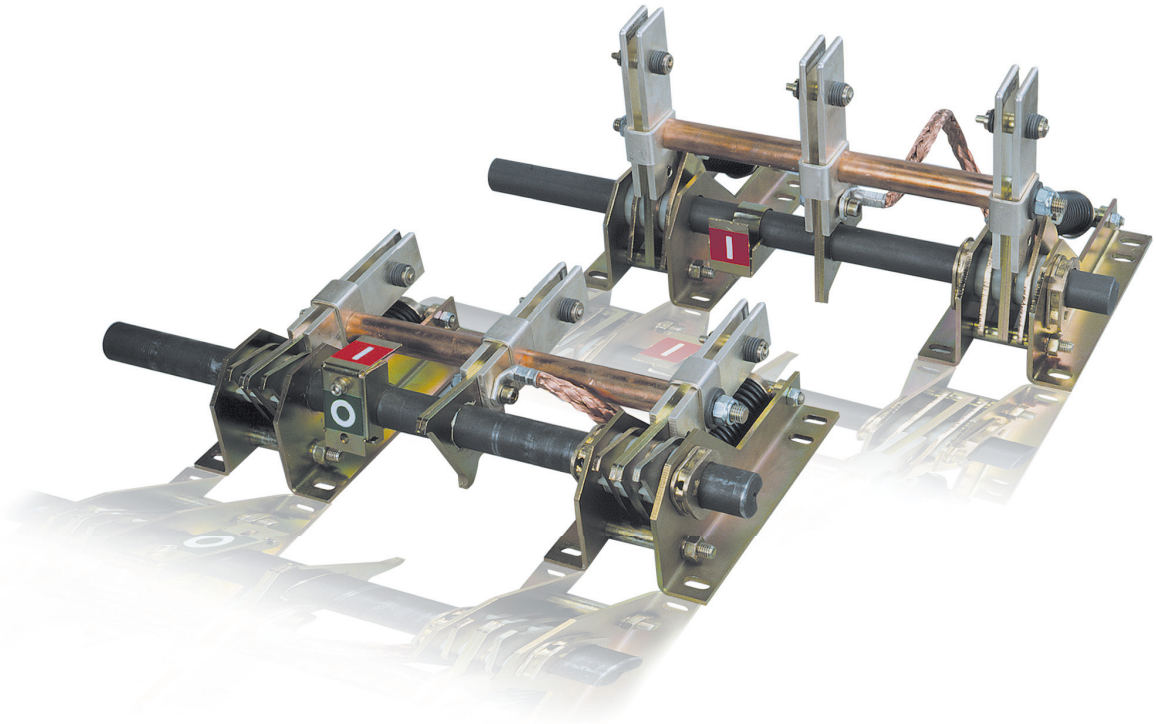
Instruction manual

EK6
Earthing switch



Power and productivity
for a better world™

Your safety first – always!

That's why our instruction manual begins with these recommendations:

- Only install switchgear and/or switchboards in enclosed rooms suitable for electrical equipment.
- Ensure that installation, operation and maintenance are carried out by specialist electricians only.
- Comply in full with the legally recognized standards (IEC), the connection conditions of the local electrical utility and the applicable safety at work regulations.
- Observe the relevant information in the instruction manual for all actions involving switchgear and switchboards.

-  Danger!
  Pay special attention to the hazard notes in the instruction manual marked with this warning symbol.
- Make sure that under operation condition of the switchgear or switchboard
  the specified data are not exceeded.
- Keep the instruction manual accessible to all persons concerned with installation, operation and maintenance.
- The user's personnel are to act responsibly in all matters affecting safety at work and the correct handling of the switchgear.

WARNING
Always follow the instruction manual and respect the rules of good engineering practice !
Hazardous voltage can cause electrical shocks and burns.
Disconnect power, then earth and short-circuit before proceeding with any work on this equipment.

If you have any further questions on this instruction manual, the members of our field organization will be pleased to provide the required information.

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1 Summary

Earthing switches of series EK6 are determined for indoor installation and conform to the requirements of IEC 62271-102. They are fitted with snap-action operating mechanisms for positive high-speed closing and sufficiently dimensioned to conduct the rated short-circuit making current when closed under load. The speed of the snap-action closing operation is independent controls.
The earthing switches are supplied as kits with a pre-assembled active part and corresponding earthing contacts supplied loose. Correct installation of these parts in a switchgear panel results in a functioning earthing switch.
Routine tests to IEC 62271-102 arc to be carried out at site accordingly.

2 Technical data

Earthing switch	Pole centres	Part number	Weight	Dimensional drawing		Rated Voltage	Rated impulse test voltage	Rated short-time current	Rated short-circuit duration	Rated short circuit making current (For various feed directions)	
Typ	p mm		kg	Number	Sheet	U kV	U_l kV	I_{th} kA	t_{th} s	I_{ma} kA	I_{ma} kA
EK6-R-1208 -Z- 150	150	GCE 716 93 12 R11 01	11[1)]	GCEM360524	1	12	75	31.5	3	65	80
EK6-R-1208 -P- 150	150	GCE 716 93 12 R21 01	11[1)]	GCEM360524	1						
EK6 – 1208 – 210	210	GCE 716 93 12 R01 02	12[1)]	GCEM360524	1						
EK6 – 1208 – 275	275	GCE 716 93 12 R11 03	13[1)]	GCEM360524	2						
EK6 – 1208 – 150	150	GCE 716 93 12 R01 14	13	GCEM700092	1						
EK6 – 1208 – 210	210	GCE 716 93 12 R01 15	14	GCEM700092	1						
EK6 – 1208 – 275	275	GCE 716 93 12 R01 16	16	GCEM700092	2						
EK6 - 1212 - 210	210	GCE 700 17 32 R01 01	31	GCEM700059	1			40	3	–	120
EK6 - 1212 - 275	275	GCE 700 17 32 R01 02	31	GCEM700059	1			50	1	–	120
EK6 – 1706 – 150	150	GCE 716 93 12 R01 44	13	[2)]		17.5	95	31.5	3	–	80
EK6 – 1706 – 210	210	GCE 716 93 12 R01 42	14	[2)]							
EK6 – 1706 – 210	210	GCE 716 93 12 R01 45	14	[2)]							
EK6 – 1706 – 275	275	GCE 716 93 12 R01 46	16	[2)]							
EK6-1710–210	210	GCE 700 17 32 R01 06	31	[2)]				40	3	–	100
EK6-1710–275	275	GCE 700 17 32 R01 05	31	[2)]							
EK6-1710–275	275	GCE 700 17 32 R01 04	31	[2)]							
EK6 – 2406 – 210	210	GCE 716 93 12 R01 05	12	GCEM700092	5	24	125	25	3	50	63
EK6-R-2406-Z-210	210	GCE 716 93 12 R11 04	12	GCEM700092	5						
EK6-R-2406-P-210	210	GCE 716 93 12 R21 04	12	GCEM700092	5						
EK6 – 2406 – 275	275	GCE 716 93 12 M01 06	14	GCEM700092	6						
EK6 – 2406 – 210	210	GCE 716 93 12 R01 17	14	GCEM700092	5						
EK6 – 2406 – 275	275	GCE 716 93 12 R01 18	16	GCEM700092	6						
EK6 – 2406 – 210	210	GCE 716 93 12 R01 19	14	GCEM700092	8			25	3	–	63
EK6 – 2406 – 275	275	GCE 716 93 12 R01 21	16	GCEM700092	9						

1) without earthing contact

2) Dimensional drawings on request.

The earthing switches are suitable for the normal operating conditions of the „minus 5 indoor class“.

Key to order code:

Earthing switch version	Type designation
Earthing switch	E · · – · – · · · – · – ·
With snap action mechanism	· K · – · – · · · – · – ·
Design code	· · 6 – · – · · · – · – ·
Mechanism on right	· · · – R – · · · – · – ·
Rated voltage 12 kV	· · · – · – 12 · – · – ·
Rated short circuit making current 80 kA	· · · – · – · 08 – · – ·
Predominantly for panel type ZK8	· · · – · – · · – Z – ·
(P types predominantly for panel type ZP)	
Pole centres 150 mm	· · · – · – · · · – · – 150
Complete type designation	E K 6 – R – 12 08 – Z – 150

3 Structure and function

Earthing switches of series EK6 have three pairs of earthing blades which are located on the operating shaft and are freely movable. The pairs of earthing blades are electrically connected to each other by a short-circuiting bridge and to earth potential at the bearing brackets by two stranded copper conductors. Driver levers and toggle springs located between the bearing brackets are used to transmit the force during the switching process. Fixing the active part on a torsionally rigid switchgear panel wall or crossbeam provides it with the necessary stability.
The earthing contacts designed to suit the relevant switch type are to be bolted to the conductor bars supported on suitable insulating parts, e.g. pintype insulators or current transformers, on the opposite side and parallel to each other, and the position adjusted until it conforms to that show in the dimensional drawings.

