
Customer made motor starting solution with AS contactors with screw terminals

Starters protected by manual motor starters

- 12/82** Overview
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Starters protected by thermal overload relays

- 12/94** Direct-on-line and reversing starters
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- 12/102** Dimensions

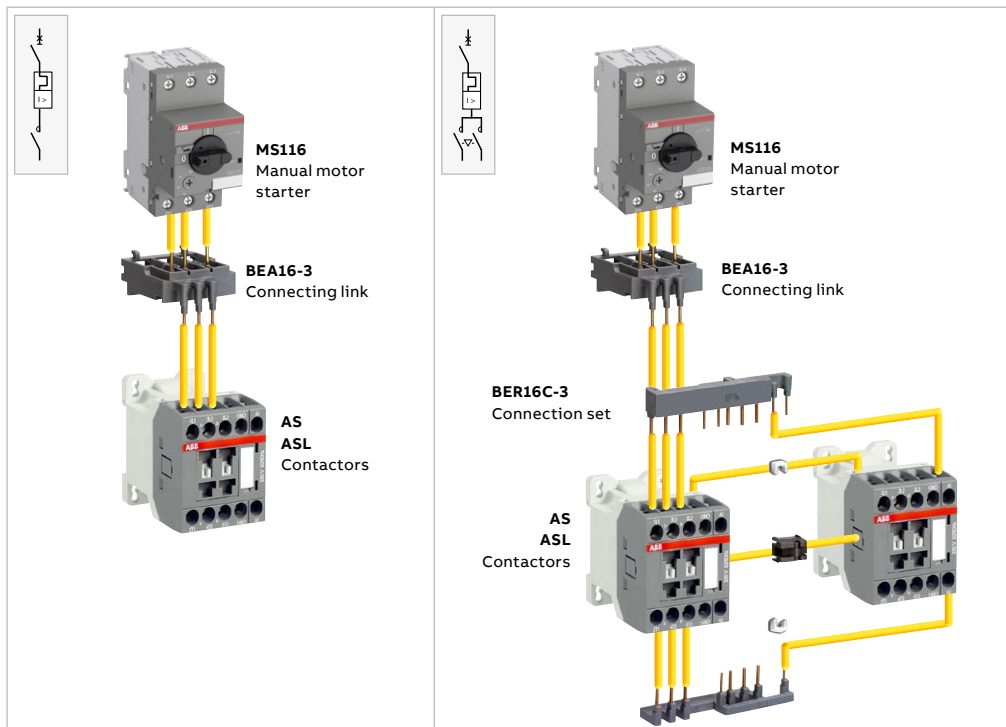
Motor starting solutions

Open type version, in kit form

Starters protected by manual motor starters

Direct-on-line starters

Reversing starters

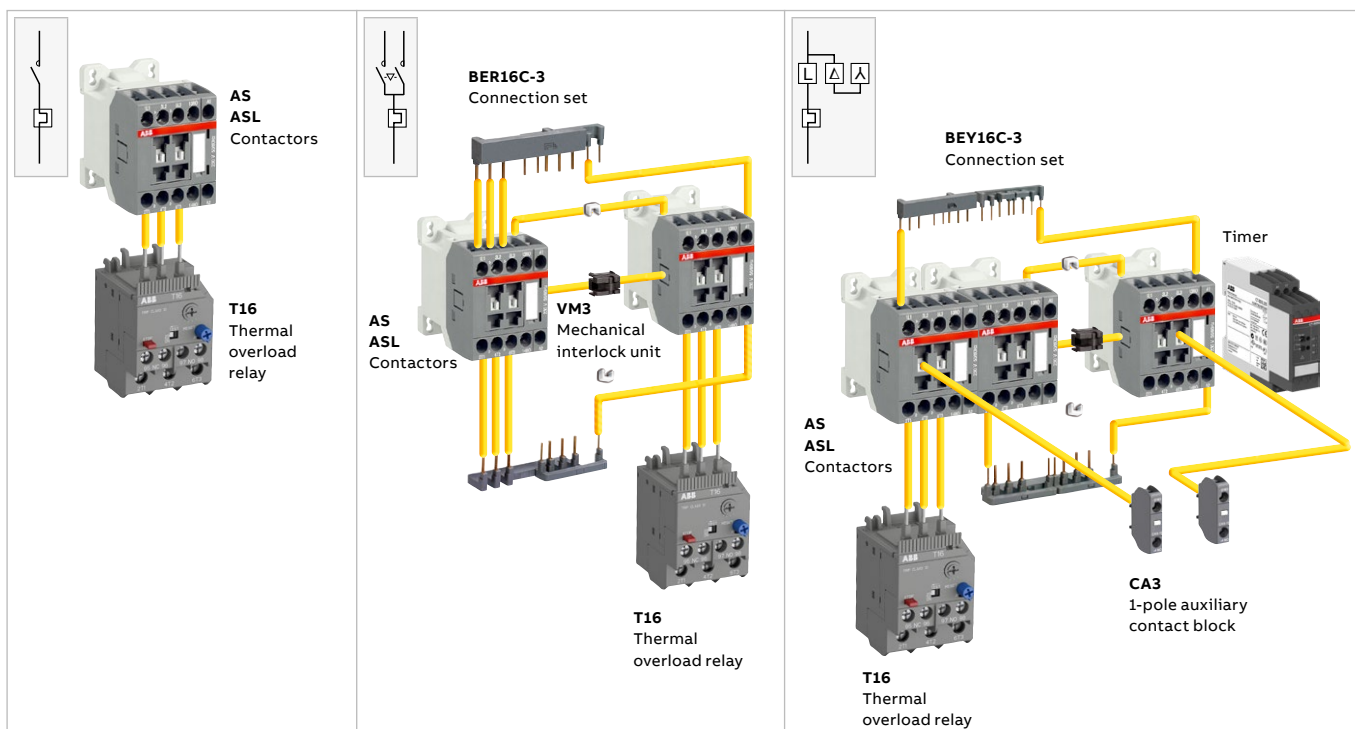


Starters protected by thermal overload relays

Direct-on-line starters

Reversing starters

Star-delta starters



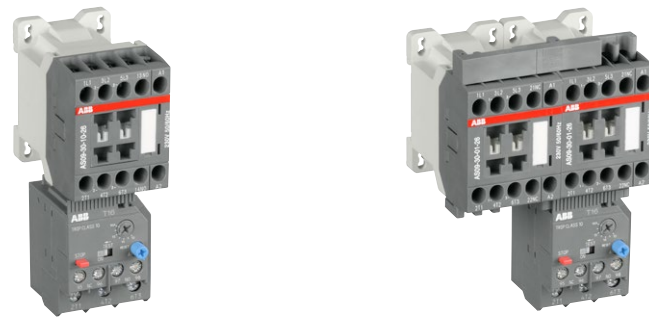
Starters protected by manual motor starters



Switching of 3-phase cage motors

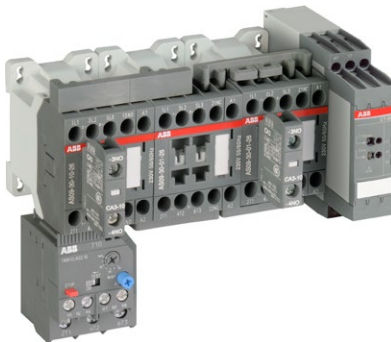
	Direct-on-line starters	Reversing starters
Rated power - AC-3, 400 V	0.06...7.5 kW	0.06...7.5 kW
Short-circuit current I _q	16 kA - 50 kA	16 kA - 50 kA
Coordination type	Type 1 & type 2	Type 1 & type 2
Manual motor starters	MS116	MS116
Contactors	AC operated	AS09 ... AS16
	DC operated	ASL09 ... ASL16

Starters protected by thermal overload relays



Switching of 3-phase cage motors

	Direct-on-line starters	Reversing starters
Rated power - AC-3, 400 V	4...7.5 kW	4...7.5 kW
Contactors	AC operated	AS09 ... AS16
	DC operated	ASL09 ... ASL16
Thermal overload relays	T16	T16

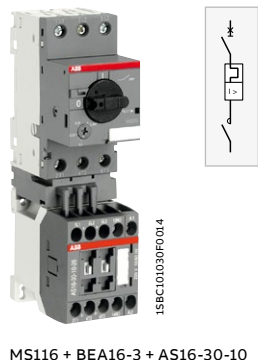


Switching of 3-phase cage motors

	Star-delta starters	
Rated power - AC-3, 400 V	7.5...11 kW	
Contactors	AC operated	AS09 ... AS16
	DC operated	ASL09 ... ASL16
Thermal overload relays	T16	

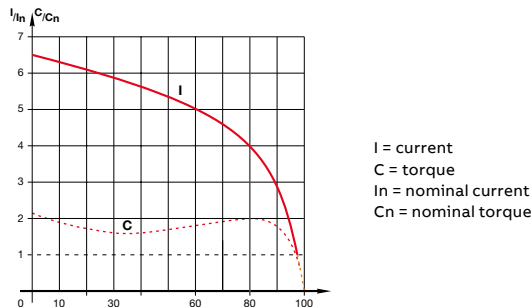
Direct-on-line starters protected by manual motor starters

With AS, ASL contactors - open type version in kit form



Application

Full voltage direct-on-line starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



