

Tap Changer Type KHM

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 as sizes 91 and 131 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 • are bolted together with supports under transformer cover and allow strong construction

Materials

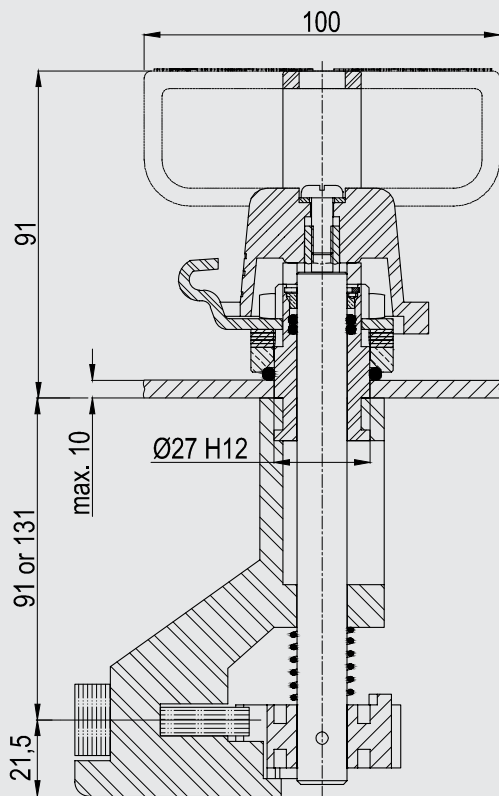
Steel Parts	<ul style="list-style-type: none"> • available in stainless or mild steel • mild steel parts are cadmium or zinc plated 	galvanizing upon request
Polyamide Parts	Nylon 66 / superior mechanical properties against all acting forces / strong against UV lights	
Aluminium Parts	GAlSi12(Cu)	
Brass Parts	CuZn40Pb2 (CW617N) / F34 DIN 17 673	
Copper Parts	E-Cu F25 DIN 40500	
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	30 A / 63 A / 120 A	
Upon Request	<ul style="list-style-type: none"> • aluminum parts can be protected by anodic oxidation • mild steel parts supplied in stainless steel • brass and copper parts are either tin- or silver-plated 	

Operating Instructions

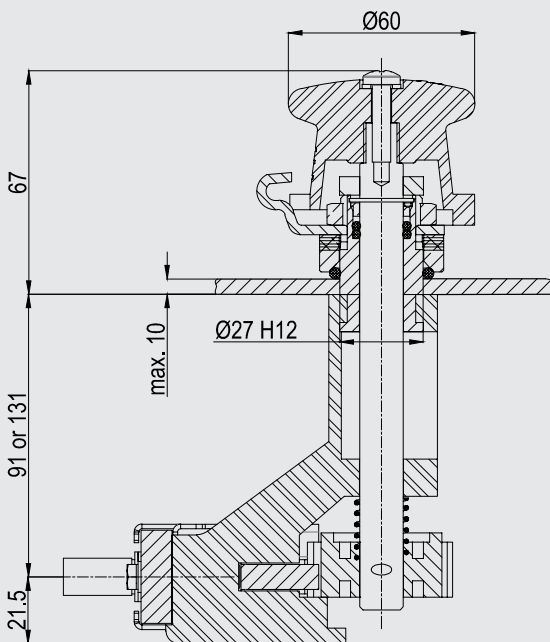
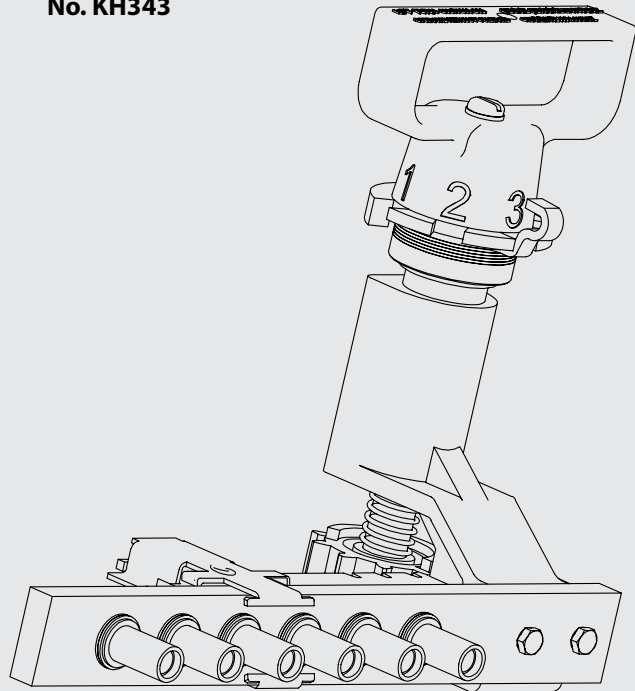
For each operation, the handle must first be pulled axially in the direction of the user in order to be subsequently rotated to the desired position. After being turned, the handle drops into the intended position by means of a high tension spring. Each position is precisely marked by a notch. This process 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
30 A	Ø 3,1 mm	20 kV	125 kV
63 A	Ø 5,1 mm	30 kV	170 kV
120 A	Ø 8,1 mm	<i>other B.I.L. values upon request</i>	

