

Tap Changer Type KHR

Specification, Assembly and Materials



Descriptions	Remarks
General Specifications	<ul style="list-style-type: none"> • available in one, two or three phase application • multi layer types upon request • shaft length is fixed in sizes 50, 70, 100 or 130 mm • driving mechanism can be either on the edge or in the middle of the phases • connection diagrams (on Page 4) can be applied in any variation to all types

Materials

Steel Parts	<ul style="list-style-type: none"> • available in stainless or mild steel • mild steel parts are cadmium or zinc plated 	galvanizing upon request
Polyamide Parts	Nylon 66 / superior mechanical properties against all acting forces / strong against UV lights	
Aluminium Parts	GAlSi12(Cu)	
Brass Parts	CuZn40Pb2 (CW617N) / F34 DIN 17 673	
Copper Parts	E - Cu F25 DIN 40 500	
Insulator Parts	Paper phenol - plastic resin based laminates / HP 2061.5 class of DIN 7735	
Transformer Cover Thickness	10 mm - 4 mm (6 spacer rings with each 1 mm)	
Current	10 A / 30 A / 63 A	
Upon Request	<ul style="list-style-type: none"> • aluminum parts protected by anodic oxidation • mild steel parts supplied in stainless steel • brass and copper parts are either tin-, silver- or cadmium-plated 	

Operating Instructions

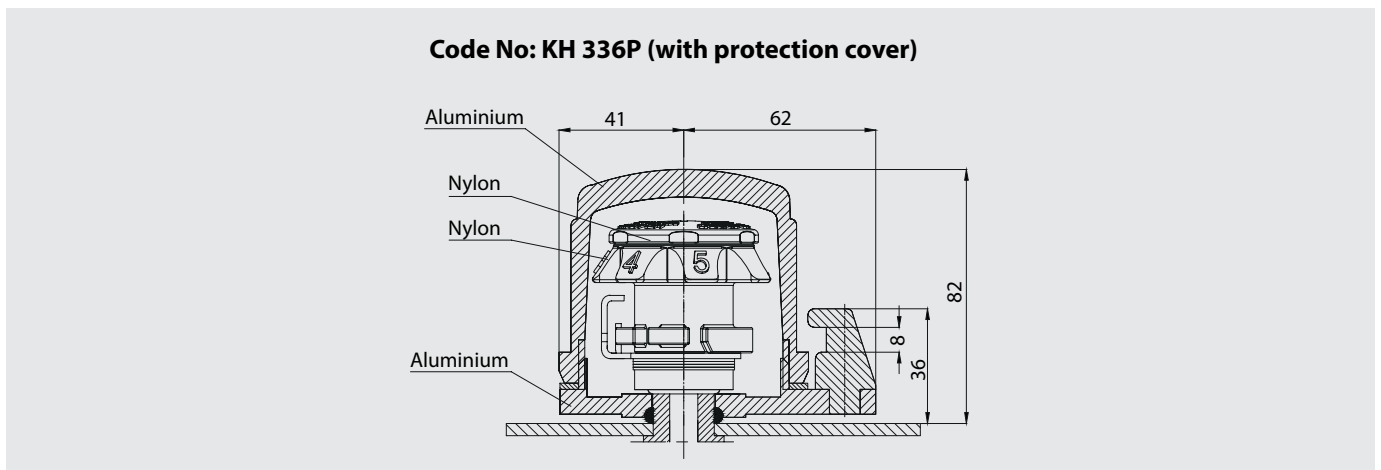
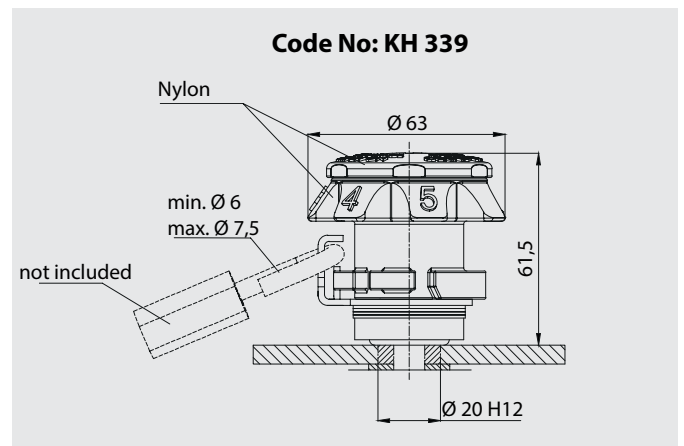
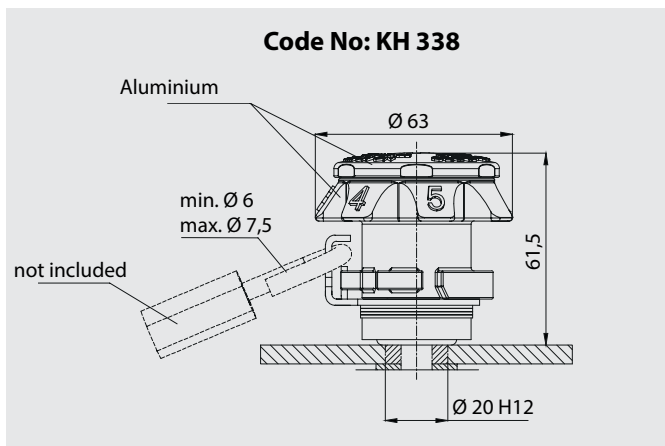
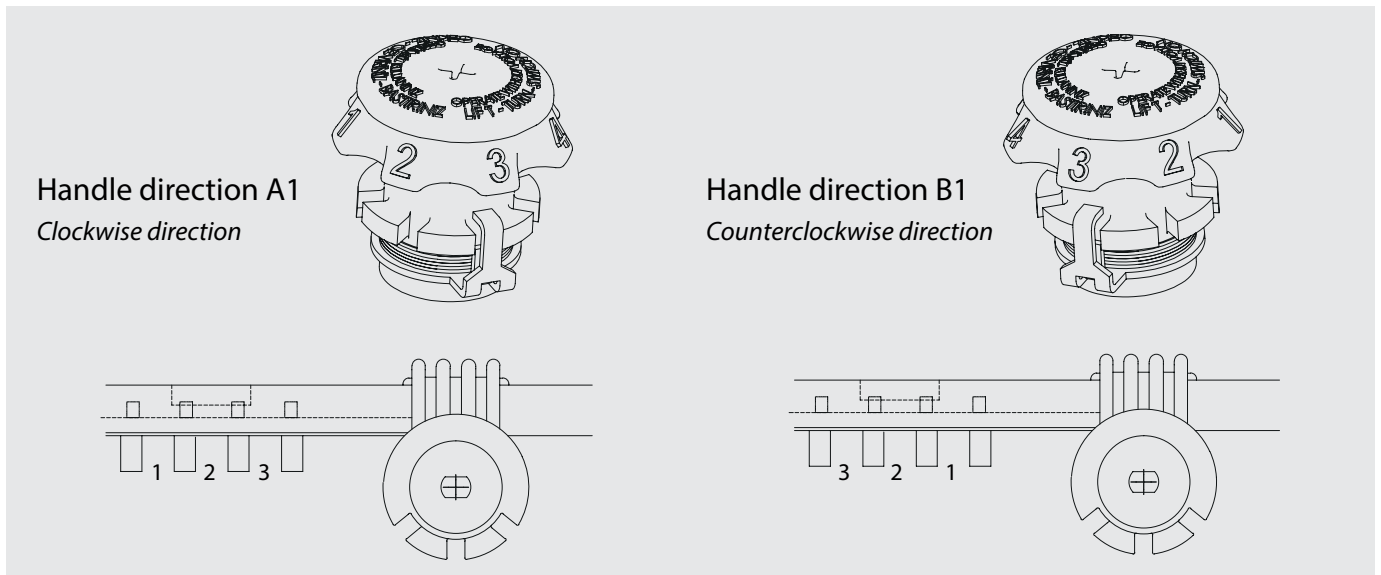
For each operation, the handle must first be pulled axially in the direction of the user in order to be subsequently rotated to the desired position. After being turned, the handle drops into the intended position by means of a high tension spring. Each position is precisely marked by a notch.

This process is clearly marked on control knob as; „ **LIFT - TURN - SWITCH ON** „ (can be engraved in any language)

Current	Contact inner dia. (cable connection)	Voltage Class	B.I.L (other values upon request)
10 A	Ø 2,1 mm	15 kV	95 kV
30 A	Ø 3,1 mm	20 kV	125 kV
63 A	Ø 5,1 mm	30 kV	170 kV

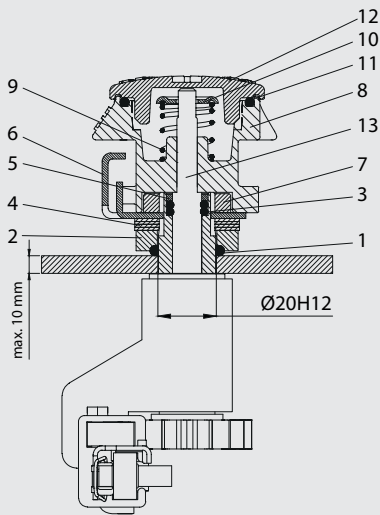
Type KHR Threephase Tap Changer

Handle Directions and Code No.