Coordination types

The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

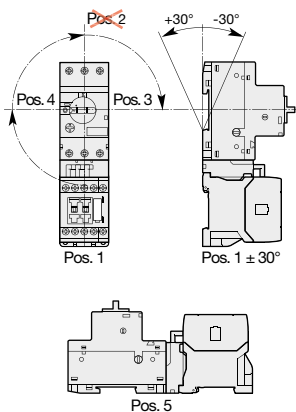
Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main technical data

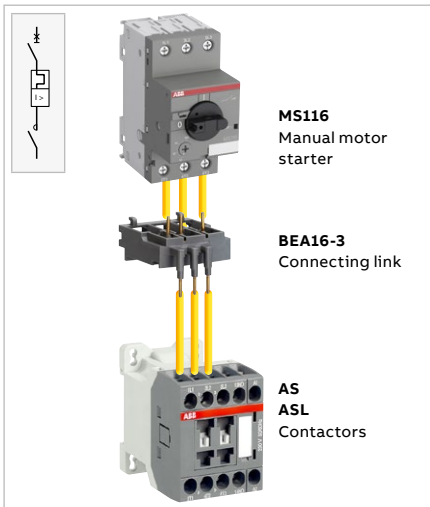
Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage U_e max.	690 V - 50/60 Hz
Rated insulation voltage U_i according to IEC 60947-4-1	690 V
Switching frequency	≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time
Ambient air temperature close to the device	≤ 55 °C
Degree of protection	IP20

Mounting positions



Direct-on-line starters protected by manual motor starters

With AS, ASL contactors - open type version in kit form



MS116
Manual motor starter

BEA16-3
Connecting link

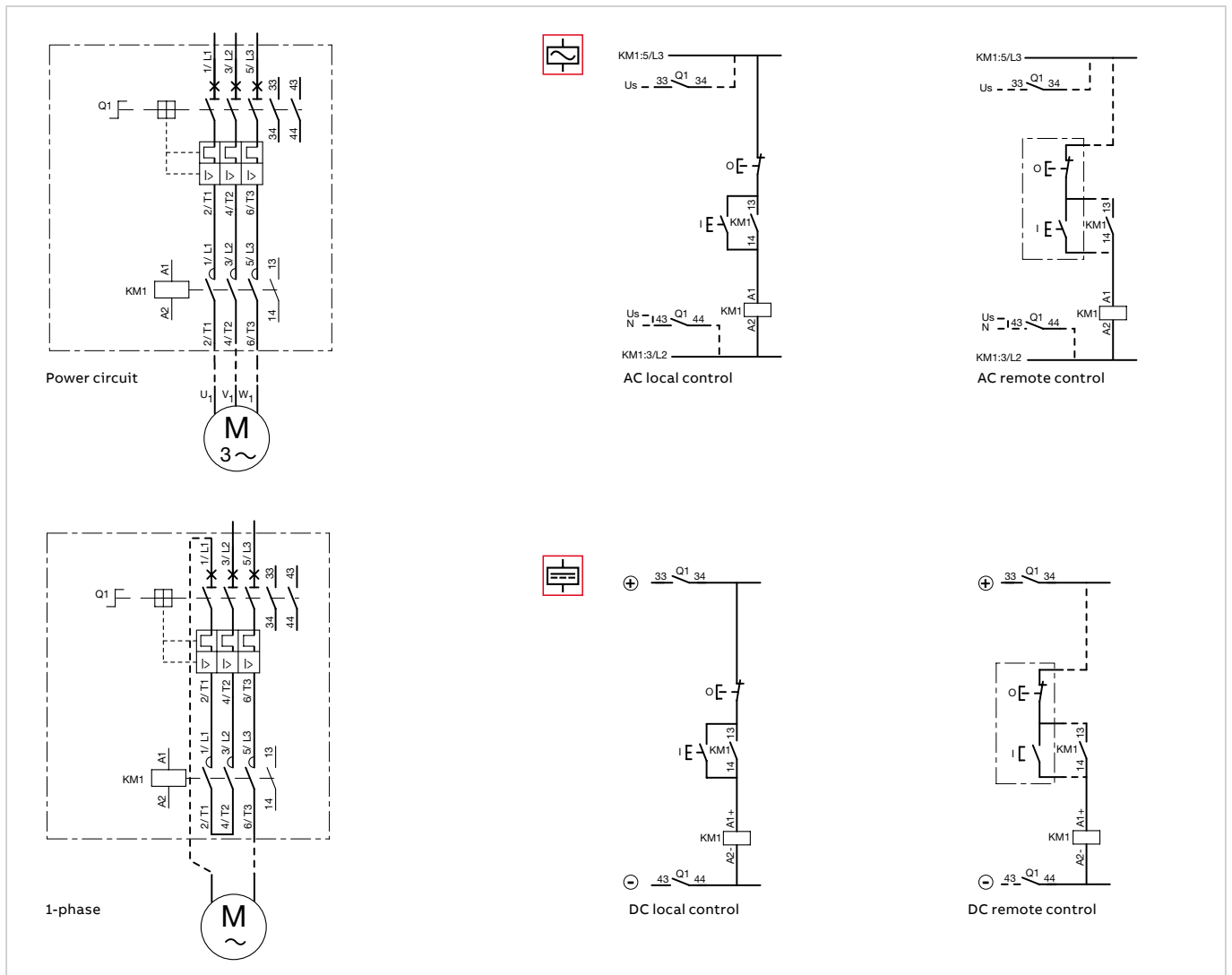
AS
ASL
Contactors

You can easily assemble a direct-on-line starter by using the BEA16-3 connecting link 3-pole insulated. It is used to electrically and mechanically connect MS116 manual motor starter and AS or ASL contactors.

Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50 / 60 Hz, I_q = 16 kA or I_q = 50 kA up to 7.5 kW.

For complete coordination tables with MS116 or MS132, please contact your ABB local sales organization.


Wiring diagrams



DOL starters protected by MS116 manual motor starters

With AS contactors - open type version in kit form

Coordination type 1 or type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz

	IEC		Manual motor starters				Rated control circuit		Type		Order code	Allowed setting current
	AC-3, 400 V		Type	Order code	Setting range	Rated instantaneous short-circuit current setting I_i	Uc (1)					
	Rated operational power	Rated operational current					V 50 Hz	V 60 Hz				
	kW	A			A							A

Coordination type 1

Coordination type 2

Iq = 16 kA		Iq = 50 kA										
0.06	0.2	MS116-0.25	1SAM250000R1002	0.16...0.25	3.13	24	24	AS09-30-10-20	1SBL101001R2010	0.25		
						230	230	AS09-30-10-26	1SBL101001R2610			
0.09	0.3	MS116-0.4	1SAM250000R1003	0.25...0.40	5	24	24	AS09-30-10-20	1SBL101001R2010	0.4		
						230	230	AS09-30-10-26	1SBL101001R2610			
0.12	0.44	MS116-0.63	1SAM250000R1004	0.40...0.63	7.88	24	24	AS09-30-10-20	1SBL101001R2010	0.63		
						230	230	AS09-30-10-26	1SBL101001R2610			
0.18	0.6	MS116-1.0	1SAM250000R1005	0.63...1.00	12.5	24	24	AS09-30-10-20	1SBL101001R2010	1		
						230	230	AS09-30-10-26	1SBL101001R2610			
0.25	0.85	MS116-1.0	1SAM250000R1005	0.63...1.00	12.5	24	24	AS09-30-10-20	1SBL101001R2010	1		
						230	230	AS09-30-10-26	1SBL101001R2610			
0.37	1.1	MS116-1.6	1SAM250000R1006	1.00...1.60	20	24	24	AS09-30-10-20	1SBL101001R2010	1.6		
						230	230	AS09-30-10-26	1SBL101001R2610			
0.55	1.5	MS116-1.6	1SAM250000R1006	1.00...1.60	20	24	24	AS09-30-10-20	1SBL101001R2010	1.6		
						230	230	AS09-30-10-26	1SBL101001R2610			
0.75	1.9	MS116-2.5	1SAM250000R1007	1.60...2.50	31.25	24	24	AS09-30-10-20	1SBL101001R2010	2.5		
						230	230	AS09-30-10-26	1SBL101001R2610			
1.1	2.7	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-10-20	1SBL101001R2010	4		
						230	230	AS09-30-10-26	1SBL101001R2610			
1.5	3.6	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-10-20	1SBL101001R2010	4		
						230	230	AS09-30-10-26	1SBL101001R2610			
2.2	4.9	MS116-6.3	1SAM250000R1009	4.00...6.30	78.75	24	24	AS09-30-10-20	1SBL101001R2010	6.3		
						230	230	AS09-30-10-26	1SBL101001R2610			
3	6.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-10-20	1SBL111001R2010	10		
						230	230	AS12-30-10-26	1SBL111001R2610			
4	8.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-10-20	1SBL111001R2010	10		
						230	230	AS12-30-10-26	1SBL111001R2610			
5.5	11.5	MS116-12	1SAM250000R1012	8.00...12.0	180	24	24	AS12-30-10-20	1SBL111001R2010	12		
						230	230	AS12-30-10-26	1SBL111001R2610			
7.5	15.5	MS116-16	1SAM250000R1011	10.0...16.0	240	24	24	AS16-30-10-20	1SBL121001R2010	15.5		
						230	230	AS16-30-10-26	1SBL121001R2610			

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.




