

AF1350/AF1650 3-pole Contactors

a.c./d.c. Operated - Wide voltage range
Electronic Coil Interface

Description

The AF1350/AF1650 3-pole contactors are of the block type design.

● Main poles and auxiliary contact blocks

- 3 main poles,
- 1 N.O. and 1 N.C. auxiliary contacts (1 contact block fitted on the left hand side).
- 2 N.O. and 2 N.C. auxiliary contacts (1 contact block fitted on each side)

A maximum of 4 auxiliary contact blocks can be fitted on each contactor.

● Electronic control

The contactors are fitted with an electronic coil interface controlled by a specific integrated circuit developed by ABB.

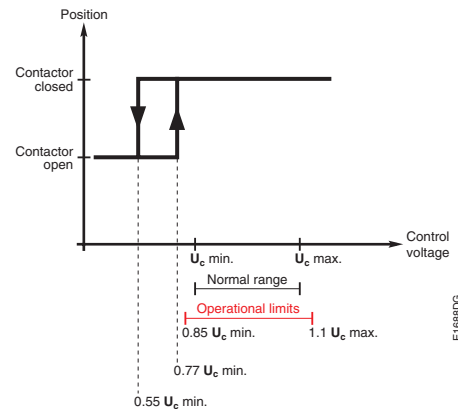
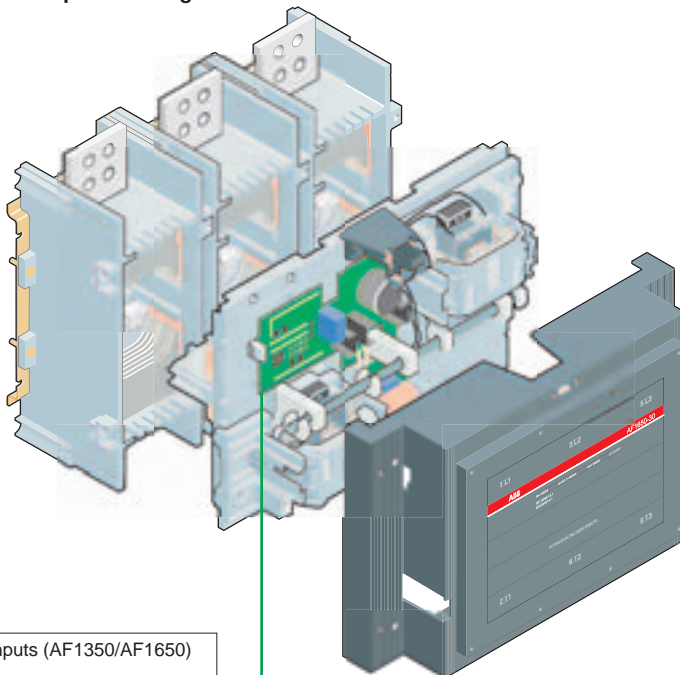
Advantages

- Wide voltage range, 100...250 V a.c. and d.c.
- Can manage large voltage variations
- Reduced power consumption
- Very distinct closing and opening
- Noise free
- Can withstand voltage interruptions or voltage dips in the control supply (≤ 20 ms)

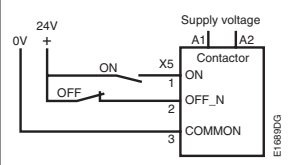
● Control inputs

The AF1350/AF1650 contactors are as standard equipped with low voltage inputs for control, for example by a PLC
( see drawing below)

AF1350/AF1650 specific design



Control inputs (AF1350/AF1650)



Control circuit
with electronic coil
interface.

AF1350/AF1650 3-pole Contactors

a.c./d.c. Operated - Wide voltage range
Electronic Coil Interface



- The most compact 1650A contactor
- Modern family design to match other ABB products
- Type 2 coordinated with breakers
- Electronic coil interface
- PLC operation possible
- cULus approved
- Low environmental impact thanks to Life Cycle Assessment

Applications

AF1350 and 1650 are modern and compact 3-pole contactors designed for heavy duty industrial applications. They are designed for carrying and switching both inductive (AC-3) and resistive (AC-1) loads. High mechanical and electrical endurance make them suitable also for motor applications.

Typical applications are as:

- Transfer switch or as main isolation contactor in generator sets
- Main contactor for static power switching
- Main or by-pass contactor in windmills
- Main or by-pass contactor for frequency drives and softstarters
- Y/D starters for example on board ships

The coil is electronically controlled with features such as wide coil voltage range, low pull-in value and low power consumption to mention some of the features. It can also be operated with a low voltage signal directly from a PLC. These contactors are fully tested together with ABB breakers to meet type 2 co-ordination.