The earthing switch has a snap action closing mechanism which functions independently of the rotation of the drive shaft. The switching speed and torque achieved in this process are independent of the actions of the operating mechanism.
In the opening process, in contrast, the toggle springs have no effect on the speed of contact separation.
A ring lever or suitable manual or motorized operating mechanism with the necessary torque for the type of switch and an operating angle 90° can be fitted for operation of the switch.

Note:
Always open earthing switches by turning until the stop is reached.
The earthing switches can also be fitted with an auxiliary switch for annunciation purposes.

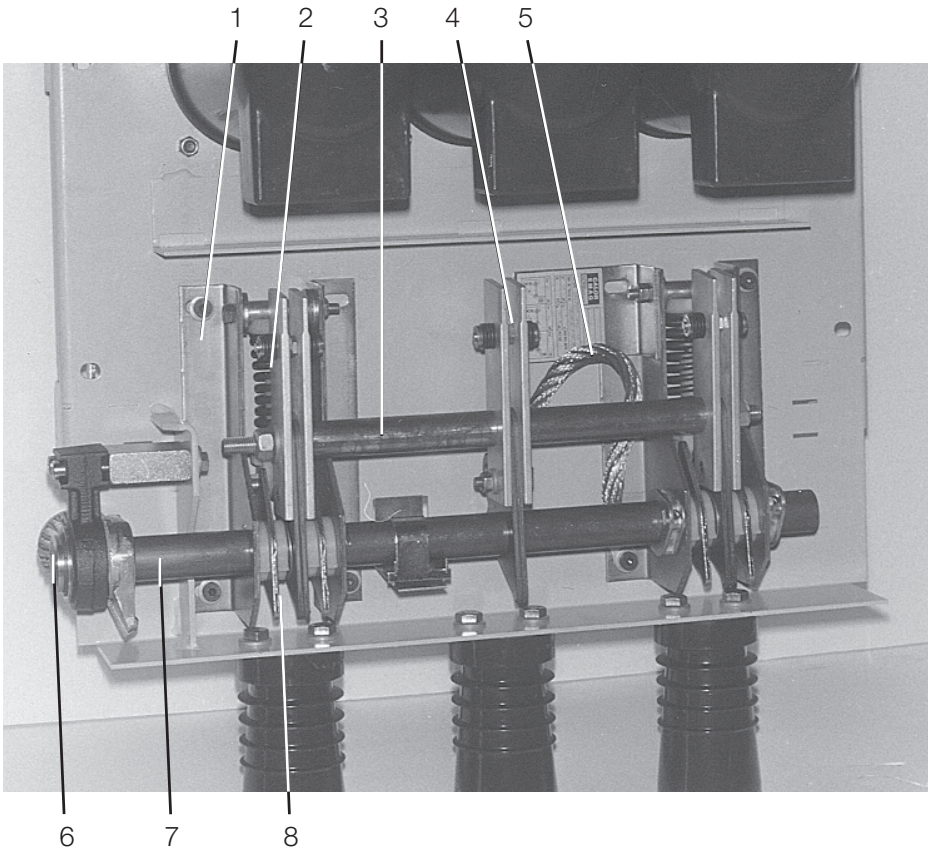


Figure 1: Example of the active part of an earthing switchmounted on a switchgear panel partition, shown in the open position.

1 Bearing bracket
2 Toggle spring
3 Short-circuiting bridge
4 Pair of earthing blades
5 Eathing conductor
6 Bevel gear mechanism (not belonging to the earthing switch)
7 Actuating shaft
8 Driver lever

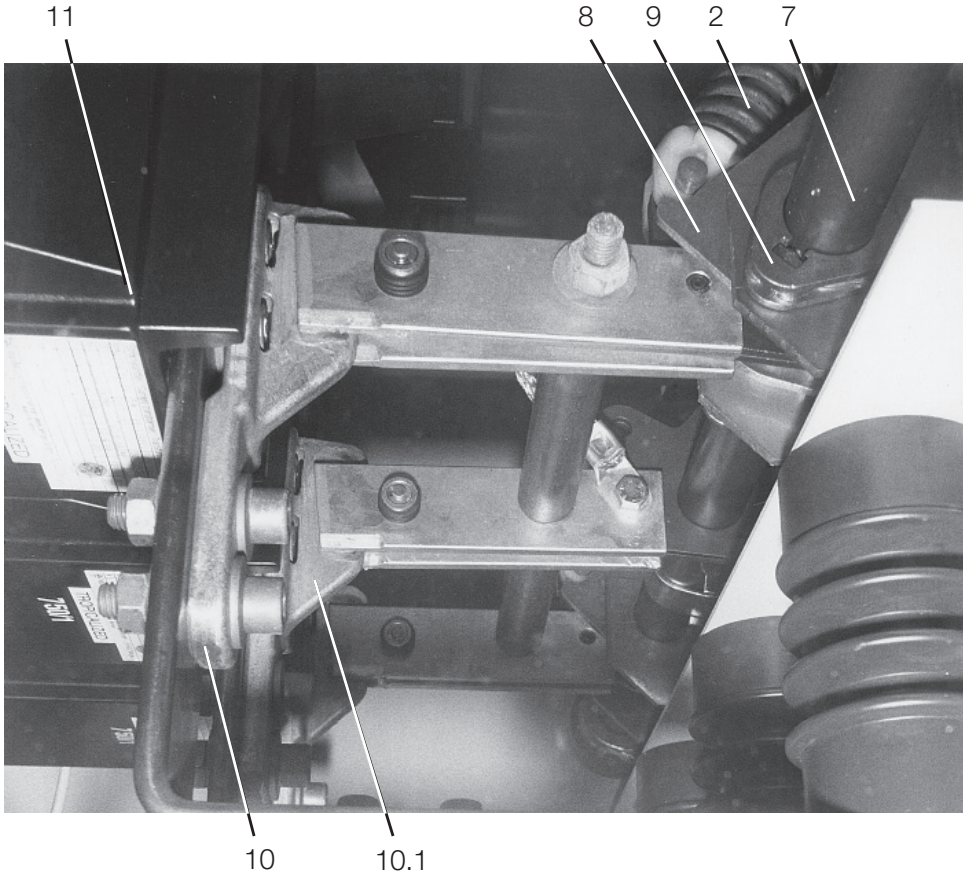


Figure 2: Example of an earthing switch mounted in a switchgear panel, shown in the closed position.

2 Toggle spring
7 Actuating shaft
8 Driver lever
9 Setting ring
10 Earthing contact
10.1 Earthing tongue
11 Current transformer

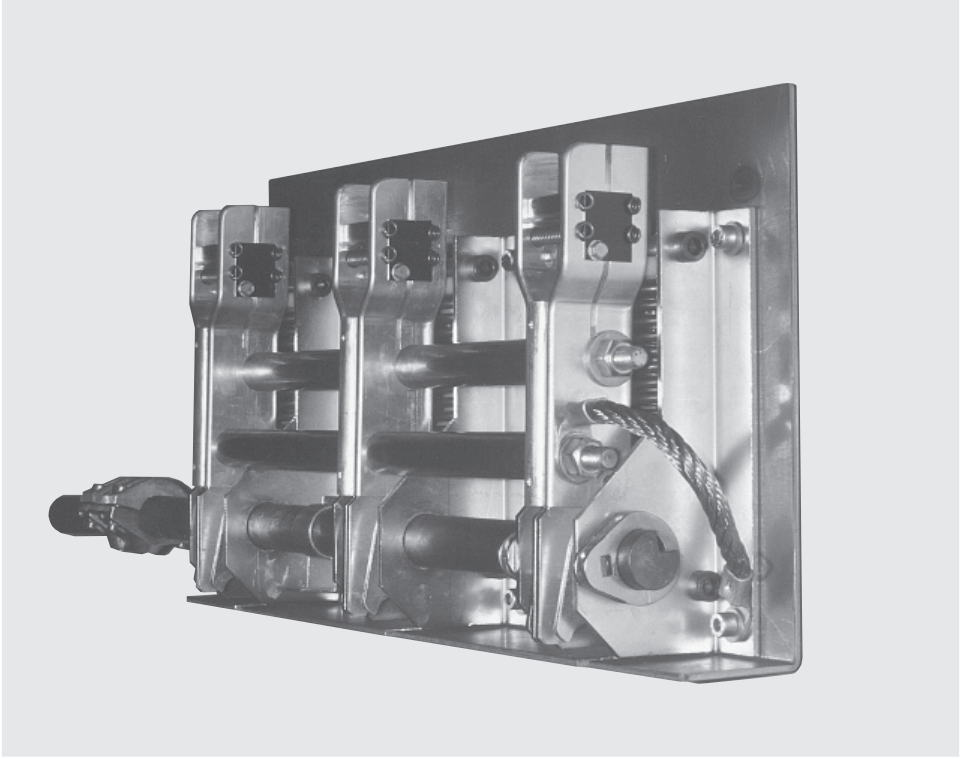


Figure 3: Live parts of an earthing switch with a rated short-circuit making current of 120 kA, mounted on a sheet steel partition.

