

Electronic compact starters: HF range

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Electronic compact starters: HF range

A compact solution with great functionality

ABB's electronic compact starter packs more functions into less space. The compact unit is just 22.5 mm wide and is suitable for three-phase motor loads up to 3 kW - 400 V AC. Direct-on-line and reversed starter with overload protection and emergency stop versions are available, making the range a perfect fit for high frequent and reliable long life switching of e.g. paper machines, conveyors, pumps, compressors and machine tools.



Saving space

Up to 90% less space required

ABB's electronic compact starter saves cabinet space, and is especially effective for group mounting. The starter is just 22.5 mm wide and yet still provides motor starting functionalities with motor protection and safety embedded.



Safety and protection

Integrated safety function

Protect your people with an emergency stop version that complies with SIL 3, PL e safety standards. Extend the life of your equipment and reduce maintenance costs with service lives that are ten times higher than electromechanical solutions.



Easy to install

Up to 75% reduced time in wiring

Wiring time during installation is cut to a minimum with motor protection, reversing function and emergency stop already integrated in the product. With just one component to install, the risk of wiring errors is lower. Separate overload protection is no longer needed.

Electronic compact starters

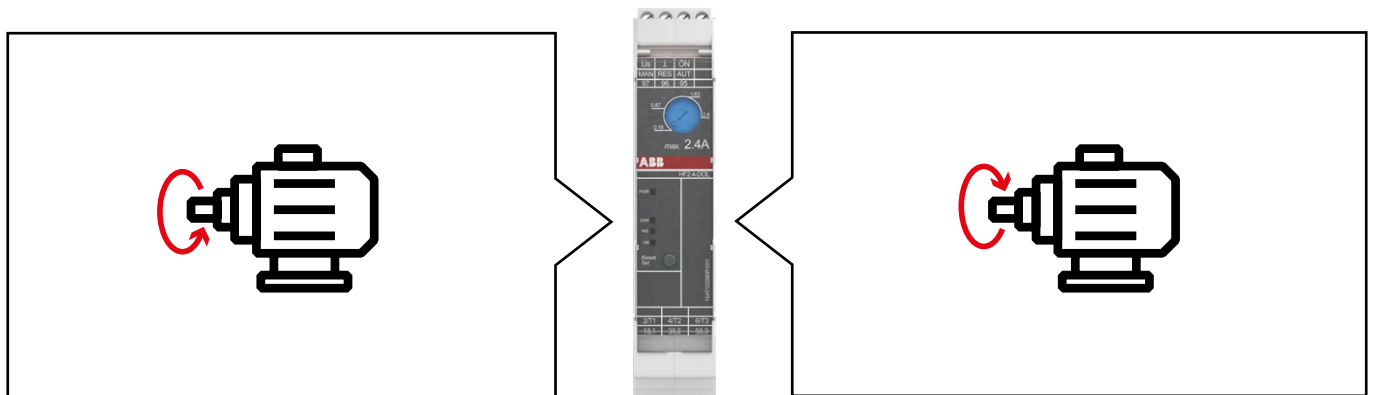
All-in-one: four functions in one starter

Direct-on-line

ABB's direct-on-line starter comes with a function that runs the motor in a forward direction. An integrated electronic overload relay also helps protect the motor.

Reversing capability

Reversing functionality is already integrated in our hybrid starter. This results in avoiding wiring faults and additionally saving time and space.



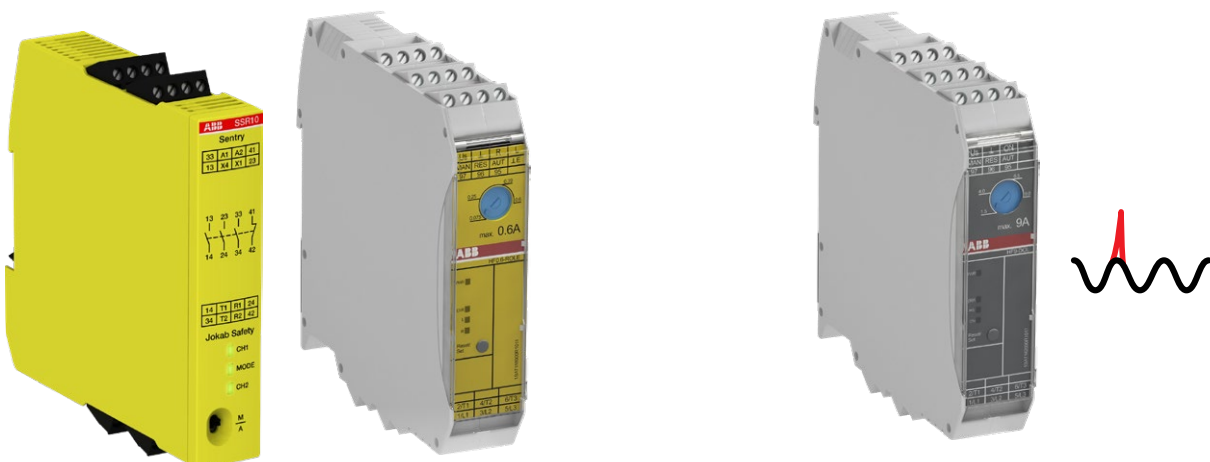
Direct-on-line and reversing function in only one product