For motor applications there is a three phase electronic overload relay called E1250 DU available.

AF1350/AF1650 3-pole Contactors

Ordering details

Contactor (Terminal screws and fixing screws included)

| Rated operational current | Auxiliary contacts fitted | Type | Order code | Weight kg |
|----------------------------------|---------------------------|------------|--|--|
| AC-1 $\theta \leq 40$ °C A | AC-3 400 V A | | | 1 piece |
| 1350 | 860 | 1 1 2 2 | AF1350-30-11 AF1350-30-22 | 1SFL 65 7001 R7011 1SFL 65 7001 R7022 |
| 1650 | 1050 | 1 1 2 2 | AF1650-30-11 AF1650-30-22 | 1SFL 67 7001 R7011 1SFL 67 7001 R7022 |

Accessories

Auxiliary contact blocks (side mounting)

| For contactor type | Contact blocks | Type | Order code | Pack ^{ing} pieces | Weight kg |
|--------------------|----------------|--------------------------------|---------------------------|----------------------------|-----------|
| AF1350, AF1650 | 1 1 | CAL18-11 | 1SFN 01 0720 R1011 | 2 | 0.050 |
| | 1 1 | CAL18-11B ¹⁾ | 1SFN 01 0720 R3311 | 2 | 0.050 |

¹⁾ CAL18-11B is a block for mounting outside a CAL18-11 block.

Main contact sets

| For contactor type | Type | Order code | Pack ^{ing} set | Weight kg |
|--------------------|---------------|---------------------------|-------------------------|-----------|
| AF1350 | ZL1350 | 1SFN 16 6503 R1000 | 1 | 2.500 |
| AF1650 | ZL1650 | 1SFN 16 6703 R1000 | 1 | 3.500 |

Arc chutes/De-ionizing plates

| For contactor type | Type | Order code | Pack ^{ing} set | Weight kg |
|--------------------|---------------|---------------------------|-------------------------|-----------|
| AF1350, AF1650 | ZW1650 | 1SFN 16 6510 R1000 | 1 | 4.000 |

Coils

| For contactor type | Type | Order code | Pack ^{ing} set | Weight kg |
|--------------------|----------------|---------------------------|-------------------------|-----------|
| AF1350, AF1650 | ZAF1650 | 1SFN 15 6570 R7026 | 1 | 0.900 |

Printed circuit-board

| For contactor type | Type | Order code | Pack ^{ing} set | Weight kg |
|--------------------|---------------|---------------------------|-------------------------|-----------|
| AF1350, AF1650 | ZP1650 | 1SFN 16 6521 R1070 | 1 | 0.300 |

Mechanical interlocking of two horizontal mounted contactors

| For contactor type | Type | Order code | Pack ^{ing} set | Weight kg |
|--------------------|----------------|---------------------------|-------------------------|-----------|
| AF1350, AF1650 | VM1650H | 1SFN 03 6503 R1000 | 1 | 6 |

Electronic overload relay - class 10, 20, 30 selectable

| For contactor type | Type | Order code | Pack ^{ing} set | Weight kg |
|--------------------|------------------------------|---------------------------|-------------------------|-----------|
| AF1350, AF1650 | E1250 DU²⁾ | 1SFA 73 9001 R1000 | 1 | 10 |


²⁾ mounting kit with busbars for contactor mounting included



AF1350/AF1650 3-pole Contactors

Technical Data

General Technical Data

| | | |
|--|---|------------|
| Contactor type: | AF1350/AF1650 | |
| Rated insulation voltage U_i | | |
| according to IEC 60947-4-1 | V | 1000 |
| according to UL/CSA | V | 600 |
| Rated impulse withstand voltage | | |
| $U_{imp.}$ | kV | 8 |
| Standards | | |
| Devices complying with | | |
| - International standards | IEC 60947-1 / 60947-4-1 | |
| - European standards | EN 60947-1 / 60947-4-1 | |
| - UL | 508 | |
| Certifications - Approvals |  | |
| Air temperature close to contactor | | |
| - fitted with electronic O/L relay | °C | -25 to +70 |
| - without electronic O/L relay | °C | -40 to +70 |
| - for storage | °C | -40 to +70 |
| Operating altitude | m | ≤ 3000 |