4 Instalation

When installing earthing switches in switchgear panels, the following details must be taken into account if perfect switching functions etc. are to be achieved:

- The active part of the earthing switch is supplied in the open position and with pretensioned toggle springs.
- The earthing switch can be installed in any position.
- Do not operate the switch without earthing contacts!
- Install the active part and earthing contacts without stress or distortion and parallel to each other on a torsionally rigid and flat panel wall/crossbeam and conductor bar respectively.
- Precisely maintain the spatial/dimensional position of the earthing contacts relative to the active part as shown in the dimensional drawing for the relevant switch type.
- Only use insulated mountings with a cantilever strength equivalent to a cast resin pin type insulator to DIN 48136:
  - For switches to dimensional diagram GCEM 360524, sheets 1 and 2 and GCEM 700092, sheets 1, 2, 5, 6, 8 and 9: Form B, 12 kV or 24 kV, 7.5 kN
  - For switches to dimensional diagram GCEM 700059, sheet 1: Form C, 12 kV, 16 kN
- Fit the operating mechanism.
- The operating shaft can be moved after the two setting rings have been released. Observe the tightening torque of 4 Nm for the M6 threaded pins.
- Adjust the motion sequence of the earthing blades in relation to the earthing contacts as follows:
  1. Grease the contact areas.
  2. Close the switch with the fixing bolts in the earthing contacts loosely tightened.
  3. Check that the blade pairs are properly located on the contact tongues of the earthing contacts and adjust if necessary.
  4. Tighten the fixing bolts and carry out a test switching operation.
  5. Maximum permissible deviation between the central position of the earthing blades and the contact tongues of the earthing contacts:
     - ≤ 1 mm for switches to dimensional diagram GCEM 360524, sheets 1 and 2, and GCEM 700092, sheets 1, 2, 5, 6, 8 and 9
     - ≤ 0.6 mm for switches to dimensional diagram GCEM 700059, sheet 1.

⚠ Measuring Point: Clearance between the earthing blades and the contact tongues during opening.
Take care when handling the switch!

6. Irrespective of the routine testing of the relevant switchgear panels/switchboard to IEC 62271-200, the earthing switch is to be subjected to routine testing in accordance with IEC 62271-102, on completion of installation.
   - Check for unimpeded function of the high-speed switching system when the switch has been installed without stress or distortion.
   - Check the tightening torque for the M 12 hexagon nut on the short-circuiting bridge, possibly removing a pair of earthing blades to provide access. This torque is important for correct function!

⚠ Rated tightening torque:
   - without lubricant: 86 Nm
   - with oil or grease lubricated: 40 Nm.
   - Bolt the copper earthing conductors to the bearing brackets and connect the other ends to the switchboard earthing bar.
   - Perform at least 20 mechanical opening and closing operations on the earthing switch after completion of installation.

Auxiliary switches:

- Auxiliary switches on the side wall of the switchgear panel:
  - 2 x 5 pole auxiliary switches: GCE 8282292R0101 (contact arrangement as per order)
  - Signalling of open and closed positions
  - Operation by rod mechanism (engages with M 12 threaded bar)
- Auxiliary switches on the rear wall of the switchgear panel:
  - S1 + S2 (2 NCC + 2 NOC = 2 change-over): GCE 7169 272 R0108
  - S1 + S2 + S3 (3 NCC + 3 NOC = 3 change-over): GCE 7169 272 R0107
  - Signalling of the closed position only.

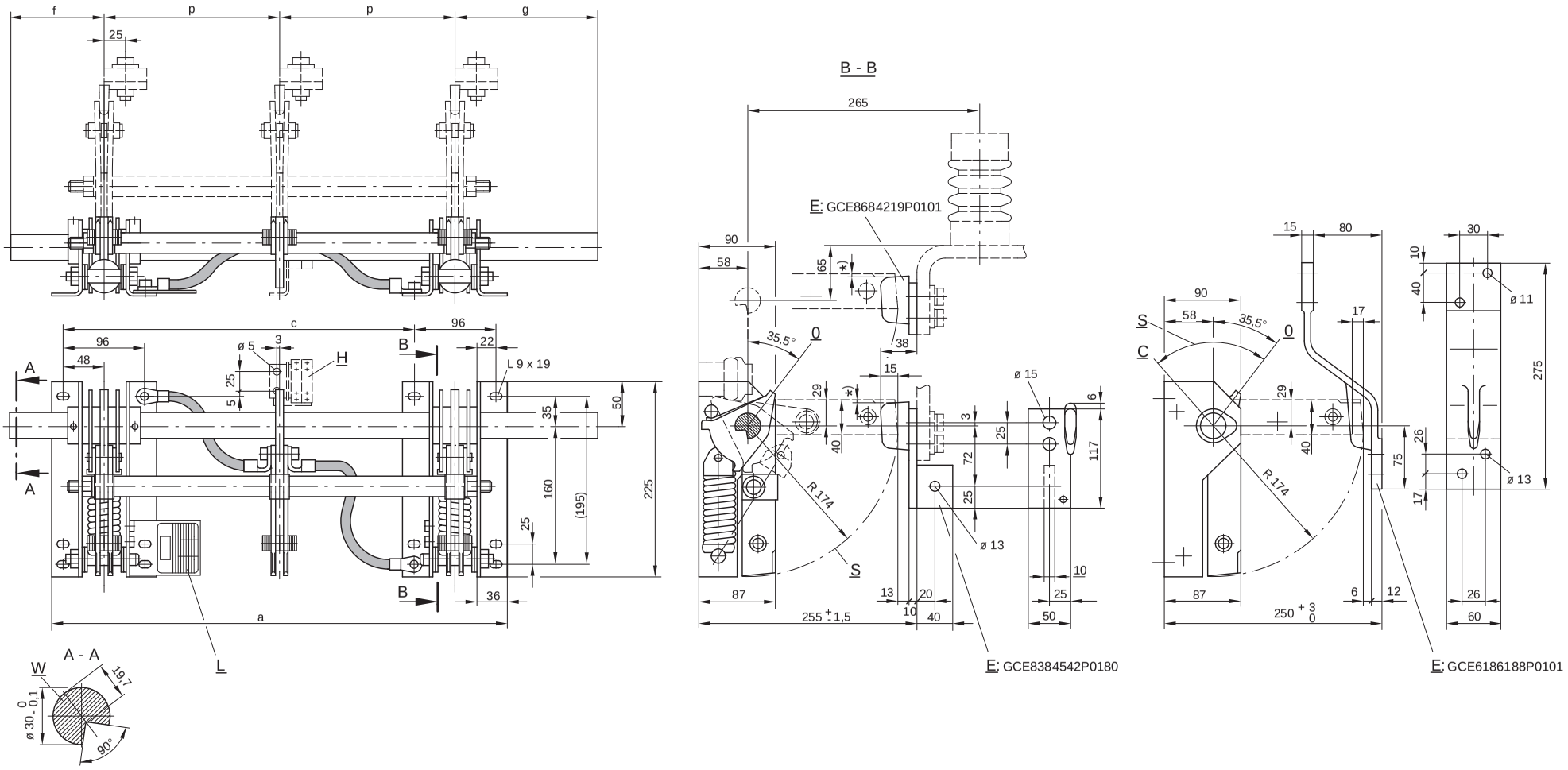
5 Maintenance

Closing of the switch several times under load conditions (maximum loading two closing operations at 100 % of the rated short-circuit making current) makes inspection and possibly maintenance necessary. The electrical and mechanical functions of the switch must not be adversely affected, and only slight contact welding is permissible. The pairs of earthing blades and the earthing contacts should be replaced if necessary.