Emergency stop

ABB's HF safety range supports safety applications complying to SIL3 and PL e safety level in combination with modular safety relays such as ABB's Sentry SSR10.

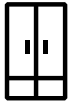
Overload protection

ABB offers three variants with wide setting ranges, using an electronic relay to protect the motor from overload. Protection against phase asymmetry and phase failure is also integrated.



Electronic compact starters

Features and benefits



Space-saving

Using an HF electronic compact starter saves space, especially when group-mounting units. With a width of just 22.5 mm and high function density, the unit fits any control cabinet. Smaller footprints for more compact systems are also possible.

22.5 mm



Reset function

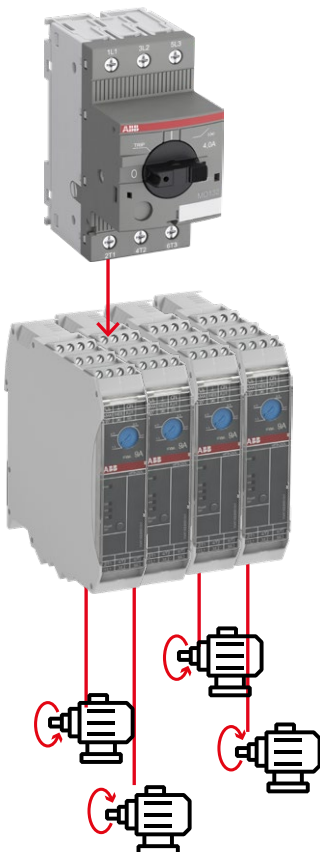
After the overload function has tripped, the electronic compact starter can be reset automatically, manually or remotely. The LEDs on the device are visualizing that an error has occurred. Additionally, a feedback relay will be activated.

ERR



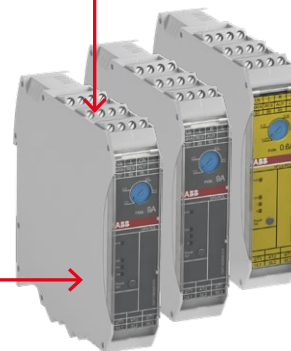
Less wiring

The control circuit is connected on the upper side of the device with the main circuit on the underside. The all-in-one functionality reduces wiring, saving time and money – and reducing faults.



Group mounting and protection ability

Combine the HF-Starter with a MO132 up to 10 A. Protection against overload is realized with the HF-Starter and the MO132 protects against short circuits. Maximum space saving for group mounting is guaranteed.



