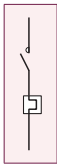


DOL & Reversing Starters Protected by Thermal Overload Relay With AF Contactors - Open Type Version in Kit Form

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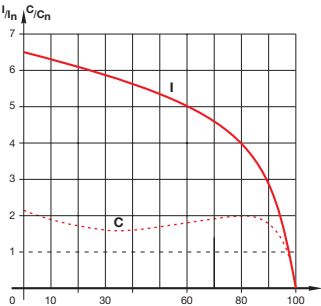


AF16-30-10 + TF42



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.



I = current
C = torque
 I_n = nominal current
 C_n = nominal torque

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.

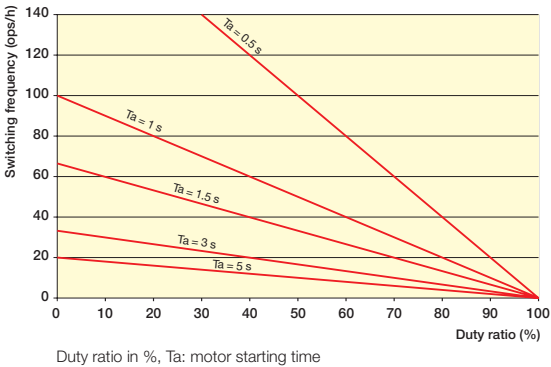
Main Technical Data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage U_o 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	$\leq 60\text{ }^{\circ}\text{C}$ (above 38 A $\leq 50\text{ }^{\circ}\text{C}$)
Degree of protection	IP 20

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.

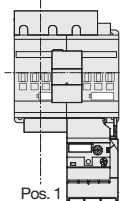


Mounting positions

Direct-on-line

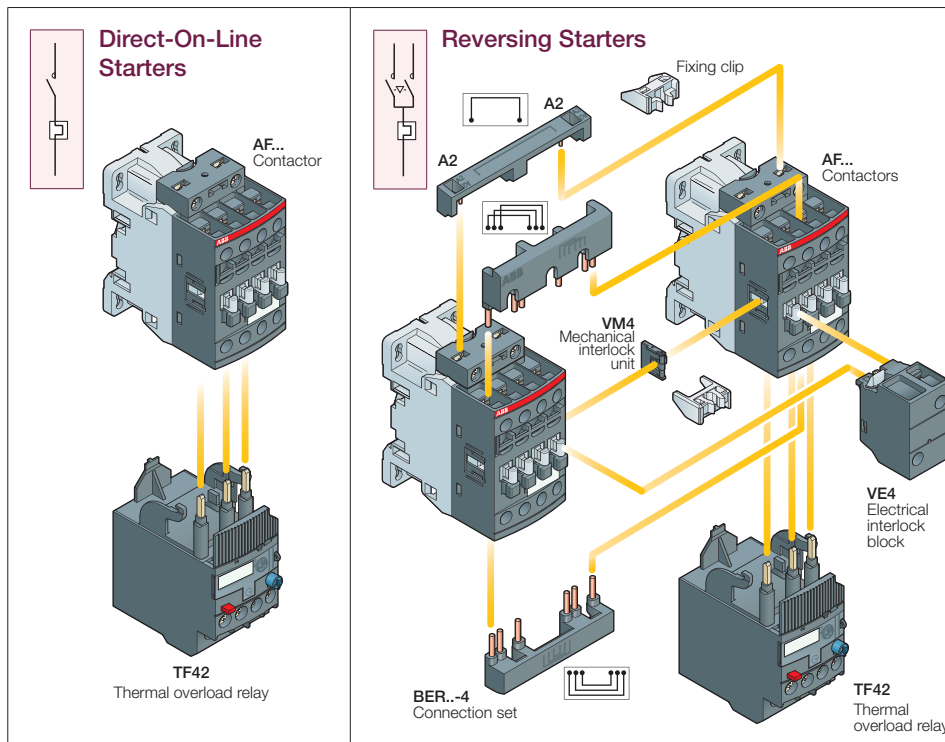


Reversing



DOL & Reversing Starters Protected by Thermal Overload Relay With AF Contactors - Open Type Version in Kit Form

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Description

You can easily assemble a direct-on-line starter by connecting AF contactor and TF42 thermal overload relay.

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

- VEM4 mechanical and electrical interlock set for reversing starter in 90 mm width.