Type KHR Threephase Tap Changer Control Devices

Assembly according to the below mentioned order



1. O-ring 18,54 x 3,53
2. O-ring sleeve
3. O-ring 9,13 x 2,62
4. Spacer washer 13,9 x 10,2 x 3,5
5. Position stopper
7. Fixing nut
8. Control device body (Nylon-6)
9. Spring
10. Control device lid
11. O-ring
12. Control device cover
13. Shaft

Lid Assembly

The notched end of the shaft (13) is to be fitted into the slot inside the lid. Press the lid onto the shaft, turn it 90° and release. The lid will be locked automatically. To dismantle the lid, apply the assembly operation in reverse order.

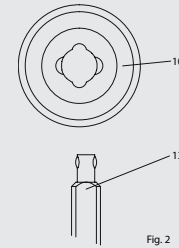
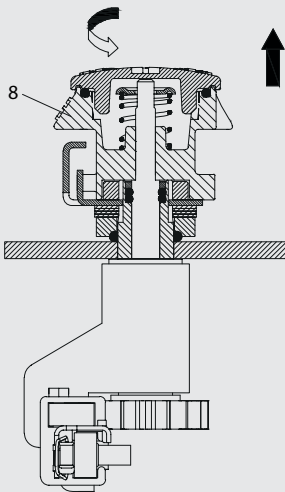


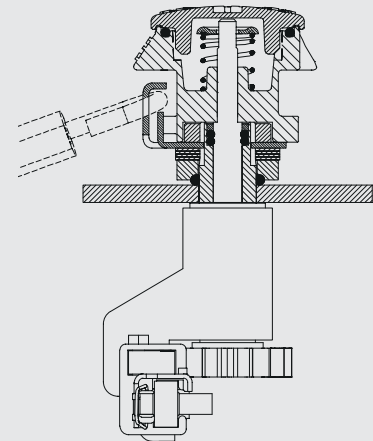
Fig. 2

Position Changing Mode



In order to change the position of the tap changer, pull the control device body (8) along the direction of the arrow, turn it to the desired position notch and release. The spring system will automatically lock the position via position stopper and position notch on the body.

Normally Rest Mode

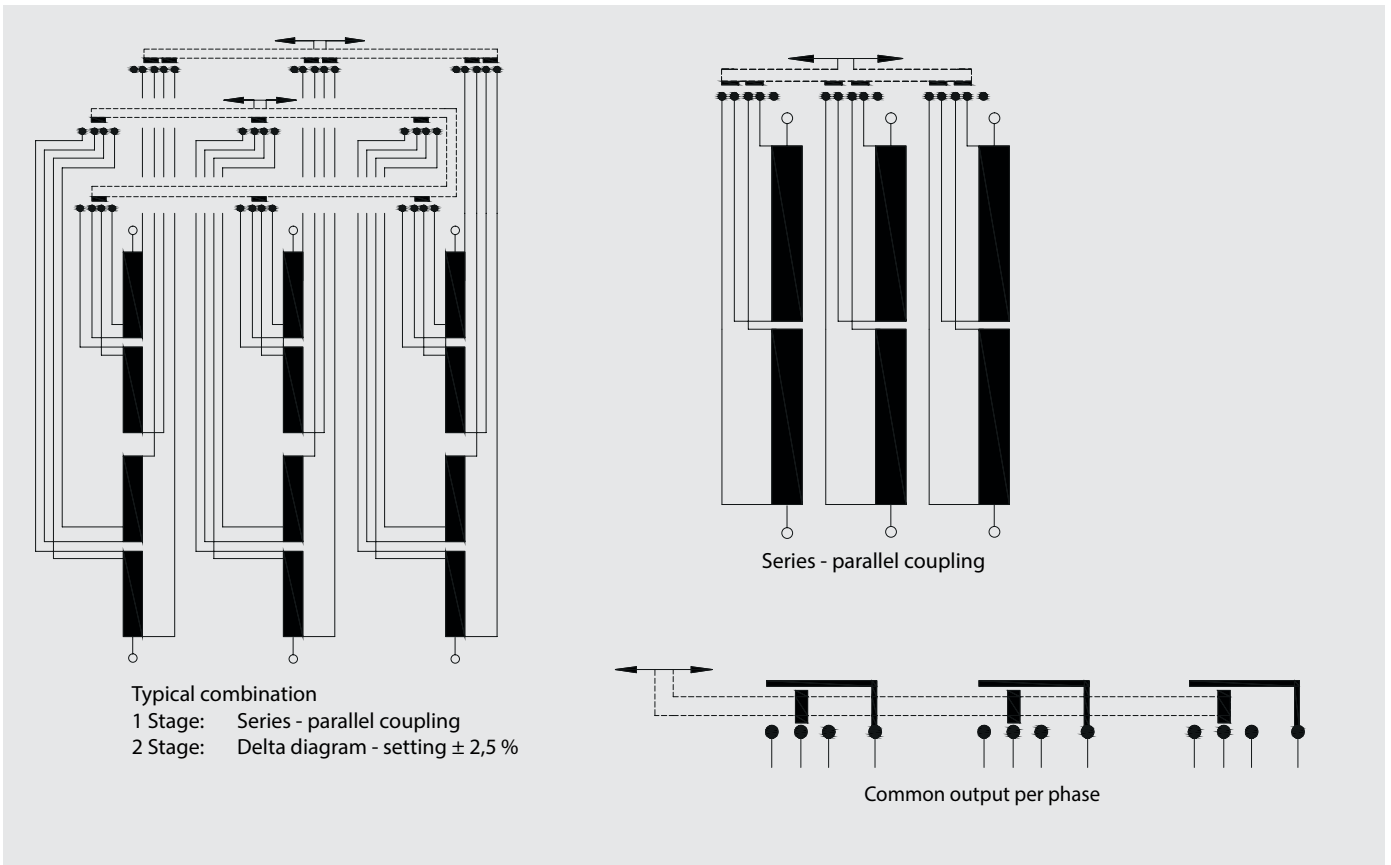
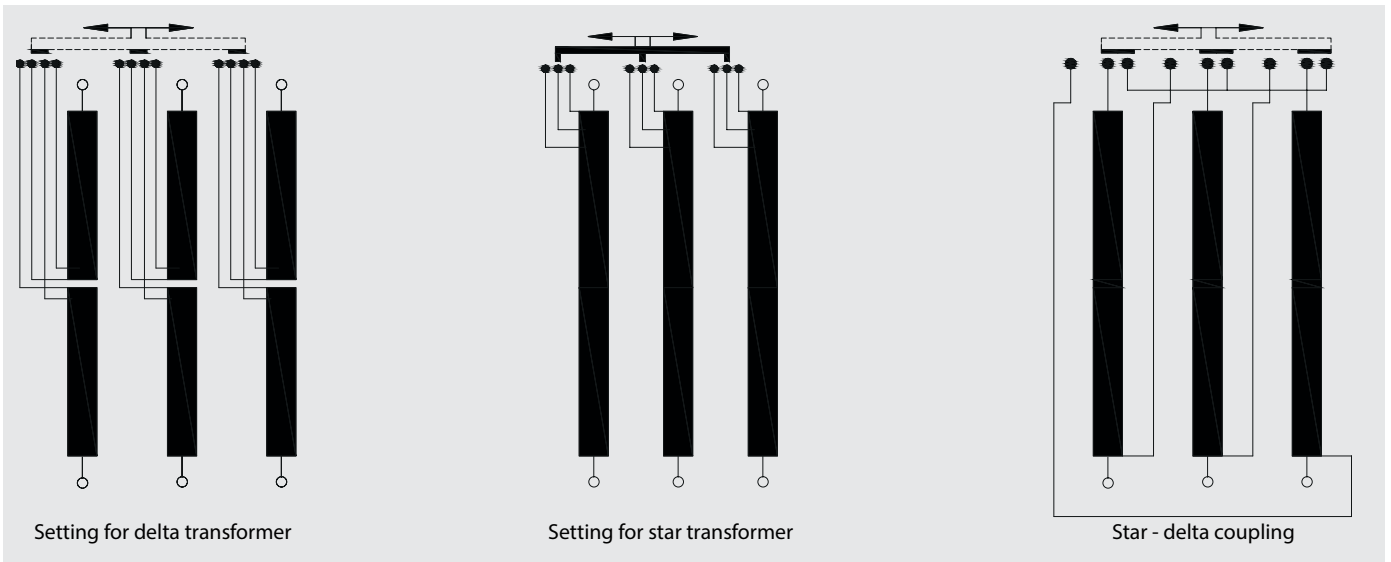


Notes

For the assembly of the tap changer, the thickness of the transformer cover is assumed to be 10 mm. If the cover thickness is lower than 10 mm the additional spacer washer (4) can be used to accommodate up to 6 mm (1 mm per spacer washer) of the transformer cover thickness. The resulting thickness is to be 10 mm. For example if the cover thickness is 6 mm, 4 washers are to be used to balance the difference of 4 mm. If the cover thickness is 10 mm there is no washer needed.