Otherwise, it is advisable to carry out inspection and maintenance of the earthing switches at appropriate intervals together with the switchboard, particularly in exceptional operating conditions and/or under adverse environmental influences such as pollution and aggressive air:

- Check whether the operating mechanism functions smoothly and easily.
- Carry out general visual examination for the condition of mechanical fasteners, dirt, moisture and corrosion.
- Remove any dust deposits on insulating parts with a dry, non-fraying cloth (do not use cleaning wool).
- Regrease the mechanically movable parts and contacts (applying grease thinly) using Isoflex Topas NB 52 lubricant, ABB part number (ordering reference) GCE0007249P0100.
- Take into account the details given in section 4 in as far as these are relevant to the work.

6 Dimensionals drawing



E = Earthing contact, **H** = Auxiliary switch, **L** = Rating plate,
S = Operating/Switching angle, **W** = Shaft section, **C** = ON, **O** = OFF,

See section 4 for the auxiliary switches fitted

Caution!
Observe the notes on installation in section 4.

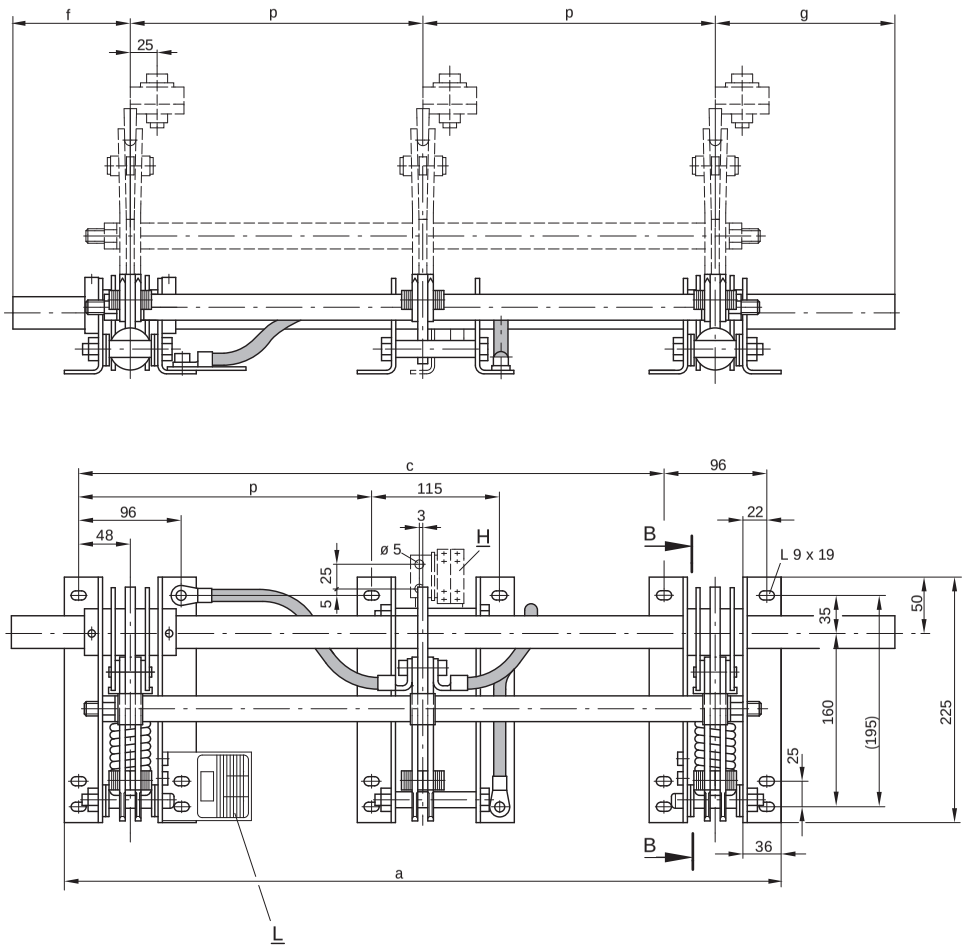
Contact blade distance:	8 ± 0,3	mm
Contact thickness:	10	mm
Contact force:	734	N
Contact spring force (cup springs):	313	N
Operating angle:	90°	
Switching angle:	90°	

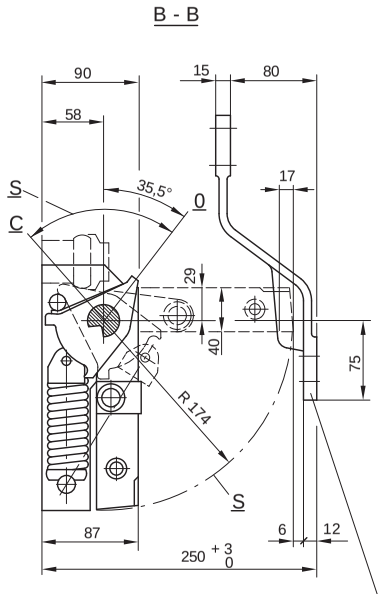
Part number	Type	p	a	c	g	f	Md OFF	Md ON	Weight kg
GCE7169312R0102	EK6-1208-210	210	544	420	247^{0}_{-2}	58	210 Nm	110Nm	12
GCE7169312R2101	EK6-R-1208-P-150	150	424	300	195^{0}_{-2}	100	210 Nm	110Nm	11
GCE7169312R1101	EK6-R-1208-Z-150	150	424	300	247^{0}_{-2}	48	210 Nm	110Nm	11

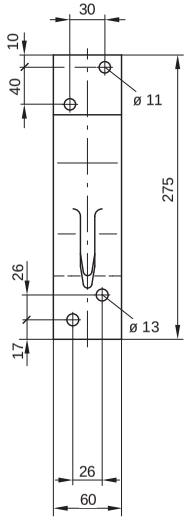
*) maximum projection of contact blades: 5 mm
(rated dimensions: 3 mm)

Earthing switch EK6
12 kV-Types

Dimensional drawing
GCEM360524, Sheet 1







E: GCE6186188P0101

E = Earthing contact, **H** = Auxiliary switch, **L** = Rating plate,
S = Operating/Switching angle, **C** = ON, **O** = OFF,

- See dimensional drawing GCEM 360 524, sheet 1, for shaft profile
- See section 4 for auxiliary switches fitted

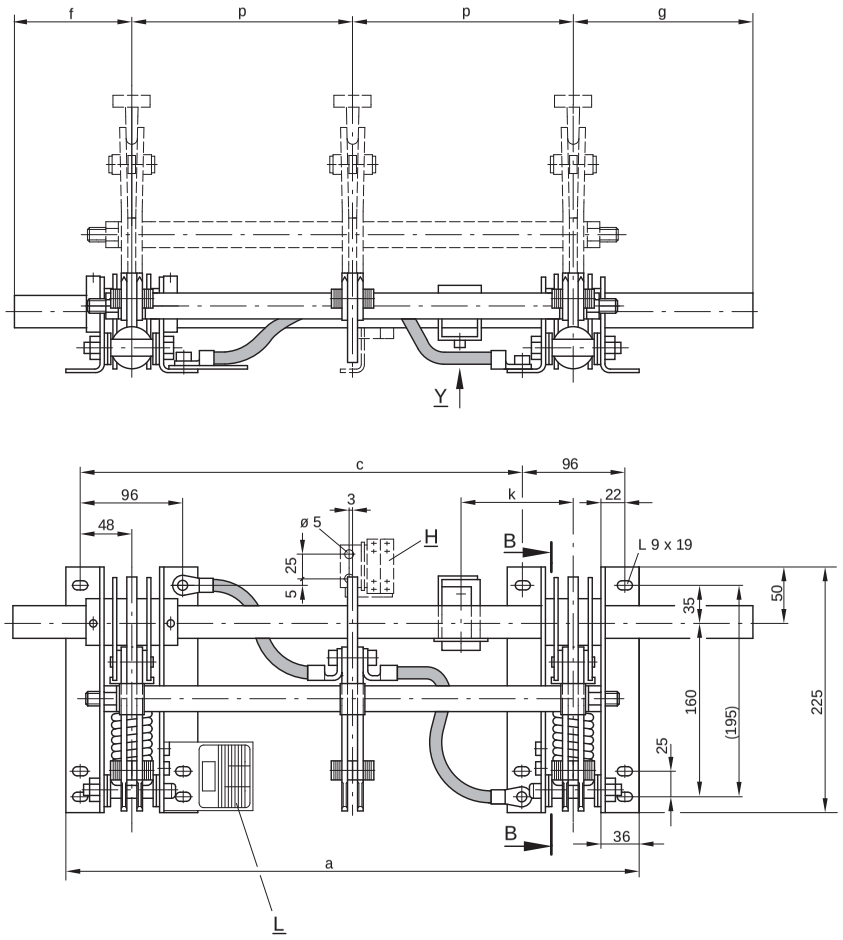
Caution!
Observe the notes on installation in section 4.

