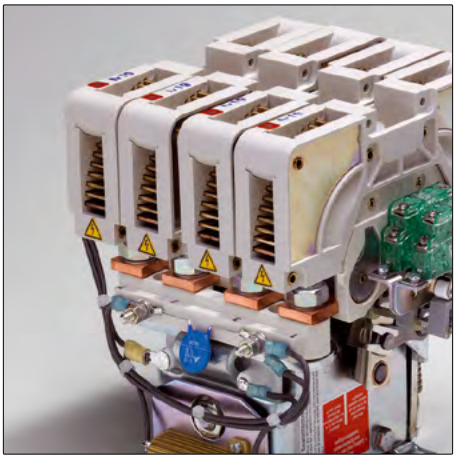
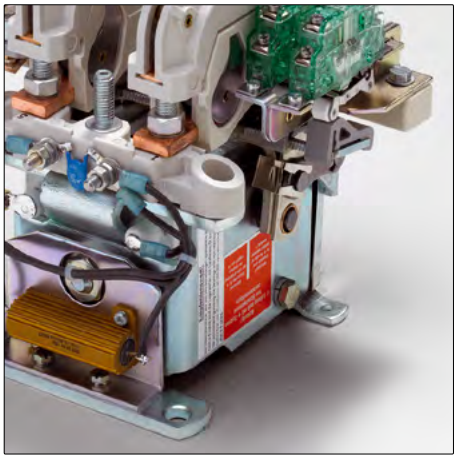
SCHALTBAU

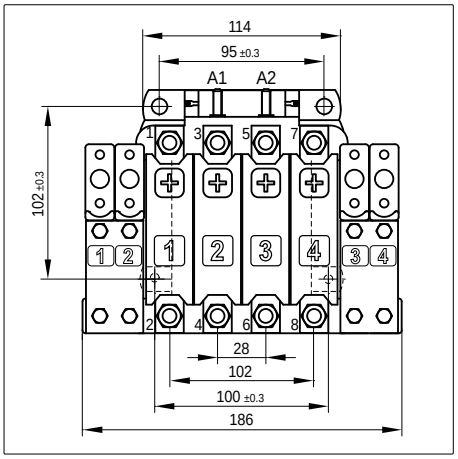
Connect · Contact · Control

Multipole DC and AC cam contactors

Series C152 ... C159







B 90.en

Multipole DC and AC cam contactors, Series C152 ... C159

C152 to C159 Series cam contactors are rugged switchgear for switching AC and DC voltages that has stood the test of time.

Main contacts: Available are 1, 2, 3 and 4 pole contactor versions fitted with S306, S307 or S310 Series cam switch elements. The double-break main contacts can be configured as SPST NC or NO and with multi-pole contactors as a combination of both. To extinguish the arc when switching higher loads, there is the option of arc chambers and for voltages ranging from 400 to 1,000 V DC arc chutes with permanent-magnetic blowout are offered.

This most variable contactor series is designed for carrying out the various switching tasks as required in industrial and railway applications.

Auxiliary switches: For the additional switching of control circuits the contactors can be equipped with up to 4 auxiliary contacts. For that purpose there are S007 Series cam switch elements which can be configured as making or breaking contact or a combination of both to suit your application. Alternatively, you can also use S800 or S826 Series snap-action switches with positive opening operation and double-break changeover contacts.

Features

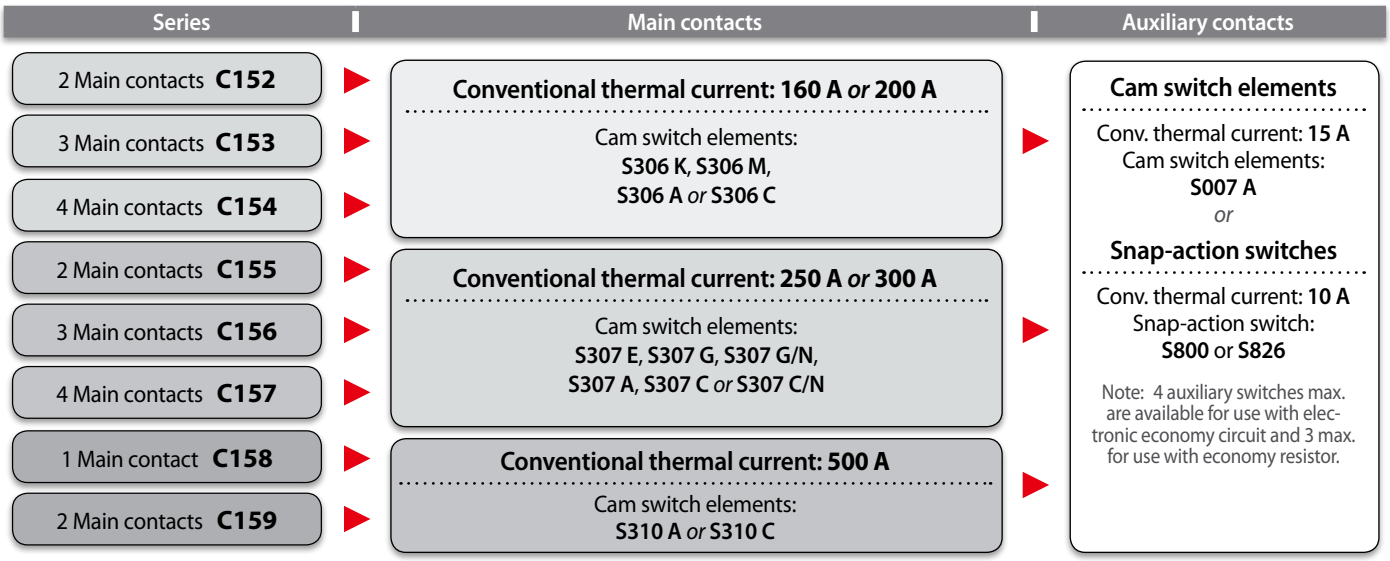
- Rugged design
- 800 A max. continuous current with parallel connection of main contacts
- 4 main contacts max. and 4 auxiliary contacts max.
- Easy to replace switching elements
- Double-break contacts
- Coil tolerance -30 % ... +25 %
- Optional economy circuit

Applications

Schaltbau cam contactors have proven themselves as line, changeover and reversing contactors for many years.

Typical applications are:

- Passenger coaches and locomotives
- Traction controls
- Power supplies
- Battery-powered vehicles



Series C152 to C159: Overview over the contact configurations of the contactor series presented in this catalogue. To extinguish the arc, arc chambers and arc chutes are offered.