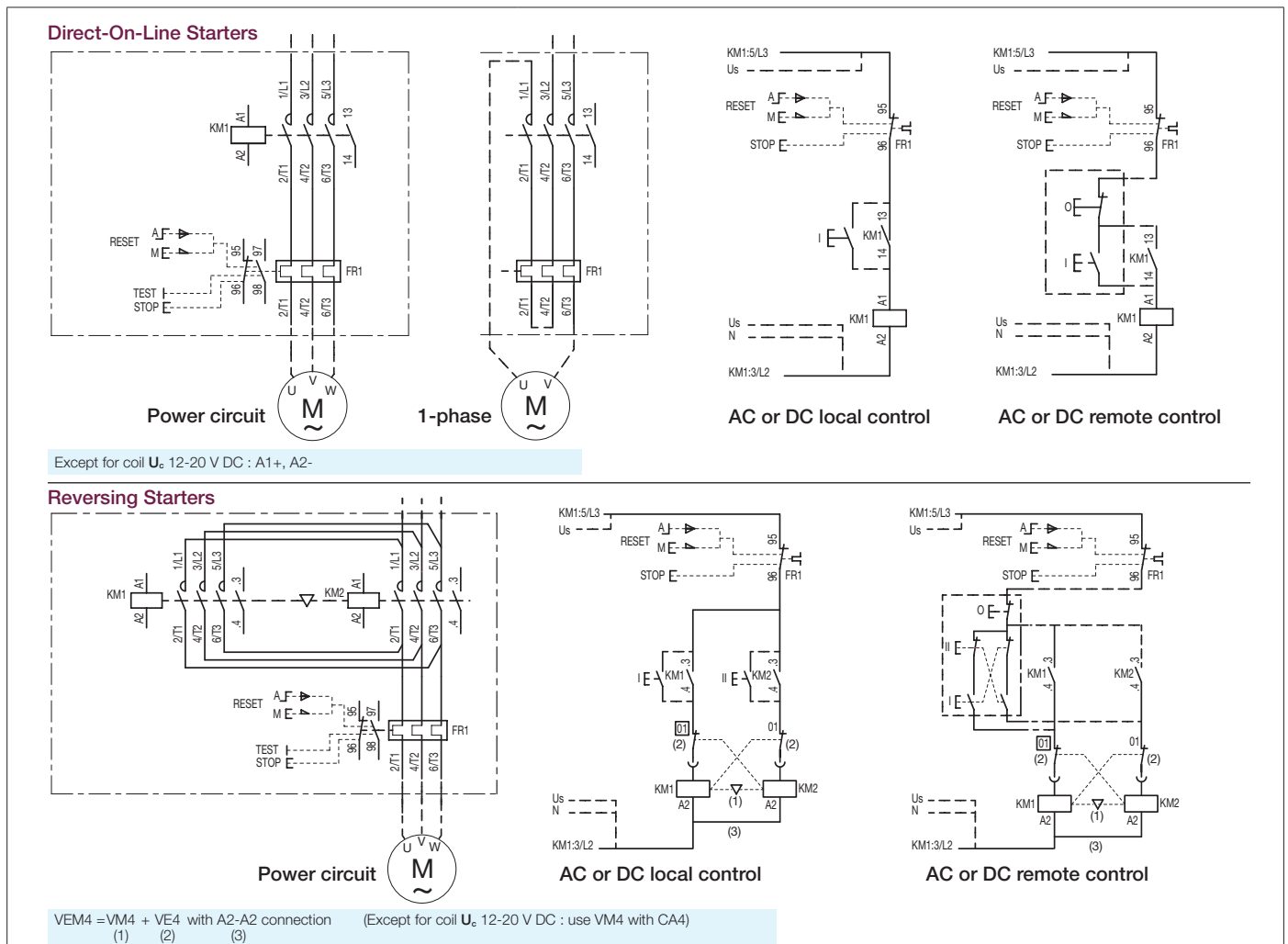
It includes:

- VM4 mechanical interlock unit including 2 fixing clips
- VE4 electrical interlock block with A2-A2 connection.
- BER...-4 connection set: it assures a safe and simple reversing connection between both contactor main terminals.

Select now easily and quickly your starter in the following pages at 400 V, up to 18.5 kW.

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

Wiring Diagrams



Direct-On-Line Starters Protected by Thermal Overload Relay With AF Contactors - Open Type Version in Kit Form

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Contactors					Thermal overload relays			Accessories
IEC AC-3, 400 V Rated power kW	Rated current A	Control voltage U _c min. ... U _c max. (1)		Type	Order code	Setting ranges	Type	Order code
		V 50/60 Hz	V DC			A ... A		
4	8.5	24...60	20...60	AF09Z-30-10-21	1SBL 136 001 R2110	7.60 ... 10.0	TF42-10	1SAZ 721 201 R1043
		48...130	48...130	AF09-30-10-12	1SBL 137 001 R1210			
		100...250	100...250	AF09-30-10-13	1SBL 137 001 R1310			
		250...500	250...500	AF09-30-10-14	1SBL 137 001 R1410			
5.5	11.5	24...60	20...60	AF12Z-30-10-21	1SBL 156 001 R2110	10.0 ... 13.0	TF42-13	1SAZ 721 201 R1045
		48...130	48...130	AF12-30-10-12	1SBL 157 001 R1210			
		100...250	100...250	AF12-30-10-13	1SBL 157 001 R1310			
		250...500	250...500	AF12-30-10-14	1SBL 157 001 R1410			
7.5	15.5	24...60	20...60	AF16Z-30-10-21	1SBL 176 001 R2110	13.0 ... 16.0	TF42-16	1SAZ 721 201 R1047
		48...130	48...130	AF16-30-10-12	1SBL 177 001 R1210			
		100...250	100...250	AF16-30-10-13	1SBL 177 001 R1310			
		250...500	250...500	AF16-30-10-14	1SBL 177 001 R1410			
11	22	24...60	20...60	AF26Z-30-00-21	1SBL 236 001 R2100	20.0 ... 24.0	TF42-24	1SAZ 721 201 R1051
		48...130	48...130	AF26-30-00-12	1SBL 237 001 R1200			
		100...250	100...250	AF26-30-00-13	1SBL 237 001 R1300			
		250...500	250...500	AF26-30-00-14	1SBL 237 001 R1400			
15	29	24...60	20...60	AF30Z-30-00-21	1SBL 276 001 R2100	29.0 ... 35.0	TF42-35	1SAZ 721 201 R1053
		48...130	48...130	AF30-30-00-12	1SBL 277 001 R1200			
		100...250	100...250	AF30-30-00-13	1SBL 277 001 R1300			
		250...500	250...500	AF30-30-00-14	1SBL 277 001 R1400			
18.5	35	24...60	20...60	AF38Z-30-00-21	1SBL 296 001 R2100	35.0 ... 38.0/40.0	TF42-38	1SAZ 721 201 R1055
		48...130	48...130	AF38-30-00-12	1SBL 297 001 R1200			
		100...250	100...250	AF38-30-00-13	1SBL 297 001 R1300			
		250...500	250...500	AF38-30-00-14	1SBL 297 001 R1400			

