



Technical catalogue

Modular DIN rail components

Installation contactors

Power and productivity
for a better world™



Installation Contactors



Overview	2
-----------------------	---

ESB Installation Contactors

20 A / AC-1/AC-7a ESB 20	4
24 A / AC-1/AC-7a ESB 24	5
40 A / AC-1/AC-7a ESB 40	6
63 A / AC-1/AC-7a ESB 63	7

Main Technical Data	8
----------------------------------	---

Lighting application	13
-----------------------------------	----

EN Installation Contactors - Manually/Automatic operated

20 A / AC-1/AC-7a EN 20	14
24 A / AC-1/AC-7a EN 24	15
40 A / AC-1/AC-7a EN 40	16

Main Technical Data	17
----------------------------------	----

ESB/EN Installation Contactors

Main Accessories	19
-------------------------------	----

Modular DIN rail components

Installation Contactors ESB and EN

All over the world, commercial and industrial buildings such as hospitals, hotels, shopping and sport centers, domestic and residential installation are equipped with ABB low voltage products and systems.

From switchboard to light switch, ABB covers the complete range of equipment required for controlling and protecting electrical installations.



Typical segments

1-2 Residential installations | 3 Hotels



For controlling and remote switching, ABB offers a complete range of installation contactors that are mainly used in the following applications:

- Lighting
- Heating
- Ventilation
- Pumps and motors.

ESB and EN installation contactors are designed to match the Modular DIN rail components for common use in dedicated panels.

The ESB range includes 4 ratings from 20A to 63A with 2 to 4-pole version.

The EN range includes 3 ratings from 20A to 40A.

Many contacts variations are available for managing all application. Products comply with standards IEC60947-4-1 and IEC61095.

Construction:

The ESB/EN20 operates with an AC solenoid system.

Types ESB/EN 24, 40 and 63 are fitted with a DC solenoid actuator and are therefore hum-free. The noise during switching is barely audible making it beneficial for use in buildings such as hospitals, hotels or houses. An incorporated varistor protects the coil against remote lightning strikes and overvoltages up to 5kV. In addition, it limits the interference voltage peaks of the solenoid system.

The contactors can therefore be combined with programmable logic controllers. There is no need for a protective circuit. The solenoid system is provided with radio interference suppression. Accessories are available, such as auxiliary contacts and sealing covers.

Advantages:

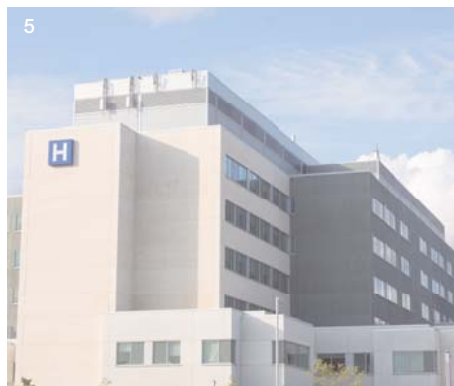
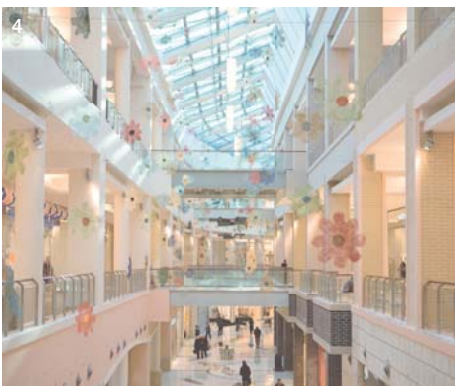
- Powerful for lamp switching
- Operation flag indicator
- DC coil: - Noiseless and hum free
 - Low power consumption
 - Integrated overvoltage protection.

The EN contactors have a built-in toggle switch for automatic and manual operation.

Advantages:

- Facilitate commissioning
- Functional test before start-up
- Ease maintenance operation
- High degree of safety and availability in case of automation system failure.

4 Shopping centers | 5 Hospitals | 6 Commercial & industrial buildings





20 A
AC-1/AC-7a

ESB 20 Installation Contactors

AC Operated



Application

The ESB contactors are used mainly in buildings for switching and controlling lighting, heating, ventilation and pumps. They are part of the complete range of Din rail products and can be integrated easily in dedicated panels.

Certifications and Approvals



Description

The **ESB 20** contactors are used for the control of single phase loads up to 20 A. They operate with an AC coil. You can choose between a various N.O. and N.C. contacts combination.

Ordering Details

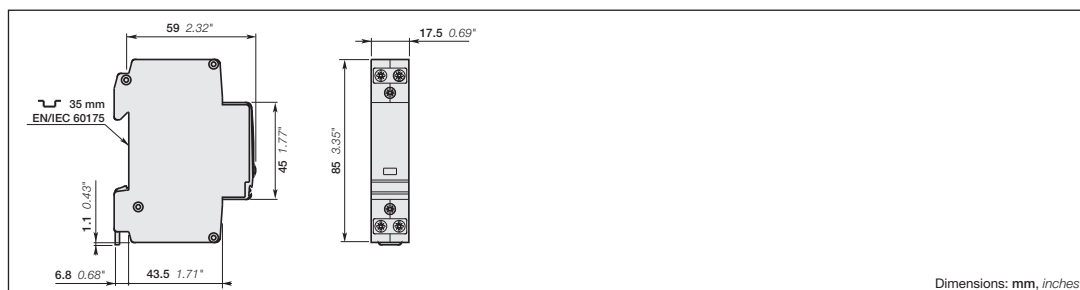
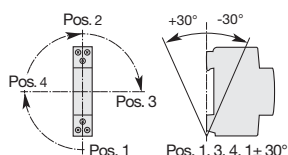
Main poles	Nb of modules	Control coil voltage		Type	Order code	Pack ^(ing) pieces	Weight kg (1 pce)
		50 Hz	60 Hz				
 1	1	12 V	14 V	ESB 20-20	GHE 321 1102 R1004	10	0.14
		20 V	24 V		GHE 321 1102 R1005	10	0.14
		24 V	28 V		GHE 321 1102 R0001	10	0.14
		42 V	48 V		GHE 321 1102 R0002	10	0.14
		48 V	55 V		GHE 321 1102 R0003	10	0.14
		110 V	125...127 V		GHE 321 1102 R0004	10	0.14
		230 V	264 V		GHE 321 1102 R0006	10	0.14
2 N.O.	1	240 V	278 V	ESB 20-02	GHE 321 1102 R0005	10	0.14
		400 V	-		GHE 321 1102 R0007	10	0.14
		12 V	14 V		GHE 321 1202 R1004	10	0.14
		20 V	24 V		GHE 321 1202 R1005	10	0.14
		24 V	28 V		GHE 321 1202 R0001	10	0.14
		42 V	48 V		GHE 321 1202 R0002	10	0.14
		48 V	55 V		GHE 321 1202 R0003	10	0.14
2 N.C.	1	110 V	125...127 V	ESB 20-02	GHE 321 1202 R0004	10	0.14
		230 V	264 V		GHE 321 1202 R0006	10	0.14
		240 V	278 V		GHE 321 1202 R0005	10	0.14
		400 V	-		GHE 321 1202 R0007	10	0.14
		12 V	14 V		GHE 321 1302 R1004	10	0.14
		20 V	24 V		GHE 321 1302 R1005	10	0.14
		24 V	28 V		GHE 321 1302 R0001	10	0.14
1 N.O.	1	42 V	48 V	ESB 20-11	GHE 321 1302 R0002	10	0.14
		48 V	55 V		GHE 321 1302 R0003	10	0.14
		110 V	125...127 V		GHE 321 1302 R0004	10	0.14
		230 V	264 V		GHE 321 1302 R0006	10	0.14
		240 V	278 V		GHE 321 1302 R0005	10	0.14
		400 V	-		GHE 321 1302 R0007	10	0.14
		1 N.C.	1				