Standards

For requirements of industrial applications according to:

IEC 60947-1 Low-voltage switchgear and controlgear - Part 1: General rules

IEC 60947-4-1 Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor starters, electromechanical contactors and motor starters

For requirements of railway applications according to:

IEC 60077-1, Railway applications - Electric equipment for rolling stock, Part 1: General service conditions and general rules

IEC 60077-2, Railway applications - Electric equipment for rolling stock, Part 2: Electrotechnical components - General rules

Specifications

Series C152 ... C159

Series	C152	C153	C154	C155	C156	C157	C158	C159
Kind of voltage	DC, AC			DC, AC			DC, AC	
Number of main contacts (NO and NC)	2x	3x	4x	2x	3x	4x	1x	2x
Nominal voltage U_n	450 V / 750 V *1			450 V / 750 V *1			300 V DC / 750 V AC *1	
Rated insulation voltage U_i to IEC 60947-1	630 V / 1,000 V *1			630 V / 1,000 V *1			630 V / 1,000 V *1	
Overvoltage category Pollution degree	OV3 PD3			OV3 PD3			OV3 PD3	
Conventional thermal current I_{th}								
Cam switch elements *2 S306 K, S306 M	160 A			---			---	
S306 A, S306 C	200 A			---			---	
S307 E, S307 G, S307 G/N	---			250 A			---	
S307 A, S307 C, S307 C/N	---			300 A			---	
S310 A, S310 C	---			---			500 A	
Making capacity, resistive load, T = 0 ms								
Cam switch elements *2 S306 K, S306 M	700 A			---			---	
S306 A, S306 C	900 A			---			---	
S307 E, S307 G, S307 G/N	---			900 A			---	
S307 A, S307 C, S307 C/N	---			1,400 A			---	
S310 A, S310 C	---			---			2,500 A	
Short-time withstand current	900 A			1,400 A			2,500 A	
Switching off, no reversing (DC only)	only one direction			only one direction			only one direction	
Blowout, permanent magnets (DC only)	•			•			•	
Arc chamber (optional)	•			•			•	
Arc chute from 400 V DC	---			• (LK-S307-DC für S307 G/N, S307 C/N)			---	
Breaking capacity/contact with arc chute LK-S307-DC, at:								
750 V L/R = 1 ms (DC1)	---			120 kW			---	
750 V L/R = 15 ms (DC5)	---			20 kW			---	
1,000 V L/R = 1 ms (DC1)	---			60 kW			---	
1,000 V L/R = 15 ms (DC5)	---			12 kW			---	
Max. breaking capacity/contact with arc chute LK-S307-DC, at:								
750 V L/R = 1 ms (DC1)	---			600 kW			---	
750 V L/R = 15 ms (DC5)	---			120 kW			---	
1,000 V L/R = 1 ms (DC1)	---			180 kW			---	
1,000 V L/R = 15 ms (DC5)	---			60 kW			---	
Main contacts: Material Terminals	$AgSnO_2$ M8, tightening torque 8 Nm			$AgSnO_2$ M10, tightening torque 12 Nm				
Auxiliary contact: Number of and type Conv. thermal current I_{th} Rated insulation voltage U_i Terminals	4 cam switch elements S007 max. or 4 snap-action switches S800 or S826 *3 max. Cam switch element S007 A: 15 A; snap-action switch S800 or S826: 10 A 400 V Cam switch elements: stud M5 Snap-action switch: screws or flat tabs 6.3 x 0.8 mm							
Magnetic drive: Coil voltage U_s Economy resistor Electronic economy circuit Coil tolerance Coil power consumption Economy resistor Electronic economy circuit Coil temperature Suppression Coil terminal	12 / 24 / 48 / 72 / 96 / 110 / 220 V DC 24 / 64 / 110 V DC -30 % ... +25 % at T_a = 70° C max. Plull-in: approx. 200 W / hold: 38 W at U_s ,T_a = 20° C Pull-in: approx. 180 W / hold: 12 W at U_s ,T_a = 20° C 155° C at $T_{a\,max}$ and $U_{s\,max}$ Varistor Screws M5							
Degree of protection	IP00							
Mechanical endurance	2 million cycles (C159: 1 million cycles)							
Duty cycles	100 %							
Mounting position	Vertical (coil terminals pointing upwards) or horizontal (magnetic drive pointing downwards)							
Ambient conditions Operating temperature T_a Storage temperature T_L	-25° C ... +70° C -40° C ... +80° C							
Weight *4	≈ 4.5 kg	≈ 4.7 kg	≈ 5.1 kg	≈ 4.9 kg	≈ 5.2 kg	≈ 5.5 kg	≈ 5.0 kg	≈ 5.5 kg

*1 *Special design*
*2 *See catalogue B40.en and B41.en*
*3 *See also »Auxiliary contacts« on pages 6 and 7*
*4 *Main contacts without permanent magnets and without arc chamber, auxiliary contacts: cam switch elements*

Ordering code

Series C152 ... C159

Example **C155 N20-S-110EV-G3-P**

Series + type of main contact

	Series	# of contacts	Cam switch element	Conv. thermal current	Blowout
C152 K	C152	2 pole	S306 K	I_{th} = 160 A	---
C152 A			S306 A	I_{th} = 200 A	---
C152 M			S306 M	I_{th} = 160 A	•
C152 C			S306 C	I_{th} = 200 A	•
C153 K	C153	3 pole	S306 K	I_{th} = 160 A	---
C153 A			S306 A	I_{th} = 200 A	---
C153 M			S306 M	I_{th} = 160 A	•
C153 C			S306 C	I_{th} = 200 A	•
C154 K	C154	4 pole	S306 K	I_{th} = 160 A	---
C154 A			S306 A	I_{th} = 200 A	---
C154 M			S306 M	I_{th} = 160 A	•
C154 C			S306 C	I_{th} = 200 A	•
C155 E	C155	2 pole	S307 E	I_{th} = 250 A	---
C155 D			S307 A	I_{th} = 300 A	---
C155 G			S307 G	I_{th} = 250 A	•
C155 F			S307 C	I_{th} = 300 A	•
C155 N			S307 G/N*1	I_{th} = 250 A	•
C155 P			S307 C/N*1	I_{th} = 300 A	•
C156 E	C156	3 pole	S307 E	I_{th} = 250 A	---
C156 D			S307 A	I_{th} = 300 A	---
C156 G			S307 G	I_{th} = 250 A	•
C156 F			S307 C	I_{th} = 300 A	•
C156 N			S307 G/N*1	I_{th} = 250 A	•
C156 P			S307 C/N*1	I_{th} = 300 A	•
C157 E	C157	4 pole	S307 E	I_{th} = 250 A	---
C157 D			S307 A	I_{th} = 300 A	---
C157 G			S307 G	I_{th} = 250 A	•
C157 F			S307 C	I_{th} = 300 A	•
C157 N			S307 G/N*1	I_{th} = 250 A	•
C157 P			S307 C/N*1	I_{th} = 300 A	•
C158 R	C158	1 pole	S310 A	I_{th} = 500 A	---
C158 S			S310 C	I_{th} = 500 A	•
C159 R	C159	2 pole	S310 A	I_{th} = 500 A	---
C159 S			S310 C	I_{th} = 500 A	•

Number and configuration of main contacts

1st digit	# of NO contacts	see table opposite: Overview main contacts
2nd digit	# of NC contacts	