(1) For other control voltages, see "3-pole contactors - Ordering details" pages.

see table below for all setting ranges

Setting ranges	Type	Order code
A ... A		
0.10 ... 0.13	TF42-0.13	1SAZ 721 201 R1005
0.13 ... 0.17	TF42-0.17	1SAZ 721 201 R1008
0.17 ... 0.23	TF42-0.23	1SAZ 721 201 R1009
0.23 ... 0.31	TF42-0.31	1SAZ 721 201 R1013
0.31 ... 0.41	TF42-0.41	1SAZ 721 201 R1014
0.41 ... 0.55	TF42-0.55	1SAZ 721 201 R1017
0.55 ... 0.74	TF42-0.74	1SAZ 721 201 R1021
0.74 ... 1.00	TF42-1.0	1SAZ 721 201 R1023
1.00 ... 1.30	TF42-1.3	1SAZ 721 201 R1025
1.30 ... 1.70	TF42-1.7	1SAZ 721 201 R1028
1.70 ... 2.30	TF42-2.3	1SAZ 721 201 R1031
2.30 ... 3.10	TF42-3.1	1SAZ 721 201 R1033
3.10 ... 4.20	TF42-4.2	1SAZ 721 201 R1035
4.20 ... 5.70	TF42-5.7	1SAZ 721 201 R1038
5.70 ... 7.60	TF42-7.6	1SAZ 721 201 R1040
7.60 ... 10.0	TF42-10	1SAZ 721 201 R1043
10.0 ... 13.0	TF42-13	1SAZ 721 201 R1045
13.0 ... 16.0	TF42-16	1SAZ 721 201 R1047
16.0 ... 20.0	TF42-20	1SAZ 721 201 R1049
20.0 ... 24.0	TF42-24	1SAZ 721 201 R1051
24.0 ... 29.0	TF42-29	1SAZ 721 201 R1052
29.0 ... 35.0	TF42-35	1SAZ 721 201 R1053
35.0 ... 38.0/40.0	TF42-38	1SAZ 721 201 R1055

Reversing Starters Protected by Thermal Overload Relay With AF Contactors - Open Type Version in Kit Form

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Contactors				Thermal overload relays				Accessories			
IEC AC-3, 400 V Rated power kW	Rated current A	Control voltage U _c min. ... U _c max. (1)	Type	Order code	Setting ranges A ... A	Type	Order code	Type	Order code		
4	8.5	24...60	AF09Z-30-10-21	1SBL 136 001 R2110	7.60 ... 10.0	TF42-10	1SAZ 721 201 R1043	BER16-4 + VEM4	1SBN 081 311 R1000 + 1SBN 030 111 R1000		
		48...130	AF09-30-10-12	1SBL 137 001 R1210							
		100...250	AF09-30-10-13	1SBL 137 001 R1310							
		250...500	AF09-30-10-14	1SBL 137 001 R1410							
5.5	11.5	24...60	AF12Z-30-10-21	1SBL 156 001 R2110	10.0 ... 13.0	TF42-13	1SAZ 721 201 R1045	BER16-4 + VEM4	1SBN 081 311 R1000 + 1SBN 030 111 R1000		
		48...130	AF12-30-10-12	1SBL 157 001 R1210							
		100...250	AF12-30-10-13	1SBL 157 001 R1310							
		250...500	AF12-30-10-14	1SBL 157 001 R1410							
7.5	15.5	24...60	AF16Z-30-10-21	1SBL 176 001 R2110	13.0 ... 16.0	TF42-16	1SAZ 721 201 R1047	BER16-4 + VEM4	1SBN 081 311 R1000 + 1SBN 030 111 R1000		
		48...130	AF16-30-10-12	1SBL 177 001 R1210							
		100...250	AF16-30-10-13	1SBL 177 001 R1310							
		250...500	AF16-30-10-14	1SBL 177 001 R1410							
11	22	24...60	AF26Z-30-00-21	1SBL 236 001 R2100	20.0 ... 24.0	TF42-24	1SAZ 721 201 R1051	BER38-4 + VEM4 + 2x CA4-10	1SBN 082 311 R1000 + 1SBN 030 111 R1000 + 1SBN 010 110 R1010		
		48...130	AF26-30-00-12	1SBL 237 001 R1200							
		100...250	AF26-30-00-13	1SBL 237 001 R1300							
		250...500	AF26-30-00-14	1SBL 237 001 R1400							
15	29	24...60	AF30Z-30-00-21	1SBL 276 001 R2100	29.0 ... 35.0	TF42-35	1SAZ 721 201 R1053	BER38-4 + VEM4 + 2x CA4-10	1SBN 082 311 R1000 + 1SBN 030 111 R1000 + 1SBN 010 110 R1010		
		48...130	AF30-30-00-12	1SBL 277 001 R1200							
		100...250	AF30-30-00-13	1SBL 277 001 R1300							
		250...500	AF30-30-00-14	1SBL 277 001 R1400							
18.5	35	24...60	AF38Z-30-00-21	1SBL 296 001 R2100	35.0 ... 38.0/40.0	TF42-38	1SAZ 721 201 R1055	BER38-4 + VEM4 + 2x CA4-10	1SBN 082 311 R1000 + 1SBN 030 111 R1000 + 1SBN 010 110 R1010		
		48...130	AF38-30-00-12	1SBL 297 001 R1200							
		100...250	AF38-30-00-13	1SBL 297 001 R1300							
		250...500	AF38-30-00-14	1SBL 297 001 R1400							

