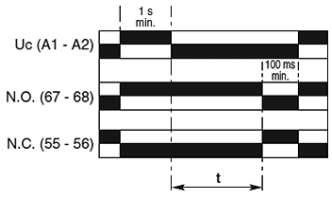
TEF5

### Ordering details

| For contactors, contactor relays | Time delay range selected by switch | Delay type | Rated control circuit voltage Uc V 50/60 Hz or DC | Auxiliary contacts | | Catalog number |
|---|---|---|---|---|---|---|
| AS/L09…AS/L16, NS(L) | 0.1...1 s | ON-delay | 24…240 | 1 | 1 | TEF3-ON |
| | | OFF-delay | 24…240 | 1 | 1 | TEF3-OFF |
| AF09(Z)…AF38(Z), NF(Z) | 1...10 s | ON-delay | 24…240 | 1 | 1 | TEF4-ON |
| | | OFF-delay | 24…240 | 1 | 1 | TEF4-OFF |
| A/E/L9…A/E/L40, A/E/F45…A/EF75 | 10...100 s | ON-delay | 24…240 | 1 | 1 | TEF5-ON |
| | | OFF-delay | 24…240 | 1 | 1 | TEF5-OFF |



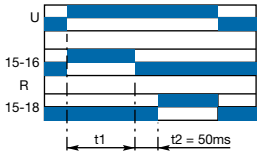

ON-delay



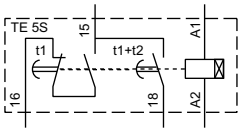

OFF-delay

# Electronic timers for wye-delta starters

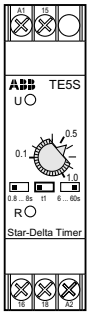
TE5S-*




Chart




Equivalent diagram




Front face

## Electronic timer

| For contactors | Rated control voltage Uc V | Packing piece | Unit weight kg | Catalog number |
|---|---|---|---|---|
| A9 – AF750 ① | 24 AC/D | 1 | 0.080 | TE5S-24 |
| | 110 – 120 AC | 1 | 0.080 | TE5S-120 |
| | 220 – 240 AC | 1 | 0.080 | TE5S-240 |
| | 380 – 440 AC | 1 | 0.080 | TE5S-440 |

## 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.

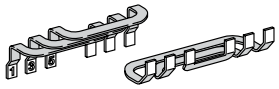
① Types AF09(Z)...AF38(Z); AF09N00(Z)...AF26N1(Z) and AS/L09...AS/L16 use Type CT-ERS... timers. See Chapter 6.

# Electronic timers for wye-delta starters
## Technical data

| Types | | | TE5S-24 | TE5S-120 | TE5S-240 | TE5S-440 |
|---|---|---|---|---|---|---|
| Compliance with standards | | | IEC 60947-5-1, EN 60947-5-1 | | | |
| Rated insulation voltage $U_i$ according to IEC 60947-5-1 | | V | 440 | | | |
| Rated operational voltage $U_e$ according to IEC 60947-5-1 | | V d.c.<br>V a.c. | 24<br>24 ... 240 | | | –<br>440 |
| Conventional free air thermal current $I_{th}$ | | A | 10 | | | |
| Rated operational current $I_e$ acc. to IEC 60947-5-1 | | | | | | |
| AC-15 | 24-120 V a.c. | A | 5 | | | – |
| | 220-240 V a.c. | A | 4 | | | – |
| | 380-440 V a.c. | A | – | | | 3 |
| DC-13 | 24 V d.c. | A | 4 | | | – |
| Short-circuit protection - gG type fuses | | A | 10 | | | |
| Rated supply voltage $U_c$ | | V d.c.<br>V a.c. | 24<br>24 | –<br>110 ... 120 | –<br>220 ... 240 | –<br>380 ... 440 |
| – 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 d.c.<br>– in a.c. | W<br>VA | 0.7<br>1.5 | –<br>3.5 | –<br>6.5 | –<br>12.5 |
| 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 operating cycles | | | |
| Minimum time lapse ($t_2$)<br>Min. time lapse after 1 million operating cycles | | ms<br>ms | 50<br>40 | | | |
| Resetting time (maximum) | | ms | 250 | | | |
| Front panel display: | – green indicator light<br>– yellow indicator light | | Energization<br>Output relay activated | | | |
| Permissible air temperature<br>– for operation<br>– for storage | | <br>°C<br>°C | <br>-25 ... +60<br>-40 ... +85 | | | |
| Vibration withstand acc. to IEC 60068-2-6, EN 60068-2-6 | | | 3 g from 10 to 300 Hz in the 3 directions | | | |
| Shock withstand acc. to IEC 60068-2-27, EN 60068-2-27 | | | 20 g / 11 ms in directions A and C<br>15 g / 11 ms in direction B | | | |
| Electrical durability | in millions of op. cycles | | 1 | | | |
| Mechanical durability | in millions of op. cycles | | 5 | | | |
| On-load maximum switching frequency | | cycles/h | 720 | | | 600 |
| Fixing on mounting rail acc. to IEC/EN 60715 | | 35 x 7.5 ( | 35 x 15 | | | |
| Connecting terminals | | | (+,-) pozidriv 1 screw | | | |
| Connecting capacity<br>– rigid solid<br>– flexible with cable end | | <br>1 or 2 x mm²<br>1 or 2 x mm² | <br>1 ... 2.5<br>0.75 ... 2.5 | | | |
| Tightening torque | | Nm | 0.6 ... 0.8 max. | | | |
| Degree of protection according to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | Terminals | IP 20 | | | |

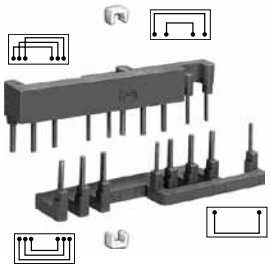
# Connection kits
## Reversing and phase-to-phase

BER16-4



BEM75-30

BEM300-30



BER16C-3

BES...

BSM6-30

### Reversing connection kits for 3-pole contactors

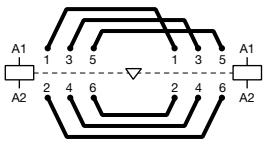
| Left side contactor | Right side contactor | Catalog number |
|---|---|---|
| AF09(Z)…AF16(Z) | AF09(Z)…AF16(Z) | BER16-4 |
| AF26(Z)…AF38(Z) | AF26(Z)…AF38(Z) | BER38-4 |
| A/E/L9…A/E/L16 | A/E/L9…A/E/L16 | BER16V |
| A/E/L26…A/E/L40 | A/E/L26…A/E/L40 | BER40V |
| A/E/F50…A/E/F75 | A/E/F50…A/E/F75 | BEM75-30 |
| A/F95…A/F110 | A/F95…A/F110 | BEM110-30 |
| A/F145…A/F185 | A/F145…A/F185 | BEM185-30 |
| A/F210…A/F300 | A/F210…A/F300 | BEMA300-30 |
| AF400…AF460 | AF400…AF460 | BEM460-30 |
| AF580…AF750 | AF580…AF750 | BEM750-30 |
| AS/L09…AS/L16 | AS/L09…AS/L16 | BER16C-3 |
| VB/C6…VB/C7 | - | BSM6-30 |

### Phase-to-phase connection kits for 3-pole contactors

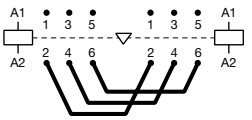
| Left side contactor | Right side contactor | Catalog number |
|---|---|---|
| A/E/F50…A/E/F75 | A/E/F50…A/E/F75 | BES75-30 |
| A/F95…A/F110 | A/F95…A/F110 | BES110-30 |
| A/F145…A/F185 | A/F145…A/F185 | BES185-30 |
| A/F210…A/F300 | A/F210…A/F300 | BESA300-30 |
| AF400…AF460 | AF400…AF460 | BES460-30 |
| AF580…AF750 | AF580…AF750 | BES750-30 |

### Phase-to-phase connection kits for 4-pole contactors

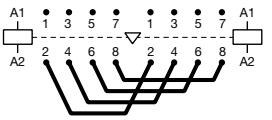
| Left side contactor | Right side contactor | Catalog number |
|---|---|---|
| A/E/F45…A/E/F75 | A/E/F45…A/E/F75 | BES75-40 |




BER, BEM connection sets




BES... for 3-pole connections

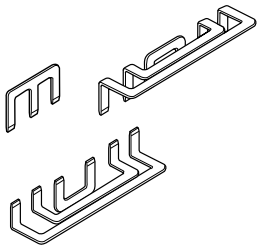



BES... for 4 N.O. main pole connections

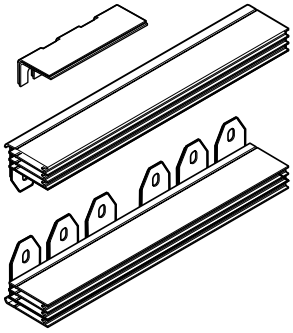
# Connection sets
## Wye-delta

BEY16-4

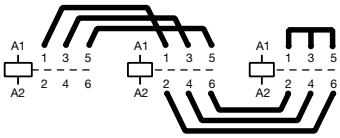
BEY16C-3



BED 110



BED 400




BEY / BED connection kits

### Wye-delta connection kits for 3-pole contactors

| Line contactor 1M | Delta contactor 2M | Shorting (wye) contactor 1S | Mechanical / electrical Interlock between 2M-1S | Catalog number |
|---|---|---|---|---|
| AF09(Z)-30 | AF09(Z)-30 | AF09(Z)-30 | VM4 / VEM4 ① | BEY16-4 |
| AF12(Z)-30 | AF12(Z)-30 | AF09(Z)-30 | | |
| AF16(Z)-30 | AF16(Z)-30 | AF09(Z)-30 | | |
| AF26(Z)-30 | AF26(Z)-30 | AF26(Z)-30 | VM4 / VEM4 ① | BEY38-4 |
| AF30(Z)-30 | AF30(Z)-30 | AF26(Z)-30 | | |
| AF38(Z)-30 | AF38(Z)-30 | AF26(Z)-30 | | |
| AS/L09-30 | AS/L09-30 | AS/L09-30 | VM3 ① | BEY16C-3 |
| AS/L12-30 | AS/L12-30 | AS/L09-30 | | |
| AS/L16-30 | AS/L16-30 | AS/L12-30 | | |
| A/E/L9-30 | A/E/L9-30 | A/E/L9-30 | VE5-1 | BEY16V-2 |
| A/E/L12-30 | A/E/L12-30 | A/E/L9-30 | | |
| A/E/L16-30 | A/E/L16-30 | A/E/L12-30 | | |
| A/E/L26-30 | A/E/L26-30 | A/E/L16-30 | VE5-1 | BEY26-2 |
| A/E/L30-30 | A/E/L30-30 | A/E/L26-30 | VE5-1 | BEY40-2 |
| A/E/L40-30 | A/E/L40-30 | A/E/L26-30 | | |
| A/E/F50-30 | A/E/F50-30 | A/E/L30-30 | VE5-2 | BED50U |
| A/E/F63-30 | A/E/F63-30 | A/E/L40-30 | VE5-2 | BED50U |
| A/E/F75-30 | A/E/F75-30 | A/E/F50-30 | VE5-2 | BED50U |
| A/F95-30 | A/F95-30 | A/E/F75-30 | VE5-2 | BED95U |
| A/F110-30 | A/F110-30 | A/F95-30 | VE5-2 | BED110U |
| A/F145-30 | A/F145-30 | A/F110-30 | VM300H | BED145U |
| A/F185-30 | A/F185-30 | A/F145-30 | VM300H | BED185U |
| A/F210-30 | A/F210-30 | A/F185-30 | VM300H | BED210U |
| A/F260-30 | A/F260-30 | A/F210-30 | VM300H | BED300U |
| A/F300-30 | A/F300-30 | A/F260-30 | | |
| AF400-30 | AF400-30 | A/F260-30 | VM300/460H | BED400U |
| AF460-30 | AF460-30 | A/F300-30 | | |
| | | AF400-30 | VM750H | BED460U |
| AF580-30 | AF580-30 | AF400-30 | VM750H | BED580U |
| | | AF460-30 | | |
| AF750-30 | AF750-30 | AF580-30 | VM750H | BED750U |

① Mechanical/electrical interlock optional.

# Coupling units
## Manual motor protectors

### Close couplers for contactors

| Manual motor protector | Miniature contactors | | AF contactors | | | | | | AS contactors | | A / AE Contactors | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B6...B7 | BC6...BC7 | AF09...AF16 | AF09Z...AF16Z | AF26...AF38 | AF26Z...AF38Z | AF50...AF75 | AF95...AF110 | AS09...AS16 | ASL09...ASL16 | A50...A75, AE50...AE75 | A95...A110 | |
| MS116-0.16…16 | • | • | | | | | | | | | | | BEA7/132 |
| | | | • | • | | | | | | | | | BEA16-4 |
| | | | | | • | • | | | | | | | BEA26-4 |
| | | | | | | | | | • | • | | | BEA16-3 |
| MS116-20…25 | | | • | • | | | | | | | | | BEA16-4 |
| | | | | | • | • | | | | | | | BEA38-4 |
| MS116-32 | | | | | • | • | | | | | | | BEA38-4 |
| MS132-0.16…10 | • | • | | | | | | | | | | | BEA7/132 |
| | | | • | • | | | | | | | | | BEA16-4 |
| | | | | | • | • | | | | | | | BEA26-4 |
| | | | | | | | | | • | • | | | BEA16-3 |
| MS132-12…16 | • | • | | | | | | | | | | | BEA7/132 |
| | | | • | • | | | | | | | | | BEA16-4 |
| | | | | | • | • | | | | | | | BEA38-4 |
| | | | | | | | | | • | • | | | BEA16-3 |
| MS132-20…25 | | | • | • | | | | | | | | | BEA16-4 |
| | | | | | • | • | | | | | | | BEA38-4 |
| MS132-32 | | | | | • | • | | | | | | | BEA38-4 |
| MS45x-40…50 | | | | | | | • | | | | • | | BEA50/450 |
| MS49x-40…100 | | | | | | | • | | | | • | | BEA75/495 |
| MS495-40…100 | | | | | | | | • | | | | • | BEA110/495 |

Note: For spring terminated AS/ASL, use part number BEA16-3U with integral wire leads for spring terminals.

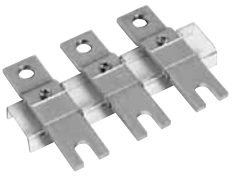
MS132 + AF Contactor

BEA16-4

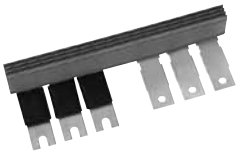
BEA16-3

# Coupling units
## MCCB/MCP/Fusible disconnects

BEA300

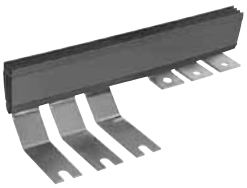


BEA...D



BEA300H

BEF300/OESA400



BEF300H/OESA400

### Ordering details

| For contactors | MCCB/MCP | Catalog number |
|---|---|---|
| **Vertical assembly** | | |
| A145, A185, AF145, AF185 | T3 | BEA185/T3 |
| A145, A185, AF145, AF185 | T4 | BEA185/T4 |
| A210, AF210 | T4 | BEA210/T4 |
| A210 ... A300, AF210 ... AF300 | T5 | BEA300/T5 |
| AF400 ... AF750 | T6 | BEA750/T6 |
| AF400 ... AF750 | T5 | BEA750/T5 |
| **Vertical assembly with control wire terminals** (also suitable when using busbar kits for starter combinations) | | |
| A145, A185, AF145, AF185 | T3 | BEA185D/T3 |
| A145, A185, AF145, AF185 | T4 | BEA185D/T4 |
| A210, AF210 | T4 | BEA210D/T4 |
| A210 ... A300, AF210 ... AF300 | T5 | BEA300D7T5 |
| AF400 ... AF750 | T6 | BEA750D/T6 |
| AF400 ... AF750 | T5 | BEA750D/T5 |
| **Horizontal assembly** (also suitable when using busbar kits for starter combinations) | | |
| A210 ... A300, AF210 ... AF300 | T5 | BEA300H/T5 |
| AF400, AF460 | T4 | BEA460H/T4 |

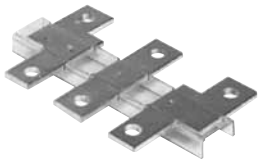
### Ordering details

| For contactors | Switch | Catalog number |
|---|---|---|
| **Vertical assembly** | | |
| A145 ... A185 | OESA250 | BEF185/OESA250 |
| A210 ... A300 | OESA250 to OESA400 | BEF300/OESA400 |
| AF400, AF460 | OESA400 | BEF460/OESA400 |
| AF460 ... AF750 | OESA630 to OESA800 | BEF750/OESA800 |
| **Horizontal assembly** | | |
| A145, A185 | OESA250...LR | BEF185H/OESA250 |
| A210 ... A300 | OESA250...LR to OESA400...LR | BEF300H/OESA400 |
| AF400, AF460 | OESA400...LR | BEF460H/OESA400 |

Note: The BEF... connection bars provided for the A145 ... A300 contactors can be used for the AF145 ... AF300 contactors.

# Terminal enlargements/extensions & Shorting bars

## LW... Terminal enlargements



LW...

| For contactors | Dimensions | | Catalog number |
|---|---|---|---|
| | hole Ø mm | bar mm | |
| A95, A110 | 6.5 | 15 x 3 | LW110 |
| A145, A185 | 10.5 | 20 x 5 | LW185 |
| A210 ... A300 | 10.5 | 25 x 5 | LW300 |
| AF400, AF460 | 10.5 | 25 x 5 | LW460 |
| AF580, AF750 | 13 | 40 x 6 | LW750 |
| AF1250 | 13 | 50 x 10 | LW1250 |

Note: The LW... pieces provided for the A... contactors can be used for the AF, AE, TAE and UA types.

## LX... Terminal extension

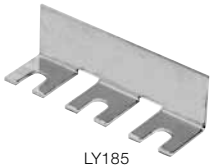
LW...

| For contactors | Dimensions | | Catalog number |
|---|---|---|---|
| | hole Ø mm | bar mm | |
| A145, A185 | 8.5 | 20 x 5 | LX185 |
| A210 ... A300 | 10.5 | 20 x 5 | LX300 |
| AF400, AF460 | 10.5 | 25 x 5 | LX460 |
| AF580, AF750 | 13 | 40 x 6 | LX750 |

Note: The LX... pieces provided for the A... contactors can be used for the AF types.

## Shorting bars

LP185



LY185

LH...

LF...

| Poles | For contactors | max. nominal continuous current with "n" poles A | Cable cross-sectional area mm² | Catalog number ① |
|---|---|---|---|---|
| 2-Pole | A145, A185 | 300 | – | LP185 |
| | A210 ... A300 | 475 | – | LP300 |
| | AF400, AF460 | 725 | – | LP460 |
| | AF580, AF750 | 1200 | – | LP750 |
| | A45 ... A75 | 200 | 95 | LH75 |
| 3-Pole | A95, A110 | 240 | – | LY110 |
| | A145, A185 | 400 | – | LY185 |
| | A210 ... A300 | 670 | – | LY300 |
| | AF400, AF460 | 1000 | – | LY460 |
| | AF580, AF750 | 1650 | – | LY750 |
| | A40 | 140 | 50 | LF40 |
| | A45 ... A75 | 275 | 150 | LF75 |

Note: The strips and shorting bars provided for the A... contactors can be used for the AF, AL, AL..Z, AE, TAL and TAE types.

## Terminal connecting strips and shorting bars

LY16-4

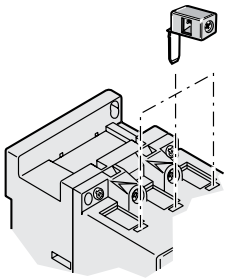
| For contactors | max. nominal continuous current with "n" poles | | | | Cable cross-sectional area | Catalog number |
|---|---|---|---|---|---|---|
| | in parallel | | | in series | | |
| | 2 poles | 3 poles | 4 poles | 2 poles | | |
| | A | A | A | A | mm² | |
| AF09 | 30 | 33 | - | 25 | 6 | LY16-4 |
| AF12 | 32 | 36 | - | 27 | | |
| AF16 | 34 | 40 | - | 30 | | |
| AF26 | 50 | 60 | - | 45 | 10 | LY38-4 |

① LP460 ... LP750, LY185 ... LY750 not insulated. Use terminal shrouds. Types LH... and LF..., not insulated, includes terminal.

# Terminal control leads, blocks & lug kits

LK75-L

LK75-F



LK... positioning

ATK185

ATK750/3

LD75

LD110

## Ordering details

| For contactors | Catalog number |
|---|---|
| Right and left on A45 ... A75 | LK75-L |
| Opposite on A45 ... A75 | LK75-F |
| Right and left on A95 ... A110 | LK110 |

Note: The LK... terminals provided for the A... contactors can be used for the AF, AE, AM, TAE, UA, GA and GAE types.

## Terminal lug kits

| For contactors | Wire | | Tightening torque | Spare terminal hardware included ① | Catalog number |
|---|---|---|---|---|---|
| | Range | Capacity | To conductor | | |
| AF145…AF185 A145…A185 | 4 AWG…300 MCM | 1 | 275 in.-lb | | ATK185 |
| | | | | • | ATK185HK |
| AF210…AF300 A210…A300 | 4 AWG…400 MCM | 1 | 375 in.-lb | | ATK300 |
| | | | | • | ATK300HK |
| | 4 AWG…500 MCM | 2 | 375 in.-lb | | ATK300/2 |
| | | | | • | ATK300/2HK |
| AF400…AF580 | 2/0 AWG…500 MCM | 2 | 275 in.-lb | | ATK580/2 |
| | | | | • | ATK580/2HK |
| AF580…AF750 | 2/0 AWG…500 MCM | 3 | 375 in.-lb | | ATK750/3 |
| | | | | • | ATK750/3HK |
| AF1350 | 4/0 AWG…500 MCM | 4 | 375 in.-lb | • | ATK1350/4 |
| AF1350…AF1650 | 1/0 AWG…750 MCM | 4 | 500 in.-lb | • | ATK1650/4 |
| | 1/0 AWG…750 MCM | 6 | 500 in.-lb | • | ATK1650/6 |

Note: AF1250, AF2050 & AF2650 intended for busbar connection only. Terminal hardware supplied separately. Use of lug kits for AF1350 & AF1650 in general purpose applications reduces the ratings to 1050A and 1350A respectively. Recommend busbar connection for full ratings.

## Spare terminal hardware kits

| For contactors | Catalog number |
|---|---|
| A/F145…A/F185 | LE185 |
| A/F210…A/F300 | LE300 |
| AF400…AF460 | LE460 |
| AF580…AF750 | LE750 |

## Terminal blocks

| For contactors | Catalog number |
|---|---|
| A45, A75 | LD-75 |
| A95, A110 | LD-110 |

Note: The LD... terminal blocks provided for the A... contactors can be used for the AF, AL, AE, TAL, TAE and UA types.

① Terminal hardware include with A(F)145…AF750 contactors; hardware for AF1350 & AF1650 available only with purchase of lug kit.

# Terminal shrouds

LT...-AC

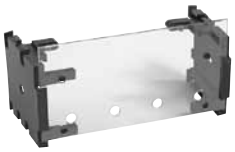
LT ...-AL

LT...-AY

## Ordering details

| For contactors | Catalog number |
|---|---|
| A145 ... A185 with connectors/busbar | LT185-AC |
| A145 ... A185 with lugs | LT185-AL |
| A145 ... A185 with short. bar LY185<br>or between A145 and TA200DU<br>or between A185 and TA200DU | LT185-AY |
| A210 ... A300 with connectors/busbar | LT300-AC |
| A210 ... A300 with lugs ① | LT300-AL |
| A210 ... A300 with short. bar LY300 | LT300-AY |
| AF400 ... AF460 with connectors/busbar | LT460-AC |
| AF400 ... AF460 with lugs | LT460-AL |
| AF580 ... AF750 with connectors/busbar | LT750-AC |
| AF580 ... AF1250 with lugs | LT750-AL |

Note: The shrouds provided for the A... contactors can be used for the AF... types.



LT210-EK

## EK shrouds

| For contactors | Catalog number |
|---|---|
| EK110, EK150 | LT150-EK |
| EK175, EK210 | LT210-EK |
| EK370, EK550 | LT550-EK |
| EK1000 | LT1000-EK |

① Cannot be used with lug kit ATK300/2.

# Function markers, protective covers & coil terminal blocks

## Ordering details

LDC4

| For contactors | Catalog number |
|---|---|

### Additional coil terminal block

Additional coil terminal block for a bottom access to the coil terminals of contactors or contactor relays.

| | |
|---|---|
| AF09 ... AF38, NF | LDC4 |

BX4

### Protective covers

Sealable and transparent protective covers BX4 and non-removable BX4-CA to protect the devices against accidental contact.

| | |
|---|---|
| All 1-stack contactors and contactor relays | BX4 |
| For 4-pole CA4 and 2-pole CAT4 auxiliary contact blocks | BX4-CA |
| For contactors B/C6...B/C7 | LT6-B |

LT6-B

### Function markers

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.

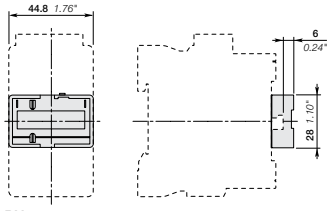
Marker dimensions: 7 x 20 mm (.276" x .787").

| | |
|---|---|
| Box of 16 blank cards - for AF09/Z...AF38/Z, (V)AS/L09...(V)ASL16, NF/Z, NS/L | BA4 |
| AMS 500 support plate for 8 BA4 | XUSP02633 |
| HTP500 support plate | 1SNA235712R2400 |
| 50 pcs. - for A9...A110, AF50...AF110, AL9...AL40, AE9...AE75 | BA5-50 |

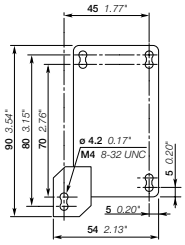
BA4

BA5-50

## Main dimensions mm, *inches*



BX4

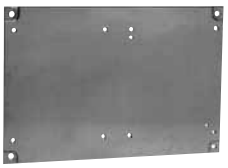


BP38-4

# Mounting plates

PN300A-11

PN300-21



PN...

## Description

Mounting plates with fixing holes for the specified contactors and overload relays.

## Ordering details

| For contactors | | For overload relays | Catalog number |
|---|---|---|---|
| **Mounting plates for Direct on line starters** | | | |
| A145, A185 | | TA200DU, E200DU | PN185-11 |
| A210 ... A300 | | TA450DU, E320DU | PN300A-11 |
| AF400, AF460 | | E500DU | PN460-11 |
| AF580, AF750 | | E800DU | PN750-11 |

| For two contactors side by side with space for mechanical interlock | | For one or two overload relays | Catalog number |
|---|---|---|---|
| **Mounting plates for mechanical interlocked contactors, reversing starters and two speed starters for double windings** | | | |
| A95, A110 | | TA80DU, TA110DU | PN110-21 |
| A145, A185 | | TA200DU, E200DU | PN185-21 |
| A210 ... A300 | | TA450DU, E320DU | PN300-21 |
| AF400, AF460 | | E500DU | PN460-21 |
| AF580, AF750 | | E800DU | PN750-21 |

### Mounting plates for two horizontal mounted contactors with or without a mechanical interlock unit.

| To use with: Left hand contactor | Mechanical interlock | Right hand contactor | Catalog number |
|---|---|---|---|
| EK110, EK150 | VH145 | EK110, EK150 | PN210-22 |
| EK175, EK210 | VH300 | EK175, EK210 | PN300-22 |

(1) Space for mechanical interlock included.

# Adapter plates & accessories

PR300-1

PR400-2

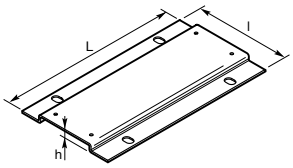
## Description

Adapter plates with fixing holes for specified old contactors to new contactors.

## Ordering details

| From old contactors | To new contactor | Catalog number |
|---|---|---|
| EH65, EH75, EH80, EH90, EG80 | A95, A110 | PR110-1 |
| EH100, EH145 | A110, A145 | PR145-1 |
| EH150, EH160, EH175, EH210, EG160 | A185, A210 | PR210-1 |
| EH250, EH260, EH300 | A210 ... A300 | PR300-1 |
| EH370, EH550, EG315 | AF400 ... AF580 | PR460-1 |
| EH700, EH800 | AF750 | PR750-1 |
| OKYM150, OKYM175 | A185 | PR185-2 |
| OKYM200, OKYM250 | A210 ... A300 | PR300-2 |
| OKYM315 | AF400, AF460 | PR400-2 |
| OKYM400 | AF400, AF460 | PR460-2 |
| OKYM500 | AF580 | PR580-2 |
| EH550, EG630, OKYM630 | AF580, AF750 | PR750-2 |

Note: The adapter plates provided for the A... contactors can also be used for the AF... contactors.




## Dimensions (mm)

| Type of the plate | Dimensions | | | Fixing holes |
|---|---|---|---|---|
| | L | l | h | mm |
| PR110-1 | 151 | 106 | 11.2 | 2 x ø 7 |
| PR145-1 | 180 | 122 | 11.5 | 4 x ø 7 |
| PR210-1 | 200 | 132 | 11.5 | 4 x ø 7 |
| PR300-1 | 200 | 172 | 11.5 | 4 x ø 7 |
| PR460-1 | 278 | 198 | 11.5 | 4 x ø 7 |
| PR750-1 | 283 | 244 | 11.5 | 4 x ø 7 |
| PR185-2 | 202 | 152 | 11.2 | 4 x ø 11 |
| PR300-2 | 202 | 152 | 11.2 | 4 x ø 11 |
| PR400-2 | 278 | 151 | 11.5 | 4 x ø 11 |
| PR460-2 | 278 | 176 | 11.5 | 4 x ø 11 |
| PR580-2 | 283 | 176 | 11.5 | 4 x ø 11 |
| PR750-2 | 283 | 255 | 11.5 | 4 x ø 14 |

Note: The adapter plates provided for the A... contactors can also be used for the AF... contactors.
Fixing holes according to the plate types

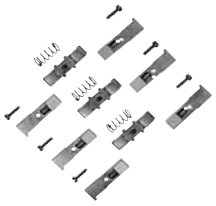
BP38-4

## Mounting piece

Mounting piece for replacement of A / AL26 ... A / AL40 contactors mounted by screws by AF contactors in 45 mm width.

| | |
|---|---|
| AF09 ... AF38 | BP38-4 |

# Replacement parts
## Contact kits & arc chutes



ZL50

ZL185

ZL1650

ZW...

KZK370

### 3-pole contact kits

| For contactors | Catalog number |
|---|---|
| A/AF/AE/TAE50-30 | ZL50 |
| A/AF/AE/TAE63-30 | ZL63 |
| A/AF/AE/TAE75-30 | ZL75 |
| A/AF95-30 | ZL95 |
| A/AF110-30 | ZL110 |
| A/AF145 | ZL145 |
| A/AF185 | ZL185 |
| A/AF210 | ZL210 |
| A/AF260 | ZL260 |
| A/AF300 | ZL300 |
| AF400 | ZL400 |
| AF460 | ZL460 |
| AF580 | ZL580 |
| AF750 | ZL750 |
| AF1250 | ZL1250 |
| AF1350 | ZL1350 |
| AF1650 | ZL1650 |
| AF2050 | ZL2050 |
| UA50 | ZLU50 |
| UA63 | ZLU63 |
| UA75 | ZLU75 |
| UA95 | ZLU95 |
| UA110 | ZLU110 |

### 4-pole contact kits

| | |
|---|---|
| A/E/F45 | ZLT45 |
| A/E/F50 | ZLT50 |
| A/E/F75 | ZLT75 |
| EK110 | KZK110 |
| EK150 | KZK150 |
| EK175 | KZK175 |
| EK210 | KZK210 |
| EK370 | KZK370 |
| EK550 | KZK550 |
| EK1000 | KZK1000 |

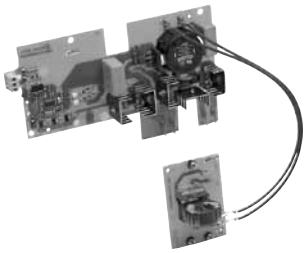
### Arc chutes

| For contactors | Catalog number |
|---|---|
| **3-pole** | |
| A145 ... A185 and AF145 ... AF185 | ZW185 |
| A210 ... A300 and AF210 ... AF300 | ZW300 |
| AF400, AF460 | ZW460 |
| AF580, AF750, AF1250 | ZW750 |
| AF1350, AF1650, AF2050 | ZW1650 |
| **4-pole** | |
| EK110 | KWK110 |
| EK150 | KWK150 |
| EK175 | KWK175 |
| EK210 | KWK210 |
| EK370 | KWK370 |
| EK550 | KWK550 |
| EK1000 | KWK1000 |

# Replacement parts
## Coils

ZA16-81

ZAF1650


ZP1650

### Coils, AC operated

| For contactors | Catalog number |
|---|---|
| A9…A16, A9N00…A16N0, UA16 | ZA16-Δ |
| A26…A40, A26N1, UA26 | ZA40-Δ |
| A45…A75, A50N2…A75N3, UA50…UA75, GA75 | ZA75-Δ |
| A95…A110, UA95…UA110 | ZA110-Δ |
| A145…A185, A145N4 | ZA185-Δ |
| A210…A300, A260N5 | ZA300-Δ |

### Coils, DC operated

| | |
|---|---|
| AE9…AE16, AE9N00…AE16N0 | ZAE16-Δ |
| AE26…AE40, AE26N1 | ZAE40-Δ |
| AE45…AE75, AE50N2…AE75N3, GAE75 | ZAE75-Δ |

### Coils, AC/DC operated (coil and printed circuit board except ZAF1650

| | |
|---|---|
| AF45…AF75, AF50N2…AF75N3 | ZAF75-Δ |
| AF95…AF110 | ZAF110-Δ |
| AF145…AF185, AF145N4, GAF185 | ZAF185-Δ |
| AF210…AF300, AF260N5, GAF300 | ZAF300-Δ |
| AF400…AF460, AF460N6, GAF460 | ZAF460-Δ |
| AF580…AF1250, AF750N5, GAF750…GAF1250 | ZAF750-Δ |
| AF1350…AF2050, AF1650N8, GAF1650…GAF2050 | ZAF1650-Δ |
| Printed circuit board (G/AF1350…2050) | ZP1650 |

### Coils, AC operated for A/UA/GA (Δ)

| For contactors | AC voltages | | Coil code |
|---|---|---|---|
| | V - 50 Hz | V - 50 Hz | |
| A9…A300, A9N00… A260N5, UA16… UA110, GA75 | 24 | 24 | 81 |
| | 26 | 28 | 16 |
| | 28 | 32 | 17 |
| | 42 | 42 | 82 |
| | 48 | 48 | 83 |
| | 60 | 60 | 73 |
| | 100 | 100…110 | 74 ② |
| | 105 | 110…127 | 26 |
| | 110 | 110…120 | 84 |
| | 110…115 | 115…127 | 89 ③ |
| | 120 | 140 | 29 |
| | 125…127 | 150 | 30 |
| | 175 | 208 | 34 |
| | 190 | 220 | 36 |
| | 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 |
| | 400 | 440 | 50 |
| | 400…415 | 480 | 51 |
| | 415…440 | 440…460 | 87 |
| | 440 | 500 | 53 |
| | 500 | 600 | 55 |
| | 550 | - | 56 |
| | 660…690 | - | 58 |

### Coils, DC operated for AE/GAE (Δ)

| For contactors | DC voltages V DC | Coil code |
|---|---|---|
| AE9…AE75, AE9N00… AE75N3. GAE75 | 12 | 80 |
| | 24 | 81 |
| | 42 | 82 |
| | 48 | 83 |
| | 50 | 21 |
| | 60 | 84 |
| | 75 | 85 |
| | 110 | 86 |
| | 125 | 87 |
| | 220 | 88 |
| | 240 | 89 |
| | 250 | 38 |

### Coils, DC operated for AE/GAE (Δ)

| AC / DC voltages V – 50/60 Hz or DC | AF50… AF300, AF50N2… AF260N5, GAF185… GAF300 | AF400… AF750, AF460N6… AF750N7, GAF460… GAF570 | AF1250, GAF1250 | AF1350… AF2050, AF1650N8, GAF1650… GAF2050 |
|---|---|---|---|---|
| 20...60V DC | 72 | - | - | - |
| 24...60V DC | - | 68 | 68 | - |
| 48...130V AC/DC | 69 | 69 | 69 | - |
| 100...250V AC/DC | 70 | 70 | 70 | 70 |
| 250...500V AC/DC | - | 71 | - | - |

① For A9…A16, A9N00…A16N0, UA16 only
② Excludes A145…A300, A145N4
③ A145…A300, A145N4 at 60 Hz, 115V only

# Replacement parts
## Coils

KH300

### Coils, AC or DC operated

| For contactors | Catalog number |
|---|---|
| EK110…EK150 | KH210-Δ |
| EK175…EK210 | KH300-Δ |
| EK370…EK1000 | KH800-Δ |

Note: AC and DC operated contactors DO NOT have the same magnetic structure. Therefore, DC coils will not fit on an AC magnetic structure and vice versa.

### Coils, AC operated for EK (Δ)

| For contactors | AC voltages | | Coil code |
|---|---|---|---|
| | V - 50 Hz | V - 50 Hz | |
| EK110… EK1000 (AC operated) | - | 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 |

### Coils, DC operated for EK (Δ)

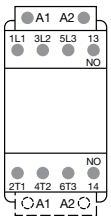
| For contactors | DC voltages V DC | Coil code |
|---|---|---|
| EK110… EK1000 (DC operated) | 24 | Y |
| | 48 | W |
| | 110 | P |
| | 125 | Q |
| | 220 | R |
| | 440 | T |

# Terminal marking and positioning

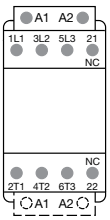
## AF09/Z...AF38/Z, AF09N00/Z...AF26N1/Z 3-pole contactors

### Standard devices without addition of auxiliary contacts

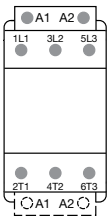
Note: Terminal markings for AF09 & AF16 apply to AF NEMA Sz. 00 & 0; terminal markings for AF26 apply to AF NEMA Sz. 1. AF09...AF38 terminal markings apply to AF..Z type.



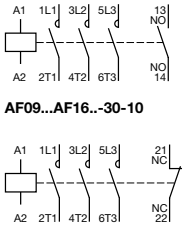

**AF09...AF16..-30-10**




**AF09...AF16..-30-01**

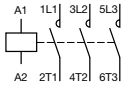



**AF26...AF38..-30-00**



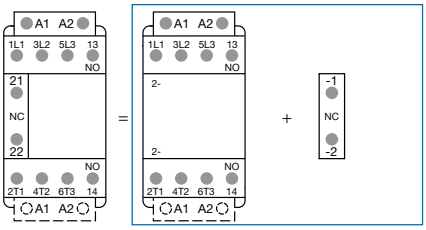

**AF09...AF16..-30-10**

**AF09...AF16..-30-01**

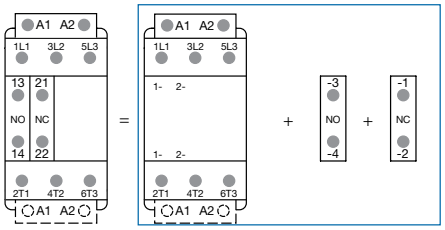



**AF26...AF30..-30-00**

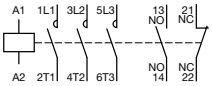
### Other possible contact combinations with auxiliary contacts



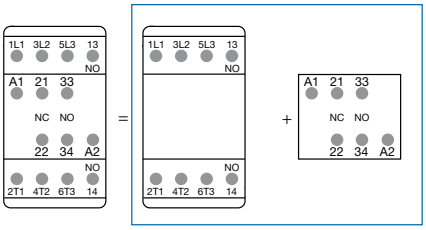

**Combination 11 = AF09...AF16..-30-10 + CA4-01**



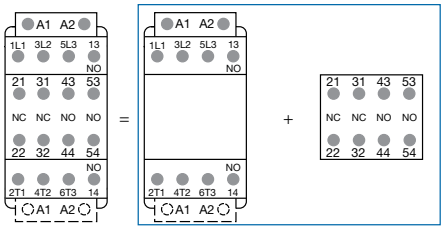

**Combination 11 = AF26...AF38..-30-00 + CA4-10 + CA4-01**



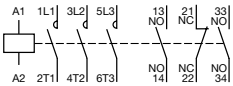

**Combination 11**



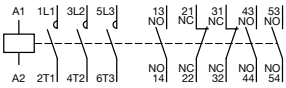

**Combination 21 = AF09...AF16..-30-10 + CAT4-11M**



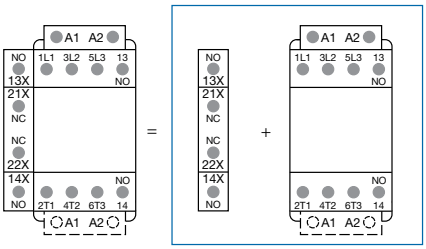

**Combination 32 = AF09...AF16..-30-10 + CA4-22M**



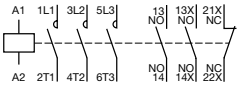

**Combination 21**




**Combination 32**




**Combination 21 = CAL4-11 + AF09...AF16..-30-10**



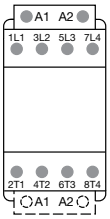

**Combination 21**

Note: Only AF..Z contactor with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

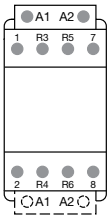
# Terminal marking and positioning
## AF09/Z...AF38/Z 4-pole contactors

Note: AF09...AF38 terminal markings apply to AF..Z type.

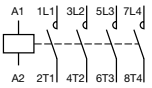
### Standard devices without addition of auxiliary contacts



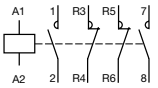

**AF09 ... AF38..-40-00**




**AF09 ... AF38..-22-00**

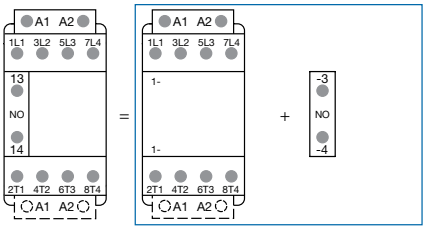



**AF09 ... AF38..-40-00**

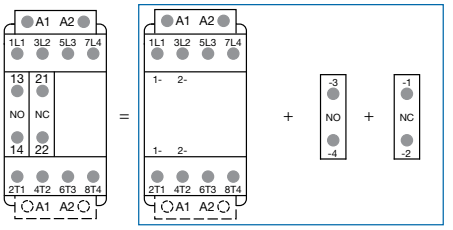



**AF09 ... AF38..-22-00**

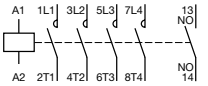
### Other possible contact combinations with auxiliary contacts



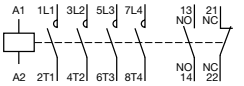

**Combination 10 = AF09 ... AF38..-40-00 + CA4-10**



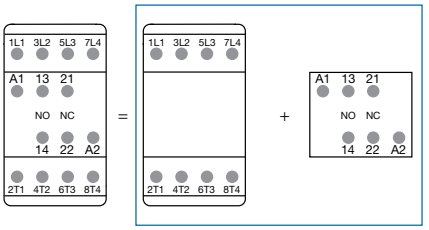

**Combination 11 = AF09 ... AF38..-40-00 + CA4-10 + CA4-01**



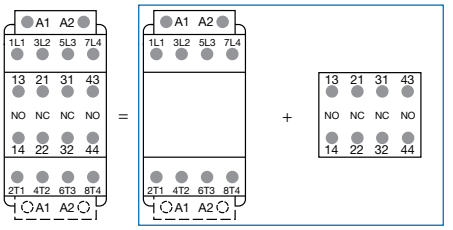

**Combination 10**



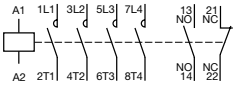

**Combination 11**



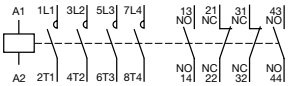

**Combination 11 = AF09 ... AF38..-40-00 + CAT4-11E**



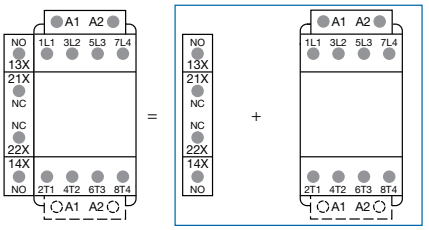

**Combination 22 = AF09 ... AF38..-40-00 + CA4-22E**



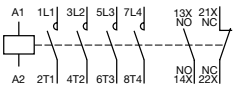

**Combination 11**




**Combination 22**




**Combination 11 = CAL4-11 + AF09 ... AF38-40-00**




**Combination 11**

Note: Only AF..Z contactor with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

# Terminal markings and positioning

## Add-on auxiliary contacts for AF09/Z...AF38/Z

### 1-pole auxiliary contacts

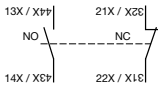
**CA4-01**

**CA4-10**

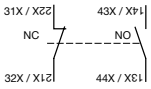
**CC4-01**

**CC4-10**

### 2-pole auxiliary contacts

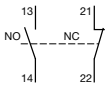



**CAL4-11**
**(Left side-mounted)**

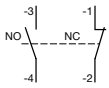



**CAL4-11**
**(Right side-mounted)**

**CAT4-11M**

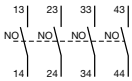



**CAT4-11E**

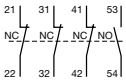



**CAT4-11U**

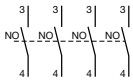
### 4-pole auxiliary contacts



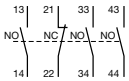

**CA4-40E**



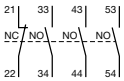

**CA4-13M**



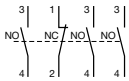

**CA4-40U**



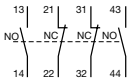

**CA4-31E**



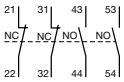

**CA4-31M**



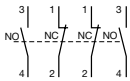

**CA4-31U**



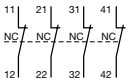

**CA4-22E**



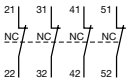

**CA4-22M**




**CA4-22U**




**CA4-04E**



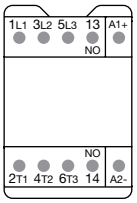

**CA4-04M**

# Terminal markings and positioning

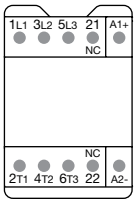
## AS/L09../S...AS/L16../S & CA3 auxiliary contacts

### ASL../S contactors - DC operated (the polarity A1+, A2- must be respected)

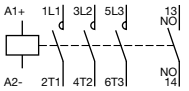
Standard devices without addition of auxiliary contacts



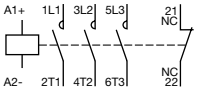

AS/L09...AS/L16-30-10/S



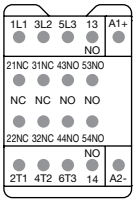

AS/L09...AS/L16-30-01/S



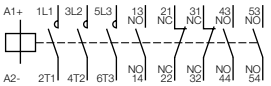

AS/L09...AS/L16-30-10/S




AS/L09...AS/L16-30-01/S

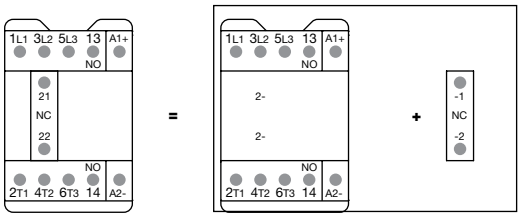



AS/L09...AS/L16-30-32/S

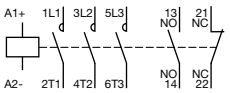



AS/L09...AS/L16-30-32/S

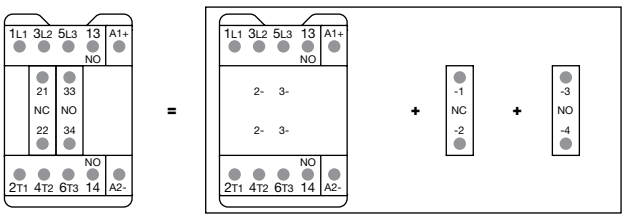
Other possible contact combinations with auxiliary contact blocks added by the user



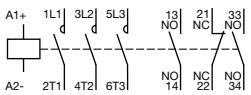

Combination 11 = AS/L09...AS/L16-30-10/S + CA3-01S




Combination 11

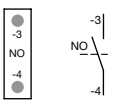



Combination 21 = AS/L09...AS/L16-30-10/S + CA3-01S + CA3-10S

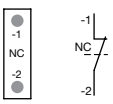



Combination 21

CA3..S 1-pole auxiliary contact blocks




CA3-10/S




CA3-01/S

# Terminal markings and positioning

## Add-on auxiliary contacts CA5 / CAL5 / CC5 / CAL16

### One pole auxiliary contacts (top mounted)

**CA5-01**

**CA5-10**

**CE5-01**

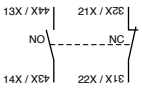
**CE5-10**

**CC5-01 (EM/LB)**

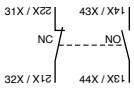
**CC5-10 (EM/LB)**

**Legend**
**L.H.S.** = Left hand side mounted
**R.H.S.** = Right hand side mounted
**EM/LB** = Early make / Late break

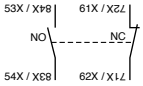
### Two pole auxiliary contacts



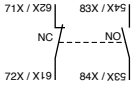

**CAL5-11** (L. h. s. mounted)



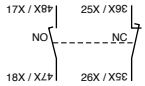

**CAL5-11** (R. h. s. mounted)



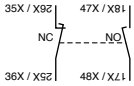

**CAL5-11B** (L. h. s. mounted)




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




**CCL5-11** (L. h. s. mounted) **(EM/LB)**




**CCL5-11** (R. h. s. mounted) **(EM/LB)**

**CAL16-11 A** (L. h. s. mounted)

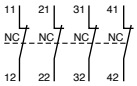
**CAL16-11 B** (R. h. s. mounted)

**CAL16-11 C** (L. h. s. mounted)

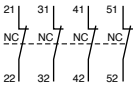
**CAL16-11 D** (R. h. s. mounted)

**CAL16-11E** (L & R. h. s. mounted) **(EM/LB)**

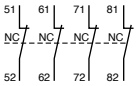
### Four pole auxiliary contacts (Top mounted)



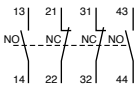

**CA5-04 E**



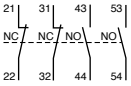

**CA5-04 M**



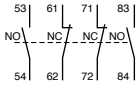

**CA5-04 N**



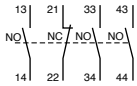

**CA5-22 E**



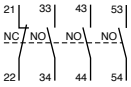

**CA5-22 M**



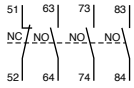

**CA5-22 N**



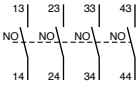

**CA5-31 E**




**CA5-31 M**

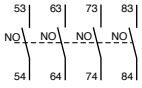



**CA5-31 N**

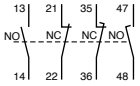



**CA5-40 E**

—




**CA5-40 N**

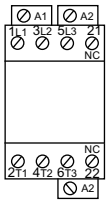



**CA5-11/11 E**

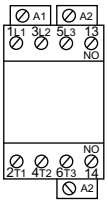
**CA5-11/11 M**

# Terminal markings and positioning
## A9...A75

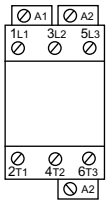
### Standard devices without addition of auxiliary contacts



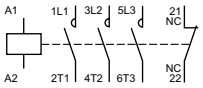

**A9 – A40-30-01**



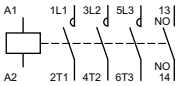

**A9 – A40-30-10**



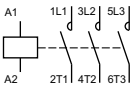

**A50 – A110-30-00**
**UA50 – UA110-30-00**



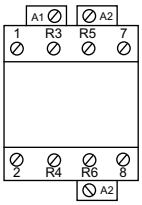

**A9 – A40-30-01**



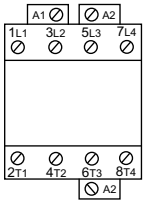

**A9 – A40-30-10**



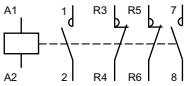

**A50 – A110-30-00**
**UA50 – UA110-30-00**



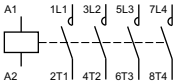

**A9 – A26-22-00**
**A45 – A75-22-00**




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

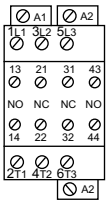



**A9 – A26-22-00**
**A45 – A75-22-00**

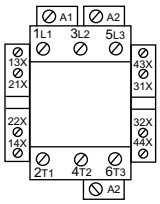



**A9 – A26-40-00**
**A45 – A75-40-00**

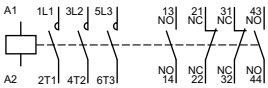
### Standard 3 pole devices with factory mounted auxiliary contacts



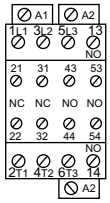

**A9 – A16-30-22**



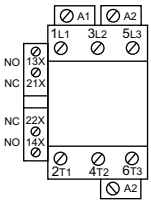

**Combination 22**



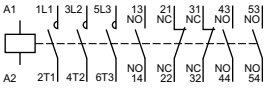

**A9 – A16-30-22**
**A50 – A110-30-22**



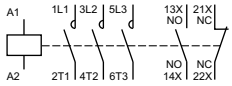

**A9 – A40-30-32**




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

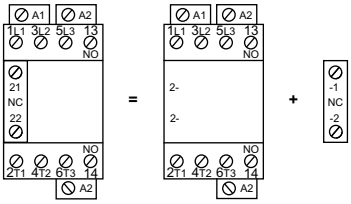



**A9 – A40-30-32**

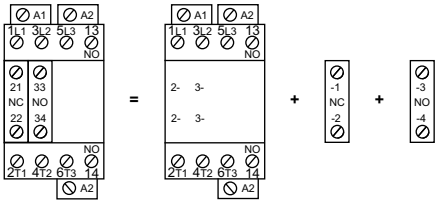



**A50 – A110-30-11**
**UA50 – UA110-30-11**

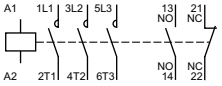
### Other possible contact combinations with auxiliary contacts added by the user



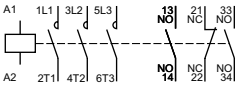

**Combination 11 = A9 – A40-30-10 + CA5-01**



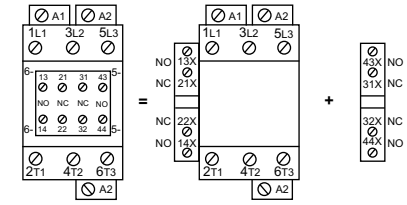

**Combination 21 = A9 – A40-30-10 + CA5-01 + CA5-10**



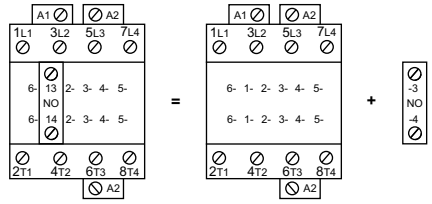

**Combination 11**



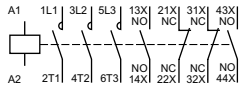

**Combination 21**



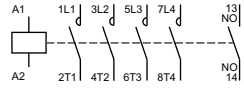

**A50 – A110-30-22 = A50 – A75-30-11 + CAL5-11**




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



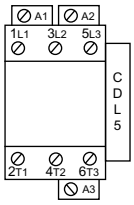

**Combination 22**



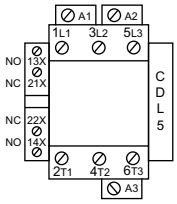

**Combination 10**

# Terminal markings and positioning
## AE9...AE75, AL9...AL40

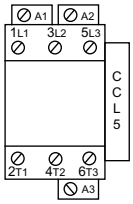
### AE Contactors – D.C. operated



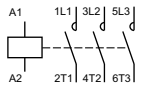
AE50 – AE75-30-00



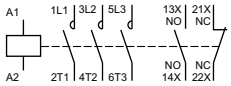
AE50 – AE75-30-11



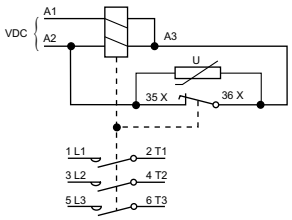
AE95 – AE110-30-00



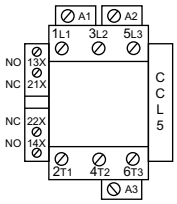
AE50 – AE110-30-00



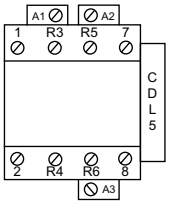
AE50 – AE110-30-11



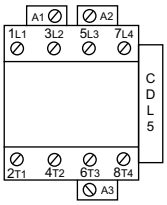
Coil wiring



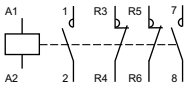
AE95 – AE110-30-11



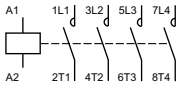
AE45 – AE75-22-00



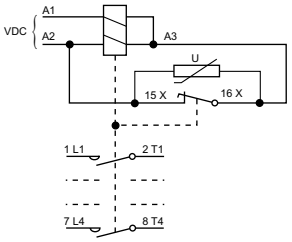
AE45 – AE75-40-00



AE45 – AE75-22-00

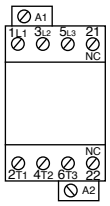


AE45 – AE75-40-00

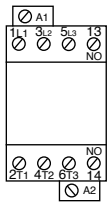


Coil wiring

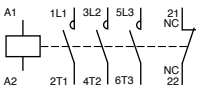
### AL Contactors – D.C. operated
Standard devices without addition of auxiliary contacts



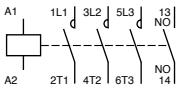
AL9 – AL40-30-01



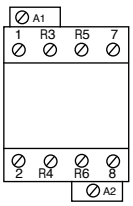
AL9 – AL40-30-10



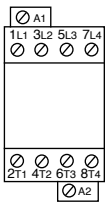
AL9 – AL40-30-01



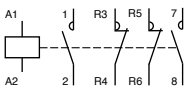
AL9 – AL40-30-10



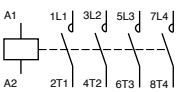
AL9 – AL26-22-00



AL9 – AL26-40-00

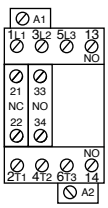


AL9 – AL26-22-00



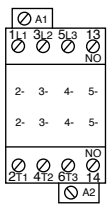
AL9 – AL26-40-00

### Other possible contact combinations with auxiliary contacts added by the user



Combination 21

=



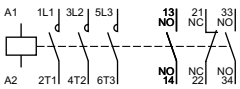
AL9 – AL40-30-10

+

CA5-01

+

CA5-10

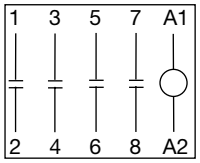


Combination 21

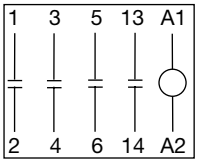
# Terminal markings and positioning

## B/C6...B/C7, CA6 & CAF6 auxiliary contacts

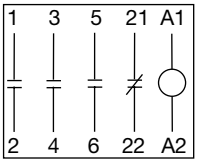
### Miniature contactors




B6(7)-40-00 ...
BC6(7)-40-00 ...

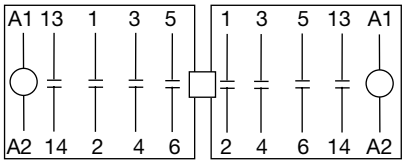



B6(7)-30-10 ...
BC6(7)-30-10 ...

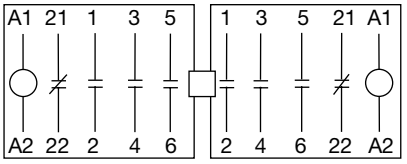



B6(7)-30-01 ...
BC6(7)-30-01 ...

### Miniature mechanically interlocked contactors

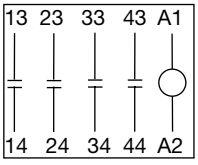



VB6(7)-30-10 ...
VBC6(7)-30-10 ...

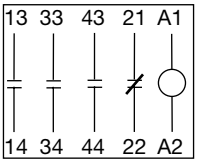



VB6(7)-30-01 ...
VBC6(7)-30-01 ...

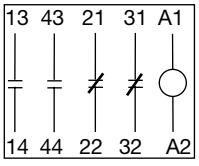
### Miniature control relays




K6-40 E ...
KC6-40 E ...

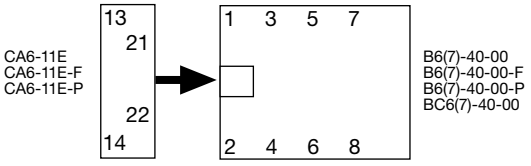


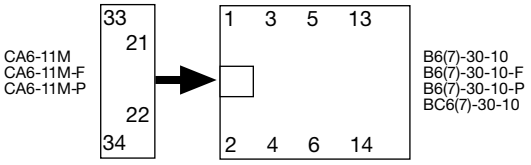

K6-31 Z ...
KC6-31 Z ...

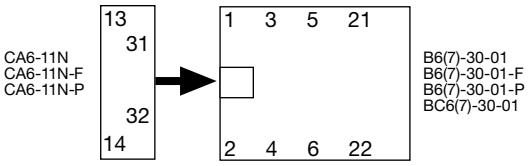


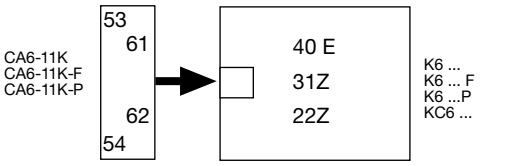

K6-22 Z ...
KC6-22 Z ...

### Side mounted auxiliary contact blocks

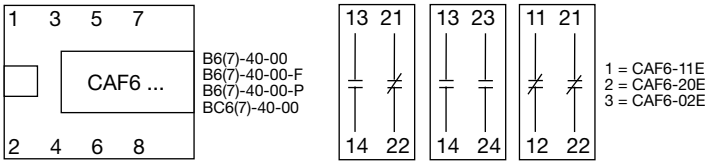


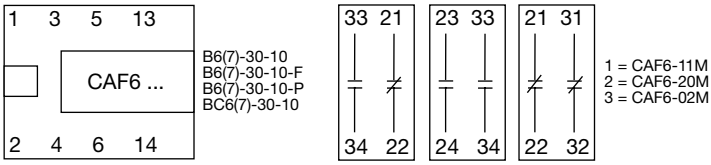



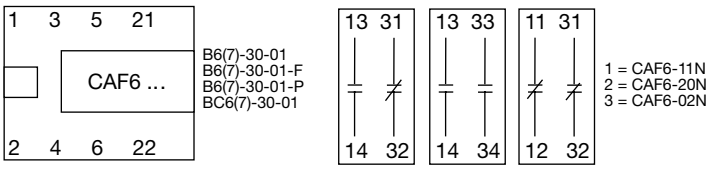



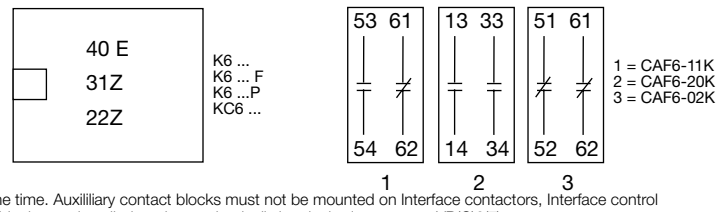




### Front mounted auxiliary contact blocks




NOTE: Only side mounted type or front mounted type auxiliary contact blocks can be used at one time. Auxililiary contact blocks must not be mounted on Interface contactors, Interface control relays or contactors for connection to PLCs. Two CAF 6 front mounted auxiliary contact blocks can installed on the mechanically interlocked contactors VB(C)6(7).

# IEC Technical data
## AF09(Z)...AF38(Z), 3-pole
## Utilization characteristics

### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| **Standards** | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | |
| **Rated operational voltage Ue max.** | | 690 V | | | | | |
| **Rated frequency (without derating)** | | 50 / 60 Hz | | | | | |
| **Conventional free-air thermal current Ith** | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A |
| With conductor cross-sectional area | | 6 mm² | 6 mm² | 6 mm² | 10 mm² | 10 mm² | 10 mm² |
| **AC-1 Utilization category** | | | | | | | |
| For air temperature close to contactor | | | | | | | |
| **Ie / Rated operational current AC-1** | **θ ≤ 40 °C** | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| Ue max. ≤ 690 V, 50/60 Hz | **θ ≤ 60 °C** | 25 A | 28 A | 30 A | 40 A | 42 A | 42 A |
| | **θ ≤ 70 °C** | 22 A | 24 A | 26 A | 32 A | 37 A | 37 A |
| With conductor cross-sectional area | | 4 mm² | 6 mm² | 6 mm² | 10 mm² | 10 mm² | 10 mm² |
| **AC-3 Utilization category** | | | | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | | | | |
| **Ie / Max. rated operational current AC-3** (1) | | | | | | | |
| | **220-230-240 V** | 9 A | 12 A | 18 A | 26 A | 33 A | 40 A |
| 3-phase motors | **380-400 V** | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | **415 V** | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | **440 V** | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | **500 V** | 9.5 A | 12.5 A | 15 A | 23 A | 28 A | 33 A |
| | **690 V** | 7 A | 9 A | 10.5 A | 17 A | 21 A | 24 A |
| **Rated operational power AC-3** (1) | | | | | | | |
| | **220-230-240 V** | 2.2 kW | 3 kW | 4 kW | 6.5 kW | 9 kW | 11 kW |
| 1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz, 3-phase motors | **380-400 V** | 4 kW | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 18.5 kW |
| | **415 V** | 4 kW | 5.5 kW | 9 kW | 11 kW | 15 kW | 18.5 kW |
| | **440 V** | 4 kW | 5.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | **500 V** | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | **690 V** | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| **Rated making capacity AC-3** | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | |
| **Rated breaking capacity AC-3** | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | |
| **AC-8a Utilization category** | | | | | | | |
| (without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C) | | | | | | | |
| **Ie / Rated operational current AC-8a** | | 12 A | 16 A | 22 A | 30 A | 40 A | 50 A |
| **Rated operational power AC-8a** | | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 20 kW | 25 kW |
| **Short-circuit protection device for contactors** | | | | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 25 A | 32 A | 32 A | 50 A | 63 A | 63 A |
| **Rated short-time withstand current Icw** | **1 s** | 300 A | 300 A | 300 A | 700 A | 700 A | 700 A |
| at 40 °C ambient temperature, | **10 s** | 150 A | 150 A | 150 A | 350 A | 350 A | 350 A |
| in free air from a cold state | **30 s** | 80 A | 80 A | 80 A | 225 A | 225 A | 225 A |
| | **1 min** | 60 A | 60 A | 60 A | 150 A | 150 A | 150 A |
| | **15 min** | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A |
| **Maximum breaking capacity** | | | | | | | |
| cos ϕ = 0.45 | **at 440 V** | 250 A | 250 A | 250 A | 500 A | 500 A | 500 A |
| | **at 690 V** | 106 A | 106 A | 106 A | 200 A | 200 A | 200 A |
| **Power dissipation per pole** | **Ie / AC-1** | 0.8 W | 1 W | 1.2 W | 1.8 W | 2.4 W | 2.4 W |
| | **Ie / AC-3** | 0.1 W | 0.2 W | 0.35 W | 0.6 W | 0.9 W | 1.3 W |
| **Max. electrical switching frequency** | **AC-1** | 600 cycles/h | | | | | |
| | **AC-3** | 1200 cycles/h | | | | | |
| | **AC-2, AC-4** | 300 cycles/h | | | 150 cycles/h | | |

Note: total power loss = power dissipation per pole x number of poles + coil consumption.