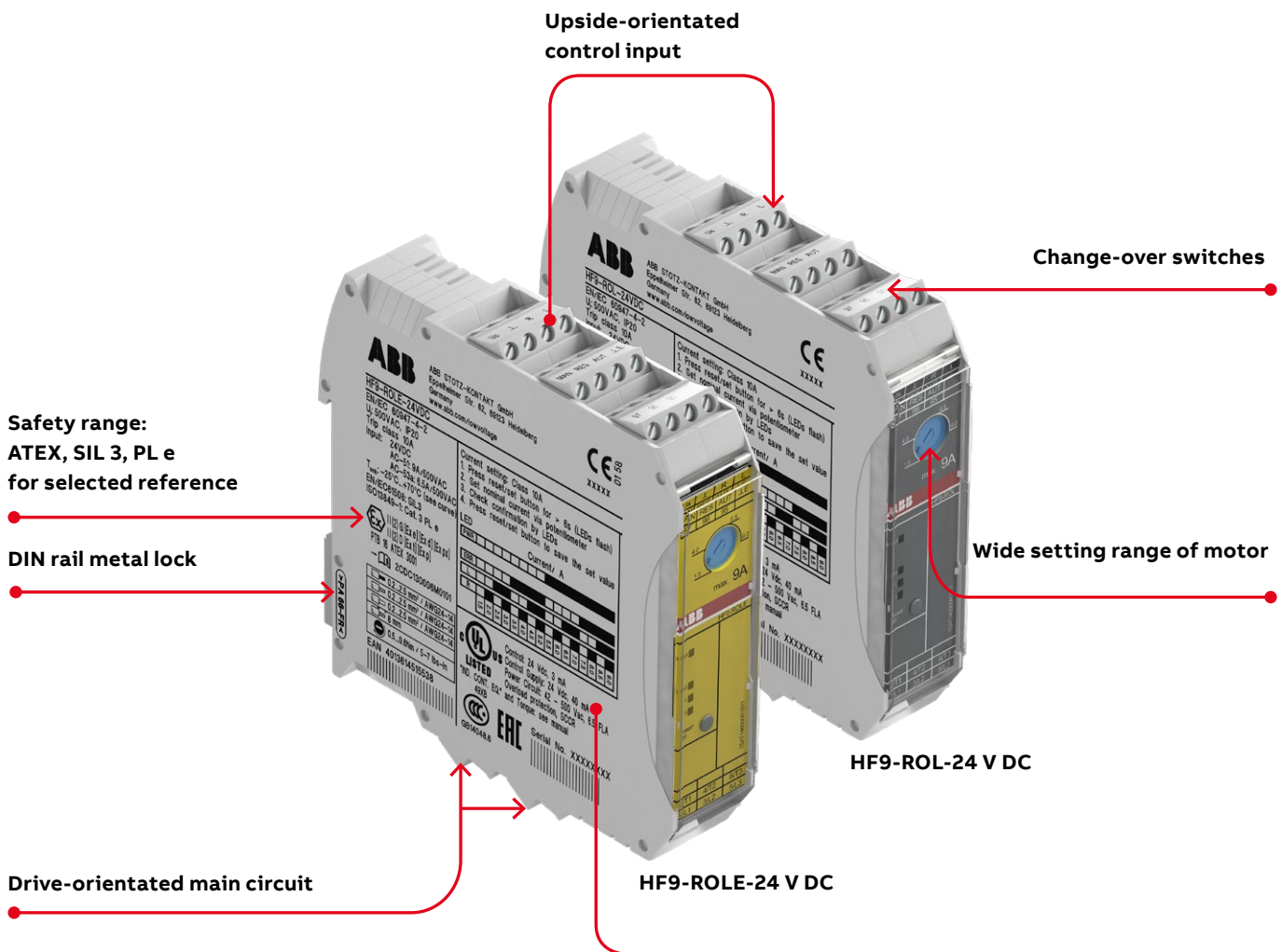
Longer working life

ABB's hybrid technology improves durability and reduces power losses. Semiconductors switch on and off the unit and the relays remain active while the motor is running. With a lifespan of 30 million cycles now achievable, maintenance costs are reduced.

Electronic compact starters

Hybrid technology

Hybrid technology – efficient, durable and compact – is the key feature of this range. Smart use of semiconductors with a relay bypass eliminates the wearing of contact materials. A microcontroller ensures the precise interaction of the components, providing the smoother switching that helps extend its long lifespan.



Electronic compact starters - HF range

Hybrid technology

Thanks to laser labeling and fewer connection points compared to conventional solutions, hybrid technology makes wiring easy. The screw connections for both the control and the main circuit have an optimized angle to provide access.

Only one component for up to four functions leads to shorter wiring time

22.5 mm

Group mounting in confined spaces is no problem

Easy-to-read starter status with LED indicators:
Precise current setting with LED confirmation
Users can easily adjust the current and get visual feedback via the LEDs.

Reset: direct manual reset of device with button, convenient remote or automatic reset after thermal trip

For example, if 6.5 A is set, the lights confirm the selection:

LED	Current A
PWR	1.5 2.2 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0
ERR	
ladj.	
ON	

HF2.4-DOL-24 V DC

The diagram shows a vertical ABB HF2.4-DOL compact starter. At the top, there are four screw terminals for control and main circuit connections. Below these is a control panel with a blue rotary selector for current setting (0.18, 0.87, 1.63, 2.4) and a 'max. 2.4A' label. The panel also features a 'PWR' LED indicator, an 'ERR' LED indicator, a 'ladj.' LED indicator, an 'ON' LED indicator, and a 'Reset/Set' button. The bottom of the device has three sets of screw terminals labeled '2/T1', '4/T2', and '6/T3' for the main circuit. Red arrows point from the text descriptions to the corresponding features on the device.