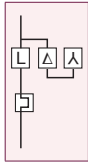
(1) For other control voltages, see "3-pole contactors - Ordering details" pages.

see table below for all setting ranges

Setting ranges	Type	Order code
A ... A		
0.10 ... 0.13	TF42-0.13	1SAZ 721 201 R1005
0.13 ... 0.17	TF42-0.17	1SAZ 721 201 R1008
0.17 ... 0.23	TF42-0.23	1SAZ 721 201 R1009
0.23 ... 0.31	TF42-0.31	1SAZ 721 201 R1013
0.31 ... 0.41	TF42-0.41	1SAZ 721 201 R1014
0.41 ... 0.55	TF42-0.55	1SAZ 721 201 R1017
0.55 ... 0.74	TF42-0.74	1SAZ 721 201 R1021
0.74 ... 1.00	TF42-1.0	1SAZ 721 201 R1023
1.00 ... 1.30	TF42-1.3	1SAZ 721 201 R1025
1.30 ... 1.70	TF42-1.7	1SAZ 721 201 R1028
1.70 ... 2.30	TF42-2.3	1SAZ 721 201 R1031
2.30 ... 3.10	TF42-3.1	1SAZ 721 201 R1033
3.10 ... 4.20	TF42-4.2	1SAZ 721 201 R1035
4.20 ... 5.70	TF42-5.7	1SAZ 721 201 R1038
5.70 ... 7.60	TF42-7.6	1SAZ 721 201 R1040
7.60 ... 10.0	TF42-10	1SAZ 721 201 R1043
10.0 ... 13.0	TF42-13	1SAZ 721 201 R1045
13.0 ... 16.0	TF42-16	1SAZ 721 201 R1047
16.0 ... 20.0	TF42-20	1SAZ 721 201 R1049
20.0 ... 24.0	TF42-24	1SAZ 721 201 R1051
24.0 ... 29.0	TF42-29	1SAZ 721 201 R1052
29.0 ... 35.0	TF42-35	1SAZ 721 201 R1053
35.0 ... 38.0/40.0	TF42-38	1SAZ 721 201 R1055

Star-delta Starters Protected by Thermal Overload Relay With AF Contactors - Open Type Version in Kit Form

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AF16-30-10 + AF16-30-10 + AF09-30-10
+ BEY16-4 + VEM4 + TF42

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.

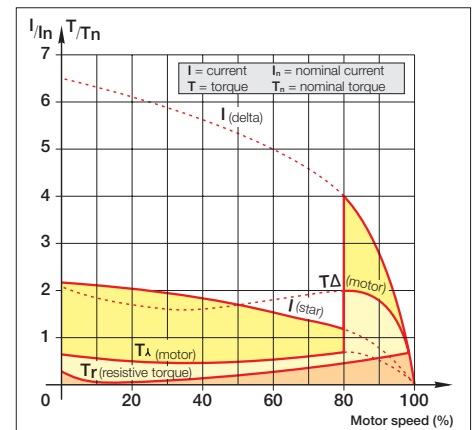
When Starting:

- 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 - Thanks to AF contactors, a transition time (or dwelling time) of 50 ms is already integrated between the opening of the "star" contactor and closing of the "delta" contactor.

Conclusion: An on-delay timer without dwelling time (e.g.: CT-ERS.21) is enough to countdown the programmed starting time (6 to 10 s) during "Star connection". The use of a star-delta timer including a dwelling time is not permitted.

Main Technical Data

Standards	IEC 60947-4-1 / EN 60947-4-1
Rated operational voltage U_n 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	$\leq 60^\circ\text{C}$ (above $38\text{ A} \leq 50^\circ\text{C}$)
Degree of protection	IP 20

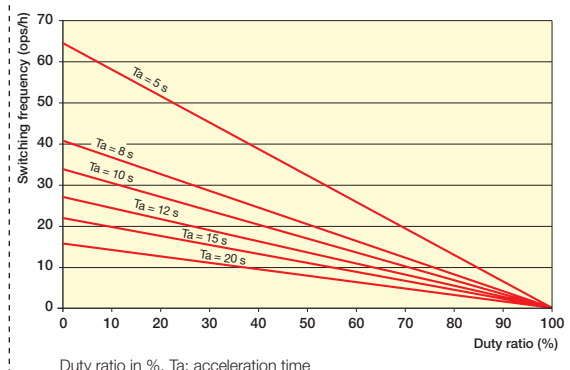
Switching frequency

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.

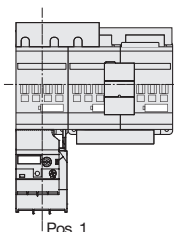
Example:

- Switching frequency = 15 starts/hr
- Motor starting time " T_a " = 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.