Magnet System Characteristics

| | | |
|--|----------------------|---|
| Contactor type: | AF1350/AF1650 | |
| Rated control circuit voltage (U_C min...U_C max) | | |
| - at 50 Hz | V | 100 ... 250 |
| - at 60 Hz | V | 100 ... 250 |
| - d.c. | V | 100 ... 250 |
| Coil operating limits | | |
| | | $\theta \leq 70$ °C |
| according to IEC 60947-4-1 | | $0.85 \times U_C$ min... $1.1 \times U_C$ max |
| Drop-out voltage in % of U_C min. level | | 55 % |
| Coil consumption | | |
| Average pull-in value | | |
| 50 Hz | VA | 1900 |
| 60 Hz | VA | 1900 |
| d.c.z. | W | 1700 |
| Average holding value | | |
| 50 Hz | VA/W | 48/17 |
| 60 Hz | VA/W | 48/17 |
| d.c. | W | 16 |
| Operating time | | |
| A1-A2 | | |
| between coil energization and: | | |
| N.O. contact closing | ms | 50 ... 80 |
| N.C. contact opening | ms | 50 ... 80 |
| between coil de-energization and: | | |
| N.O. contact opening | ms | 35 ... 55 |
| N.C. contact closing | ms | 35 ... 55 |
| with PLC | | |
| between coil energization and: | | |
| N.O. contact closing | ms | 40 ... 65 |
| N.C. contact opening | ms | 40 ... 65 |
| between coil de-energization and: | | |
| N.O. contact opening | ms | 10 ... 30 |
| N.C. contact closing | ms | 10 ... 30 |

Main Pole - Utilization Characteristics

| | | |
|--|---|---|
| Contactor type: | AF1350 | AF1650 |
| Rated operational voltage U_e max. | V 1000 | |
| Rated frequency limits | Hz 25 ... 400 | |
| Conventional free-air thermal current I_{th} | | |
| acc. to IEC 60947-4-1, | | |
| open contactors $\theta \leq 40$ °C | A | 1350 1650 |
| with conductor cross-sectional area | mm² | 2//100x5 ¹⁾ 3//100x5 ¹⁾ |
| Rated operational current I_e/AC-1 | | |
| for air temperature close to contactor | | |
| $\theta \leq 40$ °C | A | 1350 1650 |
| U_e max. 1000 V | | |
| $\theta \leq 55$ °C | A | 1150 1450 |
| $\theta \leq 70$ °C | A | 1000 1270 |
| with conductor cross-sectional area | mm² | 2//100x5 ¹⁾ 3//100x5 ¹⁾ |
| Utilization category AC-3 | | |
| for air temperature close to contactor ≤ 55 °C | | |
| Rated operational current I_e AC-3 | | |
| 220-230-240 V | A | 860 1050 |
| 3-phase motors | | |
| 380-400 V | A | 860 1050 |
| 415 V | A | 860 1050 |
| 440 V | A | 860 1050 |
| Rated operational power AC-3 | | |
| 220-230-240 V | kW | 257 315 |
| 1500 r.p.m. 50 Hz | | |
| 1800 r.p.m. 60 Hz | kW | 475 560 |
| 3-phase motors | | |
| 415 V | kW | 500 600 |
| 440 V | kW | 560 670 |
| Rated making capacity AC-3 | | |
| according to IEC 60947-4-1 | | $10 \times I_e$ AC - 3 |
| Rated breaking capacity AC-3 | | |
| according to IEC 60947-4-1 | | $8 \times I_e$ AC - 3 |
| Short-circuit protection | Product coordination with ABB circuit breaker. Please consult your nearest sales office for more information. | |
| Rated short-time withstand current I_{cw} | | |
| at 40 °C ambient temp., in free air, | | |
| from a cold state | | |
| 1 s | A | 10 000 12 000 |
| 10 s | A | 8 000 10 000 |
| 30 s | A | 6 000 7 500 |
| 1 min | A | 4 500 5 500 |
| 15 min | A | 1 600 2 200 |
| Maximum breaking capacity | | |
| $\cos \varphi = 0.35$ | | |
| at 440 V | A | 10000 12000 |
| Heat dissipation per pole I_e/AC-1 | W | 80 80 |
| I_e/AC-3 | W | 50 50 |
| Max. electrical switching frequency | | |
| - for AC-1 | cycles/h | 60 |
| - for AC-3 | cycles/h | 60 |
| - for AC-2, AC-4 | cycles/h | 60 |
| Electrical durability | | 50 000 |
| Mechanical durability | | |
| - millions of operating cycles | | 500 000 |
| - max. mechanical switching frequency | cycles/h | 60 |

1) Dimensions of the bars

AF1350/AF1650 3-pole Contactors

Technical Data UL



Amp-rating for AF1350/AF1650

The "amp-rating" value corresponds to the "General Use Rating" defined in specification UL508: the operational current, both during pull-in and steady-state conditions, must not exceed the "amp-rating" value of the device. In alternating current, the inductive $\cos \varphi$ of the load between 0.75 and 0.8.