Note: PWR: Control supply voltage, ERR : Error/Message, ladj.: Current setting, ON: Motor is running

HF0.6, HF2.4, HF9 electronic compact starters

Direct-on-line starter



HF9-DOL-24VDC



HF9-DOLE-24VDC

The HF-DOL-range is used for the direct-on-line start of motors and the switching of non-resistive loads. With contactor and overload relay functionalities integrated into one device, the results are faster wiring times and fewer faults. The range covers 0.6 A, 2.4 A and up to 9 A - for motors up to 3 kW – 400 V AC. The integrated electronic overload protection with tripping class 10A has a wide setting range that enables just three models to cover all requirements. The control supply voltage is 24 V DC. For the control and main connection points ABB offers screw connections.

ABB also offers a HF-DOLE safety range with emergency stop function. This offers Safety Integrity Level 3, in accordance with functional safety standard IEC 61508-1 and Performance Level 'e' in accordance with ISO 13849-1 all in combination with a safety relay like ABB's Sentry SSR10. The safety range is ATEX-certified.

Rated operational current AC-53a A	Rated operational power AC-53a kW	Rated operational current AC-51 A	Setting range A	Full load amps motor use A	Type	Order code	Weight (1 pce) kg
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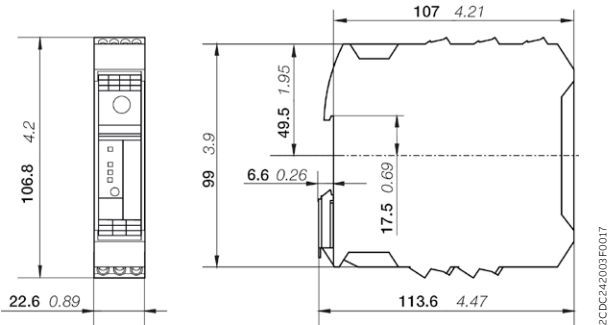
Direct-on-line starter with overload protection

0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-DOL-24VDC	1SAT112000R1011	0.205
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-DOL-24VDC	1SAT122000R1011	0.218
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-DOL-24VDC	1SAT142000R1011	0.206

Direct-on-line starter with overload protection and emergency stop

0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-DOLE-24VDC	1SAT113000R1011	0.205
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-DOLE-24VDC	1SAT123000R1011	0.218
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-DOLE-24VDC	1SAT143000R1011	0.206

Main dimensions mm, inches



HF0.6, HF2.4, HF9

HF0.6, HF2.4, HF9 electronic compact starters

Reversing starter



2CDC241003V0016

HF9-R-24VDC



2CDC241006V0016

HF9-ROL-24VDC



2CDC241003V0016

HF9-ROLE-24VDC

The HF-ROL-range is used for forward and reverse running motors, as well as for switching non resistive loads. With contactor and overload relay functionalities integrated into one device, the results are faster wiring times and fewer faults. The range covers 0.6 A, 2.4 A and up to 9 A - for motors up to 3 kW – 400 V AC. The integrated electronic overload protection with tripping class 10A has a wide setting range that enables just three models to cover all requirements. The control supply voltage is 24 V DC. For the control and main connection points ABB offers screw connections.

ABB also offers a HF-ROLE safety range with emergency stop function. This offers Safety Integrity Level 3, in accordance with functional safety standard IEC 61508-1 and Performance Level 'e' in accordance with ISO 13849-1 all in combination with a safety relay like ABB's Sentry SSR10. The safety range is ATEX-certified.

Rated operational current AC-53a A	Rated operational power AC-53a kW	Rated operational current AC-51 A	Setting range	Full load amps motor use A	Type	Order code	Weight (1 pce) kg
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Reversing starter with no monitoring and no overload functionality

6.5	3.00 (400V)	9.0	-	6.5	HF9-R-24VDC	1SAT144000R1011	0.174
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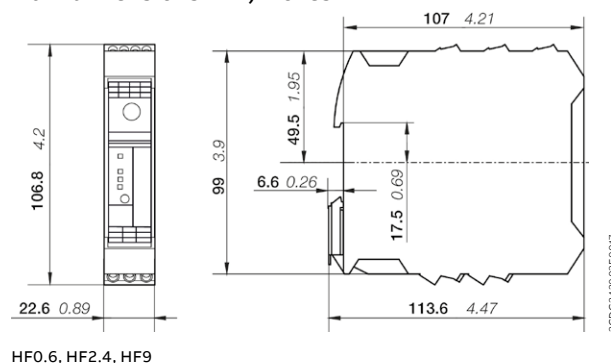
Reversing starter with overload protection