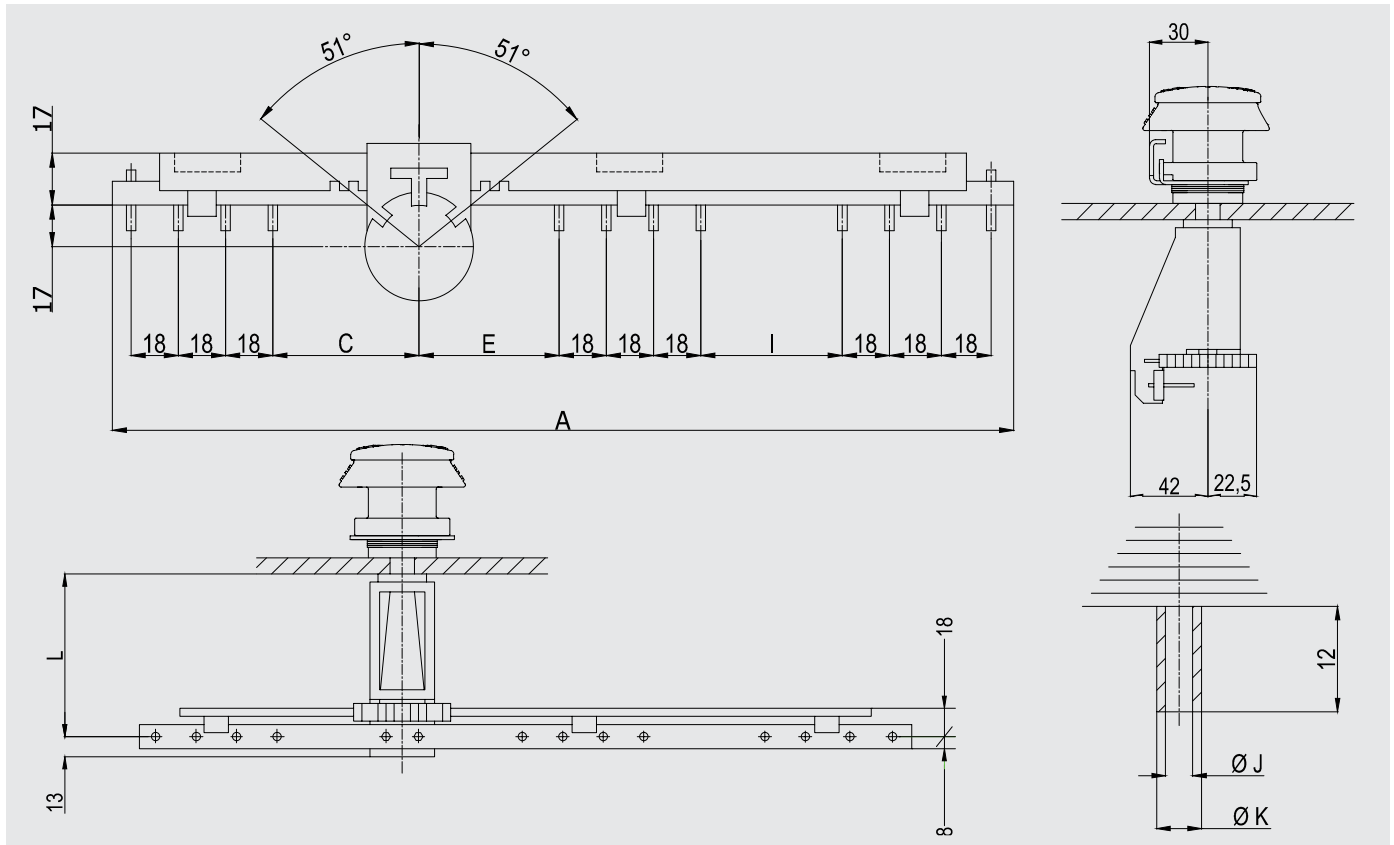
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Connection Diagrams



Type KHR Threephase Tap Changer

Delta Diagram 20-30 kV / 30-63 A / 3-7 Positions / Setting 2.5 % per Position

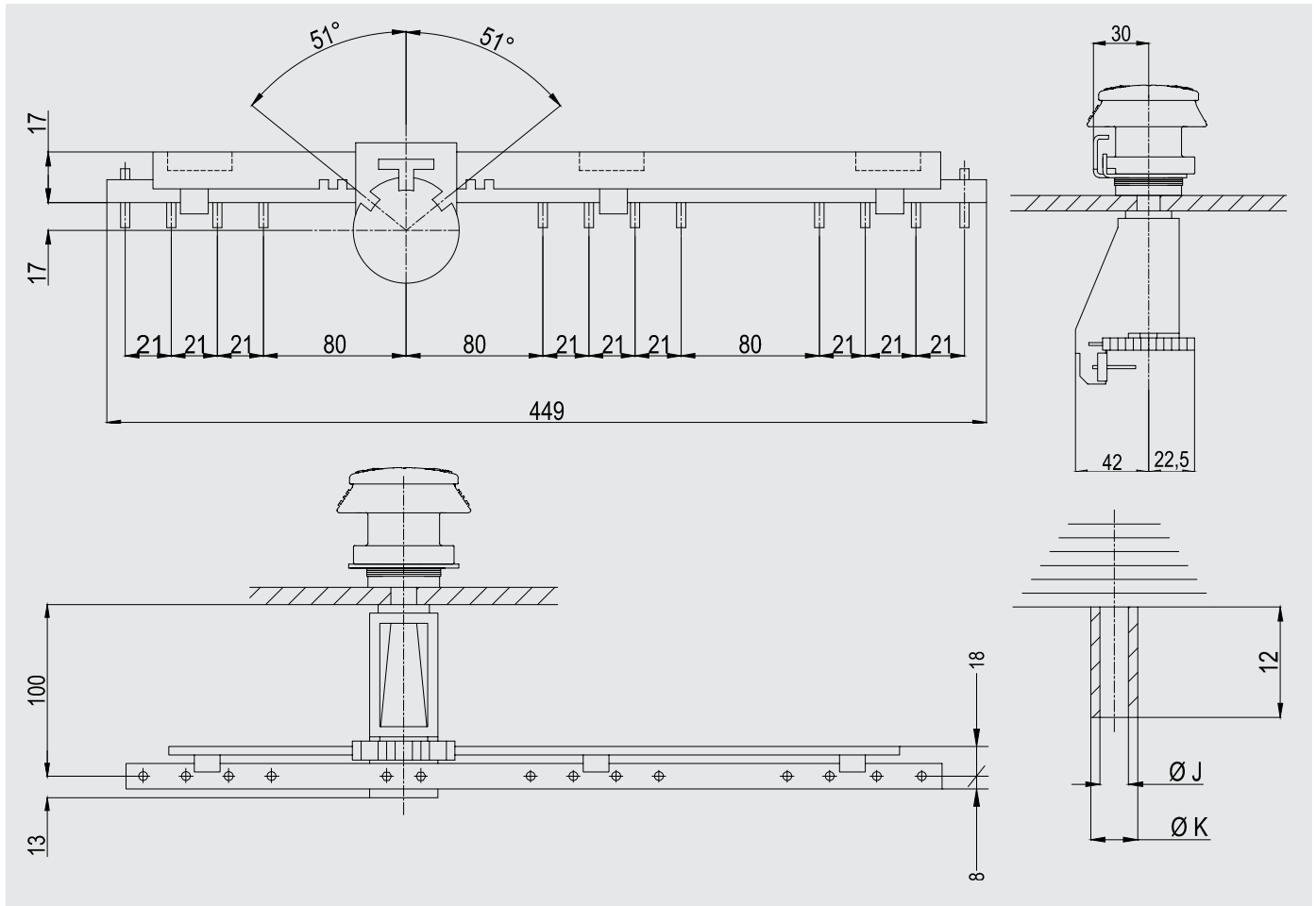


L	Number of Positions	20 kV				30 kV						
		A	10 A Unit No.	30 A Unit No.	63 A Unit No.	A	10 A Unit No.	30 A Unit No.	63 A Unit No.	C	20 kV	30 kV
50	3	347	KC136D341	KC136D342	KC136D343	-	-	-	-	E	55	80
	4	401	KC136D441	KC136D442	KC136D443	-	-	-	-	I	55	80
	5	455	KC136D541	KC136D542	KC136D543	-	-	-	-			
	6	509	KC136D641	KC136D642	KC136D643	-	-	-	-			
	7	563	KC136D741	KC136D742	KC136D743	-	-	-	-			
70	3	347	KD136D341	KD136D342	KD136D343	422	KD136D351	KD136D352	KD136D353			
	4	401	KD136D441	KD136D442	KD136D443	476	KD136D451	KD136D452	KD136D453			
	5	455	KD136D541	KD136D542	KD136D543	530	KD136D551	KD136D552	KD136D553			
	6	509	KD136D641	KD136D642	KD136D643	584	KD136D651	KD136D652	KD136D653			
	7	563	KD136D741	KD136D742	KD136D743	638	KD136D751	KD136D752	KD136D753			
100	3	347	KE136D341	KE136D342	KE136D343	422	KE136D351	KE136D352	KE136D353			
	4	401	KE136D441	KE136D442	KE136D443	476	KE136D451	KE136D452	KE136D453			
	5	455	KE136D541	KE136D542	KE136D543	530	KE136D551	KE136D552	KE136D553			
	6	509	KE136D641	KE136D642	KE136D643	584	KE136D651	KE136D652	KE136D653			
	7	563	KE136D741	KE136D742	KE136D743	638	KE136D751	KE136D752	KE136D753			
130	3	347	KF136D341	KF136D342	KF136D343	422	KF136D351	KF136D352	KF136D353			
	4	401	KF136D441	KF136D442	KF136D443	476	KF136D451	KF136D452	KF136D453			
	5	455	KF136D541	KF136D542	KF136D543	530	KF136D551	KF136D552	KF136D553			
	6	509	KF136D641	KF136D642	KF136D643	584	KF136D651	KF136D652	KF136D653			
	7	563	KF136D741	KF136D742	KF136D743	638	KF136D751	KF136D752	KF136D753			

	10 A	30 A	63 A
J	2,1	3,1	5,1
K	4	5	7

Type KHR Threephase Tap Changer

Delta Diagram 30 kV / 30-63 A / 3-7 Positions (*) Setting 2.5 % per Position



L	Number of Positions	30 kV		
		A	30 A Unit No.	63 A Unit No.