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

# IEC Technical data
## A/E/L40, A/E/F50...A/F110, 3-pole
## Utilization characteristics

### Main pole - Utilization characteristics according to IEC

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Contactor types** | **AC operated** | A40 | A50 | A63 | A75 | A95 | A110 |
| | **DC operated** | AL40 | AE50 | AE63 | AE75 | – | – |
| | | TAL40 | TAE50 | – | TAE75 | – | – |
| | **AC / DC operated** | – | AF50 | AF63 | AF75 | AF95 | AF110 |
| **Standards** | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | |
| **Rated operational voltage Ue max.** | | 690 V | 1000 V (690 V for AF.. contactors) | | | 1000 V | |
| **Rated frequency (without derating)** | | 50/60 Hz | | | | | |
| **Conventional free-air thermal current Ith** | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 65 A | 100 A | 125 A | 125 A | 145 A | 160 A |
| With conductor cross-sectional area | | 16 mm² | 35 mm² | 50 mm² | 50 mm² | 50 mm² | 70 mm² |
| **AC-1 Utilization category** | | | | | | | |
| For air temperature close to contactor | | | | | | | |
| **Ie / Rated operational current AC-1** | **θ ≤ 40 °C** | 60 A | 100 A | 115 A | 125 A | 145 A | 160 A |
| Ue max. ≤ 690 V, 50/60 Hz | **θ ≤ 55 °C** | 60 A | 85 A | 95 A | 105 A | 135 A | 145 A |
| | **θ ≤ 70 °C** (3) | 42 A | 70 A | 80 A | 85 A | 115 A | 130 A |
| With conductor cross-sectional area | | 16 mm² | 35 mm² | 50 mm² | 50 mm² | 50 mm² | 70 mm² |
| **AC-3 Utilization category** | | | | | | | |
| For air temperature close to contactor θ ≤ 55 °C | | | | | | | |
| **Ie / Max. rated operational current AC-3** (1) | | | | | | | |
| | **220-230-240 V** | 40 A | 53 A | 65 A | 75 A | 96 A | 110 A |
| | **380-400 V** | 37 A | 50 A | 65 A | 75 A | 96 A | 110 A |
| M 3~ 3-phase motors | **415 V** | 37 A | 50 A | 65 A | 75 A | 96 A | 110 A |
| | **440 V** | 37 A | 45 A | 65 A | 70 A | 93 A | 100 A |
| | **500 V** | 33 A | 45 A | 55 A | 65 A | 80 A | 100 A |
| | **690 V** | 25 A (4) | 35 A | 43 A | 46 A | 65 A | 82 A |
| | **1000 V** | – | 23 A (6) | 25 A (6) | 28 A (6) | 30 A | 30 A |
| **Rated operational power AC-3** (1) | | | | | | | |
| | **220-230-240 V** | 11 kW | 15 kW | 18.5 kW | 22 kW | 25 kW | 30 kW |
| | **380-400 V** | 18.5 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| M 3~ 1500 r.p.m. 50 Hz | **415 V** | 18.5 kW | 25 kW | 37 kW | 40 kW | 55 kW | 59 kW |
| 1800 r.p.m. 60 Hz | **440 V** | 22 kW | 25 kW | 37 kW | 40 kW | 55 kW | 59 kW |
| 3-phase motors | **500 V** | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW | 59 kW |
| | **690 V** | 22 kW (4) | 30 kW | 37 kW | 40 kW | 55 kW | 75 kW |
| | **1000 V** | – | 30 kW (6) | 33 kW (6) | 37 kW (6) | 40 kW | 40 kW |
| **Rated making capacity AC-3** | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | |
| **Rated breaking capacity AC-3** | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | |
| **AC-8a Utilization category** (without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C) | | | | | | | |
| **Ie / Rated operational current AC-8a** | | 50 A | 63 A | 85 A | 95 A | 120 A | 140 A |
| **Rated operational power AC-8a** | | 22 kW | 30 kW | 45 kW | 45 kW | 55 kW | 75 kW |
| **Short-circuit protection device for contactors** | | | | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 63 A | 100 A | 125 A | 160 A | 160 A | 200 A |
| **Rated short-time withstand current Icw** | **1 s** | 600 A | 1000 A | | | 1320 A | |
| at 40 °C ambient temperature, | **10 s** | 400 A | 650 A | | | 800 A | |
| in free air from a cold state | **30 s** | 225 A | 370 A | | | 500 A | |
| | **1 min** | 150 A | 250 A | | | 350 A | |
| | **15 min** | 65 A | 110 A | 135 A | 135 A | 160 A | 175 A |
| **Maximum breaking capacity** | | | | | | | |
| cos ϕ = 0.45 | **at 440 V** | 820 A (5) | 1300 A | | | 1160 A | |
| (cos ϕ = 0.35 for Ie > 100 A) | **at 690 V** | 340 A (5) | 630 A | | | 800 A | |
| **Power dissipation per pole** | **Ie / AC-1** | 3 W | 5 W | 6.5 W | 7 W | 6.5 W | 7.5 W |
| | **Ie / AC-3** | 1.3 W | 1.3 W | 1.5 W | 2 W | 2.7 W | 3.6 W |
| **Max. electrical switching frequency** | **AC-1** | 600 cycles/h | 600 cycles/h (300 for AF.., AE.., TAE..) | | | 300 cycles/h | |
| | **AC-3** | 1200 cycles/h | 600 cycles/h (300 for AF.., AE.., TAE..) | | | 300 cycles/h | |
| | **AC-2, AC-4** | 300 cycles/h | 150 cycles/h | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) Unauthorized for TAL.., TAE.. contactors.
(4) AC-3, 690 V values for AL40 and TAL40 contactors: 18.5 kW, Ie = 21 A.
(5) Max. breaking capacity for AL40 and TAL40 contactors: 470 A at 440 V, 175 A at 690 V.
(6) AF contactors excluded.

# IEC Technical data
## A/F145...AF300, 3-pole
## Utilization characteristics

### Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | A145 | A185 | A210 | A260 | A300 |
|---|---|---|---|---|---|---|
| | AC / DC operated | AF145 | AF185 | AF210 | AF260 | AF300 |
| **Standards** | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | |
| **Rated operational voltage Ue max.** | | 1000 V | | 690 V | | |
| **Rated frequency (without derating)** | | 50/60 Hz | | | | |
| **Conventional free-air thermal current Ith** | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 250 A | 275 A | 350 A | 400 A | 500 A (4) |
| With conductor cross-sectional area (3) | | 120 mm² | 150 mm² | 185 mm² | 240 mm² | 300 mm² (4) |
| **AC-1 Utilization category** | | | | | | |
| For air temperature close to contactor | | | | | | |
| **Ie / Rated operational current AC-1** | θ ≤ 40 °C | 250 A | 275 A | 350 A | 400 A | 500 A (4) |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 55 °C | 230 A | 250 A | 300 A | 350 A | 400 A (4) |
| | θ ≤ 70 °C | 180 A | 180 A | 240 A | 290 A | 325 A (4) |
| **Ie / Rated operational current AC-1** | θ ≤ 40 °C | 180 A | 200 A | – | – | – |
| Ue max. ≤ 1000 V, 50/60 Hz | θ ≤ 55 °C | 180 A | 200 A | – | – | – |
| | θ ≤ 70 °C | 180 A | 180 A | – | – | – |
| With conductor cross-sectional area | | 120 mm² | 150 mm² | 185 mm² | 240 mm² | 300 mm² (4) |
| **AC-3 Utilization category** | | | | | | |
| For air temperature close to contactor θ ≤ 55 °C | | | | | | |
| **Ie / Max. rated operational current AC-3** (1) | | | | | | |
| | 220-230-240 V | 145 A | 185 A | 210 A | 260 A | 305 A |
| | 380-400 V | 145 A | 185 A | 210 A | 260 A | 305 A |
| | 415 V | 145 A | 185 A | 210 A | 260 A | 300 A |
| 3-phase motors | 440 V | 145 A | 185 A | 210 A | 240 A | 280 A |
| | 500 V | 145 A | 170 A | 210 A | 240 A | 280 A |
| | 690 V | 120 A | 170 A | 210 A | 220 A | 280 A |
| | 1000 V | 80 A | 95 A | – | – | – |
| **Rated operational power AC-3** (1) | | | | | | |
| | 220-230-240 V | 45 kW | 55 kW | 59 kW | 80 kW | 90 kW |
| | 380-400 V | 75 kW | 90 kW | 110 kW | 140 kW | 160 kW |
| 1500 r.p.m. 50 Hz | 415 V | 75 kW | 90 kW | 110 kW | 140 kW | 160 kW |
| 1800 r.p.m. 60 Hz | 440 V | 75 kW | 90 kW | 110 kW | 140 kW | 160 kW |
| 3-phase motors | 500 V | 90 kW | 110 kW | 132 kW | 180 kW | 200 kW |
| | 690 V | 110 kW | 132 kW | 160 kW | 200 kW | 250 kW |
| | 1000 V | 110 kW | 132 kW | – | – | – |
| **Rated making capacity AC-3** | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | | |
| **Rated breaking capacity AC-3** | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | | |
| **Short-circuit protection device for contactors** | | | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 315 A | 355 A | 400 A | 500 A | 500 A |
| **Rated short-time withstand current Icw** | 1 s | 1800 A | 2000 A | 2500 A | 3500 A | 3500 A |
| at 40 °C ambient temperature, | 10 s | 1200 A | 1500 A | 1700 A | 2400 A | 2400 A |
| in free air from a cold state | 30 s | 800 A | 1000 A | 1200 A | 1500 A | 1500 A |
| | 1 min | 600 A | 800 A | 1000 A | 1100 A | 1100 A |
| | 15 min | 280 A | 320 A | 400 A | 500 A | 500 A |
| **Maximum breaking capacity** | | | | | | |
| cos ϕ = 0.45 | at 440 V | 1500 A | 2000 A | 2300 A | 2600 A | 3000 A |
| (cos ϕ = 0.35 for Ie > 100 A) | at 690 V | 1200 A | 1600 A | 2000 A | 2400 A | 2500 A |
| **Power dissipation per pole** | Ie / AC-1 | 13 W | 16 W | 18 W | 25 W | 32 W |
| | Ie / AC-3 | 5 W | 8 W | 9 W | 14 W | 18 W |
| **Max. electrical switching frequency** | AC-1 | 300 cycles/h | | 300 cycles/h | | |
| | AC-3 | 300 cycles/h | | 300 cycles/h | | |
| | AC-2, AC-4 | 150 cycles/h | | 150 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) Conductors with preparation.
(4) Use terminal extension / enlargement pieces (LX 300 / LW 300).

# IEC Technical data
## AF400...AF2050, 3-pole
## Utilization characteristics

### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
|---|---|---|---|---|---|---|---|---|---|
| **Standards** | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | |
| **Rated operational voltage Ue max.** | | 1000 V | | | | | | | |
| **Rated frequency (without derating)** | | 50/60 Hz | | | | | | | |
| **Conventional free-air thermal current Ith** | | | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 600 A | 700 A | 800 A | 1050 A | 1260 A | 1350 A | 1650 A | 2050 A |
| With conductor cross-sectional area (3) | | 2x185 mm² | 2x240 mm² | 2x240 mm² | 800 mm² (4) | 1000 mm² (4) | 1000 mm² (5) | 1500 mm² (5) | 2000 mm² (5) |
| **AC-1 Utilization category** | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | |
| **Ie / Rated operational current AC-1** | **θ ≤ 40 °C** | 600 A | 700 A | 800 A | 1050 A | 1260 A | 1350 A | 1650 A | 2050 A |
| Ue max. ≤ 690 V, 50/60 Hz | **θ ≤ 55 °C** | 500 A | 600 A | 700 A | 875 A | 1040 A | 1150 A | 1450 A | 1750 A |
| | **θ ≤ 70 °C** | 400 A | 480 A | 580 A | 720 A | 875 A | 1000 A | 1270 A | 1500 A |
| **Ie / Rated operational current AC-1** | **θ ≤ 40 °C** | 600 A | 700 A | 800 A | 1000 A | 1260 A | 1350 A | 1650 A | 2050 A |
| Ue max. ≤ 1000 V, 50/60 Hz | **θ ≤ 55 °C** | 500 A | 600 A | 700 A | 875 A | 1040 A | 1150 A | 1450 A | 1750 A |
| | **θ ≤ 70 °C** | 400 A | 480 A | 580 A | 720 A | 875 A | 1000 A | 1270 A | 1500 A |
| With conductor cross-sectional area | | 2x185 mm² | 2x240 mm² | 2x240 mm² | 800 mm² (4) | 1000 mm² (4) | 1000 mm² (5) | 1500 mm² (5) | 2000 mm² (5) |
| **AC-3 Utilization category** | | | | | | | | | |
| For air temperature close to contactor θ ≤ 55 °C | | | | | | | | | |
| **Ie / Max. rated operational current AC-3** (1) | | | | | | | | | |
| | **220-230-240 V** | 400 A | 460 A | 580 A | 750 A | – | 860 A | 1050 A | – |
| | **380-400 V** | 400 A | 460 A | 580 A | 750 A | – | 860 A | 1050 A | – |
| | **415 V** | 400 A | 460 A | 580 A | 750 A | – | 860 A | 1050 A | – |
| M 3~ 3-phase motors | **440 V** | 400 A | 460 A | 580 A | 750 A | – | 860 A | 1050 A | – |
| | **500 V** | 400 A | 460 A | 580 A | 750 A | – | 800 A | 950 A | – |
| | **690 V** | 350 A | 400 A | 500 A | 650 A | – | 800 A | 950 A | – |
| | **1000 V** | 155 A | 200 A | 250 A | 300 A | – | – | – | – |
| **Rated operational power AC-3** (1) | | | | | | | | | |
| | **220-230-240 V** | 110 kW | 132 kW | 160 kW | 220 kW | – | 257 kW | 315 kW | – |
| | **380-400 V** | 200 kW | 250 kW | 315 kW | 400 kW | – | 475 kW | 560 kW | – |
| | **415 V** | 220 kW | 250 kW | 355 kW | 425 kW | – | 500 kW | 600 kW | – |
| M 3~ 1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz, 3-phase motors | **440 V** | 220 kW | 250 kW | 355 kW | 450 kW | – | 560 kW | 670 kW | – |
| | **500 V** | 250 kW | 315 kW | 400 kW | 520 kW | – | 560 kW | 700 kW | – |
| | **690 V** | 315 kW | 355 kW | 500 kW | 600 kW | – | 750 kW | 900 kW | – |
| | **1000 V** | 220 kW | 280 kW | 355 kW | 400 kW | – | – | – | – |
| **Rated making capacity AC-3** | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | | |
| **Rated breaking capacity AC-3** | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | | |
| **Short-circuit protection device for contactors** | | | | | | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 630 A | 800 A | 1000 A | 1000 A | Please consult us for coordination with circuit-breaker | | | |
| **Rated short-time withstand current Icw** | **1 s** | 4600 A | 4600 A | 7000 A | 7000 A | 8000 A | 10000 A | 12000 A | 12000 A |
| at 40 °C ambient temperature, | **10 s** | 4400 A | 4400 A | 6400 A | 6400 A | 7200 A | 8000 A | 10000 A | 10000 A |
| in free air from a cold state | **30 s** | 3100 A | 3100 A | 4500 A | 4500 A | 5200 A | 6000 A | 7500 A | 7500 A |
| | **1 min** | 2500 A | 2500 A | 3500 A | 3500 A | 4000 A | 4500 A | 5500 A | 5500 A |
| | **15 min** | 840 A | 840 A | 1300 A | 1300 A | 1500 A | 1600 A | 2200 A | 2200 A |
| **Maximum breaking capacity** | | | | | | | | | |
| cos ϕ = 0.45 | **at 440 V** | 4000 A | 5000 A | 6000 A | 7500 A | | 10000 A | 12000 A | 8400 A |
| (cos ϕ = 0.35 for Ie > 100 A) | **at 690 V** | 3500 A | 4500 A | 5000 A | 7000 A | | – | – | – |
| **Power dissipation per pole** | **Ie / AC-1** | 30 W | 42 W | 32 W | 50 W | 80 W | 80 W | 80 W | 125 W |
| | **Ie / AC-3** | 16 W | 21 W | 17 W | 28 W | – | 50 W | 50 W | – |
| **Max. electrical switching frequency** | **AC-1** | 300 cycles/h | | 300 cycles/h | | 300 cycles/h | 60 cycles/h | | 60 cycles/h |
| | **AC-3** | 300 cycles/h | | 300 cycles/h | | – | 60 cycles/h | | – |
| | **AC-2, AC-4** | 60 cycles/h | | 60 cycles/h | | – | 60 cycles/h | | – |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) Conductors with preparation.
(4) Max. connection bar width 50 mm.
(5) Max. connection bar width 100 mm.

# UL/NEMA/CSA Technical data

## AF09(Z)...AF38(Z); AF09N00(Z)...AF26N1(Z), 3-pole
## Utilization characteristics

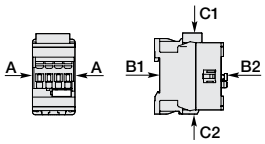
### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| **Standards** | | UL 508, CSA C22.2 N°14 | | | | | |
| **Max. operational voltage** | | 600 V | | | | | |
| **NEMA size** | | 00 | 0 | – | 1 | – | – |
| **NEMA continuous amp rating** | **Thermal current** | 9 A | 18 A | | 27 A | | |
| **NEMA maximum horse power ratings 1-phase, 60 Hz** | | | | | | | |
| | **115 V AC** | 1/3 hp | 1 hp | | 2 hp | | |
| | **230 V AC** | 1 hp | 2 hp | | 3 hp | | |
| **NEMA maximum horse power ratings 3-phase, 60 Hz** | | | | | | | |
| | **200 V AC** | 1-1/2 hp | 3 hp | | 7-1/2 hp | | |
| | **230 V AC** | 1-1/2 hp | 3 hp | | 7-1/2 hp | | |
| | **460 V AC** | 2 hp | 5 hp | | 10 hp | | |
| | **575 V AC** | 2 hp | 5 hp | | 10 hp | | |
| **UL / CSA general use rating** | | | | | | | |
| 600 V AC | | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 |
| **UL / CSA maximum 1-phase motor rating** | | | | | | | |
| Full load current | **120 V AC** | 13.8 A | 16 A | 20 A | 24 A | 24 A | 24 A |
| | **240 V AC** | 10 A | 12 A | 17 A | 17 A | 28 A | 28 A |
| Horse power rating | **120 V AC** | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 2 hp |
| | **240 V AC** | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 5 hp |
| **UL / CSA maximum 3-phase motor rating** | | | | | | | |
| Full load current (1) | **200-208 V AC** | 7.8 A | 11 A | 17.5 A | 25.3 A | 32.2 A | 32.2 A |
| | **220-240 V AC** | 6.8 A | 9.6 A | 15.2 A | 22 A | 28 A | 28 A |
| | **440-480 V AC** | 7.6 A | 11 A | 14 A | 21 A | 27 A | 27 A |
| | **550-600 V AC** | 9 A | 11 A | 17 A | 22 A | 27 A (2) | 27 A (2) |
| Horse power rating (1) | **200-208 V AC** | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | **220-240 V AC** | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | **440-480 V AC** | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 20 hp |
| | **550-600 V AC** | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp (2) | 25 hp (2) |
| **Max. electrical switching frequency** | | | | | | | |
| For general use | | 600 cycles/h | | | | | |
| For motor use | | 1200 cycles/h | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.
(2) For contactors produced since week 49-2011.

### General technical data

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| **Rated insulation voltage Ui** | | | | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | | | | |
| acc. to UL / CSA | | 600 V | | | | | |
| **Rated impulse withstand voltage Uimp.** | | 6 kV | | | | | |
| **Electromagnetic compatibility** | | Devices complying with IEC 60947-1 / EN 60947-1 - Environment A | | | | | |
| **Ambient air temperature** close to contactor | | | | | | | |
| Operation | Fitted with thermal overload relay | -25...+60 °C | | | | | |
| | Without thermal overload relay | -40...+70 °C | | | | | |
| Storage | | -60...+80 °C | | | | | |
| **Climatic withstand** | | Category B according to IEC 60947-1 Annex Q | | | | | |
| **Maximum operating altitude (without derating)** | | 3000 m | | | | | |
| **Mechanical durability** | | | | | | | |
| Number of operating cycles | | 10 millions operating cycles | | | | | |
| Max. switching frequency | | 3600 cycles/h | | | | | |
| **Shock withstand** acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | |
| Mounting position 1 | | | | | | | |
| | **Shock direction** | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | |
| | **A** | 30 g | | | | | |
| | **B1** | 25 g closed position / 5 g open position | | | | | |
| | **B2** | 15 g | | | | | |
| | **C1** | 25 g | | | | | |
| | **C2** | 25 g | | | | | |
| **Vibration withstand** acc. to IEC 60068-2-6 | | 5...300 Hz<br>4 g closed position / 2 g open position | | | | | |



# UL/NEMA/CSA Technical data

## A/E/L40; A/E/F50...A/F110, A/E/F50N2...A/E/F75N3, 3-pole

## Utilization characteristics

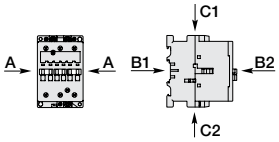
### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC operated | A40 | A50 | A63 | A75 | A95 | A110 |
|---|---|---|---|---|---|---|---|
| | DC operated | AL40, TAL40 | AE50, TAE50 | AE63 | AE75, TAE75 | – | – |
| | AC / DC operated | – | AF50 | AF63 | AF75 | AF95 | AF110 |
| **Standards** | | UL 508, CSA C22.2 N°14 | | | | | |
| **Max. operational voltage** | | 600 V | | | | | |
| **NEMA size** | | – | 2 | – | 3 | – | – |
| **NEMA continuous amp rating** | Thermal current | – | 45 A | – | 90 A | – | – |
| **NEMA maximum horse power ratings 1-phase, 60 Hz** | | | | | | | |
| | 115 V AC | – | 3 hp | – | – | – | – |
| | 230 V AC | – | 7-1/2 | – | – | – | – |
| **NEMA maximum horse power ratings 3-phase, 60 Hz** | | | | | | | |
| | 200 V AC | – | 10 hp | – | 25 hp | – | – |
| | 230 V AC | – | 15 hp | – | 30 hp | – | – |
| | 460 V AC | – | 25 hp | – | 50 hp | – | – |
| | 575 V AC | – | 25 hp | – | 50 hp | – | – |
| **UL / CSA general use rating** | | | | | | | |
| 600 V AC | | 60 A | 80 A | 90 A | 105 A | 125 A | 150 A |
| With conductor cross-sectional area | | AWG 6 | AWG 4 | AWG 3 | AWG 2 | AWG 1 | AWG 1/0 |
| **UL / CSA maximum 1-phase motor rating** | | | | | | | |
| Full load current | 120 V AC | 34 A | 34 A | 56 A | 80 A | 80 A | 100 A |
| | 240 V AC | 40 A | 40 A | 50 A | 68 A | 88 A | 110 A |
| Horse power rating | 120 V AC | 3 hp | 3 hp | 5 hp | 7.5 hp | 7.5 hp | 10 hp |
| | 240 V AC | 7.5 hp | 7.5 hp | 10 hp | 15 hp | 20 hp | 25 hp |
| **UL / CSA maximum 3-phase motor rating** | | | | | | | |
| Full load current (1) | 200-208 V AC | 32.2 A | 48.3 A | 62.1 A | 78.2 A | 92 A | 92 A |
| | 220-240 V AC | 42 A | 54 A | 68 A | 80 A | 80 A | 104 A |
| | 440-480 V AC | 40 A | 52 A | 77 A | 77 A | 77 A | 96 A |
| | 550-600 V AC | 41 A | 52 A | 77 A | 77 A | 77 A | 99 A |
| Horse power rating (1) | 200-208 V AC | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 30 hp |
| | 220-240 V AC | 15 hp | 20 hp | 25 hp | 30 hp | 30 hp | 40 hp |
| | 440-480 V AC | 30 hp | 40 hp | 60 hp | 60 hp | 60 hp | 75 hp |
| | 550-600 V AC | 40 hp | 50 hp | 75 hp | 75 hp | 75 hp | 100 hp |
| **Max. electrical switching frequency** | | | | | | | |
| For general use | | 600 cycles/h | 600 cycles/h (300 for AF.., AE..) | | | 300 cycles/h | |
| For motor use | | 1200 cycles/h | 600 cycles/h (300 for AF.., AE..) | | | 300 cycles/h | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.

### General technical data

| Contactor types | AC operated | A40 | A50 | A63 | A75 | A95 | A110 |
|---|---|---|---|---|---|---|---|
| | DC operated | AL40, TAL40 | AE50, TAE50 | AE63 | AE75, TAE75 | – | – |
| | AC / DC operated | – | AF50 | AF63 | AF75 | AF95 | AF110 |
| **Rated insulation voltage Ui** | | | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | | | |
| acc. to UL | | 600 V | | | | | |
| **Rated impulse withstand voltage Uimp.** | | 8 kV | | | | | |
| **Electromagnetic compatibility** | | AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A | | | | | |
| **Ambient air temperature** close to contactor | | | | | | | |
| Operation | Fitted with thermal overload relay | -25...+55 °C | | | | | |
| | Without thermal overload relay | -40...+70 °C (55 °C max. for TAL.., and TAE.. contactor) | | | | | |
| Storage | | -60...+80 °C | | | | -40...+70 °C | |
| **Climatic withstand** | | acc. to IEC 60068-2-30 and 60068-2-11<br>UTE C 63-100 specification II | | | | acc. to IEC 60068-2-30 | |
| **Maximum operating altitude (without derating)** | | 3000 m | | | | | |
| **Mechanical durability** | | | | | | | |
| Number of operating cycles | | 10 millions operating cycles (5 millions for AE.. and TAE..) | | | | | |
| Max. switching frequency | | 3600 cycles/h (300 for AF contactors) | | | | | |
| **Shock withstand** acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | |
| Mounting position 1 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position (2) | | | | | |
| | A | 20 g | | | | | |
| | B1 | 10 g closed position / 5 g open position | | | | | |
| | B2 | 15 g | | | | | |
| | C1 | 20 g | | | | | |
| | C2 | 20 g | | | | | |




For AL40, TAL40
A : 20 g closed position / 10 g open position
B1 : 15 g closed position / 5 g open position
B2 : 10 g closed position / 10 g open position
C1 : 20 g closed position / 8 g open position
C2 : 14 g closed position / 8 g open position

(2) These values are not valid for rail mounting with contactors A95 ... A110 and AF95 ... AF110.

# UL/NEMA/CSA Technical data

## A/F145...A/F300; A/F145N4...A/F260N5, 3-pole
## Utilization characteristics

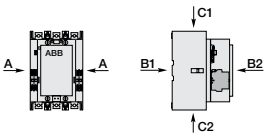
### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC operated | A145 | A185 | A210 | A260 | A300 |
|---|---|---|---|---|---|---|
| | AC / DC operated | AF145 | AF185 | AF210 | AF260 | AF300 |
| **Standards** | | UL 508, CSA C22.2 N°14 | | | | |
| **Max. operational voltage** | | 600 V | | | | |
| **NEMA size** | | 4 | – | – | 5 | – |
| **NEMA maximum horse power ratings 1-phase, 60 Hz** | | | | | | |
| | **115 V AC** | – | – | – | – | – |
| | **230 V AC** | – | – | – | – | – |
| **NEMA maximum horse power ratings 3-phase, 60 Hz** | | | | | | |
| | **200 V AC** | 40 hp | | | 75 hp | |
| | **230 V AC** | 50 hp | | | 100 hp | |
| | **460 V AC** | 100 hp | | | 200 hp | |
| | **575 V AC** | 200 hp | | | 200 hp | |
| **UL / CSA general use rating** | | | | | | |
| 600 V AC | | 230 A | 250 A | 300 A | 350 A | 400 A |
| **UL / CSA maximum 1-phase motor rating** | | | | | | |
| Full load current | **240 V AC** | – | – | – | – | – |
| Horse power rating | **240 V AC** | – | – | – | – | – |
| **UL / CSA maximum 3-phase motor rating** | | | | | | |
| Full load current (1) | **200-208 V AC** | 119.6 A | 149.5 A | 166.8 A | 220.8 A | 285.2 A |
| | **220-240 V AC** | 130 A | 145 A | 192 A | 248 A | 248 A |
| | **440-480 V AC** | 124 A | 156 A | 180 A | 240 A | 302 A |
| | **550-600 V AC** | 125 A | 144 A | 192 A | 242 A | 289 A |
| Horse power rating (1) | **200-208 V AC** | 40 hp | 50 hp | 60 hp | 75 hp | 100 hp |
| | **220-240 V AC** | 50 hp | 60 hp | 75 hp | 100 hp | 100 hp |
| | **440-480 V AC** | 100 hp | 125 hp | 150 hp | 200 hp | 250 hp |
| | **550-600 V AC** | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp |
| **Max. electrical switching frequency** | | | | | | |
| For general use | | 300 cycles/h | | | | |
| For motor use | | 300 cycles/h | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.

### General technical data

| Contactor types | | AC operated | A145 | A185 | A210 | A260 | A300 |
|---|---|---|---|---|---|---|---|
| | | AC / DC operated | AF145 | AF185 | AF210 | AF260 | AF300 |
| **Rated insulation voltage Ui** | | | | | | | |
| acc. to IEC 60947-4-1 | | | 1000 V | | | | |
| acc. to UL | | | 600 V | | | | |
| **Rated impulse withstand voltage Uimp.** | | | 8 kV | | | | |
| **Electromagnetic compatibility** | | | AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A | | | | |
| **Ambient air temperature** close to contactor | | | | | | | |
| Operation | Fitted with thermal overload relay | | -25 to +55 °C | | | | |
| | Fitted with electronic overload relay | | -25 to +70 °C | | | | |
| | Without electronic overload relay | | -40 to +70 °C | | | | |
| Storage | | | -40 to +70 °C | | | | |
| **Climatic withstand** | | | acc. to IEC 60068-2-30 | | | | |
| **Maximum operating altitude (without derating)** | | | 3000 m | | | | |
| **Mechanical durability** | | | | | | | |
| Number of operating cycles | | | 5 millions operating cycles | | | | |
| Max. switching frequency | | | 3600 cycles/h (300 for AF... contactors) | | | | |
| **Shock withstand** acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | |
| Mounting position 1 | | | | | | | |
| | | **Shock direction** | 1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position | | | | |
| | | **A** | 5 g | | | | |
| | | **B1** | 5 g | | | | |
| | | **B2** | 5 g | | | | |
| | | **C1** | 5 g | | | | |
| | | **C2** | 5 g | | | | |



# UL/NEMA/CSA Technical data

## AF400...AF2050; AF460N6...AF1650N8, 3-pole
## Utilization characteristics

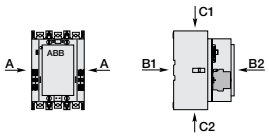
### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
|---|---|---|---|---|---|---|---|---|---|
| **Standards** | | UL 508, CSA C22.2 N°14 | | | | | | | |
| **Max. operational voltage** | | 600 V | | | | | | | |
| **NEMA size** | | – | 6 | – | 7 | | – | 8 | – |
| **NEMA maximum horse power ratings 1-phase, 60 Hz** | | | | | | | | | |
| | **115 V AC** | – | | | | | | | |
| | **230 V AC** | – | | | | | | | |
| **NEMA maximum horse power ratings 3-phase, 60 Hz** | | | | | | | | | |
| | **200 V AC** | – | 150 hp | – | – | | – | – | – |
| | **230 V AC** | – | 200 hp | – | 300 hp | | – | 450 hp | – |
| | **460 V AC** | – | 400 hp | – | 600 hp | | – | 900 hp | – |
| | **575 V AC** | – | 400 hp | – | 600 hp | | – | 900 hp | – |
| **UL / CSA general use rating** | | | | | | | | | |
| 600 V AC | | 550 A | 650 A | 750 A | 900 A | 1210 A | 1350 A | 1650 A | 2100 A |
| **UL / CSA maximum 1-phase motor rating** | | | | | | | | | |
| Full load current | **120 V AC** | – | – | – | – | – | – | – | – |
| | **240 V AC** | – | – | – | – | – | – | – | – |
| Horse power rating | **120 V AC** | – | – | – | – | – | – | – | – |
| | **240 V AC** | – | – | – | – | – | – | – | – |
| **UL / CSA maximum 3-phase motor rating** | | | | | | | | | |
| Full load current (1) | **200-208 V AC** | 358.8 A | 414 A | 552 A | 692.3 A | – | 954 A | 1030 A | – |
| | **220-240 V AC** | 360 A | 480 A | 604 A | 722 A | – | 954 A | 1030 A | – |
| | **440-480 V AC** | 414 A | 477 A | 590 A | 722 A | – | 954 A | 1030 A | – |
| | **550-600 V AC** | 382 A | 472 A | 578 A | 672 A | – | 944 A | 1050 A | – |
| Horse power rating (1) | **200-208 V AC** | 125 hp | 150 hp | 200 hp | 250 hp | – | – | – | – |
| | **220-240 V AC** | 150 hp | 200 hp | 250 hp | 300 hp | – | 400 A | 450 hp | – |
| | **440-480 V AC** | 350 hp | 400 hp | 500 hp | 600 hp | – | 800 A | 900 hp | – |
| | **550-600 V AC** | 400 hp | 500 hp | 600 hp | 700 hp | – | 1000 A | 1150 hp | – |
| **Short-circuit protection device for contactors** without thermal overload relay - Motor protection excluded | | | | | | | | | |
| Fuse rating | | 1000 A | | 1200 A | | | Please consult us for coordination with circuit-breaker | | |
| Fuse type, 600 V | | L | | | | | | | |
| **Max. electrical switching frequency** | | | | | | | | | |
| For general use | | 300 cycles/h | | | | | 60 cycles/h | | |
| For motor use | | 300 cycles/h | | | | | 60 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.

### General technical data

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
|---|---|---|---|---|---|---|---|---|---|
| **Rated insulation voltage Ui** | | | | | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | | | | | |
| acc. to UL | | 600 V | | | | | | | |
| **Rated impulse withstand voltage Uimp.** | | 8 kV | | | | | | | |
| **Electromagnetic compatibility** | | AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A | | | | | | | |
| **Ambient air temperature** close to contactor | | | | | | | | | |
| Operation | Fitted with electronic overload relay | -25 to +70 °C | | | | | | | |
| | Without electronic overload relay | -40 to +70 °C | | | | | | | |
| Storage | | -40 to +70 °C | | | | | | | |
| **Climatic withstand** | | acc. to IEC 60068-2-30 | | | | | | | |
| **Maximum operating altitude (without derating)** | | 3000 m | | | | | | | |
| **Mechanical durability** | | | | | | | | | |
| Number of operating cycles | | 3 millions operating cycles | | | | 0.5 million operating cycles | | | |
| Max. switching frequency | | 300 cycles/h | | | | | 60 cycles/h | | |
| **Shock withstand** acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | | | |
| Mounting position 1 | **Shock direction** | 1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position | | | | | | | |
| | **A** | 5 g | | | | | – | | |
| | **B1** | 5 g | | | | | – | | |
| | **B2** | 5 g | | | | | – | | |
| | **C1** | 5 g | | | | | – | | |
| | **C2** | 5 g | | | | | – | | |

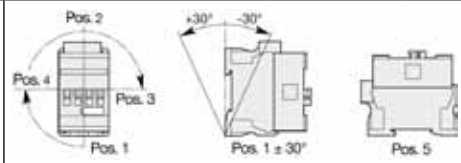


# General technical data
## AF09(Z)...AF38(Z), 3-pole
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|---|
| Coil operating limits<br>acc. to IEC 60947-4-1 | | AC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | | | | | |
| | | DC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C (AF) 0.85 x Uc min...Uc max. - (AF..Z) 0.85 x Uc min...1.1 x Uc max. | | | | | |
| AC control voltage<br>50/60 Hz | Rated control circuit voltage Uc | | 24...500 V AC | | | | | |
| | Coil consumption | Average pull-in value | (AF) 50 VA - (AF..Z) 16 VA | | | | | |
| | | Average holding value | (AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W | | | | | |
| DC control voltage | Rated control circuit voltage Uc | | 12...500 V DC | | | | | |
| | Coil consumption | Average pull-in value | (AF) 50 W - (AF..Z) 12...16 W | | | | | |
| | | Average holding value | (AF) 2 W - (AF..Z) 1.7 W | | | | | |
| PLC-output control | | | (AF..Z) ≥ 500 mA 24 V DC | | | | | |
| Drop-out voltage | | | ≤ 60 % of Uc min. | | | | | |
| Voltage sag immunity<br>acc. to SEMI F47-0706 | | | (AF..Z) conditions of use on request | | | | | |
| Dips withstand<br>-20 °C ≤ θ ≤ +60 °C | | | (AF..Z) 22 ms average | | | | | |
| Operating time | | | | | | | | |
| Between coil energization and: | | N.O. contact closing | 40...95 ms | | | | | |
| | | N.C. contact opening | 38...90 ms | | | | | |
| Between coil de-energization and: | | N.O. contact opening | 11...95 ms | | | | | |
| | | N.C. contact closing | 13...98 ms | | | | | |

### Mounting characteristics and conditions for use

| Contactor types | | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|---|
| Mounting positions | | |  | | | | | |
| | | | Max. N.C. built-in and add-on N.C. auxiliary contacts:<br>see accessory fitting details for a 3-pole contactor AF09 ... AF38 | | | | | |
| Mounting distances | | | The contactors can be assembled side by side | | | | | |
| Fixing | On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | | | |
| | By screws (not supplied) | | 2 x M4 screws placed diagonally | | | | | |

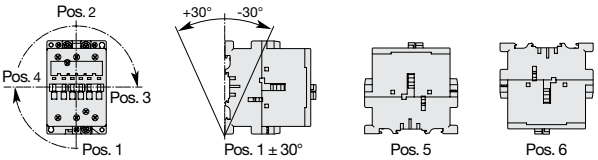
# General technical data
## A40...A110, 3-pole
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | AC operated | A40 | A50 | A63 | A75 | A95 | A110 |
|---|---|---|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **AC supply** | At θ ≤ 55 °C 0.85...1.1 x Uc | | | | at θ ≤ 70 °C 0.85...1.1 x Uc | |
| | | | Please also refer to "Mounting characteristics and conditions for use" | | | | | |
| **AC control voltage** | Rated control circuit voltage Uc | **at 50 Hz** | 24…690 V | | | | | |
| | | **at 60 Hz** | 24…690 V | | | | | |
| | Coil consumption | **Average pull-in value 50 Hz** | 120 VA | 180 VA | | | 350 VA | |
| | | **60 Hz** | 140 VA | 210 VA | | | 450 VA | |
| | | **50/60 Hz** (1) | 125 VA / 120 VA | 190 VA / 180 VA | | | 410 VA / 365 VA | |
| | | **Average holding value 50 Hz** | 12 VA / 3 W | 18 VA / 5.5 W | | | 22 VA / 6.5 W | |
| | | **60 Hz** | 12 VA / 3 W | 18 VA / 5.5 W | | | 26 VA / 8 W | |
| | | **50/60 Hz** (1) | 12 VA / 3 W | 18 VA / 5.5 W | | | 27 VA / 7.5 W | |
| **Drop-out voltage** | | | Approx. 40...65 % of Uc | | | | | |
| **Operating time** | | | | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 8…21 ms | 8…27 ms | | | 10…25 ms | |
| | | **N.C. contact opening** | 6…18 ms | 7…22 ms | | | 7…22 ms | |
| Between coil de-energization and: | | **N.O. contact opening** | 4…11 ms | 4…11 ms | | | 7…15 ms | |
| | | **N.C. contact closing** | 7…14 ms | 7…14 ms | | | 10…18 ms | |

(1) 50/60 Hz coils: see "Voltage code table".

### Mounting characteristics and conditions for use

| Contactor types | | AC operated | A40 | A50 | A63 | A75 | A95 | A110 |
|---|---|---|---|---|---|---|---|---|
| **Mounting positions** | | |   | | | | | |
| | | | Max. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor A40 ... A110 | | | | | |
| **Control voltage / Ambient temperature** | | | | | | | | |
| Mounting positions | 1, 1±30°, 2, 3, 4, 5 | **at θ ≤ 55 °C** | 0.85...1.1 x Uc | | | | 0.85...1.1 x Uc | |
| | | **at θ ≤ 70 °C** | Uc | | | | 0.85...1.1 x Uc | |
| | 6 | **at θ ≤ 55 °C** | 0.95...1.1 x Uc | | | | Unauthorized | |
| | | **at θ ≤ 70 °C** | Unauthorized | | | | Unauthorized | |
| **Mounting distances** | | | The contactors can be assembled side by side | | | | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | 35 x 15 mm or 75 x 25 mm | | | – | |
| | By screws (not supplied) | | 2 x M4 screws placed diagonally | 2 x M6 screws placed diagonally | | | 2 x M6 screws placed diagonally | |

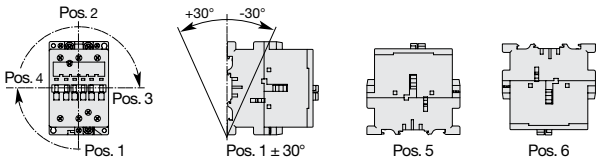
# General technical data
## AL40, AE50...AE75, 3-pole
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | DC operated | AL40 | AE50 | AE63 | AE75 |
|---|---|---|---|---|---|---|
| Coil operating limits<br>acc. to IEC 60947-4-1 | | DC supply | at θ ≤ 55 °C 0.85...1.1 x Uc<br>Please also refer to "Mounting characteristics and conditions for use" | | | |
| DC control voltage | Rated control circuit voltage Uc | | 12...250 V DC | | | |
| | Coil consumption | Average pull-in value | 3.5 W | 200 W | | |
| | | Average holding value | 3.5 W | 4 W | | |
| Drop-out voltage | | | approx. 10...30 % of Uc | approx. 15...40 % of Uc | | |
| Coil time constant | Open | L/R | 38 ms | 3 ms | | |
| | Closed | L/R | 62 ms | 15 ms | | |
| Operating time | | | | | | |
| Between coil energization and: | | N.O. contact closing | 55…110 ms | 13…30 ms | | |
| | | N.C. contact opening | 25…75 ms | 10…27 ms | | |
| Between coil de-energization and: | | N.O. contact opening (1) | 12…18 ms | 5…15 ms | | |
| | | N.C. contact closing (1) | 18…28 ms | 8…18 ms | | |

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a RV5 surge suppressor and a factor of 1.5 to 3 for a RT5 surge suppressor.

### Mounting characteristics and conditions for use

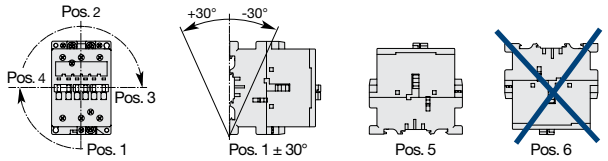
| Contactor types | | DC operated | AL40 | AE50 | AE63 | AE75 |
|---|---|---|---|---|---|---|
| Mounting positions | | |  | | | |
| | | | Max. built-in and add-on N.O. or N.C. auxiliary contacts:<br>see accessory fitting details for 3-pole contactor AL40, AE50 … AE75 | | | |
| Control voltage / Ambient temperature | | | | | | |
| Mounting positions | 1, 1±30°, 2, 3, 4, 5 | at θ ≤ 55 °C | 0.85 x Uc…1.1 x Uc | | | |
| | | at θ ≤ 70 °C | Uc | | | |
| | 6 | at θ ≤ 55 °C | Unauthorized | 0.95 x Uc…1.1 x Uc | | |
| | | at θ ≤ 70 °C | Unauthorized | | | |
| Mounting distances | | | The contactors can be assembled side by side | | | |
| Fixing | On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or<br>35 x 15 mm | 35 x 15 mm or 75 x 25 mm | | |
| | By screws (not supplied) | | 2 x M4 screws<br>placed diagonally | 2 x M6 screws placed diagonally | | |

# General technical data
## AF50...AF110, 3-pole
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | AC / DC operated | AF50 | AF63 | AF75 | AF95 | AF110 |
|---|---|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **AC or DC supply** | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use" | | | | |
| **AC control voltage** 50/60 Hz | Rated control circuit voltage Uc | | 48…250 V 50/60 Hz | | | | |
| | Coil consumption | **Average pull-in value** | 210 VA | | | 350 VA | |
| | | **Average holding value** | 7 VA / 2.8 W | | | 7 VA / 3.5 W | |
| **DC control voltage** | Rated control circuit voltage Uc | | 20…250 V DC | | | | |
| | Coil consumption | **Average pull-in value** | 190 W | | | 400 W | |
| | | **Average holding value** | 2.8 W | | | 2 W | |
| **Drop-out voltage** | | | 55 % of Uc min. | | | | |
| **Voltage sag immunity** acc. to SEMI F47 | | | Conditions of use on request | | | | |
| **Dips withstand** | | | ≥ 20 ms | | | | |
| **Operating time** | | | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 30…100 ms | | | 30…80 ms | |
| | | **N.C. contact opening** | 27…95 ms | | | 27…77 ms | |
| Between coil de-energization and: | | **N.O. contact opening** | 30…110 ms | | | 55…125 ms | |
| | | **N.C. contact closing** | 35…115 ms | | | 60…130 ms | |

### Mounting characteristics and conditions for use

| Contactor types | | AC / DC operated | AF50 | AF63 | AF75 | AF95 | AF110 |
|---|---|---|---|---|---|---|---|
| **Mounting positions** | | |   | | | | |
| | | | Max. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF50 ... AF110 | | | | |
| **Control voltage / Ambient temperature** | | | | | | | |
| Mounting positions | 1, 1±30°, 2, 3, 4, 5 | **at θ ≤ 70 °C** | 0.85 x Uc min…1.1 x Uc max. | | | | |
| | 6 | | Unauthorized | | | | |
| **Mounting distances** | | | The contactors can be assembled side by side | | | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | 35 x 15 mm or 75 x 25 mm | | | – | |
| | By screws (not supplied) | | 2 x M6 screws placed diagonally | | | | |

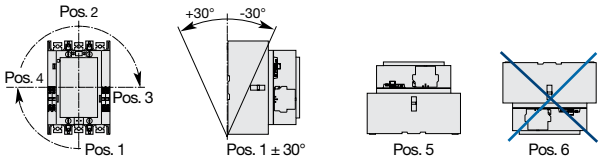
# General technical data
## A145...A300, 3-pole
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | AC operated | A145 | A185 | A210 | A260 | A300 |
|---|---|---|---|---|---|---|---|
| **Coil operating limits** | | **AC supply** | At θ ≤ 70 °C 0.85...1.1 x Uc | | | | |
| acc. to IEC 60947-4-1 | | | Please also refer to "Mounting characteristics and conditions for use" | | | | |
| **AC control voltage** | Rated control circuit voltage Uc | **at 50 Hz** | 24…690 V | | | | |
| | | **at 60 Hz** | 24…690 V | | | | |
| | Coil consumption | **Average pull-in value 50 Hz** | 550 VA | | 1350 VA | | |
| | | **60 Hz** | 600 VA | | 1550 VA | | |
| | | **50/60 Hz** (1) | 700 VA / 650 VA | | 1700 VA / 1550 VA | | |
| | | **Average holding value 50 Hz** | 35 VA / 11 W | | 60 VA / 16 W | | |
| | | **60 Hz** | 40 VA / 12 W | | 65 VA / 19 W | | |
| | | **50/60 Hz** (1) | 44 VA / 13 W | | 80 VA / 21 W | | |
| **Drop-out voltage** | | | Approx. 40…65 % of Uc min. | | | | |
| **Operating time** | | | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 13…27 ms | | 17…35 ms | | |
| | | **N.C. contact opening** | 8…22 ms | | 12…30 ms | | |
| Between coil de-energization and: | | **N.O. contact opening** | 5…10 ms | | 7…13 ms | | |
| | | **N.C. contact closing** | 9…13 ms | | 10…16 ms | | |

(1) 50/60 Hz coils: see "Voltage code table".

### Mounting characteristics and conditions for use

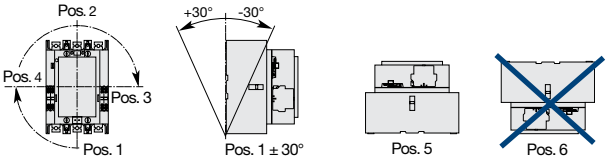
| Contactor types | | AC operated | A145 | A185 | A210 | A260 | A300 |
|---|---|---|---|---|---|---|---|
| **Mounting positions** | | |   | | | | |
| | | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor A145 ... A300 | | | | |
| **Control voltage / Ambient temperature** | | | | | | | |
| | Mounting positions 1, 1±30°, 2, 3, 4, 5 | **at θ ≤ 70 °C** | 0.85 x Uc…1.1 x Uc | | | | |
| | Mounting positions 6 | | Unauthorized | | | | |
| **Mounting distances** | | | The contactors can be assembled side by side | | | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | – | | | | |
| | By screws (not supplied) | | 4 x M5 | | | | |

# General technical data
## AF145...AF300, 3-pole
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | AC / DC operated | AF145 | AF185 | AF210 | AF260 | AF300 |
|---|---|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **AC or DC supply** | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use" | | | | |
| **AC control voltage** 50/60 Hz | Rated control circuit voltage Uc | | 48…250 V AC | | | | |
| | Coil consumption | **Average pull-in value** | 430 VA | | 470 VA | | |
| | | **Average holding value** | 12 VA / 3.5 W | | 10 VA / 2.5 W | | |
| **DC control voltage** | Rated control circuit voltage Uc | | 20…250 V DC | | | | |
| | Coil consumption | **Average pull-in value** | 500 W | | 520 W | | |
| | | **Average holding value** | 2 W | | 2 W | | |
| **Drop-out voltage** | | | 55 % of Uc min. | | | | |
| **Voltage sag immunity** acc. to SEMI F47 | | | Conditions of use on request | | | | |
| **Dips withstand** | | | ≥ 20 ms | | | | |
| **Operating time** | | | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 30…115 ms | | | | |
| | | **N.C. contact opening** | 30…115 ms | | | | |
| Between coil de-energization and: | | **N.O. contact opening** | 25…80 ms | | | | |
| | | **N.C. contact closing** | 25…80 ms | | | | |

### Mounting characteristics and conditions for use

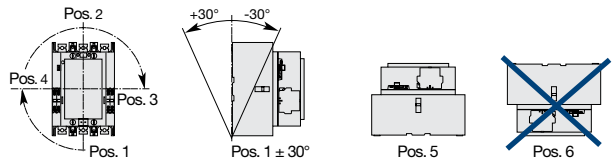
| Contactor types | | AC / DC operated | AF145 | AF185 | AF210 | AF260 | AF300 |
|---|---|---|---|---|---|---|---|
| **Mounting positions** | | |   | | | | |
| | | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF145 ... AF2050 | | | | |
| **Control voltage / Ambient temperature** | | | | | | | |
| | Mounting positions 1, 1±30°, 2, 3, 4, 5 | **at θ ≤ 70 °C** | 0.85 x Uc min...1.1 x Uc max. | | | | |
| | Mounting positions 6 | | Unauthorized | | | | |
| **Mounting distances** | | | The contactors can be assembled side by side | | | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | – | | | | |
| | By screws (not supplied) | | 4 x M5 | | | | |

# General technical data
## AF400...AF2050, 3-pole
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | AC / DC operated | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **AC or DC supply** | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use" | | | | | | | |
| **AC control voltage** 50/60 Hz | Rated control circuit voltage Uc | | 48…500 V AC | | | | | 100…250 V | | |
| | Coil consumption | **Average pull-in value** | 890 VA | | 850 VA | | | 1900 VA | | |
| | | **Average holding value** | 12 VA / 4 W | | 12 VA / 4.5 W | | | 48 VA / 17 W | | |
| **DC control voltage** | Rated control circuit voltage Uc | | 24…500 V DC | | | | | 100…250 V | | |
| | Coil consumption | **Average pull-in value** | 990 W | | 950 W | | | 1700 W | | |
| | | **Average holding value** | 4 W | | 4.5 W | | | 16 W | | |
| **Drop-out voltage** | | | 55 % of Uc min. | | | | | | | |
| **Voltage sag immunity** acc. to SEMI F47 | | | Conditions of use on request | | | | | | | |
| **Dips withstand** | | | ≥ 20 ms | | | | | | | |
| **Operating time** | | | | | | | | | | |
| **Coil supply between A1 - A2** | | | | | | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 50…120 ms | | | | | 50…80 ms | | |
| | | **N.C. contact opening** | 50…120 ms | | | | | 50…80 ms | | |
| Between coil de-energization and: | | **N.O. contact opening** | 33…70 ms | | | | | 35…55 ms | | |
| | | **N.C. contact closing** | 33…70 ms | | | | | 35…55 ms | | |
| **Control input for PLC's** | | | | | | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 40…60 ms | | 40...90 ms | | | 40…65 ms | | |
| | | **N.C. contact opening** | 40…60 ms | | 40...90 ms | | | 40…65 ms | | |
| Between coil de-energization and: | | **N.O. contact opening** | 10…30 ms | | | | | 10…30 ms | | |
| | | **N.C. contact closing** | 10…30 ms | | | | | 10…30 ms | | |

### Mounting characteristics and conditions for use

| Contactor types | | AC / DC operated | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Mounting positions** | | |   | | | | | | | |
| | | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF400 ... AF2050 | | | | | | | |
| **Control voltage / Ambient temperature** | | | | | | | | | | |
| Mounting positions | 1, 1±30°, 2, 3, 4, 5 | **at θ ≤ 70 °C** | 0.85 x Uc min…1.1 x Uc max. | | | | | | | |
| | 6 | | Unauthorized | | | | | | | |
| **Mounting distances** | | | The contactors can be assembled side by side | | | | | | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | – | | | | | | | |
| | By screws (not supplied) | | 4 x M5 | | 4 x M6 | | | 4 x M8 | | |

# General technical data
## AF09(Z)...AF38(Z), 3-pole
## Terminal characteristics

### Connecting characteristics

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| **Main terminals** | | Screw terminals with cable clamp | | | | | |
| **Connection capacity** (min. ... max.) | | | | | | | |
| **Main conductors** (poles) | | | | | | | |
| Rigid, Solid (≤ 4 mm²) | **1 x** | 1...6 mm² | | | 2.5...10 mm² | | |
| Rigid, Stranded (≥ 6 mm²) | **2 x** | 1...6 mm² | | | 2.5...10 mm² | | |
| Flexible with non insulated ferrule | **1 x** | 0.75...6 mm² | | | 1.5...10 mm² | | |
| | **2 x** | 0.75...6 mm² | | | 1.5...10 mm² | | |
| Flexible with insulated ferrule | **1 x** | 0.75...4 mm² | | | 1.5...10 mm² | | |
| | **2 x** | 0.75...2.5 mm² | | | 1.5...4 mm² | | |
| Bars or lugs | **L <** | 9.6 mm | | | 12.5 mm | | |
| Connection capacity acc. to UL/CSA (solid/stranded) | **1 or 2 x** | AWG 16...10 | | | AWG 14...8 | | |
| Stripping length | | 10 mm | | | 14 mm | | |
| Tightening torque | | 1.5 Nm / 13 lb.in | | | 2.5 Nm / 22 lb.in | | |
| **Auxiliary conductors** (built-in auxiliary terminals + coil terminals) | | | | | | | |
| Rigid solid | **1 x** | 1...2.5 mm² | | | | | |
| | **2 x** | 1...2.5 mm² | | | | | |
| Flexible with non insulated ferrule | **1 x** | 0.75...2.5 mm² | | | | | |
| | **2 x** | 0.75...2.5 mm² | | | | | |
| Flexible with insulated ferrule | **1 x** | 0.75...2.5 mm² | | | | | |
| | **2 x** | 0.75...1.5 mm² | | | | | |
| Lugs | **L <** | 8 mm | | | | | |
| Connection capacity acc. to UL/CSA (solid/stranded) | **1 or 2 x** | AWG 18...14 | | | | | |
| Stripping length | | 10 mm | | | | | |
| Tightening torque | | | | | | | |
| Coil terminals | | 1.2 Nm / 11 lb.in | | | | | |
| Built-in auxiliary terminals | | 1.2 Nm / 11 lb.in | | | | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | |
| Main terminals | | IP20 | | | | | |
| Coil terminals | | IP20 | | | | | |
| Built-in auxiliary terminals | | IP20 | | | | | |
| **Screw terminals** | | Delivered in open position, screws of unused terminals must be tightened | | | | | |
| Main terminals | | M3.5 | | | M4 | | |
| | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | | Flat Ø 6.5 / Pozidriv 2 | | |
| Coil terminals | | M3.5 | | | | | |
| | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | | | | |
| Built-in auxiliary terminals | | M3.5 | | | | | |
| | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | | | | |

# General technical data
## A/E/L40, A/E/F50...A/F110, 3-pole
## Terminal characteristics

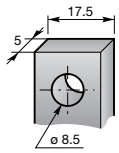
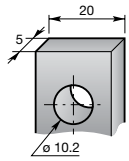
### Connecting characteristics

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Contactor types** | | | **AC operated** | A40 | A50 | A63 | A75 | A95 | A110 |
| | | | **DC operated** | AL40 | AE50 | AE63 | AE75 | – | – |
| | | | | TAL40 | TAE50 | – | TAE75 | – | – |
| | | | **AC / DC operated** | – | AF50 | AF63 | AF75 | AF95 | AF110 |
| **Main terminals** | | | | Screw terminals with double connector 2 x (5.6 x 6.5 mm) | Screw terminals with single connector (13 x 10 mm) | | | Screw terminals with single connector (14 x 14 mm) | |
| **Connection capacity** (min. ... max.) | | | | | | | | | |
| **Main conductors** (poles) | | | | | | | | | |
| Rigid | Solid (≤ 4 mm²) | **1 x** | | 2.5...16 mm² | 6...50 mm² | | | 10...95 mm² | |
| | Stranded (≥ 6 mm²) | **2 x** | | 2.5...16 mm² | 6...25 mm² | | | 6...35 mm² | |
| Flexible with ferrule | | **1 x** | | 2.5...10 mm² | 6...35 mm² | | | 10...70 mm² (1) | |
| | | **2 x** | | 2.5...10 mm² | 6...16 mm² | | | 6...35 mm² (1) | |
| Bars or lugs | | **L ≤** | | – | – | | | 30 mm (2) | |
| | | **l >** | | – | – | | | 6 mm | |
| Connection capacity acc. to UL/CSA (solid/stranded) | | **1 or 2 x** | | AWG 8...4 | AWG 8...1 | | | AWG 6...2/0 | |
| Tightening torque | Recommended | | | 2.30 Nm / 20 lb.in | 4.00 Nm / 35 lb.in | | | 8 Nm / 71 lb.in | |
| | Max. | | | 2.60 Nm | 4.50 Nm | | | 9 Nm | |
| **Auxiliary conductors** (built-in auxiliary terminals + coil terminals) | | | | | | | | | |
| Rigid solid | | **1 x** | | 1...4 mm² | | | | 0.75...2.5 mm² | |
| | | **2 x** | | 1...4 mm² | | | | 0.75...2.5 mm² | |
| Flexible with ferrule | | **1 x** | | 0.75...2.5 mm² | 1...2.5 mm² | | | 0.75...2.5 mm² | |
| | | **2 x** | | 0.75...2.5 mm² | | | | | |
| Lugs | | **L ≤** | | 8 mm | | | | | |
| | | **l >** | | 3.7 mm | | | | | |
| Connection capacity acc. to UL/CSA (solid/stranded) | | **1 or 2 x** | | AWG 18...14 | | | | | |
| Tightening torque | | | | | | | | | |
| Coil terminals | Recommended | | | 1.00 Nm / 9 lb.in | | | | | |
| | Max. | | | 1.20 Nm | | | | | |
| Built-in auxiliary terminals | Recommended | | | 1.00 Nm / 9 lb.in | – | | | – | |
| | Max. | | | 1.20 Nm | – | | | – | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | | | |
| Main terminals | | | | IP20 | IP10 | | | | |
| Coil terminals | | | | IP20 | | | | | |
| Built-in auxiliary terminals | | | | IP20 | – | | | – | |
| **Screw terminals** | | | | Delivered in open position, screws of unused terminals must be tightened | | | | | |
| Main terminals | | | | M5 | M6 | | | M8 | |
| | | | **Screwdriver type** | Flat Ø 6.5 / Pozidriv 2 | | | | Hexagon socket (s = 4 mm) | |
| Coil terminals | | | | M3.5 | | | | | |
| | | | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | | | | |
| Built-in auxiliary terminals | | | | M3.5 | – | | | | |
| | | | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | – | | | | |

(1) A(F)95 / A(F)110: use flexible without ferrule.
(2) With LW110 enlargement piece, see “Accessories”.

# General technical data
## A/F145...A/F300, 3-pole
## Terminal characteristics

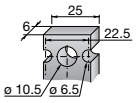
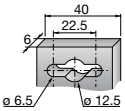
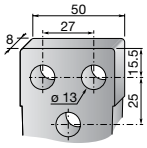
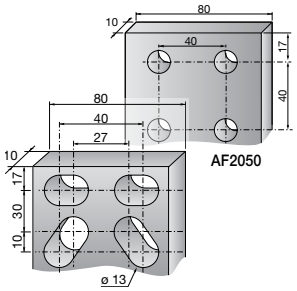
### Connecting characteristics

| Contactor types | AC operated | A145 | A185 | A210 | A260 | A300 |
|---|---|---|---|---|---|---|
| | AC / DC operated | AF145 | AF185 | AF210 | AF260 | AF300 |
| **Main terminals** Flat type | |   | |   | | |
| **Connection capacity** (min. ... max.) | | | | | | |
| **Main conductors** (poles) | | | | | | |
| Rigid with connector | Single for Cu cable | 6…185 mm² | | 16…240 mm² | | |
| | Single for Al/Cu cable | 25…150 mm² | | 120…240 mm² | | |
| | Double for Al/Cu cable | – | | 2 x 95…120 mm² | | |
| Bars or lugs | L ≤ | 24 mm | | 32 mm | | |
| | Ø > | 8 mm | | 10 mm | | |
| Connection capacity acc. to UL/CSA | | 6 - 250 MCM x 1 | | 4 - 500 MCM x 1 (1) | | |
| Tightening torque | Recommended | 18 Nm / 160 lb.in | | 28 Nm / 247 lb.in | | |
| | Max. | 20 Nm | | 30 Nm | | |
| **Auxiliary conductors** (coil terminals) | | | | | | |
| Rigid solid | 1 x | 1…4 mm² | | | | |
| | 2 x | 1…4 mm² | | | | |
| Flexible with ferrule | 1 x | 0.75…2.5 mm² | | | | |
| | 2 x | 0.75…2.5 mm² | | | | |
| Lugs | L ≤ | 8 mm | | | | |
| | l > | 3.7 mm | | | | |
| Connection capacity acc. to UL/CSA (solid/stranded) | 1 or 2 x | AWG 18…14 | | | | |
| Tightening torque | Recommended | 1.00 Nm / 9 lb.in | | | | |
| | Max. | 1.20 Nm | | | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | |
| Main terminals | | IP00 | | | | |
| Coil terminals | | IP20 | | | | |
| **Screw terminals** | | | | | | |
| Main terminals | | M8 | | M10 | | |
| | | Screws and bolts | | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | | |
| | Screwdriver type | Flat Ø 5.5 mm / Pozidriv 2 | | | | |

(1) With LW110 enlargement piece: see "Accessories".