Main Technical Data

For complete technical data see 1SBC103005S0201.pdf

Main poles acc to. IEC 60947-4-1 and IEC 61095	Rated operational voltage U_e	250 V
	I_e AC-1 / AC-7a Rated operational current (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$)	20 A
	AC-3 / AC-7b Ratings (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$)	
	Rated operational power 1 phase	230 V 1.1 kW
	I_e Rated operational current 1 phase	230 V 9 A
Magnet system	Coil operating limits (acc. to IEC 60947-4-1)	0.85 ... 1.1 U_e (at $\theta \leq 55^\circ\text{C}$)
	Average pull-in coil consumption value	8 VA / 5 W
	Average holding coil consumption value	3.2 VA / 1.2 W
Connecting capacity	Main pole terminals	Rigid 1 x 1.5 ... 10 mm ² 2 x 1.5 ... 4 mm ²
	Coil terminals	Rigid 1 x 0.5 ... 4 mm ² 2 x 0.75 ... 2.5 mm ²

Mounting positions





24 A
AC-1/AC-7a

ESB 24 Installation Contactors

AC/DC Operated



Application

The ESB contactors are used mainly in buildings for switching and controlling lighting, heating, ventilation and pumps. They are part of the complete range of Din rail products and can be integrated easily in dedicated panels.

Description

The **ESB 24** contactors are used for the control of single and three-phases loads up to 24 A. Due to their DC solenoid actuator, the **ESB 24** can be connected to AC or DC voltages.

This provides the following benefits:

Hum-free operating system, no vibration, silent in operation, low power consumption, integrated high overvoltage protection 5 kV. You can choose between a various N.O. and N.C. contacts combination.

Main accessories:

Auxiliary contact blocks **EH04**.

Certifications and Approvals



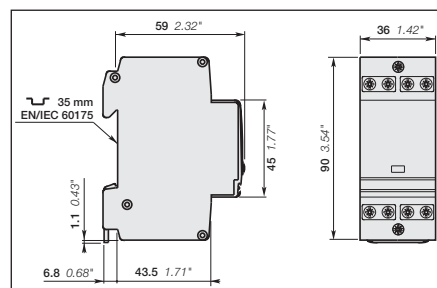
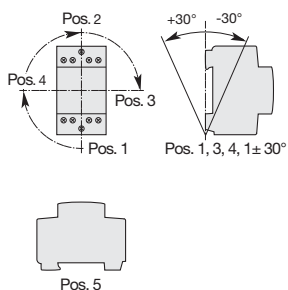
Ordering Details

Main poles	Nb of modules	Control coil voltage		Type	Order code	Pack ^(ing) pieces	Weight kg (1 pce)
		40... 450 Hz	DC				
 4 N.O.	2	12 V	12 V	ESB 24-40	GHE 329 1102 R 1004	5	0.28
		24 V	24 V		GHE 329 1102 R 0001	5	0.28
		42 V	42 V		GHE 329 1102 R 0002	5	0.28
		48 V	48 V		GHE 329 1102 R 0003	5	0.28
		110...120 V	110...120 V		GHE 329 1102 R 0004	5	0.28
		230...240 V	230...240 V		GHE 329 1102 R 0006	5	0.28
		400...415 V	400...415 V		GHE 329 1102 R 0007	5	0.28
 4 N.C.	2	12 V	12 V	ESB 24-04	GHE 329 1202 R 1004	5	0.28
		24 V	24 V		GHE 329 1202 R 0001	5	0.28
		42 V	42 V		GHE 329 1202 R 0002	5	0.28
		48 V	48 V		GHE 329 1202 R 0003	5	0.28
		110...120 V	110...120 V		GHE 329 1202 R 0004	5	0.28
		230...240V	230...240V		GHE 329 1202 R 0006	5	0.28
		400...415 V	400...415 V		GHE 329 1202 R 0007	5	0.28
 2 N.O. 2 N.C.	2	12 V	12 V	ESB 24-22	GHE 329 1302 R 1004	5	0.28
		24 V	24 V		GHE 329 1302 R 0001	5	0.28
		42 V	42 V		GHE 329 1302 R 0002	5	0.28
		48 V	48 V		GHE 329 1302 R 0003	5	0.28
		110...120 V	110...120 V		GHE 329 1302 R 0004	5	0.28
		230...240 V	230...240 V		GHE 329 1302 R 0006	5	0.28
		400...415 V	400...415 V		GHE 329 1302 R 0007	5	0.28
 3 N.O. 1 N.C.	2	12 V	12 V	ESB 24-31	GHE 329 1602 R 1004	5	0.28
		24 V	24 V		GHE 329 1602 R 0001	5	0.28
		42 V	42 V		GHE 329 1602 R 0002	5	0.28
		48 V	48 V		GHE 329 1602 R 0003	5	0.28
		110...120 V	110...120 V		GHE 329 1602 R 0004	5	0.28
		230...240 V	230...240 V		GHE 329 1602 R 0006	5	0.28
		400 ... 415 V	400 ... 415 V		GHE 329 1602 R 0007	5	0.28
 1 N.O. 3 N.C.	2	12 V	12 V	ESB 24-13	GHE 329 1702 R 1004	5	0.28
		24 V	24 V		GHE 329 1702 R 0001	5	0.28
		42 V	42 V		GHE 329 1702 R 0002	5	0.28
		48 V	48 V		GHE 329 1702 R 0003	5	0.28
		110...120 V	110...120 V		GHE 329 1702 R 0004	5	0.28
		230...240 V	230...240 V		GHE 329 1702 R 0006	5	0.28
		400 ... 415 V	400 ... 415 V		GHE 329 1702 R 0007	5	0.28

Main Technical Data

Main poles	Rated operational voltage U_e	400 V
acc to IEC 60947-4-1 and IEC 61095	I_e AC-1 / AC-7a Rated operational current (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$)	24 A
	AC-3 / AC-7b Ratings (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$)	
	Rated operational power	3 phases 400 V 4 kW
	I_e Rated operational current	3 phases 400 V 9 A
Magnet system	Coil operating limits (acc. to IEC 60947-4-1)	0.85 ... 1.1 U_e (at $\theta \leq 55^\circ\text{C}$)
	Average pull-in coil consumption value	4 VA / 4 W
	Average holding coil consumption value	4 VA / 4 W
Connecting capacity	Main pole terminals	Rigid 1 x 1.5 ... 10 mm ² 2 x 1.5 ... 4 mm ²
	Coil terminals	Rigid 1 x 1 ... 4 mm ² 2 x 0.75 ... 2.5 mm ²

Mounting positions



Dimensions: mm, inches

1SBC103005S0201



40 A
AC-1/AC-7a

ESB 40 Installation Contactors

AC/DC Operated



Application

The ESB contactors are used mainly in buildings for switching and controlling lighting, heating, ventilation and pumps. They are part of the complete range of Din rail products and can be integrated easily in dedicated panels.

Description

The **ESB 40** contactors are used for the control of single and three-phases loads up to 40 A. Due to their DC solenoid actuator, the **ESB 40** can be connected to AC or DC voltages. This provides the following benefits:

Hum-free operating system, no vibration, silent in operation, low power consumption, integrated high overvoltage protection 5 kV. You can choose between a various N.O. and N.C. contacts combination.

Main accessories:

Auxiliary contact blocks **EH04**.

