



Panorama

# Motor protection and control

## Manual motor starters, contactors and overload relays

# ABB sets a new standard in motor control and power switching

Featuring AF technology as standard, the latest range of ABB's contactors establishes a new industry benchmark. The electronically controlled coil offers multiple benefits over conventional alternatives, and together with ABB's wide product offering – an optimal configuration, every time.



## Access Global Support

The contactor and motor protection range from ABB is compatible with all major national and international standards and is available worldwide via a global distribution network. One contactor coil now handles 100 V – 250 V, AC/DC for use in Europe or Asia as well as North America.



## Optimize logistics

With its contactor and motor protection range, ABB has managed to reduce the number of contactor coils to just four. The total number of product variants has been reduced by up to 90%. This simplifies the customers' logistics and cuts administration costs.



## Simplify design

By reducing contactor coil energy consumption by up to 80%, panels can be built smaller and transformers more compact. All the features of the AF technology, along with access to drawings and coordination tables online, simplifies your design and assembly process.



## Secure uptime

Time to prevent stoppages caused by voltage fluctuations. The AF contactor ensures distinct operation in unstable networks and signifies a major advance in motor control and power switching. Voltage sags, dips and surges pose no threat. The AF contactor secures your uptime.



## MacGregor. Keeping turnarounds brief.

Until the AF range was installed, voltage sags were affecting MacGregor's deck cranes. Conventional contactors welded shut, leading to several stoppages a week. No longer. Known for superior quality and an ability to operate in the most hostile environments, MacGregor deck cranes enjoy a global reputation for reliability. A small but vital component, the AF contactor helps maintain this reputation.

To keep things moving, you need Control. Connect to Control.

Explore all our case studies at [www.abb.com/connecttocontrol](http://www.abb.com/connecttocontrol)

**SSAB**  
Making certainty  
standard

**Gamesa**  
Taming the wind

**LKAB**  
Providing fresh air

# Mini contactors 3-pole contactors, for motor control and power switching

3-pole or 4-pole



<b>IEC (1)</b>	<b>AC-3 Rated operational power</b>	$\theta \leq 60^\circ\text{C}$ (2), 400 V	<b>kW</b>	<b>4</b>	<b>5.5</b>
<b>UL/CSA</b>	<b>3-phase motor rating</b>	480 V	<b>hp</b>	<b>3</b>	<b>5</b>
<b>AC / DC Control supply</b>		Type		—	—
<b>AC Control supply</b>		Type		<b>B6</b>	<b>B7</b>
<b>DC Control supply</b>		Type		<b>BC6</b>	<b>BC7</b>
<b>IEC</b>	<b>AC-3 Rated operational current</b>	$\theta \leq 60^\circ\text{C}$ (2), 400 V	<b>A</b>	<b>8.5</b>	<b>11.5</b>
	<b>AC-1 Rated operational current</b>	$\theta \leq 40^\circ\text{C}$ , 690 V	<b>A</b>	<b>20</b> (400 V)	<b>20</b> (400 V)
<b>UL/CSA</b>	<b>General use rating</b>	600 V	<b>A</b>	<b>12</b> (300 V)	<b>16</b>
<b>NEMA</b>	<b>NEMA Size</b>			—	—

(1) 1000 V IEC ratings available for AF146 ... AF2650 contactors.  
 (2)  $\theta \leq 55^\circ\text{C}$  for mini contactors and AF400 ... AF2650 contactors.

## Main accessories

<b>Auxiliary contact blocks</b>	Front mounting	<b>CAF6</b>
	Side mounting	<b>CA6</b>
<b>Timers</b>	Electronic	
<b>Interlocking units (4)</b>	Mechanical	
	Mechanical / Electrical	
<b>Connection sets</b>	For reversing contactors	<b>BSM6-30</b>
<b>Surge suppressors</b>	Varistor (AC / DC)	<b>RV-BC6</b>
	RC type (AC)	
	Transil diode (DC)	<b>RD7</b>

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

## Overload relays

<b>Thermal relays</b>	Class 10 (Class 10A for TF140, TA200DU)	<b>T16</b> (0.10...16 A)
<b>Electronic relays</b>	Class 10E, 20E, 30E	<b>E16DU</b> (0.10...18.9 A)

## Manual motor starters

	Thermal / magnetic protection Class 10	<b>MS116</b> (0.10...32 A) Ics up to 50 kA for class 10A <b>MS132</b> (0.10...32 A) Ics up to 100 kA
	Magnetic only types	<b>MO132</b> (0.16...32A)
<b>Accessories</b>	For contactor mounting	<b>BEA7/132</b>