# General technical data
## AF400...AF2050, 3-pole
## Terminal characteristics

### Connecting characteristics

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
|---|---|---|---|---|---|---|---|---|---|
| **Main terminals** Flat type | |  | |  | |  |  | | |
| **Connection capacity** (min. ... max.) | | | | | | | | | |
| **Main conductors** (poles) | | | | | | | | | |
| Rigid with connector | Single for Cu cable | 240 mm² | | 300 mm² | | | – | | |
| | Single for Al/Cu cable | 240 mm² | | 300 mm² | | | – | | |
| | Double for Al/Cu cable | 2 x 240 mm² | | 3 x 185 mm² | | | – | | |
| Bars or lugs | **L ≤** | 47 mm | | 52 mm | | | 100 mm | | |
| | **Ø >** | 10 mm | | 12 mm | | | 12 mm | | |
| Connection capacity acc. to UL/CSA | | 250 - 500 MCM x 2 | | 2/0 - 500 MCM x 2 | | | 1/0 - 750 MCM x 4 | | |
| Tightening torque | Recommended | 35 Nm / 310 lb.in | | 45 Nm / 398 lb.in | | | 45 Nm / 398 lb.in | | |
| | Max. | 40 Nm | | 49 Nm | | | 49 Nm | | |
| **Auxiliary conductors** (coil terminals) | | | | | | | | | |
| Rigid solid | **1 x** | 1...4 mm² | | | | | | | |
| | **2 x** | 1...4 mm² | | | | | | | |
| Flexible with ferrule | **1 x** | 0.75...2.5 mm² | | | | | | | |
| | **2 x** | 0.75...2.5 mm² | | | | | | | |
| Lugs | **L ≤** | 8 mm | | | | | | | |
| | **l >** | 3.7 mm | | | | | | | |
| Connection capacity acc. to UL/CSA (solid/stranded) | **1 or 2 x** | AWG 18...14 | | | | | | | |
| Tightening torque | Recommended | 1.00 Nm / 9 lb.in | | | | | | | |
| | Max. | 1.20 Nm | | | | | | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | | | |
| Main terminals | | IP00 | | | | | | | |
| Coil terminals | | IP20 | | | | | | | |
| **Screw terminals** | | | | | | | | | |
| Main terminals | | M10 | | M12 | | | | | |
| | | Screws and bolts | | | | | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | | | | | |
| | **Screwdriver type** | Flat Ø 5.5 mm / Pozidriv 2 | | | | | | | |

# General technical data
## AF09(Z)...AF38(Z), 3-pole
## Built-in auxiliary contacts

### Built-in auxiliary contacts according to IEC

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| Rated operational voltage Ue max. | | 690 V | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | |
| Conventional free air thermal current Ith - $\theta \leq 40$ °C | | 16 A | | | | | |
| Ie / Rated operational current AC-15 | | | | | | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | | | | |
| | 220-240 V 50/60 Hz | 4 A | | | | | |
| | 400-440 V 50/60 Hz | 3 A | | | | | |
| | 500 V 50/60 Hz | 2 A | | | | | |
| | 690 V 50/60 Hz | 2 A | | | | | |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | | | | |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | | | | |
| Ie / Rated operational current DC-13 | | | | | | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | | | | |
| | 48 V DC | 2.8 A / 134 W | | | | | |
| | 72 V DC | 1 A / 72 W | | | | | |
| | 110 V DC | 0.55 A / 60 W | | | | | |
| | 125 V DC | 0.55 A / 69 W | | | | | |
| | 220 V DC | 0.27 A / 60 W | | | | | |
| | 250 V DC | 0.27 A / 68 W | | | | | |
| | 400 V DC | 0.15 A / 60 W | | | | | |
| | 500 V DC | 0.13 A / 65 W | | | | | |
| | 600 V DC | 0.1 A / 60 W | | | | | |
| Short-circuit protection device gG type fuse | | 10 A | | | | | |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | | | | | |
| | for 0.1 s | 140 A | | | | | |
| Minimum switching capacity | | 12 V / 3 mA | | | | | |
| with failure rate acc. to IEC 60947-5-4 | | $10^{-7}$ | | | | | |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms | | | | | |
| Power dissipation per pole at 6 A | | 0.1 W | | | | | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | | | | | |
| | DC-13 | 900 cycles/h | | | | | |
| Mechanically linked contacts<br>acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mechanically linked contacts. | | | | | |
| Mirror contacts<br>acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mirror contacts. | | | | | |

### Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| Max. operational voltage | | 600 V AC, 600 V DC | | | | | |
| Pilot duty | | A600, Q600 | | | | | |
| AC thermal rated current | | 10 A | | | | | |
| AC maximum volt-ampere making | | 7200 VA | | | | | |
| AC maximum volt-ampere breaking | | 720 VA | | | | | |
| DC thermal rated current | | 2.5 A | | | | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | | | | |

# General technical data
## A/E/L40, 3-pole
## Built-in auxiliary contacts

### Built-in auxiliary contacts according to IEC

| Contactor types | AC operated | A40 |
|---|---|---|
| | DC operated | AL40, TAL40 |
| Rated operational voltage Ue max. | | 690 V |
| Rated frequency (without derating) | | 50/60 Hz |
| Conventional free air thermal current Ith - $\theta \leq 40$ °C | | 16 A |
| Ie / Rated operational current AC-15 acc. to IEC 60947-5-1 | | |
| | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 380-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Ie / Rated operational current DC-13 acc. to IEC 60947-5-1 | | |
| | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 2 A / 144 W |
| | 110 V DC | 1.1 A / 121 W |
| | 125 V DC | 1.1 A / 138 W |
| | 220 V DC | 0.55 A / 121 W |
| | 250 V DC | 0.55 A / 138 W |
| Short-circuit protection device gG type fuse | | 10 A |
| Rated short-time withstand current Icw | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity | | 17 V / 5 mA |
| with failure rate acc. to IEC 60947-5-4 | | $\leq 10^{-7}$ for AL40 and TAL40 contactors |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms |
| Power dissipation per pole at 6 A | | 0.1 W |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts of 4-pole CA5 are mechanically linked contacts. |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA5, CAL5-11) are mirror contacts. |

### Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC operated | A40 |
|---|---|---|
| | DC operated | AL40, TAL40 |
| Max. operational voltage | | 600 V AC, 600 V DC |
| Pilot duty | | A600, P300 |
| AC thermal rated current | | 10 A |
| AC maximum volt-ampere making | | 7200 VA |
| AC maximum volt-ampere breaking | | 720 VA |
| DC thermal rated current | | 5 A |
| DC maximum volt-ampere making-breaking | | 138 VA |

# IEC technical data

## AS/L09...AS/L16, 3-pole, screw terminated

## Utilization characteristics

### Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|
| | DC operated | ASL09 | ASL12 | ASL16 |
| **Standards** | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | |
| **Rated operational voltage Ue max.** | | 690 V | | |
| **Rated frequency (without derating)** | | 50 / 60 Hz | | |
| **Conventional free-air thermal current Ith** | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 22 A | 25 A | 25 A |
| With conductor cross-sectional area | | 2.5 mm² | 4 mm² | 4 mm² |
| **AC-1 Utilization category** | | | | |
| For air temperature close to contactor | | | | |
| **Ie / Rated operational current AC-1** | θ ≤ 40 °C | 22 A | 24 A | 24 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 18 A | 20 A | 20 A |
| | θ ≤ 70 °C | 15 A | 16 A | 16 A |
| With conductor cross-sectional area | | 2.5 mm² | | |
| **AC-3 Utilization category** | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | |
| **Ie / Max. rated operational current AC-3** (1) | | | | |
| | 220-230-240 V | 9 A | 12 A | 15.7 A |
| 3-phase motors | 400 V | 9 A | 12 A | 15.5 A |
| | 415 V | 9 A | 12 A | 15.5 A |
| | 440 V | 8 A | 11 A | 13.6 A |
| | 500 V | 8 A | 11 A | 12.5 A |
| | 690 V | 5 A | 7 A | 9 A |
| **Rated operational power AC-3** (1) | | | | |
| | 220-230-240 V | 2.2 kW | 3 kW | 4 kW |
| 1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz, 3-phase motors | 400 V | 4 kW | 5.5 kW | 7.5 kW |
| | 415 V | 4 kW | 5.5 kW | 7.5 kW |
| | 440 V | 4 kW | 5.5 kW | 7.5 kW |
| | 500 V | 4 kW | 5.5 kW | 7.5 kW |
| | 690 V | 4 kW | 5.5 kW | 7.5 kW |
| **Rated making capacity AC-3** | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | |
| **Rated breaking capacity AC-3** | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | |
| **AC-8a Utilization category** | | | | |
| (without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C) | | | | |
| **Ie / Rated operational current AC-8a** | | 12 A | 16 A | 22 A |
| **Rated operational power AC-8a** | | 5.5 kW | 7.5 kW | 11 kW |
| **Short-circuit protection device for contactors** | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 25 A | | |
| **Rated short-time withstand current Icw** | 1 s | 230 A | 250 A | 250 A |
| at 40 °C ambient temperature, | 10 s | 100 A | 124 A | 124 A |
| in free air from a cold state | 30 s | 65 A | 75 A | 75 A |
| | 1 min | 50 A | 55 A | 55 A |
| | 15 min | 22 A | 24 A | 24 A |
| **Maximum breaking capacity** | | | | |
| cos φ = 0.45 | at 440 V | 155 A | | |
| | at 690 V | 90 A | | |
| **Power dissipation per pole** | Ie / AC-1 | 1 W | 1.2 W | 1.2 W |
| | Ie / AC-3 | 0.16 W | 0.3 W | 0.5 W |
| **Max. electrical switching frequency** | AC-1 | 600 cycles/h | | |
| | AC-3 | 1200 cycles/h | | |
| | AC-4 | 300 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

# UL/CSA Technical data

## AS/L09...AS/L16, 3-pole, screw terminated
## Utilization characteristics

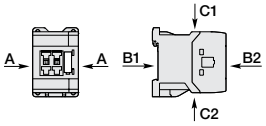
### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|
| | DC operated | ASL09 | ASL12 | ASL16 |
| **Standards** | | UL 508, CSA C22.2 N°14 | | |
| **Max. operational voltage** | | 690 V | | |
| **UL / CSA general use rating** | | | | |
| 600 V AC | | 20 A | 20 A | 20 A |
| With conductor cross-sectional area | | AWG 12 | AWG 12 | AWG 12 |
| **UL / CSA maximum 1-phase motor rating** | | | | |
| Full load current | **120 V AC** | 7.2 A | 9.8 A | 13.8 A |
| | **240 V AC** | 8 A | 10 A | 12 A |
| Horse power rating | **120 V AC** | 1/3 hp | 1/2 hp | 3/4 hp |
| | **240 V AC** | 1 hp | 1-1/2 hp | 2 hp |
| **UL / CSA maximum 3-phase motor rating** | | | | |
| Full load current (1) | **200-208 V AC** | 7.8 A | 7.8 A | 11 A |
| | **220-240 V AC** | 6.8 A | 9.6 A | 15.2 A |
| | **440-480 V AC** | 7.6 A | 11 A | 14 A |
| | **550-600 V AC** | 9 A | 11 A | 11 A |
| Horse power rating (1) | **200-208 V AC** | 2 hp | 2 hp | 3 hp |
| | **220-240 V AC** | 2 hp | 3 hp | 5 hp |
| | **440-480 V AC** | 5 hp | 7-1/2 hp | 10 hp |
| | **550-600 V AC** | 7-1/2 hp | 10 hp | 10 hp |
| **Max. electrical switching frequency** | | | | |
| For general use | | 600 cycles/h | | |
| For motor use | | 1200 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

### General technical data

| Contactor types | | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|---|
| | | DC operated | ASL09 | ASL12 | ASL16 |
| **Rated insulation voltage Ui** | | | | | |
| acc. to IEC 60947-4-1 | | | 690 V | | |
| acc. to UL / CSA | | | 600 V | | |
| **Rated impulse withstand voltage Uimp.** | | | 6 kV | | |
| **Ambient air temperature** close to contactor | | | | | |
| Operation | Fitted with thermal overload relay | | -25...+60 °C | | |
| | Without thermal overload relay | | -40...+70 °C | | |
| Storage | | | -60...+80 °C | | |
| **Climatic withstand** | | | Category B according to IEC 60947-1 Annex Q | | |
| **Maximum operating altitude (without derating)** | | | 3000 m | | |
| **Mechanical durability** | | | | | |
| Number of operating cycles | | | 10 millions operating cycles | | |
| Max. switching frequency | | | 3600 cycles/h | | |
| **Shock withstand** | | | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | **Shock direction** | **AS contactors - AC operated** | **ASL contactors - DC operated** | |
| Mounting position 1 | | **A** | 20 g | 20 g closed position / 10 g open position | |
| | | **B1** | 10 g closed position / 5 g open position | 15 g closed position / 5 g open position | |
| | | **B2** | 15 g | 10 g | |
| | | **C1** | 20 g closed position / 9 g open position | 15 g closed position / 8 g open position | |
| | | **C2** | 20 g closed position / 14 g open position | 14 g closed position / 8 g open position | |
| **Vibration withstand** acc. to IEC 60068-2-6 | | | 5...300 Hz / 3 g closed position / 2 g open position | | |



# General technical data

## AS/L09...AS/L16, 3-pole, screw terminated

## Coil & mounting characteristics

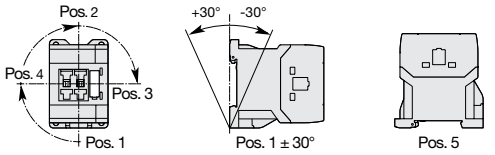
### Magnet system characteristics for AS09 ... AS16 contactors

| Contactor types | | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **AC supply** | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) | | |
| **AC control voltage** | Rated control circuit voltage Uc | **at 50 Hz** | 24...415 V | | |
| | | **at 60 Hz** | 24...415 V | | |
| | Coil consumption | **Average pull-in value 50 Hz** | 33 VA | | |
| | | **60 Hz** | 33 VA | | |
| | | **50/60 Hz** | 33 VA | | |
| | | **Average holding value 50 Hz** | 6.5 VA / 1.5 W | | |
| | | **60 Hz** | 5 VA / 1.2 W | | |
| | | **50/60 Hz** | 6.5 VA / 1.5 W | | |
| **Drop-out voltage** | | | Approx. 30...50 % of Uc | | |
| **Operating time** | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 9...24 ms | | |
| | | **N.C. contact opening** | 6...18 ms | | |
| Between coil de-energization and: | | **N.O. contact opening (1)** | 5...19 ms | | |
| | | **N.C. contact closing (1)** | 7...22 ms | | |
| | | | (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3 | | |

### Magnet system characteristics for ASL09 ... ASL16 contactors

| Contactor types | | DC operated | ASL09 | ASL12 | ASL16 |
|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **DC supply** | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) | | |
| **DC control voltage** | Rated control circuit voltage Uc | | 12...240 V DC | | |
| | Coil consumption | **Average pull-in value** | 3 W | | |
| | | **Average holding value** | 3 W | | |
| **Drop-out voltage** | | | Approx. 10...40 % of Uc | | |
| **Coil time constant** | Open | **L/R** | 12 ms | | |
| | Closed | **L/R** | 40 ms | | |
| **Operating time** | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 36...59 ms | | |
| | | **N.C. contact opening** | 31...53 ms | | |
| Between coil de-energization and: | | **N.O. contact opening (1)** | 13...17 ms | | |
| | | **N.C. contact closing (1)** | 15...20 ms | | |
| | | | (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2 | | |

### Mounting characteristics and conditions for use

| Contactor types | | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|---|
| | | DC operated | ASL09 | ASL12 | ASL16 |
| **Mounting positions** | | |   | | |
| **Mounting distances** | | | The contactors can be assembled side by side. | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | |
| | By screws (not supplied) | | 2 x M4 screws placed diagonally | | |

# General technical data

## ASL09 ... ASL16 3-pole, screw terminated

## Terminal characteristics

### Connecting characteristics

| Contactor types | | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|---|
| | | DC operated | ASL09 | ASL12 | ASL16 |
| **Main terminals** | | | Screw terminals with cable clamp | | |
| **Connection capacity (min. ... max.)** | | | | | |
| **Main conductors (poles)** | | | | | |
| Rigid solid | | 1 x | 0.75...4 mm² | | |
| | | 2 x | 0.75...4 mm² | | |
| Flexible with non insulated ferrule | | 1 x | 0.75...2.5 mm² | | |
| | | 2 x | 0.75...2.5 mm² | | |
| Flexible with insulated ferrule | | 1 x | 0.75...2.5 mm² | | |
| | | 2 x | 0.75...1.5 mm² | | |
| Bars or lugs | | L ≤ | 7.7 mm | | |
| | | l > | 3.2 mm | | |
| Connection capacity acc. to UL / CSA (Sol/Str) | | 1 or 2 x | AWG 18...12 | | |
| Stripping length | | | 9 mm | | |
| Tightening torque | Recommended | | 1.00 Nm / 9 lb.in | | |
| | Max. | | 1.20 Nm | | |
| **Auxiliary conductors** (built-in auxiliary terminals + coil terminals) | | | | | |
| Rigid solid | | 1 x | 0.75...2.5 mm² | | |
| | | 2 x | 0.75...2.5 mm² | | |
| Flexible with non insulated ferrule | | 1 x | 0.75...2.5 mm² | | |
| | | 2 x | 0.75...2.5 mm² | | |
| Flexible with insulated ferrule | | 1 x | 0.75...2.5 mm² | | |
| | | 2 x | 0.75...1.5 mm² | | |
| Lugs | | L ≤ | 7.7 mm | | |
| | | l > | 3.2 mm | | |
| Connection capacity acc. to UL / CSA (Sol/Str) | | 1 or 2 x | AWG 18...14 | | |
| Stripping length | | | | | |
| Tightening torque | | | | | |
| Coil terminals | Recommended | | 1.00 Nm / 9 lb.in | | |
| | Max. | | 1.20 Nm | | |
| Built-in auxiliary terminals | Recommended | | 1.00 Nm / 9 lb.in | | |
| | Max. | | 1.20 Nm | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | |
| All terminals | | | IP20 | | |
| **Screw terminals** | | | Delivered in open position, screws of unused terminals must be tightened | | |
| All terminals | | | M3 | | |
| | | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | |

# General technical data

## ASL09 ... ASL16, 3-pole, screw terminated
## Built-in auxiliary contacts

### Built-in auxiliary contacts according to IEC

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|
| | DC operated | ASL09 | ASL12 | ASL16 |
| **Rated operational voltage Ue max.** | | 690 V | | |
| **Rated frequency (without derating)** | | 50 / 60 Hz | | |
| **Conventional free-air thermal current Ith - θ ≤ 40 °C** | | 10 A | | |
| **Ie / Rated operational current AC-15** | | | | |
| acc. to IEC 60947-5-1 | **24-127 V 50/60 Hz** | 6 A | | |
| | **220-240 V 50/60 Hz** | 4 A | | |
| | **400-440 V 50/60 Hz** | 3 A | | |
| | **500 V 50/60 Hz** | 2 A | | |
| | **690 V 50/60 Hz** | 2 A | | |
| **Making capacity AC-15** | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | |
| **Breaking capacity AC-15** | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | |
| **Ie / Rated operational current DC-13** | | | | |
| acc. to IEC 60947-5-1 | **24 V DC** | 6 A / 144 W | | |
| | **48 V DC** | 2.8 A / 134 W | | |
| | **72 V DC** | 1 A / 72 W | | |
| | **110 V DC** | 0.55 A / 60 W | | |
| | **125 V DC** | 0.55 A / 69 W | | |
| | **220 V DC** | 0.27 A / 60 W | | |
| | **250 V DC** | 0.27 A / 68 W | | |
| **Short-circuit protection device gG type fuse** | | 10 A | | |
| **Rated short-time withstand current Icw** | **for 1.0 s** | 100 A | | |
| | **for 0.1 s** | 140 A | | |
| **Minimum switching capacity** | | 12 V / 3 mA | | |
| with failure rate acc. to IEC 60947-5-4 | | $10^{-7}$ | | |
| **Non-overlapping time between N.O. and N.C. contacts** | | 1.5 ms | | |
| **Power dissipation per pole at 6 A** | | 0.1 W | | |
| **Max. electrical switching frequency** | **AC-15** | 1200 cycles/h | | |
| | **DC-13** | 900 cycles/h | | |
| **Mechanically linked contacts** acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts. | | |
| **Mirror contacts** acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA3 aux. contact blocks) are mirror contacts. | | |

### Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|
| | DC operated | ASL09 | ASL12 | ASL16 |
| **Max. operational voltage** | | 600 V AC, 250 V DC | | |
| **Pilot duty** | | A600, Q300 | | |
| AC thermal rated current | | 10 A | | |
| AC maximum volt-ampere making | | 7200 VA | | |
| AC maximum volt-ampere breaking | | 720 VA | | |
| DC thermal rated current | | 2.5 A | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | |

# IEC Technical data

## AS/L09...AS/L16, 3-pole, spring terminated

## Utilization characteristics

### Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|---|---|---|---|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| **Standards** | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | |
| **Rated operational voltage Ue max.** | | 690 V | | |
| **Rated frequency (without derating)** | | 50 / 60 Hz | | |
| **Conventional free-air thermal current Ith** | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 20 A | 22 A | 22 A |
| With conductor cross-sectional area | | 2.5 mm² | 2.5 mm² | 2.5 mm² |
| **AC-1 Utilization category** | | | | |
| For air temperature close to contactor | | | | |
| **Ie / Rated operational current AC-1** | θ ≤ 40 °C | 20 A | 22 A | 22 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 15 A | 17 A | 17 A |
| | θ ≤ 70 °C | 12 A | 14 A | 14 A |
| With conductor cross-sectional area | | 2.5 mm² | | |
| **AC-3 Utilization category** | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | |
| **Ie / Max. rated operational current AC-3** (1) | | | | |
| | 220-230-240 V | 9 A | 12 A | 15.7 A |
| | 400 V | 9 A | 12 A | 15.5 A |
| 3-phase motors | 415 V | 9 A | 12 A | 15.5 A |
| | 440 V | 8 A | 11 A | 13.6 A |
| | 500 V | 8 A | 11 A | 12.5 A |
| | 690 V | 5 A | 7 A | 9 A |
| **Rated operational power AC-3** (1) | | | | |
| | 220-230-240 V | 2.2 kW | 3 kW | 4 kW |
| | 400 V | 4 kW | 5.5 kW | 7.5 kW |
| 1500 r.p.m. 50 Hz | 415 V | 4 kW | 5.5 kW | 7.5 kW |
| 1800 r.p.m. 60 Hz | 440 V | 4 kW | 5.5 kW | 7.5 kW |
| 3-phase motors | 500 V | 4 kW | 5.5 kW | 7.5 kW |
| | 690 V | 4 kW | 5.5 kW | 7.5 kW |
| **Rated making capacity AC-3** | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | |
| **Rated breaking capacity AC-3** | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | |
| **AC-8a Utilization category** | | | | |
| (without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C) | | | | |
| **Ie / Rated operational current AC-8a** | | 12 A | 16 A | 22 A |
| **Rated operational power AC-8a** | | 5.5 kW | 7.5 kW | 11 kW |
| **Short-circuit protection device for contactors** | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 25 A | | |
| **Rated short-time withstand current Icw** | 1 s | 230 A | 250 A | 250 A |
| at 40 °C ambient temperature, | 10 s | 100 A | 124 A | 124 A |
| in free air from a cold state | 30 s | 65 A | 75 A | 75 A |
| | 1 min | 50 A | 55 A | 55 A |
| | 15 min | 20 A | 22 A | 22 A |
| **Maximum breaking capacity** | | | | |
| cos φ = 0.45 | at 440 V | 155 A | | |
| | at 690 V | 90 A | | |
| **Power dissipation per pole** | Ie / AC-1 | 0.9 W | 1.1 W | 1.1 W |
| | Ie / AC-3 | 0.18 W | 0.33 W | 0.55 W |
| **Max. electrical switching frequency** | AC-1 | 600 cycles/h | | |
| | AC-3 | 1200 cycles/h | | |
| | AC-4 | 300 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

# UL/CSA Technical data

## AS/L09...AS/L16, 3-pole, spring terminated

## Utilization characteristics

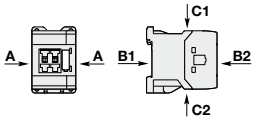
### Main pole - Utilization characteristics according to UL /CSA

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|---|---|---|---|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| **Standards** | | UL 508, CSA C22.2 N°14 | | |
| **Max. operational voltage** | | 690 V | | |
| **UL / CSA General use rating** | | | | |
| 600 V AC | | 12 A | 12 A | 15.2 A |
| With conductor cross-sectional area | | AWG 14 | AWG 14 | AWG 12 |
| **UL / CSA maximum 1-phase motor rating** | | | | |
| Full load current | **120 V AC** | 7.2 A | 9.8 A | 13.8 A |
| | **240 V AC** | 8 A | 10 A | 12 A |
| Horse power rating | **120 V AC** | 1/3 hp | 1/2 hp | 3/4 hp |
| | **240 V AC** | 1 hp | 1-1/2 hp | 2 hp |
| **UL / CSA maximum 3-phase motor rating** | | | | |
| Full load current (1) | **200-208 V AC** | 7.8 A | 7.8 A | 11 A |
| | **220-240 V AC** | 6.8 A | 9.6 A | 15.2 A |
| | **440-480 V AC** | 7.6 A | 11 A | 14 A |
| | **550-600 V AC** | 9 A | 11 A | 11 A |
| Horse power rating (1) | **200-208 V AC** | 2 hp | 2 hp | 3 hp |
| | **220-240 V AC** | 2 hp | 3 hp | 5 hp |
| | **440-480 V AC** | 5 hp | 7-1/2 hp | 10 hp |
| | **550-600 V AC** | 7-1/2 hp | 10 hp | 10 hp |
| **Max. electrical switching frequency** | | | | |
| For general use | | 600 cycles/h | | |
| For motor use | | 1200 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

### General technical data

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|---|---|---|---|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| **Rated insulation voltage Ui** | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | |
| acc. to UL / CSA | | 600 V | | |
| **Rated impulse withstand voltage Uimp.** | | 6 kV | | |
| **Ambient air temperature** close to contactor | | | | |
| Operation | | -40...+70 °C | | |
| Storage | | -60...+80 °C | | |
| **Climatic withstand** | | Category B according to IEC 60947-1 Annex Q | | |
| **Maximum operating altitude (without derating)** | | 3000 m | | |
| **Mechanical durability** | | | | |
| Number of operating cycles | | 10 millions operating cycles | | |
| Max. switching frequency | | 3600 cycles/h | | |
| **Shock withstand** | | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | **Shock direction** | **AS contactors - AC operated** | **ASL contactors - DC operated** | |
| Mounting position 1 | **A** | 20 g | 20 g closed position / 10 g open position | |
| | **B1** | 10 g closed position / 5 g open position | 15 g closed position / 5 g open position | |
| | **B2** | 15 g | 10 g | |
| | **C1** | 20 g closed position / 9 g open position | 15 g closed position / 8 g open position | |
| | **C2** | 20 g closed position / 14 g open position | 14 g closed position / 8 g open position | |
| **Vibration withstand** acc. to IEC 60068-2-6 | | 5...300 Hz / 3 g closed position / 2 g open position | | |



# General technical data

## AS/L09...AS/L16, 3-pole, spring terminated
## Coil & mounting characteristics

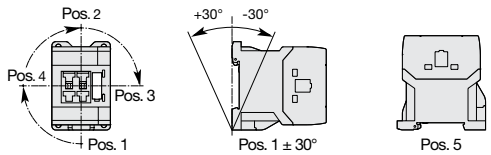
### Magnet system characteristics for AS09..S ... AS16..S contactors

| Contactor types | | AC operated | AS09..S | AS12..S | AS16..S |
|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **AC supply** | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) | | |
| **AC control voltage** | Rated control circuit voltage Uc | **at 50 Hz** | 24...415 V | | |
| | | **at 60 Hz** | 24...415 V | | |
| | Coil consumption | **Average pull-in value 50 Hz** | 33 VA | | |
| | | **60 Hz** | 33 VA | | |
| | | **50/60 Hz** | 33 VA | | |
| | | **Average holding value 50 Hz** | 6.5 VA / 1.5 W | | |
| | | **60 Hz** | 5 VA / 1.2 W | | |
| | | **50/60 Hz** | 6.5 VA / 1.5 W | | |
| **Drop-out voltage** | | | Approx. 30...50 % of Uc | | |
| **Operating time** | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 9...24 ms | | |
| | | **N.C. contact opening** | 6...18 ms | | |
| Between coil de-energization and: | | **N.O. contact opening (1)** | 5...19 ms | | |
| | | **N.C. contact closing (1)** | 7...22 ms | | |
| | | | (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3. | | |

### Magnet system characteristics for ASL09..S ... ASL16..S contactors

| Contactor types | | DC operated | ASL09..S | ASL12..S | ASL16..S |
|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **DC supply** | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) | | |
| **DC control voltage** | Rated control circuit voltage Uc | | 12...240 V DC | | |
| | Coil consumption | **Average pull-in value** | 3 W | | |
| | | **Average holding value** | 3 W | | |
| **Drop-out voltage** | | | Approx. 10...40 % of Uc | | |
| **Coil time constant** | Open | **L/R** | 12 ms | | |
| | Closed | **L/R** | 40 ms | | |
| **Operating time** | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 36...59 ms | | |
| | | **N.C. contact opening** | 31...53 ms | | |
| Between coil de-energization and: | | **N.O. contact opening (1)** | 13...17 ms | | |
| | | **N.C. contact closing (1)** | 15...20 ms | | |
| | | | (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2 | | |

### Mounting characteristics and conditions for use

| Contactor types | | AC operated | AS09..S | AS12..S | AS16..S |
|---|---|---|---|---|---|
| | | **DC operated** | ASL09..S | ASL12..S | ASL16..S |
| **Mounting positions** | | |   | | |
| **Mounting distances** | | | The contactors can be assembled side by side. | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | |
| | By screws (not supplied) | | 2 x M4 screws placed diagonally | | |

# General technical data

## AS/L09...AS/L16, 3-pole, spring terminated

## Terminal characteristics

### Connecting characteristics

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|---|---|---|---|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| **Main terminals** | | Spring terminals | | |
| **Connection capacity (min. ... max.)** | | | | |
| **Main conductors (poles)** | | | | |
| Rigid | **1 x** | 0.75...2.5 mm² | | |
| | **2 x** | 0.75...2.5 mm² | | |
| Flexible with non insulated ferrule | **1 x** | 0.75...2.5 mm² | | |
| | **2 x** | 0.75...2.5 mm² | | |
| Flexible with insulated ferrule | **1 x** | 0.75...1.5 mm² | | |
| | **2 x** | 0.75...1.5 mm² | | |
| Connection capacity acc. to UL / CSA (Sol/Str) | **1 or 2 x** | AWG 18...12 | | |
| Stripping length | | 10 mm | | |
| **Auxiliary conductors** (built-in auxiliary terminals + coil terminals) | | | | |
| Rigid solid | **1 x** | 0.75...2.5 mm² | | |
| | **2 x** | 0.75...2.5 mm² | | |
| Flexible with non insulated ferrule | **1 x** | 0.75...2.5 mm² | | |
| | **2 x** | 0.75...2.5 mm² | | |
| Flexible with insulated ferrule | **1 x** | 0.75...1.5 mm² | | |
| | **2 x** | 0.75...1.5 mm² | | |
| Connection capacity acc. to UL / CSA (Sol/Str) | **1 or 2 x** | AWG 18...14 | | |
| Stripping length | | 10 mm | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | |
| All terminals | | IP20 | | |
| **Screwdriver type** | | Flat Ø 3.5 | | |

# General technical data

## AS/L09...AS/L16, 3-pole, spring terminated

## Built-in auxiliary contacts

### Built-in auxiliary contacts according to IEC

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|---|---|---|---|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| Rated operational voltage Ue max. | | 690 V | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | |
| Conventional free air thermal current Ith - θ ≤ 40 °C | | 10 A | | |
| Ie / Rated operational current AC-15 | | | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | |
| | 220-240 V 50/60 Hz | 4 A | | |
| | 400-440 V 50/60 Hz | 3 A | | |
| | 500 V 50/60 Hz | 2 A | | |
| | 690 V 50/60 Hz | 2 A | | |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | |
| Ie / Rated operational current DC-13 | | | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | |
| | 48 V DC | 2.8 A / 134 W | | |
| | 72 V DC | 1 A / 72 W | | |
| | 110 V DC | 0.55 A / 60 W | | |
| | 125 V DC | 0.55 A / 69 W | | |
| | 220 V DC | 0.27 A / 60 W | | |
| | 250 V DC | 0.27 A / 68 W | | |
| Short-circuit protection device gG type fuse | | 10 A | | |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | | |
| | for 0.1 s | 140 A | | |
| Minimum switching capacity | | 12 V / 3 m | | |
| with failure rate acc. to IEC 60947-5-4 | | $10^{-7}$ | | |
| Non-overlapping time between N.O. and N.C. contacts | | 1.5 ms | | |
| Power dissipation per pole at 6 A | | 0.1 W | | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | | |
| | DC-13 | 900 cycles/h | | |
| Mechanically linked contacts<br>acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts. | | |
| Mirror contacts<br>acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA3 aux. contact blocks) are mirror contacts. | | |

### Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|---|---|---|---|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| Max. operational voltage | | 600 V AC, 250 V DC | | |
| Pilot duty | | A600, Q300 | | |
| AC thermal rated current | | 10 A | | |
| AC maximum volt-ampere making | | 7200 VA | | |
| AC maximum volt-ampere breaking | | 720 VA | | |
| DC thermal rated current | | 2.5 A | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | |

# IEC Technical data

## VASL09 ... VASL16, 3-pole, reversing

## Utilization characteristics

### Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | VAS09 | VAS12 | VAS16 |
|---|---|---|---|---|
| | DC operated | VASL09 | VASL12 | VASL16 |
| **Standards** | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | |
| **Rated operational voltage Ue max.** | | 690 V | | |
| **Rated frequency (without derating)** | | 50 / 60 Hz | | |
| **Conventional free-air thermal current Ith** | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 22 A | 25 A | 25 A |
| With conductor cross-sectional area | | 2.5 mm² | 4 mm² | 4 mm² |
| **AC-3 Utilization category** | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | |
| **Ie / Max. rated operational current AC-3** (1) | | | | |
| | **220-230-240 V** | 9 A | 12 A | 15.7 A |
| | **400 V** | 9 A | 12 A | 15.5 A |
| 3-phase motors | **415 V** | 9 A | 12 A | 15.5 A |
| | **440 V** | 8 A | 11 A | 13.6 A |
| | **500 V** | 8 A | 11 A | 12.5 A |
| | **690 V** | 5 A | 7 A | 9 A |
| **Rated operational power AC-3** (1) | | | | |
| | **220-230-240 V** | 2.2 kW | 3 kW | 4 kW |
| | **400 V** | 4 kW | 5.5 kW | 7.5 kW |
| 1500 r.p.m. 50 Hz | **415 V** | 4 kW | 5.5 kW | 7.5 kW |
| 1800 r.p.m. 60 Hz | **440 V** | 4 kW | 5.5 kW | 7.5 kW |
| 3-phase motors | **500 V** | 4 kW | 5.5 kW | 7.5 kW |
| | **690 V** | 4 kW | 5.5 kW | 7.5 kW |
| **Rated making capacity AC-3** | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | |
| **Rated breaking capacity AC-3** | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | |
| **Short-circuit protection device for contactors** | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 25 A | | |
| **Rated short-time withstand current Icw** | **1 s** | 230 A | 250 A | 250 A |
| at 40 °C ambient temperature, | **10 s** | 100 A | 124 A | 124 A |
| in free air from a cold state | **30 s** | 65 A | 75 A | 75 A |
| | **1 min** | 50 A | 55 A | 55 A |
| | **15 min** | 22 A | 24 A | 24 A |
| **Maximum breaking capacity** | | | | |
| cos φ = 0.45 | **at 440 V** | 155 A | | |
| | **at 690 V** | 90 A | | |
| **Power dissipation per pole** | | | | |
| | **Ie / AC-3** | 0.16 W | 0.3 W | 0.5 W |
| **Max. electrical switching frequency** | **AC-3** | 600 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

# UL/CSA Technical data
## VAS/L09 ... VAS/L16, 3-pole, reversing
## Utilization characteristics

### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | AC operated | VAS09 | VAS12 | VAS16 |
|---|---|---|---|---|
| | DC operated | VASL09 | VASL12 | VASL16 |
| **Standards** | | UL 508, CSA C22.2 N°14 | | |
| **Max. operational voltage** | | 690 V | | |
| **UL / CSA maximum 1-phase motor rating** | | | | |
| Full load current | **120 V AC** | 7.2 A | 9.8 A | 13.8 A |
| | **240 V AC** | 8 A | 10 A | 12 A |
| Horse power rating | **120 V AC** | 1/3 hp | 1/2 hp | 3/4 hp |
| | **240 V AC** | 1 hp | 1-1/2 hp | 2 hp |
| **UL / CSA maximum 3-phase motor rating** | | | | |
| Full load current (1) | **200-208 V AC** | 7.8 A | 7.8 A | 11 A |
| | **220-240 V AC** | 6.8 A | 9.6 A | 15.2 A |
| | **440-480 V AC** | 7.6 A | 11 A | 14 A |
| | **550-600 V AC** | 9 A | 11 A | 11 A |
| Horse power rating (1) | **200-208 V AC** | 2 hp | 2 hp | 3 hp |
| | **220-240 V AC** | 2 hp | 3 hp | 5 hp |
| | **440-480 V AC** | 5 hp | 7-1/2 hp | 10 hp |
| | **550-600 V AC** | 7-1/2 hp | 10 hp | 10 hp |
| **Max. electrical switching frequency** | | | | |
| For motor use | | 600 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

### General technical data

| Contactor types | | AC operated | VAS09 | VAS12 | VAS16 |
|---|---|---|---|---|---|
| | | DC operated | VASL09 | VASL12 | VASL16 |
| **Rated insulation voltage Ui** | | | | | |
| acc. to IEC 60947-4-1 | | | 690 V | | |
| acc. to UL / CSA | | | 600 V | | |
| **Rated impulse withstand voltage Uimp.** | | | 6 kV | | |
| **Ambient air temperature** close to contactor | | | | | |
| Operation | Fitted with thermal overload relay | | -25...+60 °C | | |
| | Without thermal overload relay | | -40...+70 °C | | |
| Storage | | | -60...+80 °C | | |
| **Climatic withstand** | | | Category B according to IEC 60947-1 Annex Q | | |
| **Maximum operating altitude (without derating)** | | | 3000 m | | |
| **Mechanical durability** | | | | | |
| Number of operating cycles | | | 5 millions operating cycles | | |
| Max. switching frequency | | | 1800 cycles/h | | |

# General technical data

## VAS/L09 ... VAS/L16, 3-pole, reversing
## Coil & mounting characteristics

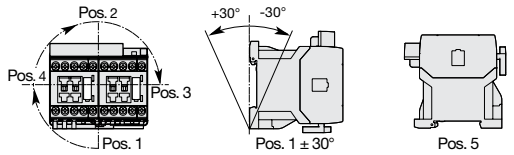
### Magnet system characteristics for VAS09 ... VAS16 contactors

| Contactor types | | AC operated | VAS09 | VAS12 | VAS16 |
|---|---|---|---|---|---|
| **Coil operating limits** | | **AC supply** | | | |
| acc. to IEC 60947-4-1 | | | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) | | |
| **AC control voltage** | Rated control circuit voltage Uc | **at 50 Hz** | 24...415 V | | |
| | | **at 60 Hz** | 24...415 V | | |
| | Coil consumption | **Average pull-in value 50 Hz** | 33 VA | | |
| | | **60 Hz** | 33 VA | | |
| | | **50/60 Hz** | 33 VA | | |
| | | **Average holding value 50 Hz** | 6.5 VA / 1.5 W | | |
| | | **60 Hz** | 5 VA / 1.2 W | | |
| | | **50/60 Hz** | 6.5 VA / 1.5 W | | |
| **Drop-out voltage** | | | Approx. 30...50 % of Uc | | |
| **Operating time** | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 9...24 ms | | |
| | | **N.C. contact opening** | 6...18 ms | | |
| Between coil de-energization and: | | **N.O. contact opening (1)** | 5...19 ms | | |
| | | **N.C. contact closing (1)** | 7...22 ms | | |
| | | | (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3. | | |

### Magnet system characteristics for VASL09 ... VASL16 contactors

| Contactor types | | DC operated | VASL09 | VASL12 | VASL16 |
|---|---|---|---|---|---|
| **Coil operating limits** | | **DC supply** | | | |
| acc. to IEC 60947-4-1 | | | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) | | |
| **DC control voltage** | Rated control circuit voltage Uc | | 12...240 V DC | | |
| | Coil consumption | **Average pull-in value** | 3 W | | |
| | | **Average holding value** | 3 W | | |
| **Drop-out voltage** | | | Approx. 10...40 % of Uc | | |
| **Coil time constant** | Open | **L/R** | 12 ms | | |
| | Closed | **L/R** | 40 ms | | |
| **Operating time** | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 36...59 ms | | |
| | | **N.C. contact opening** | 31...53 ms | | |
| Between coil de-energization and: | | **N.O. contact opening (1)** | 13...17 ms | | |
| | | **N.C. contact closing (1)** | 15...20 ms | | |
| | | | (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2 | | |

### Mounting characteristics and conditions for use

| Contactor types | | AC operated | VAS09 | VAS12 | VAS16 |
|---|---|---|---|---|---|
| | | **DC operated** | VASL09 | VASL12 | VASL16 |
| **Mounting positions** | | |   | | |
| **Mounting distances** | | | The reversing contactors can be assembled side by side. | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | |
| | By screws (not supplied) | | 2 x M4 screws placed diagonally | | |

# General technical data
## VAS/L09 ... VAS/L16, 3-pole, reversing
## Terminal characteristics

### Connecting characteristics

| Contactor types | AC operated | VAS09 | VAS12 | VAS16 |
|---|---|---|---|---|
| | DC operated | VASL09 | VASL12 | VASL16 |
| **Main terminals** | | Screw terminals with cable clamp | | |
| **Connection capacity (min. ... max.)** | | | | |
| **Main conductors (poles)** | | | | |
| Rigid solid | 1 x | 0.75...4 mm² | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | |
| Flexible with insulated ferrule | 1 x | 0.75...1.5 mm² | | |
| Connection capacity acc. to UL / CSA (Sol/Str) | 1 x | AWG 18...12 | | |
| Stripping length | | 9 mm | | |
| Tightening torque Recommended | | 1.00 Nm / 9 lb.in | | |
| Max. | | 1.20 Nm | | |
| **Auxiliary conductors** (built-in auxiliary terminals + coil terminals) | | | | |
| Rigid solid | 1 x | 0.75...2.5 mm² | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | |
| Flexible with insulated ferrule | 1 x | 0.75...1.5 mm² | | |
| Connection capacity acc. to UL / CSA (Sol/Str) | 1 x | AWG 18...14 | | |
| Stripping length | | 9 mm | | |
| Tightening torque | | | | |
| Coil terminals Recommended | | 1.00 Nm / 9 lb.in | | |
| Max. | | 1.20 Nm | | |
| Built-in auxiliary terminals Recommended | | 1.00 Nm / 9 lb.in | | |
| Max. | | 1.20 Nm | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | |
| All terminals | | IP20 | | |
| **Screw terminals** | | Delivered in open position, screws of unused terminals must be tightened | | |
| All terminals | | M3 | | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | |

# IEC Technical data (V)B/C6...(V)B/C7, 3 & 4-pole
## Utilization characteristics

### Main pole – Utilization characteristics according to IEC

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|---|---|---|
| | DC operated | BC6, VBC6, VBC6A | BC7, TBC7, VBC7, VBC7A |
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | |
| Rated operational voltage $U_{e\,max}$ | | 690 V AC | |
| Rated frequency (without derating) | | DC or 50 / 60 Hz | |
| Conventional free-air thermal current $I_{th}$<br>acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C,<br>with conductor cross-sectional area | | 20 A | |
| AC-1 Utilization category for air temperature close to contactor θ ≤ 40 °C | | | |
| $I_e$ / Rated operational current AC-1<br>$U_{e\,max}$ ≤ 690 V, 50/60 Hz | 220-230-240 V | Screw terminal types: 20 A<br>Soldering pin types: 12 A<br>Flat pin types: 16 A | |
| | 380-400 V | Screw terminal types: 20 A<br>Soldering pin types: 12 A<br>Flat pin types: 16 A | |
| | 440 V | Screw terminal types: 20 A<br>Soldering pin types: 12 A<br>Flat pin types: 16 A | |
| | 500 V | 12 A | |
| | 690 V | 6 A | |
| AC-1 Utilization category for air temperature close to contactor θ ≤ 55 °C | | | |
| $I_e$ / Rated operational current AC-1<br>$U_{e\,max}$ ≤ 690 V, 50/60 Hz | 220-230-240 V | Screw terminal types: 16 A<br>Soldering pin types: 12 A<br>Flat pin types: 16 A | Screw terminal types: 20 A<br>Soldering pin types: 12 A<br>Flat pin types: 16 A |
| | 380-400 V | Screw terminal types: 16 A<br>Soldering pin types: 12 A<br>Flat pin types: 16 A | Screw terminal types: 20 A<br>Soldering pin types: 12 A<br>Flat pin types: 16 A |
| | 440 V | Screw terminal types: 16 A<br>Soldering pin types: 12 A<br>Flat pin types: 16 A | Screw terminal types: 20 A<br>Soldering pin types: 12 A<br>Flat pin types: 16 A |
| | 500 V | 12 A | |
| | 690 V | 6 A | |
| AC-3 Utilization category for air temperature close to contactor θ ≤ 55 °C | | | |
| $I_e$ / Rated operational current AC-3<br>3-phase motors | 220-230-240 V | 9 A | 12 A |
| | 380-400 V | 8 A | 12 A |
| | 440 V | 8 A | 12 A |
| | 500 V | 6.5 A | 9 A |
| | 690 V | 3.5 A | 3.5 A |
| Rated operational power AC-3<br>1500 r.p.m. 50 Hz<br>1800 r.p.m. 60 Hz<br>3-phase motors | 220-230-240 V | 2.2 kW | 3 kW |
| | 380-400 V | 4 kW | 5.5 kW |
| | 440 V | 4 kW | 5.5 kW |
| | 500 V | 3 kW | 4 kW |
| | 690 V | 3 kW | 3 kW |
| DC-1 Utilization category for air temperature close to contactor θ ≤ 55 °C | | | |
| $I_e$ / Rated operational current DC-1 | 110 V | - | 4 A |
| | 220 V | - | 0.6 A |
| DC-3 Utilization category for air temperature close to contactor θ ≤ 55 °C | | | |
| $I_e$ / Rated operational current DC-3 | 110 V | - | 1.5 A |
| | 220 V | - | 0.25 A |
| DC-5 Utilization category for air temperature close to contactor θ ≤ 55 °C | | | |
| $I_e$ / Rated operational current DC-5 | 110 V | - | 0.4 A |
| | 220 V | - | 0.2 A |
| Rated making capacity AC-3 | | 10 x $I_e$ AC-3 acc. to IEC 60947-4-1 | |
| Rated breaking capacity AC-3 | | 8 x $I_e$ AC-3 acc. to IEC 60947-4-1 | |
| Short-circuit protection device for contactors<br>without thermal O/L relay - motor protection excluded<br>$U_e$ ≤ 500 V AC - gG type fuse | | Coordination type 1: 25 A / Coordination type 2: 20 A | |
| Rated short-time withstand current $I_{cw}$<br>at 40 °C ambient temperature, in free air from a cold state | 10 s | 64 A | 96 A |
| Maximum breaking capacity cos ϕ = 0.45 | at 400 V | 64 A | 96 A |
| Maximum electrical switching frequency | AC-1 | 300 cycles/h | |
| | AC-3 | 600 cycles/h | |
| | DC-1, DC-3, DC-5 | 600 cycles/h | |

# UL/CSA Technical data
## (V)B/C6...(V)B/C7, 3 & 4-pole
## Utilization characteristics

### Main pole – Utilization characteristics according to UL/CSA

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|---|---|---|
| | DC operated | BC6, VBC6, VBC6A | BC7, TBC7, VBC7, VBC7A |
| **Standards** | | UL 508, CSA C22.2 N°14 | |
| **Maximum operational voltage** | | 600 V | |
| **UL/CSA general use rating** | | 12 A | 16 A |
| **UL/CSA maximum 1-phase motor rating** | | | |
| Full load current | **120 V AC** | 8.4 A | 13.8 A |
| | **240 V AC** | 6.8 A | 10.0 A |
| Horse power rating | **120 V AC** | 1 hp (screw termination only) | 0.75 hp |
| | **240 V AC** | 2 hp (screw termination only) | 1.5 hp |
| **UL/CSA maximum 3-phase motor rating** | | | |
| Full load current [1] | **200-208 V AC** | 4.6 A | 7.5 A |
| | **220-240 V AC** | 6.8 A | 9.6 A |
| | **440-480 V AC** | 3.4 A | 7.6 A |
| | **550-600 V AC** | 1.7 A | 6.1 A |
| Horse power rating [1] | **200-208 V AC** | 1 hp | 2 hp |
| | **220-240 V AC** | 2 hp | 3 hp |
| | **440-480 V AC** | 3 hp | 5 hp |
| | **550-600 V AC** | 1 hp | 5 hp |
| **Maximum electrical switching frequency** | | | |
| For resitive loads AC-1 | | 300 cycles/h | |
| For motor loads AC-3 | | 600 cycles/h | |

[1] For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

### General technical data

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|---|---|---|
| | DC operated | BC6, VBC6, VBC6A | BC7, TBC7, VBC7, VBC7A |
| **Rated insulation voltage $U_i$** | | | |
| acc. to IEC 60947-4-1 | | 690 V | |
| acc. to UL/CSA | | 600 V | |
| **Rated impulse withstand voltage $U_{imp}$** | | 6 kV | |
| **Ambient air temperature, close to contactor** | | | |
| Operation | Fitted with thermal overload relay | -25 ... +55 °C | |
| | Without thermal overload relay | -25 ... +55 °C | |
| Storage | | -40 ... +80 °C | |
| **Climatic withstand** | | acc. to IEC 60947-1 Annex Q | |
| **Maximum operating altitude (without derating)** | | 2000 m | |
| **Mechanical durability** | | $10^7$ operating cycles | |
| **Resistance to shock** | | Half-sine | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | 15 g / 11 ms | |
| acc. to IEC/EN 60947-1 Annex. Q | | Category E | |
| **Resistance to vibrations** | | Sinusoidal | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | 5 g / 3 ... 150 Hz | |
| acc. to IEC/EN 60947-1 Annex. Q | | Category E | |

# General technical data
## (V)B/C6...(V)B/C7, 3 & 4-pole
## Coil & mounting characteristics

### Magnet system characteristics for B6, B7 contactors

| Contactor types | AC operated | B6, VB6 | B7, VB7 |
|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | 0.85 ... 1.1 x $U_c$ | |
| AC control voltage | | | |
| Rated control circuit voltage $U_C$ | | See ordering tables | |
| Coil consumption | Average pull-in value | 3.5 VA / 3.5 W | |
| | Average holding value | 3.5 VA / 3.5 W | |
| Drop-out voltage | | 0.20 ... 0.75 % of $U_c$ | |

### Magnet system characteristics for BC6, BC7 contactors

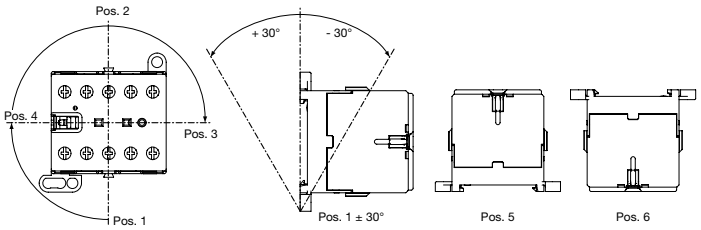
| Contactor types | DC operated | BC6, VBC6 | BC7, VBC7 |
|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | 0.85 ... 1.1 x $U_c$ | |
| DC control voltage | | | |
| Rated control circuit voltage $U_C$ | | See ordering tables | |
| Coil consumption [1] | Average pull-in value | 3.5 VA / 3.5 W | |
| | Average holding value | 3.5 VA / 3.5 W | |
| Drop-out voltage in % of $U_{C\,min}$ | | 0.10 ... 0.75 x $U_C$ | |

[1] Interface mini-contactors: see coil consumption on ordering details pages

### Magnet system characteristics for TBC7 contactors

| Contactor types | DC operated | TBC7 | |
|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | Wide range voltage supply see ordering tables, $U_{Cmin}$ ... $U_{Cmax}$ | |
| AC control voltage | | | |
| Rated control circuit voltage $U_C$ | | See ordering tables | |
| Coil consumption | Average pull-in value | 5 VA / 5 W | |
| | Average holding value | 5 VA / 5 W | |
| Drop-out voltage in % of $U_{C\,min}$ | | ≤ 0.20 % of $U_{Cmin}$ | |

### Mounting characteristics and conditions for use

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|---|---|---|
| | DC operated | BC6, VBC6, VBC6A | BC7, TBC7, VBC7, VBC7A |
| Mounting positions | |  | |
| Mounting distances | | The contactors can be assembled side by side | |
| Fixing | | | |
| On rail acc. to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | |
| By screws (not supplied) | | 2 x M4 screws placed diagonally | |

# General technical data
## (V)B/C6...(V)B/C7, 3 & 4-pole
## Built-in auxiliary contacts

### Built-in auxiliary contacts according to IEC

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|---|---|---|
| | DC operated | BC6, VBC6, VBC6A | BC7, TBC7, VBC7, VBC7A |
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | |
| Rated operational voltage Ue max | | 690 V | |
| Rated frequency (without derating) | | DC or 50 / 60 Hz | |
| Conventional free-air thermal current $I_{th}$, $\theta \leq 40$ °C | | 6 A | |
| $I_e$ / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24 V 50/60 Hz | 4 A | |
| | 110-120 V 50/60 Hz | 4 A | |
| | 220-230-240 V 50/60 Hz | 4 A | |
| | 380-400 V 50/60 Hz | 3 A | |
| | 440 V 50/60 Hz | 3 A | |
| $I_e$ / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 2.5 A | |
| | 110 V DC | 0.7 A | |
| | 220 - 240 V DC | 0.4 A | |
| Short-circuit protection device | | 6 A, Type gG | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | 17 V / 5 mA | |
| Maximum electrical switching frequency | AC-15 | 600 cycles/h | |
| | DC-13 | 600 cycles/h | |

### Built-in auxiliary contacts according to UL/CSA

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|---|---|---|
| | DC operated | BC6, VBC6, VBC6A | BC7, VBC7, VBC7A |
| Max. operational voltage | | 600 V AC | |
| Pilot duty | | A600 | |
| AC thermal rated current | | 5 A | |

# General technical data
## (V)B/C6...(V)B/C7, 3 & 4 pole
## Terminal characteristics

### Connection characteristics

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|---|---|---|
| | DC operated | BC6, VBC6, VBC6A | BC7, TBC7, VBC7, VBC7A |
| **Main terminals** [1] | | Screw terminals with cable clamp | |
| **Connection capacity** | | | |
| **Main conductors (poles)** | | | |
| Rigid: solid | **1 or 2 x** | 1 ... 4 mm² | |
| Flexible without ferrule | **1 or 2 x** | 1 ... 2.5 mm² | |
| Connection capacity acc. to UL/CSA (Sol/Str) | **1 or 2 x** | AWG 22 ... 10 | |
| Stripping length | | 9 mm | |
| Tightening torques | | 0.8 ... 1.1 Nm / 7 lb.in | |
| **Connection capacity – auxiliary conductors** (built-in auxiliary terminals + coil terminals) | | | |
| Rigid: solid | **1 or 2 x** | 1 ... 4 mm² | |
| Flexible without ferrule | **1 or 2 x** | 1 ... 2.5 mm² | |
| Connection capacity acc. to UL/CSA (Sol/Str) | **1 or 2 x** | AWG 22 ... 10 | |
| Stripping length | | 9 mm | |
| Tightening torques | | | |
| Coil terminals | | 0.8 ... 1.1 Nm / 7 lb.in | |
| Built-in auxiliary terminals | | 0.8 ... 1.1 Nm / 7 lb.in | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | |
| Main terminals | | IP20 | |
| Coil terminals | | IP20 | |
| Built-in auxiliary terminals | | IP20 | |
| **Screw terminals** | | (Delivered in open position, screws of unused terminals must be tightened) | |
| All terminals | | M3 | |
| **Screwdriver type** | | Flat Ø 5.5 mm / Pozidriv 1 | |

[1] Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

# IEC/UL/CSA Technical data
## AF09(Z)...AF38(Z), 4-pole
## Utilization characteristics

### Main pole - Utilization characteristics according to IEC

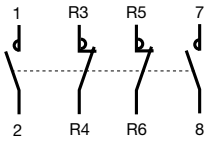
| Contactor types | AC / DC operated | AF09(Z) | AF16(Z) | AF26(Z) | AF38(Z) |
|---|---|---|---|---|---|
| **Standards** | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | |
| **Rated operational voltage Ue max.** | | 690 V | | | |
| **Rated frequency (without derating)** | | 50 / 60 Hz | | | |
| **Conventional free-air thermal current Ith** | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 35 A | 35 A | 55 A | 55 A |
| With conductor cross-sectional area | | 6 mm² | 6 mm² | 16 mm² | 16 mm² |
| **AC-1 Utilization category** | | | | | |
| For air temperature close to contactor | | | | | |
| **Ie / Rated operational current AC-1** | **θ ≤ 40 °C** | 25 A | 30 A | 45 A | 55 A |
| Ue max. ≤ 690 V, 50/60 Hz | **θ ≤ 60 °C** | 25 A | 30 A | 40 A | 45 A |
| | **θ ≤ 70 °C** | 22 A | 26 A | 32 A | 37 A |
| With conductor cross-sectional area | | 4 mm² | 6 mm² | 10 mm² | 16 mm² |
| **Short-circuit protection device for contactors** | | | | | |
| Without thermal overload relay - Motor protection excluded | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 25 A | 32 A | 50 A | 63 A |
| **Rated short-time withstand current Icw** | **1 s** | 300 A | 300 A | 450 A | 450 A |
| At 40 °C ambient temperature, | **10 s** | 150 A | 150 A | 300 A | 300 A |
| in free air from a cold state | **30 s** | 80 A | 80 A | 225 A | 225 A |
| | **1 min** | 60 A | 60 A | 150 A | 150 A |
| | **15 min** | 35 A | 35 A | 55 A | 55 A |
| **Power dissipation per pole** | **Ie / AC-1** | 0.8 W | 1.2 W | 1.6 W | 2.3 W |
| **Max. electrical switching frequency** | **AC-1** | 600 cycles/h | | | |

### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | AF09(Z) | AF16(Z) | AF26(Z) | AF38(Z) |
|---|---|---|---|---|
| **Standards** | UL 508, CSA C22.2 N°14 | | | |
| **Max. operational voltage** | 600 V | | | |
| **UL / CSA general use rating** | | | | |
| 600 V AC | 25 A | 30 A | 45 A | 55 A |
| With conductor cross-sectional area | AWG 10 | AWG 10 | AWG 8 | AWG 6 |
| **Max. electrical switching frequency** | | | | |
| For general use | 600 cycles/h | | | |

**Remark for 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles**

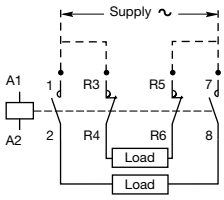
These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK before MAKE.



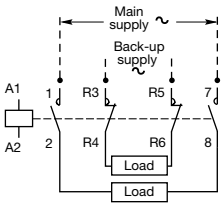

These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

**Block diagrams**

– Single supply and 2 separate loads




– 2 separate supplies and 2 separate loads



# IEC/UL/CSA Technical data
## A/E/F45...A/E/F75, 4-pole
## Utilization characteristics

### Main pole - Utilization characteristics according to IEC

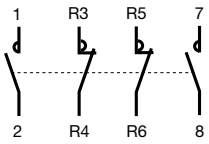
| Contactor types | AC operated | A45 | A50 | A75 |
|---|---|---|---|---|
| | DC operated | AE45 | AE50 | AE75 |
| | | TAE45 | TAE50 | TAE75 |
| | AC / DC operated | AF45 | AF50 | AF75 |
| **Standards** | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | |
| **Rated operational voltage Ue max.** | | 1000 V (690 V for AF.. contactors) | | |
| **Rated frequency (without derating)** | | 50 / 60 Hz | | |
| **Conventional free-air thermal current Ith** | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 100 A | 100 A | 125 A |
| With conductor cross-sectional area | | 35 mm² | 35 mm² | 50 mm² |
| **AC-1 Utilization category** | | | | |
| For air temperature close to contactor | | | | |
| **Ie / Rated operational current AC-1** | **θ ≤ 40 °C** | 70 A | 100 A | 125 A |
| Ue max. ≤ 690 V, 50/60 Hz | **θ ≤ 55 °C** | 60 A | 85 A | 105 A |
| | **θ ≤ 70 °C** (1) | 50 A | 70 A | 85 A |
| With conductor cross-sectional area | | 25 mm² | 35 mm² | 50 mm² |
| **Short-circuit protection device for contactors** | | | | |
| without thermal overload relay - Motor protection excluded | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 80 A | 100 A | 160 A |
| **Rated short-time withstand current Icw** | **1 s** | 1000 A | | |
| At 40 °C ambient temperature, | **10 s** | 650 A | | |
| in free air from a cold state | **30 s** | 370 A | | |
| | **1 min** | 250 A | | |
| | **15 min** | 110 A | 110 A | 135 A |
| **Power dissipation per pole** | **Ie / AC-1** | 2.5 W | 5 W | 7 W |
| **Max. electrical switching frequency** | **AC-1** | 600 cycles/h (300 for AF.., AE.., TAE..) | | |

(1) Unauthorized for TAE.. contactors

### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | AC operated | A45 | A50 | A75 |
|---|---|---|---|---|
| | DC operated | AE45 | AE50 | AE75 |
| | | TAE45 | TAE50 | TAE75 |
| | AC / DC operated | AF45 | AF50 | AF75 |
| **Standards** | | UL 508, CSA C22.2 N°14 | | |
| **Max. operational voltage** | | 600 V | | |
| **UL / CSA general use rating** | | | | |
| 600 V AC | | 65 A | 80 A | 105 A |
| With conductor cross-sectional area | | AWG 6 | AWG 4 | AWG 2 |
| **Max. electrical switching frequency** | | | | |
| For general use | | 600 cycles/h (300 for AF.., AE.. TAE..) | | |

**Remark for 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles**

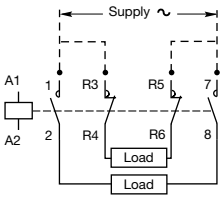



These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams below). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK before MAKE.

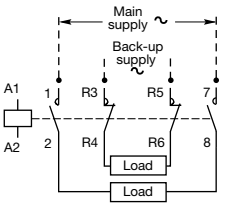
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

**Block diagrams**

– Single supply and 2 separate loads




– 2 separate supplies and 2 separate loads



# IEC/UL/CSA Technical data
## EK110...EK1000, 4-pole
## Utilization characteristics

### Main pole - Utilization characteristics according to IEC

| Contactor types | AC or DC operated | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|
| **Standards** | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | |
| **Rated operational voltage Ue max.** | | 1000 V | | | | | | |
| **Rated frequency (without derating)** | | 50 / 60 Hz | | | | | | |
| **Conventional free-air thermal current Ith** | | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 200 A | 250 A | 300 A | 350 A | 550 A | 800 A | 1000 A |
| With conductor cross-sectional area | | 95 mm² | 150 mm² | 185 mm² | 240 mm² | 2x 185 mm² | 2x 240 mm² | 2x 300 mm² |
| **AC-1 Utilization category** | | | | | | | | |
| For air temperature close to contactor | | | | | | | | |
| **Ie / Rated operational current AC-1** | **θ ≤ 40 °C** | 200 A | 250 A | 300 A | 350 A | 550 A | 800 A | 1000 A |
| Ue max. ≤ 1000 V, 50/60 Hz | **θ ≤ 55 °C** | 180 A | 230 A | 270 A | 310 A | 470 A | 650 A | 800 A |
| | **θ ≤ 70 °C** | 155 A | 200 A | 215 A | 250 A | 400 A | 575 A | 720 A |
| With conductor cross-sectional area | | 95 mm² | 150 mm² | 185 mm² | 240 mm² | 2x 185 mm² | 2x 240 mm² | 2x 300 mm² |
| **AC-3 Utilization category** | | | | | | | | |
| For air temperature close to contactor θ ≤ 55 °C | | | | | | | | |
| **Ie / Max. rated operational current AC-3** (1) | | | | | | | | |
| 3-phase motors | **220-230-240 V** | 120 A | 145 A | 210 A | 210 A | 400 A | 550 A | - |
| | **380-400 V** | 120 A | 145 A | 210 A | 210 A | 400 A | 550 A | - |
| | **415 V** | 120 A | 145 A | 210 A | 210 A | 400 A | 550 A | - |
| | **440 V** | 120 A | 145 A | 210 A | 210 A | 370 A | 550 A | - |
| | **500 V** | 120 A | 145 A | 210 A | 210 A | 370 A | 550 A | - |
| | **690 V** | 120 A | 120 A | 210 A | 210 A | 370 A | 550 A | - |
| | **1000 V** | 64 A | 80 A | 113 A | 113 A | 155 A | 175 A | - |
| **Rated operational power AC-3** (1) | | | | | | | | |
| 1500 r.p.m. 50 Hz<br>1800 r.p.m. 60 Hz<br>3-phase motors | **220-230-240 V** | 30 kW | 45 kW | 59 kW | 59 kW | 110 kW | 160 kW | - |
| | **380-400 V** | 55 kW | 75 kW | 110 kW | 110 kW | 200 kW | 280 kW | - |
| | **415 V** | 55 kW | 75 kW | 110 kW | 110 kW | 220 kW | 315 kW | - |
| | **440 V** | 59 kW | 75 kW | 110 kW | 110 kW | 220 kW | 315 kW | - |
| | **500 V** | 75 kW | 90 kW | 132 kW | 132 kW | 250 kW | 400 kW | - |
| | **690 V** | 110 kW | 110 kW | 160 kW | 160 kW | 355 kW | 500 kW | - |
| | **1000 V** | 90 kW | 110 kW | 160 kW | 160 kW | 220 kW | 250 A | - |
| **Rated making capacity AC-3** | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | |
| **Rated breaking capacity AC-3** | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | |
| **Short-circuit protection device for contactors** | | | | | | | | |
| without thermal overload relay - Motor protection excluded | | | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 250 A | 250 A | 355 A | 355 A | 630 A | 800 A | 1000 A |
| **Rated short-time withstand current Icw** | **1 s** | 1700 A | 1800 A | 2300 A | 2300 A | 5500 A | 5500 A | 6800 A |
| at 40 °C ambient temperature, | **10 s** | 900 A | 1200 A | 1680 A | 1680 A | 5300 A | 5300 A | 6400 A |
| in free air from a cold state | **30 s** | 600 A | 700 A | 1000 A | 1000 A | 3700 A | 3700 A | 4400 A |
| | **1 min** | 450 A | 550 A | 800 A | 800 A | 3000 A | 3000 A | 3400 A |
| | **15 min** | 210 A | 250 A | 320 A | 320 A | 1000 A | 1000 A | 1200 A |
| **Maximum breaking capacity** | | | | | | | | |
| cos φ = 0.45 | **at 440 V** | 1400 A | 1500 A | 2000 A | 2000 A | 5000 A | 5400 A | - |
| (cos φ = 0.35 for Ie > 100 A) | **at 690 V** | 1100 A | 1200 A | 1700 A | 1700 A | 5000 A | 5400 A | - |
| **Power dissipation per pole** | **Ie / AC-1** | 10 W | 13 W | 18 W | 18 W | 40 W | 60 W | 80 W |
| | **Ie / AC-3** | 3 W | 5 W | 9 W | 9 W | 15 W | 25 W | - |
| **Max. electrical switching frequency** | **AC-1** | 300 cycles/h | | | | | | |
| | **AC-3** | 300 cycles/h | | | | | | - |
| | **AC-2, AC-4** | 150 cycles/h | | 120 cycles/h | | | | - |

### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | AC or DC operated | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|
| **Standards** | | UL 508, CSA C22.2 N°14 | | | | | | - |
| **Max. operational voltage** | | 600 V | | | | | | - |
| **UL / CSA general use rating** | | | | | | | | |
| 600 V AC | | 170 A | 200 A | 250 A | 300 A | 420 A | 540 A | - |
| **Max. electrical switching frequency** | | | | | | | | |
| For general use | | 300 cycles/h | | | | | | |

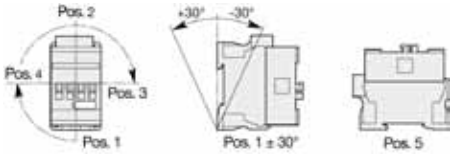
(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

# General technical data
## AF09(Z)...AF38(Z)
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | AC / DC operated | AF09(Z) | AF16(Z) | AF26(Z) | AF38(Z) |
|---|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **AC supply** | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | | | |
| | | **DC supply** | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C (AF) 0.85 x Uc min...Uc max. - (AF..Z) 0.85 x Uc min...1.1 x Uc max. | | | |
| **AC control voltage** | Rated control circuit voltage Uc | | 24...500 V AC | | | |
| 50/60 Hz | Coil consumption | **Average pull-in value** | (AF) 50 VA - (AF..Z) 16 VA | | | |
| | | **Average holding value** | (AF) 2.2 VA / 2 W - (AF..Z) 1.7 VA / 1.5 W | | | |
| **DC control voltage** | Rated control circuit voltage Uc | | 12...500 V DC | | | |
| | Coil consumption | **Average pull-in value** | (AF) 50 W - (AF..Z) 12...16 W | | | |
| | | **Average holding value** | (AF) 2 W - (AF..Z) 1.7 W | | | |
| **PLC-output control** | | | (AF..Z) ≥ 500 mA 24 V DC | | | |
| **Drop-out voltage** | | | ≤ 60 % of Uc min. | | | |
| **Voltage sag immunity** | acc. to SEMI F47-0706 | | (AF..Z) conditions of use on request | | | |
| **Dips withstand** -20 °C ≤ θ ≤ +60 °C | | | (AF..Z) 22 ms average | | | |
| **Operating time** | | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 40...95 ms | | | |
| | | **N.C. contact opening** | 38...90 ms | | | |
| Between coil de-energization and: | | **N.O. contact opening** | 11...95 ms | | | |
| | | **N.C. contact closing** | 13...98 ms | | | |

### Mounting characteristics and conditions for use

| Contactor types | | AF09(Z) | AF16(Z) | AF26(Z) | AF38(Z) |
|---|---|---|---|---|---|
| **Mounting positions** | |  | | | |
| | | Max. add-on N.C. auxiliary contacts:<br>see accessory fitting details for a 4-pole contactor AF09 ... AF38 | | | |
| **Mounting distances** | | The contactors can be assembled side by side | | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | 35 x 7.5 mm or 35 x 15 mm | | | |
| | By screws (not supplied) | 2 x M4 screws placed diagonally | | | |

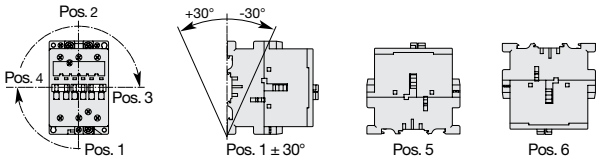
# General technical data
## A45...A75
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | AC operated | A45 | A50 | A75 |
|---|---|---|---|---|---|
| **Coil operating limits** | | **AC supply** | At θ ≤ 55 °C 0.85...1.1 x Uc | | |
| acc. to IEC 60947-4-1 | | | Please also refer to "Mounting characteristics and conditions for use" | | |
| **AC control voltage** | Rated control circuit voltage Uc | **at 50 Hz** | 24...690 V | | |
| | | **at 60 Hz** | 24...690 V | | |
| | Coil consumption | **Average pull-in value 50 Hz** | 180 VA | | |
| | | **60 Hz** | 210 VA | | |
| | | **50/60 Hz** (1) | 190 VA / 180 VA | | |
| | | **Average holding value 50 Hz** | 18 VA / 5.5 W | | |
| | | **60 Hz** | 18 VA / 5.5 W | | |
| | | **50/60 Hz** (1) | 18 VA / 5.5 W | | |
| **Drop-out voltage** | | | approx. 40...65 % of Uc | | |
| **Operating time** | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 8...27 ms | | |
| | | **N.C. contact opening** | 7...22 ms | | |
| Between coil de-energization and: | | **N.O. contact opening** | 4...11 ms | | |
| | | **N.C. contact closing** | 7...14 ms | | |

(1) 50/60 Hz coils: see "Coil voltage code table".