| Contactors | Main contacts (General Use Rating) | | Auxiliary contacts | | |
|------------|---------------------------------------|---------------------------|--------------------|----------------------|---------------------------|
| | Nominal current A | Nominal voltage V a.c. | "pilot duty" | Nominal current A | Nominal voltage V a.c. |
| AF1350 | 1350 | 600 | A600, Q300 | 10 | 600 |
| AF1650 | 1650 | 600 | A600, Q300 | 10 | 600 |

3-phase motor-rating

UL Approvals stipulate the following for contactors:

- the "3-phase motor-rating": motor power (hp) and corresponding current (A).
- the "amp-rating": usual operational current (A) and nominal voltage (V).



The technical characteristics figuring on devices must be respected and have been reproduced in the table below.

| Contactors | Size NEMA | Motor power P (hp) and nominal current I _e (A) | | | | | |
|------------|--------------|---|------|-----------------------------|------|-----------------------------|------|
| | | U _e 220V/240V | | U _e 440V/480V | | U _e 550V/600V | |
| | | hp | A | hp | A | hp | A |
| AF1350 | – | 400 | 954 | 800 | 954 | 1000 | 954 |
| AF1650 | 8 | 450 | 1030 | 900 | 1030 | 1150 | 1050 |

Electronic overload relays E1250 DU for contactors AF1350/AF1650

Technical data

General technical data

| | | |
|---|---|--------------|
| Type | E1250 DU | |
| Standards: (major European and international standards) | IEC 60947-4-1 / IEC 60947-5-1 EN 60947-4-1 / EN 60947-5-1 | |
| Approvals and certificates |   | |
| Rated insulation voltage U_i | V | 690 |
| Rated operating voltage U_e | V | 690 |
| Impulse withstand voltage U_{imp} | kV | 6 |
| Permissible ambient temperature | | |
| - Storage | °C | - 25 to +70 |
| - Operation | °C | - 25 to +70 |
| Mounting position | Same as Contactor AF1350/AF1650 | |
| Mounting | by screws: 4 x M6 | |
| Connection terminals and attachment type | | |
| Auxiliary contacts | | |
| • Screw terminal (screw size) - with self-disengaging clamping piece | | M3.5 |
| • Tightening torque | Nm | 1 |
| • Connection cross-sections - single-core or stranded | mm² | 2 x 0.75...4 |
| - flexible with wire end ferrule | mm² | 2 x 0.75...4 |
| Connection terminals | | |
| Main conductors | | |
| • Screw terminal (screw size) | | M12 |
| Protection degree acc to IEC 60947-1/EN 60947-1 | | |
| | | IP00 |

Technical data of the conducting paths

| | | |
|--|-----------|--|
| Number of conducting paths | | 3 |
| Setting range | A | 375 ... 1250 |
| Tripping classes to IEC 60947-4-1/EN 60947-4-1 | | 10, 20, 30 (adjustable) |
| Frequency range | Hz | 50 and 60 (only for a.c. operating 3 phase) |