<b>4</b>	<b>5.5</b>	<b>7.5</b>	<b>4</b>	<b>5.5</b>	<b>7.5</b>	<b>11</b>	<b>15</b>	<b>18.5</b>	<b>18.5</b>	<b>22</b>	<b>30</b>	<b>37</b>	<b>45</b>	<b>55</b>	<b>75</b>	<b>75</b>	<b>90</b>	<b>110</b>	<b>132</b>	<b>160</b>	<b>200</b>	
<b>5</b>	<b>7.5</b>	<b>10</b>	<b>5</b>	<b>7.5</b>	<b>10</b>	<b>15</b>	<b>20</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>50</b>	<b>60</b>	<b>60</b>	<b>75</b>	<b>100</b>	<b>100</b>	<b>125</b>	<b>150</b>	<b>200</b>	<b>250</b>	<b>300</b>	
—	—	—	<b>AF09</b>	<b>AF12</b>	<b>AF16</b>	<b>AF26</b>	<b>AF30</b>	<b>AF38</b>	<b>AF40</b>	<b>AF52</b>	<b>AF65</b>	<b>AF80</b>	<b>AF96</b>	<b>AF116</b>	<b>AF140</b>	<b>AF146</b>	<b>AF190</b>	<b>AF205</b>	<b>AF265</b>	<b>AF305</b>	<b>AF370</b>	
<b>AS09</b>	<b>AS12</b>	<b>AS16</b>	<b>AF09</b>	<b>AF12</b>	<b>AF16</b>	<b>AF26</b>	<b>AF30</b>	<b>AF38</b>	<b>AF40</b>	<b>AF52</b>	<b>AF65</b>	<b>AF80</b>	<b>AF96</b>	<b>AF116</b>	<b>AF140</b>	<b>AF146</b>	<b>AF190</b>	<b>AF205</b>	<b>AF265</b>	<b>AF305</b>	<b>AF370</b>	
<b>ASL09</b>	<b>ASL12</b>	<b>ASL16</b>	<b>AF09</b>	<b>AF12</b>	<b>AF16</b>	<b>AF26</b>	<b>AF30</b>	<b>AF38</b>	<b>AF40</b>	<b>AF52</b>	<b>AF65</b>	<b>AF80</b>	<b>AF96</b>	<b>AF116</b>	<b>AF140</b>	<b>AF146</b>	<b>AF190</b>	<b>AF205</b>	<b>AF265</b>	<b>AF305</b>	<b>AF370</b>	
<b>9</b>	<b>12</b>	<b>15.5</b>	<b>9</b>	<b>12</b>	<b>18</b>	<b>26</b>	<b>32</b>	<b>38</b>	<b>40</b>	<b>53</b>	<b>65</b>	<b>80</b>	<b>96</b>	<b>116</b>	<b>140</b>	<b>146</b>	<b>190</b>	<b>205</b>	<b>265</b>	<b>305</b>	<b>370</b>	
<b>22</b>	<b>24</b>	<b>24</b>	<b>25</b>	<b>28</b>	<b>30</b>	<b>45</b>	<b>50</b>	<b>50</b>	<b>70</b>	<b>100</b>	<b>105</b>	<b>125</b>	<b>130</b>	<b>160</b>	<b>200</b>	<b>225</b>	<b>275</b>	<b>350</b>	<b>400</b>	<b>500</b>	<b>600</b>	
<b>20</b>	<b>20</b>	<b>20</b>	<b>25</b>	<b>28</b>	<b>30</b>	<b>45</b>	<b>50</b>	<b>50</b>	<b>60</b>	<b>80</b>	<b>90</b>	<b>105</b>	<b>115</b>	<b>160</b>	<b>200</b>	<b>200</b>	<b>250</b>	<b>300</b>	<b>350</b>	<b>400</b>	<b>520</b>	
<b>00</b>	<b>00</b>	<b>0</b>	<b>00</b>	<b>0</b>	—	<b>1</b>	—	—	<b>2</b>	—	—	<b>3</b>	—	—	<b>4</b>	—	—	—	—	<b>5</b>	—	—

<b>CA3-10</b> (1 x N.O.) <b>CA3-01</b> (1 x N.C.)	<b>CA4-10</b> (1 x N.O.) <b>CA4-01</b> (1 x N.C.)																<b>CAL19</b> (1 x N.O. + 1 x N.C.)
<b>TEF3-ON</b> <b>TEF3-OFF</b>	<b>TEF4-ON</b> <b>TEF4-OFF</b>																
<b>VM3</b>	<b>VM4</b>	<b>VM96-4</b>															<b>VM19</b> (for same size contactors)
	<b>VEM4</b>																
<b>BER16C-3</b>	<b>BER16-4</b>	<b>BER38-4</b>	<b>BER65-4</b>	<b>BER96-4</b>	<b>BER140-4</b>	<b>BER205-4</b>	<b>BER370-4</b>										
<b>RV5</b> (24...440 V)	Built-in surge protection																
<b>RC5-1</b> (24...440 V)																	
<b>RT5</b> (12...264 V)																	