### Mounting characteristics and conditions for use

| Contactor types | | AC operated | A45 | A50 | A75 |
|---|---|---|---|---|---|
| **Mounting positions** | | |   | | |
| | | | Pos. 5 unauthorized for A45-22-00, A75-22-00 | | |
| | | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor A45 ... A75 | | |
| **Control voltage / Ambient temperature** | | | | | |
| | Mounting positions (1) 1, 1±30°, 2, 3, 4, 5 | **at θ ≤ 55 °C** | 0.85...1.1 x Uc | | |
| | | **at θ ≤ 70 °C** | Uc | | |
| | 6 | **at θ ≤ 55 °C** | 0.95...1.1 x Uc | | |
| | | **at θ ≤ 70 °C** | Unauthorized | | |
| **Mounting distances** | | | The contactors can be assembled side by side | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | 35 x 15 mm or 75 x 25 mm | | |
| | By screws (not supplied) | | 2 x M6 screws placed diagonally | | |

(1) For 60 Hz coil voltage: (only for devices fitted with CA 5-.. and CAL 5-11 auxiliary contacts or TP timer).
– A45-40-00, A50-40-00 and A75-40-00 contactors.
Mounting positions 1 to 5 and ambient temperature ≤ 55 °C: tolerance reduced to 0.9...1.1 Uc (instead of 0.85...1.1 Uc) for coil voltage codes 70 to 79 and 80 to 89.
– A45-22-00 and A75-22-00 contactors.
Mounting positions 1 to 4 and ambient temperature ≤ 55 °C: tolerance reduced to 0.9...1.1 Uc (instead of 0.85...1.1 Uc) for coil voltage codes 70 to 79 and 80 to 89.
For mounting position 6 or ambient temperature of 55 to 70 °C the information given on this page remains applicable.

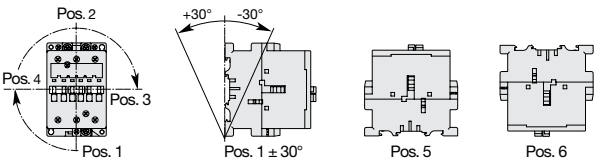
# General technical data
## AE45...AE75
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | DC operated | AE45 | AE50 | AE75 |
|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **DC supply** | At θ ≤ 55 °C 0.85...1.1 x Uc<br>Please also refer to "Mounting characteristics and conditions for use" | | |
| **DC control voltage** | Rated control circuit voltage Uc | | 12…250 V DC | | |
| | Coil consumption | **Average pull-in value** | 200 W | | |
| | | **Average holding value** | 4 W | | |
| **Drop-out voltage** | | | approx. 15...40 % of Uc | | |
| **Coil time constant** | Open | **L/R** | 3 ms | | |
| | Closed | **L/R** | 15 ms | | |
| **Operating time** | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 13…30 ms | | |
| | | **N.C. contact opening** | 10…27 ms | | |
| Between coil de-energization and: | | **N.O. contact opening** (1) | 5…15 ms | | |
| | | **N.C. contact closing** (1) | 8…18 ms | | |

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for RV5 surge suppressor and a factor of 1.5 to 3 for RT5 surge suppressor.

### Mounting characteristics and conditions for use

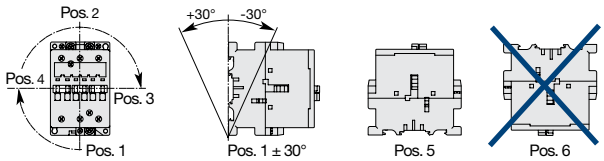
| Contactor types | | DC operated | AE45 | AE50 | AE75 |
|---|---|---|---|---|---|
| **Mounting positions** | | |  | | |
| | | | Pos. 5 unauthorized for AE45-22-00, AE75-22-00 | | |
| | | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AE45 … AE75 (1)(2) | | |
| **Control voltage / Ambient temperature** | | | | | |
| | Mounting positions 1, 1±30°, 2, 3, 4, 5 | **at θ ≤ 55 °C** | 0.85…1.1 x Uc | | |
| | | **at θ ≤ 70 °C** | Uc | | |
| | 6 | **at θ ≤ 55 °C** | 0.95…1.1 x Uc | | |
| | | **at θ ≤ 70 °C** | Unauthorized | | |
| **Mounting distances** | | | The contactors can be assembled side by side | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | 35 x 15 mm or 75 x 25 mm | | |
| | By screws (not supplied) | | 2 x M6 screws placed diagonally | | |

# General technical data
## AF45...AF75
## Coil & mounting characteristics

### Magnet system characteristics

| Contactor types | | AC / DC operated | AF45 | AF50 | AF75 |
|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | **AC or DC supply** | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use" | | |
| **AC control voltage** 50/60 Hz | Rated control circuit voltage Uc | | 48…250 V | | |
| | Coil consumption | **Average pull-in value** | 210 VA | | |
| | | **Average holding value** | 7 VA / 2.8 W | | |
| **DC control voltage** | Rated control circuit voltage Uc | | 20…250 V DC | | |
| | Coil consumption | **Average pull-in value** | 190 W | | |
| | | **Average holding value** | 2.8 W | | |
| **Drop-out voltage** | | | 55 % of Uc min. | | |
| **Voltage sag immunity** acc. to SEMI F47 | | | Conditions of use on request | | |
| **Dips withstand** | | | ≥ 20 ms | | |
| **Operating time** | | | | | |
| Between coil energization and: | | **N.O. contact closing** | 30…100 ms | | |
| | | **N.C. contact opening** | 27…95 ms | | |
| Between coil de-energization and: | | **N.O. contact opening** | 30…110 ms | | |
| | | **N.C. contact closing** | 35…115 ms | | |

### Mounting characteristics and conditions for use

| Contactor types | | AC / DC operated | AF45 | AF50 | AF75 |
|---|---|---|---|---|---|
| **Mounting positions** | | |   | | |
| | | | Pos. 5 unauthorized for AF45-22-00, AF75-22-00 contactors | | |
| | | | Max. and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AF45 ... AF110 | | |
| **Control voltage / Ambient temperature** | | | | | |
| | Mounting positions 1, 1±30°, 2, 3, 4, 5 | **at θ ≤ 70 °C** | 0.85 x Uc min…1.1 x Uc max. | | |
| | Mounting positions 6 | | Unauthorized | | |
| **Mounting distances** | | | The contactors can be assembled side by side | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | 35 x 15 mm or 75 x 25 mm | | |
| | By screws (not supplied) | | 2 x M6 screws placed diagonally | | |

# General technical data
## EK110...EK1000
## Coil & mounting characteristics

### Magnet system characteristics

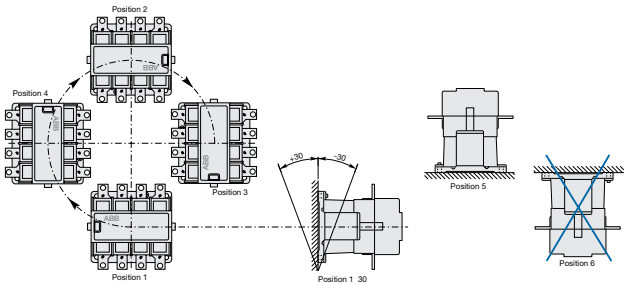
| Contactor types | | | AC operated | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | | **AC supply** | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use" | | | | | | |
| **AC control voltage** | Rated control circuit voltage | | **50 Hz** | 24...500 V | | | | 48...500 V | | |
| | | | **60 Hz** | 24...600 V | | | | 110...600 V | | |
| | Coil consumption | **Average pull-in value** | **50 Hz** | 800 VA | | 1100 VA | | 3500 VA | | |
| | | | **60 Hz** | 900 VA | | 1200 VA | | 4000 VA | | |
| | | | **50/60 Hz** (1) | 500 /500 VA | | 630 / 630 VA | | 3800 / 3400 VA | | |
| | | **Average holding value** | **50 Hz** | 44 VA / 15 W | | 52 VA / 18 W | | 125 VA / 50 W | | |
| | | | **60 Hz** | 52 VA /18 W | | 65 VA / 22 W | | 140 VA / 60 W | | |
| | | | **50/60 Hz** (1) | 2.5 VA / 2.5 W | | 2.5 VA / 2.5 W | | 140 VA /60 W | | |
| **Drop-out voltage in % of Uc min.** | | | | approx. 45...65 % (20...50 % for "E" coil voltage codes) | | | | | approx. 45...65 % | |
| **Operating time** | | | | | | | | | | |
| Between coil energization and: | | | **N.O. contact closing** | 20...40 (1) / 30...50 (2) ms | | | | | 30...60 ms | |
| | | | **N.C. contact opening** | 15...35 (1) / 25...45 (2) ms | | | | | 25...55 ms | |
| Between coil de-energization and: | | | **N.O. contact opening** | 7.5...15 (1) / 95...120 (2) ms | | | | | 10...20 ms | |
| | | | **N.C. contact closing** | 10...18 (1) / 100...125 (2) ms | | | | | 13...23 ms | |

(1) "A" coil voltage: see "Coil voltage code table".
(2) 50/60 Hz "E" coil voltage codes, see "Coil voltage code table".

### Magnet system characteristics

| Contactor types | | | DC operated | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coil operating limits** acc. to IEC 60947-4-1 | | | **DC supply** | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use" | | | | | | |
| **DC control voltage** | Rated control circuit voltage | | | 12...220 | | | | 24...220 | | |
| | Coil consumption | | **Average pull-in value** | 500 W | | 630 W | | 1100 W | | |
| | | | **Average holding value** | 2.5 W | | 2.5 W | | 20 W | | |
| **Drop-out voltage** | | | | approx. 15...50 % of Uc min. | | | | | | |
| **Coil time constant** | Open | | **L/R** | 8 ms | | | | 12 ms | | |
| | Closed | | **L/R** | 50 ms | | | | 60 ms | | |
| **Operating time** | | | | | | | | | | |
| Between coil energization and: | | | **N.O. contact closing** | 30...50 ms | | | | 60...80 ms | | |
| | | | **N.C. contact opening** | 27...47 ms | | | | 55...75 ms | | |
| Between coil de-energization and: | | | **N.O. contact opening** | 10...35 ms | | | | | | |
| | | | **N.C. contact closing** | 13...38 ms | | | | | | |

### Mounting characteristics and conditions for use

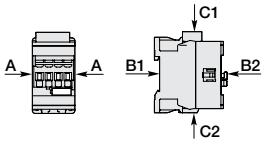
| Contactor types | | | AC / DC operated | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Mounting positions** | | | |   | | | | | | |
| | | | | Max. N.O. or N.C. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor EK110 ... EK1000 | | | | | | |
| **Control voltage / Ambient temperature** | | | | | | | | | | |
| Mounting positions | 1, 1±30°, 2, 3, 4, 5 | | **at θ ≤ 70 °C** | 0.85...1.1 x Uc | | | | | | |
| | 2 | | **at θ ≤ 70 °C** | Unauthorized | | | | 0.85...1.1 x Uc | | |
| | 6 | | **at θ ≤ 70 °C** | Unauthorized | | | | | | |
| **Mounting distances** | | | | The contactors can be assembled side by side | | | | | | |
| **Fixing** | On rail according to IEC 60715, EN 60715 | | | – | | | | | | |
| | By screws (supplied) | | | 4 x M6 | | | | 4 x M6 (1) | | |

(1) Damping elements are supplied.

# General technical data
## AF09(Z)...AF38(Z), 4-pole

### General technical data

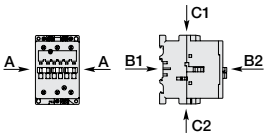
| Contactor types | | AF09(Z) | AF16(Z) | AF26(Z) | AF38(Z) |
|---|---|---|---|---|---|
| **Rated insulation voltage Ui** | | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | | |
| acc. to UL / CSA | | 600 V | | | |
| **Rated impulse withstand voltage Uimp.** | | 6 kV | | | |
| **Electromagnetic compatibility** | | Devices complying with IEC 60947-1 / EN 60947-1 - Environment A | | | |
| **Ambient air temperature** close to contactor | | | | | |
| Operation | | -40...+70 °C | | | |
| Storage | | -60...+80 °C | | | |
| **Climatic withstand** | | Category B according to IEC 60947-1 Annex Q | | | |
| **Maximum operating altitude (without derating)** | | 3000 m | | | |
| **Mechanical durability** | | | | | |
| Number of operating cycles | | 10 millions operating cycles | | | |
| Max. switching frequency | | 3600 cycles/h | | | |
| **Shock withstand** | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | |
| Mounting position 1 | | | | | |
| | **Shock direction** | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | |
| 4 N.O. Main poles | **A** | 30 g | | | |
| | **B1** | 25 g closed position / 5 g open position | | | |
| | **B2** | 15 g | | | |
| | **C1** | 25 g | | | |
| | **C2** | 25 g | | | |
| 2 N.O. + 2 N.C. Main poles | **A** | 30 g | | 30 g closed position / 25 g open position | |
| | **B1** | 25 g closed position / 5 g open position | | 25 g closed position / 5 g open position | |
| | **B2** | 15 g | | 15 g closed position / 10 g open position | |
| | **C1** | 25 g | | 25 g closed position / 20 g open position | |
| | **C2** | 25 g | | 25 g closed position / 20 g open position | |
| **Vibration withstand** | | 5...300 Hz | | | |
| acc. to IEC 60068-2-6 | | 4 g closed position / 2 g open position | | | |



# General technical data
## A/E/F45...A/E/F75, 4-pole

### General technical data

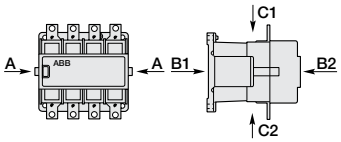
| | | | | |
|---|---|---|---|---|
| **Contactor types** | **AC operated** | A45 | A50 | A75 |
| | **DC operated** | AE45 | AE50 | AE75 |
| | | TAE45 | TAE50 | TAE75 |
| | **AC / DC operated** | AF45 | AF50 | AF75 |
| **Rated insulation voltage Ui** | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | |
| acc. to UL / CSA | | 600 V | | |
| **Rated impulse withstand voltage Uimp.** | | 8 kV | | |
| **Electromagnetic compatibility** | | AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A | | |
| **Ambient air temperature** close to contactor | | | | |
| Operation | | -40...+70 °C (1) | | |
| Storage | | -60...+80 °C | | |
| **Climatic withstand** | | acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II | | |
| **Maximum operating altitude (without derating)** | | 3000 m | | |
| **Mechanical durability** | | | | |
| Number of operating cycles | | 10 millions operating cycles (5 millions for AE... and TAE... contactors) | | |
| Max. switching frequency | | 3600 cycles/h (300 for AF...) | | |
| **Shock withstand** acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | |
| Mounting position 1 | | | | |
| | **Shock direction** | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | |
| 4 N.O. Main poles | **A** | 20 g | | |
| | **B1** | 10 g closed position / 5 g open position | | |
| | **B2** | 15 g | | |
| | **C1** | 20 g | | |
| | **C2** | 20 g | | |
| 2 N.O. + 2 N.C. Main poles | **A** | 20 g | | |
| | **B1** | 10 g closed position / 5 g open position (2) | | |
| | **B2** | 15 g (3) | | |
| | **C1** | 20 g | | |
| | **C2** | 20 g | | |




(1) 55 °C max. for TAE... contactors.
(2) 3 g in open position for AF 45-22, AE 45-22, AF 75-22 and AE 75-22.
(3) 10 g for AF 45-22, AE 45-22, AF 75-22 and AE 75-22.

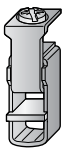
# General technical data
## EK110...EK1000, 4-pole

### General technical data

| Contactor types | AC or DC operated | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|
| **Rated insulation voltage Ui** | | | | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | | | | |
| acc. to UL | | 600 V | | | | | | |
| **Rated impulse withstand voltage Uimp.** | | 8 kV | | | | | | |
| **Electromagnetic compatibility** | | EK contactors complying with IEC 60947-1 / EN 60947-1 - Environment A | | | | | | |
| **Ambient air temperature** close to contactor | | | | | | | | |
| Operation | Fitted with thermal overload relay | -25 to +55 °C | | | | | | - |
| | Without thermal overload relay | -40 to +70 °C | | | | | | - |
| Storage | | -50 to +70 °C | | | | | | - |
| **Climatic withstand** | | Category B acc. to IEC 60068-2-30 | | | | | | |
| **Maximum operating altitude (without derating)** | | ≤ 3000 m | | | | | | |
| **Mechanical durability** | | | | | | | | |
| Number of operating cycles | | 10 millions operating cycles | | | | 5 millions operating cycles | | 3 millions operating cycles |
| Max. switching frequency | | 3600 cycles/h | | | | 60 cycles/h | | |
| **Shock withstand** | | | | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | | |
| Mounting position 1 | | | | | | | | |
|  Closed or open position | **Shock direction** | 1/2 sinusoidal shock for 15 ms: no change in contact position, closed or open position | | | | | | |
| | **A** | 10 g | | | | | | |
| | **B1** | 10 g | | | | | | |
| | **B2** | 10 g | | | | | | |
| | **C1** | 10 g | | | | | | |
| | **C2** | 10 g | | | | | | |

# General technical data
## AF09(Z)...AF38(Z), 4-pole
## Terminal characteristics

### Connecting characteristics

| Contactor types | | | AF09(Z) | AF16(Z) | AF26(Z) | AF38(Z) |
|---|---|---|---|---|---|---|
| **Main terminals** | | | Screw terminals with cable clamp | |  Screw terminals with double connector 2 x (5.5 width x 6.8 depth) | |
| **Connection capacity** (min. ... max.) | | | | | | |
| **Main conductors** (poles) | | | | | | |
| Rigid | Solid (≤ 4 mm²) | **1 x** | 1...6 mm² | | 1.5...16 mm² | |
| | Stranded (≥ 6 mm²) | **2 x** | 1...6 mm² | | 1.5...16 mm² | |
| Flexible with non insulated ferrule | | **1 x** | 0.75...6 mm² | | 1.5...16 mm² | |
| | | **2 x** | 0.75...6 mm² | | 1.5...16 mm² | |
| Flexible with insulated ferrule | | **1 x** | 0.75...4 mm² | | 1.5...16 mm² | |
| | | **2 x** | 0.75...2.5 mm² | | 1.5...16 mm² | |
| Bars or lugs | | **L <** | 9.6 mm | | - | |
| Connection capacity acc. to UL/CSA (Sol/Str) | | **1 or 2 x** | AWG 16...10 | | AWG 16...6 | |
| Stripping length | | | 10 mm | | 12 mm | |
| Tightening torque | | | 1.5 Nm / 13 lb.in | | 2.5 Nm / 22 lb.in | |
| **Auxiliary conductors** (coil terminals) | | | | | | |
| Rigid solid | | **1 x** | 1...2.5 mm² | | | |
| | | **2 x** | 1...2.5 mm² | | | |
| Flexible with non insulated ferrule | | **1 x** | 0.75...2.5 mm² | | | |
| | | **2 x** | 0.75...2.5 mm² | | | |
| Flexible with insulated ferrule | | **1 x** | 0.75...2.5 mm² | | | |
| | | **2 x** | 0.75...1.5 mm² | | | |
| Lugs | | **L <** | 8 mm | | | |
| Connection capacity acc. to UL/CSA (Sol/Str) | | **1 or 2 x** | AWG 18...14 | | | |
| Stripping length | | | 10 mm | | | |
| Tightening torque | | | 1.2 Nm / 11 lb.in | | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | |
| Main terminals | | | IP20 | | | |
| Coil terminals | | | IP20 | | | |
| **Screw terminals** | | | Delivered in open position, screws of unused terminals must be tightened | | | |
| Main terminals | | | M3.5 | | M4.5 | |
| | | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | | |
| Coil terminals | | | M3.5 | | | |
| | | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | | |

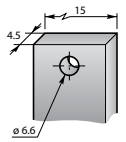
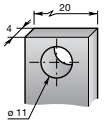
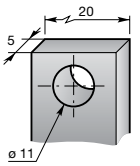
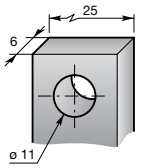
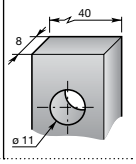
# General technical data
## A/E/F45...A/E/F75
## Terminal characteristics

### Connecting characteristics

| Contactor types | | | | | |
|---|---|---|---|---|---|
| | | AC operated | A45 | A50 | A75 |
| | | DC operated | AE45 | AE50 | AE75 |
| | | | TAE45 | TAE50 | TAE75 |
| | | AC / DC operated | AF45 | AF50 | AF75 |
| **Main terminals** | | | Screw terminals with single connector (13 x 10 mm) | | |
| **Connection capacity** (min. ... max.) | | | | | |
| **Main conductors** (poles) | | | | | |
| Rigid | Solid (≤ 4 mm²) | 1 x | 6...50 mm² | | |
| | Stranded (≥ 6 mm²) | 2 x | 6...25 mm² | | |
| Flexible with ferrule | | 1 x | 6...35 mm² | | |
| | | 2 x | 6...16 mm² | | |
| Bars or lugs | | L ≤ | - | | |
| | | l > | - | | |
| Connection capacity acc. to UL/CSA (Sol/Str) | | 1 or 2 x | AWG 8...1 | | |
| Tightening torque | Recommended | | 4.00 Nm / 35 lb.in | | |
| | Max. | | 4.50 Nm | | |
| **Auxiliary conductors** (built-in auxiliary terminals + coil terminals) | | | | | |
| Rigid solid | | 1 x | 1...4 mm² | | |
| | | 2 x | 1...4 mm² | | |
| Flexible with ferrule | | 1 x | 1...2.5 mm² | | |
| | | 2 x | 0.75...2.5 mm² | | |
| Lugs | | L ≤ | 8 mm | | |
| | | l > | 3.7 mm | | |
| Connection capacity acc. to UL/CSA (Sol/Str) | | 1 or 2 x | AWG 18...14 | | |
| Tightening torque | Recommended | | 1.00 Nm / 9 lb.in | | |
| | Max. | | 1.20 Nm | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | |
| Main terminals | | | IP10 | | |
| Coil terminals | | | IP20 | | |
| **Screw terminals** | | | Delivered in open position, screws of unused terminals must be tightened | | |
| Main terminals | | | M6 | | |
| | | Screwdriver type | Flat Ø 6.5 / Pozidriv 2 | | |
| Coil terminals | | | M3.5 | | |
| | | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | |

# General technical data
## EK110...EK1000
## Terminal characteristics

### Connecting characteristics

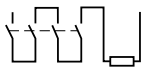
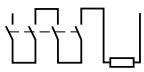
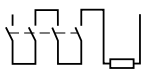
| Contactor types | AC or DC operated | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|
| **Main terminals** Flat type | |   |   |   | |   | |   |
| **Connection capacity** (min. ... max.) | | | | | | | | |
| **Main conductors** (poles) | | | | | | | | |
| Rigid with connector | Single for Cu cable | 25...120 mm² | 25...185 mm² | 25...185 mm² | | 70...300 mm² | | - |
| | Single for Al/Cu cable | 10...70 mm² | 35...120 mm² | 35...120 mm² | | 70...300 mm² | | 95...300 mm² |
| | Double for Al/Cu cable | - | - | - | | 2 x 35...185 | | 2 x 95...300 |
| Bars or lugs | L ≤ | 30 mm | 30 mm | 33 mm | 33 mm | 55 mm | 55 mm | 55 mm |
| | Ø > | 6 mm | 10 mm | 10 mm | 10 mm | 10 mm | 10 mm | 10 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | 8 -3 /0 AWG | | 6 - 250 MCM | | 2 x 4 - 500 MCM | 3 x 4 - 500 MCM | - |
| Tightening torque | Recommended | 5 Nm/44 lb.in | 18 Nm / 160 lb.in | | | | | |
| | Max. | 6 Nm | 22 Nm | | | | | |
| **Auxiliary conductors** (coil terminals) | | | | | | | | |
| Rigid solid | 1 x | 0.5…2.5 mm² | | | | | | |
| | 2 x | 0.5…2.5 mm² | | | | | | |
| Flexible with ferrule | 1 x | 0.5…2.5 mm² | | | | | | |
| | 2 x | 0.5…2.5 mm² | | | | | | |
| Bars or lugs | L ≤ | 8 mm | | | | | | |
| | l > | 3.7 mm | | | | | | |
| Connection capacity acc. to UL/CSA (Sol/Str) | 1 or 2 x | 18…14 AWG | | | | | | |
| Tightening torque | Recommended | 1.00 Nm / 9 lb.in | | | | | | |
| | Max. | 1.20 Nm | | | | | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | | |
| Main terminals | | IP00 | | | | | | |
| Coil terminals | | IP20 | | | | | | |
| **Screw terminals** | | | | | | | | |
| Main terminals | | M6 | | M10 | | | | |
| | | Screws and bolts | | | | | | |
| Coil terminals (delivered in open positions) | | M3.5 | | | | | | |
| | Screwdriver type | Flat Ø 5.5 mm / Pozidriv 2 | | | | | | |

# IEC Technical data
## AF09(Z)...AF38(Z), 3 & 4-pole
## DC circuit switching

### 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 Ie max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication, the operating voltage Ue and the pole coupling details.
Ampere values quoted in these tables are valid for a -25 … +70 °C temperature close to the contactors, as long as these values do not exceed the AC-1 Ampere values for the corresponding ambient temperature.
– Max. switching frequency: 300 cycles/h.

### Selection table

| Contactor types | | AF09 | AF12 | AF16 | AF26 | | AF30 | AF38 | |
|---|---|---|---|---|---|---|---|---|---|
| | | 3 or 4-pole | | | 3-pole | 4-pole | 3-pole | 3-pole | 4-pole |
| **Utilization category DC-1, L/R ≤ 1 ms** | | | | | | | | | |
| | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A |
| | 110 V | 10 A | 15 A | 20 A | — | — | — | — | — |
| | 220 V | — | — | — | — | — | — | — | — |
| | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A |
| | 220 V | 10 A | 15 A | 20 A | — | — | — | — | — |
| | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A |
| | 220 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A |
|  | ≤ 72 V | 25 A | — | 30 A | — | 45 A | — | — | 55 A |
| | 110 V | 25 A | — | 30 A | — | 45 A | — | — | 55 A |
| | 220 V | 25 A | — | 30 A | — | 45 A | — | — | 55 A |
| | 440 V | 10 A | — | 20 A | — | — | — | — | — |
| **Utilization category DC-3, L/R ≤ 2 ms** | | | | | | | | | |
| | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | — | 50 A | 50 A | — |
| | 110 V | 6 A | 7 A | 8 A | — | — | — | — | — |
| | 220 V | — | — | — | — | — | — | — | — |
| | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | — | 50 A | 50 A | — |
| | 110 V | 25 A | 27 A | 30 A | 45 A | — | 50 A | 50 A | — |
| | 220 V | 6 A | 7 A | 8 A | — | — | — | — | — |
| | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | — | 50 A | 50 A | — |
| | 110 V | 25 A | 27 A | 30 A | 45 A | — | 50 A | 50 A | — |
| | 220 V | 25 A | 27 A | 30 A | 45 A | — | 50 A | 50 A | — |
|  | ≤ 72 V | 25 A | — | 30 A | — | — | — | — | — |
| | 110 V | 25 A | — | 30 A | — | — | — | — | — |
| | 220 V | 25 A | — | 30 A | — | — | — | — | — |
| | 440 V | 6 A | — | 8 A | — | — | — | — | — |
| **Utilization category DC-5, L/R ≤ 7.5 ms** | | | | | | | | | |
| | ≤ 72 V | 9 A | 12 A | 16 A | 20 A | — | 25 A | 25 A | — |
| | 110 V | 4 A | 4 A | 4 A | — | — | — | — | — |
| | 220 V | — | — | — | — | — | — | — | — |
| | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | — | 50 A | 50 A | — |
| | 110 V | 10 A | 15 A | 20 A | 45 A | — | 50 A | 50 A | — |
| | 220 V | 4 A | 4 A | 4 A | — | — | — | — | — |
| | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | — | 50 A | 50 A | — |
| | 110 V | 25 A | 27 A | 30 A | 45 A | — | 50 A | 50 A | — |
| | 220 V | 9 A | 12 A | 16 A | 20 A | — | 25 A | 25 A | — |
|  | ≤ 72 V | 25 A | — | 30 A | — | — | — | — | — |
| | 110 V | 25 A | — | 30 A | — | — | — | — | — |
| | 220 V | 10 A | — | 20 A | — | — | — | — | — |
| | 440 V | 4 A | — | 4 A | — | — | — | — | — |

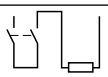
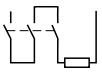
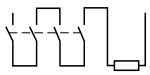
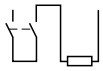
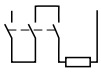
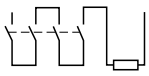
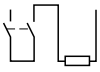
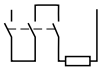
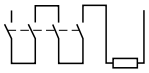
# IEC technical data

## A/E/L9...A/E/F75, GA/E75, 3 & 4-pole
## DC Circuit switching

### 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).

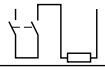
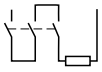
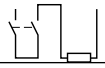
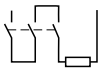
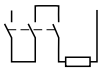
| a.c. operated contactors<br>a.c. / d.c. operated (electronic coil interface)<br>d.c. operated contactors | | | A9<br>–<br>AE9 | A12<br>–<br>AE12 | A16<br>–<br>AE16 | A26<br>–<br>AE26 | A30<br>–<br>AE30 | A40<br>–<br>AE40 | A45<br>AF45<br>AE45 | A50<br>AF50<br>AE50 | A63<br>AF63<br>AE63 | A75<br>AF75<br>AE75 | GA75<br>–<br>GAE75 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Utilization category DC-1, L/R ≤ 1 ms | | | | | | | | | | | | | |
| | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 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 | 70 | 100 | 110 | 120 | – |
| | 110 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 100 | 110 | 120 | – |
| | 220 V | A | 10 | 15 | 20 | – | – | – | – | – | – | – | – |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 100 | 110 | 120 | – |
| | 110 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 100 | 110 | 120 | – |
| | 220 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 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 | 70 | 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 | 70 | 100 | 110 | 120 | – |
| | 110 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 100 | 110 | 120 | – |
| | 220 V | A | 6 | 7 | 8 | – | – | – | – | – | – | – | – |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 100 | 110 | 120 | – |
| | 110 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 100 | 110 | 120 | – |
| | 220 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 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 | 70 | 100 | 110 | 120 | – |
| | 110 V | A | 10 | 15 | 20 | 30 | 45 | 50 | 70 | 80 | 90 | 100 | – |
| | 220 V | A | 4 | 4 | 4 | – | – | – | – | – | – | – | – |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 100 | 110 | 120 | – |
| | 110 V | A | 25 | 27 | 30 | 45 | 55 | 60 | 70 | 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/F95...AF750, B/C6...B/C7, 3-pole
## DC circuit switching

### 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 60947-4-1 publication, the operating voltage $U_e$ and the pole coupling details. See page 1.81.
  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 pages 1.45 - 146) 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).

The selection table for AE 50 ... AE 110 contactors can be used for the TAE 50 ... TAE 110 types.

| a.c. operated contactors<br>a.c. / d.c. operated (electronic coil interface)<br>d.c. operated contactors | | | A95<br>AF95<br>– | A110<br>AF110<br>– | A145<br>AF145<br>– | A185<br>AF185<br>– | A210<br>AF210<br>– | A260<br>AF260<br>– | A300<br>AF300<br>– | –<br>AF400<br>– | –<br>AF460<br>– | –<br>AF580<br>– | –<br>AF750<br>– |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | – | – | – | – | – | – | – | 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-3, L/R ≤ 2.5 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 |
| Utilization category DC-5, L/R ≤ 15 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 |

### D.C. Power circuit switching

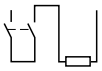
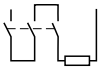
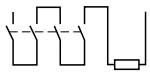
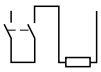
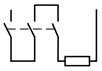
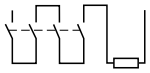
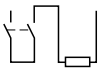
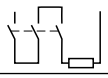
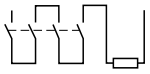
| Utilization category | | DC-1<br>L/R ≤ 1 ms | DC-3<br>L/R ≤ 2 ms | DC-5<br>L/R ≤ 7.5 ms |
|---|---|---|---|---|
| 24 V | **A** | 16.0 | 16.0 | 16.0 |
| 48 V | **A** | 16.0 | 8.0 | 2.0 |
| 60 V | **A** | 16.0 | 4.0 | 1.25 |
| 110 V | **A** | 7.0 | 1.5 | 0.4 |
| 220 V | **A** | 0.8 | 0.25 | 0.2 |
| 24 V | **A** | 16.0 | 16.0 | 16.0 |
| 48 V | **A** | 16.0 | 16.0 | 16.0 |
| 60 V | **A** | 16.0 | 15.0 | 12.0 |
| 110 V | **A** | 16.0 | 7.0 | 2.0 |
| 220 V | **A** | 5.0 | 1.5 | 0.5 |
| 24 V | **A** | 16.0 | 16.0 | 16.0 |
| 48 V | **A** | 16.0 | 16.0 | 16.0 |
| 60 V | **A** | 16.0 | 16.0 | 16.0 |
| 110 V | **A** | 16.0 | 15.0 | 8.0 |
| 220 V | **A** | 14.0 | 4.0 | 2.0 |

# IEC Technical data
## AL9 – AL40
## DC circuit switching

### 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).

| A.C. operated contactors | | | AL9 | AL12 | AL16 | AL26 | AL30 | AL40 |
|---|---|---|---|---|---|---|---|---|
| Utilization category DC-1, L/R ≤ 1 ms | | | | | | | | |
| | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 110 V | A | 10 | 15 | 20 | – | – | – |
| | 220 V | A | – | – | – | – | – | – |
| | 440 V | A | – | – | – | – | – | – |
| | 600 V | A | – | – | – | – | – | – |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 110 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 220 V | A | 10 | 15 | 20 | – | – | – |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 110 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 220 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | – | – |
| | 110 V | A | 25 | 27 | 30 | 45 | – | – |
| | 220 V | A | 25 | 27 | 30 | 45 | – | – |
| | 440 V | A | 10 | 15 | 20 | – | – | – |
| Utilization category DC-3, L/R ≤ 2 ms | | | | | | | | |
| | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 110 V | A | 6 | 7 | 8 | – | – | – |
| | 220 V | A | – | – | – | – | – | – |
| | 440 V | A | – | – | – | – | – | – |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 110 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 220 V | A | 6 | 7 | 8 | – | – | – |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 110 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 220 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | – | – |
| | 110 V | A | 25 | 27 | 30 | 45 | – | – |
| | 220 V | A | 25 | 27 | 30 | 45 | – | – |
| | 440 V | A | 6 | 7 | 8 | – | – | – |
| Utilization category DC-5, L/R ≤ 7.5 ms | | | | | | | | |
| | ≤ 72 V | A | 9 | 12 | 16 | 25 | 30 | 40 |
| | 110 V | A | 4 | 4 | 4 | – | – | – |
| | 220 V | A | – | – | – | – | – | – |
| | 440 V | A | – | – | – | – | – | – |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 110 V | A | 10 | 15 | 20 | 30 | 45 | 50 |
| | 220 V | A | 4 | 4 | 4 | – | – | – |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 110 V | A | 25 | 27 | 30 | 45 | 55 | 60 |
| | 220 V | A | 9 | 12 | 16 | 25 | 30 | 40 |
|  | ≤ 72 V | A | 25 | 27 | 30 | 45 | – | – |
| | 110 V | A | 25 | 27 | 30 | 45 | – | – |
| | 220 V | A | 10 | 15 | 20 | 30 | – | – |
| | 440 V | A | 4 | 4 | 4 | – | – | – |

# IEC Technical data
## EK110 – EK1000
## DC circuit switching

### General

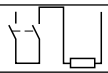
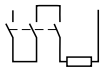
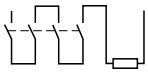
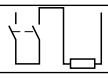
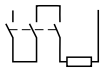
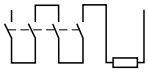
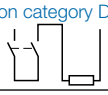
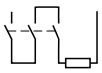
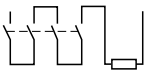
The arc switching on d.c. is more difficult than on a.c.

- 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 60947-4-1 publication (see page 1.75 for more details), 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 1.61) 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).

#### Selection Table

| a.c. / d.c. operated contactors | | | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|---|
| Utilization category DC-1, L/R ≤ 1 ms | | | | | | | | | |
| | ≤ 72 V | A | 120 | 145 | 210 | 210 | 370 | 550 | – |
| | 110 V | A | 120 | 145 | 210 | 210 | 370 | 550 | – |
|  | ≤ 72 V | A | 200 | 200 | 300 | 300 | 550 | 800 | – |
| | 110 V | A | 200 | 200 | 300 | 300 | 550 | 800 | – |
| | 220 V | A | 200 | 200 | 300 | 300 | 550 | 800 | – |
|  | ≤ 72 V | A | 200 | 200 | 300 | 300 | 550 | 800 | – |
| | 110 V | A | 200 | 200 | 300 | 300 | 550 | 800 | – |
| | 220 V | A | 200 | 200 | 300 | 300 | 550 | 800 | – |
| | 440 V | A | – | – | 210 | 210 | 450 | 650 | – |
| | 600 V | A | – | – | – | – | 450 | 650 | – |
|  | ≤ 72 V | A | 200 | 200 | 300 | 300 | 550 | 800 | – |
| | 110 V | A | 200 | 200 | 300 | 300 | 550 | 800 | – |
| | 220 V | A | 200 | 200 | 300 | 300 | 550 | 800 | – |
| | 440 V | A | 200 | 200 | 260 | 300 | 450 | 650 | – |
| | 600 V | A | – | – | 260 | 300 | 450 | 650 | – |
| Utilization category DC-3, L/R ≤ 2 ms | | | | | | | | | |
| | ≤ 72 V | A | 120 | 145 | 210 | 210 | 370 | 550 | – |
|  | ≤ 72 V | A | 135 | 145 | 210 | 210 | 450 | 650 | – |
| | 110 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 220 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
|  | ≤ 72 V | A | 135 | 145 | 210 | 210 | 450 | 650 | – |
| | 110 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 220 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 440 V | A | – | – | 210 | 210 | 450 | 650 | – |
| | 600 V | A | – | – | – | – | 450 | 650 | – |
|  | ≤ 72 V | A | 135 | 145 | 210 | 210 | 450 | 650 | – |
| | 110 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 220 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 440 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 600 V | A | – | – | 170 | 210 | 450 | 650 | – |
| Utilization category DC-5, L/R ≤ 7.5 ms | | | | | | | | | |
|  | ≤ 72 V | A | 135 | 145 | 210 | 210 | 450 | 650 | – |
| | 110 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 220 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
|  | ≤ 72 V | A | 135 | 145 | 210 | 210 | 450 | 650 | – |
| | 110 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 220 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 440 V | A | – | – | 210 | 210 | 450 | 650 | – |
| | 600 V | A | – | – | – | – | 450 | 650 | – |
|  | ≤ 72 V | A | 135 | 145 | 210 | 210 | 450 | 650 | – |
| | 110 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 220 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 440 V | A | 135 | 135 | 210 | 210 | 450 | 650 | – |
| | 600 V | A | – | – | 170 | 210 | 450 | 650 | – |

# IEC Technical data
## 3-pole contactors
## Electrical durability and utilization categories

### General
Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.
If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:
- Categories AC-1 and AC-3: Ic = Ie
- Category AC-2: Ic = 2.5 x Ie
- Category AC-4: Ic = 6 x Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.
On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current Ic.
Electrical durability is expressed in millions of operating cycles.

### Curve utilization mode
**Electrical durability forecast and contactor selection for categories AC-1, AC-2, AC-3 or AC-4**
- Note the characteristics of the load to be controlled:
- Operational voltage ..... Ue
- Current normally drawn ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents").
- Utilization category ..... AC-1, AC-2, AC-3 or AC-4
- Breaking current ..... Ic = Ie for AC-1 and for AC-3 ; Ic = 2.5 x Ie for AC-2 ; Ic = 6 x Ie for AC-4
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (Ic ; N).

**Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 (Ic = Ie) type switching off while "motor running" and, occasionally, AC-4 (Ic = 6 x Ie) type switching off while "motor accelerating"**
- Note the characteristics of the motor to be controlled:
- Operational voltage ..... Ue
- Current normally drawn while "motor running" ..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents")
- Breaking current for AC-3 ..... Ic = Ie
- Breaking current for AC-4 while "motor accelerating" ..... Ic = 6 x Ie
- Percentage of AC-4 operating cycles ..... K (on the basis of the total number of operating cycles)
- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (Ue / Ie) on Main pole utilization characteristic table (see “Technical data”).
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
- The number of operating cycles A for Ic = Ie (AC-3)
- The number of operating cycles B for Ic = 6 x Ie (AC-4)
- Calculate the estimated number of cycles N’ (N’ is always below A)

$$N' = \frac{A}{1 + 0.01\,K\,(A/B - 1)}$$

- If N' is too low in relation to the target N, calculate the estimated number of cycles for a higher contactor rating.

**Case of uninterrupted duty**
For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).
The combinated effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

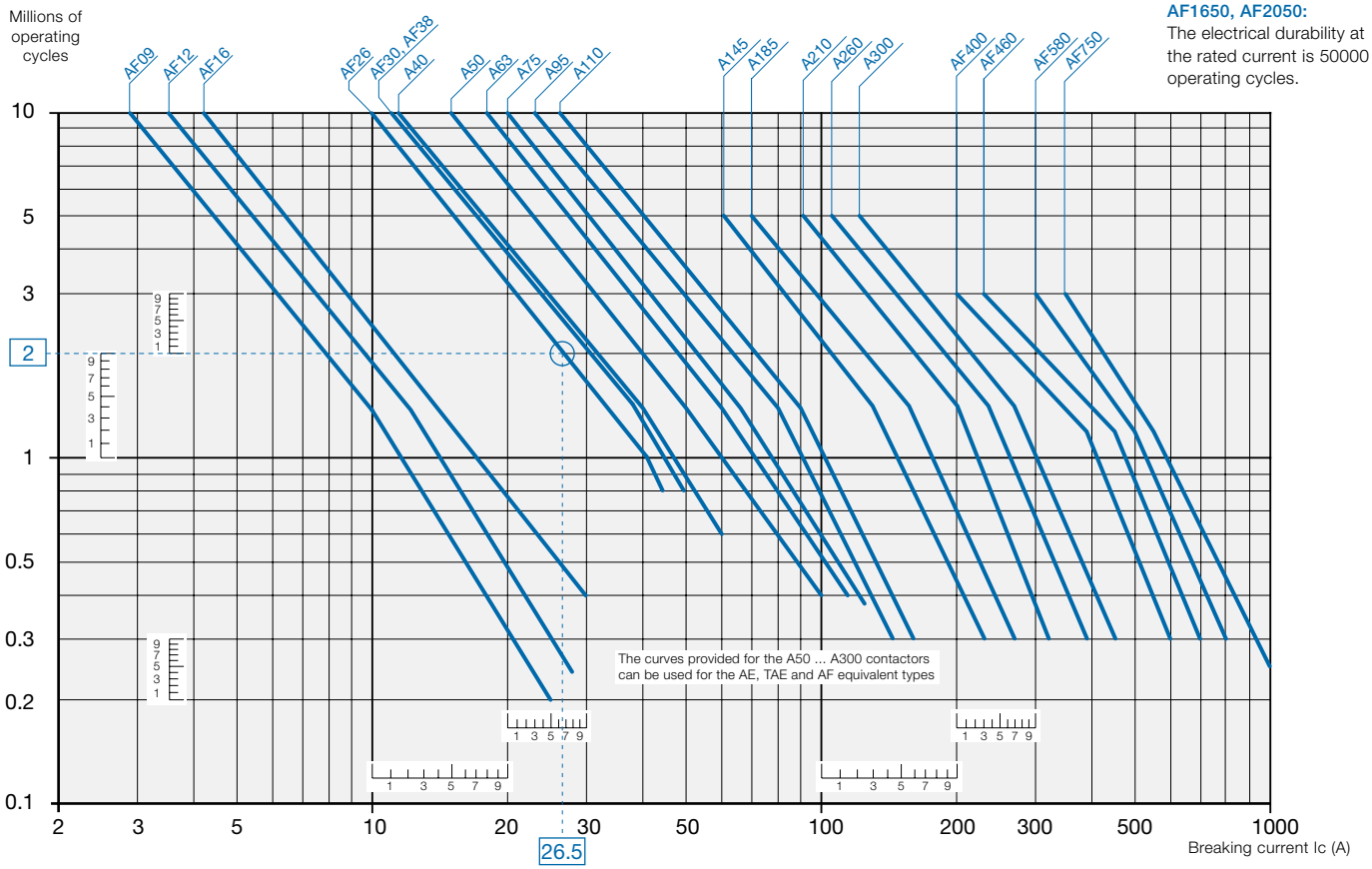
# IEC Technical data
## 3-pole contactors
## Electrical durability (AC-1)

**Electrical durability for AC-1 utilization category - Ue ≤ 690 V**
**Ambient temperature ≤ 60 °C for AF09(Z)...AF38(Z), ≤ 55 °C for A40 ... AF2050**

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

Maximum electrical switching frequency: see "Technical data".

**AF1250, AF1350, AF1650, AF2050:**
The electrical durability at the rated current is 50000 operating cycles.

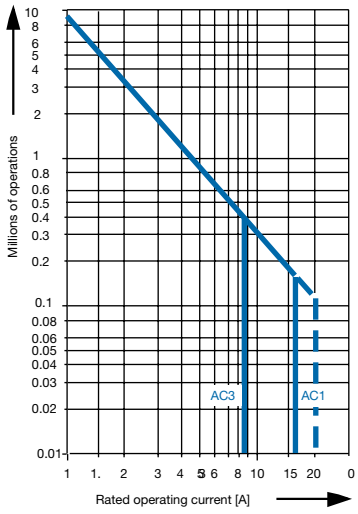



**Example:**

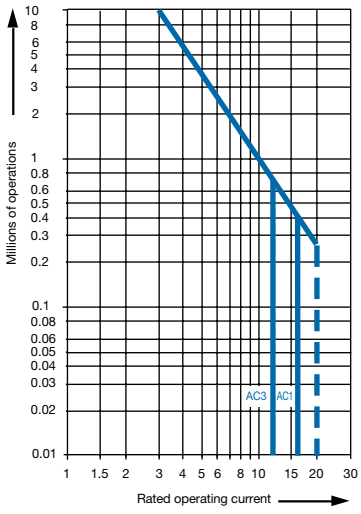
Ic / AC-1 = 26.5 A – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AF26 contactor at intersection "O" (26.5 A / 2 millions operating cycles).

Endurance curves – B 6, BC 6, B 6S



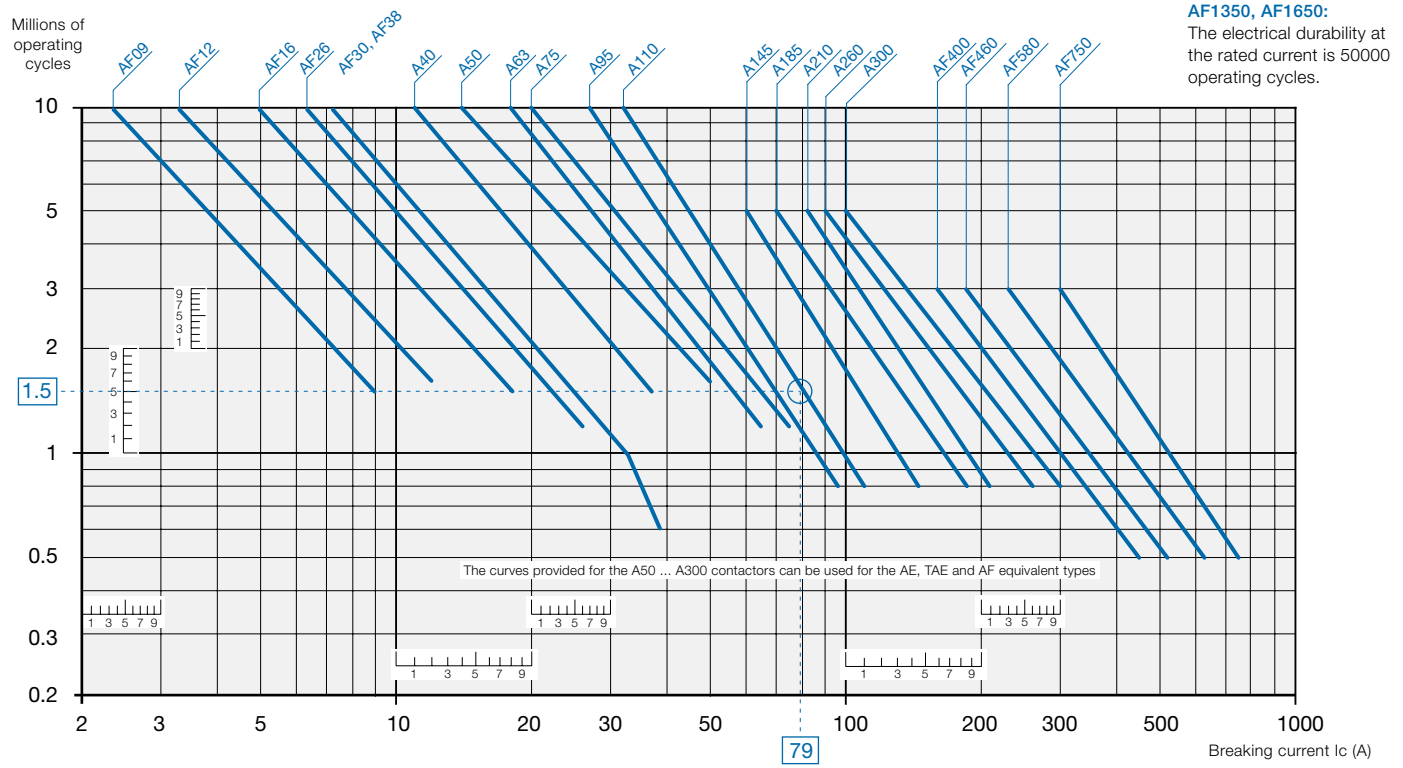

Endurance curves – B 7, BC 7, B 7S



# IEC Technical data
## 3-pole contactors
## Electrical durability (AC-3)

**Electrical durability for AC-3 utilization category - Ue ≤ 440 V**
**Ambient temperature ≤ 60 °C for AF09(Z)...AF38(Z), ≤ 55 °C for A40 ... AF1650**

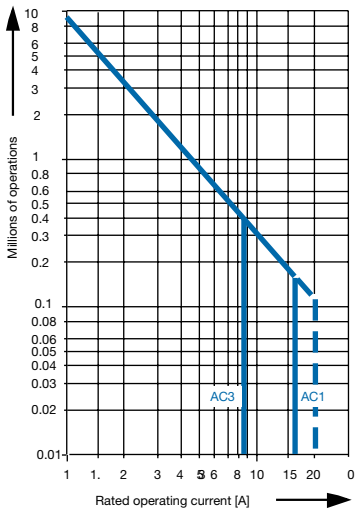
Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current). Maximum electrical switching frequency: see "Technical data".



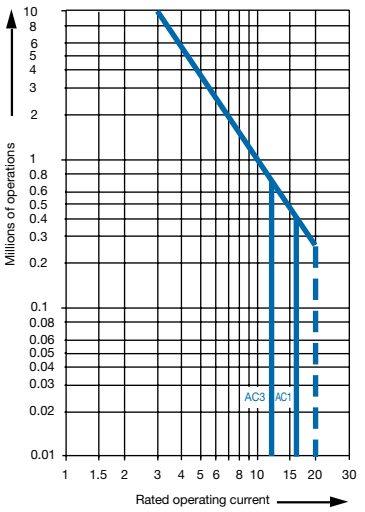

**Example:**

Motor power 40 kW for AC-3 - Ue = 400 V and Ie = 79 A utilization – Electrical durability required = 1.5 million operating cycles. For AC-3: Ic = Ie. Select the A110 contactor at intersection "O" (79 A / 1.5 million operating cycles) on the curves (AC-3 - Ue ≤ 440 V).

Endurance curves – B 6, BC 6, B 6S



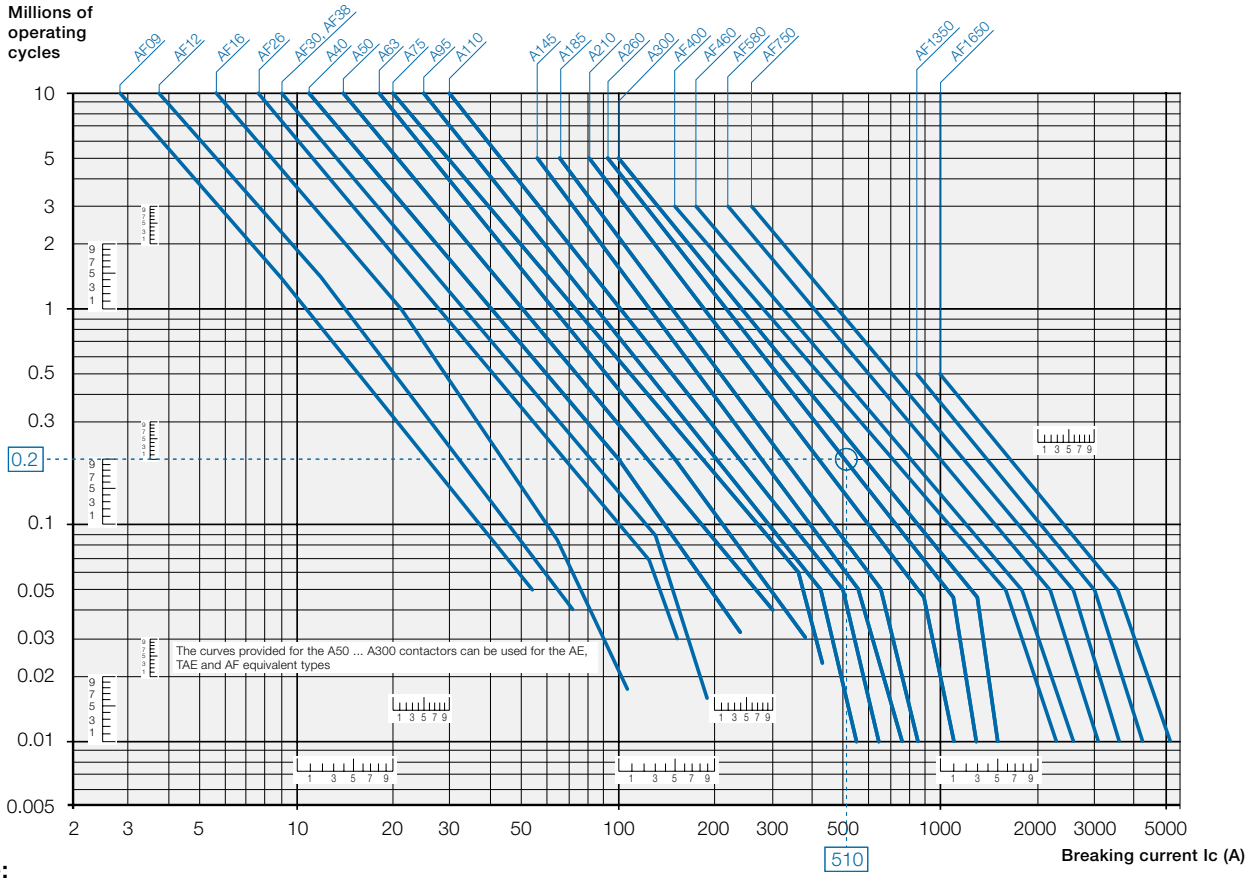

Endurance curves – B 7, BC 7, B 7S



# IEC Technical data
## 3-pole contactors
## Electrical durability (AC-2, AC-4)

**Electrical durability for AC-2 or AC-4 utilization category - Ue < 440 V**
**Ambient temperature ≤ 60 °C for AF09(Z)...AF38(Z), ≤ 55 °C for A40 ... AF1650**

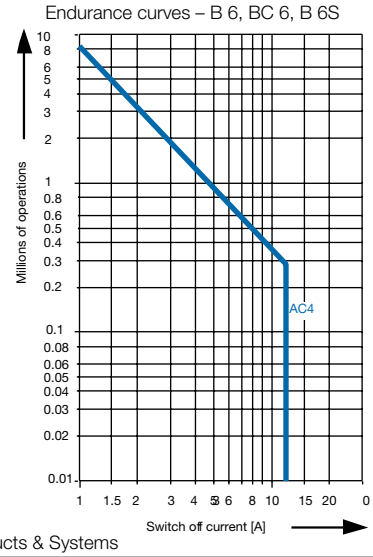
Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x Ie for AC-2 and 6 x Ie for AC-4, keeping in mind that Ie is the motor rated operational current (Ie = motor full-load current).
Maximum electrical switching frequency: see "Technical data".



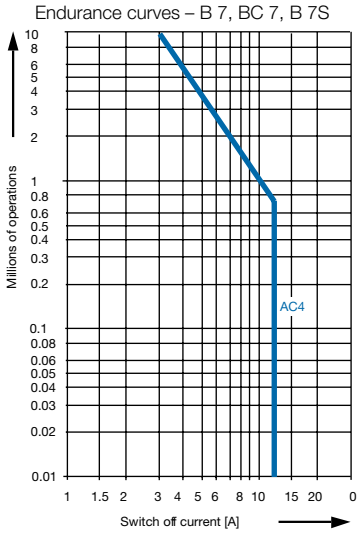

**Example:**

Motor power 45 kW for AC-4 - Ue = 400 V and Ie = 85 A utilization – Electrical durability required = 0.2 million operating cycles.
For AC-4: Ic = 6 x Ie = 510 A - Select the A260 contactor at intersection "○" (510 A / 0.2 million operating cycles) on the curves (AC-4 - Ue ≤ 440 V).

Endurance curves – B 6, BC 6, B 6S




Endurance curves – B 7, BC 7, B 7S



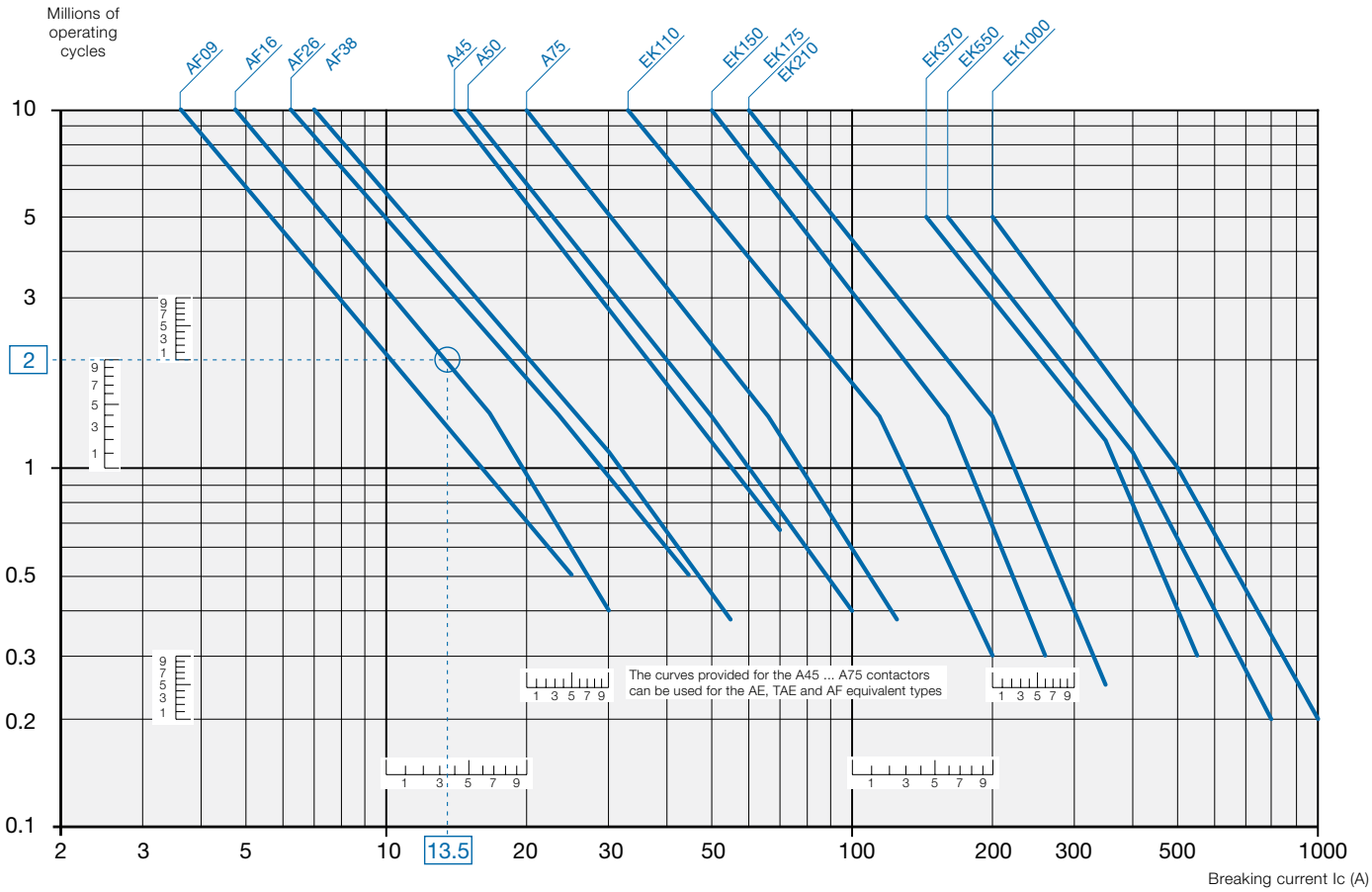
# IEC Technical data
## 4-pole contactors
## Electrical durability (AC-1)

**Electrical durability for AC-1 utilization category - Ue ≤ 690 V**
**Ambient temperature ≤ 60 °C for AF09 ... AF38, ≤ 55 °C for A45 ... EK1000**

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

Maximum electrical switching frequency: see "Technical data".

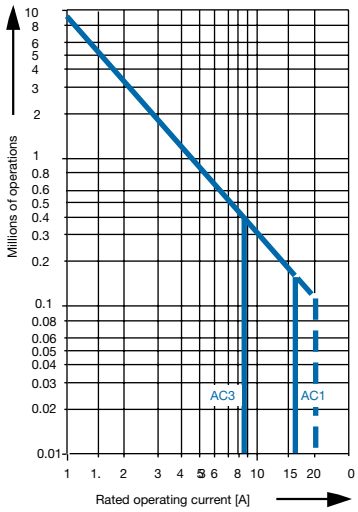
**Example:**



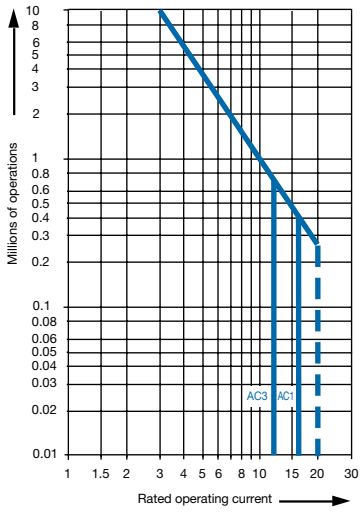

$I_c$ / AC-1 = 13.5 A – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AF16 contactor at intersection "O" (13.5 A / 2 millions operating cycles).