Arc chamber/arc chute

L	LK-S306; arc chamber for S306
M	LK-S307; arc chamber for S307
N	LK-S309; arc chamber for S307, with mounting screw
P	LK-S307-DC; arc chute for S307 C/N, S307 G/N
O	LK-S310; arc chamber for S310, with mounting screw

Number and configuration of auxiliary contacts

Cam switch elements

1st digit	# of NO contacts	see table opposite: Overview aux. contacts
2nd digit	# of NC contacts	

Snap-action switch

1st digit	# of snap switches	see table opposite: Overview aux. contacts

Auxiliary contacts (type + # of)

X	Cam switch element S007 A; I_{th} = 15 A
G	Snap-action switch S826 a, Screw-type terminals; I_{th} = 10 A
K	Snap-action switch S826 a 20, Flat tabs 90° angled; I_{th} = 10 A
T	Snap-action switch S800 a, Screw-type terminals; I_{th} = 10 A

Coil suppression

V	Varistor (only with economy resistor)
X	None (with electronic economy circuit)

Coil tolerance

E	+25% ... -30%
F	+25% ... -10%

Coil voltage

with economy resistor

12/24/48/72/96/110/220 V DC

with electronic economy circuit

24/64/110 V DC

Economy circuit

S	Economy resistor
E	Electronic economy circuit

*1 *Cam switch element with top hole for mounting arc chute with right polarity*

Note:
Presented in this catalogue are only stock items which can be supplied in short delivery time.

Special variant:
If you need a special variant, please do not hesitate to contact us. Maybe the type of contactor you are looking for is among our many **special designs**. If not, we can also supply **customized designs**. In this case, however, minimum order quantities apply.

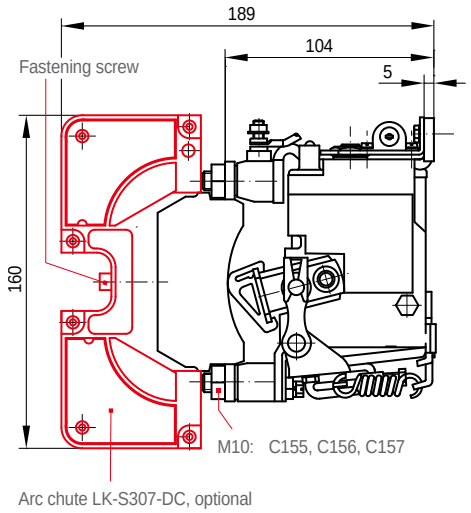
More

For detailed information on the cam switch elements and snap-action switches as presented in this catalogue refer to:

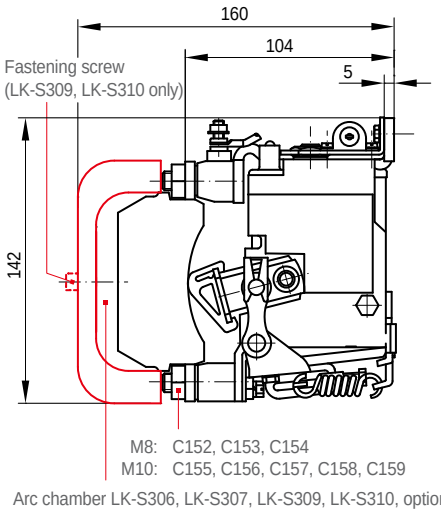
- Main contacts S306, S307: Catalogue **B40.*en***
- Main contact S310: Catalogue **B41.*en***
- Auxiliary contact S007: Catalogue **D30.*en***
- Auxiliary contact S800: Catalogue **D20.*en***
- Auxiliary contact S826: Catalogue **D26.*en***

Dimension diagram Multipole cam contactors, side view — Series C152 ... C159

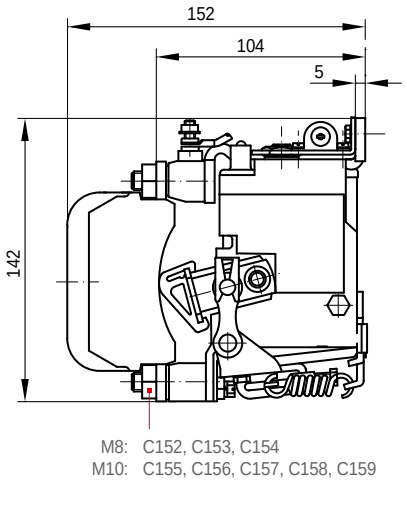
- **With arc chute:**



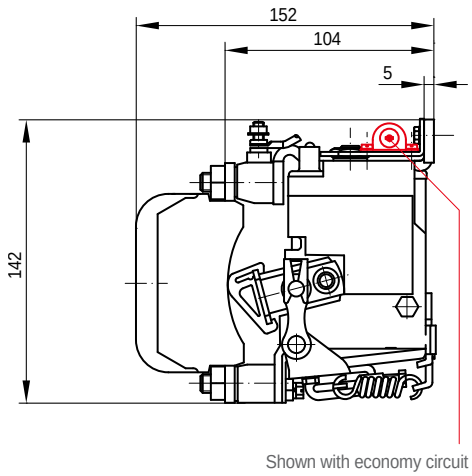
- **With arc chamber:**



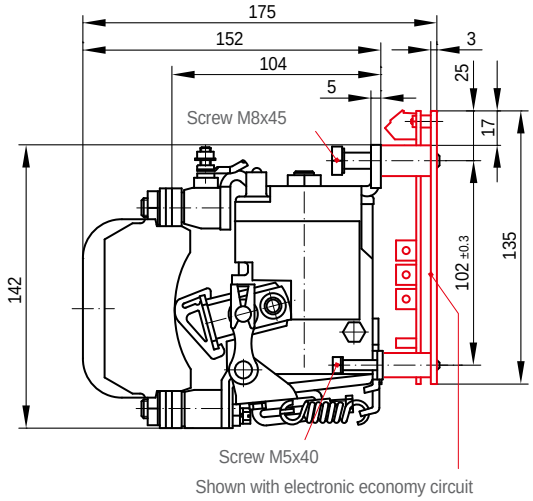
- **Without arc quenching:**



- **With economy resistor:**



- **With electronic economy circuit:**



Main contacts: Tightening torque of mounting studs

Series	Stud	Tightening torque
C152	M8	8 Nm max.
C153		
C154		
C155	M10	12 Nm max.
C156		
C157		
C158		
C159		

Overview Main contacts, auxiliary contacts — Series C152 ... C159

Overview over the contact configurations of the contactor series as presented in this catalogue:

Series	# of contacts	Main contacts				Extinguishing the arc		Auxiliary contacts *3	
		AC, w/o blowout	DC, with blowout	Conv. thermal current I_{th}	Electronic economy circuit	Arc chamber	Arc chute	# of max.	Conv. thermal current I_{th}
C152	2 pole	S306 K	---	160 A	---	LK-S306	---	4 *3	S007 A: 15 A *or* S800 / S826: 10 A
		S306 A	---	200 A	*optional*				
C153	3 pole	---	S306 M	160 A	---		---		
C154 *1,*2	4 pole	---	S306 C	200 A	*optional*				
C155 *1,*2	2 pole	S307 E	---	250 A	*optional*	LK-S307 *or* LK-S309 *4	---	4 *3	S007 A: 15 A *or* S800 / S826: 10 A
		S307 A	---	300 A	required				
C156 *2	3 pole	---	S307 G	250 A	*optional*		---		
C157 *1,*2	4 pole	---	S307 C	300 A	required				
		---	S307 G/N	250 A	*optional*		LK-S307-DC		
		---	S307 C/N	300 A	required				
C158	1 pole	S310 A	---	500 A	*optional*	LK-S310	---	4 *3	S007 A: 15 A *or* S800 / S826: 10 A
C159 *1,*2	2 pole	---	S310 C	500 A	required		---		

*1 C154, C155, C157, C159: If all main contacts are configured either as NO or NC contacts, make sure to limit the coil tolerance to +25 % / -10 %.