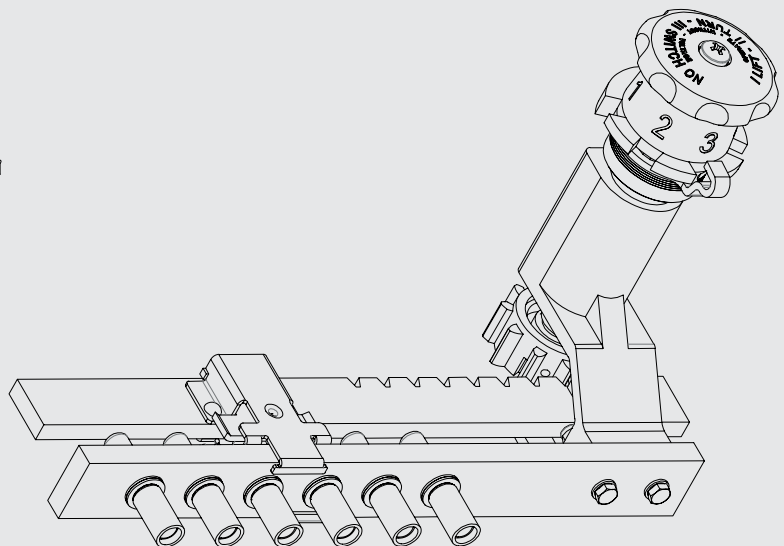
Type KHM Threephase Tap Changer Control Devices



**Control Device
No. KH343**



**Control Device
No. KH363**

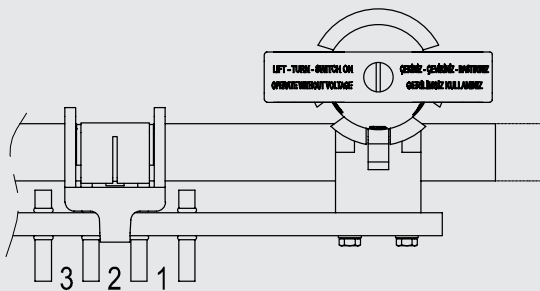
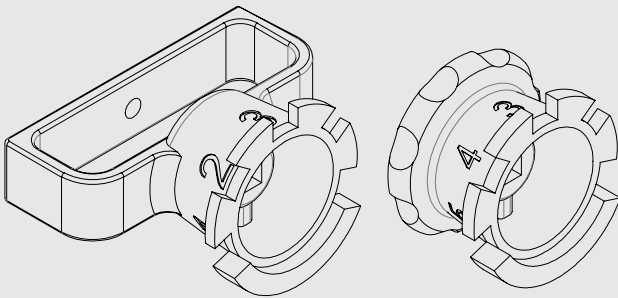


Type KHM Threephase Tap Changer

Handle Directions and Numbering Combinations

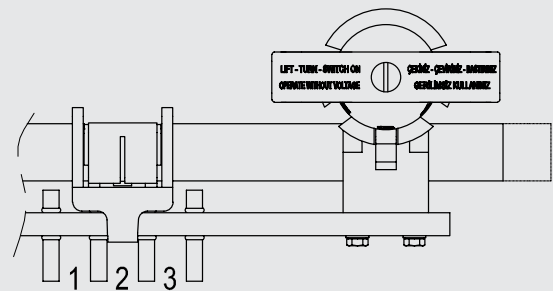
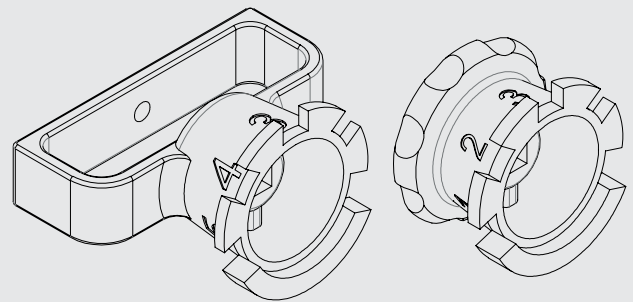
Handle direction A1