Endurance curves – B 6, BC 6, B 6S




Endurance curves – B 7, BC 7, B 7S

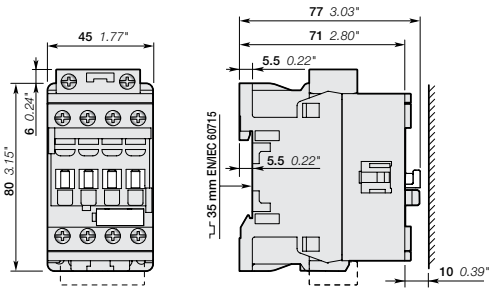


# Approximate dimensions

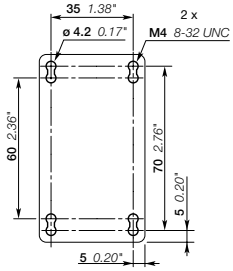
## AF09/Z...AF16/Z, AF09N00/Z...AF16N0/Z, 3-pole contactors

**Note: Approximate dimensions for AF09 & AF16 apply to AF NEMA Sz. 00 & 0. AF09...AF16 dimensions apply to AF..Z type.**

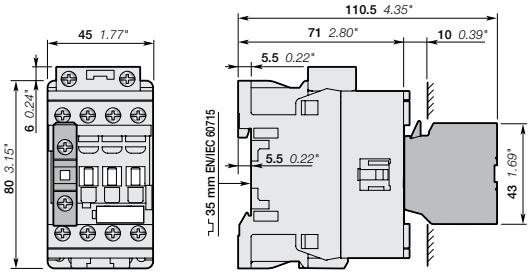
### Dimensions mm, inches



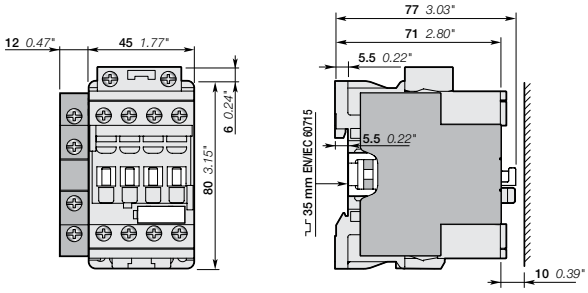

**AF09, AF12, AF16**



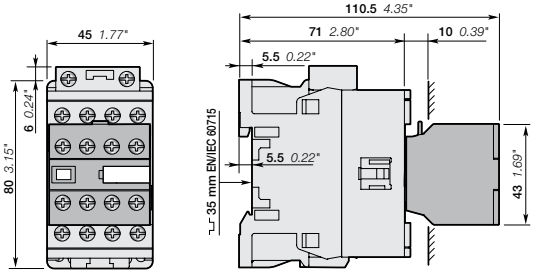

**AF09, AF12, AF16**



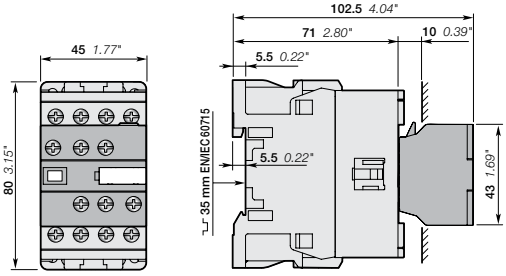

**AF09, AF12, AF16**
**+ CA4, CC4** 1-pole auxiliary contact block



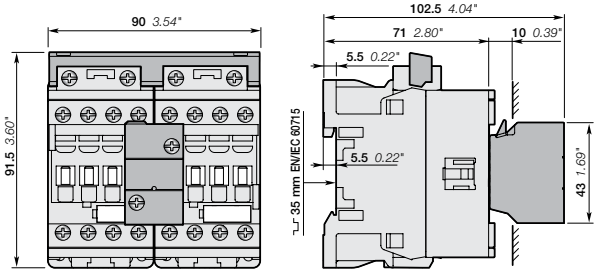

**AF09, AF12, AF16**
**+ CAL4-11** 2-pole auxiliary contact block



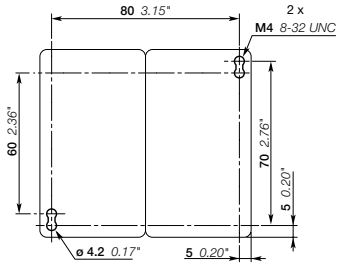

**AF09, AF12, AF16**
**+ CA4** 4-pole auxiliary contact block




**AF09, AF12, AF16**
**+ CAT4** 2-pole auxiliary contact and coil terminal block




**AF09, AF12, AF16**
**+ VEM4** mechanical and electrical interlock set




**AF09, AF12, AF16**
**+ VEM4** mechanical and electrical interlock set

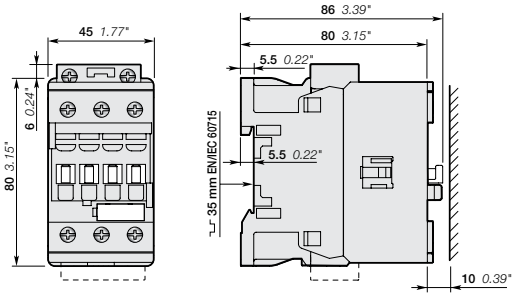
Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

# Approximate dimensions

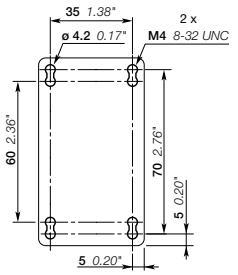
## AF09/Z...AF16/Z, AF09N00/Z...AF16N0/Z, 3-pole contactors

**Note: Approximate dimensions for AF26 apply to AF NEMA Sz. 1. AF26...AF38 dimensions apply to AF..Z type.**

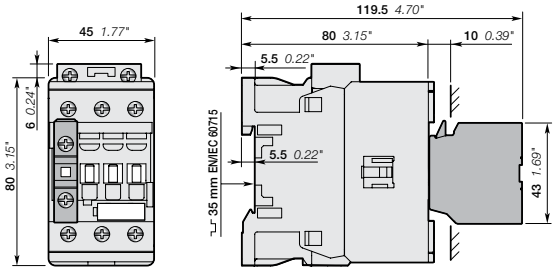
### Dimensions mm, *inches*



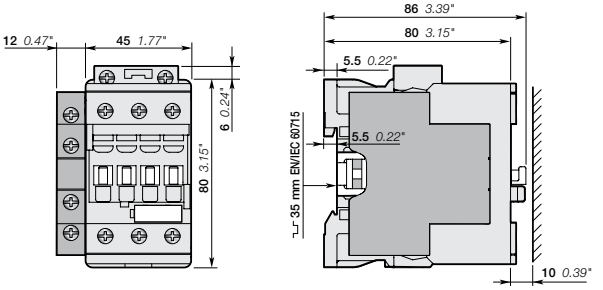

**AF26, AF30, AF38**



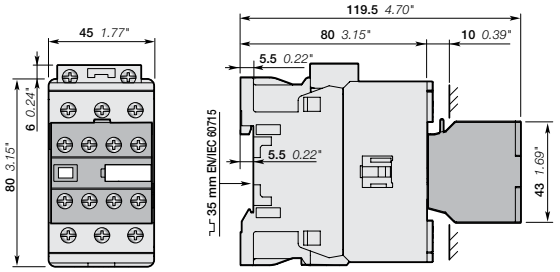

**AF26, AF30, AF38**



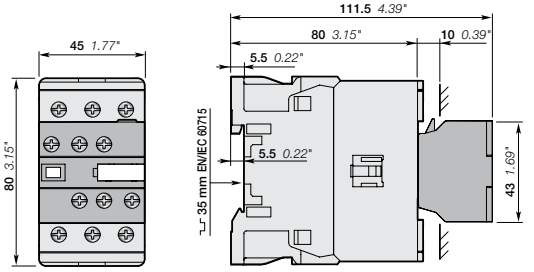

**AF26, AF30, AF38**
**+ CA4, CC4** 1-pole auxiliary contact block



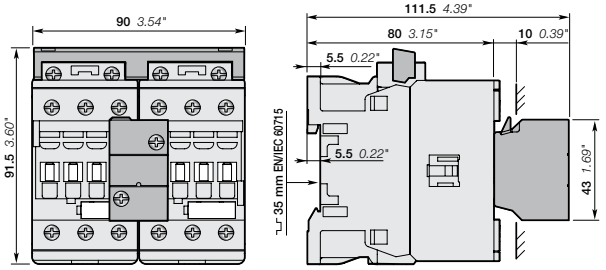

**AF26, AF30, AF38**
**+ CAL4-11** 2-pole auxiliary contact block



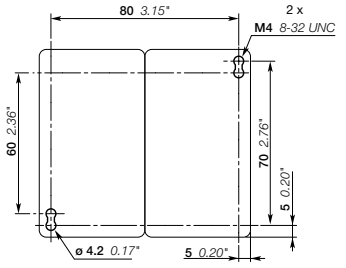

**AF26, AF30, AF380**
**+ CA4** 4-pole auxiliary contact block




**AF26, AF30, AF38**
**+ CAT4** 2-pole auxiliary contact and coil terminal block




**AF26, AF30, AF38**
**+ VEM4** mechanical and electrical interlock set



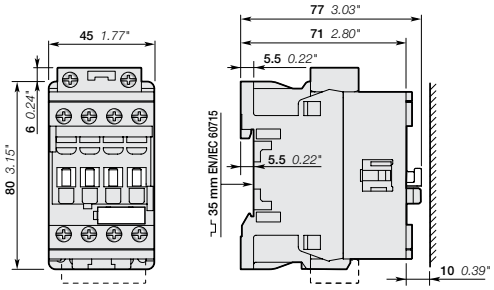

**AF26, AF30, AF38**
**+ VEM4** mechanical and electrical interlock set

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

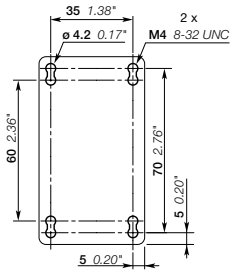
# Approximate dimensions
## AF09/Z & AF16/Z 4-pole contactors

**Note: AF09 & AF16 dimensions apply to AF..Z type.**

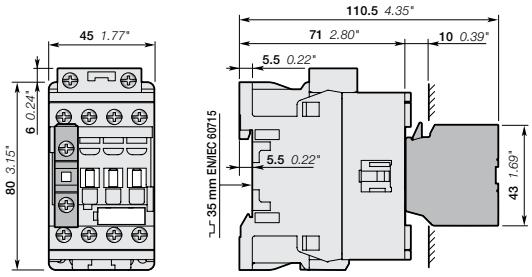
### Dimensions mm, *inches*



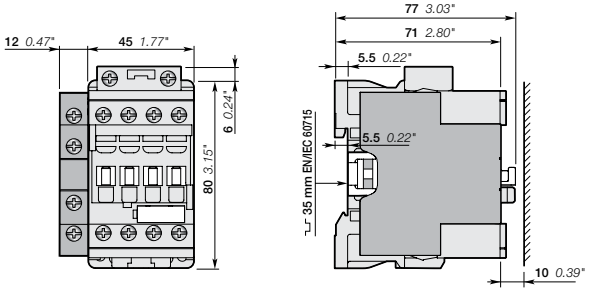

**AF09, AF16**



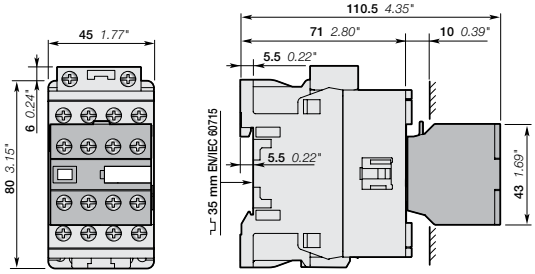

**AF09, AF16**



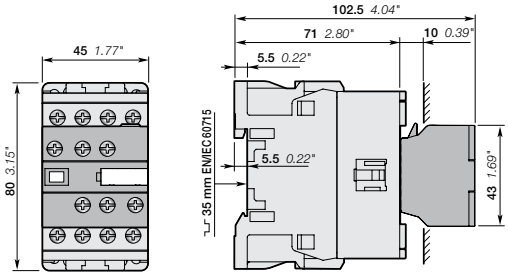

**AF09, AF16**
+ **CA4, CC4** 1-pole auxiliary contact block



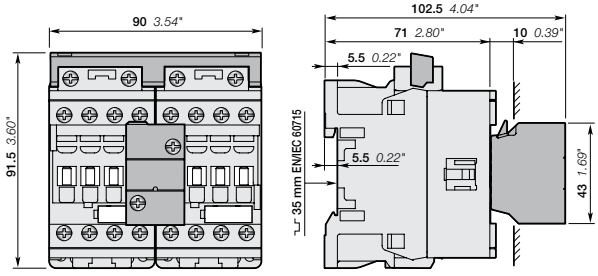

**AF09, AF16**
+ **CAL4-11** 2-pole auxiliary contact block



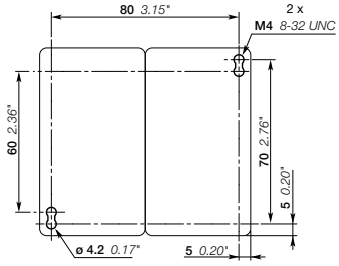

**AF09, AF16**
+ **CA4** 4-pole auxiliary contact block




**AF09, AF16**
+ **CAT4** 2-pole auxiliary contact and coil terminal block




**AF09..-40-00, AF16..-40-00**
+ **VEM4** mechanical and electrical interlock set



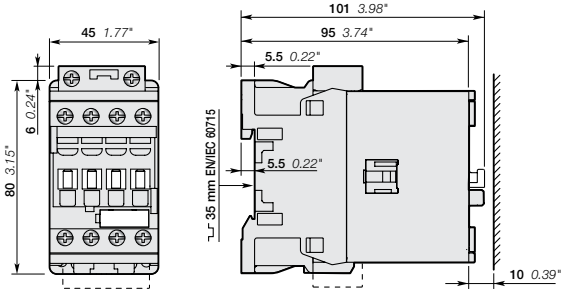

**AF09..-40-00, AF16..-40-00**
+ **VEM4** mechanical and electrical interlock set

Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

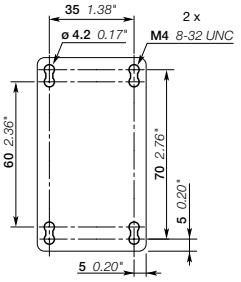
# Approximate dimensions
## AF26/Z & AF38/Z 4-pole contactors

**Note: AF26 & AF38 dimensions apply to AF..Z type.**

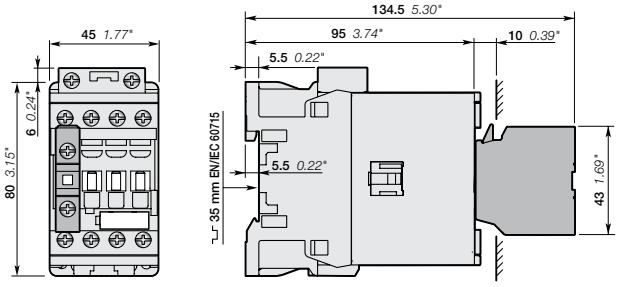
### Dimensions mm, *inches*



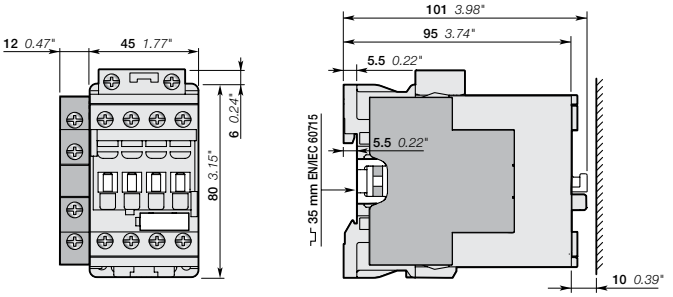

**AF26, AF38**



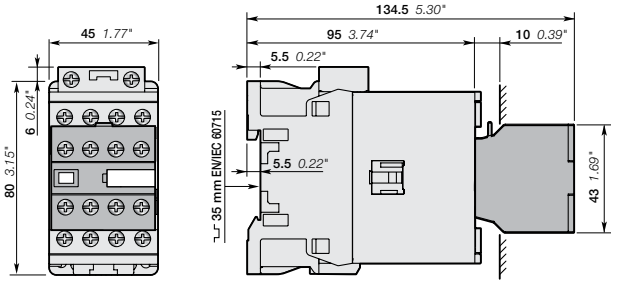

**AF26, AF38**



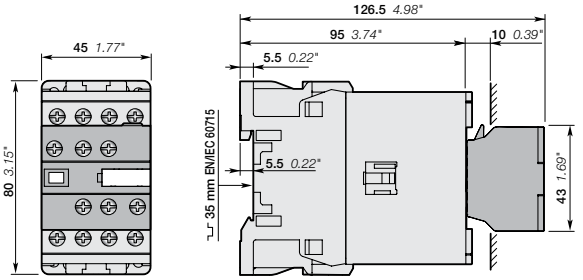

**AF26, AF38**
+ **CA4, CC4** 1-pole auxiliary contact block



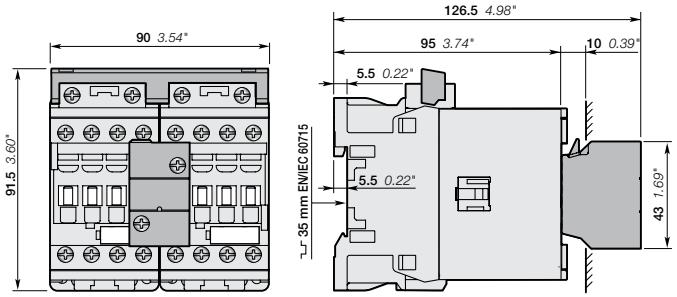

**AF26, AF38**
+ **CAL4-11** 2-pole auxiliary contact block



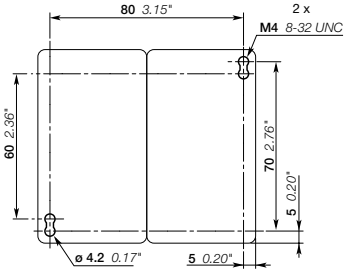

**AF26, AF38**
+ **CA4** 4-pole auxiliary contact block




**AF26, AF38**
+ **CAT4** 2-pole auxiliary contact and coil terminal block




**AF26..-40-00, AF38..-40-00**
+ **VEM4** mechanical and electrical interlock set



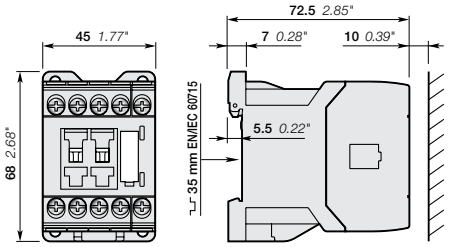

**AF26..-40-00, AF38..-40-00**
+ **VEM4** mechanical and electrical interlock set

Note: contactor lateral distance to grounded component 2 mm *0.08"* min.

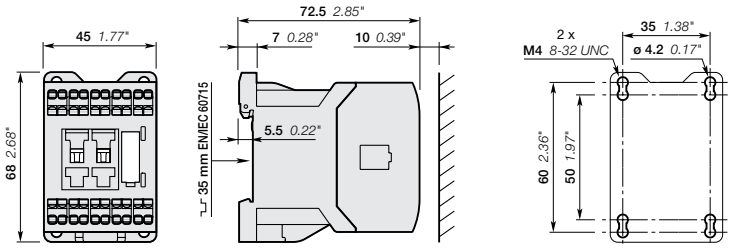
# Approximate dimensions

## AS09..S ... AS16..S 3-pole contactors w/spring terminals AC/DC operated, with screw terminals

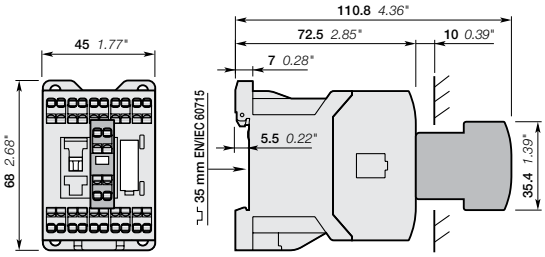
### Main dimensions mm, *inches*



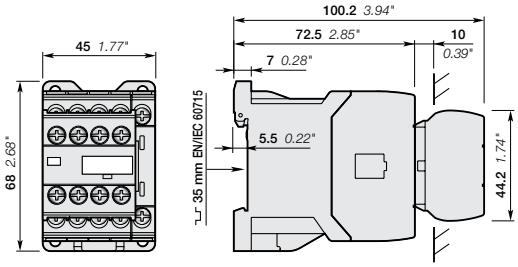

AS/L09, AS/L12, AS/L16



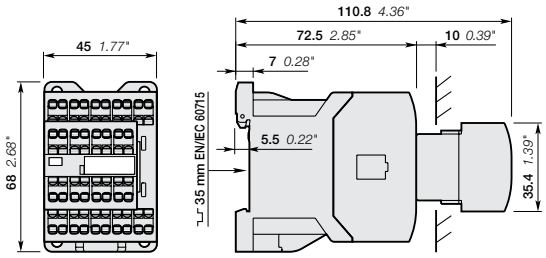

AS/L09..S, AS/L12..S, AS/L16..S



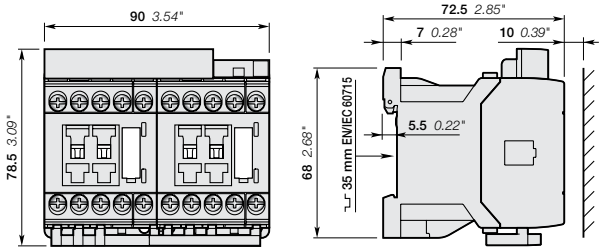

AS/L09..S, AS/L12..S, AS/L16..S
+ CA3..S front-mounted 1-pole auxiliary contact block



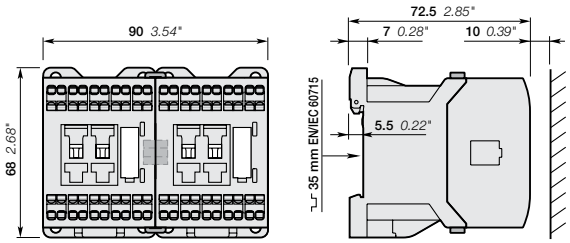

AS/L09...16-30-32




AS/L09...16-30-32S




AS/L09, AS/L12, AS/L16

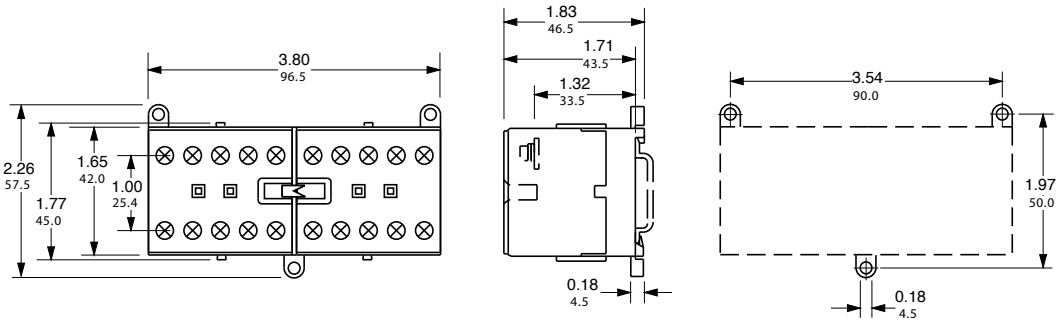



AS/L09..S, AS/L12..S, AS/L16..S
+ VM3 mechanical interlock unit including two BB3 fixing clips

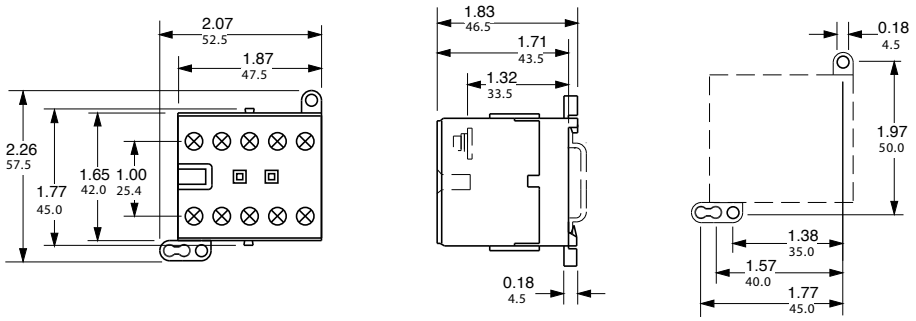
# Approximate dimensions
## B/C6...B/C7

00.00 / 00.00 Inches [Millimeters]

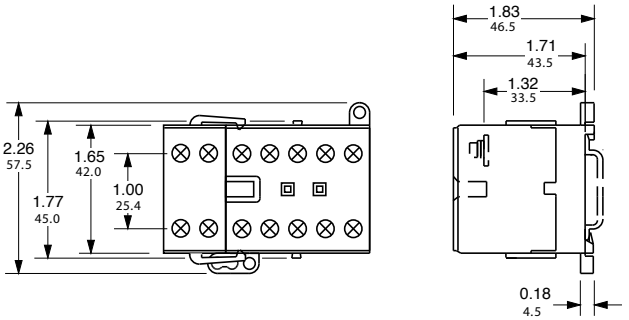
### VB/C6...VB/C7



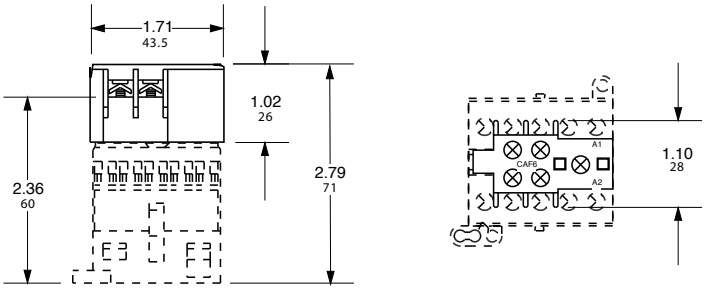

### B/C6...B/C7




### B/C6...B/C7 + CA6



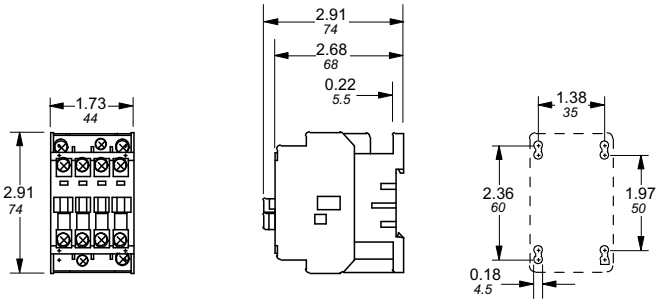

### B/C6...B/C7 + CAF6



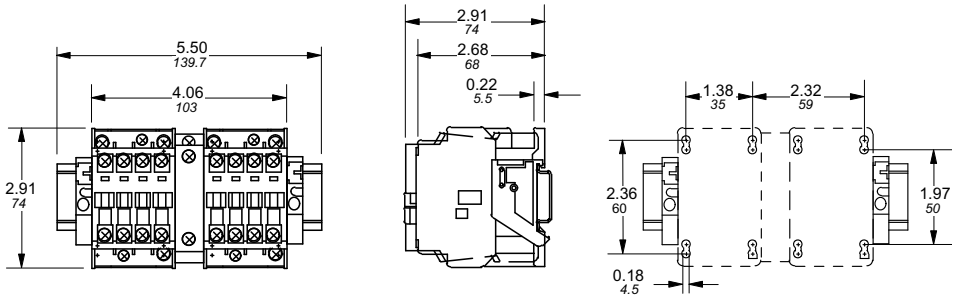
# Approximate dimensions
## A/AE9 – A/AE26, 3 pole

00.00 / 00.00 Inches [Millimeters]

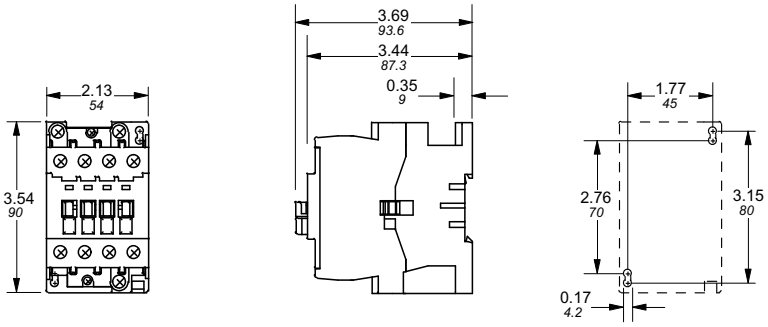
### A/AE9 – A/AE16 — Contactor, 3 pole



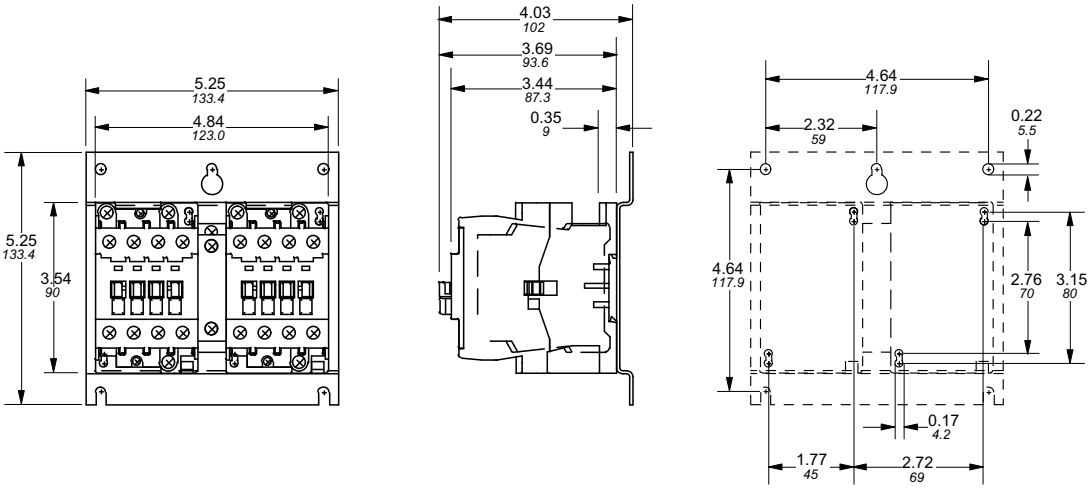

### A/AE9 – A/AE16 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole




### A/AE26 — Contactor, 3 pole



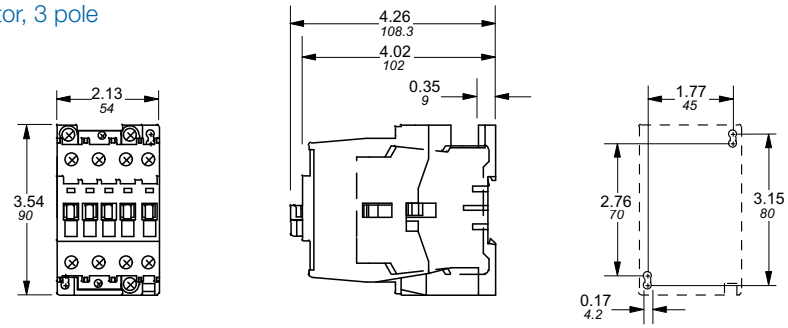

### A/AE26 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole



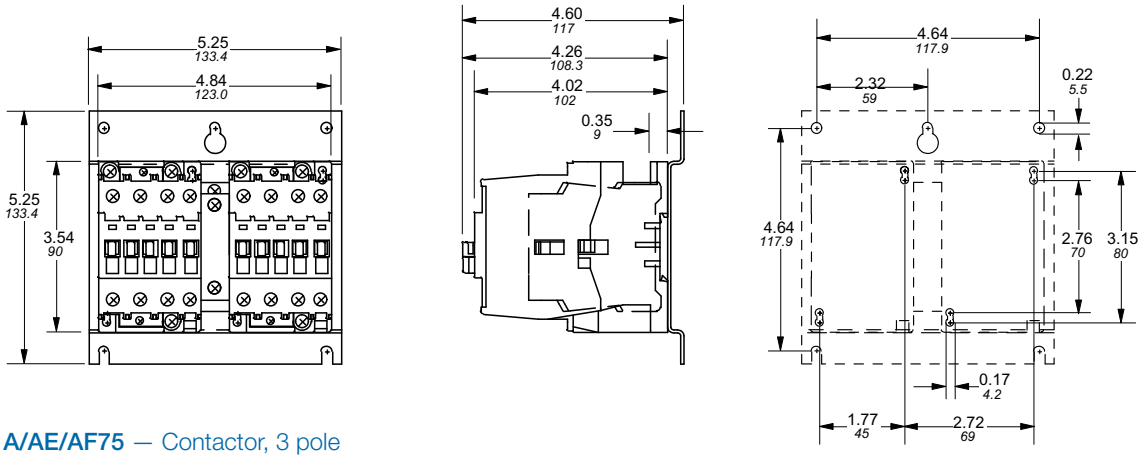
# Approximate dimensions
## A/AE30 – A/AE/AF75, 3 pole

00.00 / 00.00 Inches [Millimeters]

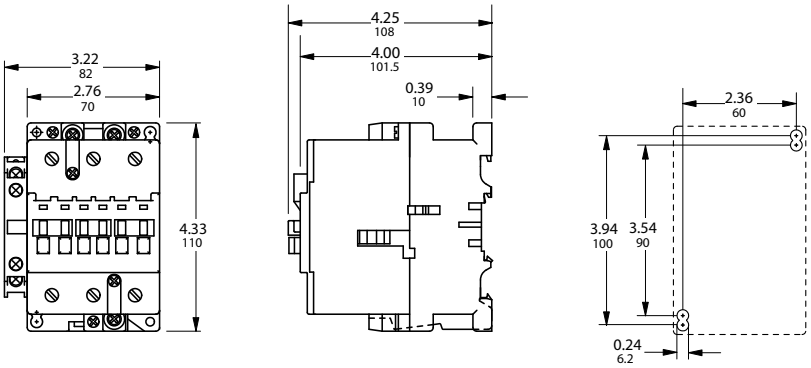
### A/AE30 & A/AE40 — Contactor, 3 pole



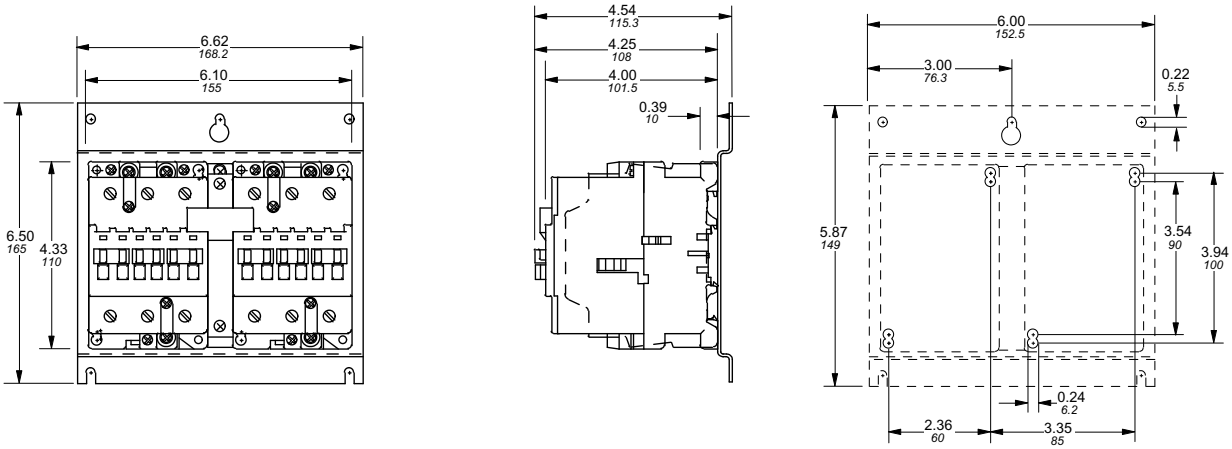

### A/AE30 & A/AE40 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole




### A/AE/AF50 – A/AE/AF75 — Contactor, 3 pole



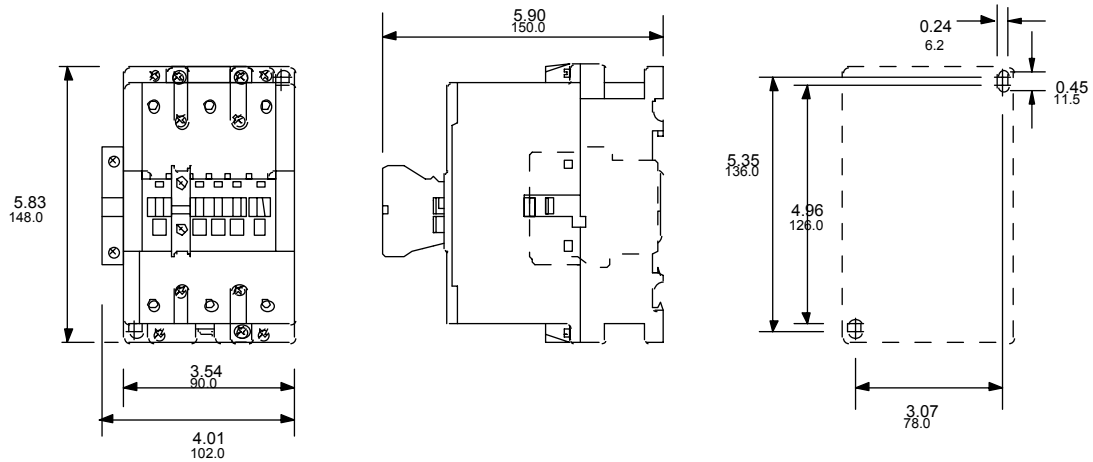

### A/AE/AF50 – A/AE/AF75 + VM5 or VE5 — Mechanically interlocked contactor, 3 pole



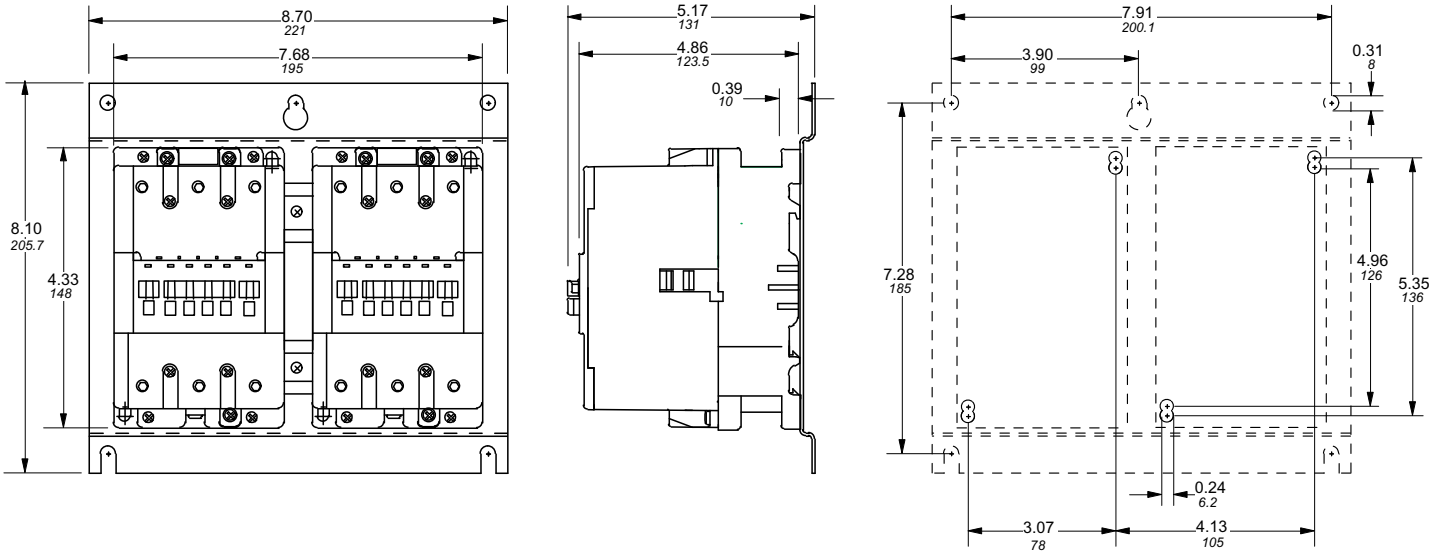
# Approximate dimensions
## A/AE/AF95 & A/AE/AF110, 3 pole

00.00 Inches
00.00 [Millimeters]

### A/AE/AF95 & A/AE/AF110 — Contactor, 3 pole



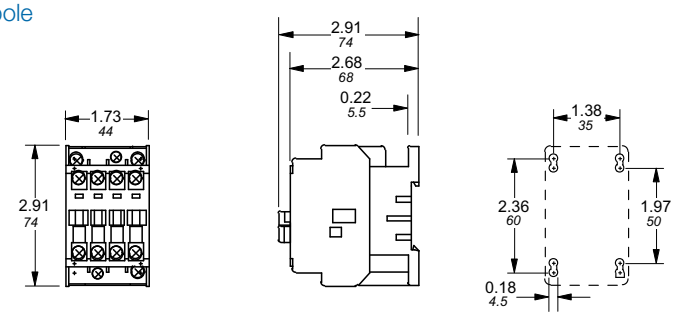

### A/AE/AF95 & A/AE/AF110 + VE5 — Mechanically interlocked contactor, 3 pole



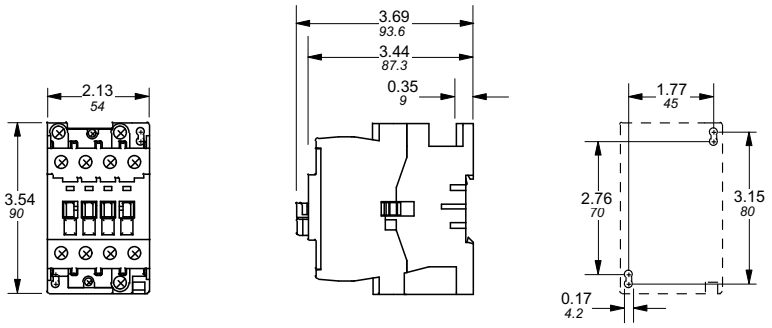
# Approximate dimensions
## A/AE9 – A/AE/AF75, 4 pole

00.00 / 00.00 Inches [Millimeters]

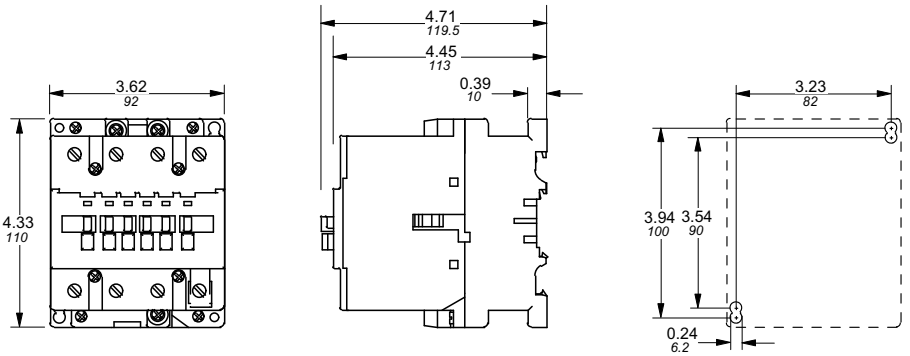
### A/AE9 – A/AE16 — Contactor, 4 pole




### A/AE26 — Contactor, 4 pole



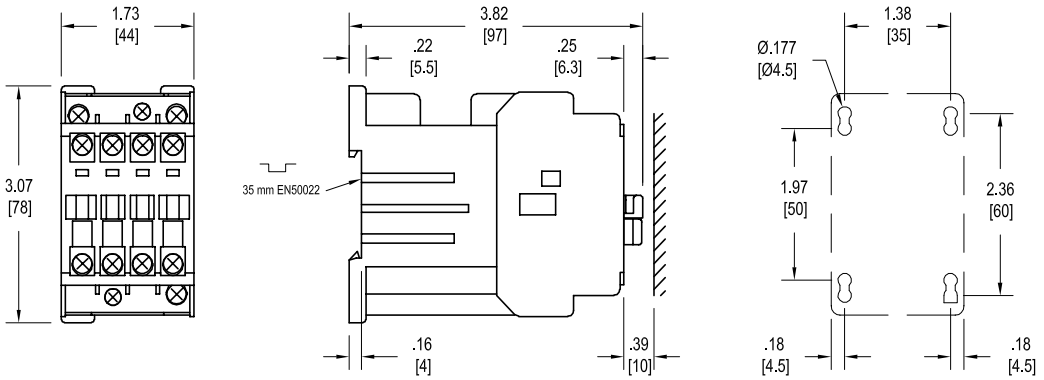

### A/AE/AF45 – A/AE/AF75 — Contactor, 4 pole



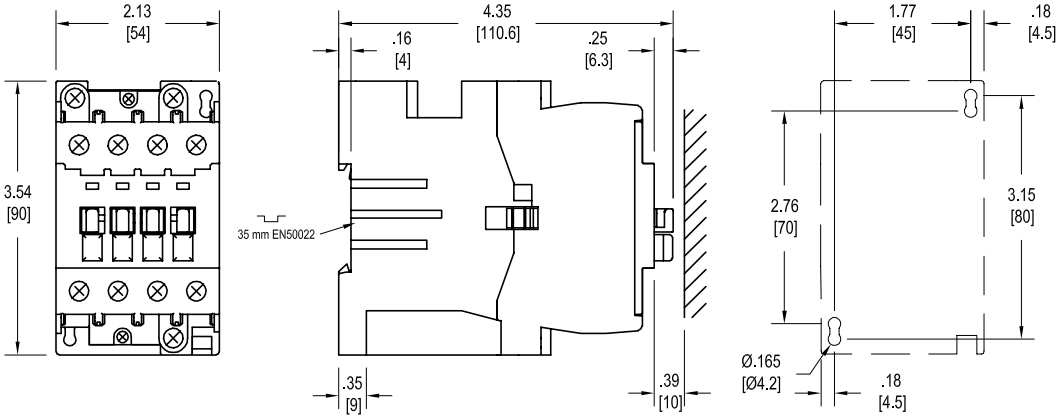
# Approximate dimensions
## AL9 – AL40, 3 & 4 pole

00.00 / 00.00 Inches [Millimeters]

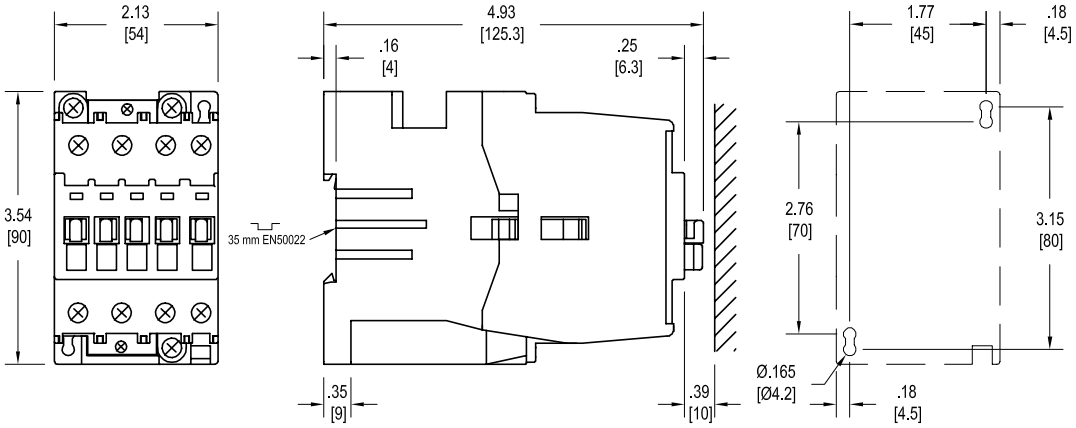
### AL9, AL12,, AL16 — Contactor, 3 & 4 pole




### AL26 — Contactor, 3 & 4 pole




### AL30, AL40 — Contactor, 3 pole

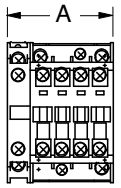


# Approximate dimensions

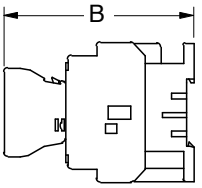
## Accessories for A/AE9 – A/AE/AF110

00.00 / 00.00 Inches [Millimeters]

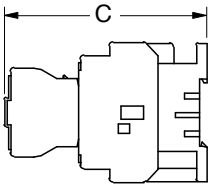
### A/AE9 – A/AE40
### A/AE/AF50 – A/AE/AF110



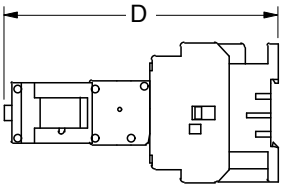

SIDE MOUNTED AUXILIARY



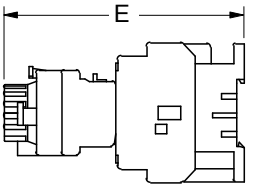

SINGLE POLE TOP MOUNTED AUXILIARY



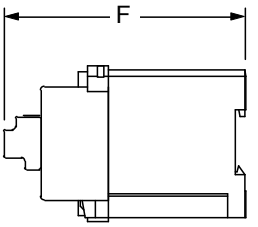

FOUR POLE TOP MOUNTED AUXILIARY




ON-POSITION LATCH




PNEUMATIC TIMER



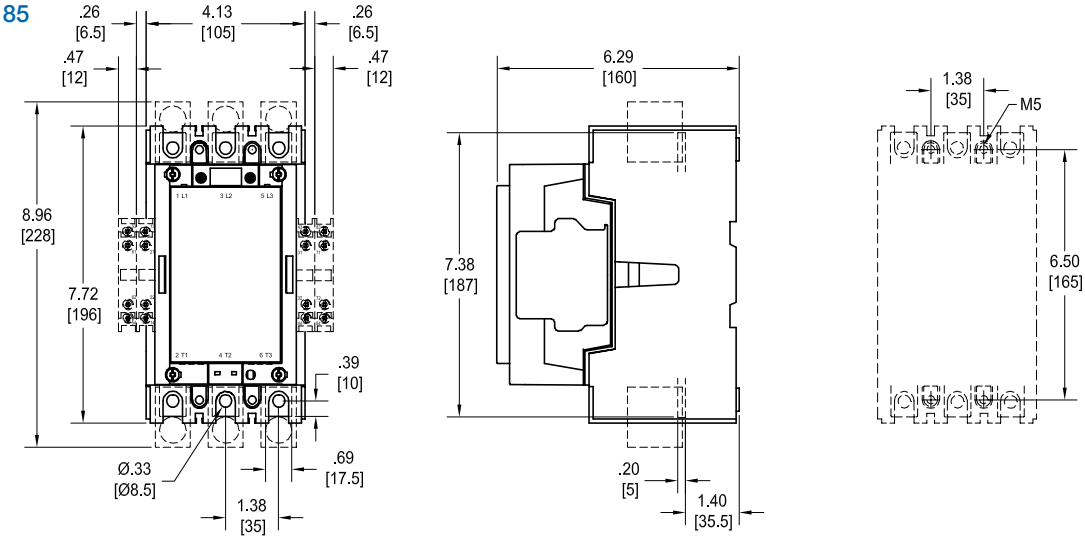

MECH INTERLOCK D.C. OPERATED

| TYPE | | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| A/AE9-16 | IN<br>MM | 2.20<br>56 | 3.96<br>100.5 | 4.21<br>107 | 5.71<br>145 | 5.00<br>127 | –<br>– |
| A/AE26 | IN<br>MM | 2.20<br>56 | 4.72<br>119.8 | 4.97<br>126.3 | 6.47<br>164.3 | 5.76<br>146.3 | –<br>– |
| A/AE30-40 | IN<br>MM | 2.20<br>56 | 5.30<br>134.5 | 5.55<br>141 | 7.05<br>179 | 6.34<br>161 | –<br>– |
| A/AE/AF50-75 | IN<br>MM | 3.23<br>82 | 5.27<br>133.9 | 5.52<br>140.3 | 7.03<br>178.5 | 6.32<br>160.4 | –<br>– |
| A/AE/AF45 | IN<br>MM | 4.09<br>104 | 5.73<br>145.5 | 5.98<br>152 | 7.48<br>190 | 6.77<br>172 | –<br>– |
| A/AE/AF95-110 | IN<br>MM | 4.02<br>102 | 5.91<br>150 | 6.16<br>156.5 | –<br>– | –<br>– | –<br>– |

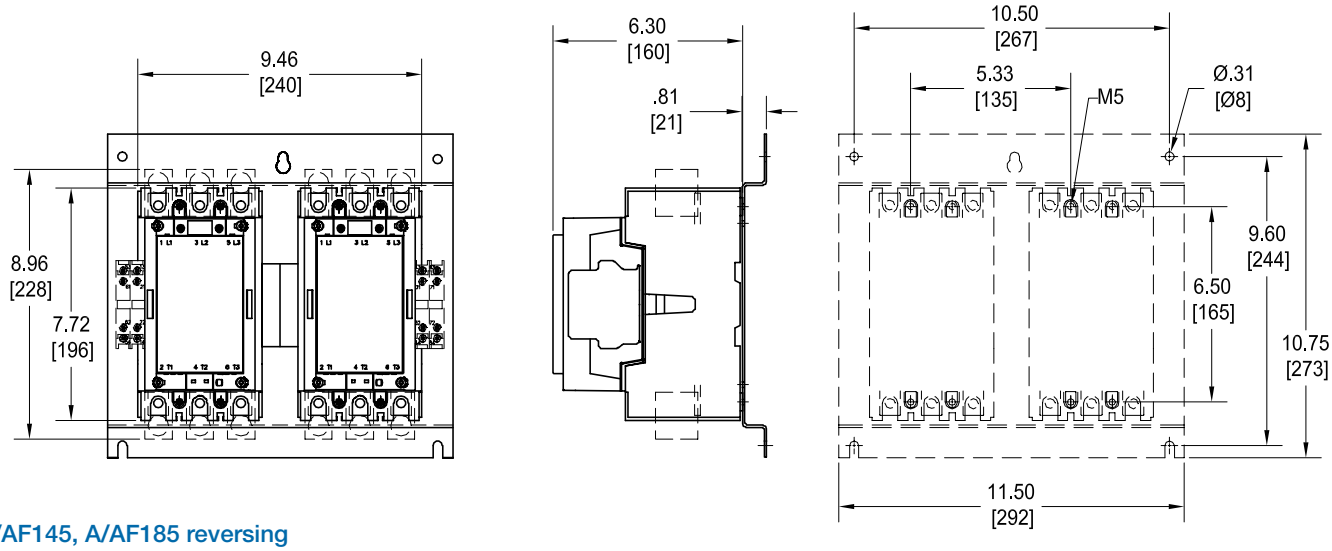
# Approximate dimensions
## A/AF145 – A/AF185

00.00 / 00.00 Inches [Millimeters]

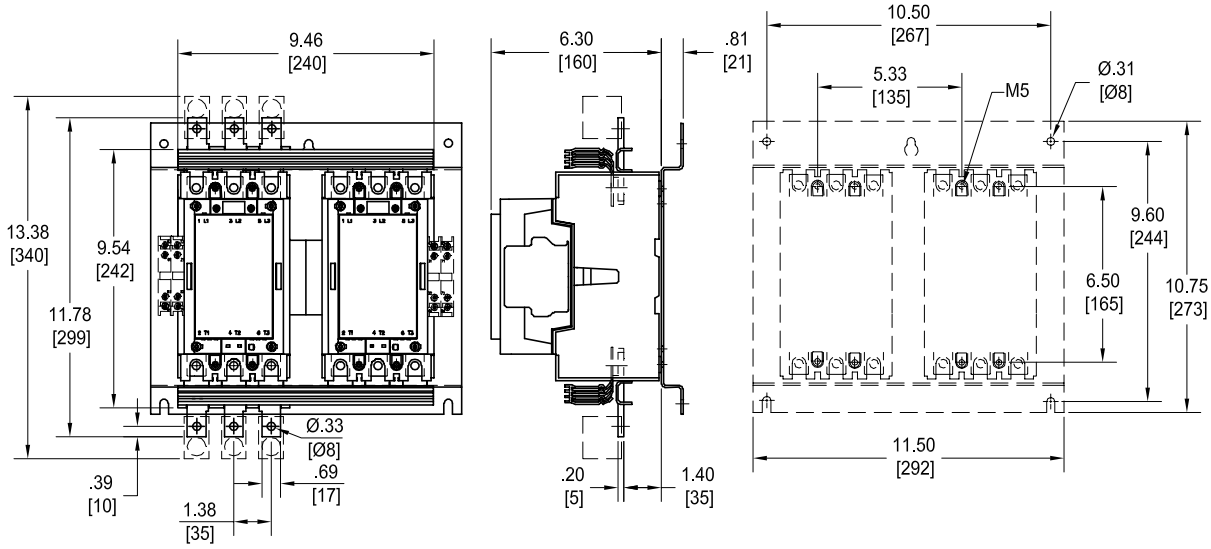
### A/AF145 & A/AF185




### A/AF145, A/AF185 with mechanical interlock



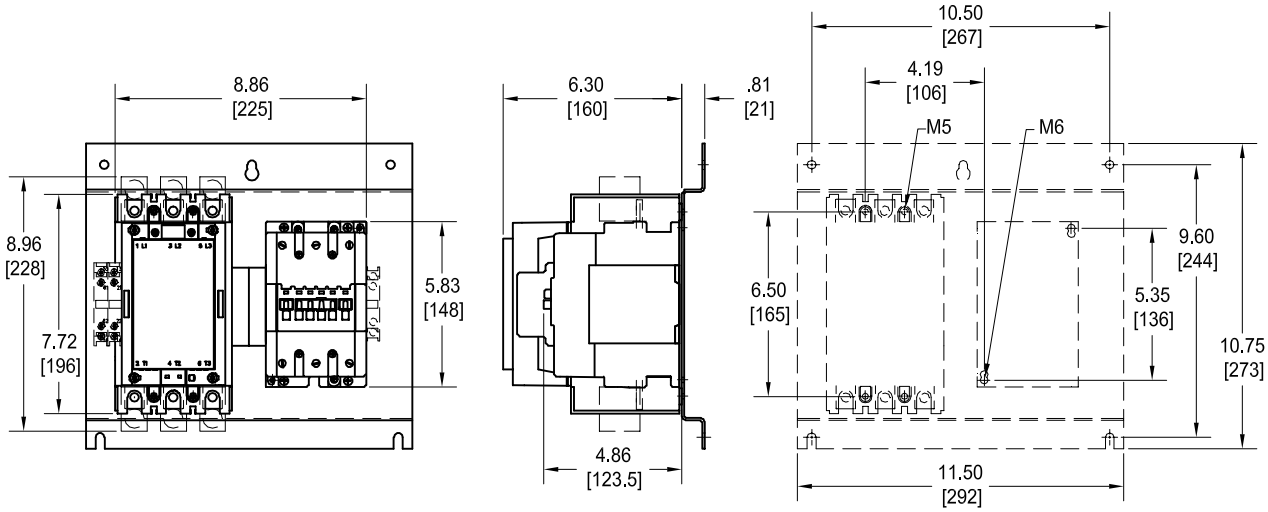

### A/AF145, A/AF185 reversing



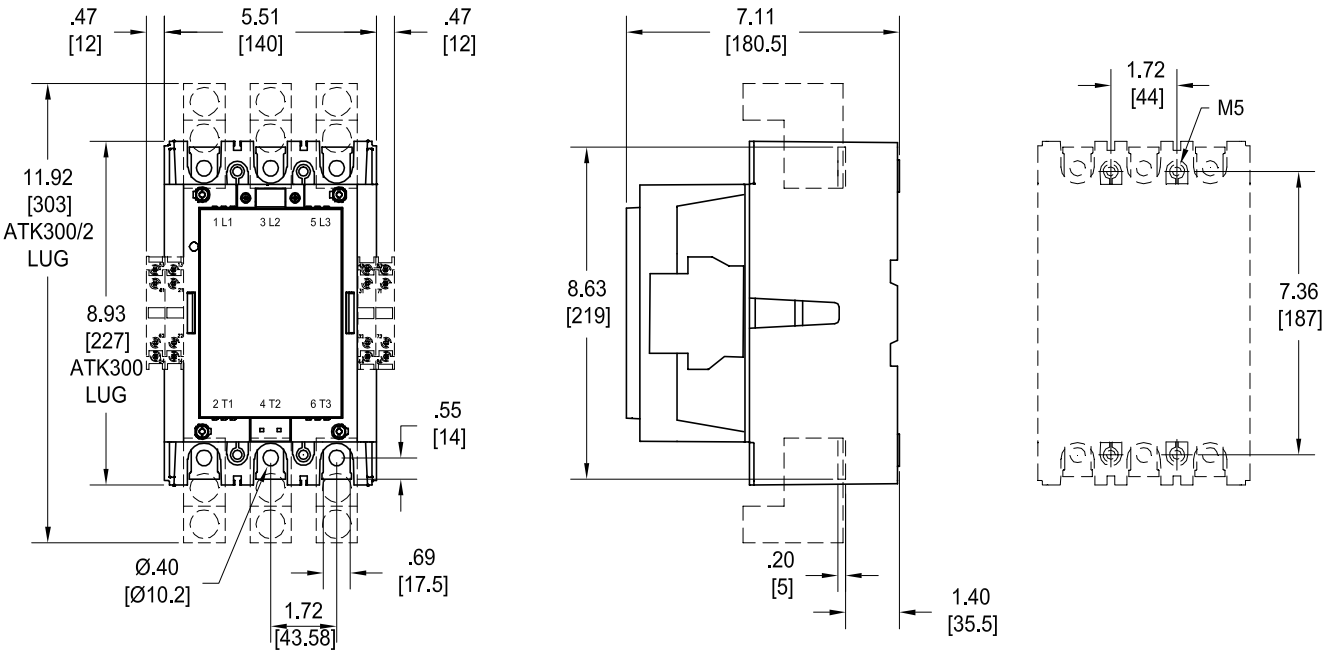
# Approximate dimensions
## A/AF145 – A/AF300

00.00 / 00.00 Inches [Millimeters]

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



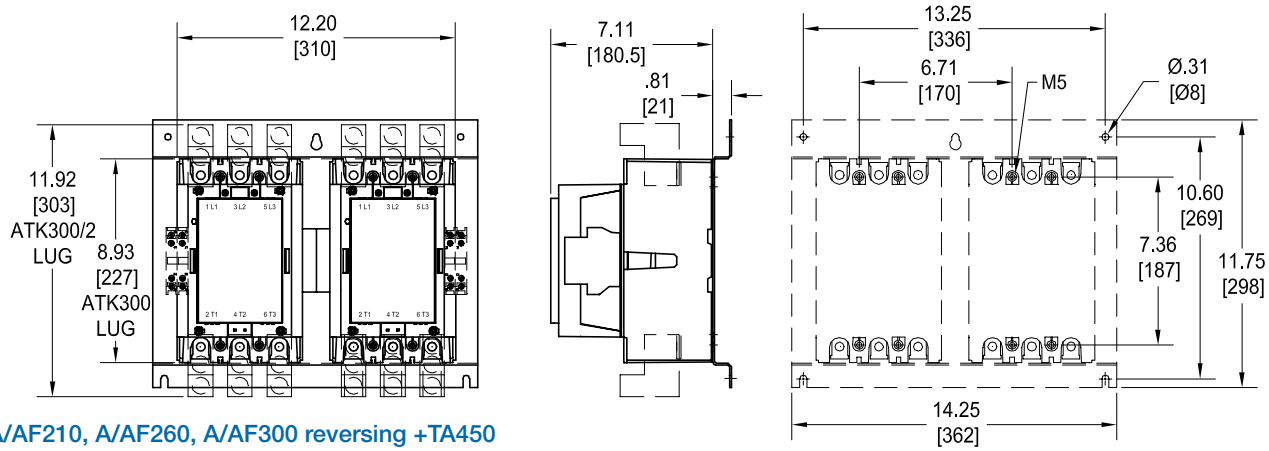

### A/AF210, A/AF260, A/AF300



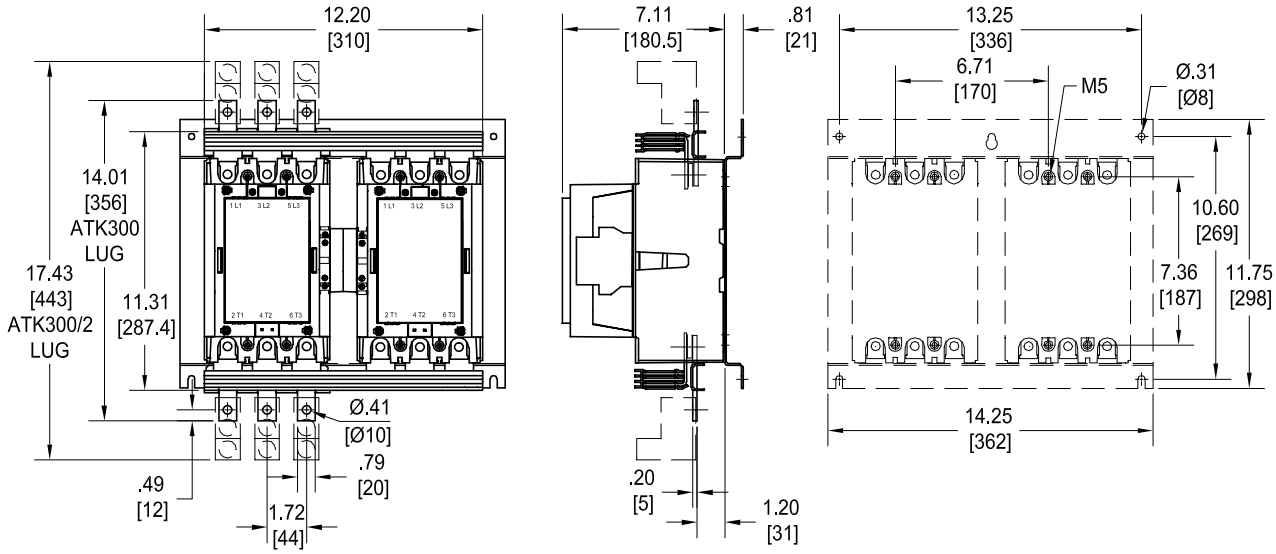
# Approximate dimensions
## A/AF210 – A/AF300

00.00 / 00.00 Inches [Millimeters]