Main accessories

	Type	Order code
Connecting link for manual motor starter	BEA16-3	1SBN081006T1000

DOL starters protected by MS116 manual motor starters

With ASL contactors - open type version in kit form

Coordination type 1 or type 2, AC-3, 16 or 50 kA, 400 V, 50/60 Hz

	Manual motor starters					Contactors				
	IEC		Type	Order code	Setting range	Rated instantaneous short-circuit current setting I _i	Rated control circuit voltage U _c (1)	Type	Order code	Allowed setting current
	AC-3, 400 V	Rated operational power					V DC			A
	kW	A			A					

Coordination type 1

Coordination type 2

I _q = 16 kA		I _q = 50 kA								
0.06	0.2	MS116-0.25	1SAM250000R1002	0.16...0.25	3.13	24	ASL09-30-10-81	1SBL103001R8110	0.25	
0.09	0.3	MS116-0.4	1SAM250000R1003	0.25...0.40	5	24	ASL09-30-10-81	1SBL103001R8110	0.4	
0.12	0.44	MS116-0.63	1SAM250000R1004	0.40...0.63	7.88	24	ASL09-30-10-81	1SBL103001R8110	0.63	
0.18	0.6	MS116-1.0	1SAM250000R1005	0.63...1.00	12.5	24	ASL09-30-10-81	1SBL103001R8110	1	
0.25	0.85	MS116-1.0	1SAM250000R1005	0.63...1.00	12.5	24	ASL09-30-10-81	1SBL103001R8110	1	
0.37	1.1	MS116-1.6	1SAM250000R1006	1.00...1.60	20	24	ASL09-30-10-81	1SBL103001R8110	1.6	
0.55	1.5	MS116-1.6	1SAM250000R1006	1.00...1.60	20	24	ASL09-30-10-81	1SBL103001R8110	1.6	
0.75	1.9	MS116-2.5	1SAM250000R1007	1.60...2.50	31.25	24	ASL09-30-10-81	1SBL103001R8110	2.5	
1.1	2.7	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	ASL09-30-10-81	1SBL103001R8110	4	
1.5	3.6	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	ASL09-30-10-81	1SBL103001R8110	4	
2.2	4.9	MS116-6.3	1SAM250000R1009	4.00...6.30	78.75	24	ASL09-30-10-81	1SBL103001R8110	6.3	
3	6.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	ASL12-30-10-81	1SBL113001R8110	10	
4	8.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	ASL12-30-10-81	1SBL113001R8110	10	
5.5	11.5	MS116-12	1SAM250000R1012	8.00...12.0	180	24	ASL12-30-10-81	1SBL113001R8110	12	
7.5	15.5	MS116-16	1SAM250000R1011	10.0...16.0	240	24	ASL16-30-10-81	1SBL123001R8110	15.5	

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.

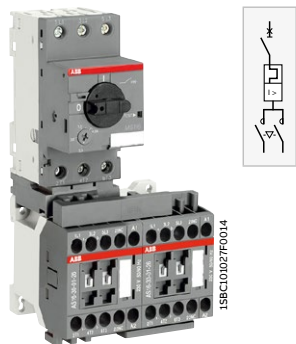


Main accessories

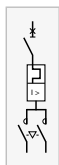
	Type	Order code
Connecting link for manual motor starter	BEA16-3	1SBN081006T1000

Reversing starters protected by manual motor starters

With AS, ASL contactors - open type version in kit form

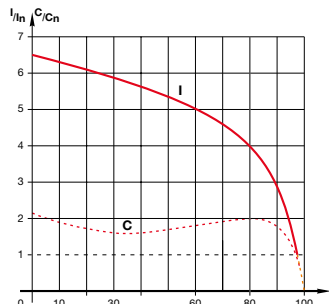


MS116 + BEA16-3 + VM3 + BER16C-3 + AS16-30-01



Application

Full voltage reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque

Coordination types

The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

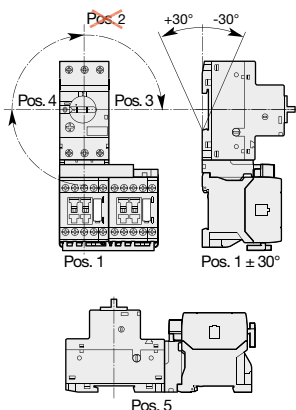
Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main technical data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui according to IEC 60947-4-1	690 V
Switching frequency	≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time
Ambient air temperature close to the device	≤ 55 °C
Degree of protection	IP20

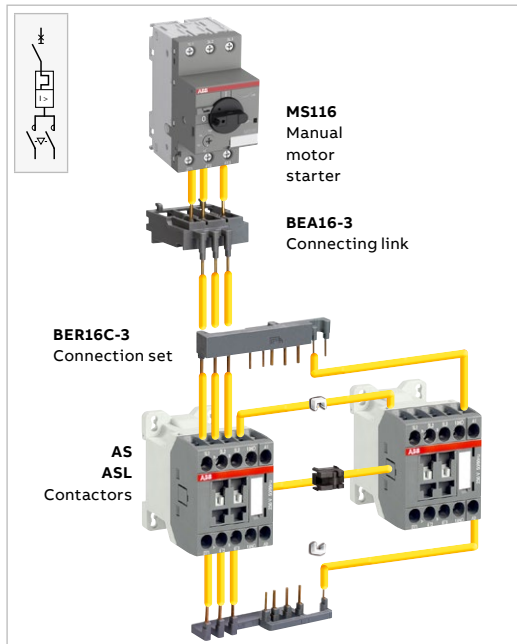
Note: Minimum switchover delay of 50 ms must be introduced between respective opening and closing of AC operated reversing contactors

Mounting positions



Reversing starters protected by manual motor starters

With AS, ASL contactors - open type version in kit form



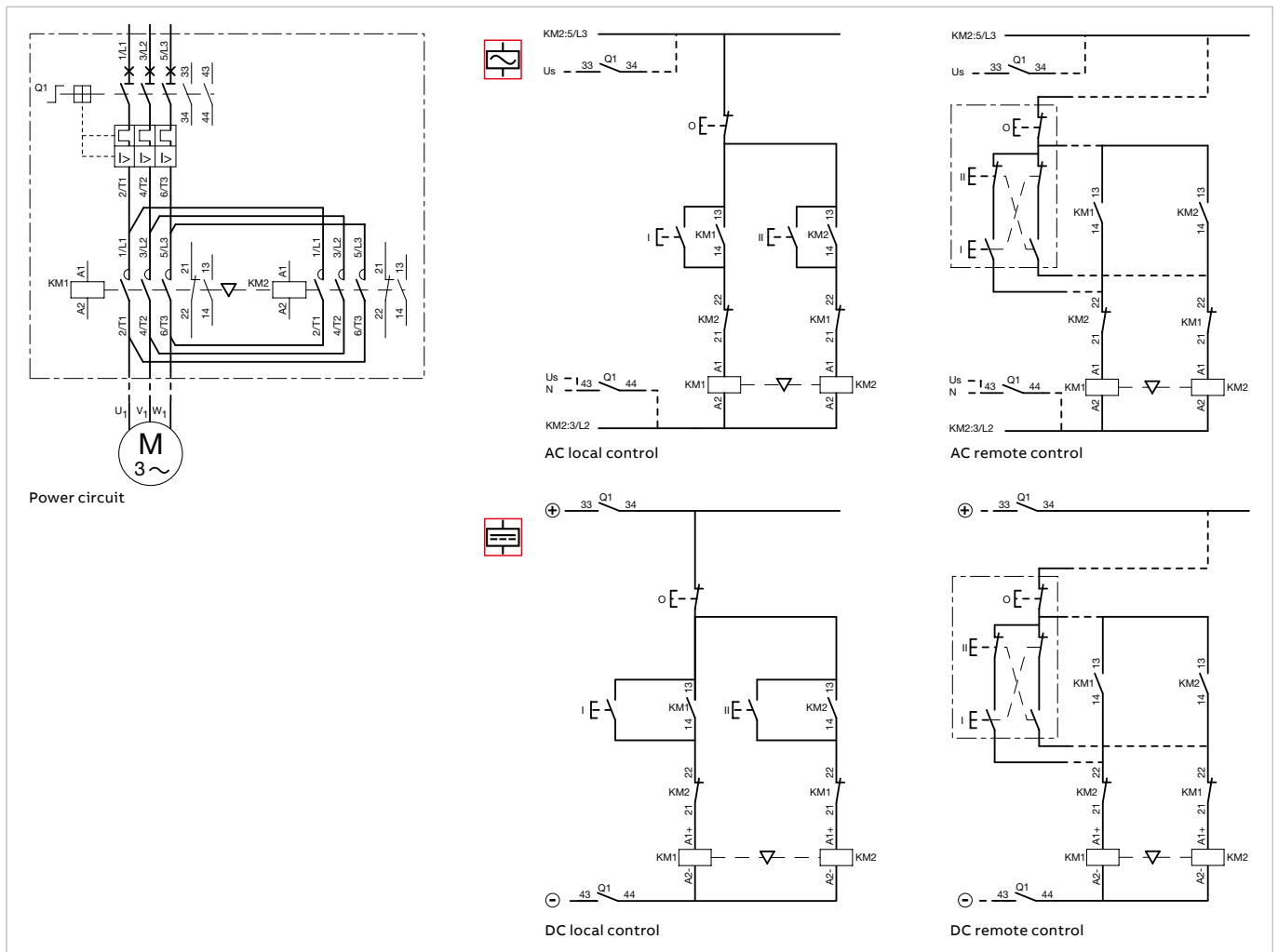
You can easily assemble reversing starter thanks to our complete range of accessories:

- BEA16-3 connecting link 3-pole insulated: it is used to electrically and mechanically connect MS116 manual motor starter and AS or ASL contactors.
- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter width.
- BER16C-3 connection set: it assures a safe and simple connection between both contactor main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact terminals of both contactors.

Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50 / 60 Hz, I_q = 16 kA or I_q = 50 kA up to 7.5 kW.

For complete coordination tables with MS116 or MS132, please contact your ABB local sales organization.


Wiring diagrams



Reversing starters protected by MS116 manual motor starters

With AS contactors - open type version in kit form

Coordination type 1 or type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz

	Manual motor starters					Contactors					
	IEC		Type	Order code	Setting range	Rated instantaneous short-circuit current setting I_i	Rated control circuit voltage U_c (1)		Type	Order code	Allowed setting current
	AC-3, 400 V	Rated operational power					Rated operational current	V 50 Hz			
kW	A	A	A	A	V 50 Hz	V 60 Hz	A				

Coordination type 1

Coordination type 2

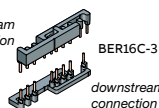
		Iq = 16 kA		Iq = 50 kA							
0.06	0.2	MS116-0.25	1SAM250000R1002	0.16...0.25	3.13	24	24	AS09-30-01-20	1SBL101001R2001	0.25	
						230	230	AS09-30-01-26	1SBL101001R2601		
0.09	0.3	MS116-0.4	1SAM250000R1003	0.25...0.40	5	24	24	AS09-30-01-20	1SBL101001R2001	0.4	
						230	230	AS09-30-01-26	1SBL101001R2601		
0.12	0.44	MS116-0.63	1SAM250000R1004	0.40...0.63	7.88	24	24	AS09-30-01-20	1SBL101001R2001	0.63	
						230	230	AS09-30-01-26	1SBL101001R2601		
0.18	0.6	MS116-1.0	1SAM250000R1005	0.63...1.00	12.5	24	24	AS09-30-01-20	1SBL101001R2001	1	
						230	230	AS09-30-01-26	1SBL101001R2601		
0.25	0.85	MS116-1.0	1SAM250000R1005	0.63...1.00	12.5	24	24	AS09-30-01-20	1SBL101001R2001	1	
						230	230	AS09-30-01-26	1SBL101001R2601		
0.37	1.1	MS116-1.6	1SAM250000R1006	1.00...1.60	20	24	24	AS09-30-01-20	1SBL101001R2001	1.6	
						230	230	AS09-30-01-26	1SBL101001R2601		
0.55	1.5	MS116-1.6	1SAM250000R1006	1.00...1.60	20	24	24	AS09-30-01-20	1SBL101001R2001	1.6	
						230	230	AS09-30-01-26	1SBL101001R2601		
0.75	1.9	MS116-2.5	1SAM250000R1007	1.60...2.50	31.25	24	24	AS09-30-01-20	1SBL101001R2001	2.5	
						230	230	AS09-30-01-26	1SBL101001R2601		
1.1	2.7	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-01-20	1SBL101001R2001	4	
						230	230	AS09-30-01-26	1SBL101001R2601		
1.5	3.6	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	24	AS09-30-01-20	1SBL101001R2001	4	
						230	230	AS09-30-01-26	1SBL101001R2601		
2.2	4.9	MS116-6.3	1SAM250000R1009	4.00...6.30	78.75	24	24	AS09-30-01-20	1SBL101001R2001	6.3	
						230	230	AS09-30-01-26	1SBL101001R2601		
3	6.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-01-20	1SBL111001R2001	10	
						230	230	AS12-30-01-26	1SBL111001R2601		
4	8.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	24	AS12-30-01-20	1SBL111001R2001	10	
						230	230	AS12-30-01-26	1SBL111001R2601		
5.5	11.5	MS116-12	1SAM250000R1012	8.00...12.0	180	24	24	AS12-30-01-20	1SBL111001R2001	12	
						230	230	AS12-30-01-26	1SBL111001R2601		
7.5	15.5	MS116-16	1SAM250000R1011	10.0...16.0	240	24	24	AS16-30-01-20	1SBL121001R2001	15.5	
						230	230	AS16-30-01-26	1SBL121001R2601		

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.



upstream connection



downstream connection




Main accessories

	Type	Order code
Connecting link for manual motor starter	BEA16-3	1SBN081006T1000
Connection set for reversing starter	BER16C-3	1SBN081012R1000
Mechanical interlock unit	VM3	1SBN031005T1000

Reversing starters protected by MS116 manual motor starters

With ASL contactors - open type version in kit form

Coordination type 1 or type 2, AC-3, 16 or 50 kA, 400 V, 50/60 Hz

	IEC		Manual motor starters				Contactors			
	AC-3, 400 V		Type	Order code	Setting range	Rated instantaneous short-circuit current setting I_i	Rated control circuit voltage U_c (1)	Type	Order code	Allowed setting current
	Rated operational power kW	Rated operational current A			A		V DC			A

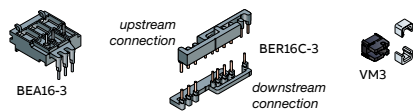
Coordination type 1

Coordination type 2

		I _q = 16 kA		I _q = 50 kA						
0.06	0.2	MS116-0.25	1SAM250000R1002	0.16...0.25	3.13	24	ASL09-30-01-81	1SBL103001R8101	0.25	
0.09	0.3	MS116-0.4	1SAM250000R1003	0.25...0.40	5	24	ASL09-30-01-81	1SBL103001R8101	0.4	
0.12	0.44	MS116-0.63	1SAM250000R1004	0.40...0.63	7.88	24	ASL09-30-01-81	1SBL103001R8101	0.63	
0.18	0.6	MS116-1.0	1SAM250000R1005	0.63...1.00	12.5	24	ASL09-30-01-81	1SBL103001R8101	1	
0.25	0.85	MS116-1.0	1SAM250000R1005	0.63...1.00	12.5	24	ASL09-30-01-81	1SBL103001R8101	1	
0.37	1.1	MS116-1.6	1SAM250000R1006	1.00...1.60	20	24	ASL09-30-01-81	1SBL103001R8101	1.6	
0.55	1.5	MS116-1.6	1SAM250000R1006	1.00...1.60	20	24	ASL09-30-01-81	1SBL103001R8101	1.6	
0.75	1.9	MS116-2.5	1SAM250000R1007	1.60...2.50	31.25	24	ASL09-30-01-81	1SBL103001R8101	2.5	
1.1	2.7	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	ASL09-30-01-81	1SBL103001R8101	4	
1.5	3.6	MS116-4.0	1SAM250000R1008	2.50...4.00	50	24	ASL09-30-01-81	1SBL103001R8101	4	
2.2	4.9	MS116-6.3	1SAM250000R1009	4.00...6.30	78.75	24	ASL09-30-01-81	1SBL103001R8101	6.3	
3	6.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	ASL12-30-01-81	1SBL113001R8101	10	
4	8.5	MS116-10	1SAM250000R1010	6.30...10.0	150	24	ASL12-30-01-81	1SBL113001R8101	10	
5.5	11.5	MS116-12	1SAM250000R1012	8.00...12.0	180	24	ASL12-30-01-81	1SBL113001R8101	12	
7.5	15.5	MS116-16	1SAM250000R1011	10.0...16.0	240	24	ASL16-30-01-81	1SBL123001R8101	15.5	

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.



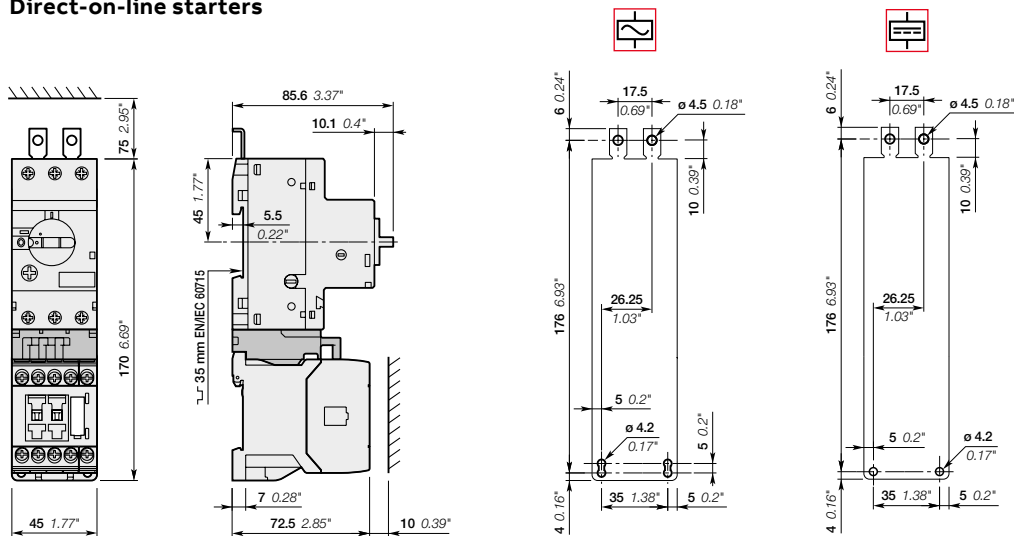
Main accessories

	Type	Order code
Connecting link for manual motor starter	BEA16-3	1SBN081006T1000
Connection set for reversing starter	BER16C-3	1SBN081012R1000
Mechanical interlock unit	VM3	1SBN031005T1000