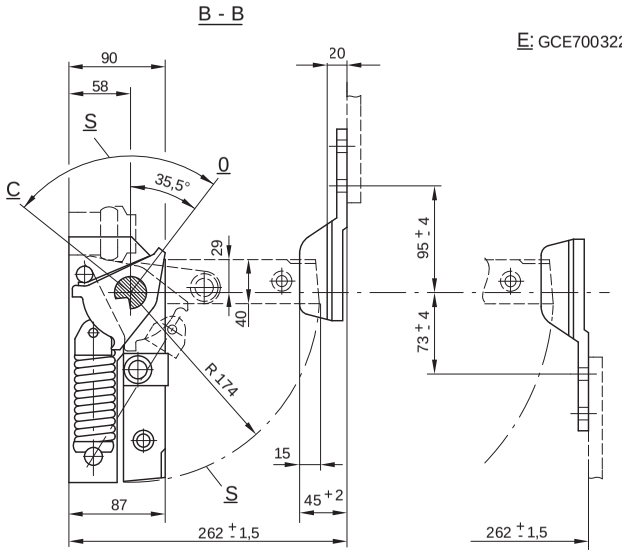
Contact blade distance:	8 + 0,3	mm
Contact thickness:	10	mm
Contact force:	734	N
Contact spring force (cup springs):	313	N
Operating angle:	90°	
Switching angle:	90°	

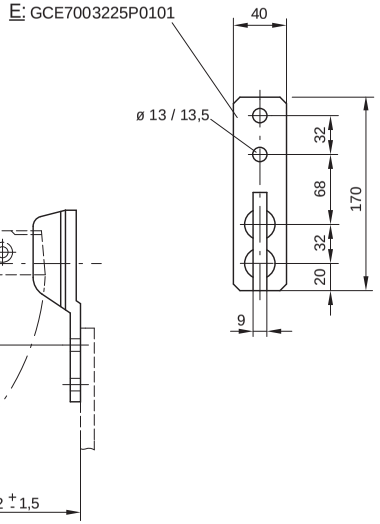
Part number	Type	p	a	c	g	f	Md OFF	Md ON	Weight kg
GCE7169312R0103	EK6-1208-275	275	674	550	195^{0}_{-2}	100	210 Nm	110Nm	13

Earthing switch EK6
12 kV-Types

Dimensional drawing
GCEM360524, Sheet 2







E = Earthing switch, **H** = Auxiliary switch, **L** = Rating plate,
Y = View direction for switch position
S = Operating/Switching angle, **C** = ON, **O** = OFF,

- See section 4 for the auxiliary switches fitted
- See dimensional drawing GCEM 360 524, sheet 1, for shaft profile

Caution!
Observe the notes on installation in section 4.

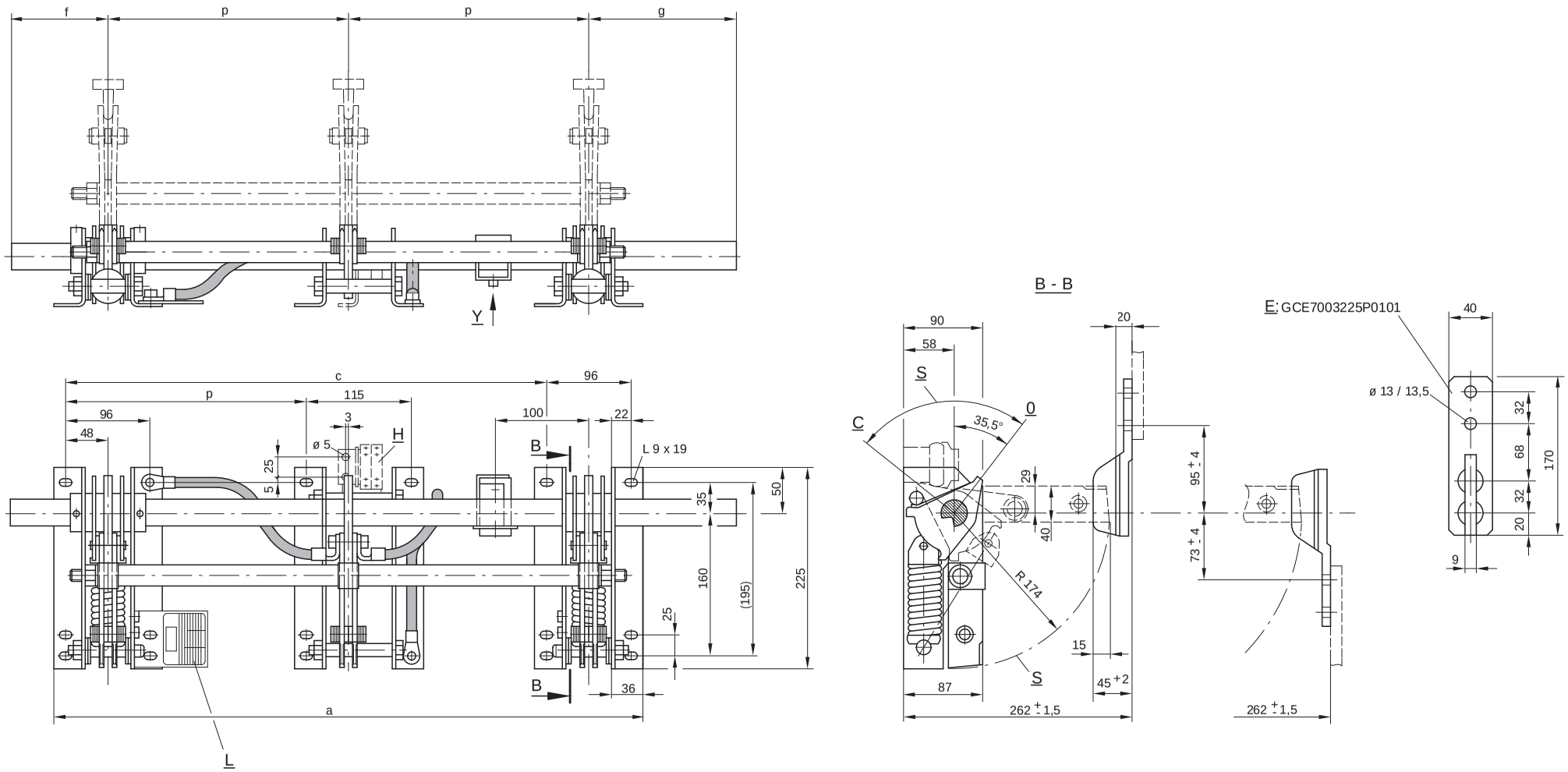
Contact blade distance:	8 ± 0,3	mm
Contact thickness:	9	mm
Contact force:	739	N
Contact spring force (cup springs):	720	N
Operating angle:	90°	
Switching angle:	90°	

Part number	Type	p_	a	c	g	f	k	Md OFF	Md ON	Weight[1] kg
GCE7169312R0114	EK6-1208-150	150	424	300	160	75	75	220 Nm	120 Nm	13
GCE7169312R0115	EK6-1208-210	210	544	420	175	50	100	220 Nm	120 Nm	13

1) including earthing contact (Weight 3 Pieces: 1,8 kg)

Earthing switch EK6
12 kV-Types

Dimensional drawing
GCEM700092, Sheet 1



E = Earthing contact, **H** = Auxiliary switch, **L** = Rating plate,
Y = View direction for switch position indicator
S = Operating/Switching angle, **C** = ON, **O** = OFF,

- See section 4 for the auxiliary switches fitted
- See dimensional drawing GCEM 360 524, sheet 1, for the shaft profile

Caution!
Observe the notes on installation in section 4.