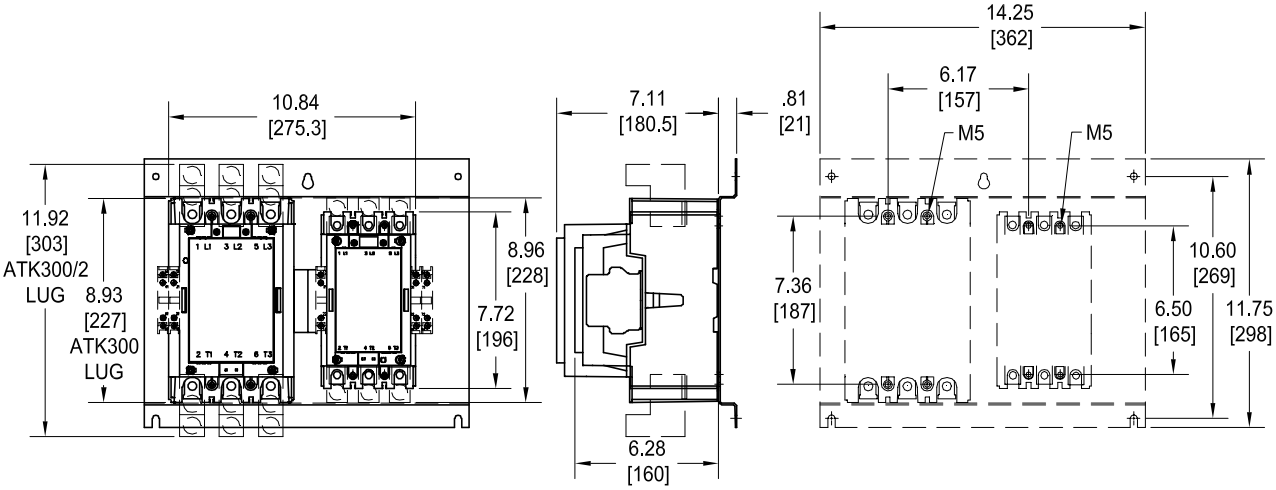
### A/AF210, A/AF260, A/AF300 with mechanical interlock




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



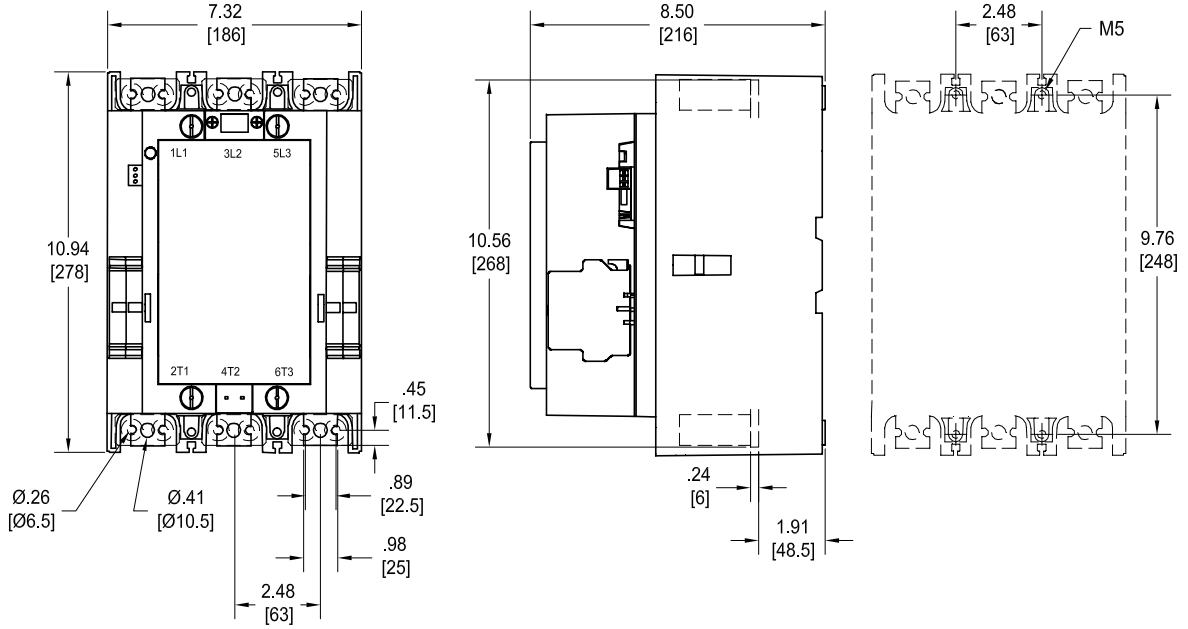

### A/AF210, A/AF145 with mechanical interlock



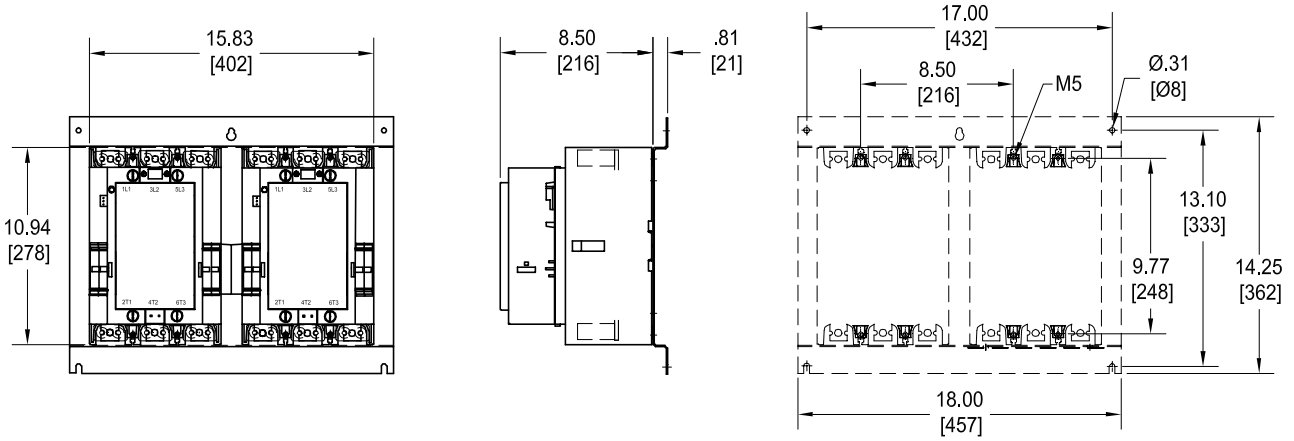
# Approximate dimensions
## AF400 – AF460

00.00 / 00.00 Inches [Millimeters]

### AF400, AF460



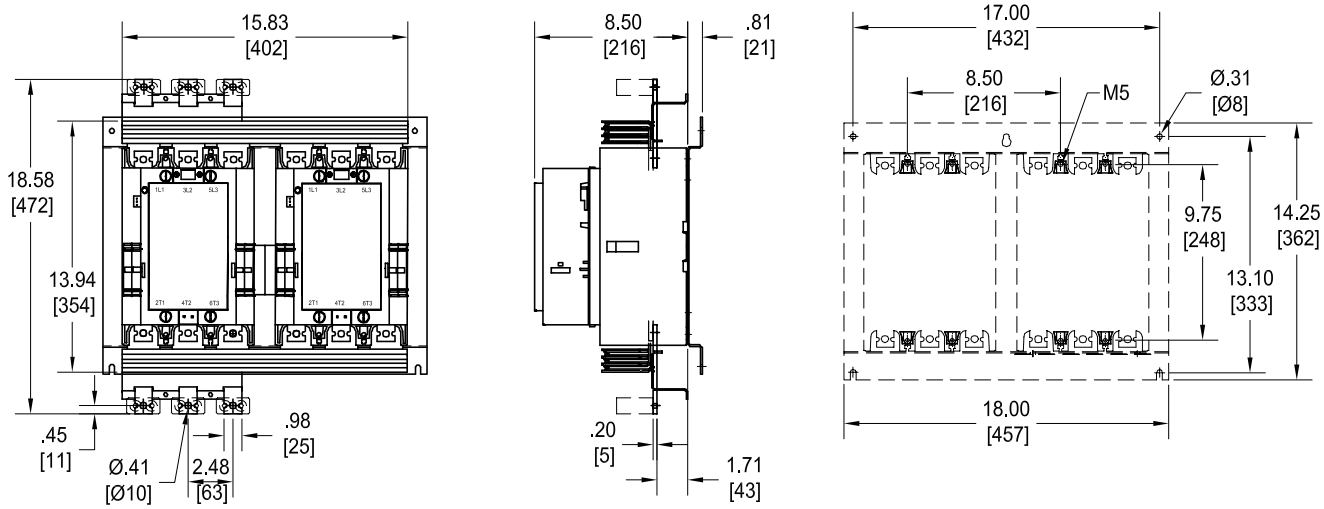

### AF400, AF460 with mechanical interlock



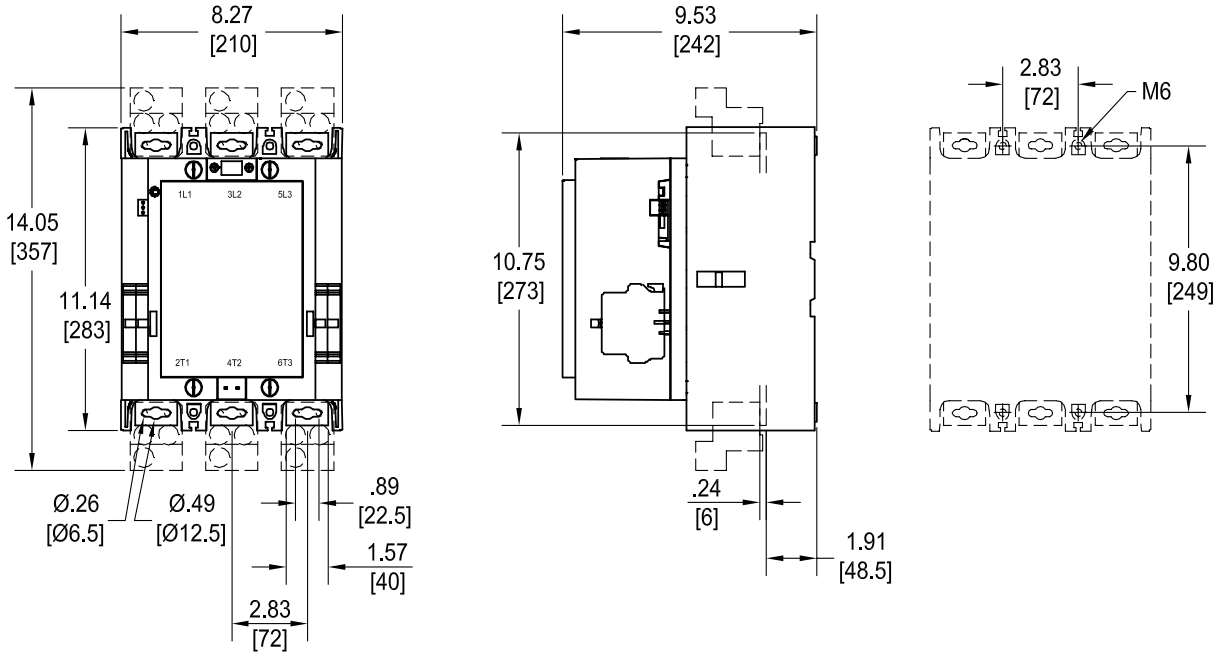
# Approximate dimensions
## AF400 – AF750

00.00 / 00.00 Inches [Millimeters]

### AF400, AF460 reversing



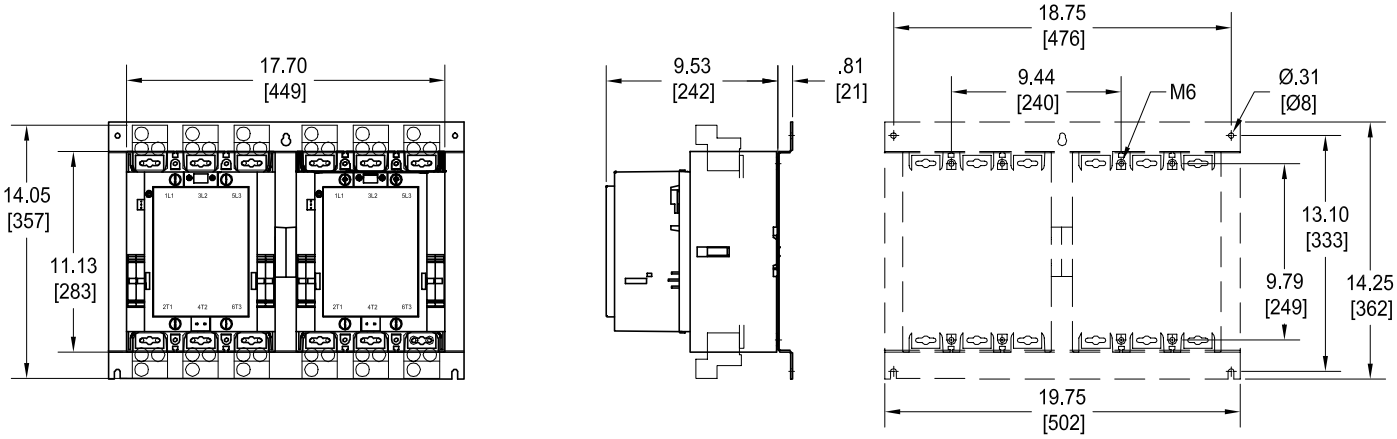

### AF580 – AF750



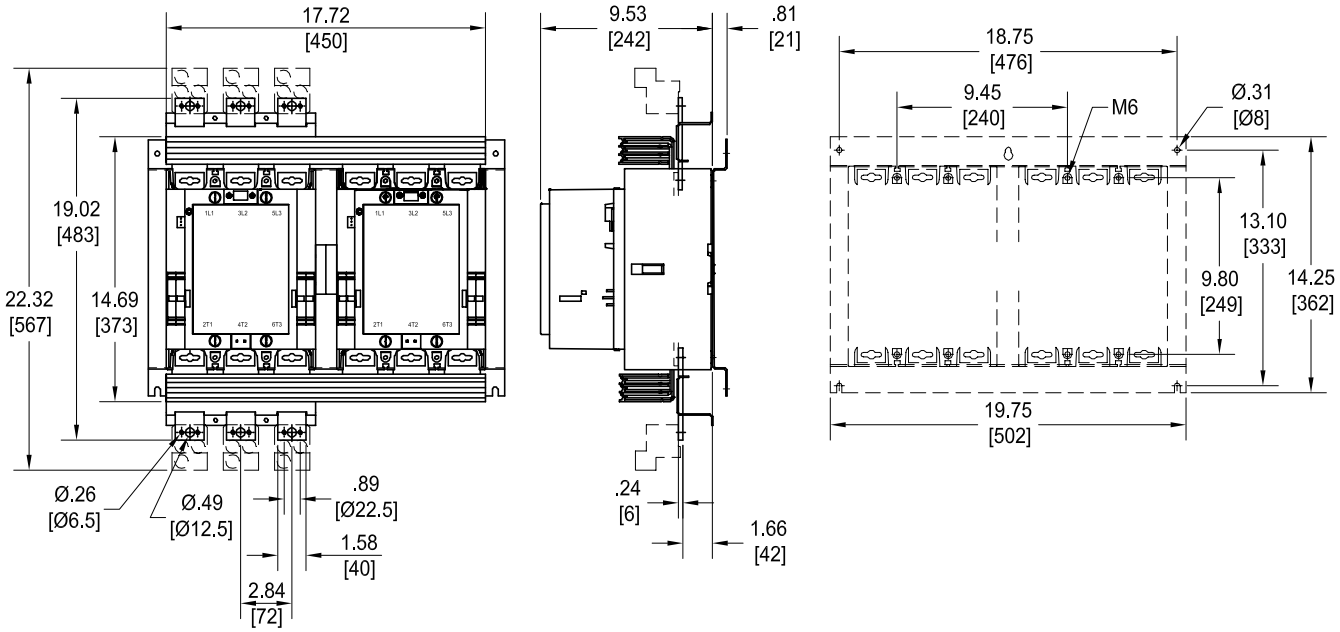
# Approximate dimensions
## AF580 – AF750

00.00 / 00.00 Inches [Millimeters]

### AF580 – AF750 with mechanical interlock



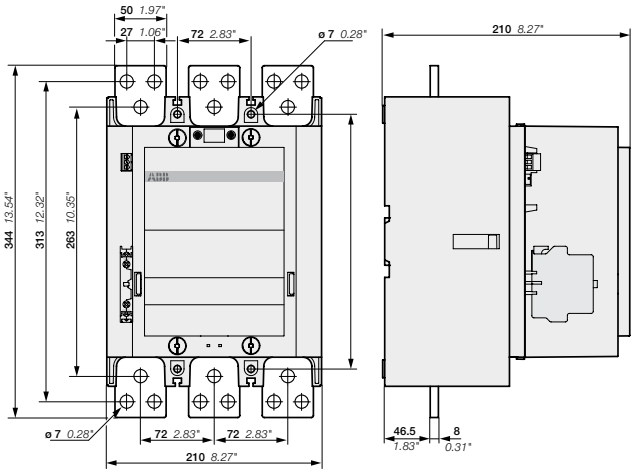

### AF580 – AF750 reversing



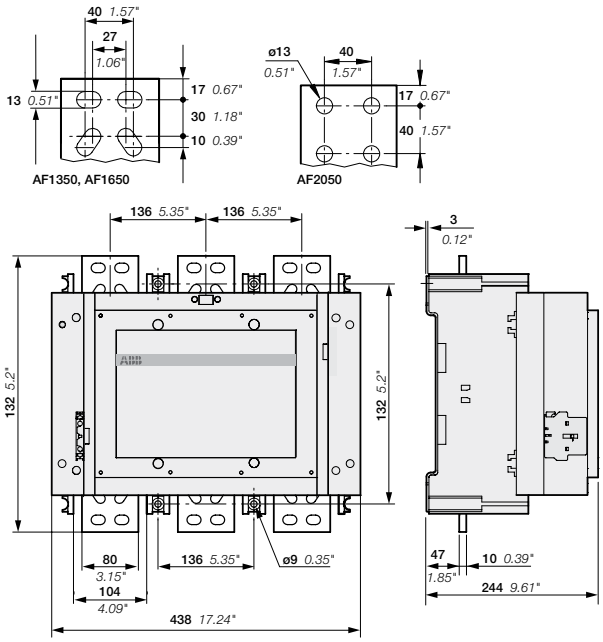
# Approximate dimensions
## AF1250 – AF2050

00.00 Inches
00.00 [Millimeters]

### AF1250 – AF2050



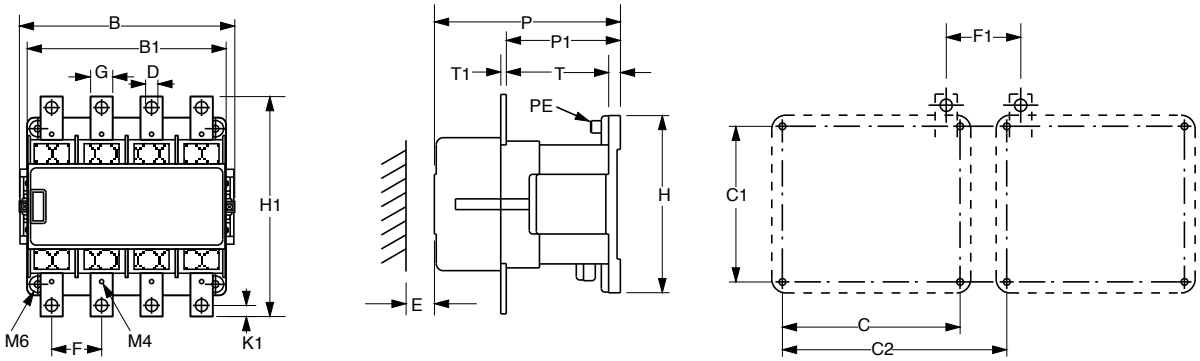

AF1250




AF1350 ... AF2050

# Approximate dimensions

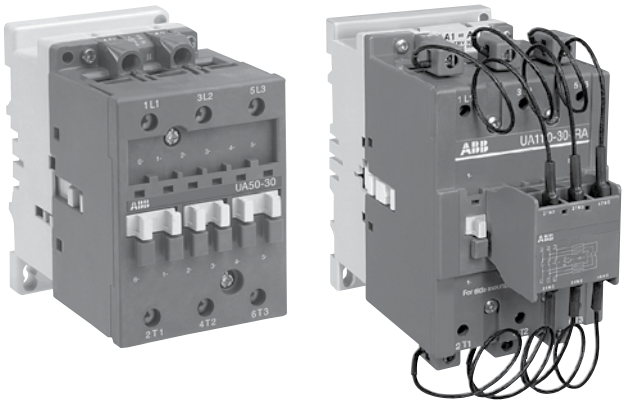
## EK110 – EK550, 4 pole




| | | 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* | *176* | *160* | *140* | *11* | *15* | *45* | *67* | *20* | *156* | *198* | *10* | *172* | *106.7* | *10* | 5 |
| EK 370 | in | 10.63 | 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* | *270* | *244* | *220* | *200* | *11* | *40* | *67* | *70* | *25* | *223* | *272* | *12.5* | *225.5* | *139.5* | *23* | 6 |
| EK 550 | in | 10.63 | 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 |
| EK 1000 | *mm* | *270* | *244* | *220* | *200* | *11* | *40* | *67* | *70* | *25* | *223* | *272* | *12.5* | *225.5* | *139.5* | *23* | 6 |

# Capacitive switching
## For applications up to 130 kVar






### ABB offers 3 contactor types for capacitive switching:

- **UA…RA contactors for capacitor switching (UA16…RA to UA110…RA)** with preinstalled damping resistors. The insertion of damping resistors protects the contactor and the capacitor from the highest inrush currents.
- **UA contactors for capacitor switching (UA16 to UA110)** Maximum permissible peak current î ≤ 100 times the nominal rms current of the switched capacitor.
- **A and AF standard contactors** Maximum permissible peak current î ≤ 30 times the nominal rms current of the switched capacitor.

Please contact Technical Support for more information.

### UA…RA description

These devices intended for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances. The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

- The UA…RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
- Their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
- The insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- Control circuit: AC operated
- Add-on auxiliary contact blocks for side mounting and a wide range of accessories.
- CE mark
- UL file #E312527 (16…75), #E36588 (95…110)
- CSA file #LR56745 (16…75), cULus (95…110)

### UA description

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current. The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making. These contactors are of the block type design with:

- Control circuit: AC operated
- Add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.
- CE mark
- UL file #E312527 (26…75), #E36588 (95…110)
- CSA file #LR56745 (26…75), cULus (95…110)

# Contactors for capacitive switching

## AC-6b utilization category according to IEC 60947-4-1

### Capacitor transient conditions

In Low Voltage industrial installations, capacitors are mainly used for reactive energy correction (raising the power factor). When these capacitors are energized, overcurrents of high amplitude and high frequencies (3 to 15 kHz) occur during the transient period (1 to 2 ms).

The amplitude of these current peaks, also known as "inrush current peaks", depends on the following factors:

- The network inductances.
- The transformer power and short-circuit voltage.
- The type of power factor correction.

**There are 2 types of power factor correction: fixed or automatic.**

**Fixed power factor correction** consists of inserting, in parallel on the network, a capacitor bank whose total power is provided by the assembly of capacitors of identical or different ratings.

The bank is energized by a contactor that simultaneously supplies all the capacitors (a single step).

The inrush current peak, in the case of fixed correction, can reach 30 times the nominal current of the capacitor bank.

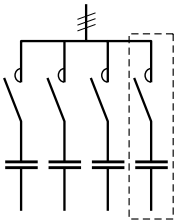
Single-step capacitor bank scheme

Use the A/AF... contactor ranges.

**An automatic power factor correction system**, on the other hand, consists of several capacitor banks of identical or different ratings (several steps), energized separately according to the value of the power factor to be corrected.

An electronic device automatically determines the power of the steps to be energized and activates the relevant contactors.

The inrush current peak, in the case of automatic correction, depends on the power of the steps already on duty, and can reach 100 times the nominal current of the step to be energized.



Multi-step capacitor bank scheme

Use the UA... or UA..RA contactor ranges.

### Steady state condition data

The presence of harmonics and the network's voltage tolerance lead to a current, estimated to be 1.3 times the nominal current $I_n$ of the capacitor, permanently circulating in the circuit.

Taking into account the manufacturing tolerances, the exact power of a capacitor can reach 1.15 times its nominal power.

Standard IEC 60831-1 Edition 2002 specifies that the capacitor must therefore have a maximum thermal current $I_T$ of:

$$I_T = 1.3 \times 1.15 \times I_n = 1.5 \times I_n$$

### Consequences for the contactors

To avoid malfunctions (welding of main poles, abnormal temperature rise, etc.), contactors for capacitor bank switching must be sized to withstand:

- **A permanent current that can reach 1.5 times the nominal current of the capacitor bank.**
- **The short but high peak current on pole closing** (maximum permissible peak current $\hat{I}$ ).

### Contactor selection tool for capacitor switching

In a given application, if the user does not know the value of the inrush current peak, this value can be approximately calculated using the formulas given on the pages **"Calculation and dimensioning"**.

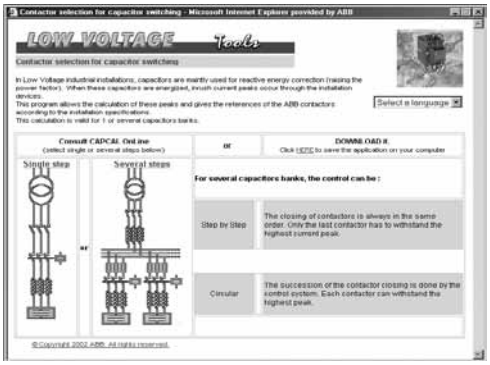
Alternatively by the **CAPCAL selection tool**, available on the ABB Website: www.abb.com/lowvoltage

right hand side menu

search: **"Online product selection tools"**

select: **"Contactors: AC-6b capacitor switching"**

This program allows the calculation of these peaks and gives the references of the ABB contactors according to the installation specifications. This calculation is valid for one or several capacitor banks.



# UA, UA...RA 3 pole

## For capacitive switching applications up to 130 kVar
## AC operated coils

UA30...40/..RA

UA50...75

UA95...110/..RA

### Electrical ratings

### Capacitive switching

| IEC/EN 60947-1<br>IEC/EN 60947-4-1 | | | | | UL 508/60947-4-1A<br>CSA C22.2 No.14, 60947-4-1-07 | | | Standard auxiliary contacts | | Catalog number |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power AC-6b, three phase, 50 Hz, 40°C (kVar) | | | | | AC capacitive switching ratings | | | | | |
| | | | | | Power, three phase, 60 Hz (kVar) | | | | | |
| 230…<br>240V | 400…<br>415V | 440V | 500…<br>550V | 690V | 220…<br>240V | 440…<br>480V | 550…<br>600V | NO | NC | |
| **UA…RA – rated for capacitors with peak (inrush) current î > 100 times the rms current (unlimited peak current)** | | | | | | | | | | |
| 8 | 12.5 | 15 | 18 | 22 | 8 | 16 | 20 | 1 | - | UA16-30-10-RA∆ |
| 12.5 | 22 | 24 | 30 | 35 | 11 | 22 | 27 | 1 | - | UA26-30-10-RA∆ |
| 16 | 30 | 32 | 34 | 45 | 14 | 28 | 35 | 1 | - | UA30-30-10-RA∆ |
| 25 | 40 | 50 | 55 | 72 | 25 | 50 | 62 | - | - | UA50-30-00-RA∆ |
| | | | | | | | | 1 | 1 | UA50-30-11-RA∆ |
| 30 | 50 | 55 | 65 | 80 | 27.5 | 55 | 70 | - | - | UA63-30-00-RA∆ |
| | | | | | | | | 1 | 1 | UA63-30-11-RA∆ |
| 35 | 60 | 65 | 75 | 100 | 32 | 64 | 80 | - | - | UA75-30-00-RA∆ |
| | | | | | | | | 1 | 1 | UA75-30-11-RA∆ |
| 40 | 70 | 75 | 85 | 120 | 40 | 80 | 100 | - | - | UA95-30-00-RA∆ |
| | | | | | | | | 1 | 1 | UA95-30-11-RA∆ |
| 45 | 80 | 85 | 95 | 130 | 45 | 95 | 120 | - | - | UA110-30-00-RA∆ |
| | | | | | | | | | 1 | UA110-30-11-RA∆ |
| **UA – rated for capacitors with peak (inrush) current î ≤ 100 times the rms current (see technical data for values)** | | | | | | | | | | |
| 7.5 | 12.5 | 13.7 | 15.5 | 21.5 | IEC/EN applications only – use UA…RA type | | | 1 | - | UA16-30-10-∆ |
| 12 | 20 | 22 | 22 | 30 | 12.5 | 25 | 30 | 1 | - | UA26-30-10-∆ |
| 16 | 27.5 | 30 | 34 | 45 | 16 | 32 | 40 | 1 | - | UA30-30-10-∆ |
| 20 | 33 | 36 | 40 | 55 | 20 | 40 | 50 | - | - | UA50-30-00-∆ |
| | | | | | | | | 1 | 1 | UA50-30-11-∆ |
| 25 | 45 | 50 | 50 | 70 | IEC/EN applications only – use UA…RA type | | | - | - | UA63-30-00-∆ |
| | | | | | | | | 1 | 1 | UA63-30-11-∆ |
| 30 | 50 | 55 | 62 | 75 | 27.5 | 55 | 70 | - | - | UA75-30-00-∆ |
| | | | | | | | | 1 | 1 | UA75-30-11-∆ |
| 35 | 65 | 65 | 70 | 80 | 35 | 70 | 75 | - | - | UA95-30-00-∆ |
| | | | | | | | | 1 | 1 | UA95-30-11-∆ |
| 40 | 75 | 75 | 80 | 90 | 40 | 80 | 85 | - | - | UA110-30-00-∆ |
| | | | | | | | | | 1 | UA110-30-11-∆ |

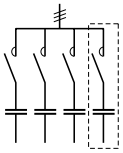
### Coil voltage selection chart (∆)

| Rated control circuit voltage Uc | UA16…<br>UA110 | UA16RA…<br>UA110RA |
|---|---|---|
| 24V 50/60 | 81 | 81 |
| 48V 50/60 | 83 | 83 |
| 110V/50, 110…120V/60 | 84 | 84 |
| 230…240V/60 | 80 | 80 |
| 400…415V/50, 480V/60 | 51 | 51 |
| 500V/50, 600V/60 | 55 | 55 |

# UA16/RA...UA110/RA 3-pole contactors
## Unlimited peak current Î
## IEC & UL/CSA Technical data

### Main pole - Utilization characteristics according to IEC

| Contactor types | | AC operated | UA16..RA | UA26..RA | UA30..RA | UA50..RA | UA63..RA | UA75..RA | UA95..RA | UA110..RA |
|---|---|---|---|---|---|---|---|---|---|---|
| **Standards** | | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | |
| **Rated operational voltage Ue max.** | | | 690 V | | | | | | | |
| **Rated frequency (without derating)** | | | 50 / 60 Hz | | | | | | | |
| **AC-6b Utilization category** | | | | | | | | | | |
| **Rated operational power AC-6b** | | | | | | | | | | |
| For air temperature close to contactor | θ ≤ 40 °C | **230-240 V** | 8 kvar | 12.5 kvar | 16 kvar | 25 kvar | 30 kvar | 35 kvar | 40 kvar | 45 kvar |
| | | **400-415 V** | 12.5 kvar | 22 kvar | 30 kvar | 40 kvar | 50 kvar | 60 kvar | 70 kvar | 80 kvar |
| | | **440 V** | 15 kvar | 24 kvar | 32 kvar | 50 kvar | 55 kvar | 65 kvar | 75 kvar | 85 kvar |
| | | **500-550 V** | 18 kvar | 30 kvar | 34 kvar | 55 kvar | 65 kvar | 75 kvar | 85 kvar | 95 kvar |
| | | **690 V** | 22 kvar | 35 kvar | 45 kvar | 72 kvar | 80 kvar | 100 kvar | 120 kvar | 130 kvar |
| | θ ≤ 55 °C | **230-240 V** | 7.5 kvar | 11.5 kvar | 16 kvar | 24 kvar | 27 kvar | 30 kvar | 35 kvar | 40 kvar |
| | | **400-415 V** | 12.5 kvar | 20 kvar | 27.5 kvar | 40 kvar | 45 kvar | 50 kvar | 60 kvar | 70 kvar |
| | | **440 V** | 13 kvar | 20 kvar | 30 kvar | 43 kvar | 48 kvar | 53 kvar | 65 kvar | 75 kvar |
| | | **500-550 V** | 16 kvar | 25 kvar | 34 kvar | 50 kvar | 60 kvar | 65 kvar | 75 kvar | 82 kvar |
| | | **690 V** | 21 kvar | 31 kvar | 45 kvar | 65 kvar | 75 kvar | 80 kvar | 105 kvar | 110 kvar |
| | θ ≤ 70 °C | **230-240 V** | 6 kvar | 9 kvar | 11 kvar | 20 kvar | 23 kvar | 25 kvar | 30 kvar | 35 kvar |
| | | **400-415 V** | 10 kvar | 15.5 kvar | 19.5 kvar | 35 kvar | 39 kvar | 41 kvar | 53 kvar | 60 kvar |
| | | **440 V** | 11 kvar | 17 kvar | 20.5 kvar | 37 kvar | 42.5 kvar | 45 kvar | 58 kvar | 70 kvar |
| | | **500-550 V** | 12.5 kvar | 20 kvar | 25 kvar | 46 kvar | 50 kvar | 55 kvar | 70 kvar | 78 kvar |
| | | **690 V** | 17 kvar | 26 kvar | 32 kvar | 60 kvar | 65 kvar | 70 kvar | 85 kvar | 100 kvar |
| **Max. permissible peak current Î** | | | Unlimited | | | | | | | |
| **Short-circuit protection device for contactors** | | | | | | | | | | |
| gG type fuse (1) | | | 80 A | 125 A | 200 A | | | | 250 A | |
| **Max. electrical switching frequency** | | | 240 cycles/h | | | | | | | |
| **Electrical durability AC-6b** | | **Ue ≤ 440 V** | 250 000 operating cycles | | | | | | | |
| | | **500 V ≤ Ue ≤ 690 V** | 100 000 operating cycles | | | | | | | |



Multi-step capacitor bank scheme

(1) The fuse ratings given represent the maximum ratings ensuring type 1 coordination according to the definition of standard IEC 60947-4-1.

### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | | AC operated | UA16..RA | UA26..RA | UA30..RA | UA50..RA | UA63..RA | UA75..RA | UA95..RA | UA110..RA |
|---|---|---|---|---|---|---|---|---|---|---|
| **Power - 60 Hz** | | | | | | | | | | |
| For air temperature close to contactor | θ ≤ 40 °C | **240 V** | 8 kvar | 11 kvar | 14 kvar | 25 kvar | 27.5 kvar | 32 kvar | 40 kvar | 45 kvar |
| | | **480 V** | 16 kvar | 22 kvar | 28 kvar | 50 kvar | 55 kvar | 64 kvar | 80 kvar | 95 kvar |
| | | **600 V** | 20 kvar | 27 kvar | 35 kvar | 62 kvar | 70 kvar | 80 kvar | 100 kvar | 120 kvar |
| **Max. permissible peak Current Î** | | | Unlimited | | | | | | | |

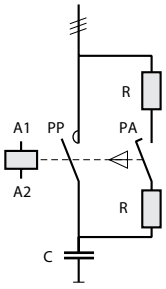
### Operating principle

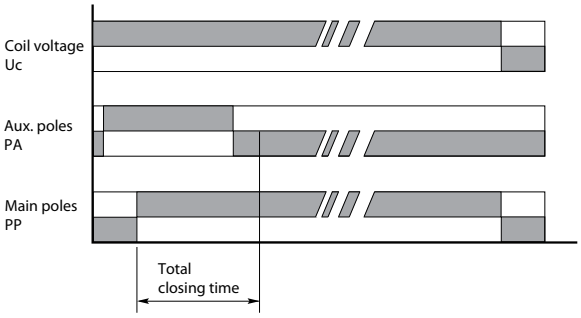
The front-mounted block mechanism of the UA..RA contactors ensures:
- early making of the auxiliary "PA" poles with respect to the main "PP" poles
- automatic return to the open position of the auxiliary "PA" poles after the main poles are closed.

**When the coil is energized**, the early making auxiliary poles connect the capacitor to the network via the set of 3 resistors. The damping resistors attenuate the first current peak and the second inrush current when the main contacts begin to make. Once the main poles are in the closed position, the auxiliary poles automatically break.

**When the coil is de-energized**, the main poles break ensuring the breaking of the capacitor bank.

The contactor can then begin a new cycle.




The insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.

# UA16/RA...UA110/RA 3-pole contactors
## Unlimited peak current Î
## General technical data

### Connecting characteristics

| Contactor types | | AC operated | UA16..RA | UA26..RA | UA30..RA | UA50..RA<br>UA63..RA<br>UA75..RA | UA95..RA<br>UA110..RA |
|---|---|---|---|---|---|---|---|
| **Connection capacity (min. ... max.)** | | | | | | | |
| **Main conductors (poles)** | | | | | | | |
| Rigid | Solid (≤ 4 mm²) | **1 x** | 1...4 mm² | 1.5...6 mm² | 2.5...16 mm² | 6...50 mm² | 10...95 mm² |
| | Stranded (≥ 6 mm²) | **2 x** | - | - | 2.5...16 + 2.5...6 mm² | 6...25 + 6...16 mm² | 6...35 mm² |
| Flexible with ferrule | | **1 x** | 0.75...2.5 mm² | 1.5...4 mm² | 2.5...10 mm² | 6...35 mm² | 10...70 mm² |
| | | **2 x** | - | - | 2.5...10 + 2.5...4 mm² | 6...16 + 6...10 mm² | 6...35 mm² |
| Bars or lugs | | **L ≤** | 7.7 mm | 10 mm | - | - | - |
| | | **l >** | 3.7 mm | 4.2 mm | - | - | - |
| Connection capacity acc. to UL/CSA | | **1 or 2 x** | AWG 18...10 | AWG 12...8 | AWG 8...4 | AWG 8...1 | AWG 6...2/0 |
| Tightening torque | Recommended | | 1 Nm / 9 lb.in | 1.7 Nm / 15 lb.in | 2.3 Nm / 20 lb.in | 4 Nm / 35 lb.in | 8 Nm / 53 lb.in |
| | Max. | | 1.2 Nm | 2.2 Nm | 2.6 Nm | 4.5 Nm | 9 Nm |
| **Auxiliary conductors** (built-in auxiliary terminals + coil terminals) | | | | | | | |
| Rigid solid | | **1 x** | 1...4 mm² | | | | 0.75...2.5 mm² |
| | | **2 x** | 1...4 mm² | | | | 0.75...2.5 mm² |
| Flexible with ferrule | | **1 x** | 0.75...2.5 mm² | | | 1...2.5 mm² | 0.75...2.5 mm² |
| | | **2 x** | 0.75...2.5 mm² | | | | |
| Lugs | Coil terminals | **L ≤** | 8 mm | | | | |
| | | **l >** | 3.7 mm | | | | |
| | Built-in auxiliary terminals | **L ≤** | 7.7 mm | 10 mm | 8 mm | - | - |
| | | **l >** | 3.7 mm | 4.2 mm | 3.7 mm | - | - |
| Connection capacity acc. to UL/CSA | | **1 or 2 x** | AWG 18...14 | | | | |
| Tightening torque | | | | | | | |
| Coil terminals | Recommended | | 1 Nm / 9 lb.in | | | | |
| | Max. | | 1.2 Nm | | | | |
| Built-in auxiliary terminals | Recommended | | 1 Nm / 9 lb.in | | | | |
| | Max. | | 1.2 Nm | | | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | |
| Main terminals | | | IP20 | | IP10 | | |
| Coil terminals | | | IP20 | | | | |
| Built-in auxiliary terminals | | | IP20 | | | - | - |
| **Screw terminals** | | | Delivered in open position, screws of unused terminals must be tightened | | | | |
| Main terminals | | | M 3.5 | M 4 | M 5 | M6 | M8 |
| | | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | Flat Ø 6.5 / Pozidriv 2 | | Hexagon socket (s = 4 mm) |
| Coil terminals | | | M 3.5 | | | | |
| | | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | | | |
| Built-in auxiliary terminals | | | M 3.5 | M 4 | M 3.5 | - | - |
| | | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | | - | - |

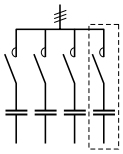
Other technical characteristics are the same as those of standard A contactors.

# UA16...UA110 3-pole contactors

## Peak current Î ≤ 100 times the rms current
## IEC & UL/CSA technical data

### Main pole - Utilization characteristics according to IEC

| Contactor types | | AC operated | UA16 | UA26 | UA30 | UA50 | UA63 | UA75 | UA95 | UA110 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Standards** | | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | |
| **Rated operational voltage Ue max.** | | | 690 V | | | | | | | |
| **Rated frequency (without derating)** | | | 50 / 60 Hz | | | | | | | |
| **AC-6b Utilization category** | | | | | | | | | | |
| **Rated operational power AC-6b** (1) | | | | | | | | | | |
| For air temperature close to contactor | **θ ≤ 40 °C** | **230-240 V** | 7.5 kvar | 12 kvar | 16 kvar | 20 kvar | 25 kvar | 30 kvar | 35 kvar | 40 kvar |
| | | **400-415 V** | 12.5 kvar | 20 kvar | 27.5 kvar | 33 kvar | 45 kvar | 50 kvar | 65 kvar | 75 kvar |
| | | **440 V** | 13.7 kvar | 22 kvar | 30 kvar | 36 kvar | 50 kvar | 55 kvar | 65 kvar | 75 kvar |
| | | **500-550 V** | 15.5 kvar | 22 kvar | 34 kvar | 40 kvar | 50 kvar | 62 kvar | 70 kvar | 80 kvar |
| | | **690 V** | 21.5 kvar | 30 kvar | 45 kvar | 55 kvar | 70 kvar | 75 kvar | 80 kvar | 90 kvar |
| | **θ ≤ 55 °C** | **230-240 V** | 6.7 kvar | 11 kvar | 16 kvar | 20 kvar | 25 kvar | 30 kvar | 35 kvar | 40 kvar |
| | | **400-415 V** | 11.7 kvar | 18.5 kvar | 27.5 kvar | 33 kvar | 43 kvar | 50 kvar | 65 kvar | 70 kvar |
| | | **440 V** | 13 kvar | 20 kvar | 30 kvar | 36 kvar | 48 kvar | 53 kvar | 65 kvar | 75 kvar |
| | | **500-550 V** | 14.7 kvar | 22 kvar | 34 kvar | 40 kvar | 50 kvar | 62 kvar | 70 kvar | 80 kvar |
| | | **690 V** | 20 kvar | 30 kvar | 45 kvar | 55 kvar | 70 kvar | 75 kvar | 80 kvar | 90 kvar |
| | **θ ≤ 70 °C** | **230-240 V** | 6 kvar | 8.5 kvar | 11 kvar | 19 kvar | 21 kvar | 22 kvar | 30 kvar | 35 kvar |
| | | **400-415 V** | 10 kvar | 14.5 kvar | 19 kvar | 32 kvar | 37 kvar | 39 kvar | 55 kvar | 65 kvar |
| | | **440 V** | 11 kvar | 16 kvar | 20 kvar | 35 kvar | 41 kvar | 43 kvar | 55 kvar | 70 kvar |
| | | **500-550 V** | 12.5 kvar | 19.5 kvar | 23.5 kvar | 40 kvar | 45 kvar | 47.5 kvar | 60 kvar | 75 kvar |
| | | **690 V** | 17 kvar | 25 kvar | 32 kvar | 52 kvar | 60 kvar | 65 kvar | 70 kvar | 85 kvar |
| **Max. permissible peak current Î** | | **Ue ≤ 500 V** | 1.8 kA | 3 kA | 3.5 kA | 5 kA | 6.5 kA | 7.5 kA | 9.3 kA | 10.5 kA |
| | | **Ue > 500 V** | 1.6 kA | 2.7 kA | 3.1 kA | 4.5 kA | 5.8 kA | 6.75 kA | 8 kA | 9 kA |
| **Short-circuit protection device for contactors** | | | | | | | | | | |
| gG type fuse | | | sized 1.5…1.8 In of the capacitor | | | | | | | |
| **Max. electrical switching frequency** | | | 240 cycles/h | | | | | | | |
| **Electrical durability AC-6b** | | **Ue ≤ 690 V** | 100 000 operating cycles | | | | | | | |



Multi-step capacitor bank scheme

(1) For 220 V and 380 V, multiply by 0.9 the rated values at 230 V and 400 V respectively.
Example: 50 kvar / 400 V corresponding to 0.9 x 50 = 45 kvar/380 V.

If, in an application, the current peak is greater than the maximum peak current Î specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | | AC operated | UA16 | UA26 | UA30 | UA50 | UA63 | UA75 | UA95 | UA110 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Power - 60 Hz** | | | | | | | | | | |
| For air temperature close to contactor | **θ ≤ 40 °C** | **240 V** | - | 12.5 kvar | 16 kvar | 20 kvar | - | 27.5 kvar | 35 kvar | 40 kvar |
| | | **480 V** | - | 25 kvar | 32 kvar | 40 kvar | - | 55 kvar | 70 kvar | 80 kvar |
| | | **600 V** | - | 30 kvar | 40 kvar | 50 kvar | - | 70 kvar | 75 kvar | 85 kvar |

If, in an application, the current peak is greater than the maximum peak current Î specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

# UA16 ... UA110 3-pole contactors

## Peak current Î ≤ 100 times the rms current

## General technical data

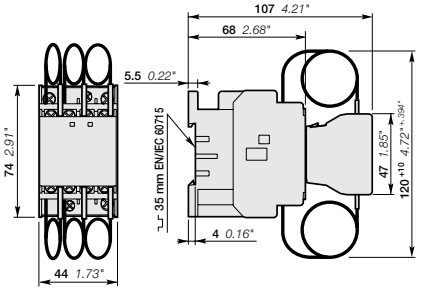
### Connecting characteristics

| Contactor types | | AC operated | UA16 | UA26 | UA30 | UA50 UA63 UA75 | UA95 UA110 |
|---|---|---|---|---|---|---|---|
| **Connection capacity (min. ... max.)** | | | | | | | |
| **Main conductors (poles)** | | | | | | | |
| Rigid | Solid (≤ 4 mm²) | **1 x** | 1...4 mm² | 1.5...6 mm² | 2.5...16 mm² | 6...50 mm² | 10...95 mm² |
| | Stranded (≥ 6 mm²) | **2 x** | 1...4 mm² | 1.5...6 mm² | 2.5...16 mm² | 6...25 mm² | 6...35 mm² |
| Flexible with ferrule | | **1 x** | 0.75...2.5 mm² | 0.75...4 mm² | 2.5...10 mm² | 6...35 mm² | 10...70 mm² |
| | | **2 x** | 0.75...2.5 mm² | 0.75...4 mm² | 2.5...10 mm² | 6...16 mm² | 6...35 mm² |
| Bars or lugs | | **L ≤** | 7.7 mm | 10 mm | - | - | - |
| | | **l >** | 3.7 mm | 4.2 mm | - | - | - |
| Connection capacity acc. to UL/CSA | | **1 or 2 x** | AWG 18...10 | AWG 12...8 | AWG 8...4 | AWG 8...1 | AWG 6...2/0 |
| Tightening torque | Recommended | | 1 Nm / 9 lb.in | 1.7 Nm / 15 lb.in | 2.3 Nm / 20 lb.in | 4 Nm / 35 lb.in | 8 Nm / 71 lb.in |
| | Max. | | 1.2 Nm | 2.2 Nm | 2.6 Nm | 4.5 Nm | 9 Nm |
| **Auxiliary conductors** (built-in auxiliary terminals + coil terminals) | | | | | | | |
| Rigid solid | | **1 x** | 1...4 mm² | | | | 0.75...2.5 mm² |
| | | **2 x** | 1...4 mm² | | | | 0.75...2.5 mm² |
| Flexible with ferrule | | **1 x** | 0.75...2.5 mm² | | | 1...2.5 mm² | 0.75...2.5 mm² |
| | | **2 x** | 0.75...2.5 mm² | | | | |
| Lugs | Coil terminals | **L ≤** | 8 mm | | | | |
| | | **l >** | 3.7 mm | | | | |
| | Built-in auxiliary terminals | **L ≤** | 7.7 mm | 10 mm | 8 mm | - | - |
| | | **l >** | 3.7 mm | 4.2 mm | 3.7 mm | - | - |
| Connection capacity acc. to UL/CSA | | | AWG 18...14 | | | | |
| Tightening torque | | | | | | | |
| Coil terminals | Recommended | | 1 Nm / 9 lb.in | | | | |
| | Max. | | 1.2 Nm | | | | |
| Built-in auxiliary terminals | Recommended | | 1 Nm / 9 lb.in | | | | |
| | Max. | | 1.2 Nm | | | | |
| **Degree of protection** acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | |
| Main terminals | | | IP20 | | | IP10 | |
| Coil terminals | | | IP20 | | | | |
| Built-in auxiliary terminals | | | IP20 | | | - | - |
| **Screw terminals** | | | Delivered in open position, screws of unused terminals must be tightened | | | | |
| Main terminals | | | M3.5 | M4 | M5 | M6 | M8 |
| | | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | Flat Ø 6.5 / Pozidriv 2 | | Hexagon socket (s = 4 mm) |
| Coil terminals | | | M3.5 | | | | |
| | | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | | | |
| Built-in auxiliary terminals | | | M3.5 | M4 | M3.5 | - | - |
| | | **Screwdriver type** | Flat Ø 5.5 / Pozidriv 2 | | | - | - |

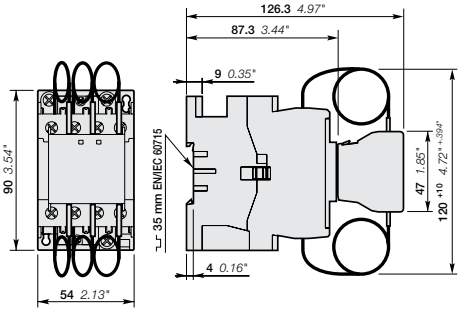
Other technical characteristics are the same as those of standard A contactors.

# Approximate dimensions

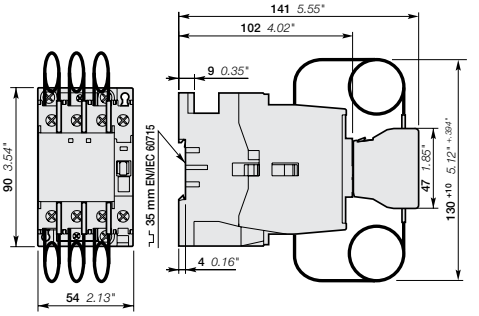
## Main dimensions mm, *inches*



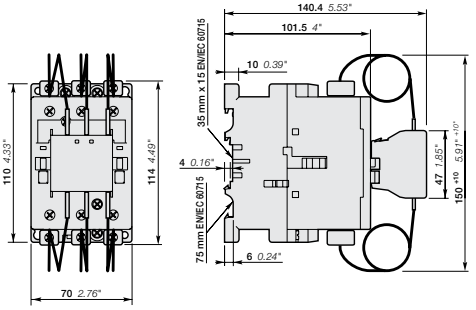

UA16..RA



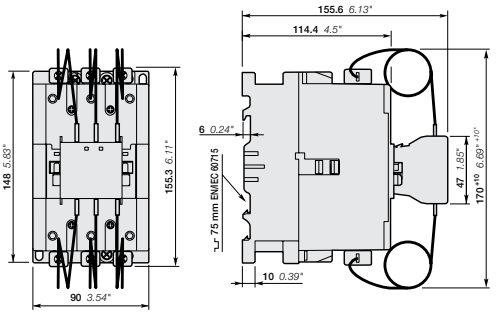

UA26..RA




UA30/40..RA




UA50/75...RA

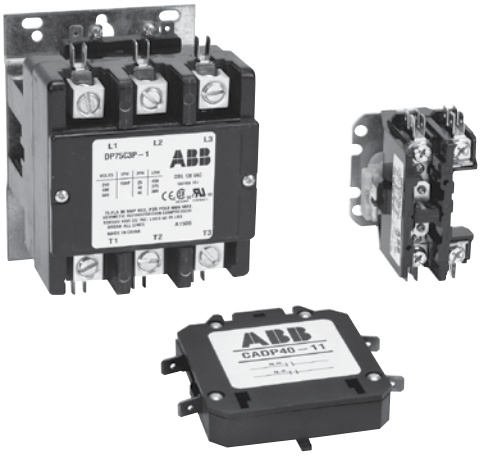



UA95/110...RA

**Note: dimensions for UA... contactor identical to UA...RA types less front-mount dampening resistors.**

# Definite purpose contactors
## For applications up to 90 FLA

Definite purpose
Contactors



### Applications

Type DP contactors provide high performance with flexibility and reliability, designed to match numerous applications including:

- Motors
- Power supplies
- Food service equipment
- Compressors
- Business machines
- Resistive heating
- Air conditioning
- Refrigeration equipment
- Welding

### Agency approvals

- UL 508 Guide No. NLDX2, File # E224401
- CSA C22.2 No. 221260 (1456104) Class 3211 04 / 3211 84
- CE/Semko Certified, EN60947-4-1:2001

### Features

- Available as:
  – 20A, 25A,1, 2 or 3 pole
  – 30A, 1, 2, 3 or 4 pole
  – 40A, 2, 3 or 4 pole
  – 50-90A, 3 pole
- Industry standard mounting plate provides easily accessible mounting holes
- Coil terminals are provided with #6-32 screws and (1) .250 quick connect or dual .250 quickconnect terminals
- Exclusive hex, slotted, phillips #10-32 terminal screws for main terminals
- Coil is class B (130° C) insulation system with a wide range of voltages and 50/60 Hz ratings
- Double E magnet assembly provides optimal performance with reduced power consumption
- Snap-in auxiliary switch with 1 SPDT or 2 SPDT contacts available as an option
- 1 N.O. & 1 N.C. auxiliary contact block with 600 VAC rating available as an option
- Base assembly is made from high arc-resistant polyesterplastic

## Catalog number explanation

**DP 30 C 3P - 1**

**Definite purpose** — DP

**Frame size**
20 = 20A
25 = 25A
30 = 30A
40 = 40A
50 = 50A
60 = 60A
75 = 75A
90 = 90A

**Contactor type**
C = Non-reversing

**Power poles**
1P = 1 N.O.
2P = 2 N.O.
3P = 3 N.O.
4P = 4 N.O.

**Coil voltage**
(See coil voltage selection chart)

# DP non-reversing 1, 2, 3 & 4 pole

## For definite purpose applications up to 90 FLA
## AC operated coils

DP20C1P…
DP40C1P

DP20C3P…
DP30C3P

DP40C4P

### Electrical ratings

| AC definite purpose controller ratings | | | | AC resistance air heating, per pole (A) | AC motor ratings, breaking all lines (hp) | | | | | N.O. power poles | Electrical ratings | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Full load amperes (FLA) | Locked rotor Amperes, breaking all lines (LRA) ① | | | | Single phase | | Three phase | | | | Catalog number | Catalog number (bulk pack) | Bulk qty. |
| | 220…240 / 277V | 440… 480V | 550… 600V | 600V ② | 110… 120V | 220… 240V | 220… 240V | 440… 480V | 550… 600V | | | | |
| 20 | 120 | 100 | 80 | 30 | - | - | - | - | - | 1 | DP20C1P-Δ | DP20C1P-Δ/B | 50 |
| 25 | 150 | 125 | 100 | 35 | - | - | - | - | - | | DP25C1P-Δ | DP25C1P-Δ/B | |
| 30 | 180 | 125 | 100 | 40 | - | - | - | - | - | | DP30C1P-Δ | DP30C1P-Δ/B | |
| 40 | 240 | 160 | 120 | 50 ④ | - | - | - | - | - | | DP40C1P-Δ | DP40C1P-Δ/B | |
| 20 | 120 | 100 | 80 | 30 | - | - | - | - | - | 2 | DP20C2P-Δ | DP20C2P-Δ/B | 50 |
| 25 | 150 | 125 | 100 | 35 | - | - | - | - | - | | DP25C2P-Δ | DP25C2P-Δ/B | |
| 30 | 180 | 125 | 100 | 40 | - | - | - | - | - | | DP30C2P-Δ | DP30C2P-Δ/B | |
| 40 | 240 | 160 | 120 | 50 ④ | - | - | - | - | - | | DP40C2P-Δ | DP40C2P-Δ/B | |
| 20 | 120 | 100 | 80 | 30 | 1.5 | 3 | 7.5 | 7.5 | 7.5 | 3 | DP20C3P-Δ | DP20C3P-Δ/B | 25 |
| 25 | 150 | 125 | 100 | 35 | 2 | 5 | 7.5 | 15 | 20 | | DP25C3P-Δ | DP25C3P-Δ/B | |
| 30 | 180 | 150 | 120 | 40 | 2 | 5 | 10 | 15 | 20 | | DP30C3P-Δ | DP30C3P-Δ/B | |
| 40 | 240 | 200 | 160 | 50 ⑤ | 3 | 7.5 | 10 | 20 | 25 | | DP40C3P-Δ | DP40C3P-Δ/B | |
| 50 | 300 ③ | 250 | 200 | 65 | 3 | 7.5 ⑥ | 15 ⑥ | 25 | 25 | | DP50C3P-Δ | - | - |
| 60 | 360 ③ | 300 | 240 | 75 | 5 | 10 ⑥ | 25 ⑥ | 30 | 30 | | DP60C3P-Δ | - | - |
| 75 | 450 ③ | 375 | 300 | 90 | 5 | 15 | 25 ⑥ | 40 | 40 | | DP75C3P-Δ | - | - |
| 90 | 540 ③ | 450 | 360 | 120 | 7.5 | 20 | 30 ⑥ | 50 | 50 | | DP90C3P-Δ | - | - |
| 20 | 120 | 100 | 80 | 30 | 1.5 | 3 | 7.5 | 7.5 | 7.5 | 4 | DP20C4P-Δ | DP20C4P-Δ/B | 25 |
| 25 | 150 | 125 | 100 | 35 | 2 | 5 | 7.5 | 15 | 20 | | DP25C4P-Δ | DP25C4P-Δ/B | |
| 30 | 180 | 150 | 120 | 40 | 2 | 5 | 10 | 15 | 20 | | DP30C4P-Δ | DP30C4P-Δ/B | |
| 40 | 240 | 200 | 160 | 50 ⑤ | 3 | 7.5 | 10 | 20 | 25 | | DP40C4P-Δ | DP40C4P-Δ/B | |

Note: 1-pole devices in 2-pole frame with shunt included.

### Coil voltage selection chart (Δ)

| Control circuit voltage | Control circuit voltage |
|---|---|
| 24V 60 Hz | F |
| 120V/60 | 1 |
| 208/240V AC | 2 |
| 277V AC | C |
| 480V AC | 4 |
| 575/600V 60 Hz | 6 |

### DP ratings for AF & AS/ASL

ABB has additionally performed definite purpose testing for air conditioning (h.r.c.) applications with AF and AS/ASL series contactors. Please contact Technical Support regarding the use of these devices for applications 20…900 FLA, 80…5600 LRA.

① 1- & 2-pole devices rated per pole
② DP20…DP30 intended for single phase resistive applications only above 277V
③ 220…240V only
④ Max. 277V
⑤ Breaking all lines
⑥ Suitable at 208V

# Accessories

## Auxiliary contact blocks

| Description | DP20 to DP40, 3 pole and 4 pole configurations | DP50 to DP60 | DP75 to DP90" |
|---|---|---|---|
| Form C SPDT | CADP40-10 | CADP40-10 | - |
| Double Form C SPDT | CADP40-20 | CADP40-20 | - |
| Form Z SPDT (1NO & 1NC)** | CADP40-11 | CADP40-11 | CADP90-11 |

** Must be the same polarity on both poles. For a complete description on contact types, please refer to page 1.78.

## Mechanical interlock

| Application | Catalog number |
|---|---|
| DP30C3P-* | VMDP-1 |
| DP40C3P-* | VMDP-1 |

## Protective cover

| Application | Catalog number |
|---|---|
| DP20C2P-* | DP-2-AC |
| DP25C2P-* | DP-2-AC |
| DP30C2P-* | DP-2-AC |

## Din-rail mounting bracket

| Application | Catalog number |
|---|---|
| DP20C1P-* | DP/DIN1-2 |
| DP25C1P-* | DP/DIN1-2 |
| DP30C1P-* | DP/DIN1-2 |
| DP20C2P-* | DP/DIN1-2 |
| DP25C2P-* | DP/DIN1-2 |
| DP30C2P-* | DP/DIN1-2 |

Note: Replace "*" with appropriate coil voltage as per previous page

# Technical data

## Contact rating of SPDT auxiliary contacts

| Voltage | Current rating |
|---|---|
| 125 VAC | 10 A, 1/3 HP |
| 120 VAC | 4 A on lamp load |
| 250 VAC | 10 A, 1/3 HP |
| 125 VDC | 0.5 A |
| 250 VDC | 0.25 A |

## Contact rating of 1 N.O. & 1 N.C. auxiliary contacts

| | 120V | 240V | 480V | 600V |
|---|---|---|---|---|
| Break (A) | 3.0 | 1.5 | 0.75 | 0.6 |
| Make (A) | 30 | 15 | 7.5 | 6 |
| Continuous (A) | 10 | 10 | 10 | 10 |

## DP20 to DP40, 1 & 2 poles

| Coil technical data | | DP20 to DP30, 1 pole | | | | DP20 to DP40, 2 poles | | | |
|---|---|---|---|---|---|---|---|---|---|
| Nominal coil voltage | | 24 | 120 | 208/240 | 277 | 24 | 120 | 208/240 | 277 |
| Maximum pickup volts | | 18 | 88 | 177 | 221 | 18 | 88 | 177 | 221 |
| Drop out volts range | | 6 - 15 | 20 - 70 | 40 - 140 | 50 - 165 | 6 - 15 | 20 - 70 | 40 - 170 | 50 - 165 |
| Nominal inrush VA | 50 Hz | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 |
| Nominal inrush VA | 60 Hz | 28 | 28 | 28 | 28 | 30 | 30 | 30 | 30 |
| Nominal closed VA | 50 Hz | 6 | 6 | 6 | 6 | 8 | 8 | 8 | 8 |
| Nominal closed VA | 60 Hz | 5 | 5 | 5 | 5 | 6.5 | 6.5 | 6.5 | 6.5 |
| Nominal coil resistance | Ohms | 18 | 420 | 1800 | 2500 | 11 | 237 | 1000 | 1600 |

### Other specifications

| Specifications | DP20 to DP30, 1 and 2 poles | DP40, 2 poles |
|---|---|---|
| Line and load terminals | # 10 - 32 screw | Box lug |
| Wire size AWG (min - max) | 16 - 8 | 14 - 4 Cu/Al |
| Tightening torque (recommended) | 25 in. lbs. | 40 in. lbs. |
| Coil terminals | Dual .250" QC | Dual .250" QC |
| Power Terminals | 1 Pole: Quad .250" QC | Quad |
| | 2 Pole: Dual or Quad .250" QC | Dual or quad |
| Covers | Optional | Standard |
| Insulation System | 130° C class B | 130° C class B |

## DP20 to DP60, 3 poles

| Coil technical data | | DP20 to DP40, 3 poles | | | | | DP50 to DP60, 3 poles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal coil voltage | | 24 | 120 | 208/240 | 277 | 480 | 24 | 120 | 208/240 | 277 | 480 |
| Maximum pickup volts | | 18 | 88 | 177 | 220 | 384 | 18 | 88 | 177 | 220 | 374 |
| Drop out volts range | | 6 - 15 | 20 - 70 | 40 - 140 | 50 - 140 | 150 - 270 | 6 - 15 | 20 - 70 | 40 - 140 | 50 - 185 | 150 - 286 |
| Nominal inrush VA | 50 Hz | 65 | 65 | 65 | 65 | 65 | 62 | 62 | 62 | 62 | 62 |
| Nominal inrush VA | 60 Hz | 60 | 60 | 60 | 60 | 60 | 59 | 59 | 59 | 59 | 59 |
| Nominal closed VA | 50 Hz | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 9 | 9 | 9 | 9 | 9 |
| Nominal closed VA | 60 Hz | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 6 | 7 | 7 |
| Nominal coil resistance | Ohms | 7 | 180 | 720 | 900 | 1320 | 2.4 | 150 | 600 | 750 | 1452 |

### Other specifications

| Specifications | DP20 to DP30, 3 poles | DP40, 3 poles | DP50 to DP60, 3 poles |
|---|---|---|---|
| Line and load terminals | # 10 - 32 screw ① | Box lug ① | Box lug ① |
| Wire size AWG (min - max) | 16 - 8 2 | 14 - 4 Cu/Al | 14 - 2 Cu/Al |
| Tightening torque (recommended) | 22 in. lbs. | 40 in. lbs. | 50 in. lbs. |
| Quick connects (power terminals) | Dual .250 QC | Dual .250 QC | Dual .250 QC |
| Coil terminals | Dual .250 QC ② | Dual .250 QC ② | # 6 - 32 screw & dual .250 QC ② |
| Covers | Standard | Standard | Standard |
| Insulation system | 130° C class B | 130° C class B | 130° C class B |

① See diagram on page 1.183 for approximate dimensions and description.
② Stranding must be split for # 8 wire.