Clockwise direction

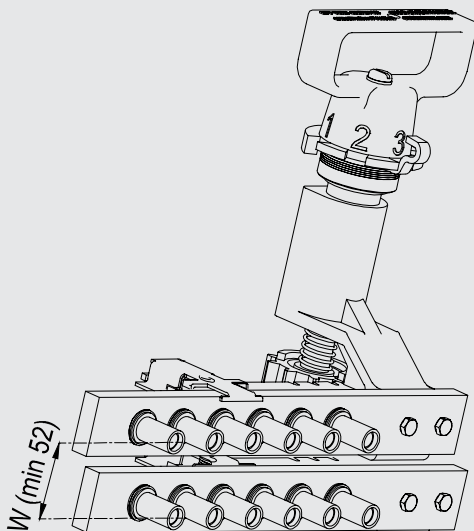


Handle direction B1

Counterclockwise direction



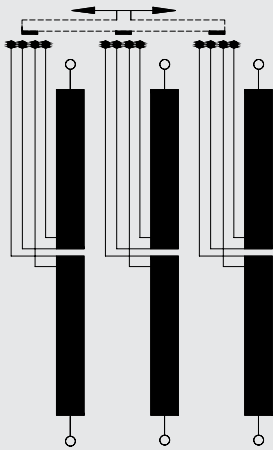
Numbering Combinations



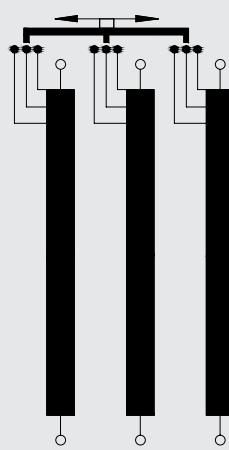
- all KHM tap changers can be paired by superimposing several tap changers whose purpose
- built steel brackets are assembled by nuts and bolts
- depending on the diagram adopted, the user can:
 - either operate the tap changers with one shaft
 - or operate part of the tap changers with one shaft, and the other part with another shaft
- the position of the coupling taps shaft and the position of the setting taps shaft has to be specified
- Note: It is essential, when ordering, to quote dimension „W“ the minimum of which to be set in each case depends on the insulation conditions and on the position of the different tap changers

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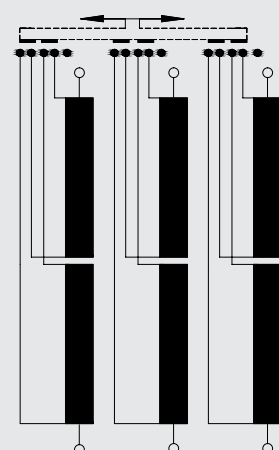
Connection Diagrams