Certifications and Approvals



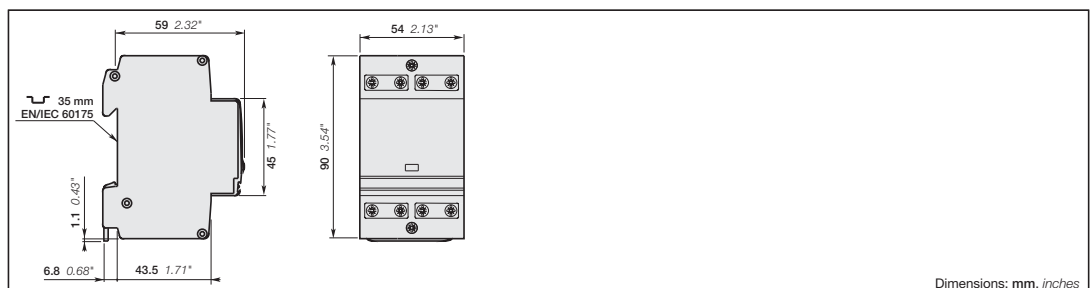
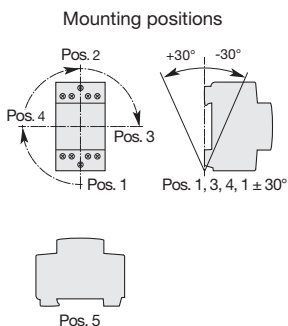
Ordering Details

Main poles	Nb of modules	Control coil voltage		Type	Order code	Pack ^(ing) pieces	Weight kg (1 pce)
		40... 450 Hz	DC				
 4 N.O.	3	12 V	12 V	ESB 40-40	GHE 349 1102 R 1004	3	0.40
		24 V	24 V		GHE 349 1102 R 0001	3	0.40
		42 V	42 V		GHE 349 1102 R 0002	3	0.40
		48 V	48 V		GHE 349 1102 R 0003	3	0.40
		110...120 V	110...120 V		GHE 349 1102 R 0004	3	0.40
		230...240 V	230...240 V		GHE 349 1102 R 0006	3	0.40
		400...415 V	400...415 V		GHE 349 1102 R 0007	3	0.40
 2 N.O. 2 N.C.	3	24 V	24 V	ESB 40-22	GHE 349 1302 R 0001	3	0.40
		230 V	230 V		GHE 349 1302 R 0006	3	0.40
 3 N.O. 1 N.C.	3	24 V	24 V	ESB 40-31	GHE 349 1602 R 0001	3	0.40
		230 V	230 V		GHE 349 1602 R 0006	3	0.40
 3 N.O.	3	24 V	24 V	ESB 40-30	GHE 349 1502 R 0001	3	0.39
		230 V	230 V		GHE 349 1502 R 0006	3	0.39
		400 V	400 V		GHE 349 1502 R 0007	3	0.39
 2 N.O.	3	24 V	24 V	ESB 40-20	GHE 349 1402 R 0001	3	0.38
		230 V	230 V		GHE 349 1402 R 0006	3	0.38

Main Technical Data

For complete technical data see 1SBC103005S0201.pdf

Main poles	Rated operational voltage U_e	400 V
acc to IEC 60947-4-1 and IEC 61095	I_e AC-1 / AC-7a Rated operational current (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$)	40 A
	AC-3 / AC-7b Ratings (for 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz, 3-phase motors) (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$)	
	Rated operational power 3 phases	400 V 11 kW
	I_e Max. Rated operational current 3 phases	400 V 22 A
Magnet system	Coil operating limits (acc. to IEC 60947-4-1)	0.85 ... 1.1 U_e (at $\theta \leq 55^\circ\text{C}$)
	Average pull-in coil consumption value	5 VA / 5 W
	Average holding coil consumption value	5 VA / 5 W
Connecting capacity	Main pole terminals	Rigid 1 x 1.5 ... 25 mm ² 2 x 1.5 ... 10 mm ²
	Coil terminals	Rigid 1 x 1 ... 4 mm ² 2 x 0.75 ... 2.5 mm ²





63 A
AC-1/AC-7a

ESB 63 Installation Contactors

AC/DC Operated



Application

The ESB contactors are used mainly in buildings for switching and controlling lighting, heating, ventilation and pumps. They are part of the complete range of Din rail products and can be integrated easily in dedicated panels.

Description

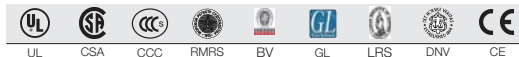
The **ESB 63** contactors are used for the control of single and three-phases loads up to 63 A. Due to their DC solenoid actuator, the **ESB 63** can be connected to AC or DC voltages. This provides the following benefits:

Hum-free operating system, no vibration, silent in operation, low power consumption, integrated high overvoltage protection 5 kV. You can choose between a various N.O. and N.C. contacts combination.

Main accessories:

Auxiliary contact blocks **EH04**.

Certifications and Approvals



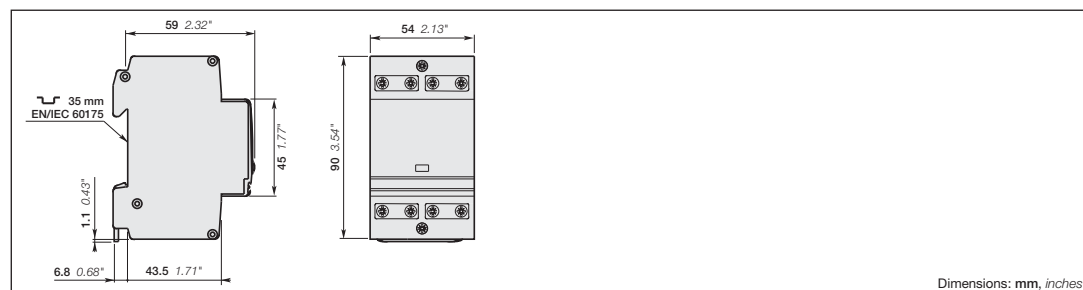
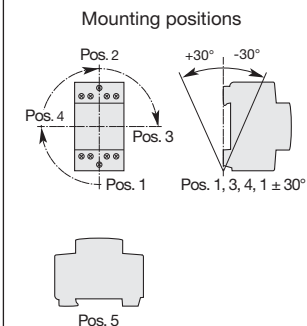
Ordering Details

Main poles	Nb of modules	Control coil voltage		Type	Order code	Pack ^(ing) pieces	Weight kg (1 pce)
		40... 450 Hz	DC				
 3 main poles, 4 N.O.	3	12 V	12 V	ESB 63-40	GHE 369 1102 R 1004	3	0.42
		24 V	24 V		GHE 369 1102 R 0001	3	0.42
		42 V	42 V		GHE 369 1102 R 0002	3	0.42
		48 V	48 V		GHE 369 1102 R 0003	3	0.42
		110...120 V	110...120 V		GHE 369 1102 R 0004	3	0.42
		230...240 V	230...240 V		GHE 369 1102 R 0006	3	0.42
 3 main poles, 2 N.O., 2 N.C.	3	400...415 V	400...415 V	ESB 63-22	GHE 369 1102 R 0007	3	0.42
		415 V	415 V		GHE 369 1102 R 0008	3	0.42
		400 V	400 V		GHE 369 1302 R 0007	3	0.42
 3 main poles, 3 N.O.	3	110 V	110 V	ESB 63-31	GHE 369 1602 R 0004	3	0.42
		230 V	230 V		GHE 369 1602 R 0006	3	0.42
 3 main poles, 3 N.O., 1 N.C.	3	230 V	230 V	ESB 63-30	GHE 369 1502 R 0006	3	0.41
		400 V	400 V		GHE 369 1502 R 0007	3	0.41
 3 main poles, 3 N.O.	3	24 V	24 V	ESB 63-20	GHE 369 1402 R 0001	3	0.40
		230 V	230 V		GHE 369 1402 R 0006	3	0.40
 3 main poles, 2 N.O., 1 N.C.	3	230 V	230 V	ESB 63-11	GHE 369 1802 R 0006	3	0.40
		1 N.O., 1 N.C.					