<b>T16</b> (0.10...16 A)	<b>TF42</b> (0.10...38 A)	<b>TF65</b> (22...67 A)	<b>TF96</b> (40...96 A)	<b>TF140DU</b> (66...142 A) $\theta \leq 55^\circ\text{C}$	<b>TA200DU</b> (66...200 A) $\theta \leq 55^\circ\text{C}$
	<b>EF19</b> (0.10...18.9 A)	<b>EF19</b> (0.10...18.9 A) <b>EF45</b> (9...45 A)	<b>EF65</b> (25...70 A)	<b>EF96</b> (36...100 A)	<b>EF146</b> (54...150 A)
					<b>EF205</b> (63...210 A)
					<b>EF370</b> (115...380 A)

<b>MS116</b> (0.10...32 A) Ics up to 50 kA for class 10 A	<b>MS450</b> (28...50 A) Ics up to 50 kA	
<b>MS132</b> (0.10...32 A) Ics up to 100 kA		<b>MS495</b> (45...100 A) Ics up to 50 kA
	<b>MS497</b> (22...100 A) Ics up to 100 kA	
<b>MO132</b> (0.16...32 A) Ics up to 100 kA	<b>MO496</b> (32...100 A) Ics up to 100 kA	<b>MO450</b> (40...50 A) Ics up to 50 kA
		<b>MO495</b> (63...100 A) Ics up to 50 kA
<b>BEA16-3</b>	<b>BEA16-4</b>	<b>BEA38-4</b>

## Short-circuit protection devices

<b>Tmax</b> Circuit breaker and accessories			
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200	250	315	400	—	475	560	—	—
350	400	500	600	—	800	900	—	—
AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
AF400	AF460	AF580	AF750	AF1250	AF1350	AF1650	AF2050	AF2650
400	460	580	750	—	860	1050	—	—
600	700	800	1050	1260	1350	1650	2050	2650
550	650	750	900	1210	1350	1650	2100	2700
—	6	—	7	—	—	8	—	—

CAL18 (1 x N.O. + 1 x N.C.)	
VM750H VM750V	VM1650H
BEM460-30	BEM750-30

E500DU (150...500 A)	E800DU (250...800 A)	E1250DU (375...1250 A)
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## 4-pole contactors



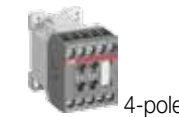
IEC	AC-1 Rated operational current	$\theta \leq 40^\circ\text{C}$ , 690 V	A	25	30	45	55	70	100	125	200	250	300	350	550	800	1000
UL/CSA	General use rating	600 V	A	25	30	45	55	65	80	105	170	200	250	300	420	540	—
AC Control supply		Type	AF09	AF16	AF26	AF38	A45	A50	A75	EK110	EK150	EK175	EK210	EK370	EK550	EK1000	
DC Control supply		Type	AF09	AF16	AF26	AF38	AE45	AE50	AE75	EK110	EK150	EK175	EK210	EK370	EK550	EK1000	
AC / DC Control supply		Type	AF09	AF16	AF26	AF38	AF45	AF50	AF75	—	—	—	—	—	—	—	

## Mini contactor relays



IEC	AC-15 Rated operational current	400 V	A	3	
UL/CSA	Pilot duty			A600	
AC Control supply		Type	K6-22Z	K6-31Z	K6-40E
DC Control supply		Type	KC6-22Z	KC6-31Z	KC6-40E
AC / DC Control supply		Type	—	—	—

## Contactor relays



3	3	3
A600, Q300	A600, Q300	A600, Q600
NS22E	NS31E	NS40E
NSL22E	NSL31E	NSL40E
—	—	—
NF22E	NF31E	NF40E
NF22E	NF31E	NF40E
NF22E	NF31E	NF40E

## R contactors

### DC Circuit switching

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 Circuit switching

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

### Special versions

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

## Specific contactors

### Capacitor switching

12.5 to 80 kvar  
UA16 to UA110 types  
UA16..RA to UA110..RA types

### DC Circuit switching

100 A, 440 V, DC-1  
GA75, GAE75 types

275 to 2050 A, 1000 V, DC-1  
GAF185 to GAF2050 types

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