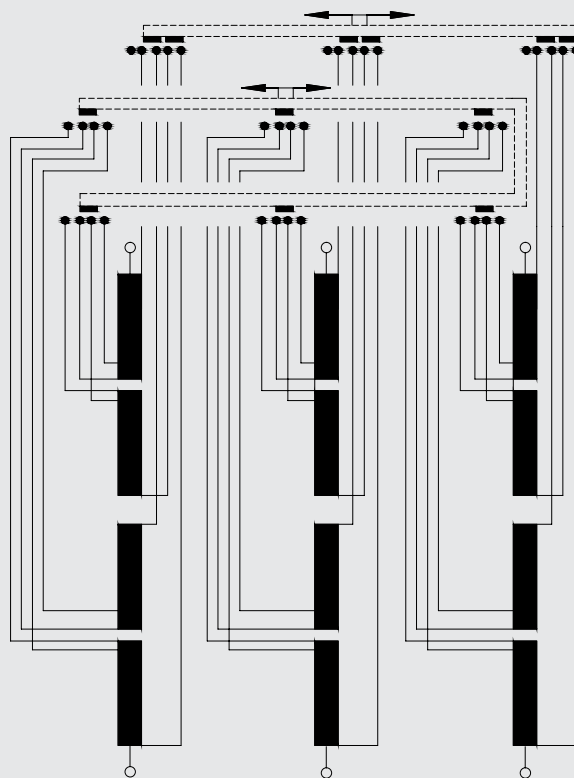
Setting for delta Transformer



Setting for star Transformer



Series - parallel coupling



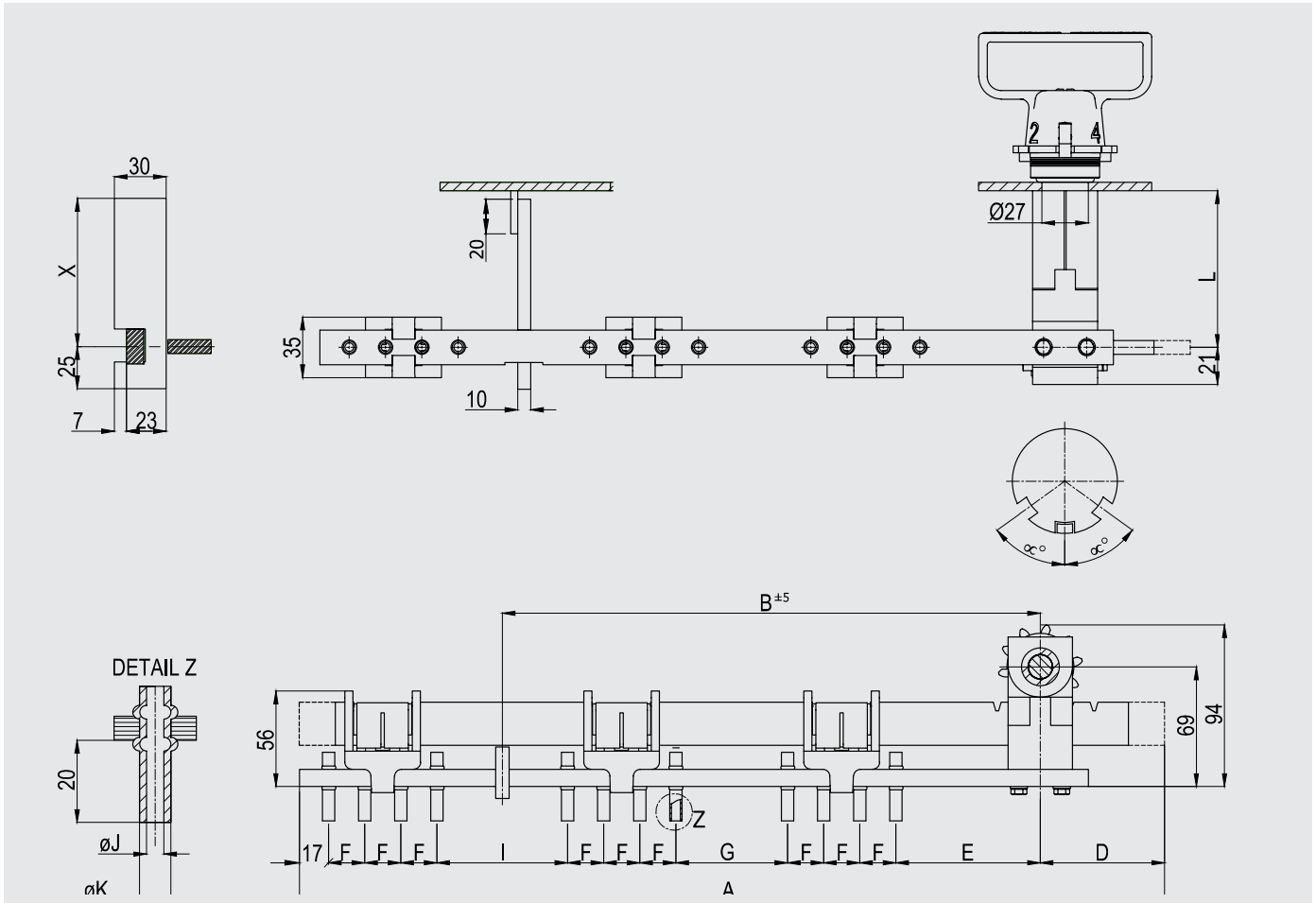
Typical Combination

1 Stage: Series - parallel coupling

2 Stage: Delta diagram - $\pm 2,5 \%$

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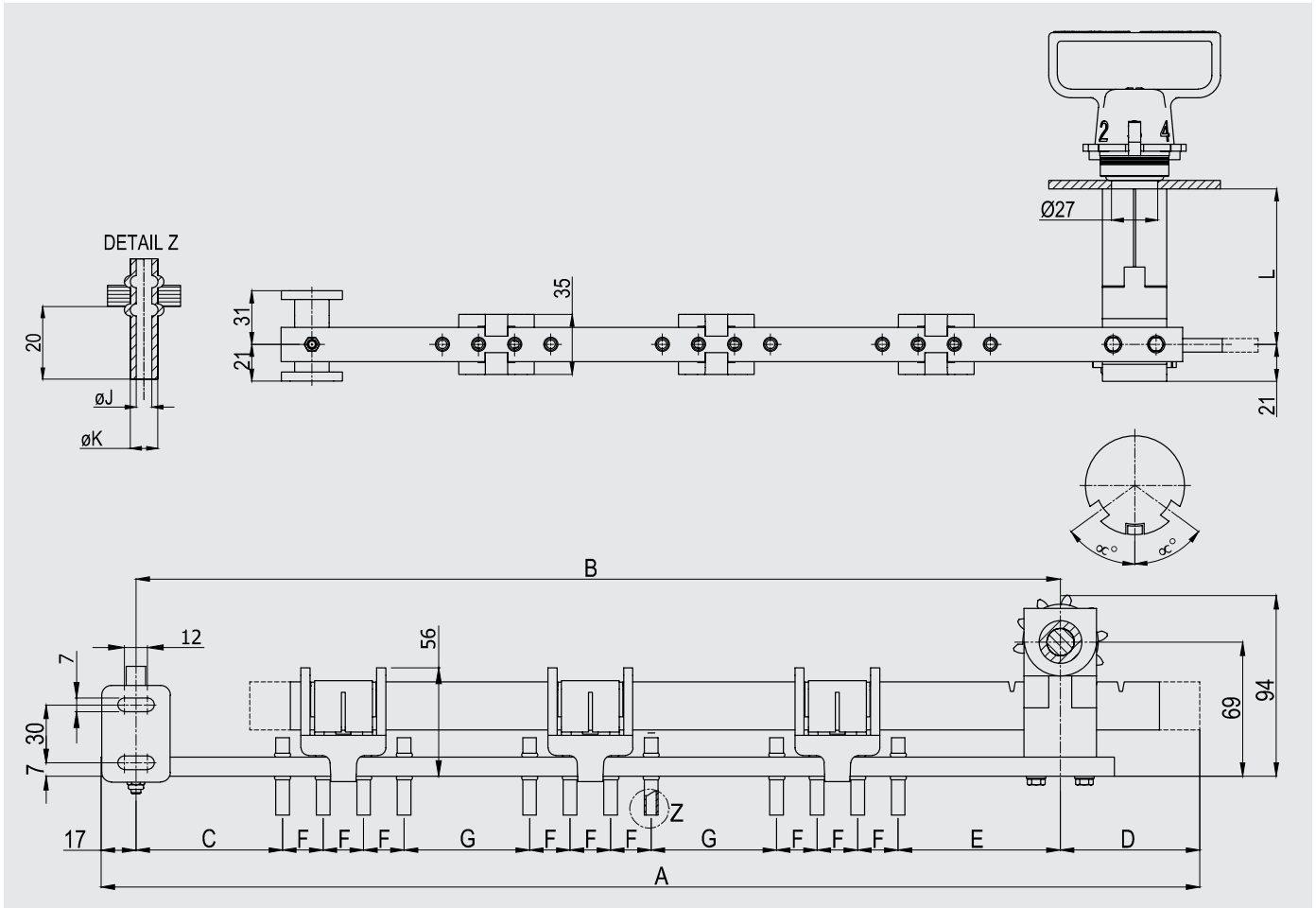
Delta Diagram 20 - 30 kV / 30 - 63 A / 3 - 7 Positions / Setting 2.5 % per Position