Main Technical Data

For complete technical data see 1SBC103005S0201.pdf

Main poles	Rated operational voltage U_e	400 V
	acc to IEC 60947-4-1 and IEC 61095	I_e AC-1 / AC-7a Rated operational current (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$) 63 A
Magnet system	AC-3 / AC-7b Ratings (for 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz, 3-phase motors) (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$)	Rated operational power 3 phases 400 V 15 kW
		I_e Max. rated operational current 3 phases 400 V 30 A
	Coil operating limits (acc. to IEC 60947-4-1)	0.85 ... 1.1 U_e (at $\theta \leq 55^\circ\text{C}$)
Connecting capacity	Average pull-in coil consumption value	65 VA / 65 W
	Average holding coil consumption value	4.2 VA / 4.2 W
	Main pole terminals	Rigid 1 x 1.5 ... 25 mm ²
	Coil terminals	Rigid 2 x 1.5 ... 10 mm ²
		1 x 1 ... 4 mm ²
		2 x 0.75 ... 2.5 mm ²





ESB Installation Contactors

Technical Data

Main Pole - Utilization Characteristics according to IEC

Contactor types:	AC operated AC/DC operated	ESB20	ESB24	ESB40	ESB63
Rated operational voltage U_e max.	V	250	400		
Rated frequency limits	Hz	50/60	40...450		
Utilization category AC-1 / AC-7a					
for air temperature close to contactor < 55 °C					
Max. rated operational current I_e AC-1 / AC-7a	A	20	24	40	63
Rated operational power AC-1					
230 V - 1 phase	kW	4	5.3	8.8	13.8
400 V - 3 phases	kW	-	16	26	41
Utilization category AC-3 / AC-7b					
for air temperature close to contactor \leq 55 °C					
Max. rated operational current I_e AC-3/AC-7b					
230 V - 1 phase	A	9	9	22	30
400 V - 3 phases	A	-	9	22	30
Rated operational power AC-3					
230 V - 1 phase	kW	1.1	2.2	5.5	8
400 V - 3 phases	kW	-	4	11	15
Rated making capacity AC-3					
10 x I_e / AC-3					
Rated breaking capacity AC-3					
8 x I_e / AC-3					
Short-circuit protection for contactors					
gG type fuse					
	A	20	35	63	80
Rated short-time withstand current I_{cw}					
at 40 °C ambient temp., in free air, from a cold state					
	10 s A	72		176	240
Heat dissipation per pole I_e/AC-1/AC-7a					
	W	1	1.5	3	6
Max. electrical switching frequency					
- for AC-1 / AC-7a	cycles/h	300			
- for AC-3 / AC-7b	cycles/h	600			
Electrical durability					
- for AC-1 / AC-7a	cycles	150000	150000	150000	150000
- for AC-3 / AC-7b	cycles	150000	500000	170000	240000
Mechanical durability					
- millions of operating cycles		1			



ESB Installation Contactors

Technical Data

Main Pole - Utilization Characteristics according to UL/CSA

Contactor types:	AC operated		ESB20			
	AC/DC operated			ESB24	ESB40	ESB63
General use rating						
Amp rating	240 V	A	20	24	40	63
Motor rating						
Amp rating						
	120 V - 1 phase	A	9.8	-	-	-
	240 V - 1 phase	A	8	17	40	55
	440 - 480 V - 3 phases	V	-	14	34	34
Motor power						
	120 V - 1 phase	hp	1/2	-	-	-
	240 V - 1 phase	hp	1	3	7.5	10
	440 - 480 V - 3 phases	V	-	5	15	15
Short-circuit protection for contactors without thermal O/L relay - Motor protection excluded						
Fuse rating		A	25	25	40	75
Fuse type, 600 V			-	-	-	-
Max. electrical switching frequency						
- for general use		cycles/h	300			
- for motor use		cycles/h	600			

General Technical Data

Rated insulation voltage U_i			
according to IEC 60947-4-1	V	400	500
according to UL/CSA	V	240	600
Rated impulse withstand voltage $U_{imp.}$	kV	6	
Standards IEC 60947-4-1 / EN 60947-4-1 and IEC 61095 / EN 61095, UL 508, CSA C22.2 N°14-05			
Air temperature close to contactor			
- for operation at $0.85 \dots 1.1 U_c$	°C	-25 ... +55 (Type ESB 24...63: for ambient temperature > 40°C, add ESB-DIS (1/2 module) at every second contactor)	
- for storage	°C	-40 ... +80	
Climatic withstand		IEC 60068-2-30, UTE 63-100 execution 1*	
Operating altitude	m	≤ 2000	
Shock withstand		10 g / 4 ms / axes X Y Z	
Mounting positions			
Pos 1, 3, 4, 1±30°			
Pos 5 : not allowed for ESB20			
Fixing			
on rail acc. to IEC 60715 and EN 60715			

* ESB20 only



ESB Installation Contactors

Technical Data

Magnet System Characteristics

Contactor types:	AC operated		ESB20	ESB24	ESB40	ESB63
	AC/DC operated					
Rated operational voltage U_e max.						
	- at 50 Hz	V	12 ... 400	12 ... 415	24 ... 415	
	- at 60 Hz	V	14 ... 380	12 ... 415	24 ... 415	
	- at 400 Hz	V	-	12 ... 415	24 ... 415	
	DC	V	-	12 ... 415	24 ... 415	
Coil operating limits acc. to IEC 60947-4-1			0.85 ... 1.1 x U_c (at $\theta \leq 55$ °C)			
Drop-out voltage in % of U_c			approx. 20 ... 75 %		approx. 20 ... 70 %	
Frequency range			50/60		40 ... 450	
Coil consumption						
Average pull-in value	VA/W		8 / 5	4 / 4	5 / 5	65 / 65
Average holding value	VA/W		3.2 / 1.2	4 / 4	5 / 5	4.2 / 4.2
Operating time						
between coil energization and:						
	- N.O. contact closing	ms	12	40		
between coil de-energization and:						
	- N.O. contact opening	ms	12	40		

Connecting Characteristics

Contactor types:	AC operated		ESB20	ESB24	ESB40	ESB63
	AC/DC operated					
Connecting capacity (min. ... max.)						
Main pole terminals						
	Rigid	1 x mm ²	1.5 ... 10		1.5 ... 25	
		2 x mm ²	1.5 ... 4		1.5 ... 10	
	Capacity acc. to UL/CSA		14-8		16-8	
Coil terminals						
	Rigid	1 x mm ²	0.5 ... 4		1 ... 4	
		2 x mm ²	0.75 ... 2.5			
	Capacity acc. to UL/CSA		18-14		16-10	
Degree of protection						
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529						
Protection against direct contact in acc. with EN 50274						
All terminals			IP20			
Screwdriver type						
Main poles			Flat Ø 5 / Pozidriv 1		Flat Ø 7.5 / Pozidriv 2	
Coil terminals			Flat Ø 5 / Pozidriv 1		Flat Ø 5 / Pozidriv 1	
Stripping length						
Main poles			10		13	
Coil terminals			7			
Tightening torque						
Main poles			1.2		2.5	
Coil terminals			0.9			