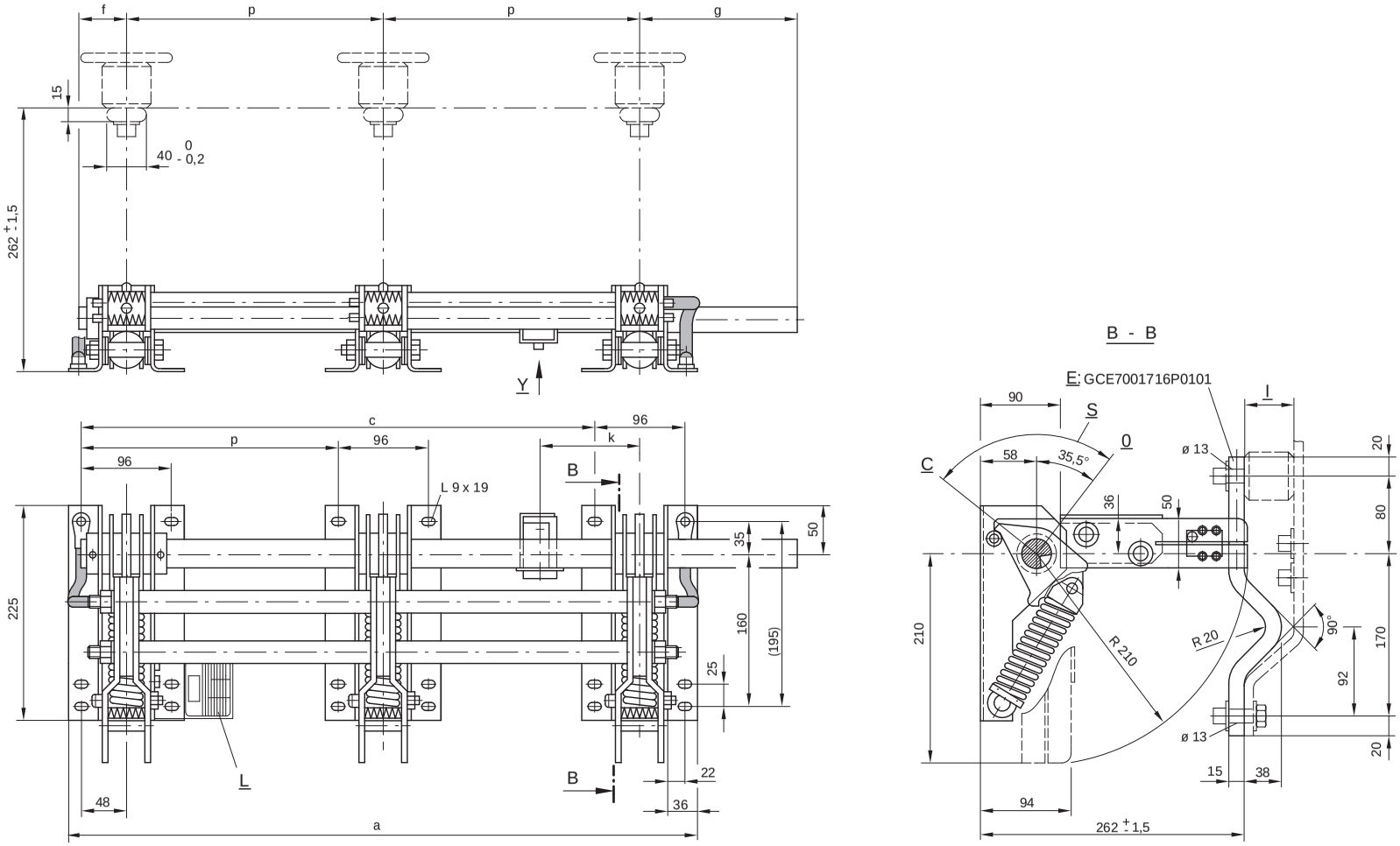
Contact blade distance:	8 ± 0,3	mm
Contact thickness:	9	mm
Contact force:	739	N
Contact spring force (cup springs):	720	N
Operating angle:	90°	
Switching angle:	90°	

Part number	Type	p	a	c	g	f	Md OFF	Md ON	Weight [1] kg
GCE7169312R0116	EK6-1208-275	275	674	550	210	50	220 Nm	120 Nm	16

1) including earthing contact (Weight 3 Pieces: 1,8 kg)

Earthing switch EK6
12 kV-Types

Dimensional drawing
GCEM700092, Sheet 2



E = Earthing contact, **I** = Isolator, **L** = Rating plate,
Y = View direction for switch position indicator (ZS1-Type),
S = Operating/Switching angle, **C** = ON, **O** = OFF,

– See dimensional drawing GCEM 360 524, sheet 1, for shaft profile

Caution!
Observe the notes on installation in sector 4.

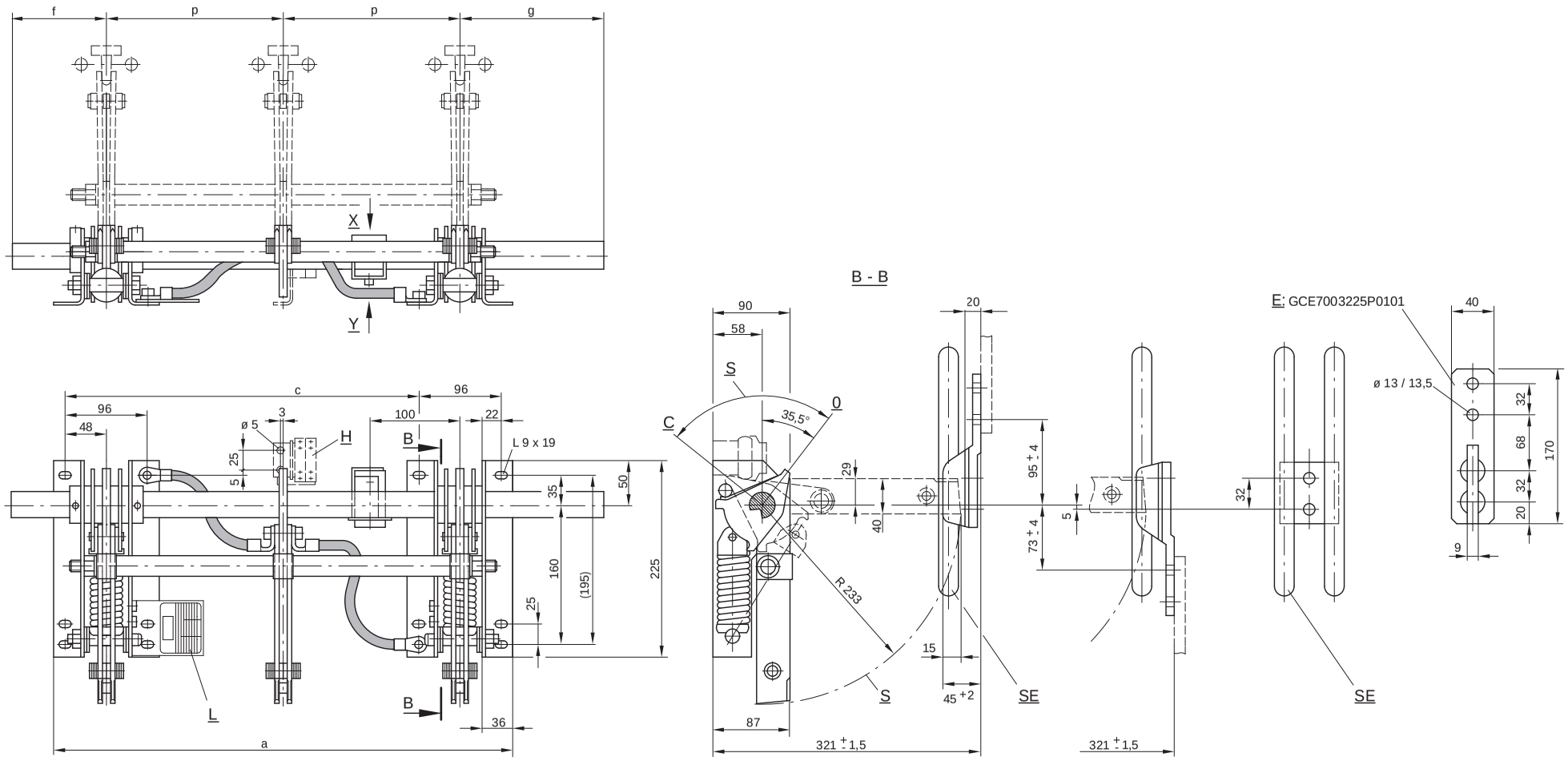
Contact blade distance:	38,5 $^{0}_{-0,6}$ mm
Contact thickness:	40 $^{0}_{-0,2}$ mm
Contact force:	500 N
Operating angle:	90°
Switching angle:	90°