Voltage Class kV	Number of Positions	A	B	D	E	F	G	I	&°	Unit No.			
										30 A / J= 3,1 / K= 5		63 A / J= 5,1 / K= 7	
										L= 91 X= 85	L= 131 X= 120	L= 91 X= 85	L= 131 X= 120
20	3	503	313	72	84	21	65	76	54°	KB333D342	KA333D342	KB333D343	KA333D343
	4	587	355	93	84	21	65	76	54°	KB333D442	KA333D442	KB333D443	KA333D443
	5	671	397	114	84	21	65	76	54°	KB333D542	KA333D542	KB333D543	KA333D543
	6	755	439	135	84	21	65	76	54°	KB333D642	KA333D642	KB333D643	KA333D643
	7	839	481	156	84	21	65	76	54°	KB333D742	KA333D742	KB333D743	KA333D743
30	3	583	386	72	125	21	90	90	54°	KB333D352	KA333D352	KB333D353	KA333D353
	4	667	428	93	125	21	90	90	54°	KB333D452	KA333D452	KB333D453	KA333D453
	5	751	470	114	125	21	90	90	54°	KB333D552	KA333D552	KB333D553	KA333D553
	6	835	512	135	125	21	90	90	54°	KB333D652	KA333D652	KB333D653	KA333D653
	7	919	554	156	125	21	90	90	54°	KB333D752	KA333D752	KB333D753	KA333D753