100	3	449	KE136D352A	KE136D353A
	4	512	KE136D452A	KE136D453A
	5	575	KE136D552A	KE136D553A
	6	638	KE136D652A	KE136D653A
	7	701	KE136D752A	KE136D753A

130	3	449	KF136D352A	KF136D353A
	4	512	KF136D452A	KF136D453A
	5	575	KF136D552A	KF136D553A
	6	638	KF136D652A	KF136D653A
	7	701	KF136D752A	KF136D753A

	30 A	63 A
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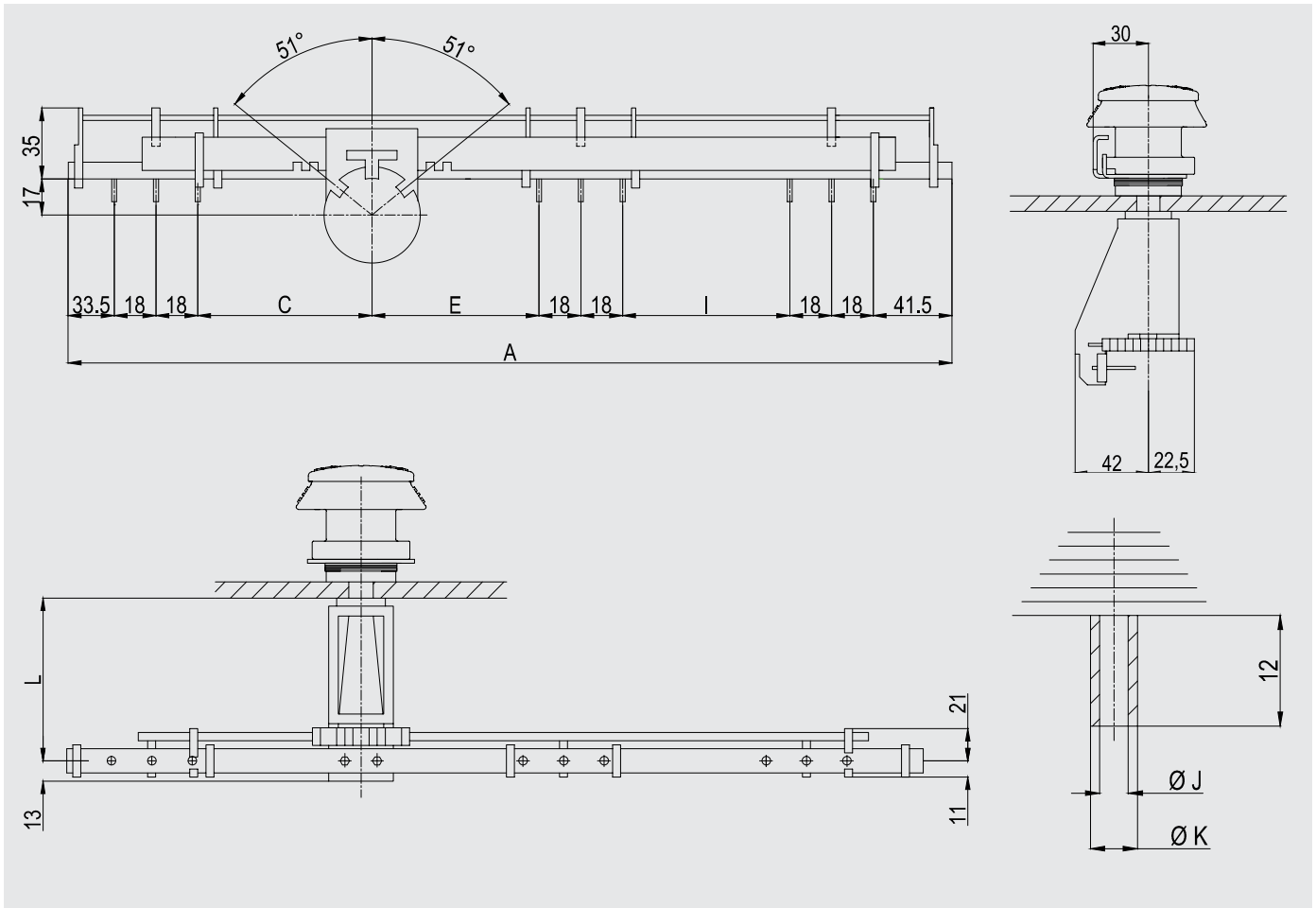
J 3,1 5,1

K 5 7

(*) Special type with 21 distance between contacts for 30 kV

Type KHR Threephase Tap Changer

Star Diagram 20-30 kV / 10-63 A / 3-7 Positions / Setting 2.5 % per Position



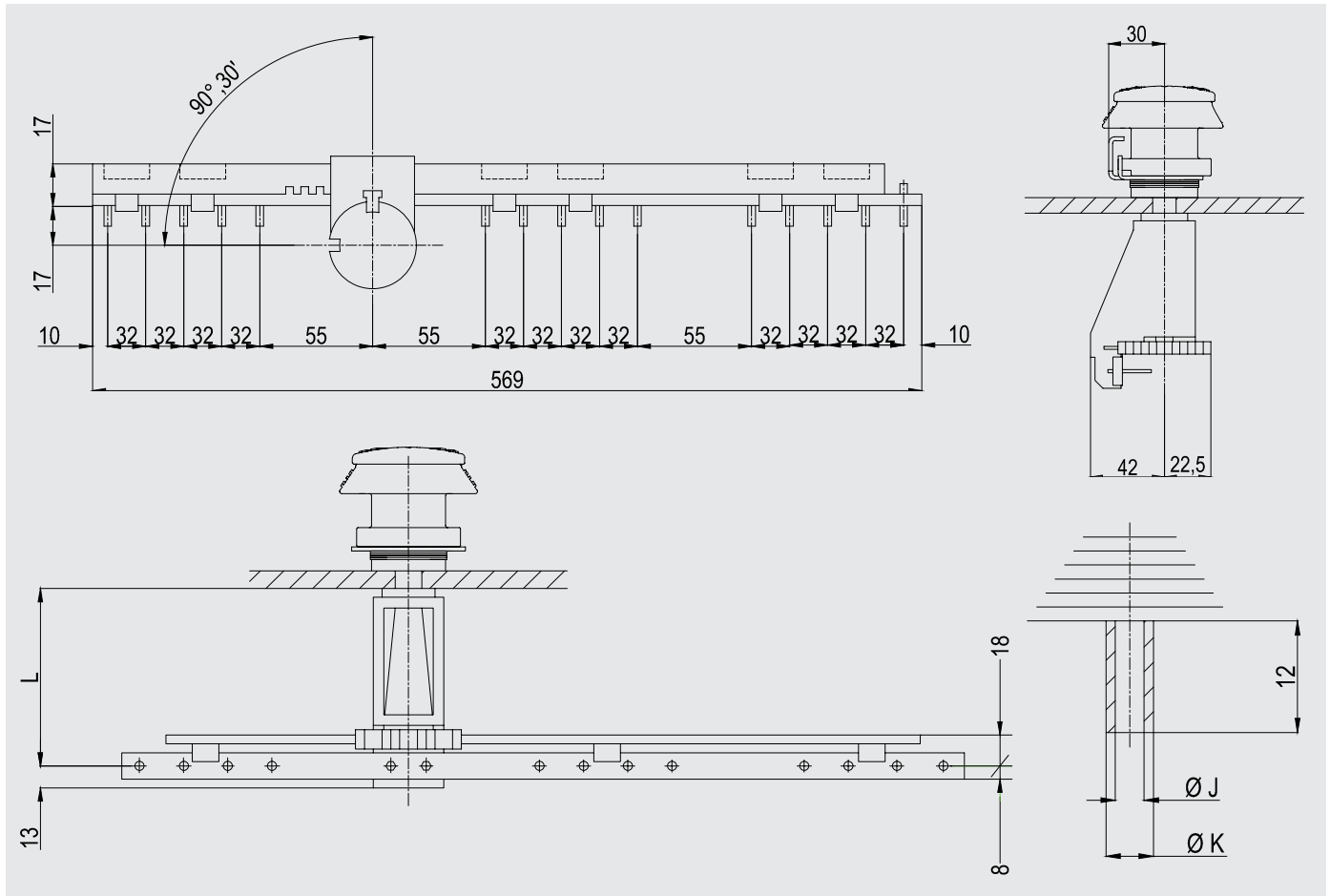
L	Number of Positions	20 kV				30 kV			
		A	10 A Unit No.	30 A Unit No.	63 A Unit No.	A	10 A Unit No.	30 A Unit No.	63 A Unit No.
70	3	347	KD136S341	KD136S342	KD136S343	455	KD136S351	KD136S352	KD136S353
	5	456	KD136S541	KD136S542	KD136S543	564	KD136S551	KD136S552	KD136S553
	7	564	KD136S741	KD136S742	KD136S743	672	KD136S751	KD136S752	KD136S753
100	3	347	KE136S341	KE136S342	KE136S343	455	KE136S351	KE136S352	KE136S353
	5	456	KE136S541	KE136S542	KE136S543	564	KE136S551	KE136S552	KE136S553
	7	564	KE136S741	KE136S742	KE136S743	672	KE136S751	KE136S752	KE136S753
130	3	347	KF136S341	KF136S342	KF136S343	455	KF136S351	KF136S352	KF136S353
	5	456	KF136S541	KF136S542	KF136S543	564	KF136S551	KF136S552	KF136S553
	7	564	KF136S741	KF136S742	KF136S743	672	KF136S751	KF136S752	KF136S753