*2 C154, C155, C156, C157, C159: If all main contacts are configured either as NO or NC contacts, and the required extended coil tolerance for railway applications of +25 % / -30 % at 70°C ambient temperature should be met, the use of an electronic economy circuit is necessary. The following coil voltages are currently possible: 24V, 64V, 110V.

*3 When using the electronic economy circuit.
Note: When using an economy resistor there is one auxiliary contact less. For one is used as economy contact which must always be a S007 a Series cam switch element.

*4 With fastening screw: Unlike the snap-on type LK-S307 arc chamber the LK-S309 can be screwed to the main contact.

Versions with 2 main contacts

Series C152, C155

Arrangement of main and auxiliary contacts (selection):

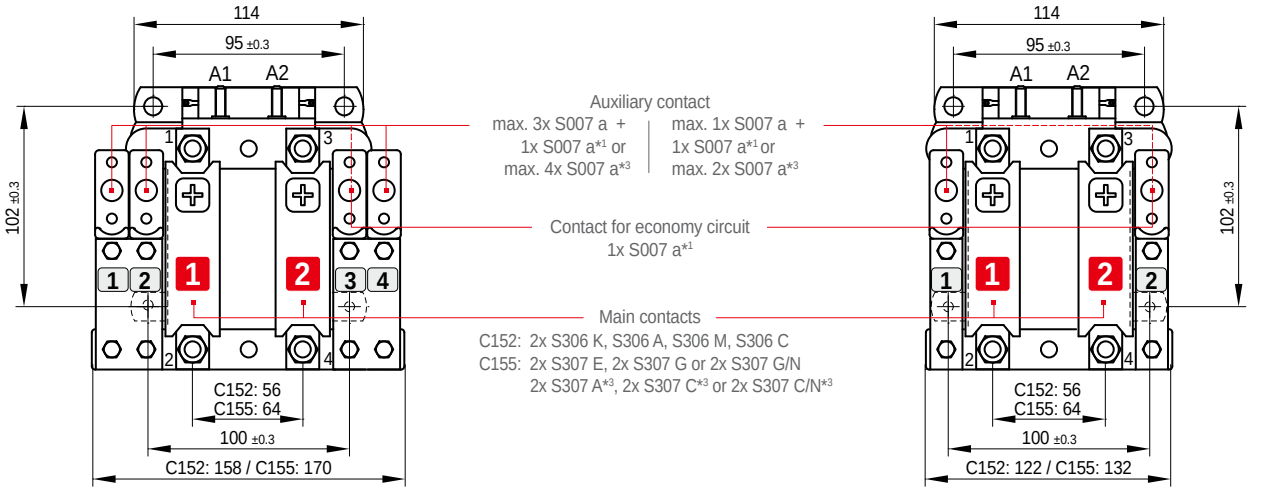


Figure A

Figure B

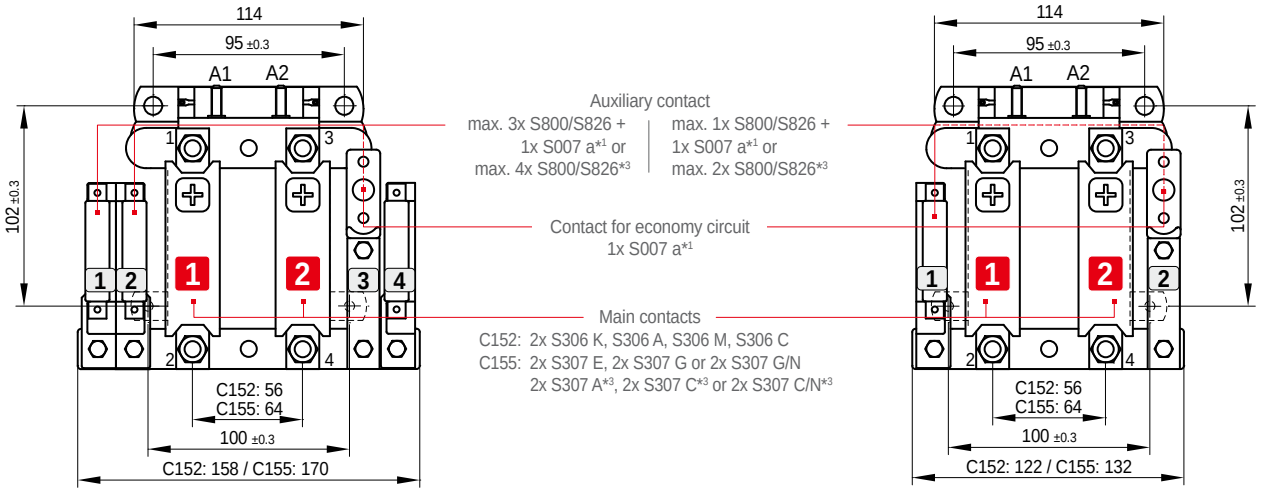


Figure C

Figure D

Number of main and auxiliary contacts:

Main contacts		Auxiliary contacts									
		Cam switch elements				Snap-action switches				Economy circuit	Figure
1	2	1	2	3	4	1	2	3	4		
		or	or	or	or	---	---	---	---	Electronic economy circuit	A*3
		or	or	*1	or	---	---	---	---	Economy resistor	A
		or	or	*1	---	---	---	---	---	or	A, B*3
		or	*1	---	---	---	---	---	---	Electronic economy circuit*4	B
		---	---	---	---	*2	*2	*2	*2	Electronic economy circuit	C*3
		---	---	*1	---	*2	*2	---	*2	Economy resistor	C
		---	---	*1	---	*2	*2	---	---	or	C, D*3
		---	*1	---	---	*2	---	---	---	Electronic economy circuit*4	D
		---	*1	---	---	---	---	---	---		B

*1 NC contact for use with economy resistor, series S007 a. Not to be used with electronic economy circuit.
*2 SPDT with double-break contacts, series S800 (solid contact bridge) or S826 (galvanically isolated contact bridge)
*3 Only with electronic economy circuit
*4 If *3 applies, i. e. with use of main contacts S307 A, S307 C, S307 C/N and depending on number of auxiliary contacts