ESB Installation Contactors

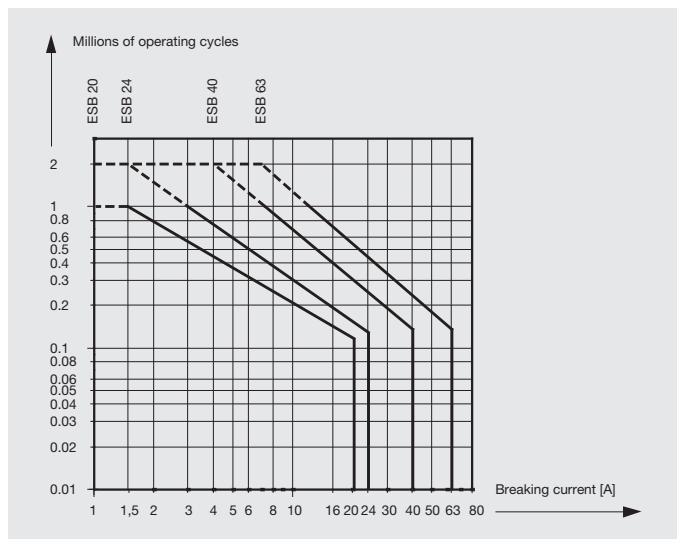
Technical Data

EH04... Auxiliary Contact Block - Utilization Characteristics according to IEC

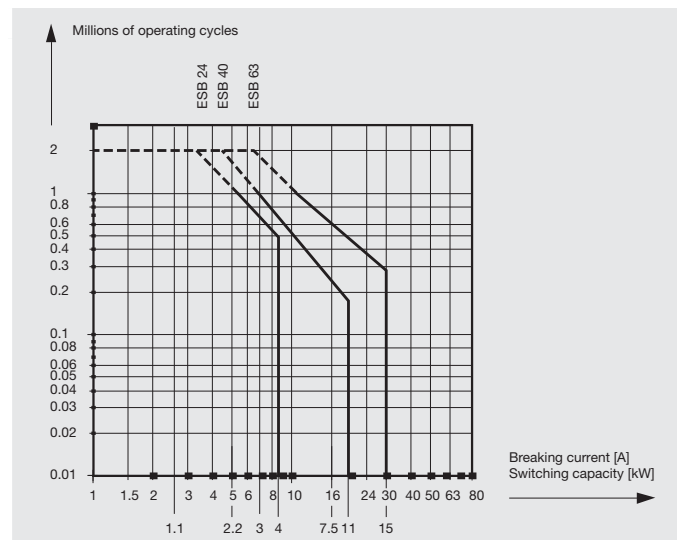
Contactor types:	AC operated AC/DC operated	ESB20	ESB24	ESB40	ESB63
Rated operational voltage U_e max.	V	-	500		
Conventional free air thermal current I_{th} $\theta \leq 40^\circ\text{C}$	A	-	6		
Rated frequency limits	Hz	-	50/60		
Rated operational current I_e / AC-15					
acc. to IEC 60947-5-1	240 V 50/60 Hz	A	4		
	415 V 50/60 Hz	A	3		
	500 V 50/60 Hz	A	2		
Making capacity	acc. to IEC 60947-5-1	-	11 x I_e AC-15		
Breaking capacity	acc. to IEC 60947-5-1	-	11 x I_e AC-15		
Short-circuit protection gl type fuse	A	-	10		
Minimum switching capacity					
with failure rate acc. to IEC 60947-5-4	V/mA	-	17 / 5		
Heat dissipation per pole at 6 A	W	-	0.1		

Electrical durability

AC-1 / 400 V / 3-phase for ESB 20, 24, 40, 63



AC-3 / 400 V / 3-phase for ESB 24, 40, 63





ESB Installation Contactors

Technical Data

DC-1/DC-3 switching DC with N.O. contacts (N.O.)

Type	Rated operating voltage U_e	DC-1 ($L/R \leq 1 \text{ ms}$)			DC-3 ($L/R \leq 2 \text{ ms}$)		
		1 current path	2 current paths in series	3 current paths in series	1 current path	2 current paths in series	3 current paths in series
ESB 20-20	24 V DC	20 A	20 A	-	15 A	20 A	-
	48 V DC	15 A	20 A	-	7 A	15 A	-
	60 V DC	15 A	20 A	-	5 A	10 A	-
	110 V DC	5 A	15 A	-	1.5 A	5 A	-
	220 V DC	0.5 A	5 A	-	0.2 A	1.5 A	-
ESB 24	24 V DC	24.0 A	24.0 A	24.0 A	16.0 A	24.0 A	24.0 A
	48 V DC	21.0 A	24.0 A	24.0 A	8.0 A	18.0 A	24.0 A
	60 V DC	17.0 A	24.0 A	24.0 A	4.0 A	14.0 A	24.0 A
	110 V DC	7.0 A	16.0 A	24.0 A	1.6 A	6.5 A	16.0 A
	220 V DC	0.9 A	4.5 A	13.0 A	0.2 A	1.0 A	4.0 A
ESB 40	24 V DC	40.0 A	40.0 A	40.0 A	19.0 A	40.0 A	40.0 A
	48 V DC	23.0 A	40.0 A	40.0 A	10.0 A	20.0 A	40.0 A
	60 V DC	18.0 A	32.0 A	40.0 A	5.0 A	16.0 A	34.0 A
	110 V DC	8.0 A	17.0 A	30.0 A	1.8 A	7.0 A	18.0 A
	220 V DC	1.0 A	5.0 A	15.0 A	0.3 A	1.1 A	4.5 A
ESB 63	24 V DC	50.0 A	63.0 A	63.0 A	21.0 A	44.0 A	63.0 A
	48 V DC	25.0 A	43.0 A	63.0 A	11.0 A	22.0 A	47.0 A
	60 V DC	20.0 A	35.0 A	60.0 A	5.5 A	18.0 A	38.0 A
	110 V DC	9.0 A	19.0 A	33.0 A	2.0 A	8.0 A	21.0 A
	220 V DC	1.1 A	5.5 A	17.0 A	0.3 A	1.2 A	5.0 A

DC-1/DC-3 switching DC with N.C. contacts (N.C.)

Type	Rated operating voltage U_e	DC-1 ($L/R \leq 1 \text{ ms}$)			DC-3 ($L/R \leq 2 \text{ ms}$)		
		1 current path	2 current paths in series	3 current paths in series	1 current path	2 current paths in series	3 current paths in series
ESB 20-02	24 V DC	14 A	20 A	-	6 A	10 A	-
	48 V DC	7 A	14 A	-	3 A	6 A	-
	60 V DC	4.5 A	10 A	-	2 A	4 A	-
	110 V DC	1.5 A	4.4 A	-	0.6 A	1.8 A	-
	220 V DC	0.2 A	1.5 A	-	0.1 A	0.6 A	-
ESB 24	24 V DC	14.5 A	24.0 A	24.0 A	6.3 A	11.0 A	19.0 A
	48 V DC	7.5 A	12.5 A	22.0 A	3.1 A	5.4 A	9.4 A
	60 V DC	4.5 A	10.0 A	17.5 A	2.0 A	4.3 A	7.5 A
	110 V DC	1.6 A	4.4 A	9.5 A	0.7 A	1.9 A	4.1 A
	220 V DC	0.2 A	1.4 A	3.8 A	0.1 A	0.6 A	1.6 A



ESB Installation Contactors - Lighting application

Technical Data

Switching of lamp load

The following table shows the number of lamps which can be connected per phase at 230 V, 50 Hz. Air temperature, near the contactor, must be limited to 55°C.

Please, note that the given capacitor load must not be exceeded, otherwise inadmissible high inrush current peaks could occur.

These are influenced by the length and cross section of the wire used, the type of power supply unit and specifications of the lamp brand.

For these reasons, values in the table are for information only.

Numbers are given for a 230V voltage distributed between phase and neutral: single phase (phase + neutral) or three-phases (3 phases + neutral), lamps are wired in star connection.

In the case of three-phase supply without neutral, 230V phase-to-phase, the permissible number of lamps per phase will be that given in the table multiplied by 0,58.