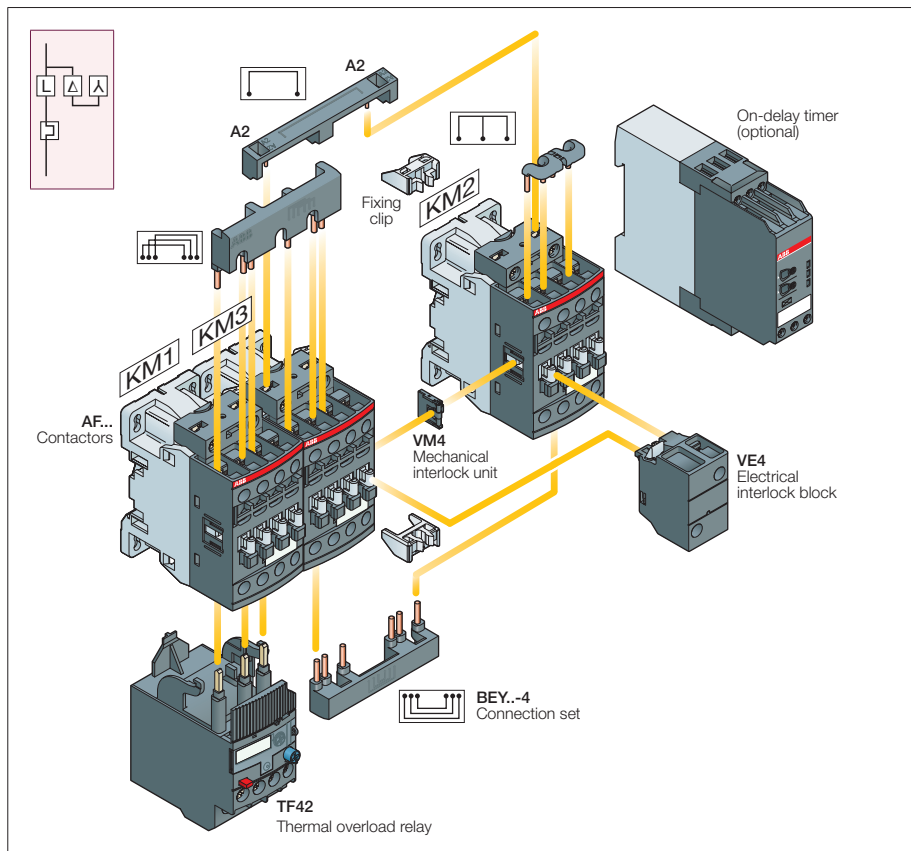


Mounting positions



Star-delta Starters Protected by Thermal Overload Relay With AF Contactors - Open Type Version in Kit Form

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Description

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

- VEM4 mechanical and electrical interlock set without increasing starter width.

It includes:

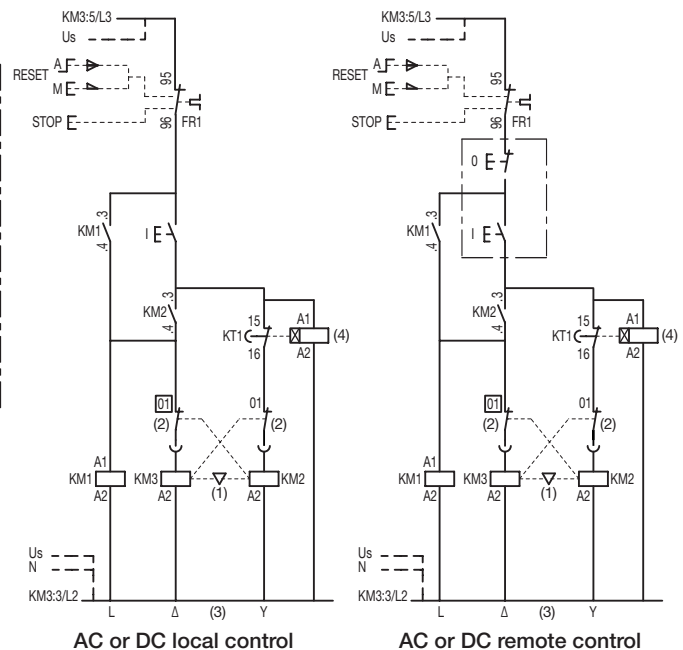
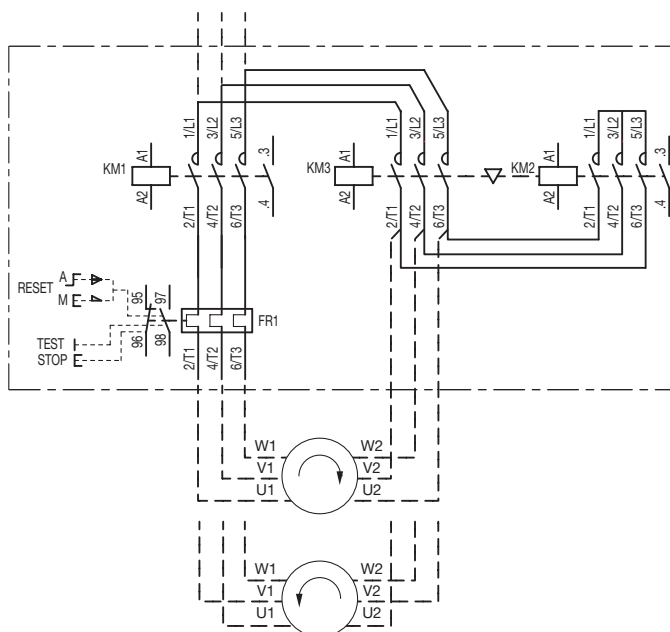
- VM4 mechanical interlock unit and fixing clips
- VE4 electrical interlock block with A2-A2 connection.
- BEY...-4 connection set: it assures a safe and simple connection between contactors main terminals.

Select now easily and quickly your starter in the following pages at 400 V, up to 25 kW.