Type KHM Threephase Tap Changer

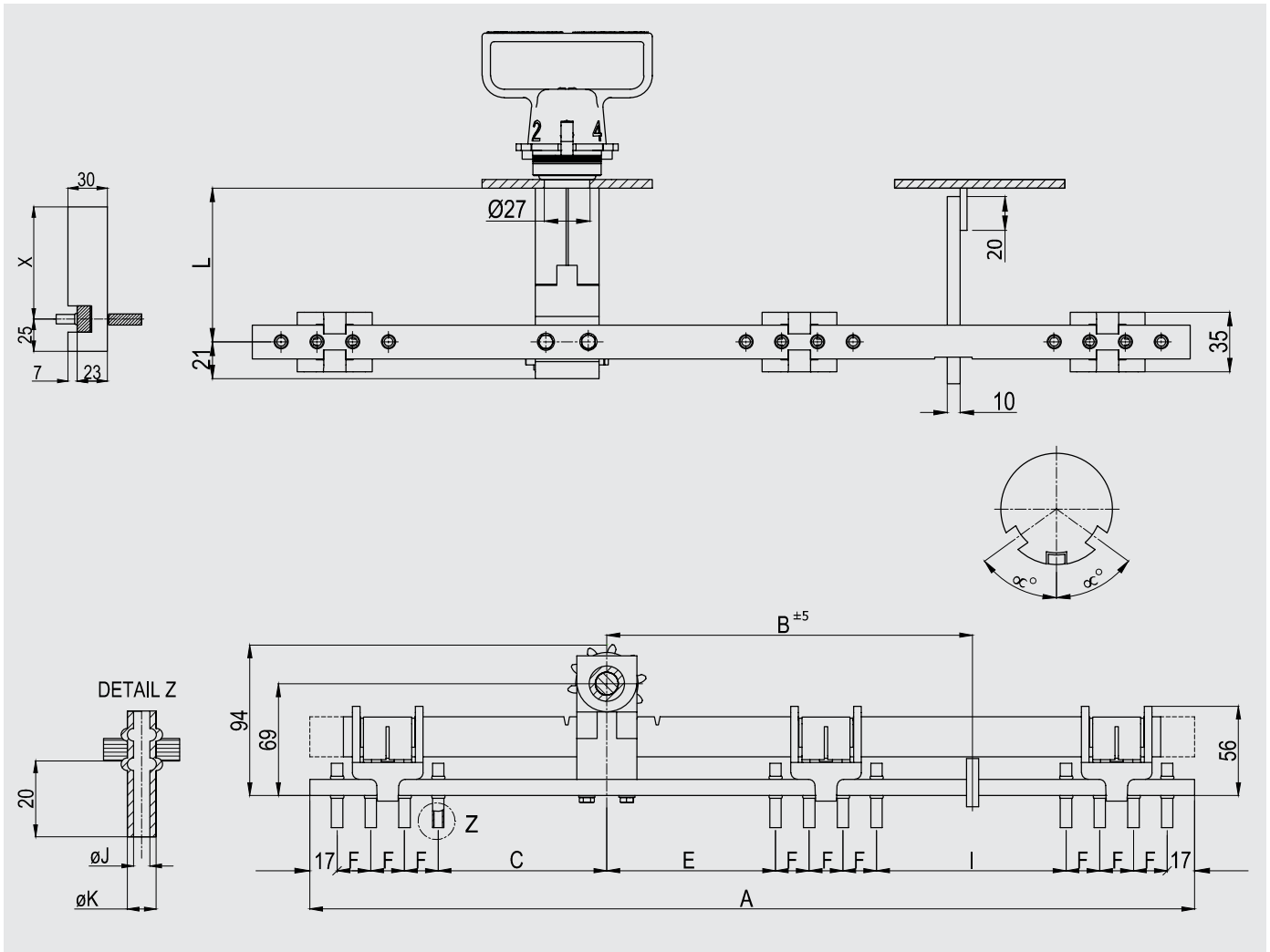
Delta Diagram 20 - 30 kV / 30 - 63 A / 3 - 7 Positions / Setting 2.5 % per Position



Voltage Class kV	Number of Positions	A	B	C	D	E	F	G	α°	Unit No.			
										30 A / J= 3,1 / K= 5		63 A / J= 5,1 / K= 7	
										L= 91	L= 131	L= 91	L= 131
20	3	569	479	76	72	84	21	65	54°	KB331D342	KA331D342	KB331D343	KA331D343
	4	653	542	76	93	84	21	65	54°	KB331D442	KA331D442	KB331D443	KA331D443
	5	737	605	76	114	84	21	65	54°	KB331D542	KA331D542	KB331D543	KA331D543
	6	821	668	76	135	84	21	65	54°	KB331D642	KA331D642	KB331D643	KA331D643
	7	905	731	76	156	84	21	65	54°	KB331D742	KA331D742	KB331D743	KA331D743
30	3	701	611	117	72	125	21	90	54°	KB331D352	KA331D352	KB331D353	KA331D353
	4	785	674	117	93	125	21	90	54°	KB331D452	KA331D452	KB331D453	KA331D453
	5	869	737	117	114	125	21	90	54°	KB331D552	KA331D552	KB331D553	KA331D553
	6	953	800	117	135	125	21	90	54°	KB331D652	KA331D652	KB331D653	KA331D653
	7	1037	863	117	156	125	21	90	54°	KB331D752	KA331D752	KB331D753	KA331D753