	20 kV	30 kV
C	55	91
E	55	91
I	55	91

	10 A	30 A	63 A
J	2,1	3,1	5,1
K	4	5	7

Type KHR Threephase Tap Changer

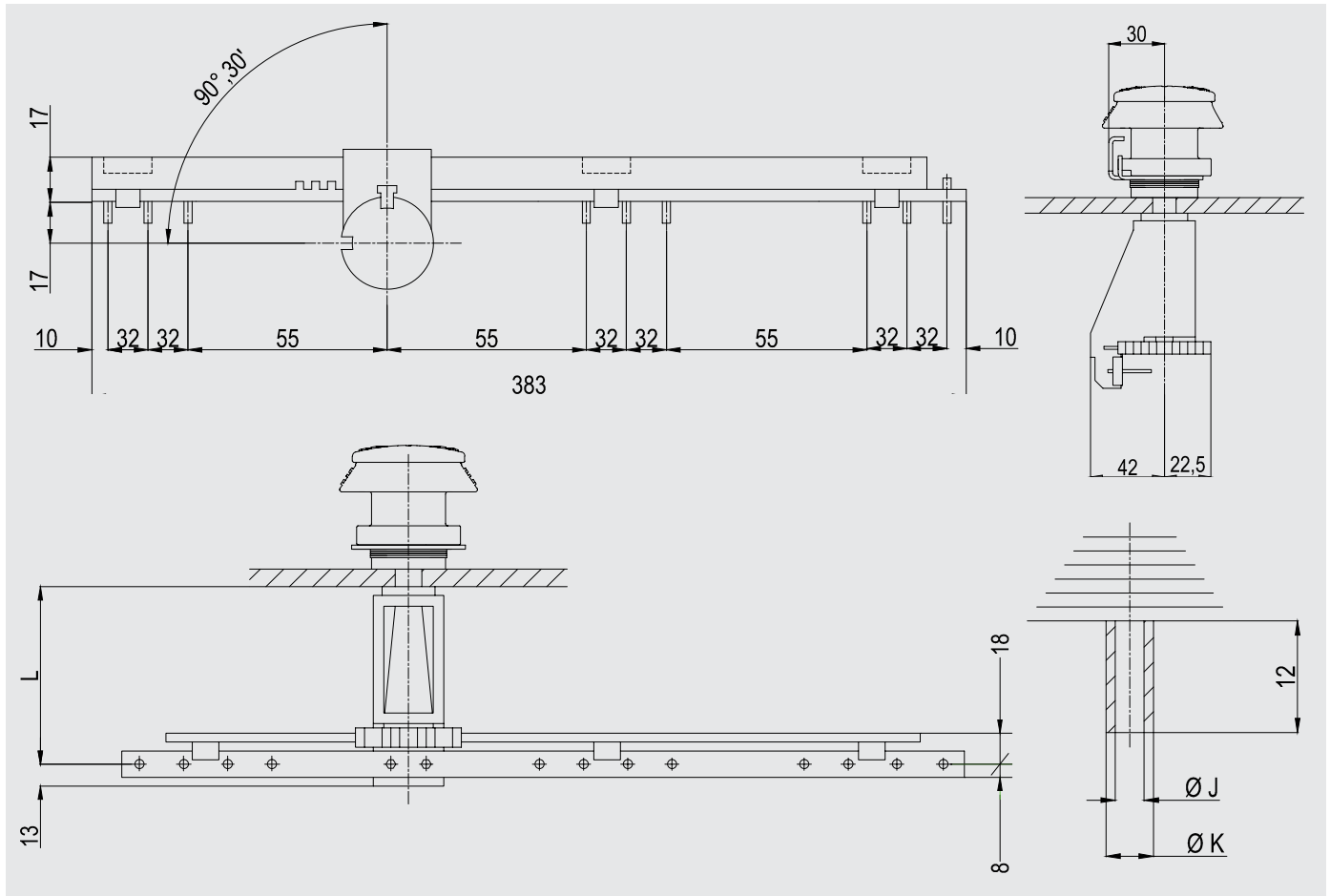
Series Parallel Coupling 15-20 kV / 30-63 A



L	Number of Positions	30 A / Unit No.	63 A / Unit No.		
				30 A	63 A
50	2	KC136P272	KC136P273	J	3,1 5,1
70	2	KD136P272	KD136P273	K	5 7
100	2	KE136P272	KE136P273		
130	2	KF136P272	KF136P273		

Type KHR Threephase Tap Changer

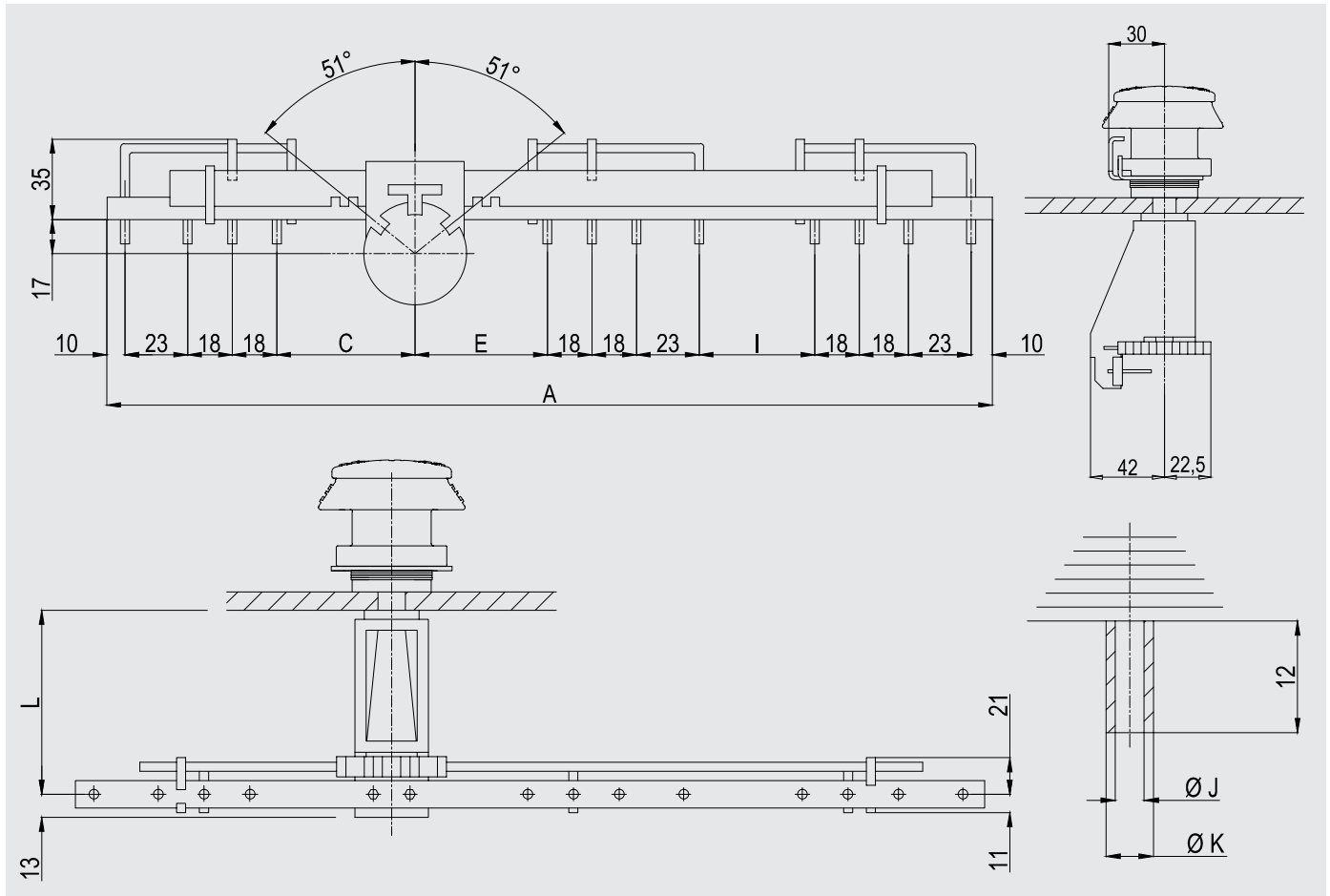
Star - Delta Coupling 15-20 kV / 30-63 A



L	Number of Positions	30 A / Unit No.	63 A / Unit No.		
				30 A	63 A
50	2	KC136R272	KC136R273	J	3,1 5,1
70	2	KD136R272	KD136R273	K	5 7
100	2	KE136R272	KE136R273		
130	2	KF136R272	KF136R273		

Type KHR Threephase Tap Changer

Common Output per Phase 20-30 kV / 10-63 A / 3-7 Positions / Setting 2.5 % per Position