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

Wiring Diagrams

Star-delta starter

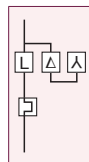


VEM4 = VM4 + VE4 with A2-A2 connection (1) (2) (3) (Except for coil U_e 12-20 V DC : use VM4 with CA4)

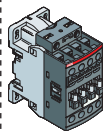
(4) On-delay timer without dwelling time e.g. CT-ERS.21

Star-delta Starters Protected by Thermal Overload Relay With AF Contactors - Open Type Version in Kit Form

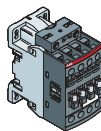
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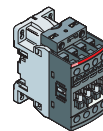
Line contactor KM1



Delta contactor KM3



Star contactor KM2



IEC		Control voltage U_c min. ... U_c max. (1)		Type	Order code	Type	Order code	Type	Order code
AC-3, 400 V									
Rated power	Rated current								
kW	A	V 50/60 Hz	V DC						
7.5	15.5	24...60	20...60	AF09Z-30-10-21	1SBL 136 001 R2110	AF09Z-30-10-21	1SBL 136 001 R2110	AF09Z-30-10-21	1SBL 136 001 R2110
		48...130	48...130	AF09-30-10-12	1SBL 137 001 R1210	AF09-30-10-12	1SBL 137 001 R1210	AF09-30-10-12	1SBL 137 001 R1210
		100...250	100...250	AF09-30-10-13	1SBL 137 001 R1310	AF09-30-10-13	1SBL 137 001 R1310	AF09-30-10-13	1SBL 137 001 R1310
		250...500	250...500	AF09-30-10-14	1SBL 137 001 R1410	AF09-30-10-14	1SBL 137 001 R1410	AF09-30-10-14	1SBL 137 001 R1410
11	22	24...60	20...60	AF12Z-30-10-21	1SBL 156 001 R2110	AF12Z-30-10-21	1SBL 156 001 R2110	AF09Z-30-10-21	1SBL 136 001 R2110
		48...130	48...130	AF12-30-10-12	1SBL 157 001 R1210	AF12-30-10-12	1SBL 157 001 R1210	AF09-30-10-12	1SBL 137 001 R1210
		100...250	100...250	AF12-30-10-13	1SBL 157 001 R1310	AF12-30-10-13	1SBL 157 001 R1310	AF09-30-10-13	1SBL 137 001 R1310
		250...500	250...500	AF12-30-10-14	1SBL 157 001 R1410	AF12-30-10-14	1SBL 157 001 R1410	AF09-30-10-14	1SBL 137 001 R1410
15	29	24...60	20...60	AF16Z-30-10-21	1SBL 176 001 R2110	AF16Z-30-10-21	1SBL 176 001 R2110	AF09Z-30-10-21	1SBL 136 001 R2110
		48...130	48...130	AF16-30-10-12	1SBL 177 001 R1210	AF16-30-10-12	1SBL 177 001 R1210	AF09-30-10-12	1SBL 137 001 R1210
		100...250	100...250	AF16-30-10-13	1SBL 177 001 R1310	AF16-30-10-13	1SBL 177 001 R1310	AF09-30-10-13	1SBL 137 001 R1310
		250...500	250...500	AF16-30-10-14	1SBL 177 001 R1410	AF16-30-10-14	1SBL 177 001 R1410	AF09-30-10-14	1SBL 137 001 R1410
18.5	35	24...60	20...60	AF26Z-30-00-21	1SBL 236 001 R2100	AF26Z-30-00-21	1SBL 236 001 R2100	AF26Z-30-00-21	1SBL 236 001 R2100
		48...130	48...130	AF26-30-00-12	1SBL 237 001 R1200	AF26-30-00-12	1SBL 237 001 R1200	AF26-30-00-12	1SBL 237 001 R1200
		100...250	100...250	AF26-30-00-13	1SBL 237 001 R1300	AF26-30-00-13	1SBL 237 001 R1300	AF26-30-00-13	1SBL 237 001 R1300
		250...500	250...500	AF26-30-00-14	1SBL 237 001 R1400	AF26-30-00-14	1SBL 237 001 R1400	AF26-30-00-14	1SBL 237 001 R1400
22	41	24...60	20...60	AF26Z-30-00-21	1SBL 236 001 R2100	AF26Z-30-00-21	1SBL 236 001 R2100	AF26Z-30-00-21	1SBL 236 001 R2100
		48...130	48...130	AF26-30-00-12	1SBL 237 001 R1200	AF26-30-00-12	1SBL 237 001 R1200	AF26-30-00-12	1SBL 237 001 R1200
		100...250	100...250	AF26-30-00-13	1SBL 237 001 R1300	AF26-30-00-13	1SBL 237 001 R1300	AF26-30-00-13	1SBL 237 001 R1300
		250...500	250...500	AF26-30-00-14	1SBL 237 001 R1400	AF26-30-00-14	1SBL 237 001 R1400	AF26-30-00-14	1SBL 237 001 R1400
25	47	24...60	20...60	AF30Z-30-00-21	1SBL 276 001 R2100	AF30Z-30-00-21	1SBL 276 001 R2100	AF26Z-30-00-21	1SBL 236 001 R2100
		48...130	48...130	AF30-30-00-12	1SBL 277 001 R1200	AF30-30-00-12	1SBL 277 001 R1200	AF26-30-00-12	1SBL 237 001 R1200
		100...250	100...250	AF30-30-00-13	1SBL 277 001 R1300	AF30-30-00-13	1SBL 277 001 R1300	AF26-30-00-13	1SBL 237 001 R1300
		250...500	250...500	AF30-30-00-14	1SBL 277 001 R1400	AF30-30-00-14	1SBL 277 001 R1400	AF26-30-00-14	1SBL 237 001 R1400

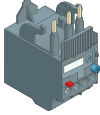
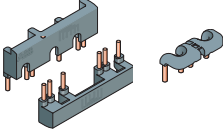
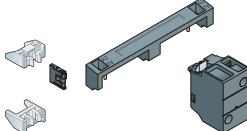
(1) For other control voltages, see "3-pole contactors - Ordering details" pages.