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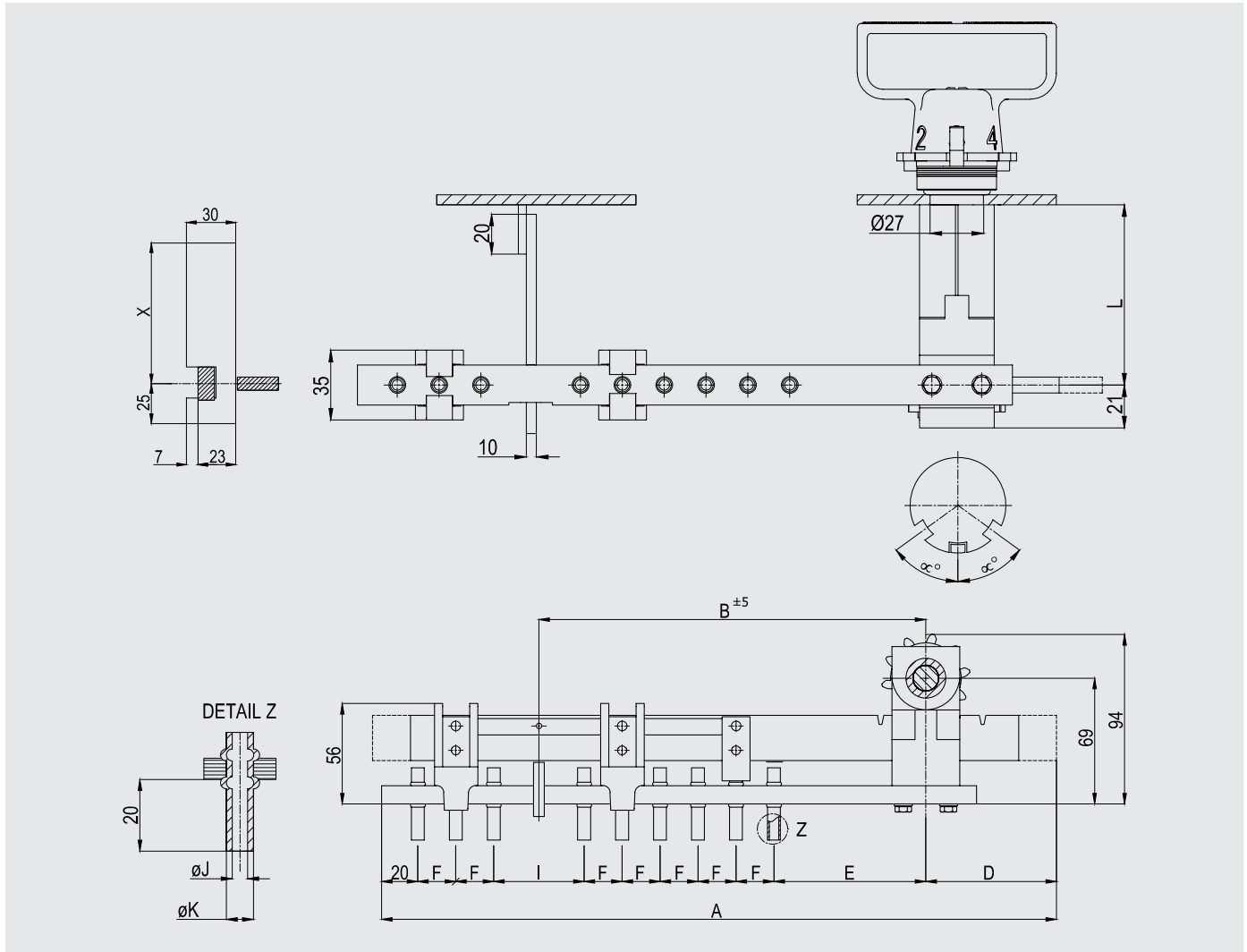
Delta Diagram 20 - 30 kV / 30 - 63 A / 3 - 7 Positions / Setting 2.5 % per Position



Voltage Class kV	Number of Positions	A	B	C	E	F	I	&°	Unit No.			
									30 A / J= 3,1 / K= 5		63 A / J= 5,1 / K= 7	
									L= 91 X= 85	L= 131 X= 120	L= 91 X= 85	L= 131 X= 120
20	3	551	227	105	105	21	118	54°	KB335D342	KA335D342	KB335D343	KA335D343
	4	572	227	105	84	21	97	54°	KB335D442	KA335D442	KB335D443	KA335D443
	5	593	227	84	84	21	76	54°	KB335D542	KA335D542	KB335D543	KA335D543
	6	656	248	84	84	21	76	54°	KB335D642	KA335D642	KB335D643	KA335D643
	7	719	269	84	84	21	76	54°	KB335D742	KA335D742	KB335D743	KA335D743
30	3	647	275	146	146	21	132	54°	KB335D352	KA331D352	KB335D353	KA335D353
	4	668	275	146	125	21	111	54°	KB335D452	KA331D452	KB335D453	KA335D453
	5	689	275	125	125	21	90	54°	KB335D552	KA331D552	KB335D553	KA335D553
	6	752	296	125	125	21	90	54°	KB335D652	KA331D652	KB335D653	KA335D653
	7	815	317	125	125	21	90	54°	KB335D752	KA331D752	KB335D753	KA335D753