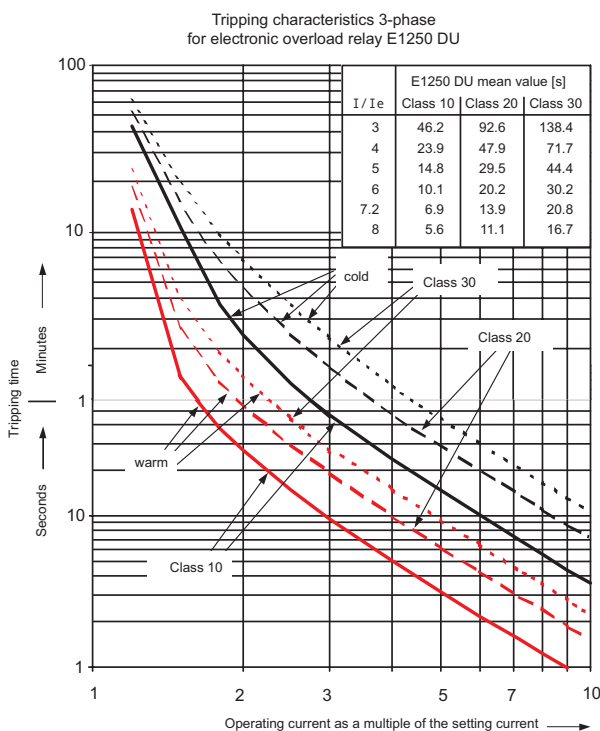
Load rating of auxiliary contacts

| | | | |
|---|----------|------------|------------|
| Contact | | NC (95-96) | NO (97-98) |
| Rated operating voltage U_e | V | 600 | 600 |
| Rated thermal continuous current | A | 6 | 6 |
| Rated operating current I_e | | | |
| at AC-15 230 V | A | 3 | 3 |
| at AC-15 400 V | A | 1.1 | 1.1 |
| at AC-15 500 V | A | 0.9 | 0.9 |
| at AC-15 690 V | A | 0.7 | 0.7 |
| at DC-13 24 V | A | 1.5 | 1.5 |
| at DC-13 60 V | A | 0.5 | 0.5 |
| at DC-13 110 V | A | 0.4 | 0.4 |
| at DC-13 220 V | A | 0.2 | 0.2 |
| Short-circuit protection fuse gG | A | 6 | 6 |

Description

The electronic overload relay (type E1250 DU) is available in the current range 375...1250 A. The E1250 DU is a 3-phase relay intended for a.c. circuits and is not suitable for single-phase or direct current (d.c.) circuits. The reset of the relay can be done manually or automatically. Tripping class can be set manually (class 10, 20 or 30). A busbar kit for mounting the E1250 DU to the AF1350/AF1650 contactor is included.

Tripping curves for E1250 DU electronic overload relays

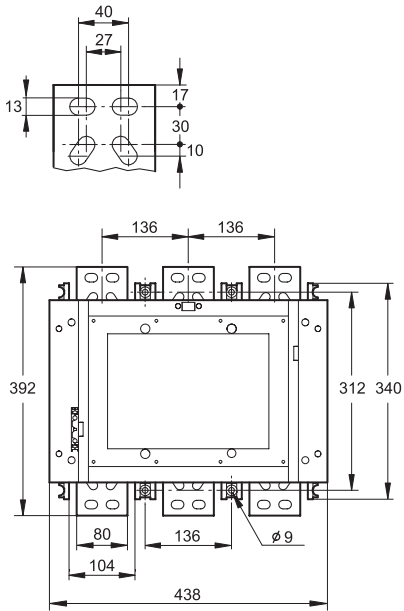


Not suitable for single-phase and direct current (d.c.) motors!