Note: an on-delay timer without dwelling-time (e.g.: CT-ERS.21 1SVR 630 100 R0300) is enough to countdown the programmed starting time during "Star connection".

Star-delta Starters Protected by Thermal Overload Relay With AF Contactors - Open Type Version in Kit Form

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Thermal overload relays			Connection sets		Mechanical and electrical interlock set		Auxiliary contact block	
 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	TF42-10	1SAZ 721 201 R1043	BEY16-4	1SBN 081 313 R2000	VEM4	1SBN 030 111 R1000		
10.0 ... 13.0	TF42-13	1SAZ 721 201 R1045	BEY16-4	1SBN 081 313 R2000	VEM4	1SBN 030 111 R1000		
16.0 ... 20.0	TF42-20	1SAZ 721 201 R1049	BEY16-4	1SBN 081 313 R2000	VEM4	1SBN 030 111 R1000		
20.0 ... 24.0	TF42-24	1SAZ 721 201 R1051	BEY38-4	1SBN 082 713 R2000	VEM4	1SBN 030 111 R1000	KM1: 1 x CA4-10 KM2: 1 x CA4-10	1SBN 010 110 R1010 1SBN 010 110 R1010
20.0 ... 24.0	TF42-24	1SAZ 721 201 R1051	BEY38-4	1SBN 082 713 R2000	VEM4	1SBN 030 111 R1000	KM1: 1 x CA4-10 KM2: 1 x CA4-10	1SBN 010 110 R1010 1SBN 010 110 R1010
24.0 ... 29.0	TF42-29	1SAZ 721 201 R1052	BEY38-4	1SBN 082 713 R2000	VEM4	1SBN 030 111 R1000	KM1: 1 x CA4-10 KM2: 1 x CA4-10	1SBN 010 110 R1010 1SBN 010 110 R1010

see table below for all setting ranges

Setting ranges	Type	Order code
A ... A		
0.10 ... 0.13	TF42-0.13	1SAZ 721 201 R1005
0.13 ... 0.17	TF42-0.17	1SAZ 721 201 R1008
0.17 ... 0.23	TF42-0.23	1SAZ 721 201 R1009
0.23 ... 0.31	TF42-0.31	1SAZ 721 201 R1013
0.31 ... 0.41	TF42-0.41	1SAZ 721 201 R1014
0.41 ... 0.55	TF42-0.55	1SAZ 721 201 R1017
0.55 ... 0.74	TF42-0.74	1SAZ 721 201 R1021
0.74 ... 1.00	TF42-1.0	1SAZ 721 201 R1023
1.00 ... 1.30	TF42-1.3	1SAZ 721 201 R1025
1.30 ... 1.70	TF42-1.7	1SAZ 721 201 R1028
1.70 ... 2.30	TF42-2.3	1SAZ 721 201 R1031
2.30 ... 3.10	TF42-3.1	1SAZ 721 201 R1033
3.10 ... 4.20	TF42-4.2	1SAZ 721 201 R1035
4.20 ... 5.70	TF42-5.7	1SAZ 721 201 R1038
5.70 ... 7.60	TF42-7.6	1SAZ 721 201 R1040
7.60 ... 10.0	TF42-10	1SAZ 721 201 R1043
10.0 ... 13.0	TF42-13	1SAZ 721 201 R1045
13.0 ... 16.0	TF42-16	1SAZ 721 201 R1047
16.0 ... 20.0	TF42-20	1SAZ 721 201 R1049
20.0 ... 24.0	TF42-24	1SAZ 721 201 R1051
24.0 ... 29.0	TF42-29	1SAZ 721 201 R1052
29.0 ... 35.0	TF42-35	1SAZ 721 201 R1053
35.0 ... 38.0/40.0	TF42-38	1SAZ 721 201 R1055

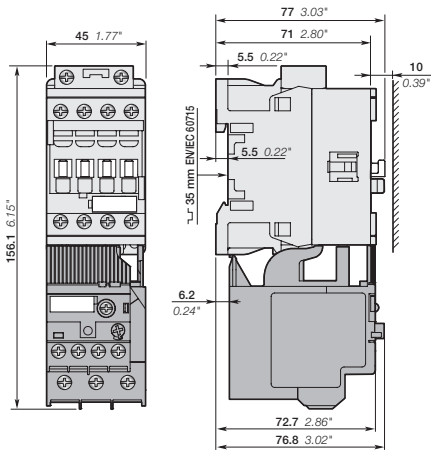
DOL & Reversing Starters Protected by Thermal Overload Relay With AF Contactors - Open Type Version in Kit Form

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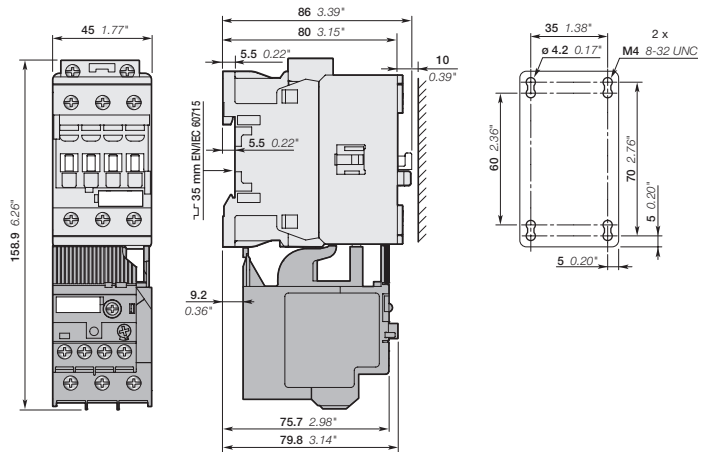