Reduced scale diagrams / dimensions in mm

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Versions with 3 main contacts

Series C153, C156

Arrangement of main and auxiliary contacts (selection):

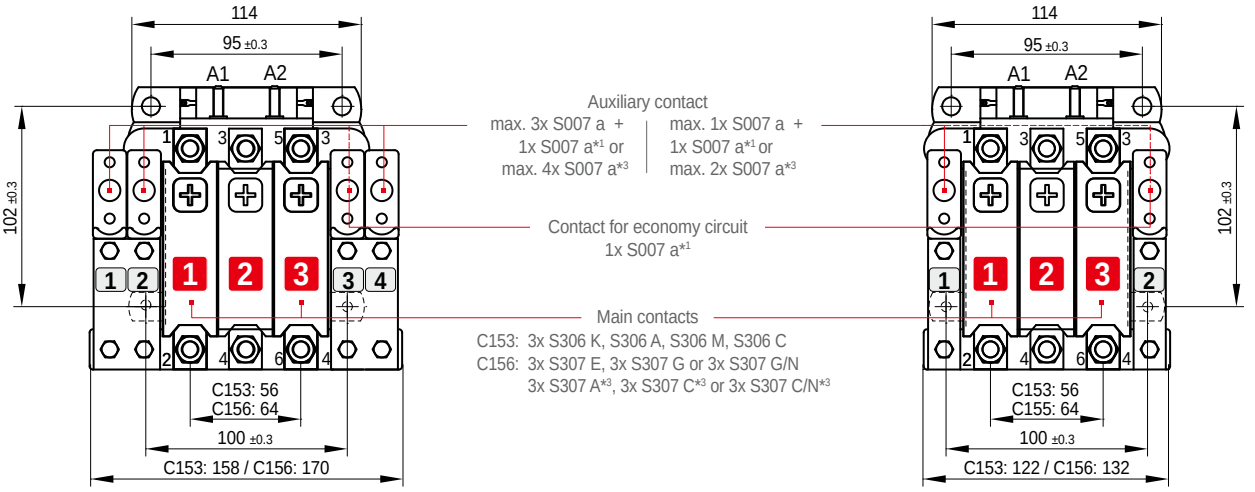

Figure A

Figure B

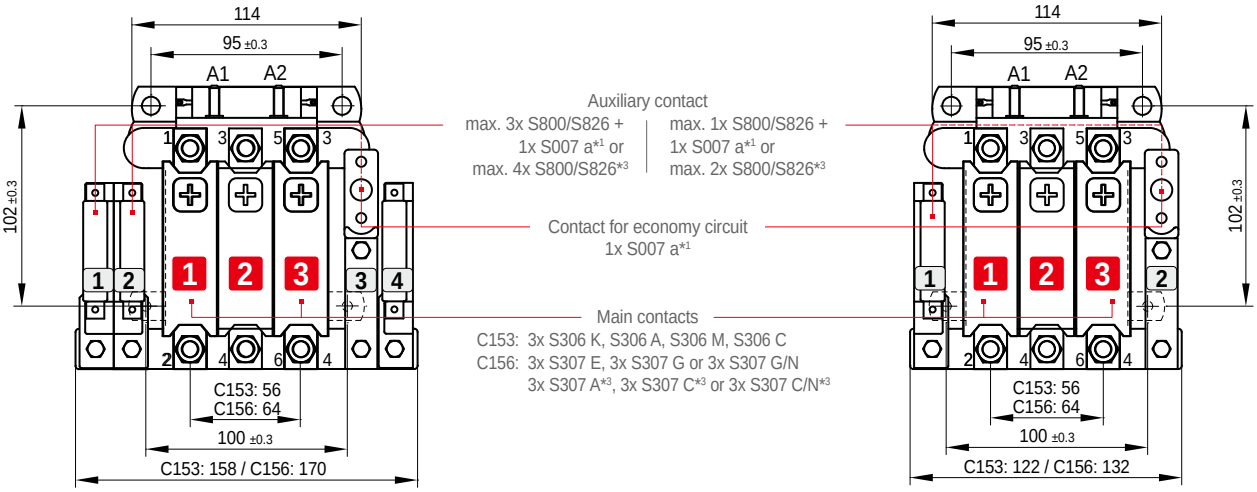

Figure C

Figure D

Number of main and auxiliary contacts:

Main contacts

1	2	3
⊣	⊣	⊣
⊣	⊢	⊣
⊢	⊣	⊢
⊢	⊢	⊢

Auxiliary contacts

Cam switch elements 1	2	3	4	Snap-action switches 1	2	3	4	Economy circuit	Figure
⊣ or ⊢	⊣ or ⊢	⊣ or ⊢	⊣ or ⊢	---	---	---	---	Electronic economy circuit	A*3
⊣ or ⊢	⊣ or ⊢	⊣*1	⊣ or ⊢	---	---	---	---	Economy resistor or Electronic economy circuit*4	A
⊣ or ⊢	⊣ or ⊢	⊣*1	---	---	---	---	---		A, B*3
⊣ or ⊢	⊣*1	---	---	---	---	---	---		B
---	---	---	---	⊣*2	⊣*2	⊣*2	⊣*2	Electronic economy circuit	C*3
---	---	⊣*1	---	⊣*2	⊣*2	---	⊣*2	Economy resistor or Electronic economy circuit*4	C
---	---	⊣*1	---	⊣*2	⊣*2	---	---		C, D*3
---	⊣*1	---	---	⊣*2	---	---	---		D
---	⊣*1	---	---	---	---	---	---		B