0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-ROL-24VDC	1SAT115000R1011	0.217
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-ROL-24VDC	1SAT125000R1011	0.219
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-ROL-24VDC	1SAT145000R1011	0.218

Reversing starter with overload protection and emergency stop

0.6	0.18 (400V)	0.6	0.075 ... 0.6	0.6	HF0.6-ROLE-24VDC	1SAT116000R1011	0.218
2.4	0.75 (400V)	2.4	0.18 ... 2.4	2.4	HF2.4-ROLE-24VDC	1SAT126000R1011	0.270
6.5	3.00 (400V)	9.0	1.5 ... 9.0	6.5	HF9-ROLE-24VDC	1SAT146000R1011	0.289

Main dimensions mm, inches



HF0.6, HF2.4, HF9 electronic compact starters

Technical data

Main circuit – Utilization characteristics according to IEC/EN

Type	HF-DOL/ROL	HF-DOLE/ROLE	HF-R
Standards	IEC/EN 60947-1, IEC/EN 60947-4-2	IEC/EN 60947-1, IEC/EN 60947-4-2, IEC/EN 61508, ISO 13849	IEC/EN 60947-1, IEC/EN 60947-4-2
Rated operational voltage U _e	500 V AC		
Operational voltage	42 V AC,		
Minimum	550 V AC		
Maximum			
Setting range	see ordering details		
Rated frequency	50/60 Hz		
Trip class	10A		
Number of poles	3		
Number of protected poles	3		
Mechanical durability	10000 cycles		
Electrical durability	30 Mio. cycles		
Rated impulse withstand voltage U _{imp}	6 kV		
Rated insulation voltage U _i	500 V		
Rated operational current I _e AC-51	see ordering details		
Rated operational current I _e AC-53a	see ordering details		
Rated uninterrupted current I _u	see ordering details, Rated operational current I _e		
Overvoltage category	III		
Delay time	Off, minimum, switched off with pushbutton	1 s	-
	Off, maximum, switched off with pushbutton	3 s	-
	Off, typical, switched off via control input voltage	30 ms	30 ms
	Off, maximum, switched off via control input voltage	-	HF0.6, HF2.4: 60 ms HF9: 80 ms
	Off, typical, switched off via supply voltage	25 ms	25 ms
	Off, maximum, switched off via supply voltage	-	500 ms
Switch off time	By phase failure	1.8 s	-
	By phase asymmetry at 33%	120 s	-
	By phase asymmetry at 67%	1.8 s	-
Overspeed tripping	Operating threshold	HF9-DOL/ROL/DOLE/ROLE: >45 A	
	Response time	HF9-DOL/ROL/DOLE/ROLE: 2 s	
Power loss	Minimum	1.1 W	
	Maximum	HF0.6: 1.5 W HF2.4: 3.3 W HF9: 14.6 W	
Switching frequency	≤ 2 Hz; 120 starts/min; 7200 starts/h		
Overvoltage category	III		

Short circuit protection with fuses and miniature circuit breakers according to IEC/EN 60947-4-2

Order code	Rated current AC-53a A	I _q kA	Protection type	Rated current A	Maximum voltage V	Type of coordination
1SAT...	0.6/2.4/6.5	50	Fuse gG	25	415	1
1SAT...	0.6/2.4/6.5	35	Fuse gG	25	500	1
1SAT...	0.6/2.4/6.5	1	S203-16B	16	500	1

For single and group mounting protection with manual motor starters according to IEC/EN 60947-4-2

I _q kA	Number of HF starter			Manual motor starter	Rated current A	Maximum voltage V	Type of coordination
	HF0.6	HF2.4	HF09				
70	9	2	1	MO132-6.3	6.3	415	1
50	9	2	1	MO132-6.3	6.3	415	1
50	9	2	1	MO132-10	10	415	1
35	9	2	1	MO132-6.3	6.3	500	1
35	16	4	1	MO132-10	10	500	1

HF0.6, HF2.4, HF9 electronic compact starters

Technical data

Main circuit – Utilization characteristics according to UL/CSA

Type	HF	
Standards	UL 60947-1; UL 60947-4-2	
Rated operational voltage	500 V AC	
Operational voltage	Minimum	42 V AC
	Maximum	550 V AC
Ampere Rating UL/CSA	see ordering details, Full load amps motor use	
Horse power rating	Nominal switching performance full load (power factor = 0.4)	HF0.6: 0.4 hp HF2.4: 1.2 hp HF9: 3.0 hp
	Nominal switching performance full load (power factor = 0.8)	HF0.6: 0.6 hp HF2.4: 2.2 hp HF9: 6.1 hp
Full loads Amps (FLA)	see ordering details	
Short-circuit current rating (SCCR) (500 V AC, 30 A Class J or CC)	100 kA	