Lamp type	Lamp data		Permissible number of lamps per phase (230 V, 50 Hz)				Capacitor	
	Watt	I _n A	ESB 20	ESB 24	ESB 40	ESB 63	µF	
Incandescent lamps	60	0.26	21	25	54	83		
	100	0.43	13	15	32	50		
	200	0.87	7	7	16	25		
	300	1.30	4	5	11	16		
	500	2.17	3	3	6	10		
	1000	4.35	1	1	3	5		
Fluorescent lamps Uncompensated and series compensation	15	0.33	40	30	100	155		
	20	0.37	37	26	85	135		
	40	0.43	32	20	65	105		
	42	0.54	26	16	52	85		
	58	0.64	21	12	40	65		
	65	0.67	21	12	40	65		
Two-lamp circuit	2 x 20	2 x 0.13	2 x 22	2 x 26	2 x 85	2 x 140		
	2 x 40	2 x 0.22	2 x 17	2 x 20	2 x 65	2 x 105		
	2 x 42	2 x 0.24	2 x 13	2 x 16	2 x 52	2 x 65		
	2 x 58	2 x 0.34	2 x 10	2 x 12	2 x 40	2 x 65		
	2 x 65	2 x 0.34	2 x 10	2 x 12	2 x 40	2 x 65		
	2 x 115	2 x 0.65	2 x 4	2 x 5	2 x 18	2 x 28		
Parallel compensation	2 x 140	2 x 0.75	2 x 4	2 x 5	2 x 18	2 x 28		
	15	0.11	16	8	16	67	4.5	
	20	0.13	16	8	16	67	4.5	
	40	0.22	16	8	16	67	4.5	
	42	0.24	13	6	12	50	6	
	58	0.34	11	5	10	43	7	
High pressure mercury-vapor lamps Uncompensated	65	0.34	11	5	10	43	7	
	115	0.65	4	2	4	17	18	
	140	0.75	4	2	4	17	18	
	50	0.61	30	14	36	50		
	80	0.8	15	10	27	38		
	125	1.15	10	7	19	26		
Parallel compensation	250	2.15	6	4	10	14		
	400	3.25	2	2	7	10		
	700	5.40	2	1	4	6		
	1000	7.5	1	1	3	4		
	2000/400 V	8	-	1	3	4		
	50	0.28	4	5	10	43	7	
Lamps with electronic power supply units	80	0.41	3	4	8	37	8	
	125	0.65	2	3	6	26	10	
	250	1.22	1	2	3	15	18	
	400	1.95	-	1	3	10	25	
	700	3.45	-	-	1	5	45	
	1000	4.8	-	-	1	4	60	
2000/400 V	5.45	-	1	2	3	35		
Halogen metal-vapor lamps Uncompensated	35	0.53	9	10	28	38		
	70	1	4	5	14	20		
	150	1.8	3	3	8	11		
	250	3	1	2	5	7		
	400	3.5	1	1	4	6		
	1000	9.5	-	-	1	2		
	2000	16.5	-	-	1	1		
	2000/3500/400 V	10.5	-	-	2	2		
	Parallel compensation	3500/400 V	18	-	-	1	1	
		35	0.25	-	5	11	30	6
		70	0.45	-	3	5	18	12
		150	0.75	-	1	3	9	20
250		1.5	-	1	2	7	33	
400		2.5	-	-	2	6	35	
Low pressure sodium-vapor lamps Uncompensated	1000	5.8	-	-	-	2	95	
	2000	11.5	-	-	-	1	148	
	2000/3500/400 V	6.6	-	-	1	2	58	
	3500/400 V	11.6	-	-	-	1	100	
	35	1.5	10	8	22	30		
	55	1.5	10	8	22	30		
Parallel compensation	90	2.4	5	5	13	19		
	135	3.5	3	3	10	13		
	150	3.3	3	3	10	14		
	180	3.3	3	3	10	14		
	200	2.3	3	5	14	20		
	35	0.31	-	1	4	15	20	
High pressure sodium-vapor lamps Uncompensated	55	0.42	-	1	4	15	20	
	90	0.63	-	1	3	10	30	
	135	0.94	-	-	2	7	45	
	150	1.0	-	-	2	8	40	
	180	1.16	-	-	2	8	40	
	200	1.32	-	1	3	12	25	
Parallel compensation	150	1.8	3	4	15	20		
	250	3.0	2	3	9	15		
	330	3.7	1	2	8	10		
	400	4.7	-	1	6	8		
	1000	10.3	-	-	3	4		
	150	0.83	-	1	3	15	20	
Transformers for halogen low voltage lamps (12 or 24 V AC)	250	1.5	-	1	2	9	33	
	330	2.0	-	-	2	7	40	
	400	2.4	-	-	1	6	48	
	1000	6.3	-	-	-	2	106	
	20	Transformers for Watt		Permissible number of transformers per circuit (230 V, 50 Hz)				
	50	40	50	110	174			
75	20	24	50	80				
100	13	16	35	54				
150	10	12	27	43				
200	7	9	19	29				
300	5	6	14	23				
300	3	4	9	14				



20 A
AC-1/AC-7a

EN 20 Installation Contactors - Manually / Automatic operated

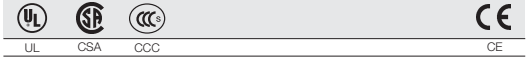
AC Operated



Application

The EN contactors are used mainly in buildings for switching and controlling lighting, heating, ventilation and pumps. They are part of the complete range of Din rail products and can be integrated easily in dedicated panels.

Certifications and Approvals



Description

The EN 20 contactors are used for the control of single phase loads up to 20 A. They operate with an AC coil.

EN contactors have a built-in toggle switch to select between three function modes:

Off position, automatic run (normal contactor function), manual override with a return to Auto the next time the coil is energized.

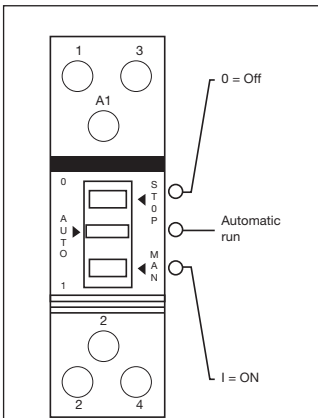
This offers many advantages as:

You can make functional test before installation start-up. It can be used for maintenance operation, to change lamps and test it. It provides higher safety and drop out as you can switch the application manually.

The toggle switch is also used for household application like water heating where double tariff of kWh is used.

Ordering Details

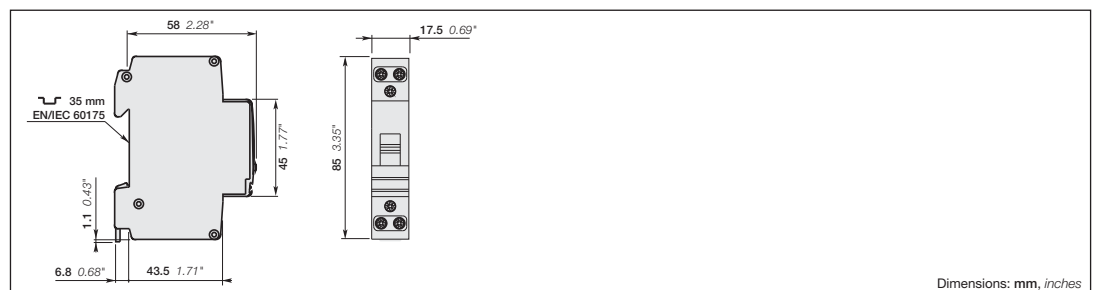
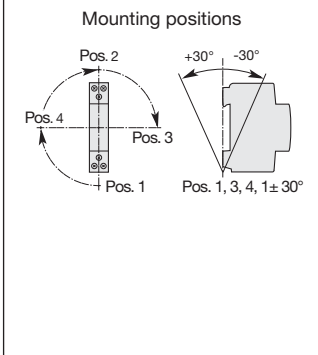
Main poles	Nb of modules	Control coil voltage		Type	Order code	Pack ^(ing) pieces	Weight kg (1 pce)
		50 Hz	60 Hz				
 2 N.O.	1	24 V	28 V	EN 20-20	GHE 322 1101 R0001	10	0.14
		230 V	264 V		GHE 322 1101 R0006		



Main Technical Data

For complete technical data see 1SBC103005S0201.pdf

Main poles	Rated operational voltage U_e	250 V
acc to. IEC 60947-4-1 and IEC 61095	I_e AC-1 / AC-7a Rated operational current (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$)	20 A
	P_e AC-1 Rated power	4 kW
Magnet system	Coil operating limits (acc. to IEC 60947-4-1)	0.85 ... 1.1 U_e (at $\theta \leq 55^\circ\text{C}$)
	Average pull-in coil consumption value	8 VA / 5 W
	Average holding coil consumption value	3.2 VA / 1.2 W
Connecting capacity	Main pole terminals	1 x 1.5 ... 10 mm ² 2 x 1.5 ... 4 mm ²
	Coil terminals	1 x 0.5 ... 4 mm ² 2 x 0.75 ... 2.5 mm ²





24 A
AC-1/AC-7a

EN 24 Installation Contactors - Manually / Automatic operated

AC /DC Operated



Application

The EN contactors are used mainly in buildings for switching and controlling lighting, heating, ventilation and pumps. They are part of the complete range of Din rail products and can be integrated easily in dedicated panels.