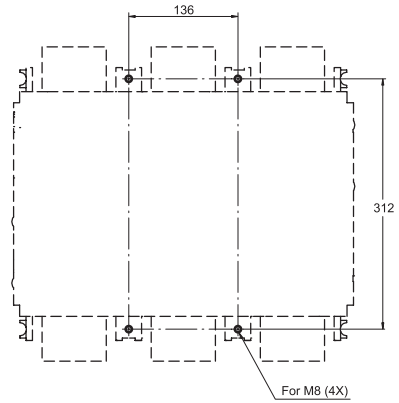
AF1350/AF1650 3-pole Contactors

Dimensions and Drilling plans

Dimensions

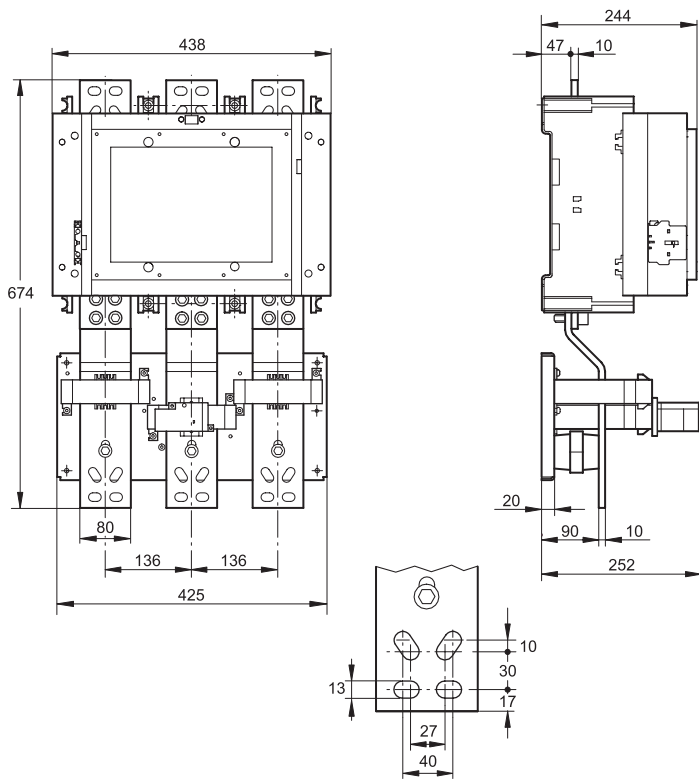


Drilling plan

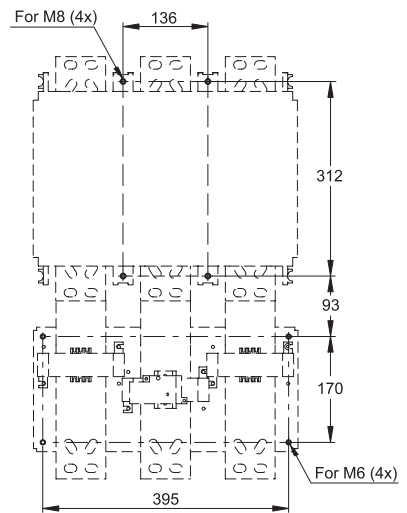


AF1350/AF1650 Contactor

Dimensions



Drilling plan

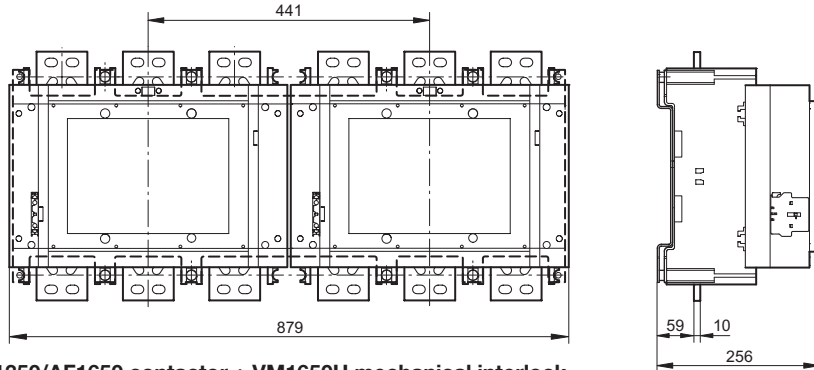


AF1350/AF1650 Contactor + E1250 DU Electronic O/L relay

AF1350/AF1650 3-pole Contactors

Dimensions and Drilling plan
PLC wiring and mounting positions

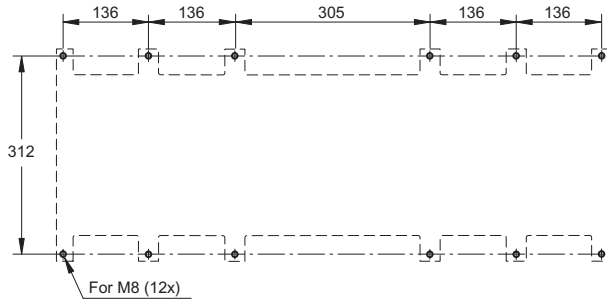
Dimensions



AF1350/AF1650 contactor + VM1650H mechanical interlock

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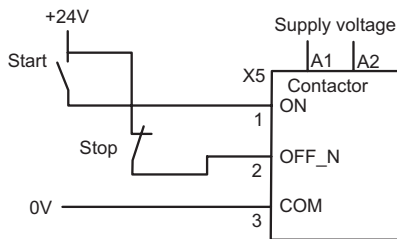
Drilling plan



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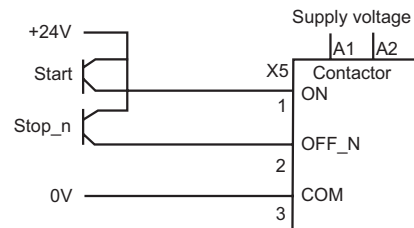
Control with logic control signals

When used with switches the wiring can be done as below.



Note: Emergency stop should disconnect A1 and A2

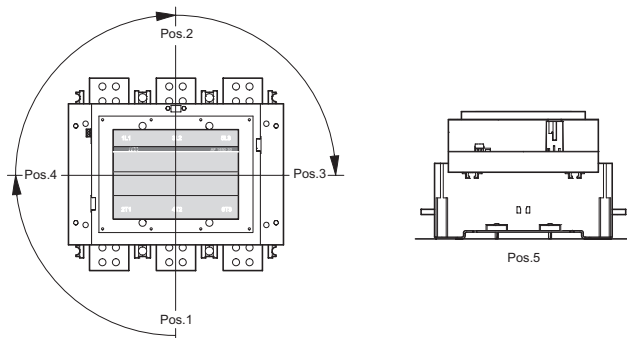
When used with transistor outputs the wiring can be done as below.