DOL starters protected by MS116 manual motor starters

With AS, ASL contactors - open type version in kit form

Direct-on-line starters

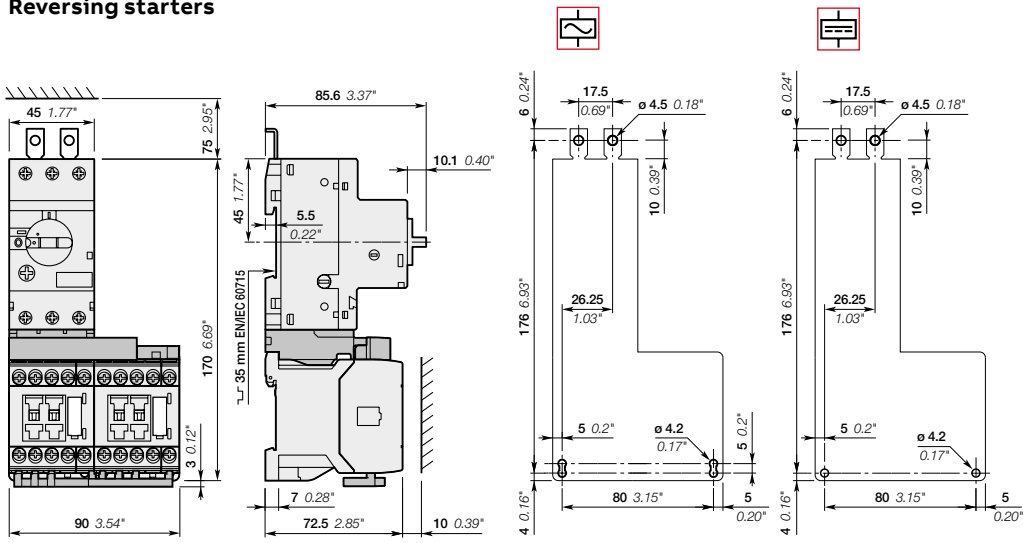


- MS116
- + BEA16-3
- + AS09, ASL09, AS12, ASL12, AS16, ASL16

Reversing starters protected by MS116 manual motor starters

With AS, ASL contactors - open type version in kit form

Reversing starters



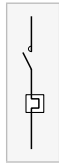
- MS116
- + BEA16-3 + BER16C-3 + VM3
- + AS09, ASL09, AS12, ASL12, AS16, ASL16

DOL & reversing starters protected by thermal overload relays

With AS, ASL contactors - open type in kit form

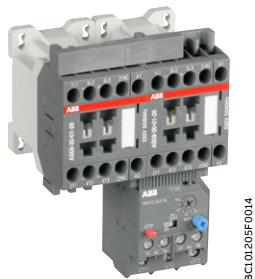
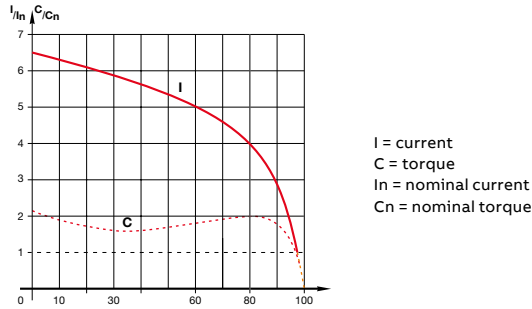


AS09-30-10 + T16



Application

Full voltage direct-on-line and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



AS09-30-01 + BER16C + VM3 + T16



Coordination types

The contactor, the short-circuit protection device and the thermal overload relay control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:
 Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main technical data

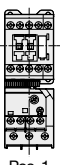
Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage Ue max.	690 V - 50/60 Hz
Rated insulation voltage Ui according to IEC 60947-4-1	690 V
Air temperature close to the device	≤ 60 °C
Degree of protection	IP20
Switching frequency	
Thermal overload relays cannot be operated at any arbitrary switching frequency in order to avoid tripping. Applications involving up to 15 operations per hour are acceptable. Higher switching frequencies are permitted if the duty ratio and the motor starting time are allowed for and if the motor's making current does not appreciably exceed 6 times the rated operating current. Please refer to the adjacent diagram for guideline values for the permitted switching frequency. Example: Starting time of the motor: 1 second Duty ratio: 40 % means a permitted switching frequency of max. 60 operating cycles per hour.	

Note: Minimum switchover delay of 50 ms must be introduced between respective opening and closing of AC operated reversing contactors

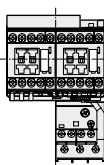
Mounting positions

Direct-on-line

Reversing



Pos. 1



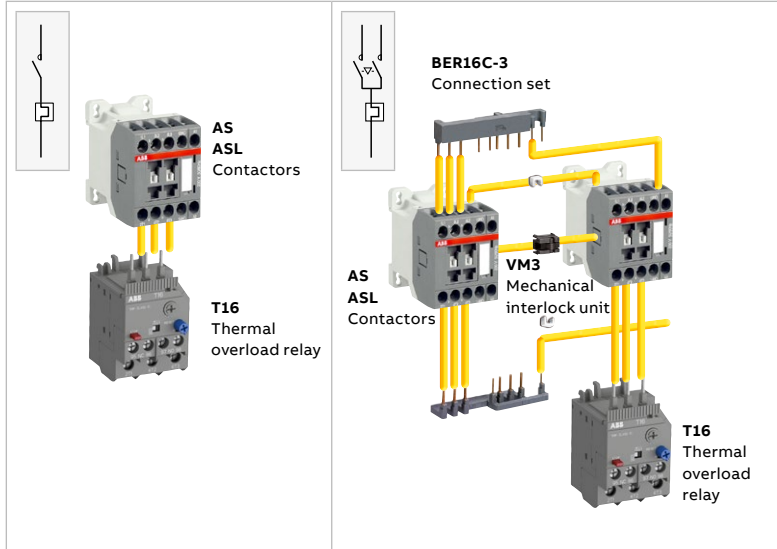
Pos. 1

DOL & reversing starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form

Direct-on-line starters

Reversing starters



You can easily assemble a direct-on-line starter by connecting AS or ASL contactors and T16 thermal overload relay.

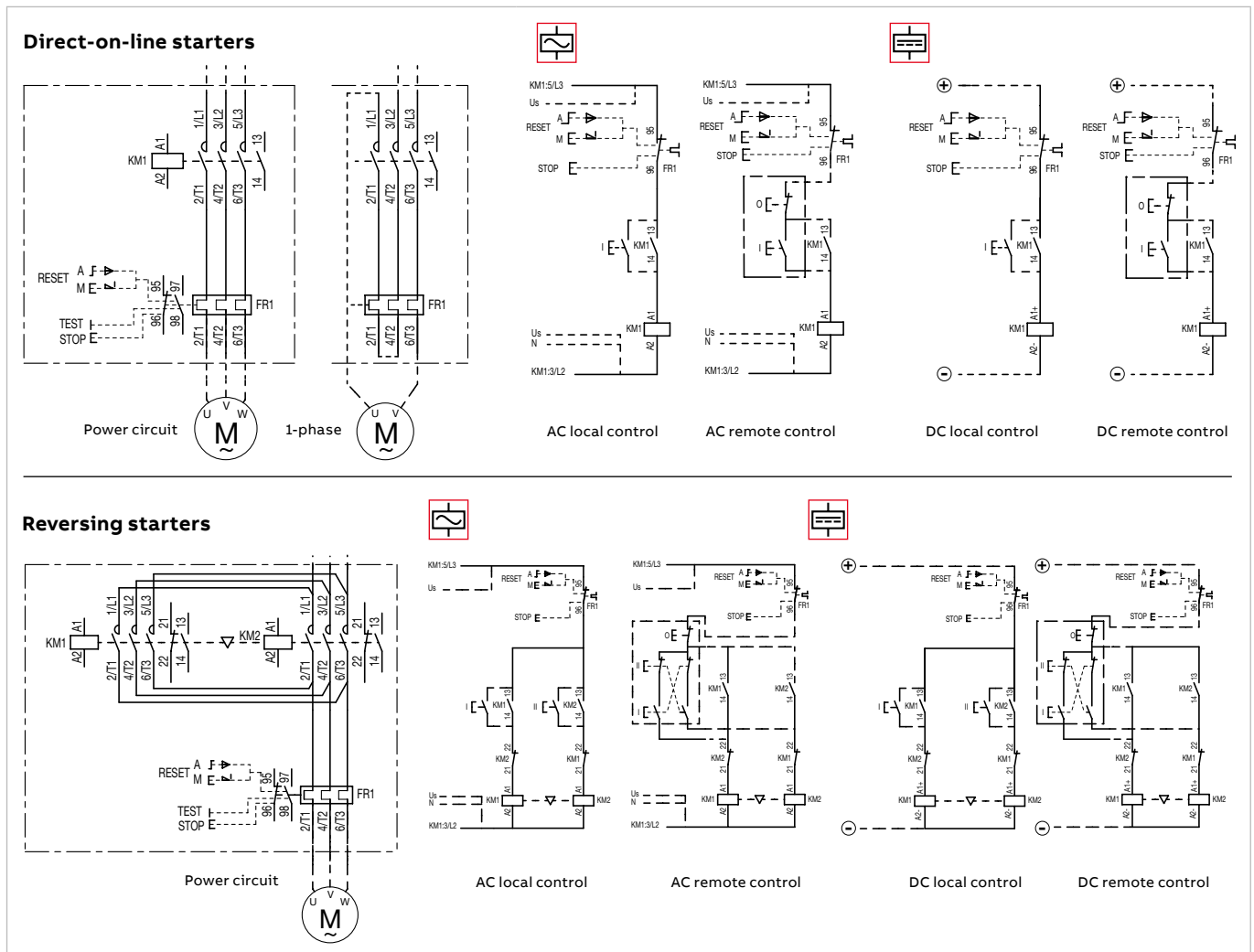
You can easily assemble reversing starter thanks to our complete range of accessories:

- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter length.
- BER16C-3 connection set: it assures a safe and simple reversing connection between both contactor main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact terminals of both contactors.