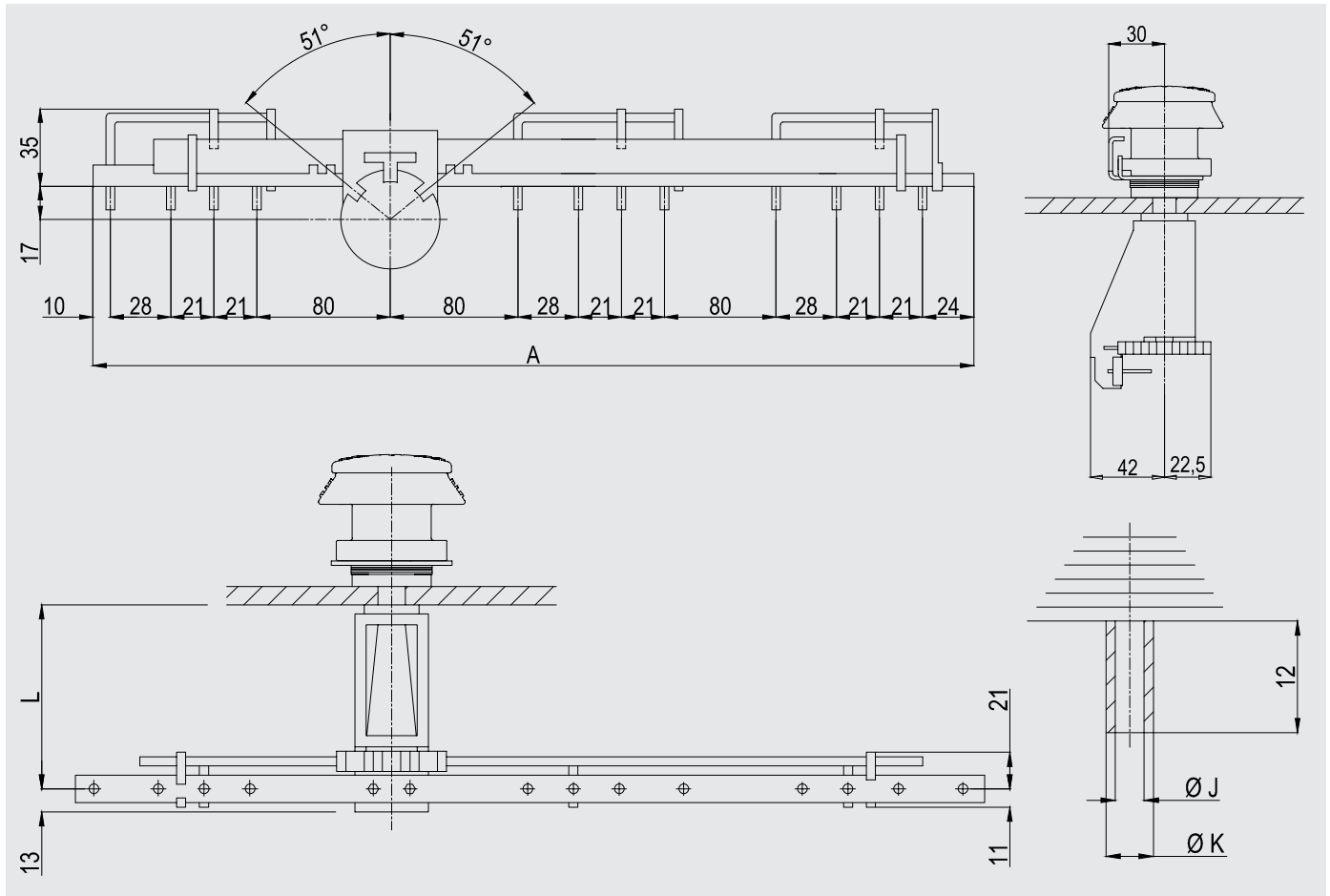
L	Number of Positions	20 kV				30 kV			
		A	10 A Unit No.	30 A Unit No.	63 A Unit No.	A	10 A Unit No.	30 A Unit No.	63 A Unit No.
50	3	392	KC136C341	KC136C342	KC136C343	467	-	-	-
	5	500	KC136C541	KC136C542	KC136C543	575	-	-	-
	7	608	KC136C741	KC136C742	KC136C743	683	-	-	-
70	3	392	KD136C341	KD136C342	KD136C343	455	KD136C351	KD136C352	KD136C353
	5	500	KD136C541	KD136C542	KD136C543	564	KD136C551	KD136C552	KD136C553
	7	608	KD136C741	KD136C742	KD136C743	672	KD136C751	KD136C752	KD136C753
100	3	392	KE136C341	KE136C342	KE136C343	455	KE136C351	KE136C352	KE136C353
	5	500	KE136C541	KE136C542	KE136C543	564	KE136C551	KE136C552	KE136C553
	7	608	KE136C741	KE136C742	KE136C743	672	KE136C751	KE136C752	KE136C753
130	3	392	KF136C341	KF136C342	KF136C343	455	KF136C351	KF136C352	KF136C353
	5	500	KF136C541	KF136C542	KF136C543	564	KF136C551	KF136C552	KF136C553
	7	608	KF136C741	KF136C742	KF136C743	672	KF136C751	KF136C752	KF136C753

	20 kV	30 kV
C	65	90
E	65	90
I	65	90

	10 A	30 A	63 A
J	2,1	3,1	5,1
K	4	5	7

Type KHR Threephase Tap Changer

Common Output per Phase 30 kV/10-63 A / 3-7 Positions / Setting 2.5 % per Position

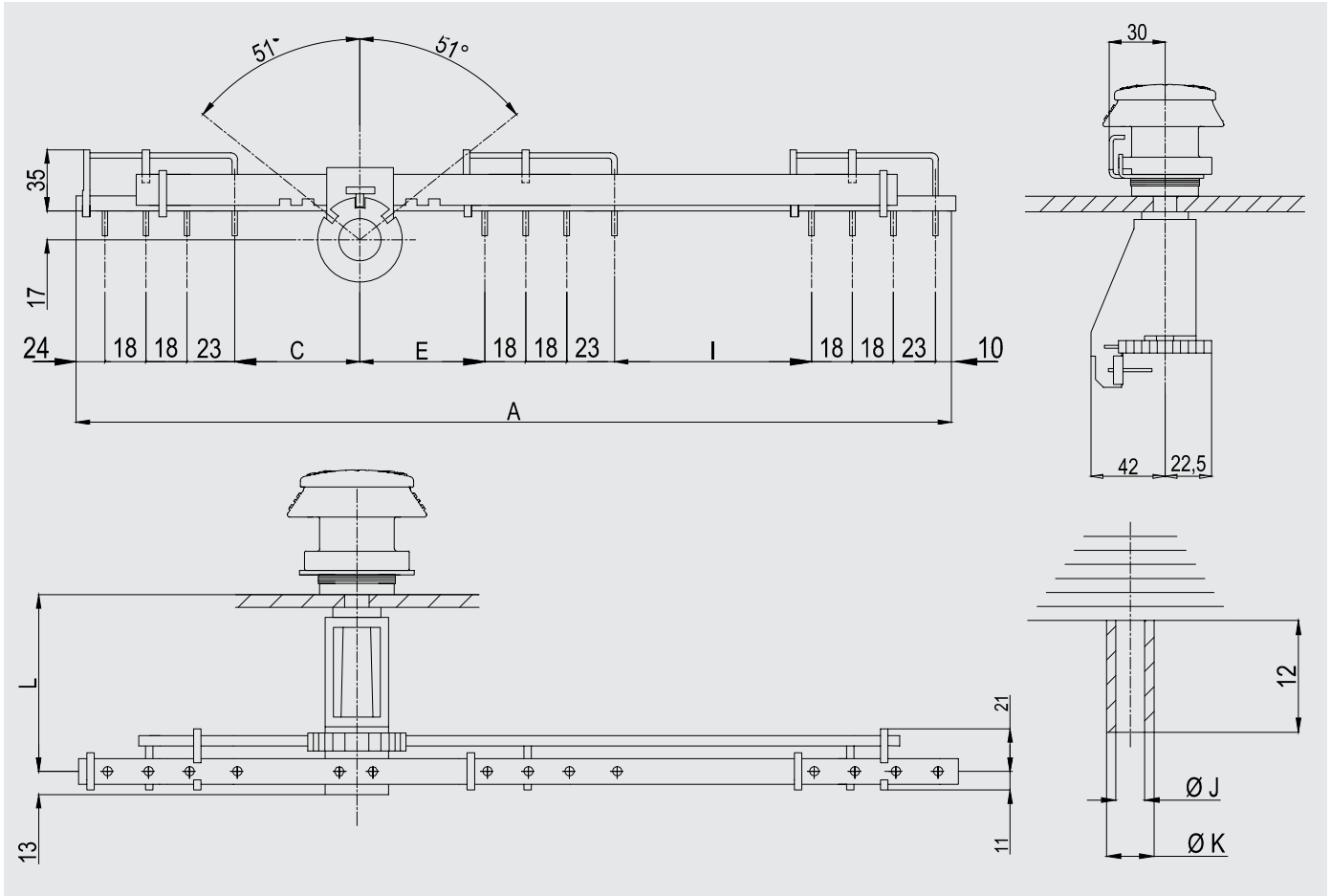


L	Number of Positions	30 kV			
		A	10 A Unit No.	30 A Unit No.	63 A Unit No.
100	3	484	KE136C351A	KE136C352A	KE136C353A
	5	610	KE136C551A	KE136C552A	KE136C553A
	7	736	KE136C751A	KE136C752A	KE136C753A
130	3	484	KF136C351A	KF136C352A	KF136C353A
	5	610	KF136C551A	KF136C552A	KF136C553A
	7	736	KF136C751A	KF136C752A	KF136C753A