Certifications and Approvals



Description

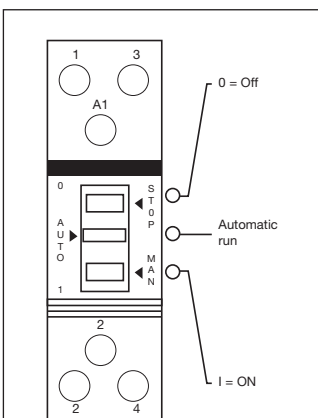
The EN 24 contactors are used for the control of single and three-phase loads up to 24 A. They operate with a DC coil. EN contactors have a built-in toggle switch to select between three function modes: Off position, automatic run (normal contactor function), manual Override with a return to Auto the next time the coil is energized.

This offers many advantages as:

You can make functional test before installation start-up, it can be used for maintenance operation, to change lamps and test it, it provide higher safety and drop out as you can switch the application manually. The toggle switch is also used for household application like water heating where double tariff of kWh is used.

Ordering Details

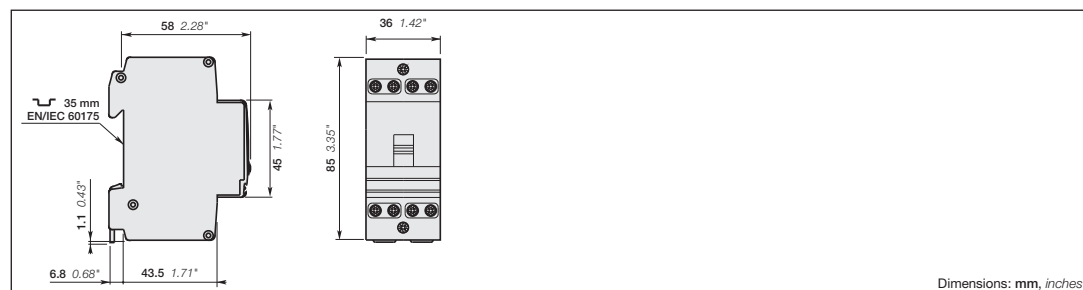
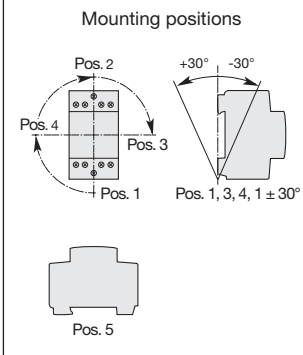
Main poles	Nb of modules	Control coil voltage		Type	Order code	Pack ⁽ⁱⁿ⁾ pieces	Weight kg (1 pce)
		40...450 Hz	DC				
	2	24 V	24 V	EN 24-40	GHE 326 1101 R0001	5	0.24
		230/240 V	230/240 V		GHE 326 1101 R0006	5	0.24
	2	24 V	24 V	EN 24-31	GHE 326 1601 R0001	5	0.24
		230/240 V	230/240 V		GHE 326 1601 R0006	5	0.24
	2	230/240 V	230/240 V	EN 24-30	GHE 326 1501 R0006	5	0.23



Main Technical Data

For complete technical data see 1SBC103005S0201.pdf

Main poles acc to IEC 60947-4-1 and IEC 61095	Rated operational voltage U_e	400 V
	I_e AC-1 / AC-7a Rated operational current (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$)	24 A
	P_e AC-1 Rated power	230 V 5,3 kW 400 V 16 kW
Magnet system	Coil operating limits (acc. to IEC 60947-4-1)	0.85 ... 1.1 U_e (at $\theta \leq 55^\circ\text{C}$)
	Average pull-in coil consumption value	4 VA / 4 W
	Average holding coil consumption value	4 VA / 4 W
Connecting capacity	Main pole terminals	Rigid 1 x 1.5 ... 10 mm ² 2 x 1.5 ... 4 mm ²
	Coil terminals	Rigid 1 x 1 ... 4 mm ² 2 x 0.75 ... 2.5 mm ²



Dimensions: mm, inches

1SBC103005S0201



40 A
AC-1/AC-7a

EN 40 Installation Contactors - Manually / Automatic operated

AC /DC Operated



Application

The EN contactors are used mainly in buildings for switching and controlling lighting, heating, ventilation and pumps. They are part of the complete range of Din rail products and can be integrated easily in dedicated panels.

Description

The EN 40 contactors are used for the control of single and three-phase loads up to 40 A. They operate with a DC coil.

EN contactors have a built-in toggle switch to select between three function modes:

Off position, automatic run (normal contactor function), manual Override with a return to Auto the next time the coil is energized.

This offers many advantages as:

You can make functional test before installation start-up, it can be used for maintenance operation, to change lamps and test it, it provide higher safety and drop out as you can switch the application manually.

The toggle switch is also used for household application like water heating where double tariff of kWh is used.

Certifications and Approvals



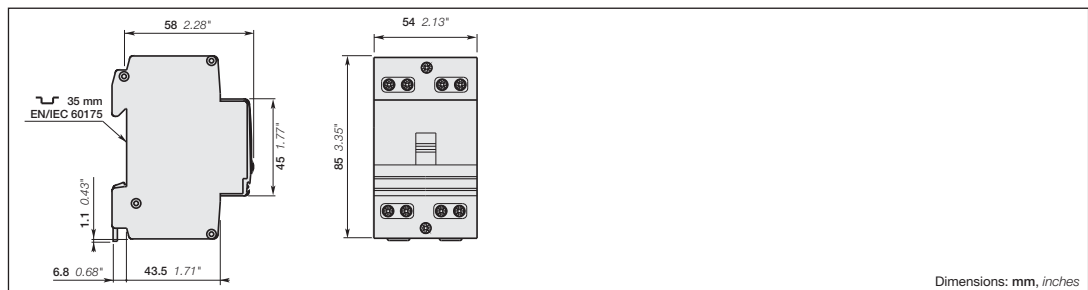
Ordering Details

Main poles	Nb of modules	Control coil voltage		Type	Order code	Pack ^(ing) pieces	Weight kg (1 pce)
		40...450 Hz	DC				
	3	24 V	24 V	EN 40-40	GHE 342 1101 R0001	3	0.41
		110 V	110 V		GHE 342 1101 R0004	3	0.41
		230/240 V	230/240 V		GHE 342 1101 R0006	3	0.41
	3	24 V	24 V	EN 40-31	GHE 342 1601 R0001	3	0.41
		230/240 V	230/240 V		GHE 342 1601 R0006	3	0.41
	3	230/240 V	230/240 V	EN 40-30	GHE 342 1501 R0006	3	0.40
	3	230/240 V	230/240 V	EN 40-20	GHE 342 1401 R0006	3	0.30