Select now easily and quickly your starter in the following pages at 400 V, up to 7.5 kW.

For complete coordination tables, please contact your ABB local sales organization.

Wiring diagrams



DOL starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form

Contactors - AC operated

IEC		Contactors				Thermal overload relays			Accessories
AC-3, 400 V		Rated control circuit voltage U _c (1)		Type	Order code	Setting ranges	Type	Order code	
Rated operational power kW	current A	V 50 Hz	V 60 Hz			A ... A			
		4	8.5	24	24	AS09-30-10-20	1SBL101001R2010	7.60...10.0	T16-10
		230	230	AS09-30-10-26	1SBL101001R2610				
5.5	11.5	24	24	AS12-30-10-20	1SBL111001R2010	10.0...13.0	T16-13	1SAZ711201R1045	-
		230	230	AS12-30-10-26	1SBL111001R2610				
7.5	15.5	24	24	AS16-30-10-20	1SBL121001R2010	13.0...16.0	T16-16	1SAZ711201R1047	-
		230	230	AS16-30-10-26	1SBL121001R2610				

Contactors - DC operated

IEC		Rated control circuit voltage U _c (1)		Type	Order code	Setting ranges	Type	Order code	
Rated operational power kW	current A	DC				A ... A			
		4	8.5	24		ASL09-30-10-81	1SBL103001R8110	7.60...10.0	T16-10
5.5	11.5	24		ASL12-30-10-81	1SBL113001R8110	10.0...13.0	T16-13	1SAZ711201R1045	-
7.5	15.5	24		ASL16-30-10-81	1SBL123001R8110	13.0...16.0	T16-16	1SAZ711201R1047	-

Note: for multiple packaging, please contact your ABB local sales organization.
 (1) Other control voltages see voltage code table.

see table below for all setting ranges

Setting ranges	Type	Order code
A ... A		
0.10...0.13	T16-0.13	1SAZ711201R1005
0.13...0.17	T16-0.17	1SAZ711201R1008
0.17...0.23	T16-0.23	1SAZ711201R1009
0.23...0.31	T16-0.31	1SAZ711201R1013
0.31...0.41	T16-0.41	1SAZ711201R1014
0.41...0.55	T16-0.55	1SAZ711201R1017
0.55...0.74	T16-0.74	1SAZ711201R1021
0.74...1.00	T16-1.0	1SAZ711201R1023
1.00...1.30	T16-1.3	1SAZ711201R1025
1.30...1.70	T16-1.7	1SAZ711201R1028
1.70...2.30	T16-2.3	1SAZ711201R1031
2.30...3.10	T16-3.1	1SAZ711201R1033
3.10...4.20	T16-4.2	1SAZ711201R1035
4.20...5.70	T16-5.7	1SAZ711201R1038
5.70...7.60	T16-7.6	1SAZ711201R1040
7.60...10.0	T16-10	1SAZ711201R1043
10.0...13.0	T16-13	1SAZ711201R1045
13.0...16.0	T16-16	1SAZ711201R1047

Reversing starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form

Contactors - AC operated

IEC		Rated control circuit voltage Uc (1)		Type	Order code	Setting ranges	Type	Order code	Type	Order code
power kW	current A	V 50 Hz	V 60 Hz			A ... A				
		4	8.5	24	24	AS09-30-01-20	1SBL101001R2001	7.60...10.0	T16-10	1SAZ711201R1043
		230	230	AS09-30-01-26	1SBL101001R2601					
5.5	11.5	24	24	AS12-30-01-20	1SBL111001R2001	10.0...13.0	T16-13	1SAZ711201R1045	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		230	230	AS12-30-01-26	1SBL111001R2601					
7.5	15.5	24	24	AS16-30-01-20	1SBL121001R2001	13.0...16.0	T16-16	1SAZ711201R1047	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
		230	230	AS16-30-01-26	1SBL121001R2601					

Contactors - DC operated

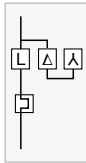
IEC		Rated control circuit voltage Uc (1)		Type	Order code	Setting ranges	Type	Order code	Type	Order code
power kW	current A	DC				A ... A				
		4	8.5	24		ASL09-30-10-81	1SBL103001R8110	7.60...10.0	T16-10	1SAZ711201R1043
5.5	11.5	24		ASL12-30-10-81	1SBL113001R8110	10.0...13.0	T16-13	1SAZ711201R1045	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010
7.5	15.5	24		ASL16-30-10-81	1SBL123001R8110	13.0...16.0	T16-16	1SAZ711201R1047	BER16C-3 + VM3 + 2x CA3-10	1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010

Note: for multiple packaging, please contact your ABB local sales organization. see table below for all setting ranges
 (1) Other control voltages see voltage code table.

Setting ranges	Type	Order code
A ... A		
0.10...0.13	T16-0.13	1SAZ711201R1005
0.13...0.17	T16-0.17	1SAZ711201R1008
0.17...0.23	T16-0.23	1SAZ711201R1009
0.23...0.31	T16-0.31	1SAZ711201R1013
0.31...0.41	T16-0.41	1SAZ711201R1014
0.41...0.55	T16-0.55	1SAZ711201R1017
0.55...0.74	T16-0.74	1SAZ711201R1021
0.74...1.00	T16-1.0	1SAZ711201R1023
1.00...1.30	T16-1.3	1SAZ711201R1025
1.30...1.70	T16-1.7	1SAZ711201R1028
1.70...2.30	T16-2.3	1SAZ711201R1031
2.30...3.10	T16-3.1	1SAZ711201R1033
3.10...4.20	T16-4.2	1SAZ711201R1035
4.20...5.70	T16-5.7	1SAZ711201R1038
5.70...7.60	T16-7.6	1SAZ711201R1040
7.60...10.0	T16-10	1SAZ711201R1043
10.0...13.0	T16-13	1SAZ711201R1045
13.0...16.0	T16-16	1SAZ711201R1047

Star-delta starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form



AS09-30-10 + AS09-30-01
+ AS09-30-01 + BEY16C-3 + VM3
+ CT-SDS + CA3-10 + T16

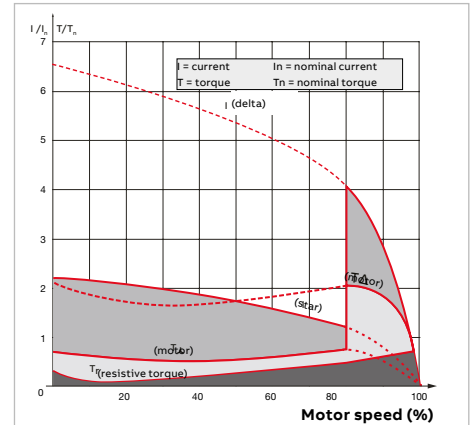
Application

Star-delta starting is the most common method to reduce the starting current of a motor. This system can be used on all the squirrel cage motors, which are normally used in delta connection. In this type of starting, it is recommended to choose motors having high starting torque i.e. much higher than the resistive torque in order to reach sufficient high speed when the motor is connected in star.

When starting:

- Inrush current is reduced to a third of direct starting current
- Motor torque is reduced to a third or even less of direct starting torque.

Transient current is generated when switching from star to delta connection. During the initial starting phase ("star" connection), the resistive torque of the driven load must remain, irrespective of speed, less than the "star" motor torque until "star-delta" switching occurs. This starting mode is therefore ideal for machines having low starting torque such as pumps, centrifugal compressors, wood-working machines...



Precaution

- Motor nominal voltage in delta connection must be equal to that of the mains. Example: a motor for 400 V star-delta starting must be designed for 400 V in "delta" connection. Its usual designation is "400 V / 690 V motor". The motor must be constructed with 6 terminal windings
- In order to prevent a high current peak, at least 85 % of nominal speed must be reached before switching from star to delta

Sequence

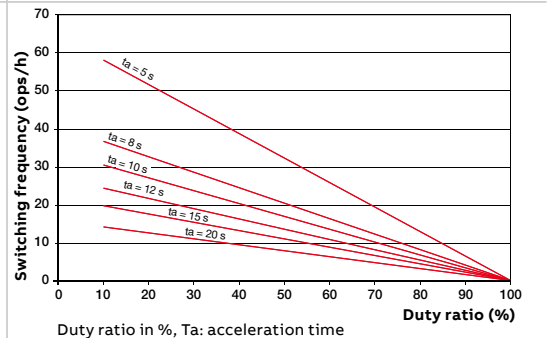
Starting is a three-stage process:

- 1st stage: "Star" connection - Press the "On" button on the control circuit to close the KM2 "Star" contactor. The KM1 "line" contactor then closes and the motor starts. Countdown of programmed starting time (6 to 10 s) then begins.
- 2nd stage: "Star" to "Delta" switching - when programmed starting time is over, the KM2 "Star" contactor opens.
- 3rd stage: "Delta" connection - A transition time (or dwelling time) of 50 ms is fixed between opening of the "star" contactor and closing of the "delta" contactor by the use of CT-SDS timer. This prevent short-circuit between "star" and "delta".