# Technical data

## DP20 to DP40, 4 poles

| Coil technical data | | DP20 to DP40, 4 poles | | | | |
|---|---|---|---|---|---|---|
| Nominal coil voltage | | 24 | 120 | 208/240 | 277 | 480 |
| Maximum pickup volts | | 18 | 88 | 177 | 220 | 384 |
| Drop out volts range | | 6 - 15 | 20 - 70 | 40 - 140 | 65 - 185 | 150 - 270 |
| Nominal inrush VA | 50 Hz | 62 | 62 | 62 | 62 | 62 |
| Nominal inrush VA | 60 Hz | 59 | 59 | 59 | 59 | 59 |
| Nominal closed VA | 50 Hz | 9 | 9 | 9 | 9 | 9 |
| Nominal closed VA | 60 Hz | 7 | 7 | 6 | 7 | 6 |
| Nominal coil resistance | Ohms | 6 | 148 | 600 | 750 | 2100 |

### Other specifications

| Specifications | DP20 to DP30, 4 poles | DP40, 4 poles |
|---|---|---|
| Line and load terminals | # 10 - 32 screw ① | Box lug ① |
| Wire size AWG (min - max) | 16 - 8 2 | 14 - 4 Cu/Al |
| Tightening torque (recommended) | 22 in. lbs. | 40 in. lbs. |
| Quick connects (power terminals) | Dual .250 QC | Dual .250 QC |
| Coil terminals | Dual .250 QC ② | Dual .250 QC ② |
| Covers | Standard | Standard |
| Insulation system | 130° C class B | 130° C class B |

## DP75 to DP90, 3 poles

| Coil technical data | | DP75 to DP90, 3 poles | | | | |
|---|---|---|---|---|---|---|
| Nominal coil voltage | | 24 | 120 | 208/240 | 277 | 480 |
| Maximum pickup volts | | 18 | 88 | 177 | 220 | 384 |
| Drop out volts range | | 6-15 | 20-70 | 40-10 | 65-185 | 150 - 270 |
| Nominal inrush VA | 50 Hz | 285 | 285 | 285 | 285 | 62 |
| Nominal inrush VA | 60 Hz | 240 | 240 | 240 | 240 | 59 |
| Nominal closed VA | 50 Hz | 42 | 42 | 42 | 42 | 9 |
| Nominal closed VA | 60 Hz | 27 | 27 | 27 | 27 | 6 |
| Nominal coil resistance | Ohms | 0.65 | 16 | 64 | 85 | 2100 |

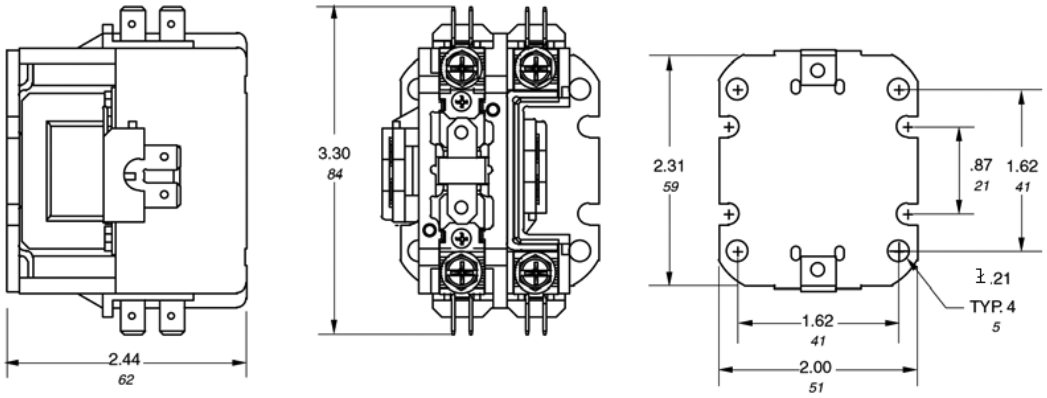
### Other specifications

| Specifications | DP75 to DP90, 3 poles |
|---|---|
| Line and load terminals | Box lug (1) |
| Wire size AWG (min-max) | 14-1 Cu/Al |
| Tightening torque (recommended) | 50 in. lbs |
| Quick connects (power terminals) | Dual .250" QC |
| Coil terminals | Dual .250" QC |
| Covers | Standard |
| Insulation system | 130°C Class B |

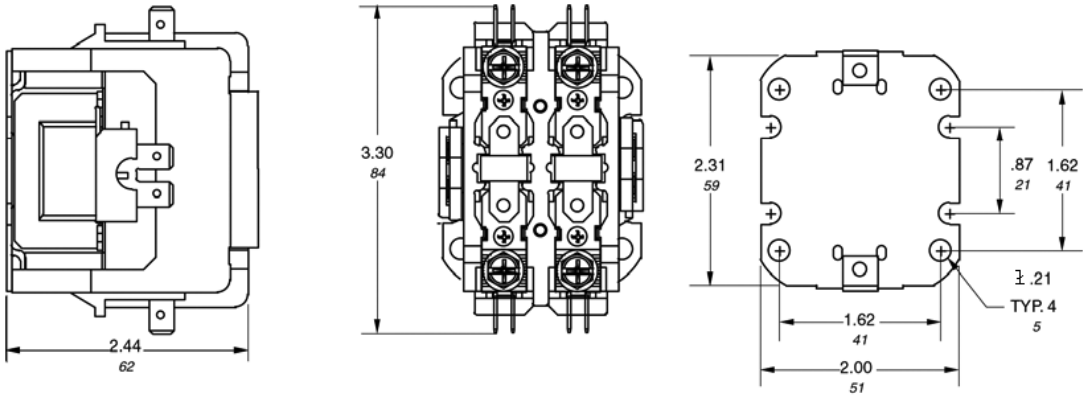
① See diagram on page 1.183 for approximate dimensions and description.
② Stranding must be split for # 8 wire.

# Approximate dimensions

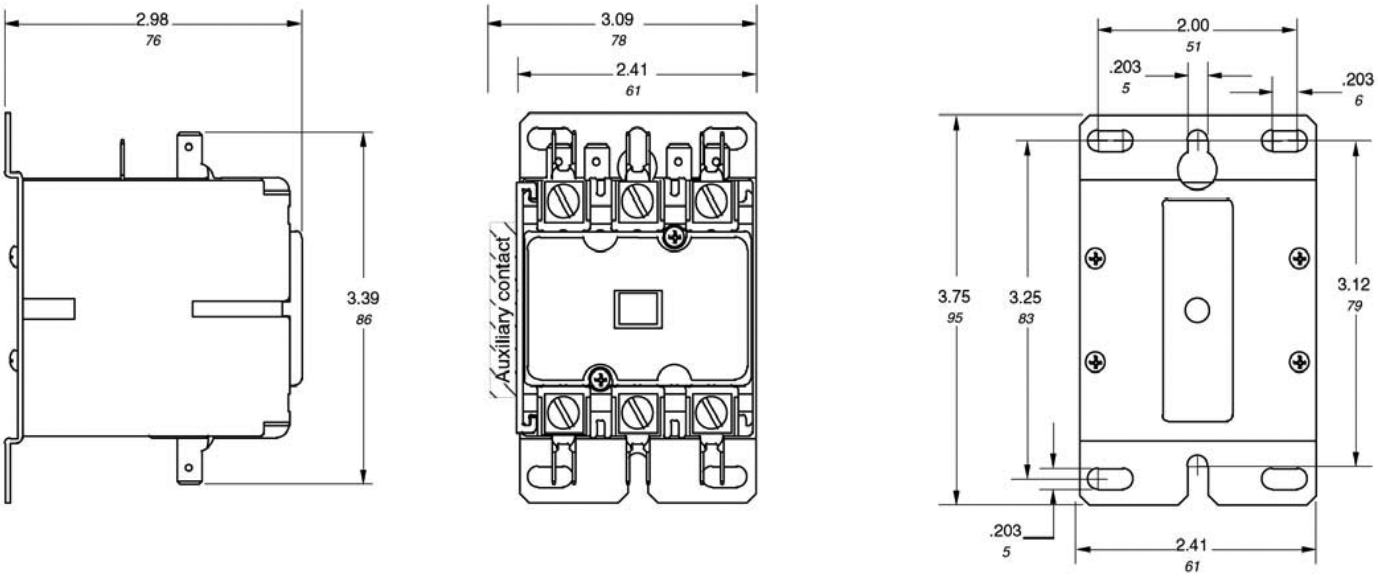
## DP20 to DP30, 1 pole




## DP20 to DP30, 2 poles

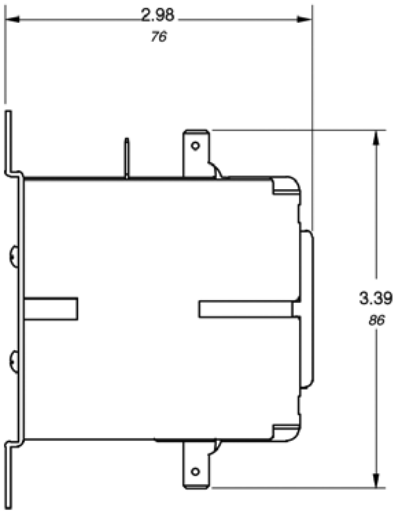


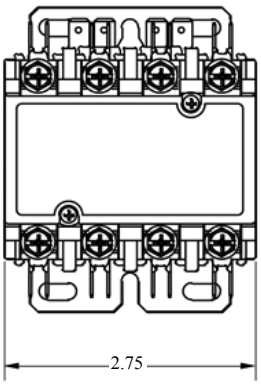

## DP20 to DP30, 3 poles

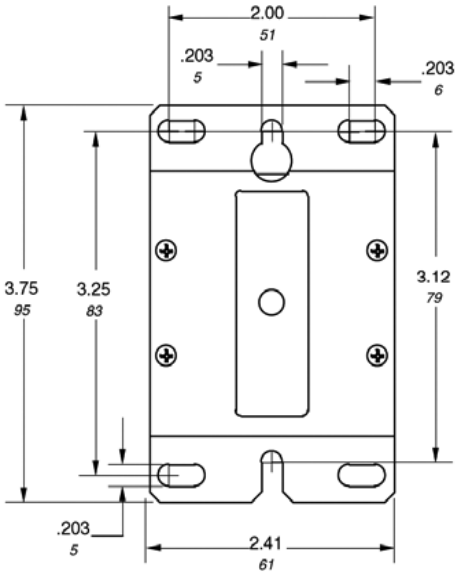


# Approximate dimensions

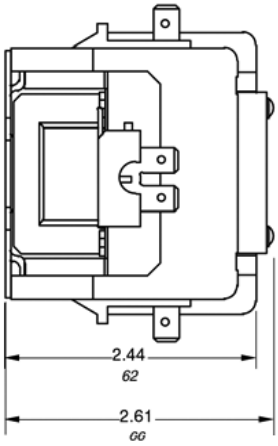
## DP30, 4 poles

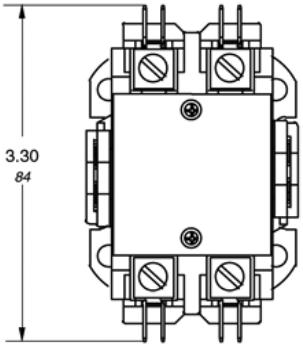


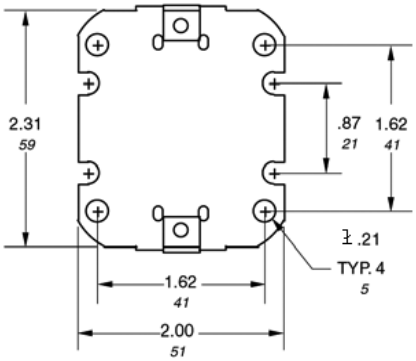



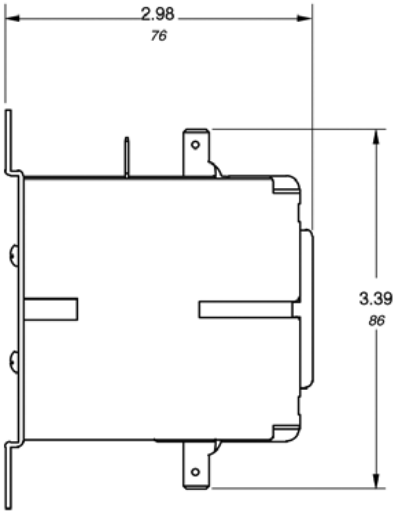

## DP40, 2 poles

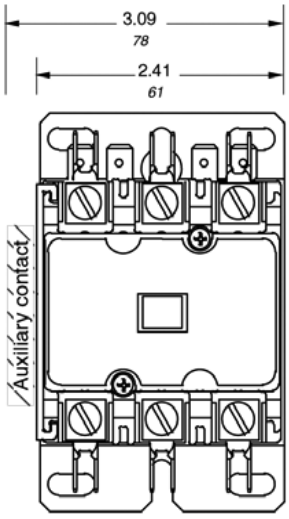


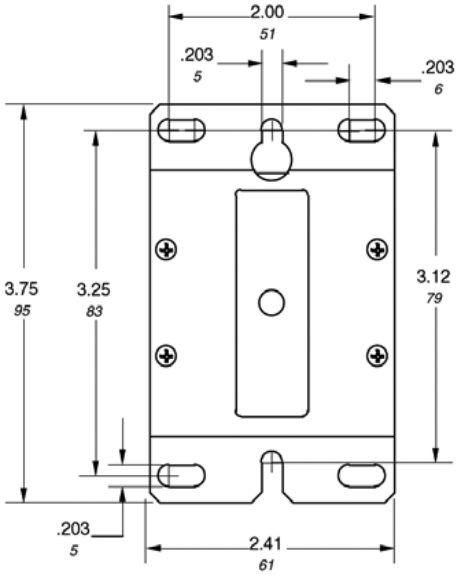




## DP40, 3 poles

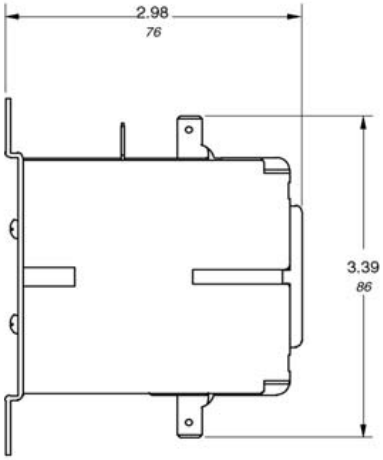


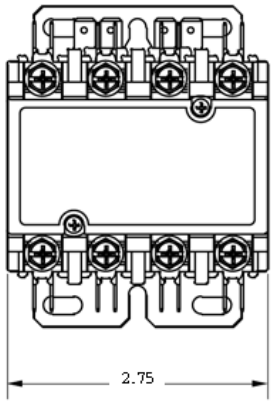



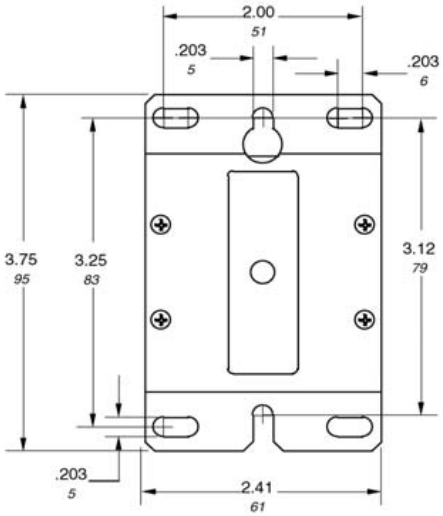



# Approximate dimensions

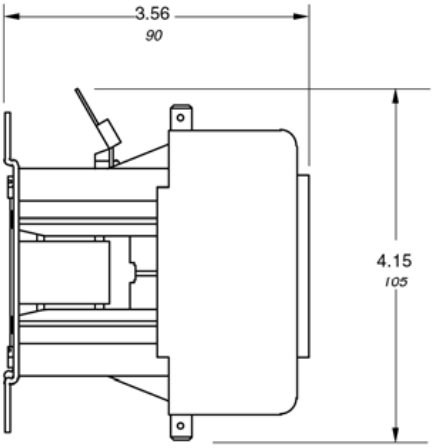
## DP40, 4 poles

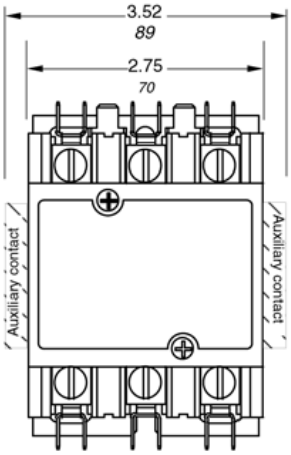


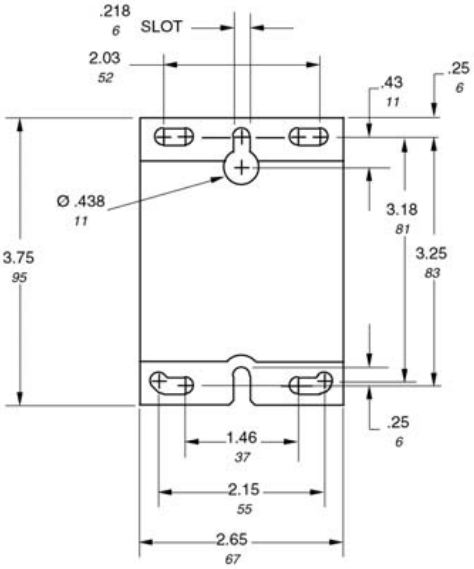



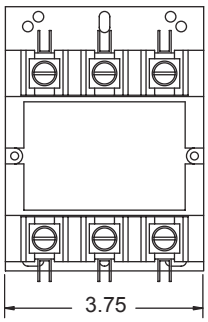

## DP50 to DP60, 3 poles

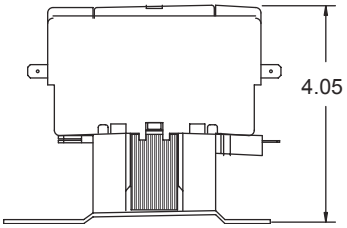


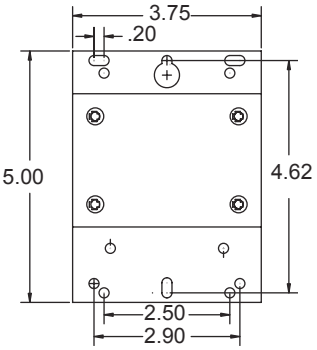




## DP75 to DP90, 3 poles



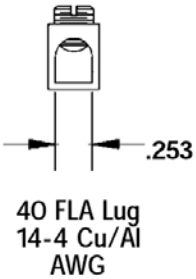



# Approximate dimensions

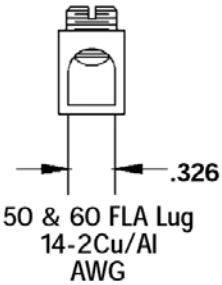
## Terminals

**Standard on DP 20 to DP30**

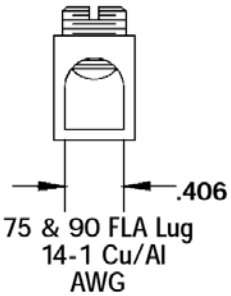
**Standard on DP40**




**Standard on DP 60**



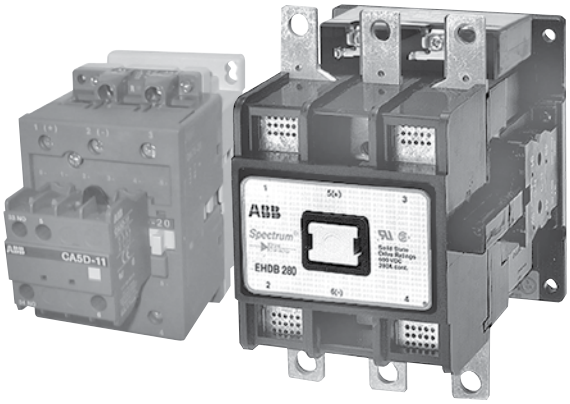

**Standard on DP 90**



# Notes

# Dynamic braking / DC drive
## Up to 960 A, 600V DC






## Description
Drive contactors are specifically designed for use with solid state D.C. adjustable speed drive systems. In drive applications, the contactor is not required to make or break the load during normal operation. The N.C. contact is used for dynamic braking applications. EHDB contactors are provided less terminal lugs. Additionally, EHDB contactors carry elevator service ratings.

### Type DA
- 60 A continuous
- 160…300V DC dynamic braking
- Double-break contacts
- Identical H/W dimensions to standard A-line
- DIN rail and panel mount
- cULus Recognized – File # E312527
- Motor Controllers, Magnetic – Component (NLDX2, NLDX8)

### Type EHDB
- 220..960 A continuous
- 600V DC dynamic braking
- Double-break contacts with magnetic arc chutes
- Elevator service rated
- Replacement parts available
- cULus Recognized – File # E36588
- Motor Controllers, Magnetic – Component (NLDX2, NLDX8)

# EHDB, DA75 2- & 3-pole, non-reversing

## For DC drive applications up to 960 A
## AC or DC operated coils

DA75-21A-11-84

EHDB280C-1L

EHDB520C2P-1L

## Electrical ratings

## 2 & 3 pole non-reversing

| DC continuous current (A) | N.O. power poles | N.C. dynamic braking pole | | | Standard auxiliary contacts | | Catalog number 2-pole 2 N.O. | Catalog number 3-pole 2 N.O. + 1 N.C. |
|---|---|---|---|---|---|---|---|---|
| | DC make/break | DC make | DC break | | | | | |
| 500V | 500V | 500V | 150V | 300V | N.O. | N.C. | | |
| **Type DA75, 2 & 3 pole** | | | | | | | | |
| 60 | 60 | - | - | - | 1 | 1 | DA75-20-11-Δ | - |
| 60 | 60 | 90 | 55 | - | 2 | 1 | - | DA75-21-21-Δ |
| 60 | 60 | 90 | - | 55 | 1 | 1 | - | DA75-21A-11-Δ |

Note: DA75 2 & 3 pole contactors are equipped with polarity-dependent N.O. contacts.

| DC continuous current (A) | N.O. power poles | N.C. dynamic braking pole | | Standard auxiliary contacts | | Catalog number 2-pole 2 N.O. | Catalog number 3-pole 2 N.O. + 1 N.C. |
|---|---|---|---|---|---|---|---|
| | DC make/break | DC make | DC break | | | | |
| 600V | 600V | 600V | 300V | N.O. | N.C. | | |
| **Type EHDB, 2 & 3 pole** | | | | | | | |
| 220 | 333 | 450 | 285 | 1 | 1 | EHDB220C2P-ΔL | EHDB220C-ΔL |
| 280 | 425 | 565 | 363 | 1 | 1 | EHDB280C2P-ΔL | EHDB280C-ΔL |
| 360 | 556 | 728 | 472 | 1 | 1 | EHDB360C2P-ΔL | EHDB360C-ΔL |
| 520 | 780 | 1040 | 680 | 1 | 1 | EHDB520C2P-ΔL | EHDB520C-ΔL |
| 650 | 975 | 1300 | 850 | 1 | 1 | EHDB650C2P-ΔL | EHDB650C-ΔL |
| 800 | 1200 | 1600 | 1050 | 1 | 1 | EHDB800C2P-ΔL | EHDB800C-ΔL |
| 960 | 1440 | 1920 | 1250 | 1 | 1 | EHDB960C2P-ΔL | EHDB960C-ΔL |

Note: The polarity of the N.C. dynamic braking pole must be respected; 5/L2 (+) – 6/T2 (-).

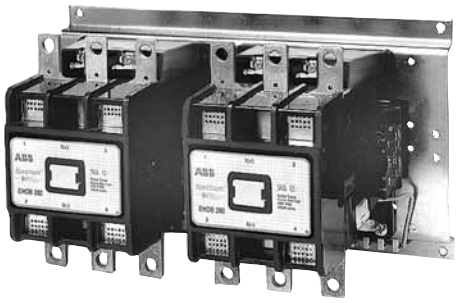
## Coil voltage selection chart (Δ)

| Rated control circuit voltage $U_C$ | DA75 | EHDB220... EHDB360 | EHDB520... EHDB960 |
|---|---|---|---|
| 24V/50 | 81 | N | - |
| 24V/60 | 81 | F | - |
| 24V DC | - | Y | Y |
| 48V/60 | 83 | G | - |
| 48V DC | - | W | W |
| 110/50, 110…120/60 | 84 | 1 | 1 |
| 125V DC | - | Q | Q |
| 208V/60 | 34 | B | B |
| 220V DC | - | R | R |
| 240V/60 | 80 | 2 | 2 |
| 277V/60 | 42 | C | C |
| 480V/60 | 51 | 4 | 4 |
| 600V/60 | 55 | 6 | 6 |

Example:
24V DC input voltage: EHDB280C-YL
120V AC input voltage: DA75-21-21-84

# EHDB, DA75 2 & 3 pole, mechanically-interlocked

## DC drive applications up to 960 A
## AC or DC operated coils



EHDB280M-1L

### Electrical ratings

### 2 & 3 pole mechanically interlocked

| DC continuous current (A) | N.O. power poles | N.C. dynamic braking pole | | | Standard auxiliary contacts | | Catalog number 2-pole 2 N.O. | Catalog number 3-pole 2 N.O. + 1 N.C. |
|---|---|---|---|---|---|---|---|---|
| | DC make/break | DC make | DC break | | | | | |
| 500V | 500V | 500V | 150V | 300V | N.O. | N.C. | | |
| **Type DA75, 2 & 3 pole** | | | | | | | | |
| 60 | 60 | - | - | - | 1 | 1 | DA75M-20-11-Δ | - |
| 60 | 60 | 90 | - | 55 | 1 | 1 | - | DA75M-21A-11-Δ |

Note: DA75 2 & 3 pole contactors are equipped with polarity-dependent N.O. contacts.

| DC continuous current (A) | N.O. power poles | N.C. dynamic braking pole | | Standard auxiliary contacts | | Catalog number 2-pole 2 N.O. | Catalog number 3-pole 2 N.O. + 1 N.C. |
|---|---|---|---|---|---|---|---|
| | DC make/break | DC make | DC break | | | | |
| 600V | 600V | 600V | 300V | N.O. | N.C. | | |
| **Type EHDB, 2 & 3 pole** | | | | | | | |
| 220 | 333 | 450 | 285 | 1 | 1 | EHDB220M2P-ΔL | EHDB220M-ΔL |
| 280 | 425 | 565 | 363 | 1 | 1 | EHDB280M2P-ΔL | EHDB280M-ΔL |
| 360 | 556 | 728 | 472 | 1 | 1 | EHDB360M2P-ΔL | EHDB360M-ΔL |
| 520 | 780 | 1040 | 680 | 1 | 1 | EHDB520M2P-ΔL | EHDB520M-ΔL |
| 650 | 975 | 1300 | 850 | 1 | 1 | EHDB650M2P-ΔL | EHDB650M-ΔL |
| 800 | 1200 | 1600 | 1050 | 1 | 1 | EHDB800M2P-ΔL | EHDB800M-ΔL |
| 960 | 1440 | 1920 | 1250 | 1 | 1 | EHDB960M2P-ΔL | EHDB960M-ΔL |

Note: The polarity of the N.C. dynamic braking pole must be respected; 5/L2 (+) – 6/T2 (-).

### Coil voltage selection chart (Δ)

| Rated control circuit voltage $U_C$ | DA75 | EHDB220... EHDB360 | EHDB520... EHDB960 |
|---|---|---|---|
| 24V/50 | 81 | N | - |
| 24V/60 | 81 | F | - |
| 24V DC | - | Y | Y |
| 48V/60 | 83 | G | - |
| 48V DC | - | W | W |
| 110/50, 110…120/60 | 84 | 1 | 1 |
| 125V DC | - | Q | Q |
| 208V/60 | 34 | B | B |
| 220V DC | - | R | R |
| 240V/60 | 80 | 2 | 2 |
| 277V/60 | 42 | C | C |
| 480V/60 | 51 | 4 | 4 |
| 600V/60 | 55 | 6 | 6 |

Example:
24V DC input voltage: EHDB280M-YL
120V AC input voltage: DA75M-21A-11-84

# Replacement parts

EHDBRC280-1

## Coils

| | Contactor type | Catalog number |
|---|---|---|
| | DA75 | ZA75-Δ ① |
| | EHD220, EHD280 | EHDRC280-Δ |
| | EHD350 | EHDRC360-Δ |
| Withdrawable type | EHDB220, EHDB280 | EHDBRC280-Δ |
| | EHDB360 | EHDBRC360-Δ |
| | EHDB520, EHDB650 | EHDBRC650-Δ |
| | EHDB800, EHDB960 | EHDBRC960-Δ |

Δ Substitute the Δ for a coil voltage suffix found in the Coil Voltage Selection Chart. EHDB coils can be used as replacement parts in EHD contactors.

## Coil voltage selection chart – DA contactors ①

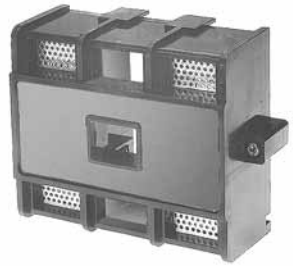
| Hz | Cntr type | Volts | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 12 | 24 | 48 | 110 | 120 | 125 | 208 | 220 | 240 | 277 | 380 | 415 | 440 | 480 | 500 | 600 |
| 60 | A | | 81 | 83 | 84 | 84 | | 34 | 36 | 80 | 42 | | 86 | 86 | 51 |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

NOTE: DC coils are available for DA75 contactors only.

## Coil voltage selection chart – EHDB contactors

| | Volts | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 24 | 48 | 110 | 120 | 125 | 208 | 220 | 240 | 277 | 380 | 415 | 440 | 480 | 500 | 600 |
| 60 | F | G | | 1 | | B | 2 | 2 | C | | | 3 | 4 | | 6 |
| 50 | N | | 1 | | | | J | | | 3 | 4 | | | 6 | |
| DC | Y | W | P | | Q | | R | | | | | | | | |

NOTE: For other voltages, consult factory. • 24VAC coils are not available for sizes EHDB520 – EHDB960. • 48VAC coils are not available for sizes EHDB520 – EHDB960. For these 24V and 48V applications, use an interposing control relay. • 12VDC coils are not available for EHDB520 – EHDB960.



EHDBAS280

## Arc shields

| Contactor size | Catalog number |
|---|---|
| **3 Pole** | |
| EHDB220 | EHDBAS220 |
| EHDB280 | EHDBAS280 |
| EHDB360 | EHDBAS360 |
| EHDB520 | EHDBAS520 |
| EHDB650 | EHDBAS650 |
| EHDB800 | EHDBAS800 |
| EHDB960 | EHDBAS960 |
| **2 Pole** | |
| EHDB220 | EHDBAS220-2 |
| EHDB280 | EHDBAS280-2 |
| EHDB360 | EHDBAS360-2 |
| EHDB520 | EHDBAS520-2 |
| EHDB650 | EHDBAS650-2 |
| EHDB800 | EHDBAS800-2 |
| EHDB960 | EHDBAS960-2 |

## Auxiliary contact blocks — EHDB220 to EHDB960

| Contactor size | Description | Terminal markings | | Catalog number | |
|---|---|---|---|---|---|
| EHDB130 to EHDB960 | Standard 1 N.O. & 1 N.C. | 13, 14 | 21, 22 | CAL16-11A | L |
| | Standard 1 N.O. & 1 N.C. | 43, 44 | 31, 32 | CAL16-11B | R |
| | Standard 1 N.O. & 1 N.C. | 53, 54 | 61, 62 | CAL16-11C | L |
| | Standard 1 N.O. & 1 N.C. | 83, 84 | 71, 72 | CAL16-11D | R |
| | Late break 1 N.O. & 1 N.C. | 47, 48 | 35, 36 | CAL16-11E | L,R |

EHDB130 to EHDB960 contactors are provided with a 1 N.O. & 1 N.C. auxiliary contact block mounted on each contactor. One additional 1 N.O. & 1 N.C. auxiliary contact block can be mounted on the left side of the contactor and two additional 1 N.O. & 1 N.C. contact blocks can be mounted on the right side.

## Positive driven action auxiliary contact blocks — EHDB220 to EHDB360

| Contactor size | Description | Terminal markings | | Catalog number | |
|---|---|---|---|---|---|
| EHDB220 to EHDB360 | Standard 1 N.O. & 1 N.C. | 13, 14 | 21, 22 | CAL16-11A | L |
| | Standard 1 N.O. & 1 N.C. | 43, 44 | 31, 32 | CAL16-11B | R |

Only one of these auxiliary contact blocks can be mounted on each side of the contactor. They fulfi ll the mirror contacts IEC609 47-1 Annex F, positive driven action IEC609 47-1, Chapter 4. They also fulfi ll elevator standard ASME A17-1-2000.

① For other voltages, see page 1.26.

# Replacement parts

EHDBCK280-2

EHDBCK280-NC

## Contact kits – 2 Pole, N.O.

| Contactor size | Catalog number |
|---|---|
| DA75 | ZL75 |
| EHDB220 | EHDBCK220-2 |
| EHDB280 | EHDBCK280-2 |
| EHDB360 | EHDBCK360-2 |
| EHDB520 | EHDBCK520-2 |
| EHDB650 | EHDBCK650-2 |
| EHDB800 | EHDBCK800-2 |
| EHDB960 | EHDBCK960-2 |

## N.C. DB Kit only

| Contactor size | Contact rating | Auxiliary interlocks | Catalog number |
|---|---|---|---|
| DA75 | 55A/160V; 28A/300V | 1 NO | CA5D-11 |
| DA75 | 300V | — | CA5D-01 |
| EHDB220 | 300V | — | EHDBCK220-NC |
| EHDB280 | 300V | — | EHDBCK280-NC |
| EHDB360 | 300V | — | EHDBCK360-NC |
| EHDB520 | 300V | — | EHDBCK520-NC |
| EHDB650 | 300V | — | EHDBCK650-NC |
| EHDB800 | 300V | — | EHDBCK800-NC |
| EHDB960 | 300V | — | EHDBCK960-NC |

## Lug kits – 2 & 3 Pole

| Contactor size | Wire size | Catalog number |
|---|---|---|
| EHDB220 – EHDB280 | 6-250 | EHTK210 |
| EHDB360 – EHDB650 | 4-500 | EHTK550N |
| EHDB800 | (2) 4-500 | EHTK700 |
| EHDB960 | (3) 2-600 | EHTK800 |

# Technical data
## Type DA

| Contactor | | DA75-21 | DA75-21A |
|---|---|---|---|
| **Center pole** | | | |
| N.C. Pole, 150V Make | Max. Amps | 90 | — |
| N.C. Pole, 150V Break | Max. Amps | 55 | — |
| N.C. Pole, 300V Make | Max. Amps | — | 90 |
| N.C. Pole, 300V Break | Max. Amps | — | 55 |
| **DC rating** | | | |
| Maximum thermal current | A | 60 | 60 |
| Peak interrupting current A | 90 | 90 | |
| **Connectable wire size** | | | |
| Main poles with lugs | | 8 – 1 | 8 – 1 |
| Auxiliary contacts, min/max | | 18 – 10 | 18 – 10 |
| **Main contacts (contactor life)** | | | |
| Mechanical endurance @ no load | mil. | 5 | 5 |
| Electrical endurance, main poles | mil. | 1.5 | 1.5 |
| Frequency of operations per hour | 600 | 600 | |
| **Auxiliary contacts** | | | |
| NEMA rating | | A600 | A600 |
| AC rated voltage | V | 600 | 600 |
| AC thermal rated current A | 10 | 10 | |
| AC maximum making | VA | 7200 | 7200 |
| AC maximum breaking | VA | 720 | 720 |
| NEMA rating | | P600 | P600 |
| DC rated voltage | V | 600 | 600 |
| DC thermal rated current A | 5 | 5 | |
| DC maximum make-break | A | 0.2 | 0.2 |
| Min. breakdown AC RMS voltage between live parts and ground | V | 2200 | 2200 |
| Minimum permissable load, 17V | A | 0.005 | 0.005 |
| Max. wire size on terminals @ 2/term | | 10 AWG | 10 AWG |
| Max. operations per hour | | 600 | 600 |
| Min. expected mechanical life | mil. | 10 | 10 |
| Min. expected electrical life | mil. | 2 | 2 |
| **Coil operating data** | | | |
| AC power consumption | | | |
| Inrush 60 Hz | VA | 200 | 200 |
| Holding 60 Hz | VA | 20 | 20 |
| Holding 60 Hz | W | 5.5 | 5.5 |
| AC operating time (in milliseconds) | | | |
| Closing time | ms | 20 – 25 | 20 – 15 |
| Opening time | ms | 10 – 15 | 10 – 15 |
| **General data** | | | |
| Approximate weight | lbs | 2.4 | 2.4 |
| **Temperature limits** | | | |
| Maximum operating temperature | °C | 50 | 50 |
| Minimum operating temperature | °C | -25 | -25 |
| Minimum storage temperature | °C | -40 | -40 |
| Maximum storage temperature | °C | 70 | 70 |
| Min. breakdown AC RMS voltage | V | 2200 | 2200 |
| **Operating altitude** | | | |
| Maximum operating altitude | feet | 10,000 | 10,000 |

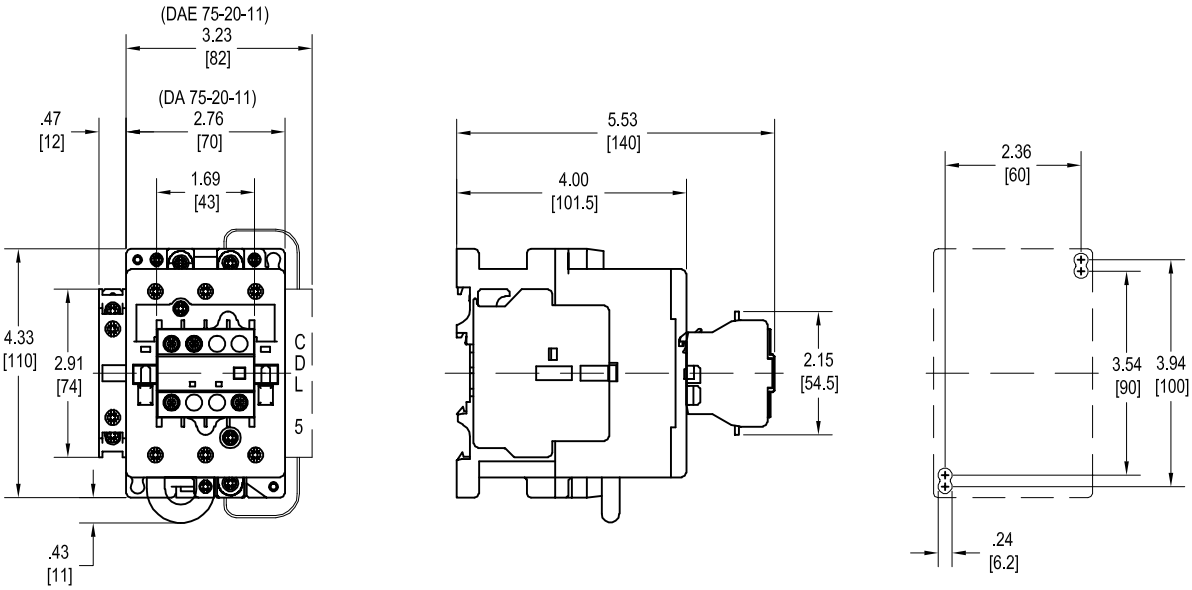
# Technical data
## Type EHDB

| Contactor model number | | EHDB220 | EHDB280 | EHDB360 | EHDB520 | EHDB650 | EHDB800 | EHDB960 |
|---|---|---|---|---|---|---|---|---|
| N.O. poles, Amps | 600 VDC | 220 | 280 | 360 | 520 | 650 | 800 | 960 |
| N.C. pole, 600V Make | Max. amps | 456 | 565 | 728 | 1040 | 1300 | 1600 | 1920 |
| N.C. pole, 300V Break | Max. amps | 285 | 363 | 472 | 680 | 850 | 1050 | 1250 |
| **Connectable wire size** | | | | | | | | |
| Main poles with lugs | | 8 – 30 | 5 – 250 kcmils | 4 – 500 kcmils | (2) 4 – 500 kcmils | (2) 4 – 500 kcmils | (3) 2 – 600 kcmils | (3) 2 – 600 kcmils |
| Auxiliary contacts | min./max. | 16/10 | 16/10 | 16/10 | 16/10 | 16/10 | 16/10 | 16/10 |
| **DC rating information** | **No. Poles** | | | | | | | |
| Peak interrupting current | A | 330 | 420 | 540 | 780 | 975 | 1200 | 1440 |
| Maximum thermal current | A | 220 | 280 | 360 | 520 | 650 | 800 | 960 |
| **Main contacts (contactor life)** | | | | | | | | |
| Mechanical endurance @ no load | mil. | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Electrical endurance | mil. | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Frequency of operations | per hour | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| **Auxiliary contacts** | | | | | | | | |
| NEMA rating | | A600 | A600 | A600 | A600 | A600 | A600 | A600 |
| AC rated voltage | V | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| AC thermal rated current | A | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| AC maximum making | VA | 7200 | 7200 | 7200 | 7200 | 7200 | 7200 | 7200 |
| AC maximum breaking | VA | 720 | 720 | 720 | 720 | 720 | 720 | 720 |
| NEMA rating | | | | | | | | |
| DC rated voltage | V | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| DC thermal rated current | A | 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 |
| Min. breakdown AC RMS voltage between live parts and ground | | 2200 | 2200 | 2200 | 2200 | 2200 | 2200 | 2200 |
| Min. permissable load, 17V | A | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |
| Expected mechanical life | mil. | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Max. operations per hour | | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| **Coil operating data** | | | | | | | | |
| AC power consumption | | | | | | | | |
| Inrush 60 Hz | VA | 900 | 900 | 1200 | 2900 | 2900 | 400 | 4000 |
| Holding 60 Hz | VA | 52 | 52 | 65 | 105 | 105 | 140 | 140 |
| Holding 60 Hz | W | 18 | 18 | 22 | 44 | 44 | 60 | 60 |
| DC power consumption | | | | | | | | |
| Inrush | W | 500 | 500 | 630 | 800 | 800 | 1100 | 1100 |
| Holding | W | 3.6 | 3.6 | 4 | 20 | 20 | 20 | 20 |
| AC operating time | | | | | | | | |
| Closing time | ms | 20 – 30 | 20 – 30 | 20 – 30 | 30 – 50 | 30 – 50 | 30 – 50 | 30 – 50 |
| Opening time | ms | 7 – 15 | 7 – 15 | 7 – 15 | 10 – 20 | 10 – 20 | 10 – 20 | 10 – 20 |
| DC operating time | | | | | | | | |
| Closing time | ms | 30 – 40 | 30 – 40 | 30 – 40 | 60 – 80 | 60 – 80 | 60 – 80 | 60 – 80 |
| Opening time | ms | 27 – 37 | 27 – 37 | 27 – 37 | 10 – 20 | 55 – 75 | 55 – 75 | 55 – 75 |
| **General data** | | | | | | | | |
| Approximate weight | lbs | 9.2 | 9.2 | 13 | 27.3 | 27.3 | 37 | 38 |
| Temperature limits | | | | | | | | |
| Maximum operating temperature | °C | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| Minimum operating temperature | °C | -40 | -40 | -40 | -40 | -40 | -40 | -40 |
| Minimum storage temperature | °C | -50 | -50 | -50 | -50 | -50 | -50 | -50 |
| Maximum storage temperature | °C | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| Min. Breakdown AC | RMS Voltage | 2200 | 2200 | 2200 | 2200 | 2200 | 2200 | 2200 |
| **Operating altitude** | | | | | | | | |
| Maximum operating altitude | feet | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |

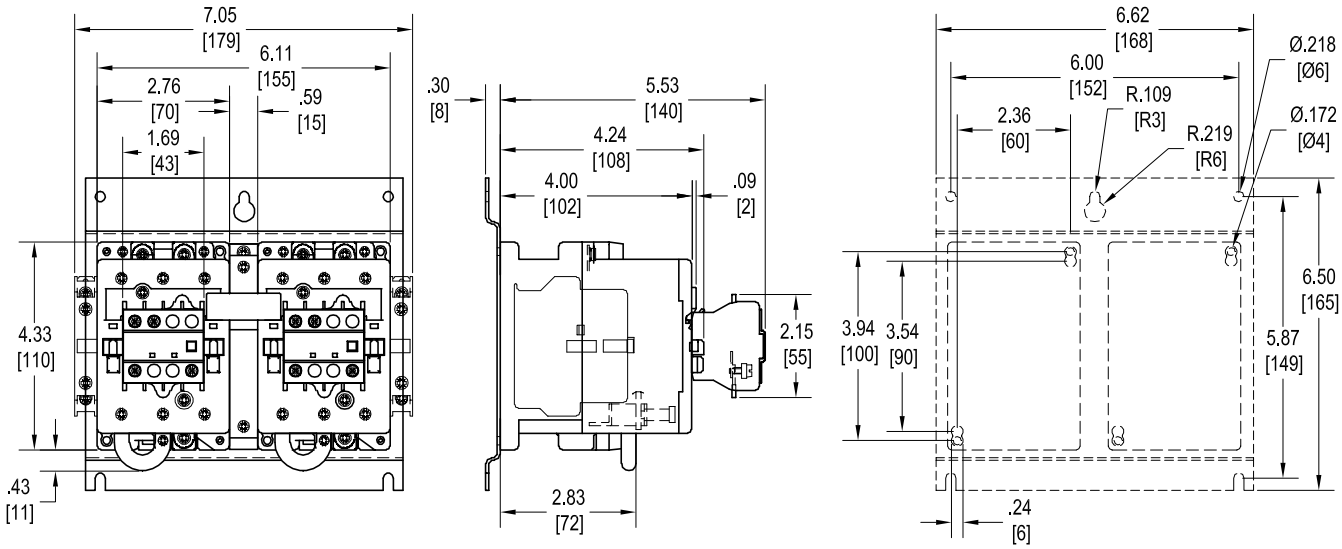
# Approximate dimensions

## Type DA, 2 & 3 pole

### DA75

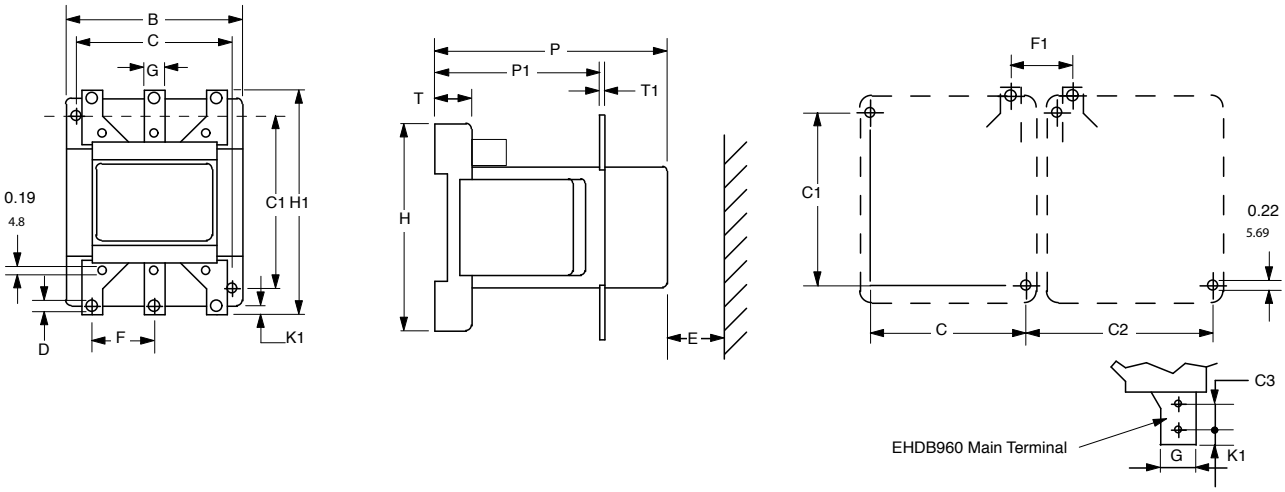



### DA75M



# Approximate dimensions
## Type EHDB, 2 & 3 pole
## Mounting positions

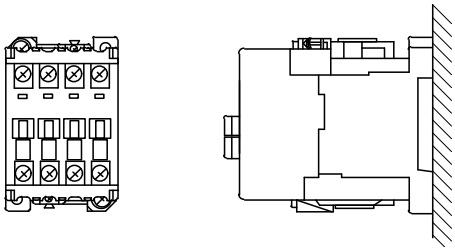
### EHDB220 – EHDB960




| DIM. | B | | | B2 | C | C1 | C2 | | | | E | D | F | G | H | H1 | K1 | P | P1 | T | T1 | C3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1, 2 | 3 | 4 | | | | ① Aux. contact block | ② | ③ | ④ | | | | | | | | | | | | |
| EHDB220in | 5.35 | 5.83 | 6.30 | 6.46 | 4.72 | 5.51 | 5.39 | 5.39 | 5.87 | 6.34 | 0.59 | 0.24 | 1.77 | 0.79 | 6.14 | 7.79 | 0.39 | 6.65 | 4.06 | 0.41 | 0.20 | — |
| *mm* | *136* | *148* | *160* | *164* | *120* | *140* | *137* | *137* | *149* | *161* | *15* | *6* | *45* | *20* | *156* | *198* | *10* | *169* | *103* | *10.5* | *5* | — |
| EHDB280in | 5.35 | 5.83 | 6.30 | 6.46 | 4.72 | 5.51 | 5.39 | 5.39 | 5.87 | 6.34 | 0.59 | 0.24 | 1.77 | 0.79 | 6.14 | 7.79 | 0.39 | 6.65 | 4.06 | 0.41 | 0.20 | — |
| *mm* | *136* | *148* | *160* | *164* | *120* | *140* | *137* | *137* | *149* | *161* | *15* | *6* | *45* | *20* | *156* | *198* | *10* | *169* | *103* | *10.5* | *5* | — |
| EHDB360in | 6.92 | 7.44 | 7.72 | 8.11 | 6.30 | 5.51 | 7.20 | 7.32 | 7.48 | 7.76 | 1.18 | 0.24 | 2.44 | 0.98 | 6.14 | 8.14 | 0.49 | 6.88 | 4.21 | 0.7 | 0.20 | — |
| *mm* | *176* | *189* | *196* | *206* | *160* | *140* | *183* | *186* | *190* | *197* | *30* | *6* | *62* | *25* | *156* | *207* | *12.5* | *175* | *107* | *19* | *5* | — |
| EHDB520in | 7.80 | 8.23 | 8.62 | 8.90 | 6.69 | 7.87 | 7.91 | 7.91 | 8.19 | 8.54 | 1.57 | 0.24 | 2.64 | 0.98 | 8.78 | 10.71 | 0.49 | 8.90 | 5.51 | 0.9 | 0.24 | — |
| *mm* | *198* | *209* | *219* | *226* | *170* | *200* | *201* | *201* | *208* | *217* | *40* | *6* | *67* | *25* | *223* | *272* | *12.5* | *226* | *140* | *23* | *6* | — |
| EHDB650in | 7.80 | 8.23 | 8.62 | 8.90 | 6.69 | 7.87 | 7.91 | 7.91 | 8.19 | 8.54 | 1.57 | 0.24 | 2.64 | 0.98 | 8.78 | 10.71 | 0.49 | 8.90 | 5.51 | 0.9 | 0.24 | — |
| *mm* | *198* | *209* | *219* | *226* | *170* | *200* | *201* | *201* | *208* | *217* | *40* | *6* | *67* | *25* | *223* | *272* | *12.5* | *226* | *140* | *23* | *6* | — |
| EHDB800in | 9.61 | 9.96 | 10.31 | 10.63 | 8.66 | 7.87 | 9.69 | 9.690 | 10.00 | 10.35 | 1.57 | 0.24 | 3.23 | 1.57 | 8.78 | 11.57 | 0.79 | 8.90 | 5.51 | 0.9 | 0.24 | — |
| *mm* | *244* | *253* | *262* | *270* | *220* | *200* | *246* | *246* | *254* | *263* | *40* | *6* | *82* | *40* | *223* | *294* | *20* | *226* | *140* | *23* | *6* | — |
| EHDB960in | 9.61 | 9.96 | 10.31 | 10.63 | 8.66 | 7.87 | 9.69 | 9.690 | 10.00 | 10.35 | 1.57 | 0.24 | 3.23 | 1.57 | 8.78 | 11.57 | 0.79 | 8.90 | 5.51 | 0.9 | 0.24 | 1.36 |
| *mm* | *244* | *253* | *262* | *270* | *220* | *200* | *246* | *246* | *254* | *263* | *40* | *6* | *82* | *40* | *223* | *294* | *20* | *226* | *140* | *23* | *6* | *34.5* |

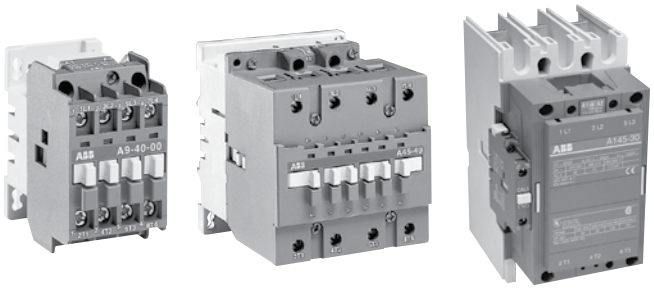
① Minimum dimension
② Makes distance F1 = F
③ Includes space for three auxiliary contact blocks between the contactors.
④ Includes space for four auxiliary contact blocks between the contactors.
⑤ Damping elements are included.
NOTE: Screw, nut and washer are included for terminal hardware.

### Type DA & EHDB mounting positions



# Notes

# Lighting contactors
## A9 – A300



### Features
- CE mark
- Compact space saving design
- Standard auxiliary contact configurations:
  A9 - A40 1 NO or 1 NC
  A50 - A110 1 NO & 1 NC
- Additional auxiliary contact blocks are available
- Panel mounting with screws or fast, snap-on DIN rail mounting
- Silver alloy 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); (AL9 - AL40); (AF50 - AF75)
- UL File No: E36588 (A95 - A110); (AE95 - AE110); (AF145 - AF750)
- CSA File No: LR56745 (A9 - A75); (AE9 - AE75); (AF50 - AF75)
- CSA File No: LR19700 (A95 - A110); (AE95 - AE110); (AF145 - AF750)

### Applications
Lighting contactors can be used to control a variety of lighting loads including:
- Tungsten filament lighting loads (incandescent), iodine lamps, quartz-iodine and infrared lamps
- Electric discharge lighting loads (ballast), high intensity discharge (HID), mercury vapor, metal halide and high pressure sodium and fluorescent lamps

### Typical applications
- Parking lots
- Industrial plants
- Office buildings
- Theaters and auditoriums
- Stadiums
- Shopping centers
- Airports
- Hospitals
- Transportation lighting
- Institutions

### Description
The A-Line lighting contactors are available with or without an enclosure.
- Maximum operating voltage of 600VAC 60Hz
- Includes 3, 4, 8 or 12 pole versions, other versions on request
- Electrically or mechanically held contactors
- IP 20 protection for connection terminals
- Can be mounted onto a mounting plate or a 35 x 7.5mm DIN rail
- UL/CSA Approved

Lighting Contactors

# A9 - A300
## Electrically & mechanically held

A9-40-00

A45-40-00

A145-30-11

| Normally Open Power Poles | | | Electrically Held | | | Mechanically Held | | |
|---|---|---|---|---|---|---|---|---|
| | | | Open Type | UL Type 1 Enclosed | | Open Type | UL Type 1 Enclosed | |
| Ballast Amp Rating | Incandescent (Tungsten) Amp Rating | Number of Power Poles | Catalog number | Enclosure Size | Catalog number | Catalog number | Enclosure Size | Catalog number |
| 15 | 15 | 4 | A9-40-00-84 | A | A9C4P1-84 | A9L-40-00-84 | B | A9LC4P1-84 |
| 15 | 15 | 8 | A9-80-00-84 | A | A9C8P1-84 | A9L-80-00-84 | B | A9LC8P1-84 |
| 15 | 15 | 12 | A9-120-00-84 | A | A9C12P1-84 | A9L-120-00-84 | B | A9LC12P1-84 |
| 30 | 20 | 4 | A16-40-00-84 | A | A16C4P1-84 | A16L-40-00-84 | B | A16LC4P1-84 |
| 30 | 20 | 8 | A16-80-00-84 | A | A16C8P1-84 | A16L-80-00-84 | B | A16LC8P1-84 |
| 30 | 20 | 12 | A16-120-00-84 | A | A16C12P1-84 | A16L-120-00-84 | B | A16LC12P1-84 |
| 30 | 30 | 4 | A16-40L-00-84 | A | A16C4PL1-84 | A16L-40L-00-84 | B | A16LC4PL1-84 |
| 30 | 30 | 8 | A16-80L-00-84 | A | A16C8PL1-84 | A16L-80L-00-84 | B | A16LC8PL1-84 |
| 30 | 30 | 12 | A16-120L-00-84 | A | A16C12PL1-84 | A16L-120L-00-84 | B | A16LC12PL1-84 |
| 35 | 35 | 4 | A26-40-00-84 | B | A26C4P1-84 | A26L-40-00-84 | B | A26LC4P1-84 |
| 35 | 35 | 8 | A26-80-00-84 | B | A26C8P1-84 | A26L-80-00-84 | B | A26LC8P1-84 |
| 35 | 35 | 12 | A26-120-00-84 | B | A26C12P1-84 | A26L-120-00-84 | B | A26LC12P1-84 |
| 50 | 50 | 3 | A30-30-10-84 | B | A30C3P1-84 | A30L-30-10-84 | C | A30LC3P1-84 |
| 60 | 60 | 3 | A40-30-10-84 | B | A40C3P1-84 | A40L-30-10-84 | C | A40LC3P1-84 |
| 60 | 60 | 4 | A45-40-00-84 | B | A45C4P1-84 | A45L-40-00-84 | C | A45LC4P1-84 |
| 65 | 65 | 3 | A50-30-00-84 | B | A50C3P1-84 | A50L-30-00-84 | C | A50LC3P1-84 |
| 65 | 65 | 4 | A50-40-00-84 | B | A50C4P1-84 | A50L-40-00-84 | C | A50LC4P1-84 |
| 85 | 85 | 3 | A63-30-00-84 | B | A63C3P1-84 | A63L-30-00-84 | C | A63LC3P1-84 |
| 105 | 105 | 3 | A75-30-00-84 | B | A75C3P1-84 | A75L-30-00-84 | C | A75LC3P1-84 |
| 105 | 105 | 4 | A75-40-00-84 | B | A75C4P1-84 | A75L-40-00-84 | C | A75LC4P1-84 |
| 120 | 120 | 3 | A95-30-00-84 | B | A95C3P1-84 | --- | --- | --- |
| 200 | 200 | 3 | A145-30-00-84 | E | A145C3P1-84 | --- | --- | --- |
| 300 | 300 | 3 | A210-30-00-84 | F | A210C3P1-84 | --- | | --- |
| 400 | 400 | 3 | A300-30-00-84 | F | A300C3P1-84 | --- | --- | --- |

| Normally Closed Power Poles | | | Electrically Held | | | Mechanically Held | | |
|---|---|---|---|---|---|---|---|---|
| | | | Open Type | UL Type 1 Enclosed | | Open Type | UL Type 1 Enclosed | |
| Ballast Amp Rating | Incandescent (Tungsten) Amp Rating | Number of Power Poles | Catalog number | Enclosure Size | Catalog number | Catalog number | Enclosure Size | Catalog number |
| 30 | 20 | 4 | A16-04-00-84 | B | A16C4NCP1-84 | A16L-04-00-84 | B | A16LC4NCP1-84 |
| 30 | 20 | 8 | A16-08-00-84 | B | A16C8NCP1-84 | A16L-08-00-84 | B | A16LC8NCP1-84 |
| 30 | 20 | 12 | A16-012-00-84 | B | A16C12NCP1-84 | A16L-012-00-84 | B | A16LC12NCP1-84 |

## Coil voltage selection

All 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: A75-30-00-80

### Coil voltage selection

| | Cntr | Volts | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hz | 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, consult factory

## Control transformer option

| Contactor size | VA rating |
|---|---|
| A9 – A40 | 50 |
| A50 – A75 | 75 |
| A95 | 100 |
| A145 | 150 |
| A210 – A300 | 250 |

### Control transformer voltage selection chart

| | | Volts | | | |
|---|---|---|---|---|---|
| Hz | Type | 208/120 | 230 – 240/120 | 460 – 480/120 | 575 – 600/120 |
| 50/60 | A | 0 | 7 | 8 | 9 |

For other voltages, consult factory

# A9 - A300
## Electrically & mechanically held

| 2 Normally Open & 2 Normally Closed Power Poles | | | Electrically Held | | | Mechanically Held | | |
|---|---|---|---|---|---|---|---|---|
| | | | Open Type | UL Type 1 Enclosed | | Open Type | UL Type 1 Enclosed | |
| Ballast Amp Rating | Incandescent (Tungsten) Amp Rating | Number of Power Poles | Catalog number | Enclosure Size | Catalog number | Catalog number | Enclosure Size | Catalog number |
| 15 | 15 | 2 NO / 2 NC | A9-22-00-84 | A | A9C22P1-84 | A9L-22-00-84 | A | A9LC22P1-84 |
| 30 | 20 | 2 NO / 2 NC | A16-22-00-84 | B | A16C22P1-84 | A16L-22-00-84 | B | A16LC22P1-84 |
| 35 | 35 | 2 NO / 2 NC | A26-22-00-84 | B | A26C22P1-84 | A26L-22-00-84 | B | A26LC22P1-84 |
| 60 | 60 | 2 NO / 2 NC | A45-22-00-84 | B | A45C22CP1-84 | A45L-22-00-84 | C | A45LC22CP1-84 |
| 105 | 105 | 2 NO / 2 NC | A75-22-00-84 | B | A75C22CP1-84 | A75L-22-00-84 | C | A75LC22CP1-84 |

## NEMA rated

| Normally open Power Poles 600 VAC Max. | | | Electrically held Open type |
|---|---|---|---|
| Ballast Amp Rating | Incandescent (Tungsten) Amp rating | Number of Power poles 1 | Catalog number |
| 30 | 30 | 3 | L30A3010Δ |
| 60 | 60 | 3 | L60A3010Δ |
| 100 | 100 | 3 | L100A3000Δ |
| 200 | 200 | 3 | L200A3000Δ |

## Coil voltage selection

All 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: A75-30-00-80

### Coil voltage selection

| | Cntr | Volts | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hz | 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, consult factory

## Control transformer option

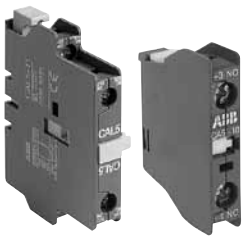
| Contactor size | VA rating |
|---|---|
| A9 – A40 | 50 |
| A50 – A75 | 75 |
| A95 | 100 |
| A145 | 150 |
| A210 – A300 | 250 |

### Control transformer voltage selection chart

| | | Volts | | | |
|---|---|---|---|---|---|
| Hz | Type | 208/120 | 230 – 240/120 | 460 – 480/120 | 575 – 600/120 |
| 50/60 | A | 0 | 7 | 8 | 9 |

For other voltages, consult factory

# Accessories
# Factory modifications



CAL5-11 CA5-10

WB75-01

RV5/50

## Accessories

### Auxiliary contact blocks

| Mounting on contactors | Positioning | Contacts | | Catalog number |
|---|---|---|---|---|
| A 9 … A 95 | Front face | 1 | - | CA5-10 |
| | | - | 1 | CA5-01 |
| A 9 … A 40 | Front face | 3 | 1 | CA5-31M |
| | | 2 | 2 | CA5-22M |
| A 9 … A 75 | Side | 1 | 1 | CAL5-11 |
| A 95 … A 300 | Side | 1 | 1 | CAL18-11 |
| A145... A 300 | Side | 1 | 1 | CAL18-11B |

### Mechanical latch

| For contactors | Voltage | Catalog number |
|---|---|---|
| A 9 … A 75 | 24 … 28 V a.c./d.c. | WB75A-01 |
| | 48 … 55 V a.c./d.c. | WB75A-03 |
| | 110 … 127V a.c./d.c. | WB75A-04 |
| | 230 … 277 V a.c./d.c. | WB75A-05 |
| | 380 … 440 V a.c./d.c. | WB75A-07 |
| | 440 … 480 V a.c./d.c. | WB75A-08 |

### Surge suppressor, varistor

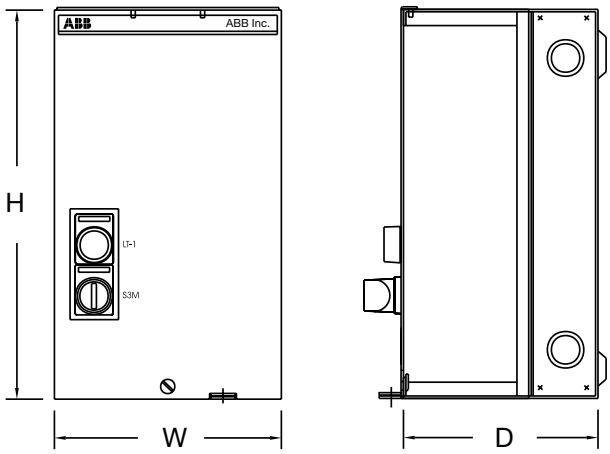
| For contactors | Voltage range | Catalog number |
|---|---|---|
| A 9 … A 110 | 24 … 50 V a.c./d.c. | RV5/50 |
| | 50 … 133 V a.c./d.c. | RV5/133 |
| | 110 … 250 V a.c./d.c. | RV5/250 |
| | 250 … 440 V a.c./d.c. | RV5/440 |

## Factory modifications for enclosed contactors

### Pilot devices

| Description | Suffix code |
|---|---|
| Selector - 2 position maintained OFF - ON | C |
| Selector - 3 position maintained HAND OFF - AUTO | D |
| Pilot light - ON (green) | R |

# Approximate dimensions




## Enclosure dimensions (in)

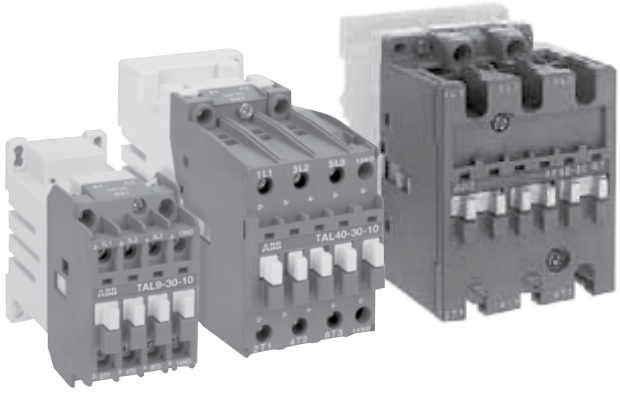
| Type | H | W | D |
|---|---|---|---|
| A | 11 | 6 | 5 |
| B | 13 | 9 | 7 |
| C | 14 | 12 | 8 |
| D | 24 | 12 | 8 |
| E | 30 | 24 | 9 |

# Notes

# Railway application contactors

## Types TBC, TAL & TAE
## TNL, ring-tongue termination






### Description

Rolling stock applications necessitate compliance to national and international standards tailored to railway environments (see "Reference Standards" on the following page). In order to improve reliability and durability, most railway applications employ specific connection methods, such as ring-tongue termination.

Coil surge suppression is also popular among rail applications. ABB's AF Series contactors are equipped with integral surge suppression in the form of a free-wheel diode, eliminating the need for additional accessories. AF Series devices are also immune to short time voltage interruption (or voltage dips) up to 20 ms.

### Contactors and contactor relays are used in versatile rolling stock applications:

- Lighting
- Heating
- Braking
- Air conditioning
- Ventilation
- Door control

### Requirements of railway applications

- Control networks typically utilizing DC (battery source) with wide voltage ranges:
  – 0.7 Uc ... 1.25 Uc (Operating limits included as Uc)
- Wide temperature range: -40 °C… +70 °C
- Shock & vibration withstand
- Fire-retardant / low smoke materials required

Railway application Contactors

# Reference standards

### The contactor and control relays described in the following pages are in accordance with the following standards:

- IEC 60077-1 and IEC 60077-2 : Railway applications - Electric equipment for rolling stock.
- IEC 61373 : Railway applications - Rolling stock - Shocks and vibration tests.
- NF F 60002 : French standard - Vibration tests.
- IEC 60947-4-1 / EN 60947-4-1 : Low voltage controlgear - Contactors and motor starters.
- IEC 60947-5-1 / EN 60947-5-1 : Low voltage controlgear - Control circuit devices and switching elements.
- NF F 62000 : French standard - Functional tests for French railways (SNCF).