Part number	Type	p	a	c	g	f	k	Md OFF	Md ON	Weight [1] kg
GCE7001732R0102	EK6-1212-275	275	674	550	210	50	100	300 Nm	190 Nm	31
GCE7001732R0101	EK6-1212-210	210	544	420	175	60	100	300 Nm	190 Nm	31

1) including earthing contact

Earthing switch EK6
12 kV-Types for ZS-Feeder

Dimensional drawing
GCEM700059, Sheet 1



E = Earthing contact, **H** = Auxiliary swithch, **L** = Rating plate, **S** = Operating/Switching angle,
SE = Control electrode varies with panel design; **X** = View direction
for switch position indicator, **Y** = view direction for switch position indicator,
C = ON, **O** = OFF,

Part number	Type	p	a	c	g	f	Md OFF	Md ON	Weight [1] kg
GCE7169312R0117	EK6-2406-210	210	544	420	175	50	220 Nm	120 Nm	14
GCE7169312R0105	EK6-2406-210	210	544	420	47	258	220 Nm	120 Nm	12
GCE7169312R1104	EK6-R-2406-Z-210	210	544	420	258	47	220 Nm	120 Nm	12
GCE7169312R2104	EK6-R-2406-P-210	210	544	420	190 $^{0}_{-2}$	115	220 Nm	120 Nm	12

1) including earthing contact (Weight 3 Pieces: 1,8 kg)

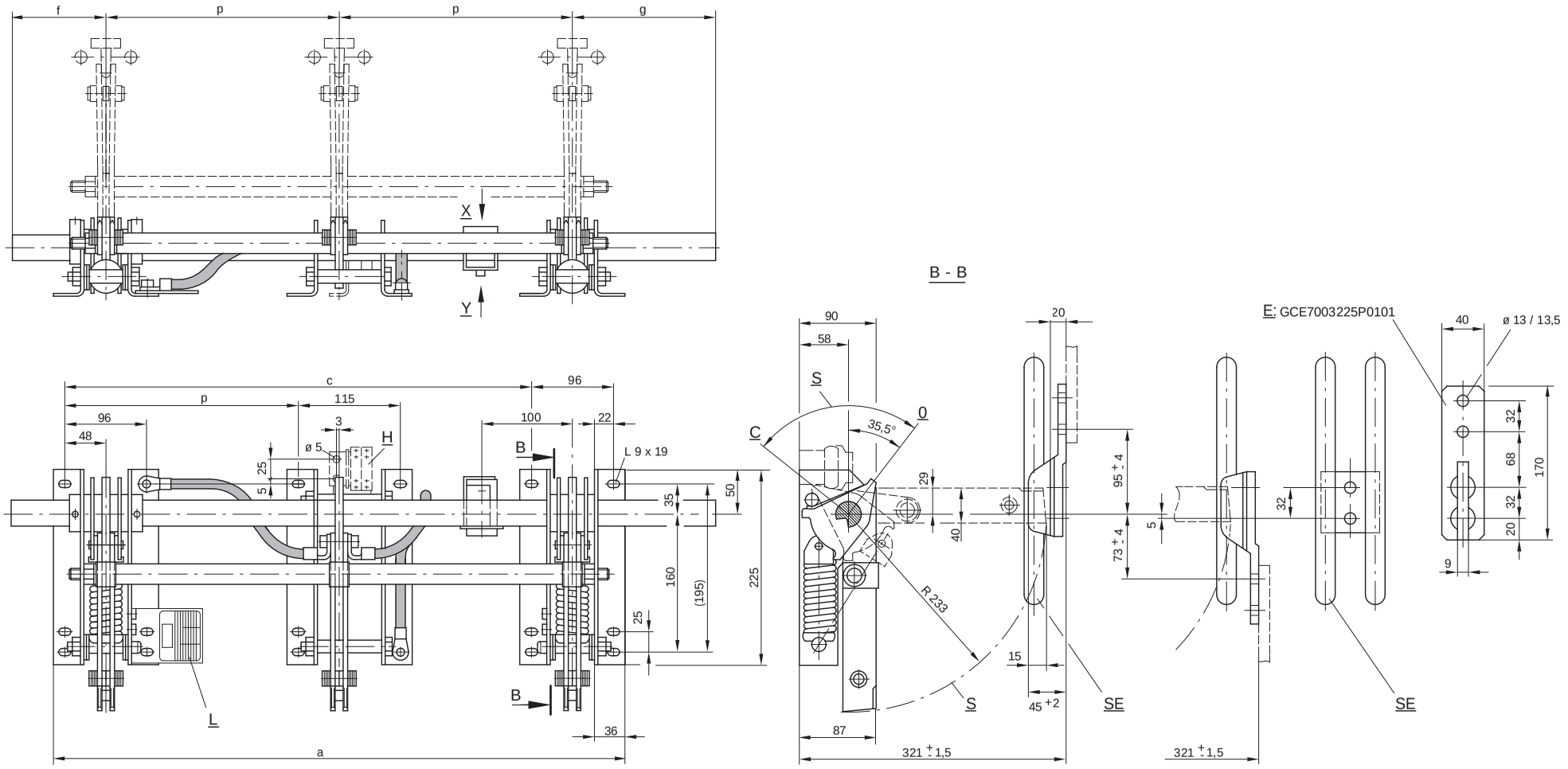
- See dimensional drawing GCEM 360524, sheet 1, for shaft profile
- See section 4 for auxiliary switches fitted.

Caution!
Observe the notes on installation in section 4.

Contact blade distance:	8 ± 0,3	mm
Contact thickness:	9	mm
Contact force:	353	N
Contact spring force (cup springs):	376	N
Operating angle:	90°	
Switching angle:	90°	

Earthing switch EK6
24 kV-Types

Dimensional drawing
GCEM700092, Sheet 5



E = Earthing switch, **H** = Auxiliary switch, **L** = Rating plate, **S** = Operating/Switching angle
SE = Control electrode varies with panel design; **X** = View direction for switch position indicator, **Y** = View direction for switch position indicator,
C = ON, **O** = OFF,

Part number	Type	p	a	c	g	f	Md OFF	Md ON	Weight [1] kg
GCE7169312R0118	EK6-2406-275	275	674	550	210	50	220 Nm	120 Nm	16
GCE7169312M0106	EK6-2406-275	275	674	550	120 $^{0}_{-2}$	55	220 Nm	120 Nm	14

1) including earthing contact (Weight 3 Pieces: 1,8 kg)