Main Technical Data

For complete technical data see 1SBC103005S0201.pdf

Main poles acc to. IEC 60947-4-1 and IEC 61095	Rated operational voltage U_e	400 V
	I_e AC-1 / AC-7a Rated operational current (for air temperature close to contactor $\theta \leq 55^\circ\text{C}$)	40 A
	P_e AC-1 Rated power	230 V: 8.8 kW 400 V: 26 kW
Magnet system	Coil operating limits (acc. to IEC 60947-4-1)	0.85 ... 1.1 U_e (at $\theta \leq 55^\circ\text{C}$)
	Average pull-in coil consumption value	5 VA / 5 W
	Average holding coil consumption value	5 VA / 5 W
Connecting capacity	Main pole terminals	Rigid
		1 x 1.5 ... 25 mm ²
		2 x 1.5 ... 10 mm ²
	Coil terminals	Rigid
		1 x 1 ... 4 mm ²
		2 x 0.75 ... 2.5 mm ²





EN Installation Contactors - Manually / Automatic operated

Technical Data

Main Pole - Utilization Characteristics according to IEC

Contactor types:	AC operated		EN20	EN24	EN40
	AC/DC operated				
Rated operational voltage U_e max.	V		250	400	
Rated frequency limits	Hz		50/60	40... 450	
Utilization category AC-1 / AC-7a for air temperature close to contactor < 55 °C					
Max. rated operational current I_e AC-1 / AC-7a	A		20	24	40
Rated operational power AC-1					
230 V - 1 phase	kW		4	5.3	8.8
400 V - 3 phase	kW		-	16	26
Short-circuit protection for contactors gG type fuse					
	A		20	35	63
Rated short-time withstand current I_{cw} at 40 °C ambient temp., in free air, from a cold state					
10 s	A		72		176
Heat dissipation per pole I_e / AC-1 / AC-7a	W		1	1.5	3
Max. electrical switching frequency – for AC-1 / AC-7a					
	cycles/h		300		
Electrical Durability – for AC-1 / AC-7a					
	cycles		150000		
Mechanical durability – millions of operating cycles					
			1		

General Technical Data

Contactor types:	AC operated		EN20	EN24	EN40
	AC/DC operated				
Rated insulation voltage U_i according to IEC 60947-4-1	V		400	500	
Rated impulse withstand voltage U_{imp.}	kV		6		
Standards IEC 60947-4-1 / EN 60947-4-1 and IEC 61095 / EN 61095					
Air temperature close to contactor – for operation at 0.85 ... 1.1 U _c					
	°C		-25 ... +55 (Type EN 24...40: for ambient temperature > 40°C, add ESB-DIS (1/2 module) at every second contactor)		
– for storage	°C		-40 ... +80		
Climatic withstand IEC 60068-2-30, UTE 63-100 execution 1*					
Operating altitude	m		≤ 2000		
Shock withstand 10 g / 4 ms / axes X Y Z					
Mounting positions Pos 1, 3, 4, 1±30° Pos 5 : not allowed for EN20					
Fixing on rail acc. to IEC 60715 and EN 60715					

* EN20 only



EN Installation Contactors - Manually / Automatic operated

Technical Data

Magnet System Characteristics

Contactor types:	AC operated	EN20	EN24	EN40
	AC/DC operated			
Rated operational voltage U_e max.				
- at 50 Hz	V	12 ... 400	12 ... 415	24 ... 415
- at 60 Hz	V	14 ... 380	12 ... 415	24 ... 415
	V DC	-	12 ... 415	24 ... 415
Coil operating limits acc. to IEC 60947-4-1				
Drop-out voltage in % of U_c		approx. 20 ... 75 %		approx. 20 ... 70 %
Frequency range		50/60	40 ... 450	
Coil consumption				
Average pull-in value	VA/W	8 / 5	4 / 4	5 / 5
Average holding value	VA/W	3.2 / 1.2	4 / 4	5 / 5
Operating time				
between coil energization and:				
- N.O. contact closing	ms	12	40	
between coil de-energization and:				
- N.O. contact opening	ms	12	40	

Connecting Characteristics

Contactor types:	EN20	EN24	EN40
Connecting capacity (min. ... max.)			
Main pole terminals			
Rigid	1 x mm ²	1.5 ... 10	1.5 ... 25
	2 x mm ²	1.5 ... 4	1.5 ... 10
Capacity acc. to UL/CSA		14 ... 8	16 ... 8
AWG			16 ... 4
Coil terminals			
Rigid	1 x mm ²	0.5 ... 4	1 ... 4
	2 x mm ²	0.75 ... 2.5	
Capacity acc. to UL/CSA		18 ... 14	16 ... 10
AWG			
Degree of protection			
acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529			
Protection against direct contact in acc. with EN 50274			
All terminals		IP20	
Screwdriver type			
Main poles		Flat Ø 5 / Pozidriv 1	Flat Ø 7.5 / Pozidriv 2
Coil terminals		Flat Ø 5 / Pozidriv 1	Flat Ø 5 / Pozidriv 1
Stripping length			
Main poles		10	13
Coil terminals		7	
Tightening torque			
Main poles		1.2	1
Coil terminals		0.9	



ESB/EN Installation Contactors

Main Accessories

Sealing cover



ESB-PLK 40/63



ESB-PLK 24

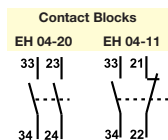
Auxiliary Contact Blocks



EH 04-20



ESB 24-40



Labelling material



SZ-KZS...

Distance piece



ESB-DIS

Ordering Details

Auxiliary Contact Blocks

Contactor type	Contact blocks	Type	Order code	Pack ^(ing) pieces	Weight kg (1 pce)
ESB/EN 24, 40, 63	2	-	EH 04-20	GHE 340 1321 R0001	10 0.004
	1	1	EH 04-11	GHE 340 1321 R0002	10 0.004

Sealing cover

Contactor type	Type	Order code	Pack ^(ing) pieces	Weight kg (1 pce)
ESB/EN 24	ESB-PLK 24	GHE 320 1903 R0001	10	0.002
ESB/EN 40, 63	ESB-PLK 40/63	GHE 340 1903 R0002	10	0.009

Distance piece

Contactor type	Type	Order code	Pack ^(ing) pieces	Weight kg (1 pce)
ESB/EN 24, 40, 63	ESB-DIS	GHE 320 1902 R0001	10	0.002

Labelling material

Contactor type	Type	Order code	Pack ^(ing) pieces	Weight kg (1 pce)
ESB/EN 20, 24, 40, 63	SZ-KZS	GHS 210 1946 R0004	30	0.008
Label - unlabelled*	SZ-KZS	GHS 210 1946 R0004	30	0.008
Label - numbering 1-40	SZ-KZS/1	GHS 210 1946 R0005	30	0.008
Label - numbering 2 * 1-20	SZ-KZS/6	GHS 210 1946 R0010	30	0.008
Label - numbering 4 * 1-10	SZ-KZS/9	GHS 210 1946 R0013	30	0.008
Label - numbering 4 * 11-20	SZ-KZS/10	GHS 210 1946 R0014	30	0.008
Label - labelled L1	SZ-KZS/11	GHS 210 1946 R0015	30	0.008
Label - labelled L2	SZ-KZS/12	GHS 210 1946 R0016	30	0.008
Label - labelled L3	SZ-KZS/13	GHS 210 1946 R0017	30	0.008

Note: * The unlabelled can be labelled by water-resistant and permanent marker or by means of computer-controlled labelling system (plotter).
Special labels on request: minimum quantities 50

Contact us

ABB France

Automation Products Division

10, rue Ampère Z.I. - B.P. 114
F-69685 Chassieu cedex / France

ABB STOTZ-KONTAKT GmbH

Eppelheimer Straße 82
D-69123 Heidelberg / Germany

You can find the address of your local sales organisation
on the **ABB home page**

<http://www.abb.com/contacts> -> **Low Voltage products**

Note:

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB AG does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB AG.

Copyright© 2010 ABB
All rights reserved