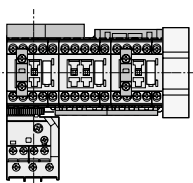
Main technical data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage U _e max.	690 V - 50/60 Hz
Rated insulation voltage U _i according to IEC 60947-4-1	690 V
Air temperature close to the device	≤ 60 °C
Degree of protection	IP20

Switching frequency
Switching frequency/hour, according to acceleration time and load factor. Respect of the following conditions enables utilization of the starter without excessive overheating of the connections or nuisance tripping of the thermal overload relay. Example:
– Switching frequency = 15 starts/hr
– Motor starting time "Ta" = 7 s (use 8 s curve)
– Maximum load factor = 63 %
This corresponds to a 4-minute operating cycle (15 starts/hr) with 7 seconds acceleration, 2.5 minutes operation and 1.5 minutes rest.



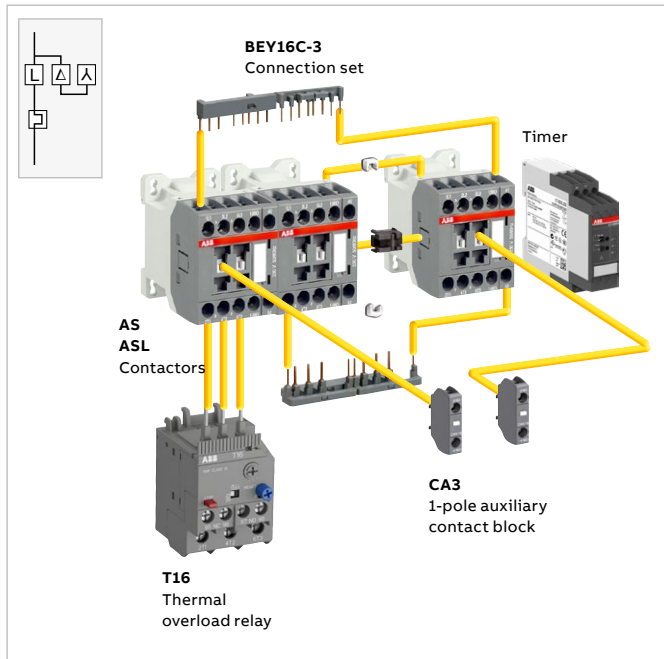
Mounting positions



Pos. 1

Star-delta starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form



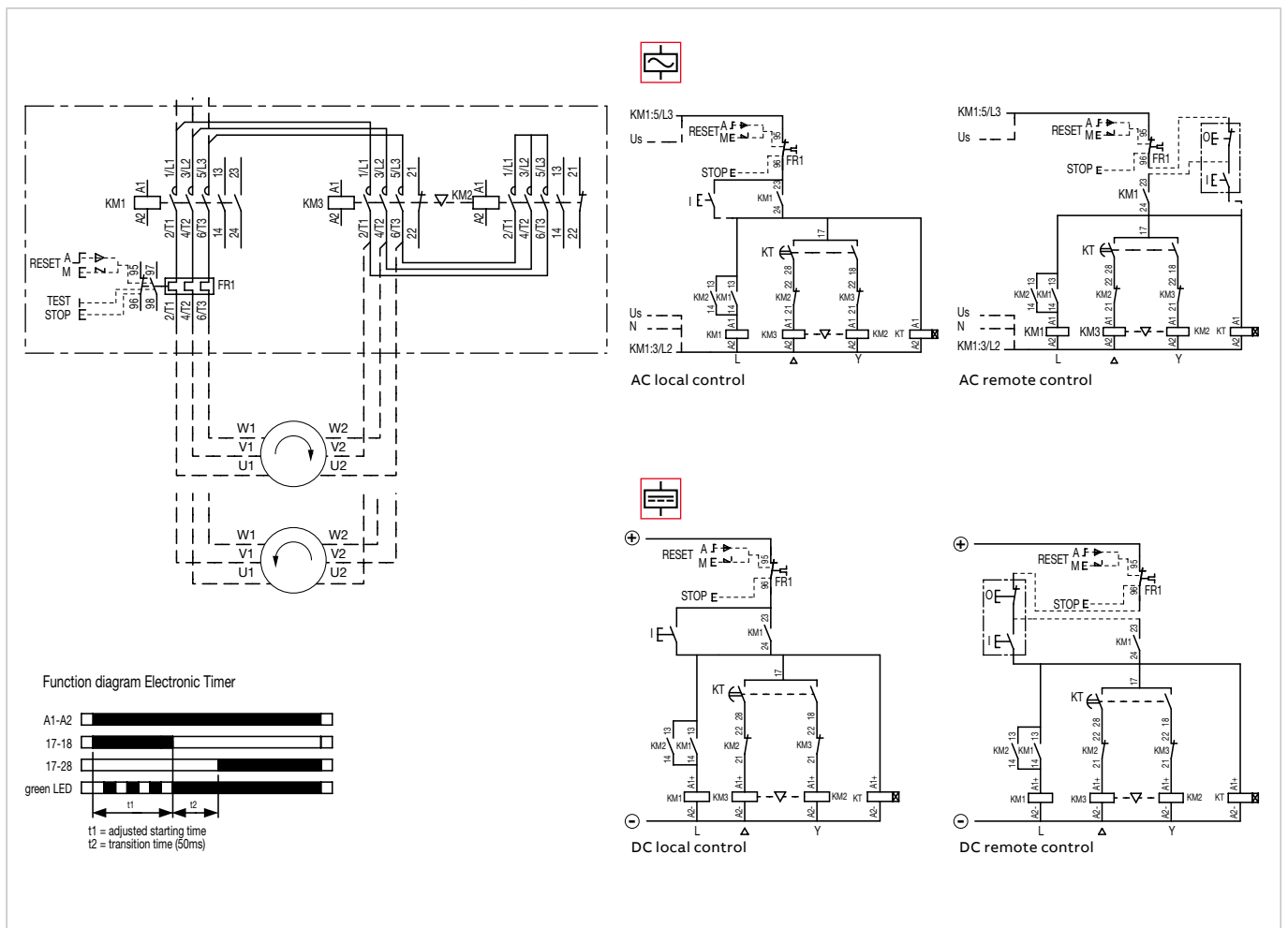
You can easily assemble a star-delta starter thanks to our complete range of accessories:

- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter length.
- BEY16C-3 connection set: it assures a safe and simple connection between contactors main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact terminals of star and delta contactors.

Select now easily and quickly your starter in the following pages at 400 V, up to 11 kW.

For complete coordination tables, please contact your ABB local sales organization.

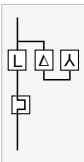
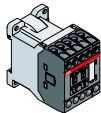
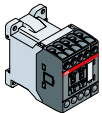
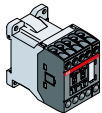
Wiring diagrams



Star-delta starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form

Contactors - AC operated

				Line contactor KM1		Delta contactor KM3		Star contactor KM2		
										
IEC AC-3, 400 V Rated operational power kW	current A	Rated control circuit voltage Uc (1)		Type	Order code	Type	Order code	Type	Order code	
		V 50 Hz	V 60 Hz							
7.5	15.5	24	24	AS09-30-10-20	1SBL101001R2010	AS09-30-01-20	1SBL101001R2001	AS09-30-01-20	1SBL101001R2001	
		230	230	AS09-30-10-26	1SBL101001R2610	AS09-30-01-26	1SBL101001R2601	AS09-30-01-26	1SBL101001R2601	
11	22	24	24	AS12-30-10-20	1SBL111001R2010	AS12-30-01-20	1SBL111001R2001	AS09-30-01-20	1SBL101001R2001	
		230	230	AS12-30-10-26	1SBL111001R2610	AS12-30-01-26	1SBL111001R2601	AS09-30-01-26	1SBL101001R2601	

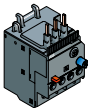
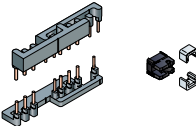

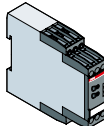
Contactors - DC operated

IEC AC-3, 400 V Rated operational power kW	current A	Rated control circuit voltage Uc (1) DC	Type	Order code	Type	Order code	Type	Order code	
11	22	24	ASL12-30-10-81	1SBL113001R8110	ASL12-30-01-81	1SBL113001R8101	ASL09-30-01-81	1SBL103001R8101	

Note: for multiple packaging, please contact your ABB local sales organization.
 (1) Other control voltages see voltage code table.