Dimensions (mm, inches)

Direct-on-line Starters

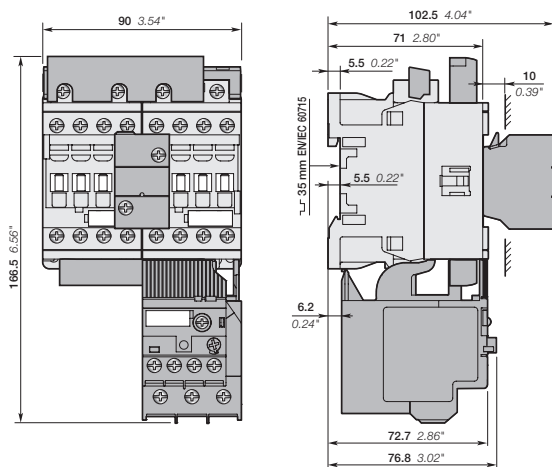


AF09, AF12, AF16
+ TF42

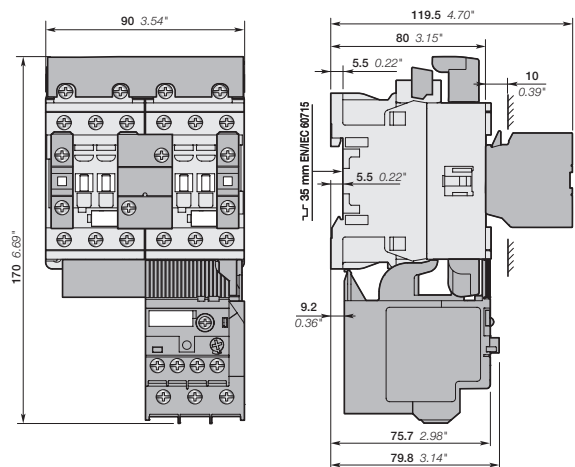


AF26, AF30, AF38
+ TF42

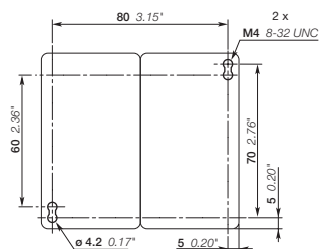
Reversing Starters



AF09, AF12, AF16
+ BER16-4, VEM4
+ TF42



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ TF42

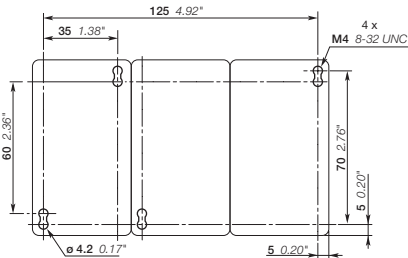
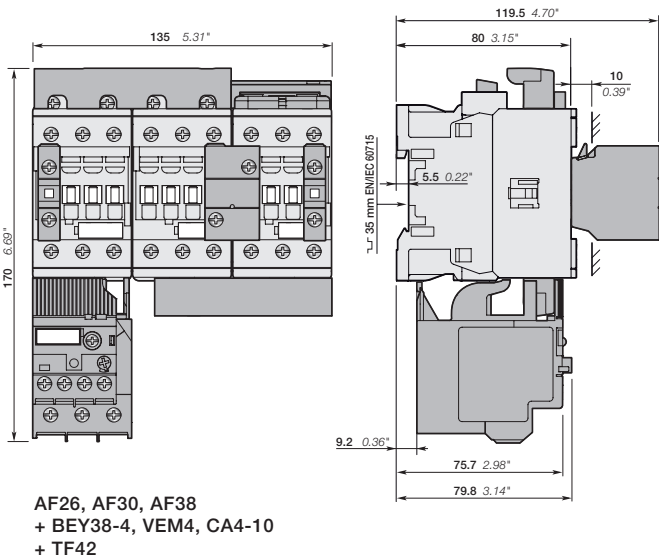
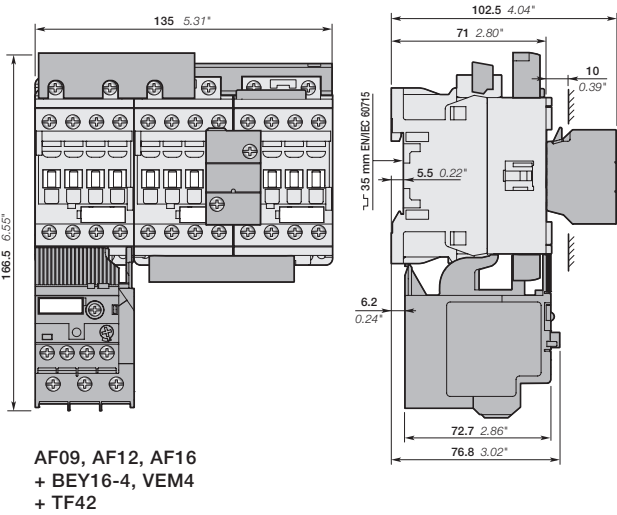


Note: contactor lateral distance to grounded component 2 mm 0.08 inches min.

Star-Delta Starters Protected by Thermal Overload Relay With AF Contactors - Open Type Version in Kit Form



Dimensions (mm, inches)



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