	10 A	30 A	63 A
J	2,1	3,1	5,1
K	4	5	7

Type KHR Threephase Tap Changer

Common Output per Phase 20-30 kV / 10-63 A / 3-7 Positions / Setting 2.5 % per Position



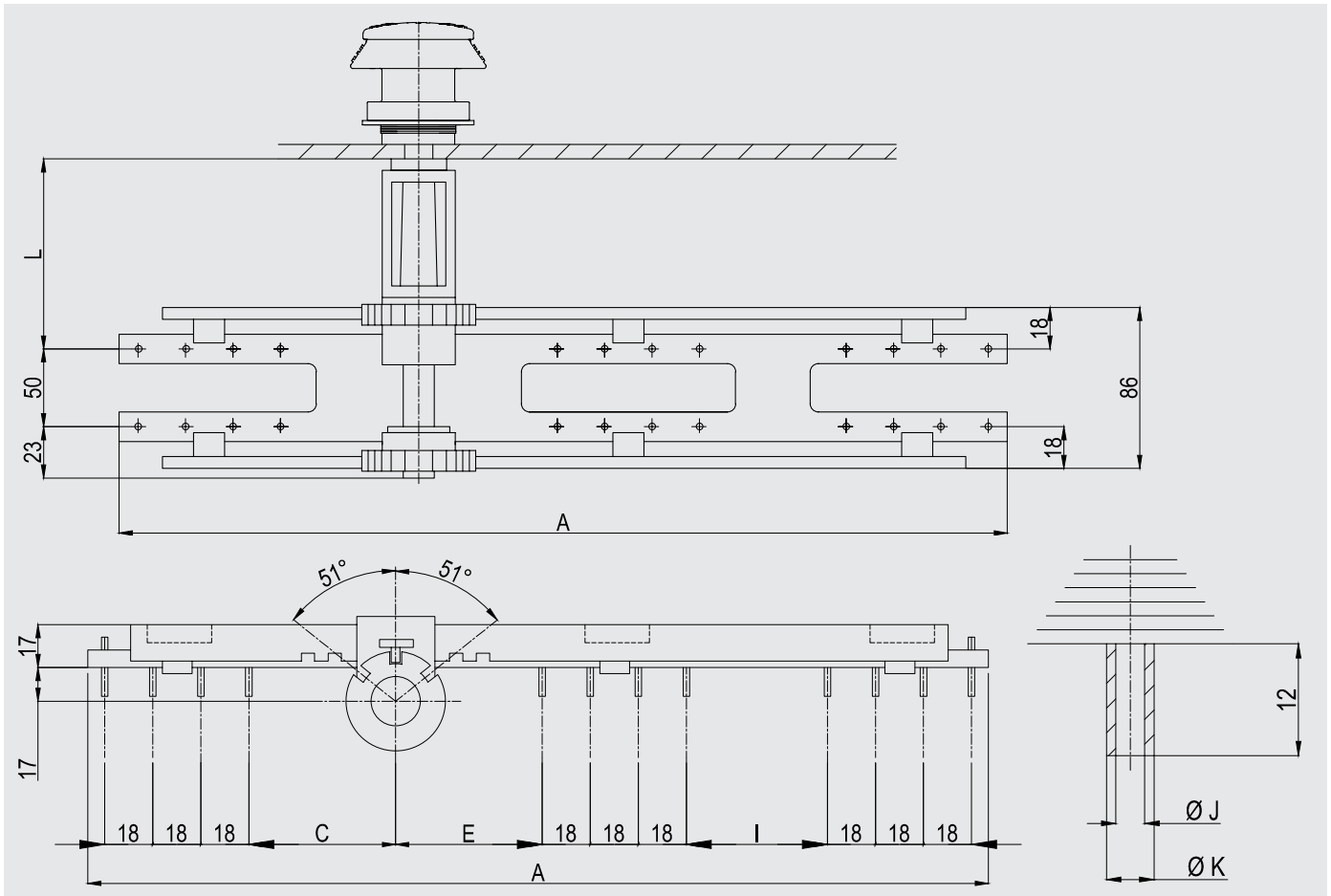
L	Number of Positions	20 kV				30 kV			
		A	10 A Unit No.	30 A Unit No.	63 A Unit No.	A	10 A Unit No.	30 A Unit No.	63 A Unit No.
50	3	495	KC136C341B	KC136C342B	KC136C343B	533	-	-	-
	5	603	KC136C541B	KC136C542B	KC136C543B	641	-	-	-
	7	711	KC136C741B	KC136C742B	KC136C743B	749	-	-	-
70	3	495	KD136C341B	KD136C342B	KD136C343B	533	KD136C351B	KD136C352B	KD136C353B
	5	603	KD136C541B	KD136C542B	KD136C543B	641	KD136C551B	KD136C552B	KD136C553B
	7	711	KD136C741B	KD136C742B	KD136C743B	749	KD136C751B	KD136C752B	KD136C753B
100	3	495	KE136C341B	KE136C342B	KE136C343B	533	KE136C351B	KE136C352B	KE136C353B
	5	603	KE136C541B	KE136C542B	KE136C543B	641	KE136C551B	KE136C552B	KE136C553B
	7	711	KE136C741B	KE136C742B	KE136C743B	749	KE136C751B	KE136C752B	KE136C753B
130	3	495	KF136C341B	KF136C342B	KF136C343B	533	KF136C351B	KF136C352B	KF136C353B
	5	603	KF136C541B	KF136C542B	KF136C543B	641	KF136C551B	KF136C552B	KF136C553B
	7	711	KF136C741B	KF136C742B	KF136C743B	749	KF136C751B	KF136C752B	KF136C753B

	20 kV	30 kV
C	71	90
E	71	90
I	142	142

	10 A	30 A	63 A
J	2,1	3,1	5,1
K	4	5	7

Type KHR Threephase Tap Changer

Two Stages - Delta Diagram 20-30 kV / 10-63 A / 3-7 Positions / Setting 2.5 % per Position



L	Number of Positions	20 kV				30 kV			
		A	10 A Unit No.	30 A Unit No.	63 A Unit No.	A	10 A Unit No.	30 A Unit No.	63 A Unit No.
50	3	358	KC146D341	KC146D342	KC146D343	-	-	-	-
	4	412	KC146D441	KC146D442	KC146D443	-	-	-	-
	5	466	KC146D541	KC146D542	KC146D543	-	-	-	-
	6	520	KC146D641	KC146D642	KC146D643	-	-	-	-
	7	574	KC146D741	KC146D742	KC146D743	-	-	-	-
70	3	358	KD146D341	KD146D342	KD146D343	433	KD146D351	KD146D352	KD146D353
	4	412	KD146D441	KD146D442	KD146D443	487	KD146D451	KD146D452	KD146D453
	5	466	KD146D541	KD146D542	KD146D543	541	KD146D551	KD146D552	KD146D553
	6	520	KD146D641	KD146D642	KD146D643	595	KD146D651	KD146D652	KD146D653
	7	574	KD146D741	KD146D742	KD146D743	649	KD146D751	KD146D752	KD146D753
100	3	358	KE146D341	KE146D342	KE146D343	433	KE146D351	KE146D352	KE146D353
	4	412	KE146D441	KE146D442	KE146D443	487	KE146D451	KE146D452	KE146D453
	5	466	KE146D541	KE146D542	KE146D543	541	KE146D551	KE146D552	KE146D553
	6	520	KE146D641	KE146D642	KE146D643	595	KE146D651	KE146D652	KE146D653
	7	574	KE146D741	KE146D742	KE146D743	649	KE146D751	KE146D752	KE146D753
130	3	358	KF146D341	KF146D342	KF146D343	433	KF146D351	KF146D352	KF146D353
	4	412	KF146D441	KF146D442	KF146D443	487	KF146D451	KF146D452	KF146D453
	5	466	KF146D541	KF146D542	KF146D543	541	KF146D551	KF146D552	KF146D553
	6	520	KF146D641	KF146D642	KF146D643	595	KF146D651	KF146D652	KF146D653
	7	574	KF146D741	KF146D742	KF146D743	649	KF146D751	KF146D752	KF146D753