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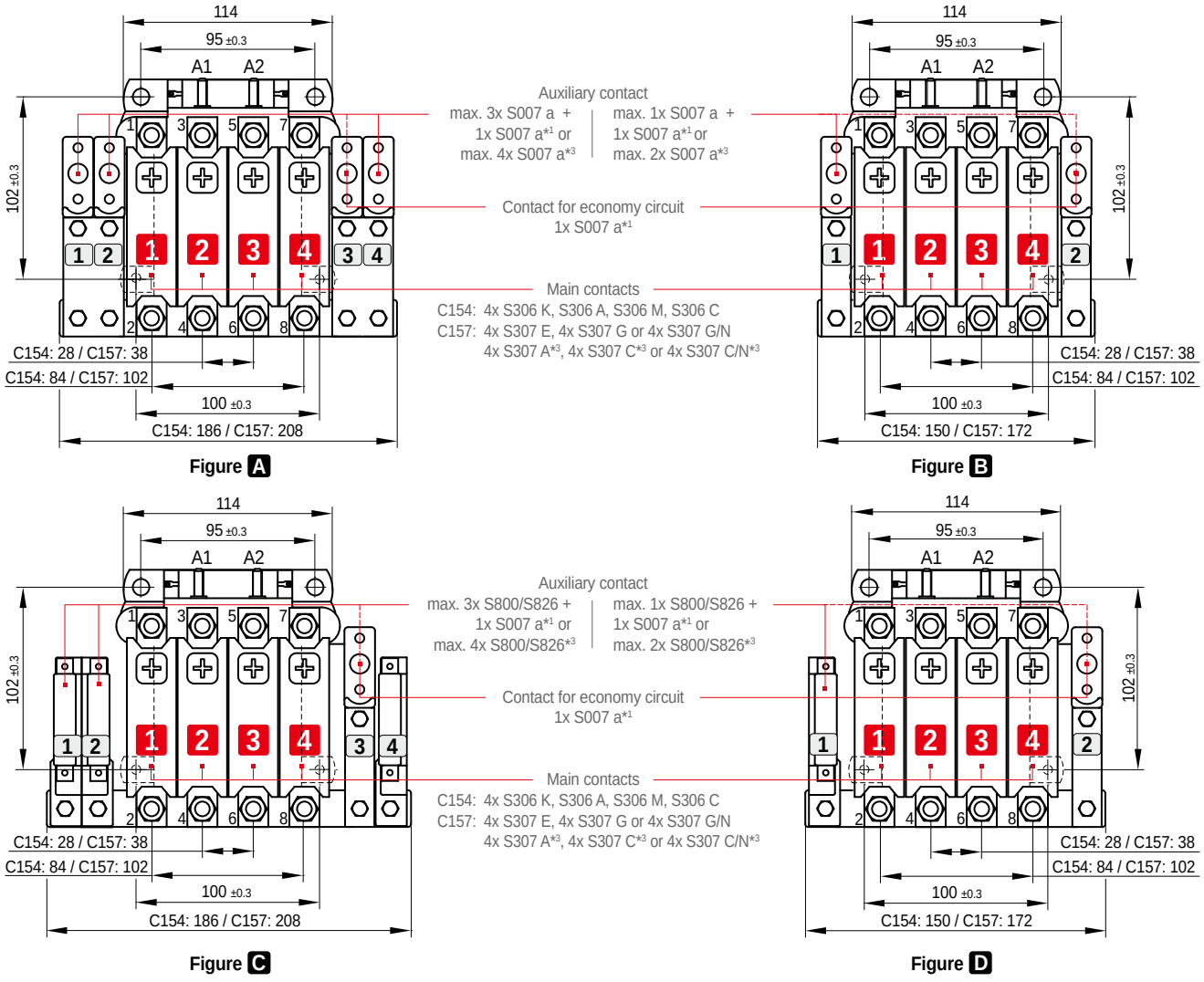
*1 NC contact for use with economy resistor, series S007 a. Not to be used with electronic economy circuit.
*2 SPDT with double-break contacts, series S800 (solid contact bridge) or S826 (galvanically isolated contact bridge)
*3 Only with electronic economy circuit
*4 If *3 applies, i. e. with use of main contacts S307 A, S307 C, S307 C/N and depending on number of auxiliary contacts

Reduced scale diagrams / dimensions in mm

Versions with 4 main contacts

Series C154, C157

Arrangement of main and auxiliary contacts (selection):



Number of main and auxiliary contacts:

Main contacts				Auxiliary contacts									
				Cam switch elements				Snap-action switches				Economy circuit	Figure
1	2	3	4	1	2	3	4	1	2	3	4		
●	●	●	●	or	or	or	or	---	---	---	---	Electronic economy circuit	A*3
●	●	●	●	or	or	*1	or	---	---	---	---	Economy resistor or Electronic economy circuit*4	A
●	○	●	●	or	or	*1	---	---	---	---	---	Economy resistor or Electronic economy circuit*4	A, B*3
●	○	●	●	or	*1	---	---	---	---	---	---	Economy resistor or Electronic economy circuit*4	B
●	●	●	○	---	---	---	---	*2	*2	*2	*2	Electronic economy circuit	C*3
●	○	●	○	---	---	*1	---	*2	*2	---	*2	Economy resistor or Electronic economy circuit*4	C
●	○	●	○	---	---	*1	---	*2	*2	---	---	Economy resistor or Electronic economy circuit*4	C, D*3
●	○	○	○	---	*1	---	---	*2	---	---	---	Economy resistor or Electronic economy circuit*4	D
●	○	○	○	---	*1	---	---	---	---	---	---	Economy resistor or Electronic economy circuit*4	B

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*1 NC contact for use with economy resistor, series S007 a. Not to be used with electronic economy circuit.
*2 SPDT with double-break contacts, series S800 (solid contact bridge) or S826 (galvanically isolated contact bridge)
*3 Only with electronic economy circuit
*4 If *3 applies, i. e. with use of main contacts S307 A, S307 C, S307 C/N and depending on number of auxiliary contacts

Reduced scale diagrams / dimensions in mm

Versions with 1 main contact

Series C158

Arrangement of main and auxiliary contacts (selection):