### "Fire and Smoke" classification

According to ASTM standards:

ASTM standards, mainly used in North America, device products into two categories:

- For surfaces < 16 inch2 the products are tested in accordance with:
  - ASTM E1354 : flammability and visible smoke
- For surfaces > 16 inch2 the products are tested in accordance with:
  - E662 (97): density of smoke,
  - E162 (98): flammability of surface and
  - BSS 7239: toxicity of smoke (CO, HF, NO2, HCl, HCN, SO2).

Most of contactors, contactor relays and accessories have been tested according to the above standards. Certificates are available on request.

### According to NF F standards:

French standards NF F (Normes Francaises Ferroviaires) are mainly used in Europe and Asia.

- NF F 16101: Fire behavior - Material choosing.
- NF F 16102: Fire behavior - Application to electrical equipment.

The contactors and accessories are at severity level 2 or 3 (classification level from 1 to 4) according to flammability (mark I) on the one hand, the opacity and toxicity of smoke (mark F) (CO, CO2, HCl, HBr, HCN, HF, SO2) in other hand.

Note: French standards are still used as references in some international railways because they were used for a long time and were alone to qualify the fire and smoke problem. There is no links between ASTM and NFF standards. A plastic material acceptable in NF F frame doesn't mean the acceptability in ASTM frame.

### Technical data

Technical data for the following devices is provided in Literature no. 1SBC104032D0201. Please reference this document number at ABB.com to download or contact Technical Support at 1 (888) 385.1221, Option 4

# Standard devices, ring-tongue, 3-pole
## A/L9…A/F75
## AC or DC controlled

A26..RT

A50…A75..RT

### Electrical ratings

| AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | Standard auxiliary contacts | | Catalog number, AC controlled | Catalog number, DC controlled |
|---|---|---|---|---|---|---|---|---|---|
| 600V | | 200…208V | 220…240V | 440…480V | 550…600V | NO | NC | | |
| 21 | 9 | 2 | 2 | 5 | 7.5 | 1 | - | A93010RT-Δ | AL93010RT-Δ |
| | | | | | | - | 1 | A93001RT-Δ | AL93001RT-Δ |
| 25 | 11 | 3 | 3 | 7.5 | 10 | 1 | - | A123010RT-Δ | AL123010RT-Δ |
| | | | | | | - | 1 | A123001RT-Δ | AL123001RT-Δ |
| 30 | 17 | 5 | 5 | 10 | 15 | 1 | - | A163010RT-Δ | AL163010RT-Δ |
| | | | | | | - | 1 | A163001RT-Δ | AL163001RT-Δ |
| 40 | 28 | 7.5 | 10 | 20 | 25 | 1 | - | A263010RT-Δ | AL263010RT-Δ |
| | | | | | | - | 1 | A263001RT-Δ | AL263001RT-Δ |
| 50 | 34 | 10 | 10 | 25 | 30 | 1 | - | A303010RT-Δ | AL303010RT-Δ |
| | | | | | | - | 1 | A303001RT-Δ | AL303001RT-Δ |
| 60 | 42 | 10 | 15 | 30 | 40 | 1 | - | A403010RT-Δ | AL403010RT-Δ |
| | | | | | | - | 1 | A403001RT-Δ | AL403001RT-Δ |
| 80 | 54 | 15 | 20 | 40 | 50 | 1 | 1 | A503011RT-Δ | AF503011RT-Δ |
| 90 | 68 | 20 | 25 | 50 | 60 | 1 | 1 | A633011RT-Δ | AF633011RT-Δ |
| 105 | 80 | 25 | 30 | 60 | 75 | 1 | 1 | A753011RT-Δ | AF753011RT-Δ |

Note: devices with ring-tongue termination UL recognized

### Coil voltage selection chart (Δ)

| Rated control circuit voltage $U_c$ | A9…A75 | AL9...AL40 | AF50…AF75 |
|---|---|---|---|
| 12V DC | - | 80 | 80 |
| 24V AC | 81 | - | - |
| 24V DC | - | 81 | 81 |
| 20…60V DC | - | | 72 |
| 110V/50, 110…120V/60 | 84 | - | - |
| 48…130V AC/DC | - | - | 69 |
| 100…250V AC/DC | - | - | 70 |
| 125V DC | - | 87 | 87 |
| 220V DC | - | 88 | 88 |
| 230..240V/60 | 80 | - | - |
| 240V DC | - | 89 | 89 |
| 480V/60 | 51 | - | - |
| 600V/60 | 55 | - | - |

Example:
24V DC input voltage: AL303010RT-81
120V AC input voltage: A753011RT-84

# Traction-specific, ring-tongue, 3-pole

## TBC7, TAL9…AF300B

## DC controlled, standard & ring-tongue termination

TBC7-30

TAL26..RT

TAE50…TAE75..RT

AF210B…AF300B

### Electrical ratings

| AC general purpose ratings (A) | Maximum motor switching current (A) | AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp) | | | | Standard auxiliary contacts | | Catalog number, Standard termination | Catalog number, Ring-tongue termination |
|---|---|---|---|---|---|---|---|---|---|
| 600V | | 200…208V | 220…240V | 440…480V | 550…600V | NO | NC | | |
| 16 | 9.6 | 2 | 3 | 5 | 5 | 1 | - | TBC7-30-10-Δ | - |
| | | | | | | - | 1 | TBC7-30-01-Δ | - |
| 21 | 9 | 2 | 2 | 5 | 7.5 | 1 | - | TAL9-30-10-Δ | TAL9-30-10RT-Δ |
| | | | | | | - | 1 | TAL9-30-01-Δ | TAL9-30-01RT-Δ |
| 25 | 11 | 3 | 3 | 7.5 | 10 | 1 | - | TAL12-30-10-Δ | TAL12-30-10RT-Δ |
| | | | | | | - | 1 | TAL12-30-01-Δ | TAL12-30-01RT-Δ |
| 30 | 17 | 5 | 5 | 10 | 15 | 1 | - | TAL16-30-10-Δ | TAL16-30-10RT-Δ |
| | | | | | | - | 1 | TAL16-30-01-Δ | TAL16-30-01RT-Δ |
| 40 | 28 | 7.5 | 10 | 20 | 25 | 1 | - | TAL26-30-10-Δ | TAL26-30-10RT-Δ |
| | | | | | | - | 1 | TAL26-30-01-Δ | TAL26-30-01RT-Δ |
| 50 | 34 | 10 | 10 | 25 | 30 | 1 | - | TAL30-30-10-Δ | TAL30-30-10RT-Δ |
| | | | | | | - | 1 | TAL30-30-01-Δ | TAL30-30-01RT-Δ |
| 60 | 42 | 10 | 15 | 30 | 40 | 1 | - | TAL40-30-10-Δ | TAL40-30-10RT-Δ |
| | | | | | | | 1 | TAL40-30-01-Δ | TAL40-30-01RT-Δ |
| 80 | 54 | 15 | 20 | 40 | 50 | 1 | 1 | TAE50-30-11-Δ | TAE50-30-11RT-Δ |
| 105 | 80 | 25 | 30 | 60 | 75 | 1 | 1 | TAE75-30-11-Δ | TAE75-30-11RT-Δ |
| 150 | 88 | 30 | 30 | 60 | 75 | 1 | 1 | AF95B-30-11-Δ | AF95B-30-11RT-Δ |
| 150 | 104 | 30 | 40 | 75 | 100 | 1 | 1 | AF110B-30-11-Δ | AF110B-30-11RT-Δ |
| 230 | 130 | 40 | 50 | 100 | 125 | 1 | 1 | AF145B-30-11-Δ | AF145B-30-11RT-Δ |
| 250 | 156 | 50 | 60 | 125 | 150 | 1 | 1 | AF185B-30-11-Δ | AF185B-30-11RT-Δ |
| 300 | 192 | 60 | 75 | 150 | 200 | 1 | 1 | AF210B-30-11-Δ | AF210B-30-11RT-Δ |
| 350 | 248 | 75 | 100 | 200 | 250 | 1 | 1 | AF260B-30-11-Δ | AF260B-30-11RT-Δ |
| 400 | 302 | 100 | 100 | 250 | 300 | 1 | 1 | AF300B-30-11-Δ | AF300B-30-11RT-Δ |

Note: devices with ring-tongue termination UL recognized

### Coil voltage selection chart (Δ)

| Rated control circuit voltage $U_c$ | TBC7 | TAL9… TAL40 | TAE50… TAE75 | AF95B… AF300B |
|---|---|---|---|---|
| 17…32V DC | 51 | 51 | 51 | - |
| 24…45V DC | 52 | 52 | 52 | - |
| 20…60V DC | - | - | - | 72 |
| 36…65V DC | 54 | 54 | 54 | - |
| 42…78V DC | 58 | 58 | 58 | - |
| 50…90V DC | 55 | 55 | 55 | - |
| 48…130V AC/DC | - | - | - | 69 |
| 77..143V DC | 62 | 62 | 62 | - |
| 90…150V DC | 66 | 66 | 66 | - |
| 100…250V AC/DC | - | - | - | 70 |
| 152…264V DC | 68 | 68 | 68 | - |

Example:
24V DC input voltage: TAL9-30-10-52
120V AC input voltage: AF300B-30-11RT-70

### Coil operating limits

For traction-specific catalog numbers starting with "T", the coil operating limits are included in the coil voltage range (Uc min…Uc max.). For AF..B devices, the coil range is nominal with operating limits 15% below and 10% above the range specified.

# Traction-specific, ring-tongue, 4-pole & relays
## TBC7, TAL9…TAE75, TNL
## DC controlled

TBC7-30

TAL26-40..RT

TAE50-40…TAE75-40..RT

TNL80E

### 4-pole contactors – Electrical ratings

| AC general purpose ratings (A) | Main (power) pole Configuration | | Standard auxiliary contacts | | Catalog number, Standard termination | Catalog number, Ring-tongue termination |
|---|---|---|---|---|---|---|
| 600V | NO | NO | NO | NC | | |
| 16 | 4 | - | - | - | TBC7-40-00-Δ | - |
| | 2 | 2 | | | TBC7-22-00-Δ | - |
| 21 | 4 | - | - | - | TAL9-40-00-Δ | TAL9-40-00RT-Δ |
| | 2 | 2 | | | TAL9-22-00-Δ | TAL9-22-00RT-Δ |
| 30 | 4 | - | - | - | TAL16-40-00-Δ | TAL16-40-00RT-Δ |
| | 2 | 2 | | | TAL16-22-00-Δ | TAL16-22-00RT-Δ |
| 40 | 4 | - | - | - | TAL26-40-00-Δ | TAL26-40-00RT-Δ |
| | 2 | 2 | | | TAL26-22-00-Δ | TAL26-22-00RT-Δ |
| 65 | 4 | - | - | - | TAL45-40-00-Δ | TAL40-40-00RT-Δ |
| 80 | 4 | - | - | - | TAE50-40-00-Δ | TAE50-40-00RT-Δ |
| 105 | 4 | - | - | - | TAE75-40-00-Δ | TAE75-40-00RT-Δ |

Note: devices with ring-tongue termination UL recognized

### Control relays

| Pilot duty ratings | Number of contacts | | | | Catalog number, Standard termination | Catalog number, Ring-tongue termination |
|---|---|---|---|---|---|---|
| | 1st stack | | 2nd stack | | | |
| | NO | NO | NO | NC | | |
| A600, Q300 | 2 | 2 | - | - | TNL22E-Δ | TNL22ERT-Δ |
| | 3 | 1 | - | - | TNL31E-Δ | TNL31ERT-Δ |
| | 4 | - | - | - | TNL40E-Δ | TNL40ERT-Δ |
| | 4 | - | - | 4 | TNL44E-Δ | TNL44ERT-Δ |
| | 4 | - | 2 | 2 | TNL62E-Δ | TNL62ERT-Δ |
| | 4 | - | 4 | - | TNL80E-Δ | TNL80ERT-Δ |

Note: devices with ring-tongue termination UL recognized

### Coil voltage selection chart (Δ)

| Rated control circuit voltage $U_c$ | TBC7 | TAL9… TAL40 | TAE50… TAE75 | AF95B… AF300B |
|---|---|---|---|---|
| 17…32V DC | 51 | 51 | 51 | 51 |
| 24…45V DC | 52 | 52 | 52 | 52 |
| 36…65V DC | 54 | 54 | 54 | 54 |
| 42…78V DC | 58 | 58 | 58 | 58 |
| 50…90V DC | 55 | 55 | 55 | 55 |
| 77..143V DC | 62 | 62 | 62 | 62 |
| 90…150V DC | 66 | 66 | 66 | 66 |
| 152…264V DC | 68 | 68 | 68 | 68 |

Example:
24V DC input voltage: TAL9-22-00-52
120V AC input voltage: TAE75-40-00RT-62

### Coil operating limits
For traction-specific catalog numbers starting with "T", the coil operating limits are included in the coil voltage range (Uc min…Uc max.).

### Load / supply requirements
4-pole devices can be utilized for controlling either 2 separate loads from 2 separate supplies, or 2 separate loads from 1 supply. These devices are not suitable for controlling 1 load from 2 separate supplies. There is no mechanical overlapping (NO poles will break before NC poles make).

# Accessories

**Devices in this section of the catalog utilize the same accessories as ABB's standard across-the-line motor switching devices. Please see the below page references for accessories:**

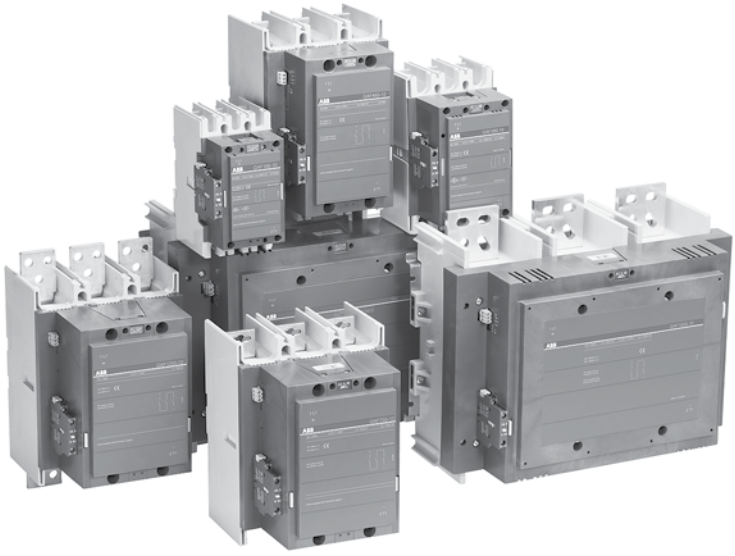
| Accessory type | Page reference |
|---|---|
| Surge suppressors | 1.52…1.53 |
| Mechanical / electrical interlocks | 1.57 |
| Electronic timers | 1.59 |
| Replacement coils | 1.73 |

# DC Circuit switching contactors

## Up to 2050A, 1000V DC

## Type GA/E, GAF, AF

DC Circuit switching Contactors



### Description

The new GAF range contactors are the latest addition to ABB's well established A/AF range. This further extends our offering of contactors for DC switching at voltages up to 1000 V DC. The GAF contactors utilize all the well known features of the existing A/AF range such as modern and compact design. In addition all the benefits from the AF coil technology and reliability of a proven contactor design. These contactors are rated for DC-1 or DC general purpose applications according to IEC 1000V DC or cULus 600V DC. The new GAF contactors share the external dimensions of its corresponding standard AF contactor.

### Applications

- Solar / Photovoltaic power
- Traction / rolling-stock
- Power distribution
- Switchgear
- Battery systems
- Telecom

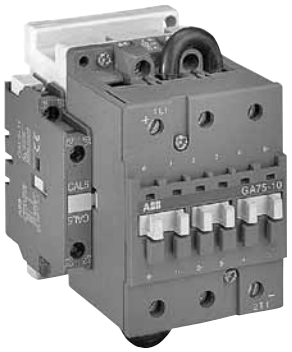
### Type GA / GAE

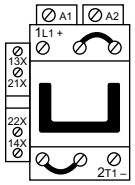
- DC general use up to 1000V DC, 35A
- AC or DC input voltages
- Pre-wired 3-poles-in-series
- Permanent magnets for high DC breaking
- cULus Listed – File # E319322
  – Switches, Industrial Control (NRNT, NRNT7)

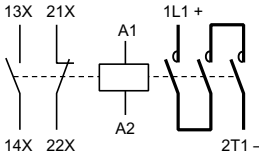
### Type AF / GAF

- DC general use up to 600V, 1900A
- DC-1 up to 1000V DC, 2050A
- Electronic AC/ DC coil input voltages
- PLC interface (GAF460…GAF2050)
- Series busbar kits available
- Permanent magnets for high DC breaking
- GAF185…GAF300 cULus Listed – File # E73397
  – Switches, Industrial Control (NRNT, NRNT7)
- GAF460…GAF2050 IEC/EN only
- AF145…AF2650 cULus Listed – File # E73397
  – Switches, Industrial Control (NRNT, NRNT7)

# GA75 - GAE75






GA75-10-00-84

## Electrical ratings

| UL/CSA DC general use (A) | | | IEC / EN DC-1, θ≤40° (A) | | | Standard auxiliary contacts | | Catalog number |
|---|---|---|---|---|---|---|---|---|
| 440V | 600V | 1000V | 440V | 600V | 1000V | N.O. | N.C. | |
| 100 | 75 | 35 | 100 | 75 | 35 | – | – | GA75-10-00-Δ |
| 100 | 75 | 35 | 100 | 75 | 35 | 1 | 1 | GAE75-10-11-Δ |

Rated insulation voltage Ui = 1000V d.c. according to IEC 947-4-1.
Maximum switching frequencies: 300 operating cycles/

## Additional IEC/EN electrical ratings for GA/E75

| Utilization category | Maximum voltage | Rated operational current $I_e$ (A) |
|---|---|---|
| DC-3 | 440V | 85 |
| DC-5 | 220V | 85 |
| | 440V | 35 |

## Coil voltage selection chart (Δ)

| Hz | Cntr type | Volts 12 | 24 | 48 | 110 | 120 | 125 | 208 | 220 | 240 | 277 | 380 | 415 | 440 | 480 | 500 | 600 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60 | GA | | 81 | 83 | 84 | 84 | | 34 | 75 | 80 | 42 | 48 | 86 | 86 | 51 | 53 | 55 |
| 50 | GA | | 81 | 83 | 84 | | | | 80 | | | 85 | 86 | | | 55 | |
| DC | GAE | 80 | 81 | 83 | 86 | | 87 | | 88 | 89 | | | | | | | |

For other voltages, see page 1.35.

## Accessories

Standard **A** and **AE 40 - 75** contactor accessories are suitable for **GA75** and **GAE75** contactors.
Coils are the standard coils for **A** and **AE50 - 75** contactors.
Contacts cannot be changed.

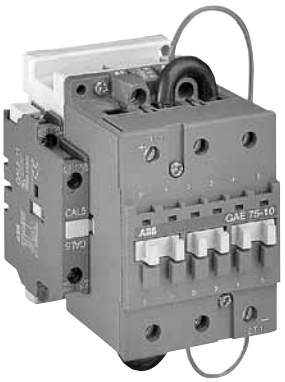
## Wiring diagrams

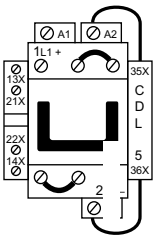
In D.C. circuits, the source to earth (or frame) connection mode is an important element.

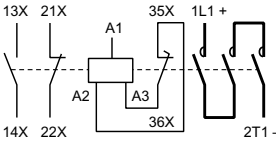
Three modes are mainly used:
- **A** – insulated source, i.e. unearthed (or not connected to the frame).
- **B** – source earthed via its central point.
- **C** – source earthed via one of its outer poles.

Modes **A** and **B** do not impose any constraints with regard to the distribution of the contactor poles between the two source/load connecting branches. Mode **C** requirements are therefore suitable for modes **A** and **B**.
For mode **C**, *all the poles necessary for breaking must be installed in series between the load and the ungrounded source polarity.We recommend this solution for all connection modes.*

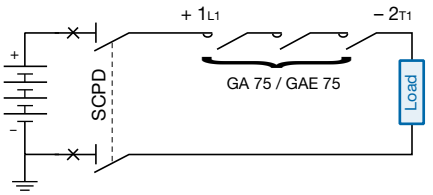
The above provisions relate to power circuit switching, the SCPD (Short-Circuit Protection Device) must comply with protection rules.

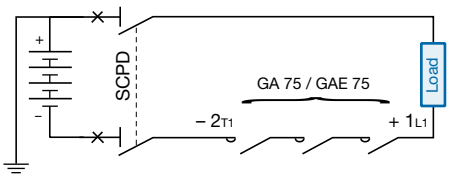





GAE75-10-00-84



# GAF185 - GAF2050

## DC circuit switching GAF & AF

## 3 contacts in series

GAF185
AF145, AF185

GAF300
AF210 ... AF300

GAF460
AF400, AF460

GAF750, GAF1250
AF580 ... AF1250

GAF1650, GAF 2050
AF1350 ... AF2050

LP185

LP2050

### GAF - 1000 V DC max. (IEC)

| L/R 1 ms, air temperature close to contactor | | | | | Catalog number | Reference code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|---|
| 40 °C | 55 °C | 60 °C | 65 °C | 70 °C | | | | |
| A | | | | | | | | |
| 275 | 250 | 230 | 205 | 180 | GAF185-10-11-Δ | 1SFL497025RΔ11 | | 3.60 |
| 500 | 400 | 375 | 350 | 325 | GAF300-10-11-Δ | 1SFL557025RΔ11 | | 6.20 |
| 700 | 600 | 560 | 520 | 480 | GAF460-10-11-Δ | 1SFL597025RΔ11 | | 12.00 |
| 1050 | 875 | 800 | 760 | 720 | GAF750-10-11-Δ | 1SFL637025RΔ11 | | 15.00 |
| 1250 | 1040 | 970 | 920 | 875 | GAF1250-10-11-Δ | 1SFL647025RΔ11 | | 16.00 |
| 1650 | 1450 | 1380 | 1325 | 1270 | GAF1650-10-11-Δ | 1SFL677025RΔ11 | | 35.00 |
| 2050 | 1750 | 1650 | 1575 | 1500 | GAF2050-10-11-Δ | 1SFL707025RΔ11 | | 35.00 |

### GAF & AF - 600 V DC max. (UL/CSA) & 850...1000 V DC max. (IEC)

| UL/CSA general use, 40 °C | | | IEC DC-1, 40 °C | | | | |
|---|---|---|---|---|---|---|---|
| A | | | A | | | | |
| 250 | | | 250 | GAF185-10-11-Δ | 1SFL497025RΔ11 | | 3.60 |
| 400 | | | 500 | GAF300-10-11-Δ | 1SFL557025RΔ11 | | 6.20 |
| Use GAF185 - GAF300 | | | See next page for IEC data at various voltages. | AF145-30-11-Δ | 1SFL477001RΔ11 | | 3.60 |
| | | | | AF185-30-11-Δ | 1SFL497001RΔ11 | | 3.60 |
| | | | | AF210-30-11-Δ | 1SFL517001RΔ11 | | 6.20 |
| | | | | AF260-30-11-Δ | 1SFL537001RΔ11 | | 6.20 |
| | | | | AF300-30-11-Δ | 1SFL597001RΔ11 | | 6.20 |
| 550 | | | | AF400-30-11-Δ | 1SFL637001RΔ11 | | 12.00 |
| 650 | | | | AF460-30-11-Δ | 1SFL597001RΔ11 | | 12.00 |
| 750 | | | | AF580-30-11-Δ | 1SFL617001RΔ11 | | 15.00 |
| 900 | | | | AF750-30-11-Δ | 1SFL637001RΔ11 | | 15.00 |
| 1210 | | | | AF1250-30-11-Δ | 1SFL647001RΔ11 | | 16.00 |
| – | | | | AF1350-30-11-Δ | 1SFL657001RΔ11 | | 34.00 |
| 1350 | | | | AF1650-30-11-Δ | 1SFL677001RΔ11 | | 35.00 |
| 1900 | | | | AF2050-30-11-Δ | 1SFL707001RΔ11 | | 35.00 |

### Connection bar for contactor ①

| | | | | |
|---|---|---|---|---|
| GAF185, AF145, AF185 | LP185 | 1SFN074712R1000 | 2 | 0.30 |
| GAF300, AF210 ... AF300 | LP300 | 1SFN075112R1000 | 2 | 0.40 |
| GAF460, AF400, AF460 | LP460 | 1SFN075712R1000 | 4 | 0.55 |
| GAF750, AF580, AF750 | LP750 | 1SFN076112R1000 | 4 | 0.95 |
| GAF1250, AF1250 | LP1250 | 1SFN076412R1000 | 2 | 1.90 |
| GAF1650, GAF2050, AF1350, AF1650, AF2050 | LP2050 | 1SFN076512R1000 | 4 | 2.90 |

① Not included with the contactor; connection diagrams must be respected

### Auxiliary contact blocks, low energy microswitch 0.1 A, N.O or N.C.

| | | | | | |
|---|---|---|---|---|---|
| AF145...AF2050<br>GAF185...GAF2050 | N.C. | CEL18-01 | 1SFN010716R1001 | | 0.05 |
| | N.O. | CEL18-10 | 1SFN010716R1010 | | 0.05 |

### AC / DC coils with electronic coil interface

**Contactors GAF185 ... GAF300, AF145 ... AF300**

| Voltage | Voltage | Code | |
|---|---|---|---|
| V - 50/60Hz | V - DC | Δ | Δ |
| — | 20 ... 60 | 7 | 2 |
| 48 ... 130 | 48 ... 130 | 6 | 9 |
| 100...250 | 100 ... 250 | 7 | 0 |

**Contactors GAF460 ... GAF1250, AF400 ... AF1250**

| Voltage | Voltage | Code | |
|---|---|---|---|
| V - 50/60Hz | V - DC | Δ | Δ |
| — | 24 ... 60 | 6 | 8 |
| 48 ... 130 | 48 ... 130 | 6 | 9 |
| 100 ... 250 | 100 ... 250 | 7 | 0 |
| 250 ... 500 | 250 ... 500 | 7 | 1 |

**Contactors GAF1650, GAF2050, AF1350, AF1650, AF2050**

| | | | |
|---|---|---|---|
| 100 ... 250 | 100 ... 250 | 7 | 0 |

# Technical data

## DC switching ratings AF contactors

### IEC

| | | AF145 | AF185 | AF210 | AF260 | AF300 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Utilization category DC-1** | | A | A | A | A | A | A | A | A | A | A | A | A | A |
| Contacts in series | L/R 1 ms | | | | | | | | | | | | | |
| 1 contact | 110 V | | | | | | 600 | 700 | 800 | 1050 | | | | |
| 2 contacts | 110 V | 250 | 275 | 350 | 400 | 450 | 600 | 700 | 800 | 1050 | | | | |
| 3 contacts | 220 V | 250 | 275 | 350 | 400 | 450 | 600 | 700 | 800 | 1050 | 1250 | 1350 | 1650 | 2050 |
| 3 contacts | 600 V | | | | | | 600 | 700 | 800 | 1050 | 1250 | 1350 | 1650 | 2050 |
| 3 contacts | 850 V | | | | | | | | 800 | 1050 | 1250 | 1350 | 1650 | 2050 |
| Conductor cross-sectional area | $mm^2$ | 120 | 150 | 185 | 240 | 300[1] | 2x185 | 2x240 | | 2 x 50x8[2] | 1000[3] | 2 x 100x5[2] | 3 x 100x5[2] | 4 x 100x5[2] |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Utilization category DC-3** | | | | | | | | | | | | | | |
| Contacts in series | L/R 2.5 ms | | | | | | | | | | | | | |
| 1 contact | 110 V | | | | | | 600 | 700 | 800 | 1050 | | | | |
| 2 contacts | 110 V | 250 | 275 | 350 | 400 | 450 | 600 | 700 | 800 | 1050 | | | | |
| 3 contacts | 220 V | 250 | 275 | 350 | 400 | 450 | 600 | 700 | 800 | 1050 | | | | |
| 3 contacts | 600 V | | | | | | 600 | 700 | 800 | 1050 | | | | |
| Conductor cross-sectional area | $mm^2$ | 120 | 150 | 185 | 240 | 300[1] | 2x185 | 2x240 | | 2 x 50x8[2] | 1000[3] | 2 x 100x5[2] | 3 x 100x5[2] | 4 x 100x5[2] |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Utilization category DC-5** | | | | | | | | | | | | | | |
| Contacts in series | L/R 15 ms | | | | | | | | | | | | | |
| 1 contact | 110 V | | | | | | 600 | 700 | 800 | 1050 | | | | |
| 2 contacts | 110 V | 250 | 275 | 350 | 400 | 450 | 600 | 700 | 800 | 1050 | | | | |
| 3 contacts | 220 V | 250 | 275 | 350 | 400 | 450 | 600 | 700 | 800 | 1050 | | | | |
| 3 contacts | 600 V | | | | | | 600 | 700 | 800 | 1050 | | | | |
| Conductor cross-sectional area | $mm^2$ | 120 | 150 | 185 | 240 | 300[1] | 2x185 | 2x240 | | 2 x 50x8[2] | 1000[3] | 2 x 100x5[2] | 3 x 100x5[2] | 4 x 100x5[2] |

[1] For currents above 450 A use 300 $mm^2$ and terminal extension / enlargement pieces ( LW300: see www.abb.com/lowvoltage or local ABB catalog)
[2] Dimension of the bars (mm)
[3] Max connection bar width 50 mm

### cULus

| | | AF145 | AF185 | AF210 | AF260 | AF300 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Intended device application general purpose | | | | | | | | | | | | | | |
| Contacts in series | | | | | | | | | | | | | | |
| 3 contacts | 240 V | | 250 | | | | 550 | 650 | 750 | 900 | 1210 | | 1350 | 1900 |
| 3 contacts | 600 V | | | | | | 550 | 650 | 750 | 900 | 1210 | | 1350 | 1900 |

### General

- When selecting a contactor for DC switching it is essential to determine the current, the voltage and the L/R time constant of the controlled load.
- The loads are defined by the time constant L/R: 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).
- In addition to the block contactors shown in this document:

  1) ABB also offers bar mounted contactors (R-series). Bar contactors can typically be used for higher amps and voltages or other configurations or number of main poles (contacts).

# Technical data
## DC contactors GAF and AF

### Main technical data

### IEC60947-4-1

| Contactor type GAF | | | GAF185 | | GAF300 | | GAF460 | | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational voltage $U_e$ max | V DC | 1000 | | | | | | | | | | |
| IEC 60947-4-1, DC-1, $\theta \leq 40$ °C | A | | 275 | | 500 | | 700 | | 1050 | 1250 | 1650 | 2050 |
| Conductor cross-sectional area | $mm^2$ | | 150 | | 300[1)] | | 2x240 | | 2 x 50x8[2)] | 1000[3)] | 3 x 100x5[2)] | 4 x 100x5[2)] |

[1)] For currents above 450 A use 300 $mm^2$ and terminal extension / enlargement pieces ( LW300: see www.abb.com/lowvoltage or local ABB catalog)
[2)] Dimension of the bars (mm)
[3)] Max connection bar width 50 mm

### cULus

| Contactor type GAF | | | GAF185 | | | GAF300 |
|---|---|---|---|---|---|---|
| Rated operational voltage $U_e$ max | V DC | 600 | | | | |
| Amp-ratings general purpose | A | | 250 | | | 400 |

### General technical data

| | | | GAF185 | | | GAF300 | | GAF460 | | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contactor type | | AF145 | AF185 | AF210 | AF260 | AF300 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 AF1650 | AF2050 |
| Rated making capacity DC-1 | | 1.5 x $I_e$ acc. to IEC60947-4-1 | | | | | | | | | | | |
| Rated breaking capacity DC-1 | | | | | | | | | | | | | |
| Rated frequency limits | Hz | 25 ... 400 | | | | | | | | | | | |
| Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded | | On request or see www.abb.com/lowvoltage or local ABB catalog | | | | | | | | | | | |
| Rated short-time withstand current, $I_{cw}$ | | On request or see www.abb.com/lowvoltage or local ABB catalog | | | | | | | | | | | |
| Heat dissipation per pole $I_e$ /DC-1 | W | 13 | 16 | 18 | 25 | 32 | 30 | 42 | 32 | 50 | 80 | 80 | 125 |
| Rated impulse withstand voltage, $U_{imp}$ | kV | 8 | | | | | | | | | | | |
| Ambient temperature close to contactor | | see "Conditions for use", for control voltage limits and authorized mounting | | | | | | | | | | | |
| - during operation / storage | °C | -40 to +70 | | | | | | | | | | | |
| Operating altitude | m | ≤3000 without derating | | | | | | | | | | | |

### Magnet system characteristics

| | | | | | |
|---|---|---|---|---|---|
| Rated control circuit voltage $U_c$ | | | | | |
| - at 50 Hz and 60 Hz | | V | 48 ... 250 | 48 ... 500 | 100 ... 250 |
| - d.c. | | V | 20 ... 250 | 24 ... 500 | 100 ... 250 |
| Coil operating limits acc. IEC60947-4-1 | | | 0.85 x $U_c$ min. ... 1.1 x $U_c$ max. (at $\theta \leq 70$ °C) Please also refer to "Mounting characteristics" | | |
| Drop-out voltage in % of $U_c$ min. | | % | 55 | | |
| Coil consumption | | | | | |
| Average pull-in value | 50 Hz and 60 Hz | VA | 430 | 470 | 890 | 850 | 850 | 1900 |
| | d.c. | W | 500 | 520 | 990 | 950 | 950 | 1700 |
| Average holding value | 50 Hz and 60 Hz | VA/W | 12/3.5 | 10/2.5 | 12/4 | 12/4.5 | 12/4 | 48/17 |
| | d.c. | W | 2 | 2 | 4 | 4.5 | 4 | 16 |
| Operating time coil supply between A1-A2 | | | On request or see www.abb.com/lowvoltage or local ABB catalog | | | | | |

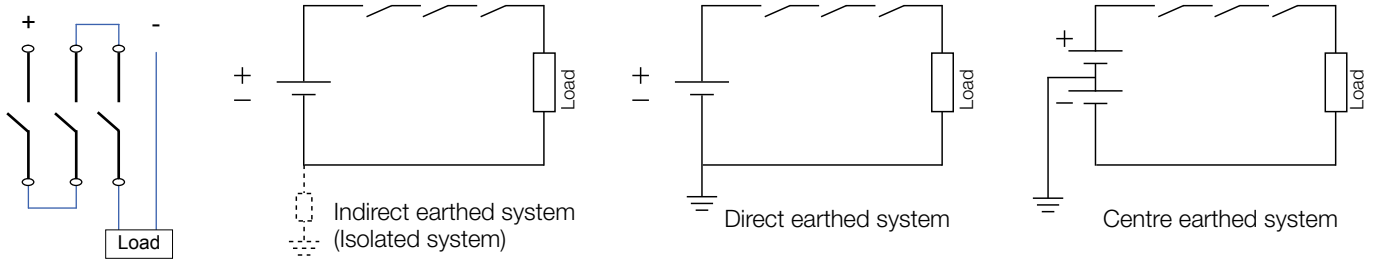
### Mounting characteristics

| | | | | |
|---|---|---|---|---|
| Mounting positions | | - mounting on a vertical plane: any position with a tilt up to ± 30° | | |
| | | - mounting on a horizontal plane: any position with a tilt up to ± 30°, except up-side down | | |
| Fixing | | | | |
| - by screws (not supplied) | | 4 x M5 | 4 x M6 | 4 x M8 |

# Connections

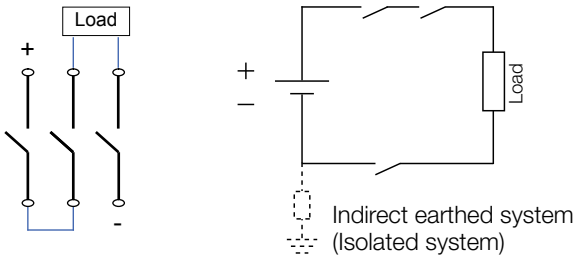
## Recommended connection

All three contacts connected in series without the load in between. This connection is recommended in systems according to the configurations below.




## Alternative connection

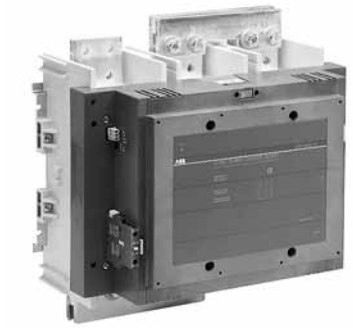
The load is placed in between the three contacts in an indirect earhted system or in a fully isolated system. If not connected according to the configuration below, a fault to earth could result in one or two contacts breaking the full load which the contactor is not approved for.

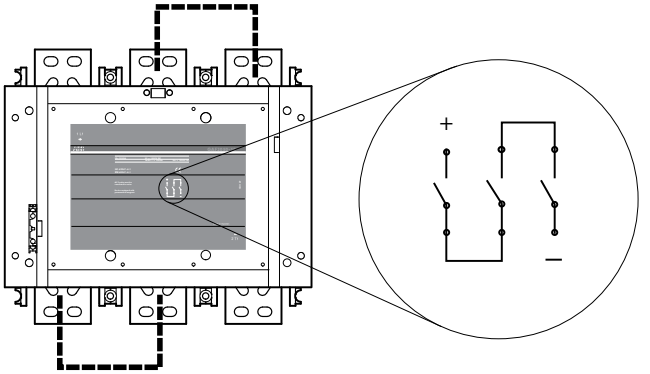



## Points to consider

- The above relates to power circuit switching. The SCPD (Short Circuit Protection Device) must comply with applicable protection rules.
- The direction of the current must be as shown on the contactor front label.
- Connection bars for connecting three contacts in series are not delivered with the contactor as standard, but are available as accessories.

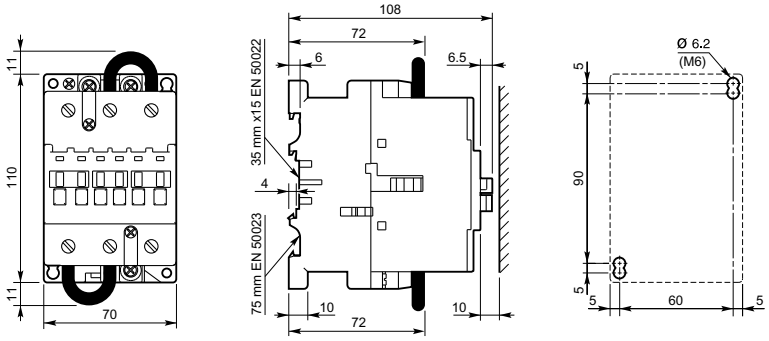
For further information regarding connections see Technical paper.



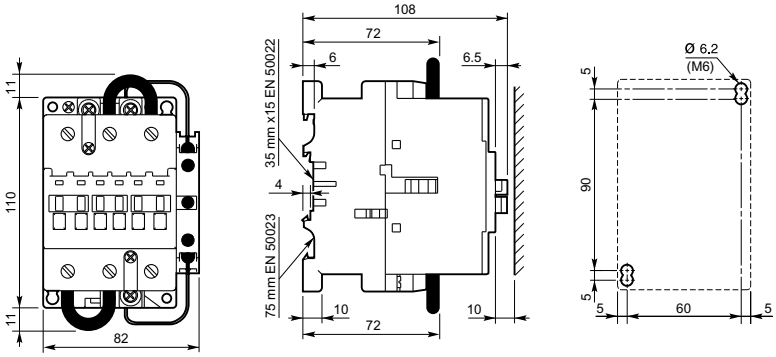


# Approximate dimensions (mm)

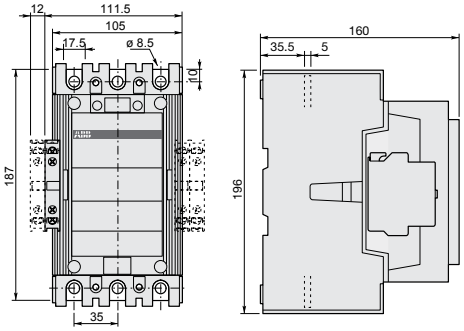
## GA75



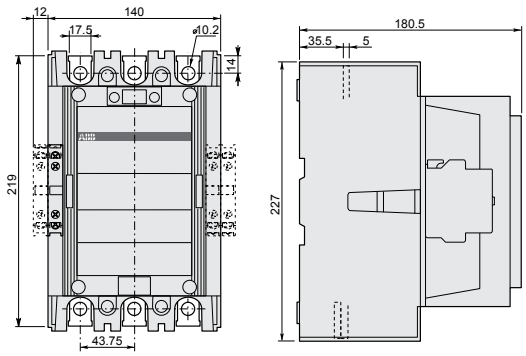

## GAE75



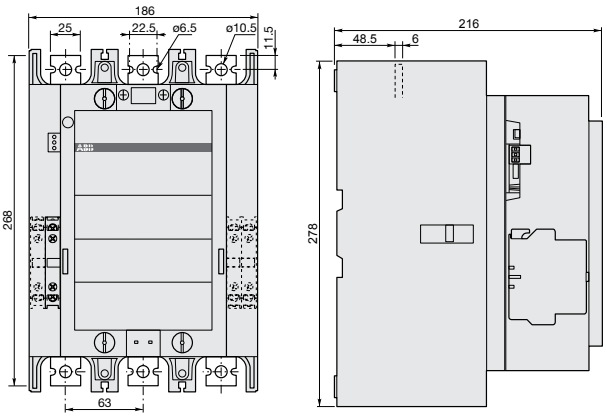
# Approximate dimensions



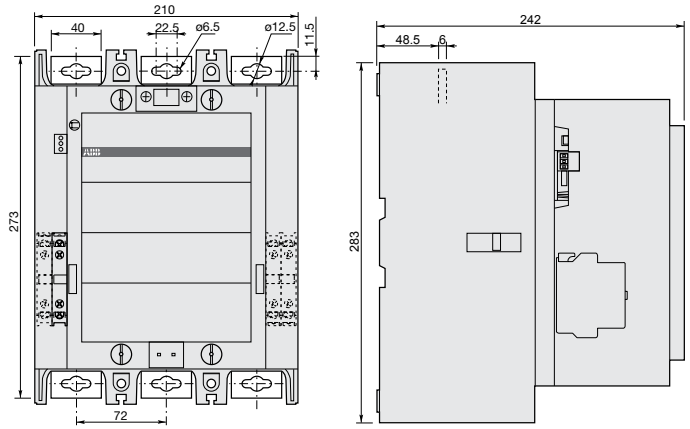

GAF185
AF145, AF185



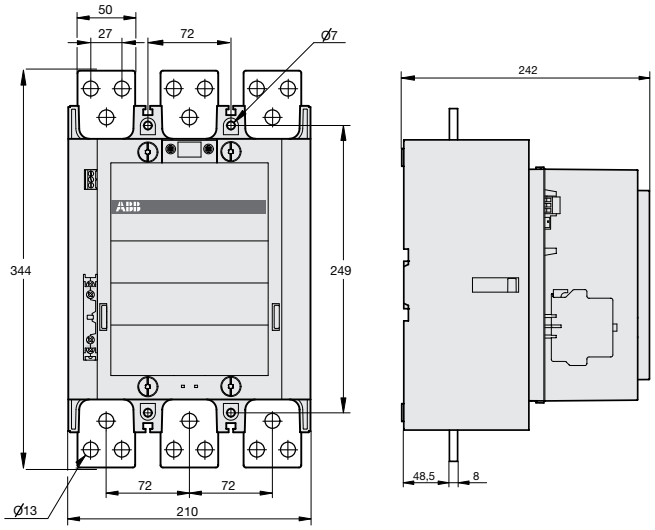

GAF300
AF210 ... AF300



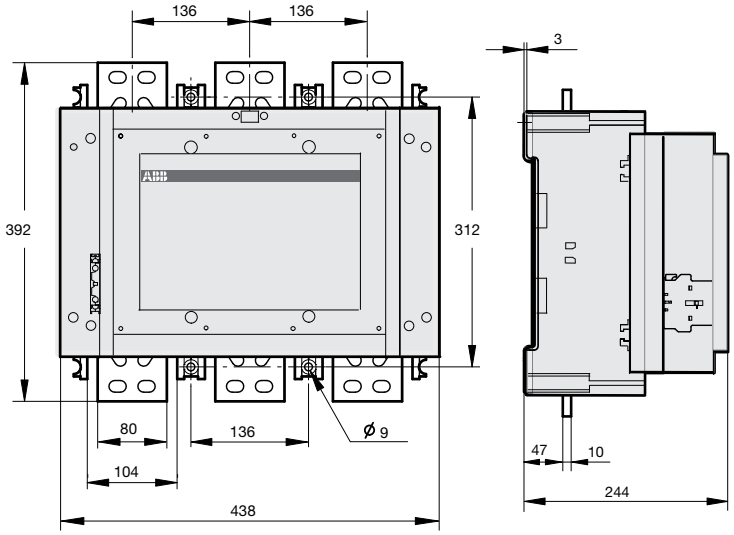

GAF460
AF400, AF460




GAF750
AF580, AF750



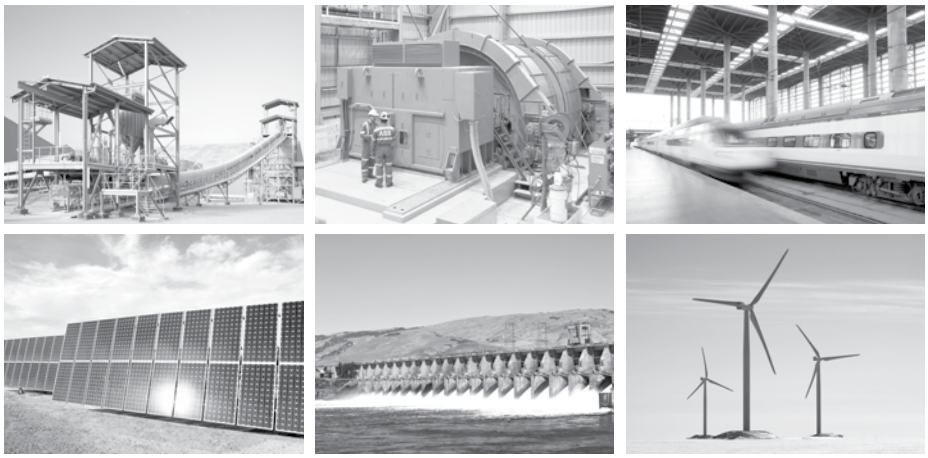

GAF1250,
AF1250




GAF1650, GAF2050
AF1350, AF1650, AF2050

Dimensions in mm
Inch converter: 1 mm = 0.0394 in

# Bar contactors
## 50 to 5000 A



**R contactors with variable number of poles and their variants (contactors with N.C. + N.O. poles, couplers...) are used for controlling power circuits up to 1000 V AC or 1500 V DC. They are designed with common standard components. With the combination of these elements and the adaptation possibilities, special versions can be provided. Designed for long-lasting operation and demanding applications, the ABB R contactors are used for many applications all over the world.**

### Flexibility of design
- Variable number of poles
- Adjustable number of auxiliary contacts
- Optional combination of N.O. & N.C. poles
- Mechanical or magnetic latching available.

### Easy maintenance
- Direct access to all the components of the contactor
- Complete and didactic instruction manual
- Spare parts available
- Dedicated service for bar contactors.

### Exceptional durability
- Mechanical durability up to 10 millions operating cycles
- Mechanical switching frequency up to 1200 cycles per hour
- Electrical durability up to 350 000 operating cycles.

### Ideal for heavy duty applications
- High making and breaking capacity
- Fully compatible with the requirements of utilization categories AC-3, DC-3 and DC-5 (control of AC / DC motors for mining, iron and steel industries...).

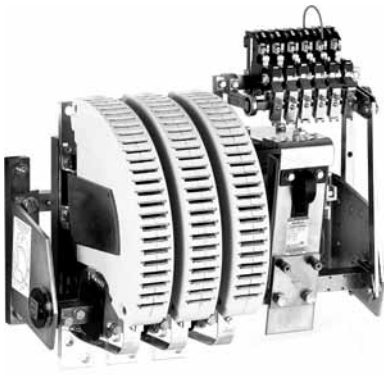
### Custom-made solutions
- More than 60 years' experience in dealing with customers projects
- Development of solutions from specifications
- Pre-sales support to identify and define customer requirements
- Specialists available to help you, select your product or optimize your configuration.

Bar Contactors

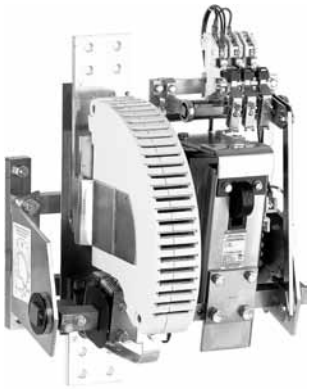
# Bar contactors
## For heavy duty applications

R contactors meet the particular requirements of each AC / DC control application up to 5000 A, where the demands are increasing:
- Power distribution
- Photovoltaic, hydroelectric power stations
- Batteries
- Mining
- Railway networks and rolling stock
- Induction furnaces
- Pump stations
- Travelling cranes.

### Control your AC applications up to 5000 A
AC-1 Rated operational current up to 5000 A
AC-3 Rated power up to 1500 kW (1520 A - 440 V)

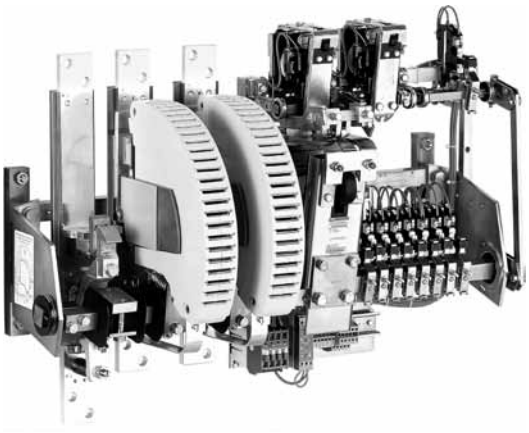


### Control your DC applications up to 5000 A
DC-1 Rated operational current up to 5000 A
DC-3 / DC-5 Rated operational current up to 2000 A
1500 V with poles in series



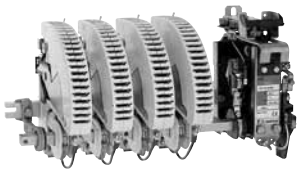
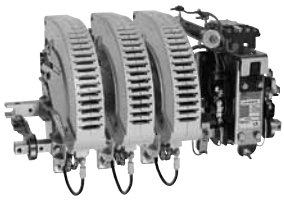
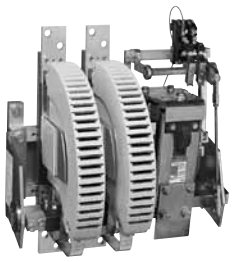
## Special applications

AC / DC coupling: LOR.. contactors
Slip ring motor control: FOR.. contactors
AC / DC switching (N.C. / N.O. main poles): NOR & JOR.. contactors
Latching contactors for energy saving and safety requirements: AMA or AME contactors
Field discharge: AM(F)-CC-JORE.. contactors



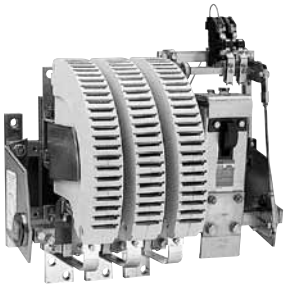
# Bar contactors for the AC circuits switching

**Voltage Ue up to 1000 V AC**
Current Ie up to 4500 A

| Contactor type | AC control circuit | | ~ | IORR63..-MT | IORR125..-MT | IORR200..-MT | IORR400..-MT | IORR500..-MT | IORR800..-MT |
|---|---|---|---|---|---|---|---|---|---|
| | DC control circuit | | ⎓ | IORE63..-MT | IORE125..-MT | IORE200..-MT | IORE400..-MT | IORE500..-MT | IORE800..-MT |
| **Categories** | | **Ue** | | | | | | | |
| **AC-1** | at 40 °C | | **Ie** | 85 A | 170 A | 260 A | 400 A | 550 A | 800 A |
| **AC-3** | | 690 V AC | **Ie** | 85 A | 160 A | 260 A | 400 A | 550 A | 800 A |
| | | 1000 V AC max. | **Ie** | 56 A | 105 A | 180 A | 280 A | 380 A | 580 A |
| **AC-3** | | 690 V AC | **Power** | **80 kW** | **150 kW** | **240 kW** | **400 kW** | **540 kW** | **780 kW** |

**Voltage Ue up to 500 V AC**
Current Ie up to 5000 A



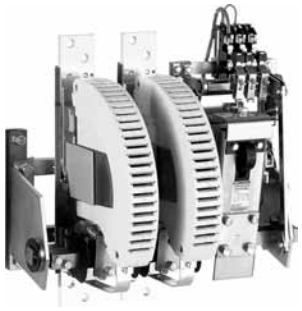
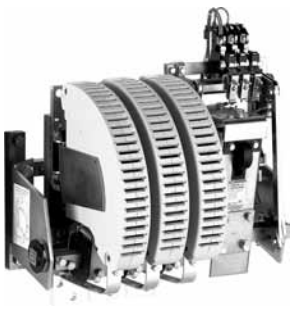
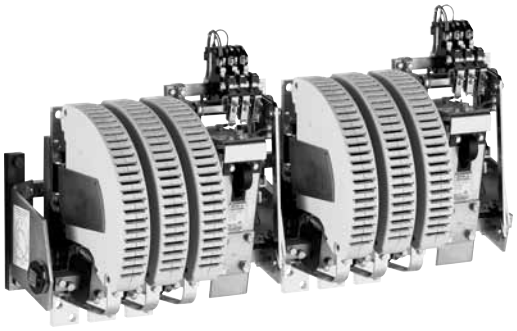
| Contactor type | AC control circuit | | ~ | – | IORR800 |
|---|---|---|---|---|---|
| | DC control circuit | | ⎓ | – | IORE800 |
| **Categories** | | **Ue** | | | |
| **AC-1** | at 40 °C | | **Ie** | From 85 A to 550 A, select above IOR..-MT | 900 A |
| **AC-3** | | 380-415-440 V AC | **Ie** | – | 800 A |
| | | 500 V AC max. | **Ie** | – | 800 A |
| **AC-3** | | 400 V AC | **Power** | – | **450 kW** |

**Recap**:
All contactors fulfill the IEC 60947-4-1 / EN 60947-4-1 standards.

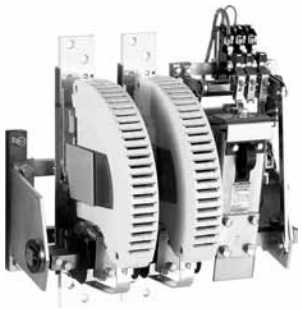
Utilization category AC-1: max. breaking current = 1.5 x Ie, max. making current = 1.5 x Ie.

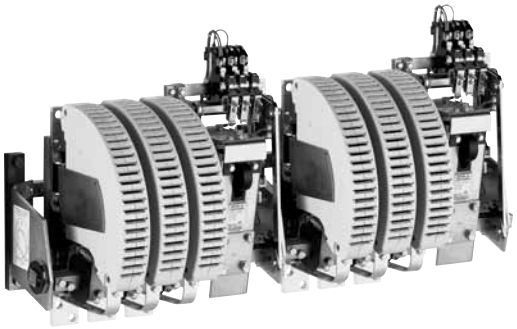
Utilization category AC-3: max. breaking current = 8 x Ie, max. making current = 10 x Ie.

Contactors with NC poles, magnetic or mechanical latching devices on request.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **IORR1400..-MT** | **IORR1700..-MT** | **IORR2100..-MT** | **IORR2500..-MT** | **IORR3200..-MT** | **IORR3800..-MT** | **IORR4500..-MT** | **IORR5100..-MT** |
| **IORE1400..-MT** | **IORE1700..-MT** | **IORE2100..-MT** | **IORE2500..-MT** | **IORE3200..-MT** | **IORE3800..-MT** | **IORE4500..-MT** | **IORE5100..-MT** |
| 1250 A | 1650 A | 1850 A | 2200 A | 3000 A | 3500 A | 4000 A | 4500 A |
| 970 A | 1170 A | 1270 A | – | – | – | – | – |
| 610 A | 680 A | 810 A | – | – | – | – | – |
| **1000 kW** | **1200 kW** | **1300 kW** | – | – | – | – | – |

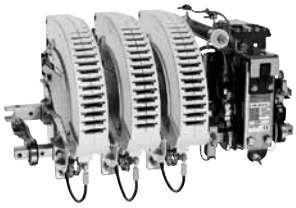




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **IORR1000** | **IORR1400** | **IORR1700** | **IORR2100** | **IORR2500** | **IORR3200** | **IORR3800** | **IORR4500** | **IORR5100** |
| **IORE1000** | **IORE1400** | **IORE1700** | **IORE2100** | **IORE2500** | **IORE3200** | **IORE3800** | **IORE4500** | **IORE5100** |
| 1000 A | 1350 A | 1650 A | 2000 A | 2400 A | 3200 A | 3800 A | 4500 A | 5000 A |
| 800 A | 1060 A | 1260 A | 1520 A | – | – | – | – | – |
| 800 A | 1080 A | 1220 A | 1340 A | – | – | – | – | – |
| **450 kW** | **630 kW** | **750 kW** | **900 kW** | – | – | – | – | – |

# Bar contactors for the DC circuits switching

**Voltage Ue up to** 1500 V DC
**Current Ie up to** 5000 A



| Contactor type | AC control circuit | | ~ | IORR63..-CC | IORR125..-CC | IORR200..-CC | IORR400..-CC | IORR500..-CC |
|---|---|---|---|---|---|---|---|---|
| | DC control circuit | | ⎓ | IORE63..-CC | IORE125..-CC | IORE200..-CC | IORE400..-CC | IORE500..-CC |
| Number of poles in series* | Categories | Ue max. | | | | | | |
| 1 pole | DC-1 | 500 V DC | Ie | 85 A | 170 A | 275 A | 400 A | 550 A |
| | DC-3 / DC-5 | 500 V DC | Ie | 68 A | 140 A | 205 A | 350 A | 500 A |
| 2 poles | DC-1 | 1000 V DC | Ie | 85 A | 170 A | 275 A | 400 A | 550 A |
| | DC-3 / DC-5 | 1000 V DC | Ie | 68 A | 140 A | 205 A | 350 A | 500 A |
| 3 poles | DC-1 | 1500 V DC | Ie | 85 A** | 170 A** | 275 A** | 400 A** | 550 A** |
| | DC-3 / DC-5 | 1500 V DC | Ie | 68 A** | 140 A** | 205 A** | 350 A** | 500 A** |

*Number of poles to be fitted in series according to the operational voltage and the utilization categories.

**Version with increased insulation for 1000 V DC < Ue ≤ 1500 V DC, please consult us.

**Contactors**
**UL / CSA approved** c UL us

**Voltage Ue up to** 600 V DC
**Current Ie up to** 2000 A

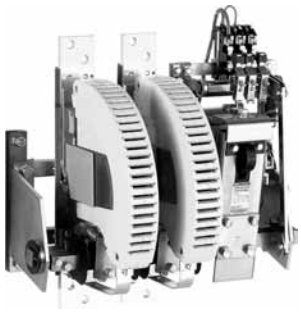
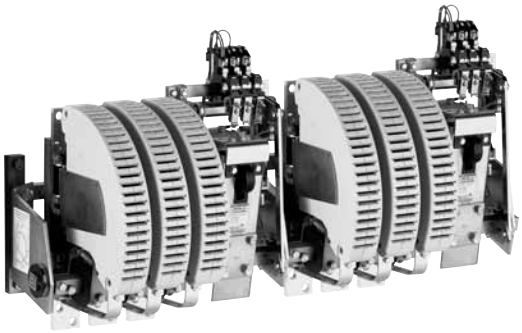
| Contactor type | AC control circuit | | ~ | IORR800-10-CC | IORR1000-10-CC | IORR1400-10-CC | IORR1700-10-CC | IORR2100-10-CC |
|---|---|---|---|---|---|---|---|---|
| | DC control circuit | | ⎓ | IORE800-10-CC | IORE1000-10-CC | IORE1400-10-CC | IORE1700-10-CC | IORE2100-10-CC |
| | | U max. | | | | | | |
| 1 pole | General use | 600 V DC | Ie | 800 A | 1000 A | 1300 A | 1700 A | 2000 A |

**Recap**:
All contactors fulfill the IEC 60947-4-1 / EN 60947-4-1 standards.

Utilization category DC-1: max. breaking current = 1.5 x Ie, max. making current = 1.5 x Ie.

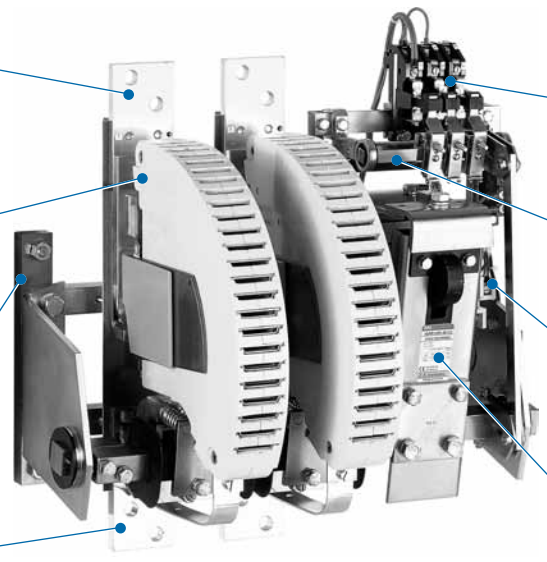
Utilization categories DC-3 / DC-5: max. breaking current = 4 x Ie, max. making current = 4 x Ie.

Contactors with NC poles, magnetic or mechanical latching devices on request.

| | IORR800..-CC | IORR1000..-CC | IORR1400..-CC | IORR1700..-CC | IORR2100..-CC | IORR2500..-CC | IORR3200..-CC | IORR3800..-CC | IORR4500..-CC | IORR5100..-CC |
|---|---|---|---|---|---|---|---|---|---|---|
| | IORE800..-CC | IORE1000..-CC | IORE1400..-CC | IORE1700..-CC | IORE2100..-CC | IORE2500..-CC | IORE3200..-CC | IORE3800..-CC | IORE4500..-CC | IORE5100..-CC |
| **Ue max.** | | | | | | | | | | |
| 750 V DC | 800 A | 1000 A | 1250 A | 1600 A | 2000 A | 2300 A | 3200 A | 3800 A | 4500 A | 5000 A |
| 600 V DC | 720 A | 1000 A | 1250 A | 1600 A | 2000 A | On request | On request | On request | On request | On request |
| 1500 V DC | 800 A | 1000 A | 1250 A | 1600 A | 2000 A | 2300 A | 3200 A | 3800 A | 4500 A | 5000 A |
| 1000 V DC | 720 A | 1000 A | 1250 A | 1600 A | 2000 A | On request | On request | On request | On request | On request |
| 1500 V DC | 800 A | 1000 A | 1250 A | 1600 A | 2000 A | 2300 A | 3200 A | 3800 A | 4500 A | 5000 A |
| 1500 V DC | 720 A | 1000 A | 1250 A | 1600 A | 2000 A | On request | On request | On request | On request | On request |

## Product overview



# Questionnaire
## Specification for R contactors

Customer .....
Contact person ..... Date .....
Tel. ..... e-mail .....

ABB .....
Contact person .....
Tel. .....

Quantity ..... Requested delivery date .....
Project / Application .....

## Power circuit

**AC switching**

Application type
☐ AC-1 (resistive load)
☐ AC-3 (direct starting, switching off running motors)
☐ No load breaking
☐ Other .....
Number of poles: N.O. ..... N.C. .....
Rated operational current Ie ..... A
Max. making current ..... A
Max. breaking current ..... A
Rated operational voltage Ue ..... V ..... Hz

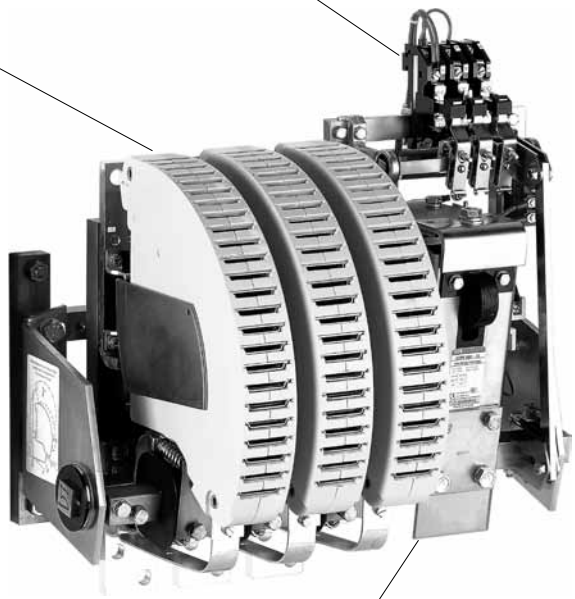
or

**DC switching**

Application type
☐ DC-1 (resistive load)
☐ DC-3 (shunt motors)
☐ DC-5 (series motors)
☐ No load breaking
☐ Other ..... L/R ..... ms
Number of poles: N.O. ..... N.C. .....
Rated operational current Ie ..... A
Making current ..... A
Breaking current min. ..... A max. ..... A
Rated operational voltage Ue ..... V DC

## Auxiliary contacts

Number of N.O. auxiliary contacts .....
Number of N.C. auxiliary contacts .....



## Control circuit (coil)

AC ☐ Voltage ..... V ..... Hz
DC ☐ Voltage ..... V DC

**Options**

☐ Magnetical latching
☐ Mechanical latching

## Operating conditions

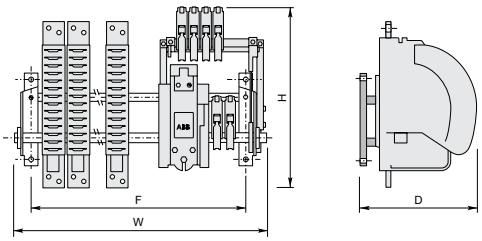
Switching frequency ..... cycles/h
Mech. durability required (millions of operating cycles) .....
Remarks .....

## Accessories .....

Please add any other useful documents for further information e.g. technical specification, drawing, wiring diagram, etc.

## Replacement of an existing contactor

Brand .....
Type .....
Fixing dimension F = ..... mm
Overall dimensions W = ..... mm
H = ..... mm
D = ..... mm




Please photocopy and forward. Questionnaire also available on the ABB Website:
www.abb.com/lowvoltage Section: Our offering Select: Control Products > Contactors > Bar mounted contactors

## Other information / Application type

This document is used to define the contactor specification according to the complete information on the application

Please photocopy and forward. Questionnaire also available on the ABB Website:
www.abb.com/lowvoltage Section: Our offering Select: Control Products > Contactors > Bar mounted contactors

# Notes