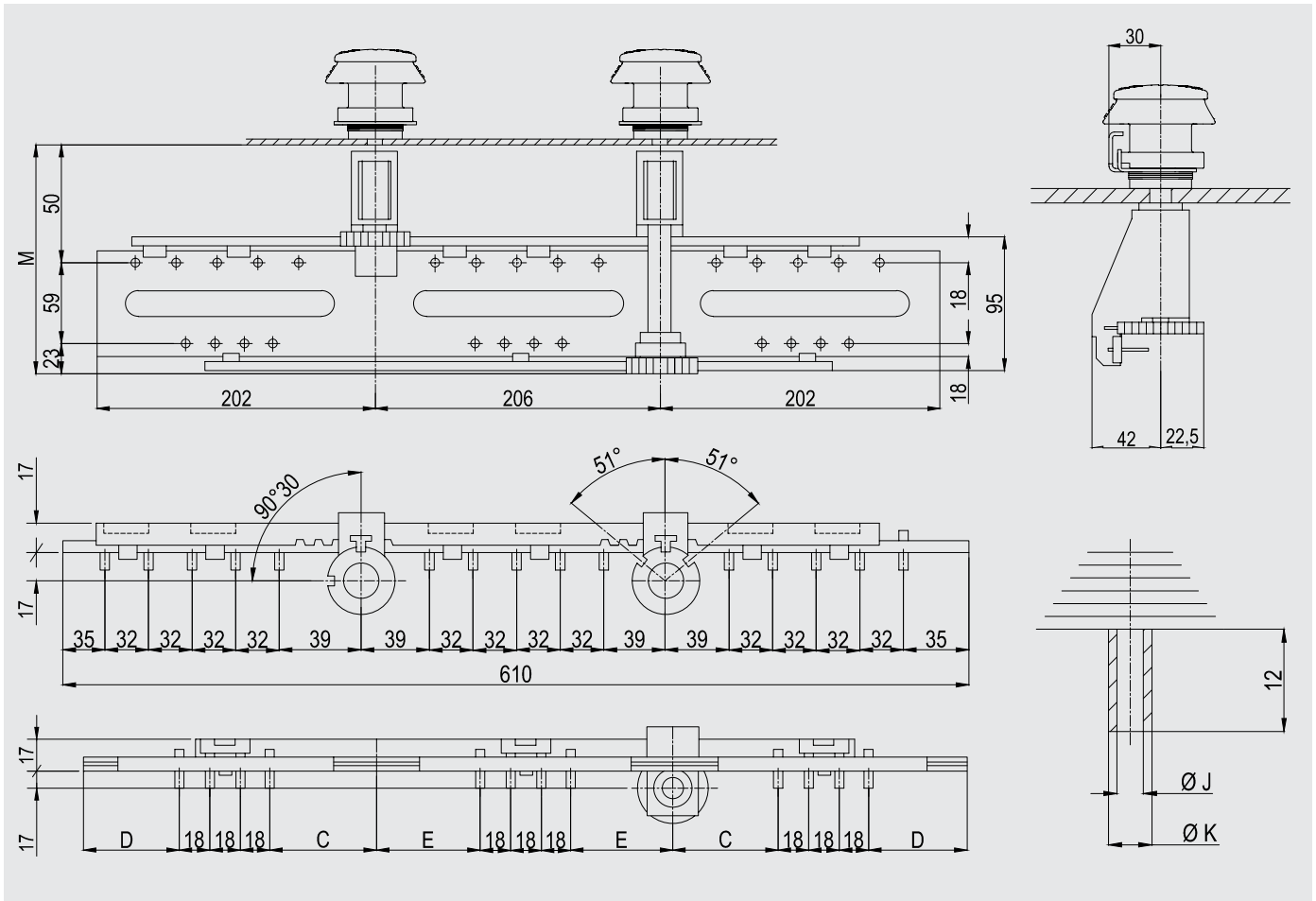
	20 kV	30 kV
C	55	80
E	55	80
I	55	80

	10 A	30 A	63 A
J	2,1	3,1	5,1
K	4	5	7

Type KHR Threephase Tap Changer

1. Stage Series Parallel Coupling 15-20 kV / 30-63 A

2. Stage Delta Diagram 20 kV / 30-63 A / 3-7 Positions / Setting 2.5 % per Position



L	Number of Positions	20 kV			
		M	10 A Unit No.	30 A Unit No.	63 A Unit No.
50	3	132	KC146H371	KC146H372	KC146H373
	4		KC146H471	KC146H472	KC146H473
	5		KC146H571	KC146H572	KC146H573
	6		KC146H671	KC146H672	KC146H673
	7		KC146H771	KC146H772	KC146H773
70	3	152	KD146H371	KD146H372	KD146H373
	4		KD146H471	KD146H472	KD146H473
	5		KD146H571	KD146H572	KD146H573
	6		KD146H671	KD146H672	KD146H673
	7		KD146H771	KD146H772	KD146H773
100	3	182	KE146H371	KE146H372	KE146H373
	4		KE146H471	KE146H472	KE146H473
	5		KE146H571	KE146H572	KE146H573
	6		KE146H671	KE146H672	KE146H673
	7		KE146H771	KE146H772	KE146H773
130	3	212	KF146H371	KF146H372	KF146H373
	4		KF146H471	KF146H472	KF146H473
	5		KF146H571	KF146H572	KF146H573
	6		KF146H671	KF146H672	KF146H673
	7		KF146H771	KF146H772	KF146H773

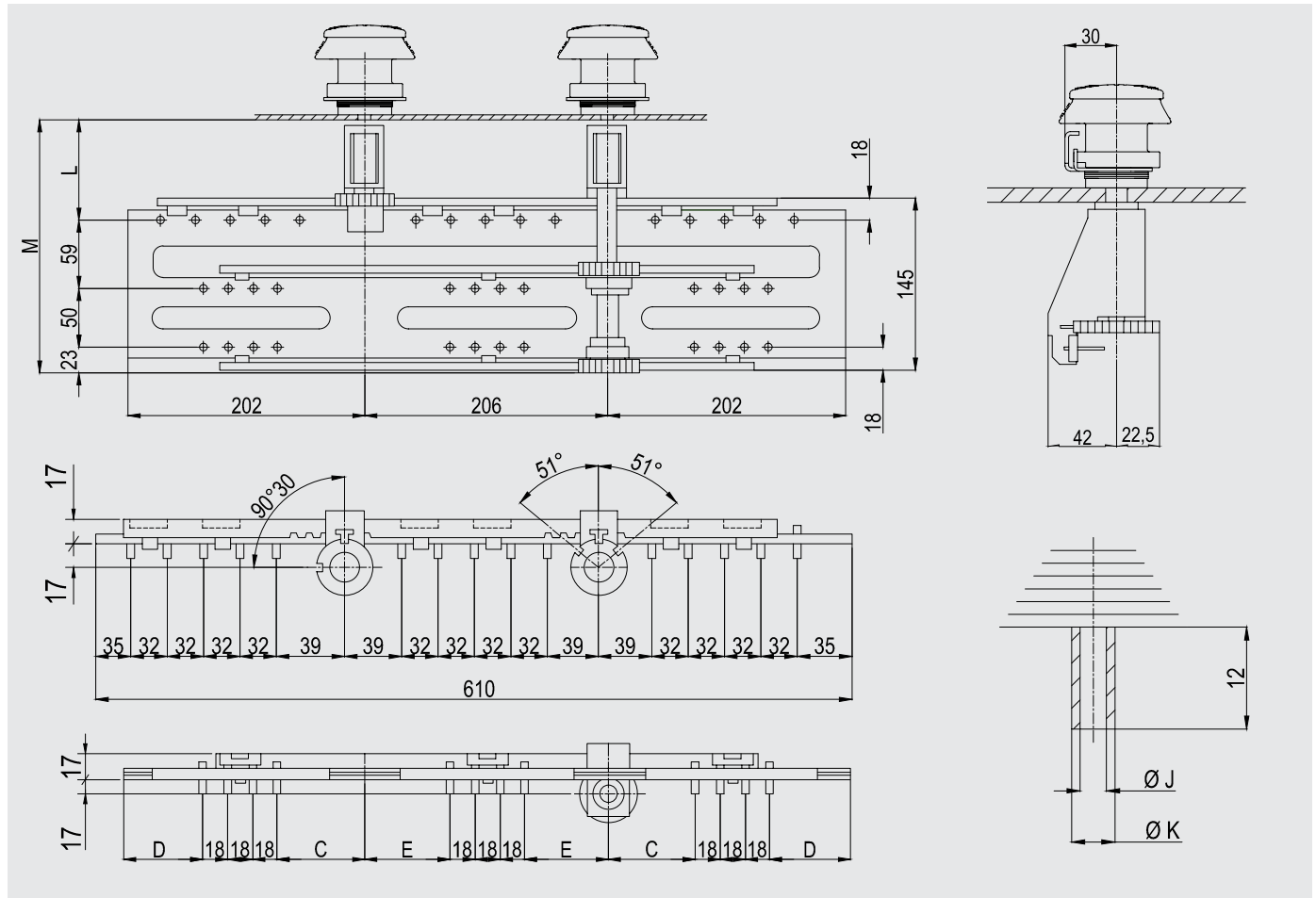
Number of Positions	C	D	E
3	73	75	76
5	55	57	58
7	37	39	40

	10 A	30 A	63 A
J	2,1	3,1	5,1
K	4	5	7

Type KHR Threephase Tap Changer

1. Stage Series Parallel Coupling 15-20 kV / 30-63 A

2. Stage Delta Diagram 20-30 kV / 30-63 A / 3-7 Positions / Setting 2.5 % per Position



L	Number of Positions	20 kV			
		M	10 A Unit No.	30 A Unit No.	63 A Unit No.
50	3	182	KC156K371	KC156K372	KC156K373
	4		KC156K471	KC156K472	KC156K473
	5		KC156K571	KC156K572	KC156K573
	6		KC156K671	KC156K672	KC156K673
	7		KC156K771	KC156K772	KC156K773
70	3	202	KD156K371	KD156K372	KD156K373
	4		KD156K471	KD156K472	KD156K473
	5		KD156K571	KD156K572	KD156K573
	6		KD156K671	KD156K672	KD156K673
100	3	232	KE156K371	KE156K372	KE156K373
	4		KE156K471	KE156K472	KE156K473
	5		KE156K571	KE156K572	KE156K573
	6		KE156K671	KE156K672	KE156K673
130	3	262	KF156K371	KF156K372	KF156K373
	4		KF156K471	KF156K472	KF156K473
	5		KF156K571	KF156K572	KF156K573
	6		KF156K671	KF156K672	KF156K673
	7		KF156K771	KF156K772	KF156K773

Number of Positions	C	D	E
3	73	75	76
5	55	57	58
7	37	39	40

	10 A	30 A	63 A
J	2,1	3,1	5,1
K	4	5	7