General technical data

Type	HF	
Utilization category	AC51, AC53a	
Pollution degree	2	
Phase loss sensitive	Yes	
Ambient air temperature	Operation	-25 ... + 70 °C
	Operation compensated	-40 ... + 80 °C
Mounting position	Position 1, load side bottom	
Mounting in DIN Rail	TH35-15 (35 x 15 mm Mounting Rail) acc. to IEC 60715, TH35-7.5 (35 x 7.5 mm Mounting Rail) acc. to IEC 60715	
Degree of protection	Housing	IP20
	Main circuit terminals	IP20

Control circuit

Type	HF	
Rated control circuit voltage U _c	24 V DC	
Input voltage U _{in}	Switching Threshold at Signal <0>	-3 ... 9.6 V
	Switching Threshold at Signal <1>	19.2 ... 30 V
Input current I _c	3 mA	

Supply circuit

Type	HF	
Rated control supply voltage U _s	24 V DC	
Control supply voltage	19.2 ... 30 V DC	
Rated control supply current I _s	0.04 A	

For single or group protection following fuses can be used for UL application according to UL 60947-1/ -4-1

Order code	Rated current A	I _q kA	Protection type	Rated current A	Maximum voltage V	Type of coordination
1SAT...	0.6/2.4/6.5	100	Fuses class J or CC	30	500	1
1SAT...	0.6/2.4/6.5	5	Fuse RK5	20	500	1

HF0.6, HF2.4, HF9 electronic compact starters

Technical data

Safety related data




Type	HF-DOLE/ROLE
Standards	IEC/EN 60947-1, IEC/EN 60947-4-2, IEC/EN 61508, ISO 13849
Safe shut down for ambient temperature 40°C ... 60°C	
Safety integrity level acc. to IEC 61508-1	SIL 3
Performance level	Up to e
Mean time to failure (MTTF) acc. to IEC60050-191-12-07	DOLE: 43 years ROLE: 39.3 years
Mean time to dangerous failure, motor protection	447 years
Mean time to dangerous failure, safe shutdown	DOLE: 518 years ROLE: 517 years
Failure in time	Safe, detectable λ_{sd}
	DOLE: 543 FIT ROLE: 664 FIT
	Safe, undetectable λ_{su}
	DOLE: 852 FIT ROLE: 968 FIT
	Dangerous, detectable λ_{dd}
	218 FIT
	Dangerous, undetectable λ_{du}
	DOLE: 2.4 FIT ROLE: 2.67 FIT
Safe failure fraction (SFF)	DOLE: 99.85% ROLE: 99.86%
Diagnostic coverage (DC)	DOLE: 98.91% ROLE: 98.79%
Probability of dangerous failure per hour (PFH)	DOLE: 2.4 ROLE: 2.67
Motor overload protection for ambient temperature 40°C ... 60°C	
Safety integrity level acc. to IEC 61508-1	SIL 3
Performance level	Up to e
Mean time to failure (MTTF) acc. to IEC60050-191-12-07	DOLE: 43 years ROLE: 39.3 years
Mean time to dangerous failure, safe shutdown	DOLE: 518 years ROLE: 517 years
Failure in time	Safe, detectable
	DOLE: 517 FIT ROLE: 637 FIT
	Safe, undetectable
	DOLE: 809 FIT ROLE: 870 FIT
	Dangerous, detectable
	239 FIT
	Dangerous, undetectable
	17 FIT
Safe failure fraction (SFF)	DOLE: 98.92% ROLE: 99.03%
Diagnostic coverage	DOLE: 98.91% ROLE: 98.79%

HF0.6, HF2.4, HF9 electronic compact starters




Technical data

Connecting characteristics

Main circuit

Type	HF
Connecting capacity	
 Rigid 1 x	2 ... 2.5 mm ²
 Flexible 1 x	2 ... 2.5 mm ²
 Flexible with ferrule 1 x	2 ... 2.5 mm ²
Connecting capacity acc. to UL/CSA	
Rigid 1 x	24 ... 14 AWG
Flexible 1 x	24 ... 14 AWG
Flexible with ferrule 1 x	24 ... 14 AWG
Stripping length	8 mm
Tightening torque	0.5 ... 0.6 N·m
Tightening torque UL/CSA	5 ... 7 in·lb
Terminal type	Screw terminals
Recommended screw driver	M3