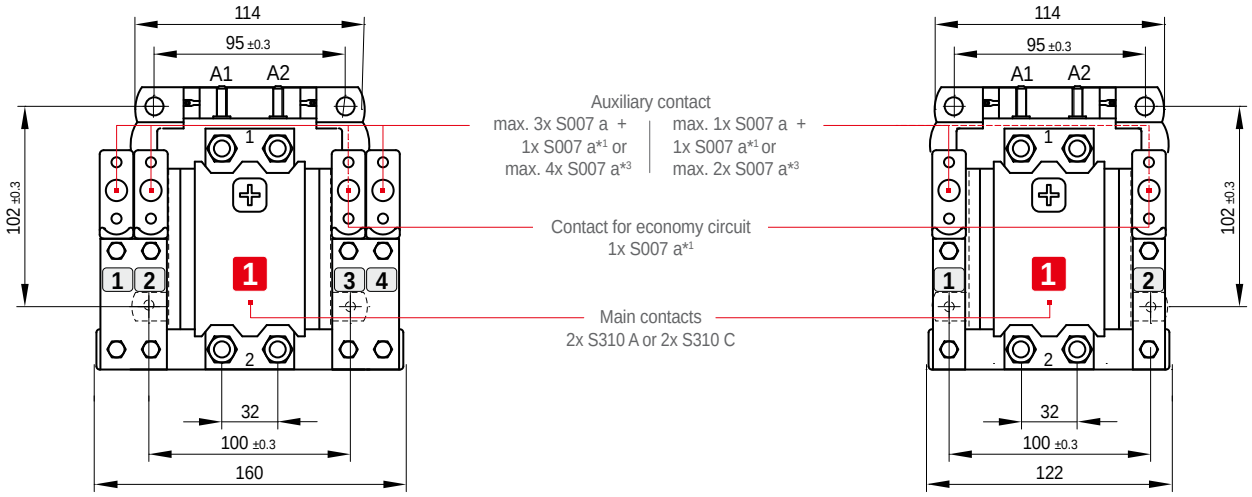

Figure A

Figure B

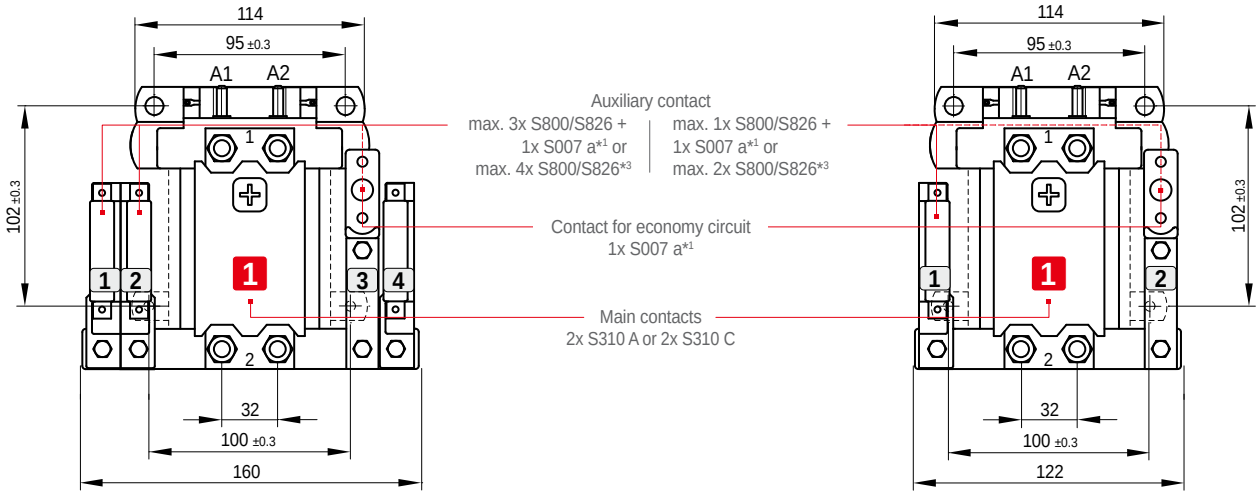

Figure C

Figure D

Number of main and auxiliary contacts:

Main contacts	Auxiliary contacts									
	Cam switch elements				Snap-action switches				Economy circuit	Figure
1	1	2	3	4	1	2	3	4		
					---	---	---	---	Electronic economy circuit	A*3
					---	---	---	---	Economy resistor or Electronic economy circuit	A
				---	---	---	---	---		A, B*3
			---	---	---	---	---	---		B
	---	---	---	---					Electronic economy circuit	C*3
	---	---		---			---		Economy resistor or Electronic economy circuit	C
	---	---		---			---	---		C, D*3
	---		---	---		---	---	---		D
	---		---	---	---	---	---	---		B

*1 NC contact for use with economy resistor, series S007 a. Not to be used with electronic economy circuit.
*2 SPDT with double-break contacts, series S800 (solid contact bridge) or S826 (galvanically isolated contact bridge)
*3 Only with electronic economy circuit

Reduced scale diagrams / dimensions in mm

Versions with 2 main contacts

Series C159

Arrangement of main and auxiliary contacts (selection):

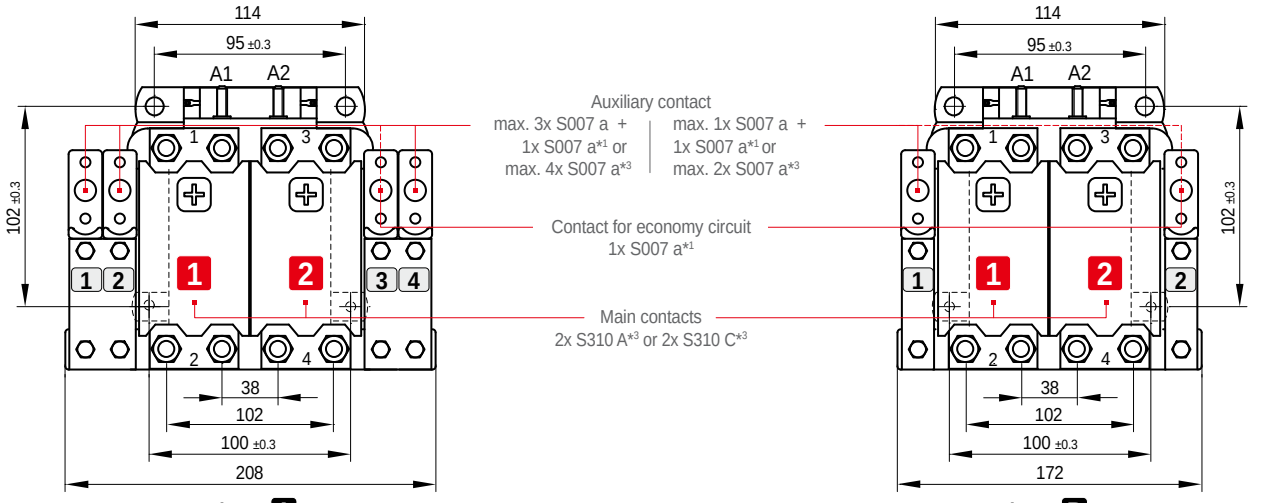

Figure A

Figure B

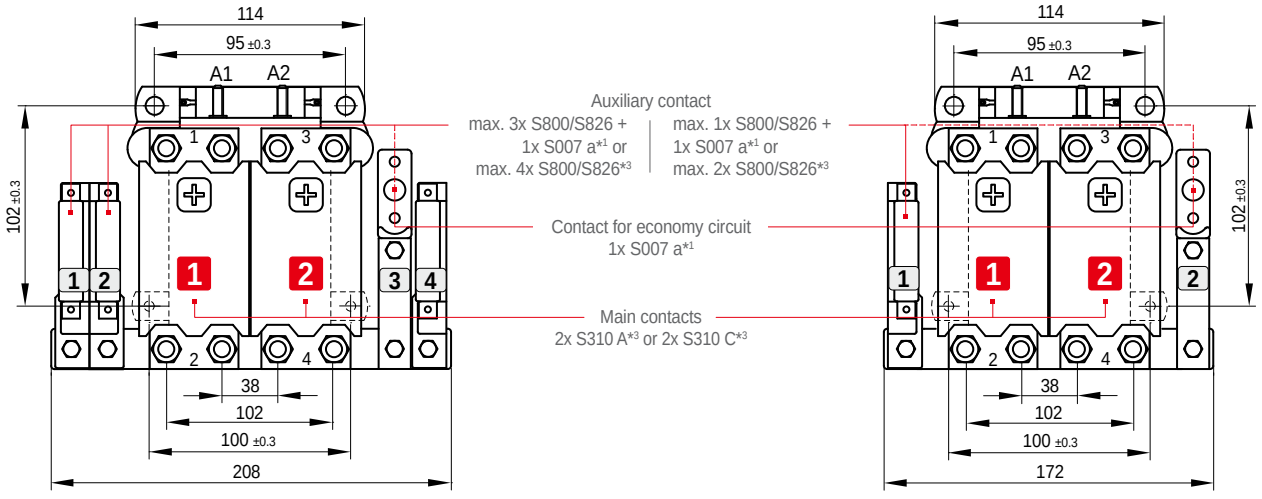

Figure C

Figure D

Number of main and auxiliary contacts:

Main contacts		Auxiliary contacts									
		Cam switch elements				Snap-action switches				Economy circuit	Figure
1	2	1	2	3	4	1	2	3	4		
		or	or	or	or	---	---	---	---	Electronic economy circuit	A
		or	or	*1	or	---	---	---	---		A
		or	or	*1	---	---	---	---	---		A, B
		or	*1	---	---	---	---	---	---		B
		---	---	---	---	*2	*2	*2	*2	Electronic economy circuit	C
		---	---	*1	---	*2	*2	---	*2		C
		---	---	*1	---	*2	*2	---	---		C, D
		---	*1	---	---	*2	---	---	---		D
		---	*1	---	---	---	---	---	---		B

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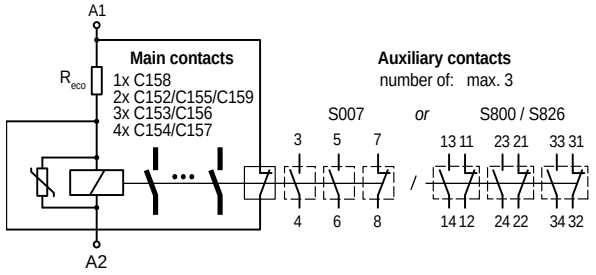
*1 NC contact for use with economy resistor, series S007 a. Not to be used with electronic economy circuit.
*2 SPDT with double-break contacts, series S800 (solid contact bridge) or S826 (galvanically isolated contact bridge)
*3 Only with electronic economy circuit

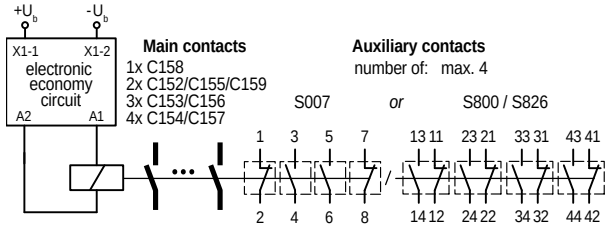
Reduced scale diagrams / dimensions in mm

Circuit diagram Economy resistor, electronic economy circuit — Series C152 ... C159

- **Economy resistor:**



- **Electronic economy circuit:**



Note: *The shown circuit diagrams are only examples. For configurations to suit your application refer to pages 7 to 10.*

Economy resistor

Multipole contactors require high pull-in power for switching ON. After closing of the contacts only a fraction of this power is needed for holding. In order to protect the contactor coil from overheating, a series connected resistor is switched active after the contactor has been switched ON.

Electronic economy circuit

The electronic economy circuit allows the supply of pull-in power only for the short time that is needed for switching ON the contactor. After pull-in, the current rate is limited to the much lower rate needed for holding by the electronic economy circuit. The result is a minimal self-heating of the contactor coil and a significant reduction of power for the control system.

Assembly: The component is mounted directly on the underside of the contactor. Thereby the mounting dimensions on the level of the mounting holes remain the same as with the contactors that have no economy circuit. The only difference is in height, where an additional space of 23 mm is needed.

Safety instructions, Mounting holes, Clearance — Series C152 ... C159

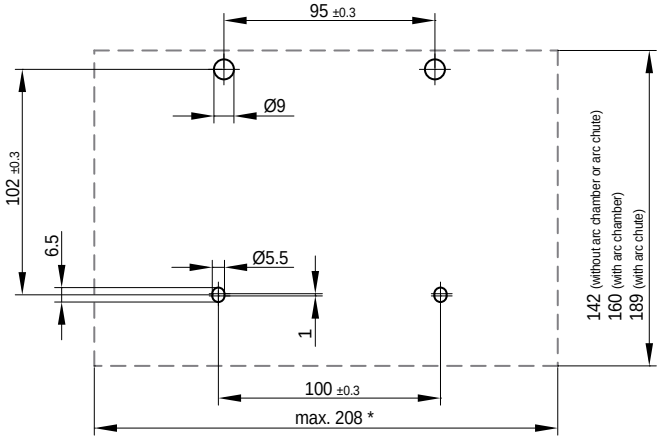
- **Safety instructions:**

The user has to see to it that there are no exposed electrical parts of the contactor when live or under load.

The way you mount the contactor has no less an impact on the temperature and the insulation of the switching device. For that purpose, please observe the required clearance towards live parts and earth and comply with the safety regulations of the applicable standards.

No liability will be accepted by Schaltbau in any circumstances for indirect damage resulting from clearances not being observed, devices not mounted properly, or products tampered with in any way.

- **Mounting holes:**

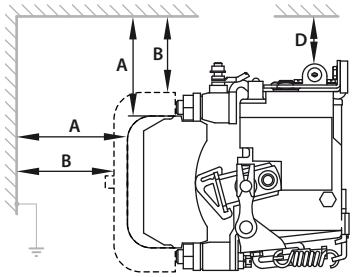


* *Maximum length depends on how many contacts the contactor is fitted with, see also dimension diagrams on pages 6 to 10.*

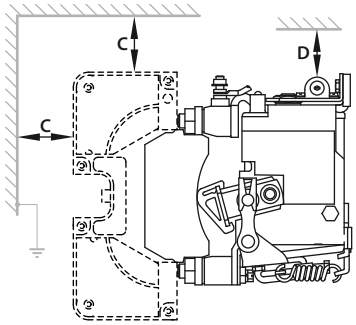
Mounting position: Vertical: Coil terminals pointing upwards
Horizontal: Magnetic drive pointing downwards

- **Minimum clearance to adjacent or uninsulated live parts and earth:**

w/o or w/ arc chamber



w/ arc chute



Minimum clearance to		plasma exit		economy resistor
		P < rated power	P ≥ rated power	economy circuit with economy resistor
No arc chamber	A	40 mm	70 mm	
Arc chamber	B	40 mm	70 mm	
Arc chute	C	70 mm	100 mm	
Economy resistor	D			25 mm

Reduced scale diagrams / dimensions in mm

RoHS 2011/65/EC

Schaltbau GmbH manufactures in compliance with RoHS.

IRIS Certification

The production facilities of Schaltbau GmbH have been IRIS certified since 2008.

Schaltbau GmbH ISO 14001 certified since 2002

Certified to DIN EN ISO 14001 since 2002. For the most recent certificate visit our website.

Schaltbau GmbH ISO 9001 certified since 1994

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Connectors	• Connectors manufactured to industry standards • Connectors to suit the special requirements of communications engineering (MIL connectors) • Charging connectors for battery-powered machines and systems • Connectors for railway engineering, including UIC connectors • Special connectors to suit customer requirements
Snap-action switches	• Snap-action switches with positive opening operation • Snap-action switches with self-cleaning contacts • Enabling switches • Special switches to suit customer requirements
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Schaltbau GmbH
Hollerithstrasse 5
81829 Munich
Germany

Phone +49 89 9 30 05-0
Fax +49 89 9 30 05-350
E-mail contact@schaltbau.de
Internet www.schaltbau.com

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