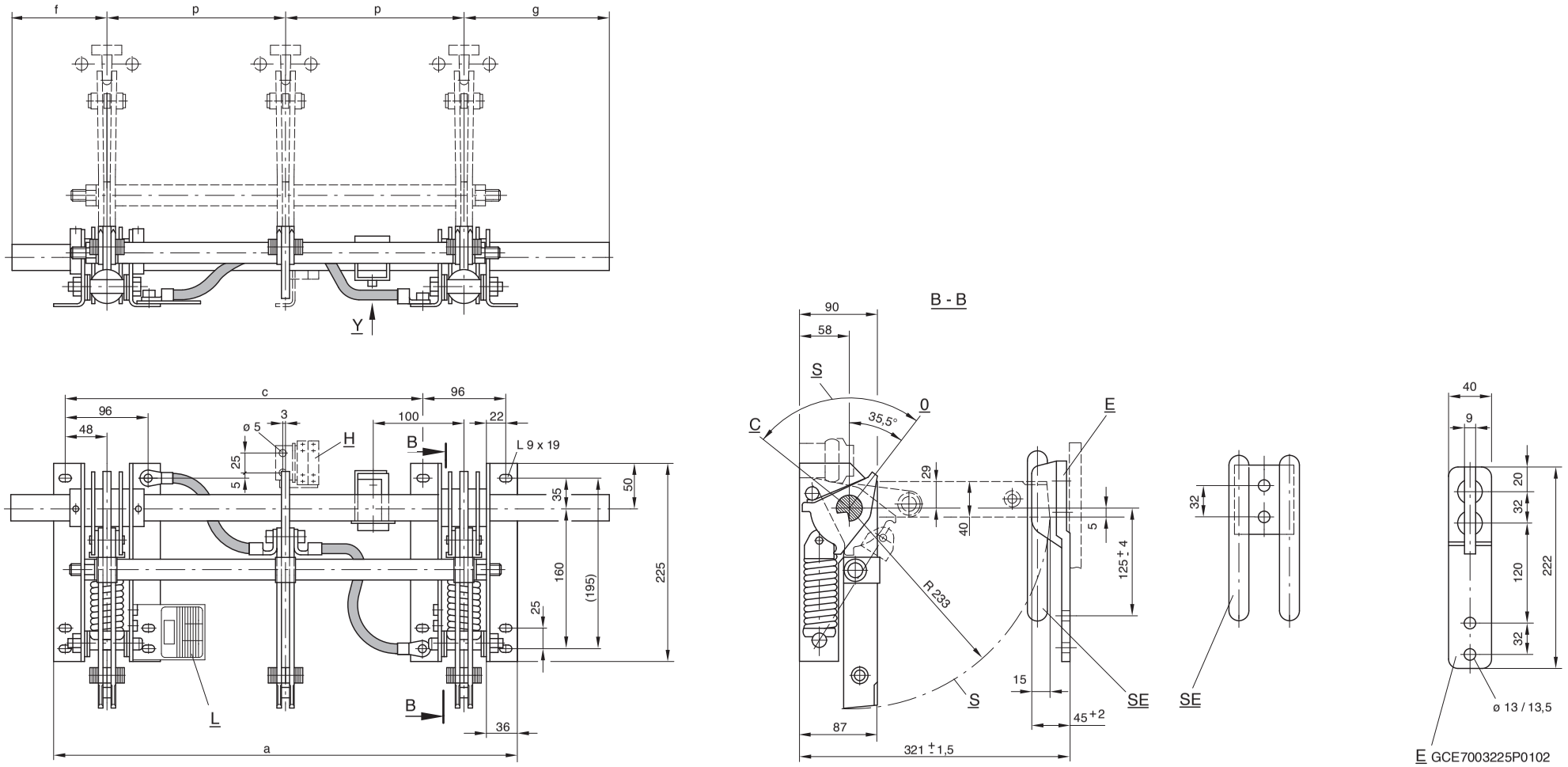
– See section 4 for auxiliary switches fitted.
– See dimensional drawing GCEM 360 524, sheet 1, for the shaft profile

Caution!
Observe the notes on installation in Section 4.

Contact blade distance:	8 ± 0,3	mm
Contact thickness:	9	mm
Contact force:	353	N
Contact spring force (cup springs):	376	N
Operating angle:	90°	
Switching angle:	90°	

Earthing switch EK6
24 kV-Types

Dimensional drawing
GCEM700092, Sheet 6



E = Earthing contact, **H** = Auxiliary switch, **L** = Rating plate, **S** = Operating/Switching angle, SE = Control electrode varies with panel design;
Y = View direction for switch position indicator, **C** = ON, **O** = OFF,

- See dimensional drawing GCEM 360 524, sheet 1, for shaft profile
- See section 4 for auxiliary switches fitted.

Caution!
Observe the notes on installation in section 4.

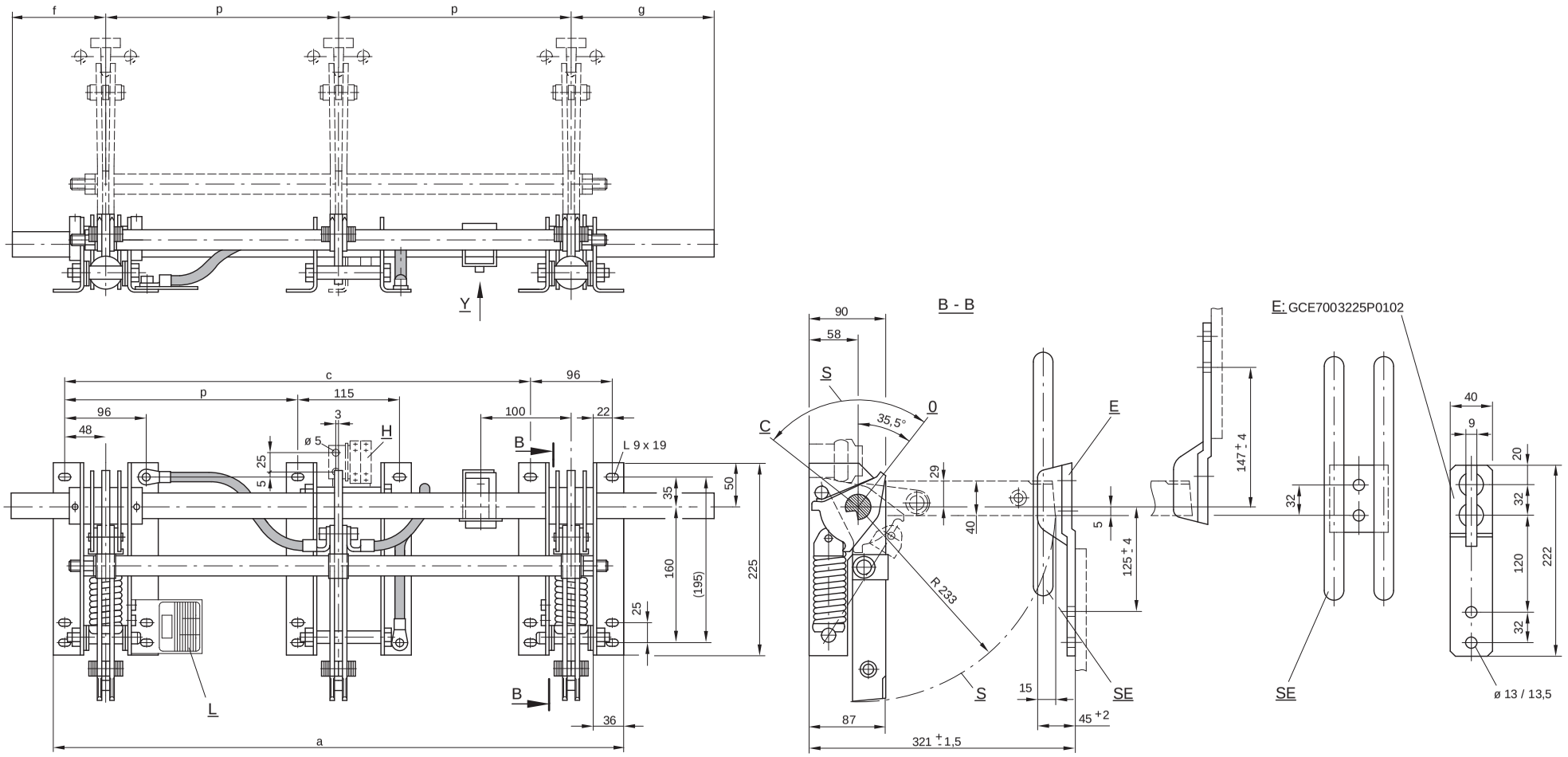
Contact blade distance:	8 ± 0,3	mm
Contact thickness:	9	mm
Contact force:	353	N
Contact spring force (cup springs):	376	N
Operating angle:	90°	
Switching angle:	90°	

Part number	Type	p	a	c	g	f	Md OFF	Md ON	Weight[1] kg
GCE7169312R0119	EK6 -2406-210	210	544	420	175	50	220 Nm	120 Nm	14

1) including earthing contact

Earthing switch EK6
24 kV-Types

Dimensional drawing
GCEM700092, Sheet 8



E = Earthing contact, **H** = Auxiliary plate, **L** = Rating plate, **S** = Operating/Switching angle, **SE** = Control electrode varies with panel design;
Y = View direction for switch position indicator, **C** = ON, **O** = OFF

- See dimensional drawing GCEM 360 524, sheet 1, for shaft profile
- See section 4 for auxiliary switches fitted

Caution!
Observe the notes on installation in section 4.

Contact blade distance:	8 ± 0,3	mm
Contact thickness:	9	mm
Contact force:	353	N
Contact spring force (cup springs):	376	N
Operating angle:	90°	
Switching angle:	90°	

Part number	Type	p	a	c	g	f	Md OFF	Md ON	Weight[1] kg
GCE7169312R0121	EK6-2406-275	275	674	550	210	50	220 Nm	120 Nm	16

1) including earthing contact

Earthing switch EK6
24 kV-Types

Dimensional drawing
GCEM700092, Sheet 9

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