Control circuit

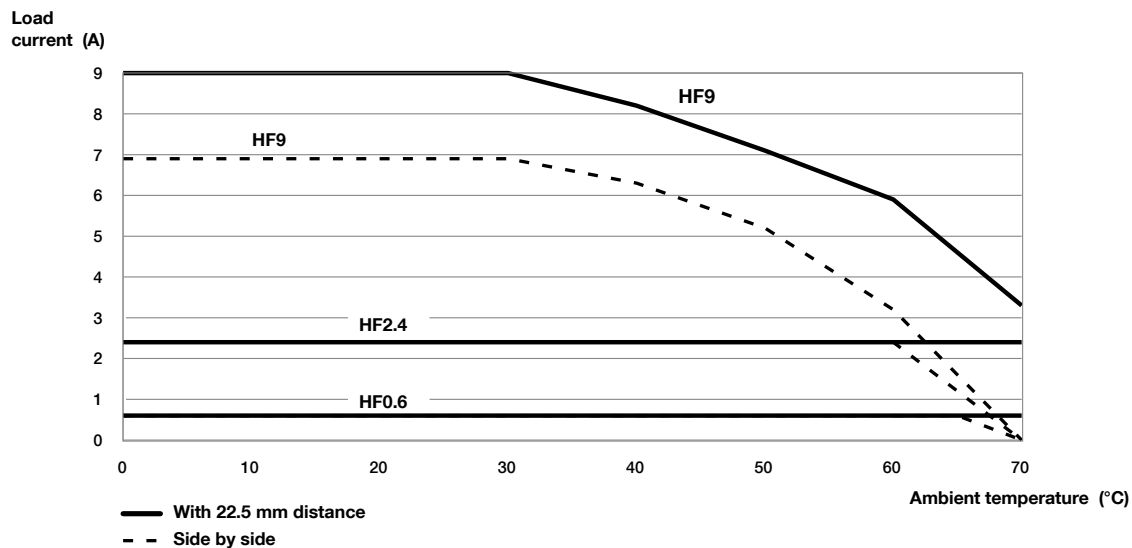
Type	HF
Connecting capacity	
 Rigid 1 x	2 ... 2.5 mm ²
 Flexible 1 x	2 ... 2.5 mm ²
 Flexible with ferrule 1 x	2 ... 2.5 mm ²
Connecting capacity acc. to UL/CSA	
Rigid 1 x	24 ... 14 AWG
Flexible 1 x	24 ... 14 AWG
Flexible with ferrule 1 x	24 ... 14 AWG
Stripping length	8 mm
Tightening torque	0.5 ... 0.6 Nm
Tightening torque UL/CSA	5 ... 7 in·lb
Terminal type	Screw terminals
Recommended screw driver	M3

HF0.6, HF2.4, HF9 electronic compact starters

Technical diagrams

Derating curve

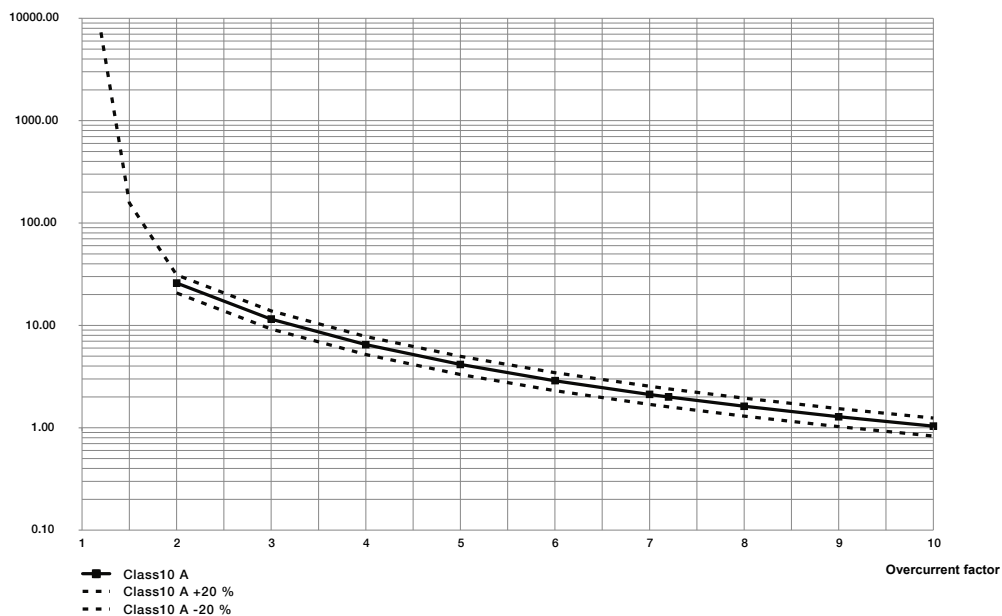
Please consider the derating curves for group mounting with and without ≥ 22.5 mm distance and the overload protection for tripping class 10A.