Note: Emergency stop should disconnect A1 and A2

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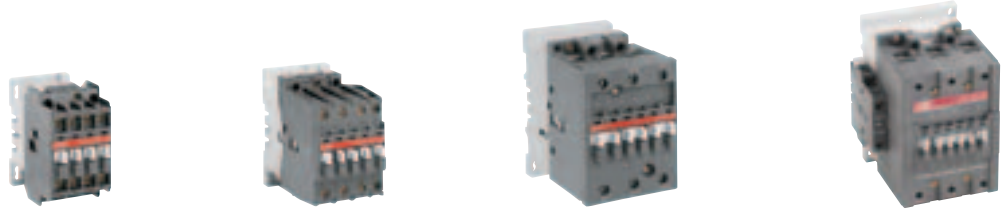
Mounting positions



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A Comprehensive product portfolio

A., AF., 3-pole Contactors

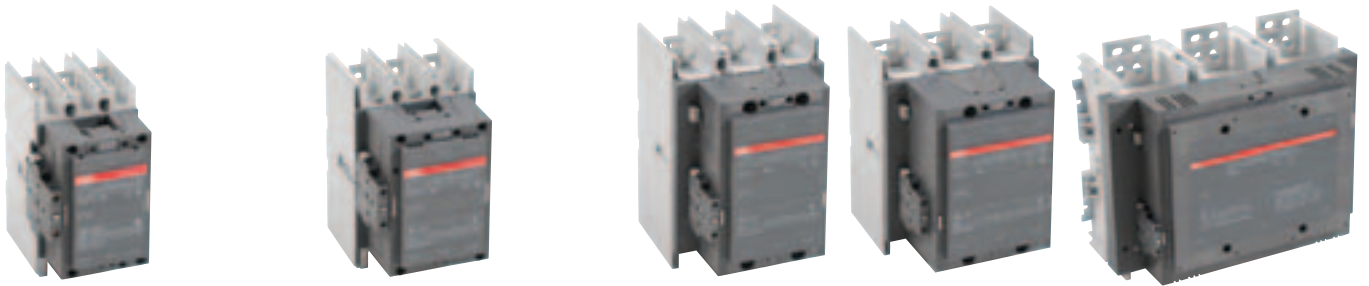


| Types | | 3-Pole | A9 | A12 | A16 | A26 | A30 | A40 | A/AF50 | A/AF63 | A/AF75 | A/AF95 | A/AF110 | | | | | | | | | | | | | | | | | |
|--|-----|--------|--|--------|--------|--|---------|---------|---|---------|--------|--|---------|------------------------------------|----------|----------|--------------------|--|----------|--|--|--|----------|--|---------|--|-----------|--|---------------------|--|
| Power rating AC-3, 220-240 V 380-400 V 690 V | IEC | | 2.2 kW | 3 kW | 4 kW | 6.5 kW | 9 kW | 11 kW | 15 kW | 18.5 kW | 22 kW | 25 kW | 30 kW | | | | | | | | | | | | | | | | | |
| | | | 4 kW | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 18.5 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW | | | | | | | | | | | | | | | | | |
| | | | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW | 30 kW | 37 kW | 40 kW | 55 kW | 75 kW | | | | | | | | | | | | | | | | | |
| Rated current AC-1, 40 °C | | | 25 A | 27 A | 30 A | 45 A | 55 A | 60 A | 100 A | 115 A | 125 A | 145 A | 160 A | | | | | | | | | | | | | | | | | |
| Power 220-240 V 440-480 V 600 V | UL | | 2 hp | 3 hp | 5 hp | 10 hp | 10 hp | 15 hp | 20 hp | 25hp | 30 hp | 30 hp | 40 hp | | | | | | | | | | | | | | | | | |
| | | | 5 hp | 7.5 hp | 10 hp | 20 hp | 25 hp | 30 hp | 40 hp | 60 hp | 60 hp | 60 hp | 75 hp | | | | | | | | | | | | | | | | | |
| | | | 7.5 hp | 10 hp | 15 hp | 25 hp | 30 hp | 40 hp | 50 hp | 75 hp | 75 hp | 75 hp | 100 hp | | | | | | | | | | | | | | | | | |
| General use rating | | | 21 A | 25 A | 30A | 40 A | 50 A | 60 A | 80 A | 90 A | 105 A | 125 A | 140 A | | | | | | | | | | | | | | | | | |
| Thermal/Electronic overload relay | | | TA 25 DU | | | 0.4 ...0.63 0.63 ...1.0 1.0 ...1.4 1.6...0.25 0.25...0.4 | | | 2.2...3.1 2.8...4.0 3.5...5.0 4.5...6.5 6.0...8.5 | | | 7.5...11 10 ...14 13 ...19 18 ...25 24 ...32 | | | TA 42 DU | | 22...32 29...42 | | TA 75 DU | | 29...42 36...52 45...63 60...80 | | TA 80 DU | | 60...80 | | TA 110 DU | | 65...90 80...110 | |
| Auxiliary contact block | | | Front Mounting 1 x NO CA 5-10 1 x NC CA 5-01 (Up to A/AF110) | | | | | | | | | | | Side Mounting 1 NO + 1 NC CAL 5-11 | | CAL18-11 | | | | | | | | | | | | | | |
| Timer | | | Pneumatic 0.1 ... 40 s TP 40 10 ... 180 s TP 180 | | | | | | | | | | | Electronic TE5S | | | | | | | | | | | | | | | | |
| Interlock | | | Mechanical and electrical VE 5-1 | | | | | | Mechanical and electrical VE 5-2 | | | | | | | | | | | | | | | | | | | | | |