Star-delta starters protected by thermal overload relays

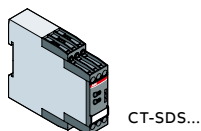
With AS, ASL contactors - open type version in kit form

	Thermal overload relays		Connection sets Mechanical interlock unit		Auxiliary contact block		Electronic timer	
								
	The setting current value is: nominal motor current x 0.58							
Setting ranges	Type	Order code	Type	Order code	Type	Order code	Type	Order code
A ... A								
7.60...10.0	T16-10	1SAZ711201R1043	BEY16C-3 + VM3	1SBN081018R2000 + 1SBN031005T1000	KM1: 1 x CA3-10 KM2: 1 x CA3-10	1SBN011010T1010 1SBN011010T1010	CT-SDS...	see "Ordering Details"
10.0...13.0	T16-13	1SAZ711201R1045	BEY16C-3 + VM3	1SBN081018R2000 + 1SBN031005T1000	KM1: 1 x CA3-10 KM2: 1 x CA3-10	1SBN011010T1010 1SBN011010T1010	CT-SDS...	see "Ordering Details"

Setting ranges	Type	Order code	Type	Order code	Type	Order code	Type	Order code
A ... A								
7.60...10.0	T16-10	1SAZ711201R1043	BEY16C-3 + VM3	1SBN081018R2000 + 1SBN031005T1000	KM1: 1 x CA3-10 KM2: 1 x CA3-10	1SBN011010T1010 1SBN011010T1010	CT-SDS...	see "Ordering Details"
10.0...13.0	T16-13	1SAZ711201R1045	BEY16C-3 + VM3	1SBN081018R2000 + 1SBN031005T1000	KM1: 1 x CA3-10 KM2: 1 x CA3-10	1SBN011010T1010 1SBN011010T1010	CT-SDS...	see "Ordering Details"

see table below for all setting ranges

Setting ranges	Type	Order code
A ... A		
0.10...0.13	T16-0.13	1SAZ711201R1005
0.13...0.17	T16-0.17	1SAZ711201R1008
0.17...0.23	T16-0.23	1SAZ711201R1009
0.23...0.31	T16-0.31	1SAZ711201R1013
0.31...0.41	T16-0.41	1SAZ711201R1014
0.41...0.55	T16-0.55	1SAZ711201R1017
0.55...0.74	T16-0.74	1SAZ711201R1021
0.74...1.00	T16-1.0	1SAZ711201R1023
1.00...1.30	T16-1.3	1SAZ711201R1025
1.30...1.70	T16-1.7	1SAZ711201R1028
1.70...2.30	T16-2.3	1SAZ711201R1031
2.30...3.10	T16-3.1	1SAZ711201R1033
3.10...4.20	T16-4.2	1SAZ711201R1035
4.20...5.70	T16-5.7	1SAZ711201R1038
5.70...7.60	T16-7.6	1SAZ711201R1040
7.60...10.0	T16-10	1SAZ711201R1043
10.0...13.0	T16-13	1SAZ711201R1045
13.0...16.0	T16-16	1SAZ711201R1047



Ordering details - Main accessories

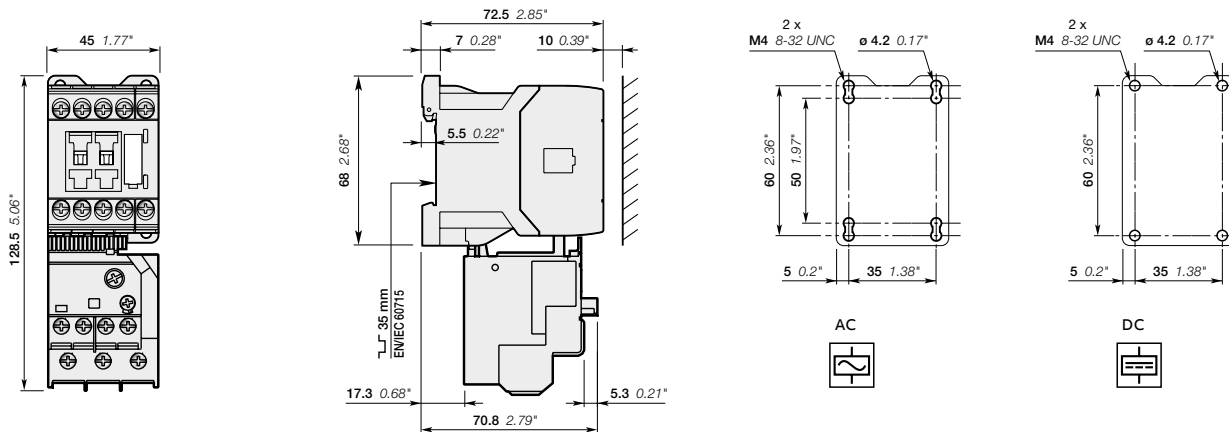
	Type	Order code	Pkg qty	Weight (1 pce) kg
Electronic timer*	28-48 V DC 24-240 V AC	CT-SDS.22S 1SVR730210R3300	1	0.114
	380-440 V AC	CT-SDS.23S 1SVR730211R2300	1	0.118

* 7 time ranges (0.05 s - 10 min), 50 ms transition time, 2 n/o contacts, 3 LEDs

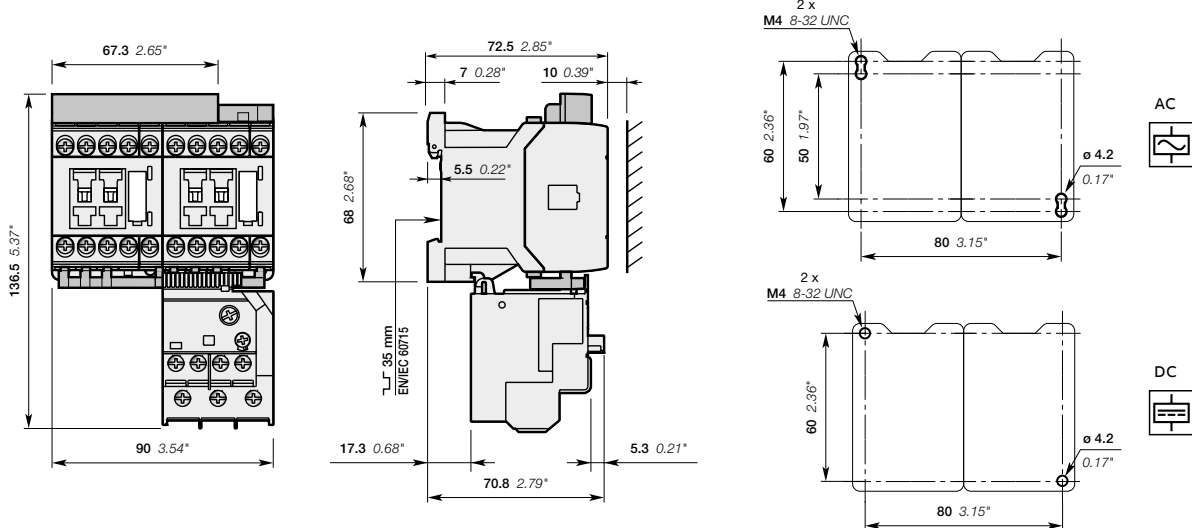
Protected by thermal overload relays

With AS, ASL contactors - open type in kit form

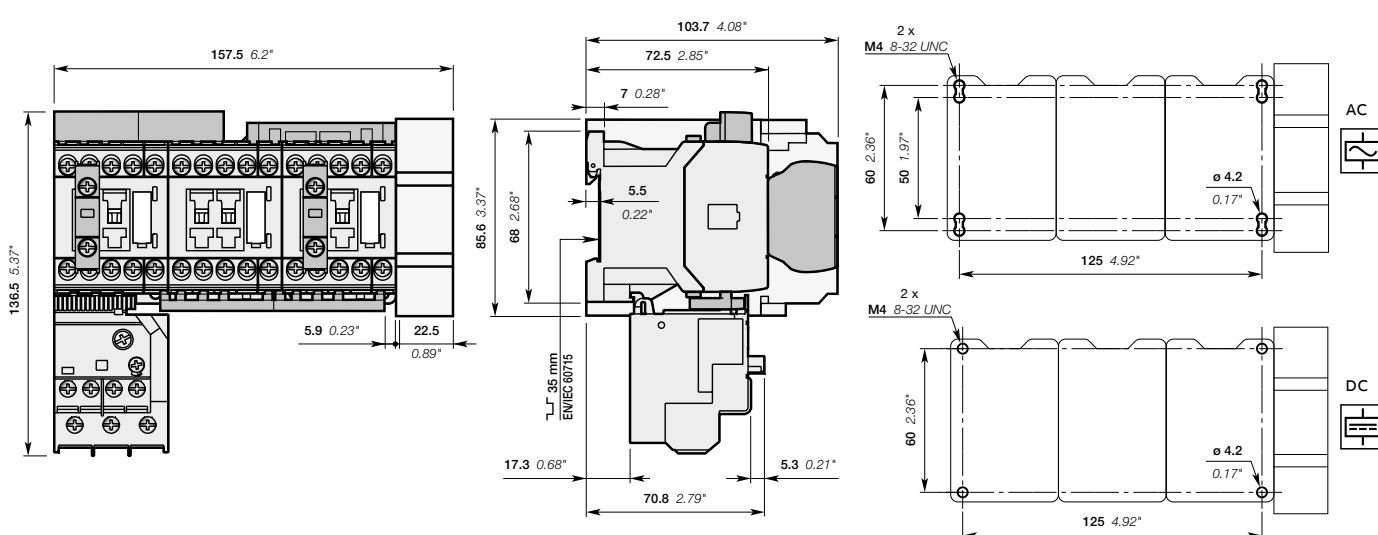
Direct-on-line starters



Reversing starters



Star-delta starters



Notes

A large rectangular area filled with a grid of small, light gray dotted lines, intended for writing notes. The grid covers most of the page below the 'Notes' header.