Derating curve HF range - electronic compact starters

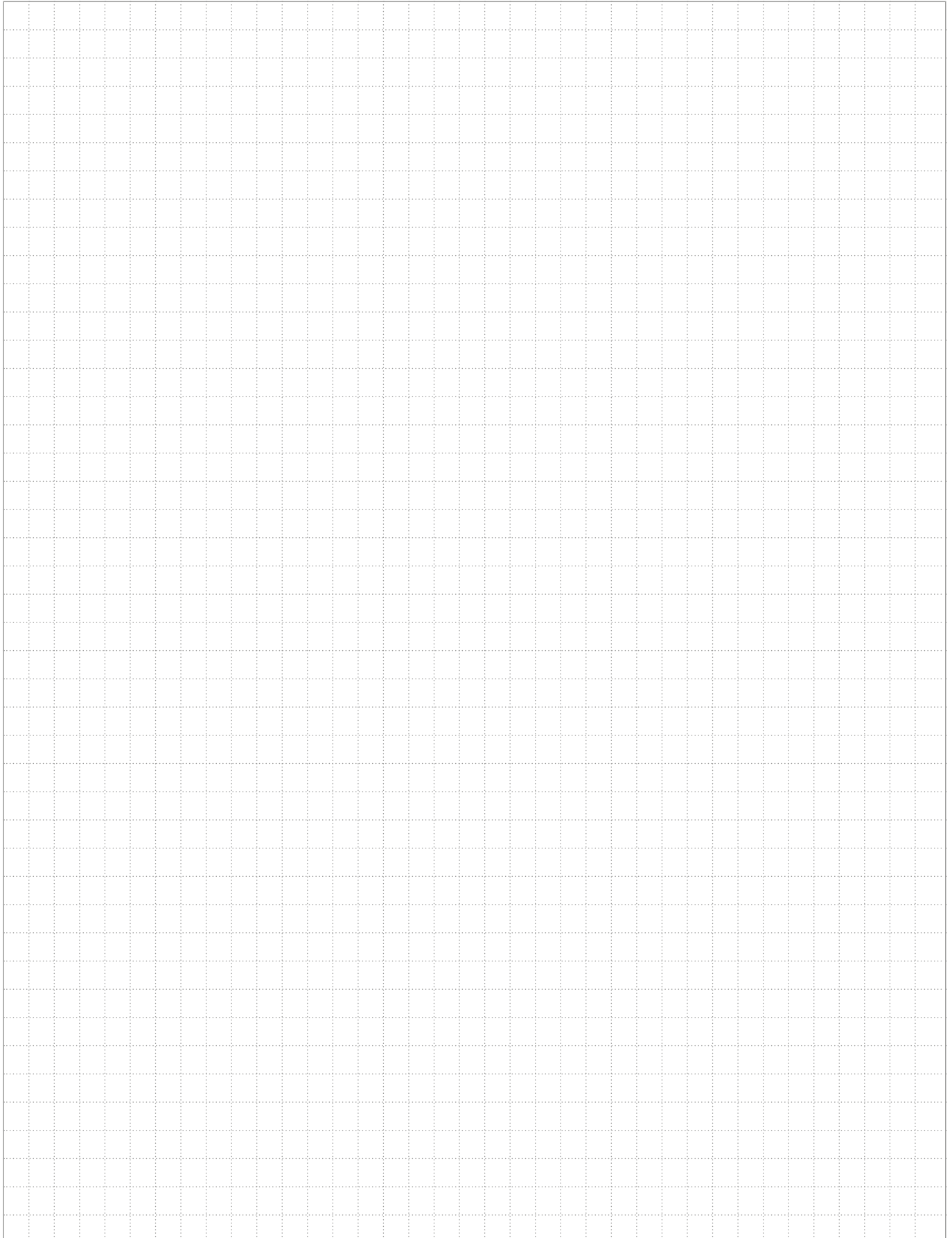
Tripping characteristics

tripping time (s)



Tripping characteristics class 10A HF range - electronic compact starters

Notes

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