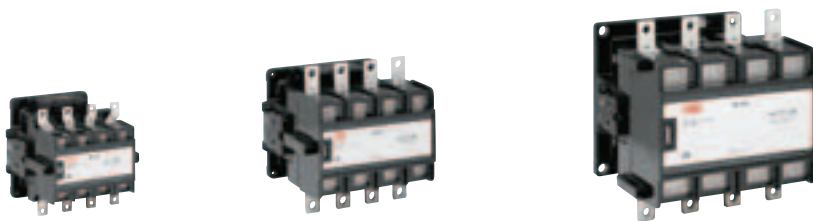
A., EK., 4-pole Contactors



| Types | | 4-Pole | A9 | A16 | A26 | A45 | A50 | A75 |
|---------------------------|--|--------|------|------|------|------|-------|-------|
| Rated current AC-1, 40 °C | | IEC | 25 A | 30 A | 45 A | 70 A | 100 A | 125 A |
| General use rating | | UL | 21 A | 30 A | 40 A | 80 A | 80 A | 105 A |



| 3-Pole | A/AF145 | A/AF185 | A/AF210 | A/AF260 | A/AF300 | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 |
|------------------------------------|-----------|----------------------------|-----------|----------------------------|---------|--------------------|-------------|----------|---------------------|-----------|--------------|
| | 45 kW | 55 kW | 59 kW | 80 kW | 90 kW | 110 kW | 132 kW | 160 kW | 220 kW | 257 kW | 315 kW |
| | 75 kW | 90 kW | 110 kW | 140 kW | 160 kW | 200 kW | 250 kW | 315 kW | 400 kW | 475 kW | 560 kW |
| | 110 kW | 132 kW | 160 kW | 200 kW | 250 kW | 315 kW | 355 kW | 500 kW | 600 kW | – | – |
| | 250 A | 275 A | 350 A | 400 A | 500 A | 600 A | 700 A | 800 A | 1050 A | 1350 A | 1650 A |
| | 50 hp | 60 hp | 75 hp | 100 hp | 100 hp | 150 hp | 200 hp | 250 hp | 300 hp | 400 hp | 450 hp |
| | 100 hp | 125 hp | 150 hp | 200 hp | 250 hp | 350 hp | 400 hp | 500 hp | 600 hp | 800 hp | 900 hp |
| | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp | 400 hp | 500 hp | 600 hp | 700 hp | 1000 hp | 1150 hp |
| | 230 A | 250 A | 300 A | 350 A | 400 A | 550 A | 650 A | 750 A | 900 A | 1350 A | 1650 A |
| | TA 200 DU | 130 ... 175 150 ... 200 | TA 450 DU | 165 ... 235 220 ... 310 | | E 500 DU | 150 ... 500 | E 800 DU | 250 ... 800 | E 1250 DU | 375 ... 1250 |
| | E 200 DU | 60 ... 200 | E 320 DU | 100 ... 320 | | | | | | | |
| Side Mounting 1 NO + 1 NC CAL18-11 | | | | | | | | | | | |
| Electronic TE5S | | | | | | | | | | | |
| Mechanical VM 300H | | | | | | Mechanical VM 750H | | | Mechanical VM 1650H | | |



| 4-Pole | EK110 | EK150 | EK175 | EK210 | EK370 | EK550 | EK1000 |
|--------|-------|-------|-------|-------|-------|-------|--------|
| | 200 A | 250 A | 300 A | 350 A | 550 A | 800 A | 1000 A |
| | 170 A | 200 A | 250 A | 300 A | 420 A | 540 A | – |

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Low Voltage Products

The new range of motor control equipment is supported by technical documentation and coordination tables. This together with improved design and more compact units makes it easier than ever to incorporate our products in your projects.

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- Coordination tables according to IEC 947-4-1
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