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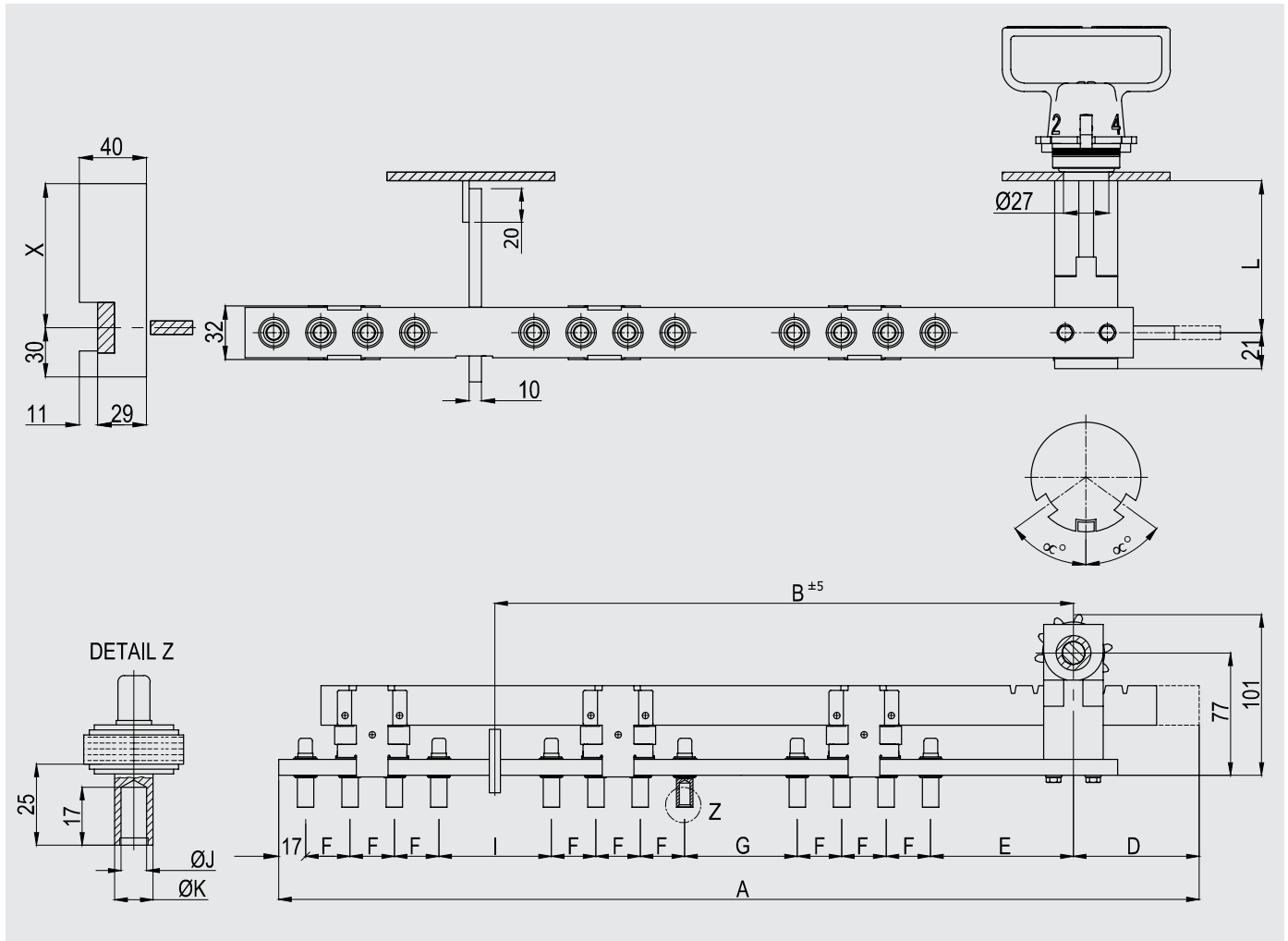
Star Diagram 20 - 30 kV / 30 - 63 A / 3 - 7 Positions / Setting 2.5 % per Position



Voltage Class kV	Number of Positions	A	B	D	E	F	I	&°	Unit No.			
									30 A / J= 3,1 / K= 5		63 A / J= 5,1 / K= 7	
									L= 91	L= 131	L= 91	L= 131
20	3	373	214	72	84	21	50	54°	KB333S342	KA333S342	KB333S343	KA333S343
	4	457	256	93	84	21	50	54°	KB333S442	KA333S442	KB333S443	KA333S443
	5	541	298	114	84	21	50	54°	KB333S542	KA333S542	KB333S543	KA333S543
	6	625	340	135	84	21	50	54°	KB333S642	KA333S642	KB333S643	KA333S643
	7	709	382	156	84	21	50	54°	KB333S742	KA333S742	KB333S743	KA333S743
30	3	414	255	72	125	21	50	54°	KB333S352	KA333S352	KB333S353	KA333S353
	4	498	297	93	125	21	50	54°	KB333S452	KA333S452	KB333S453	KA333S453
	5	582	339	114	125	21	50	54°	KB333S552	KA333S552	KB333S553	KA333S553
	6	666	381	135	125	21	50	54°	KB333S652	KA333S652	KB333S653	KA333S653
	7	750	423	156	125	21	50	54°	KB333S752	KA333S752	KB333S753	KA333S753

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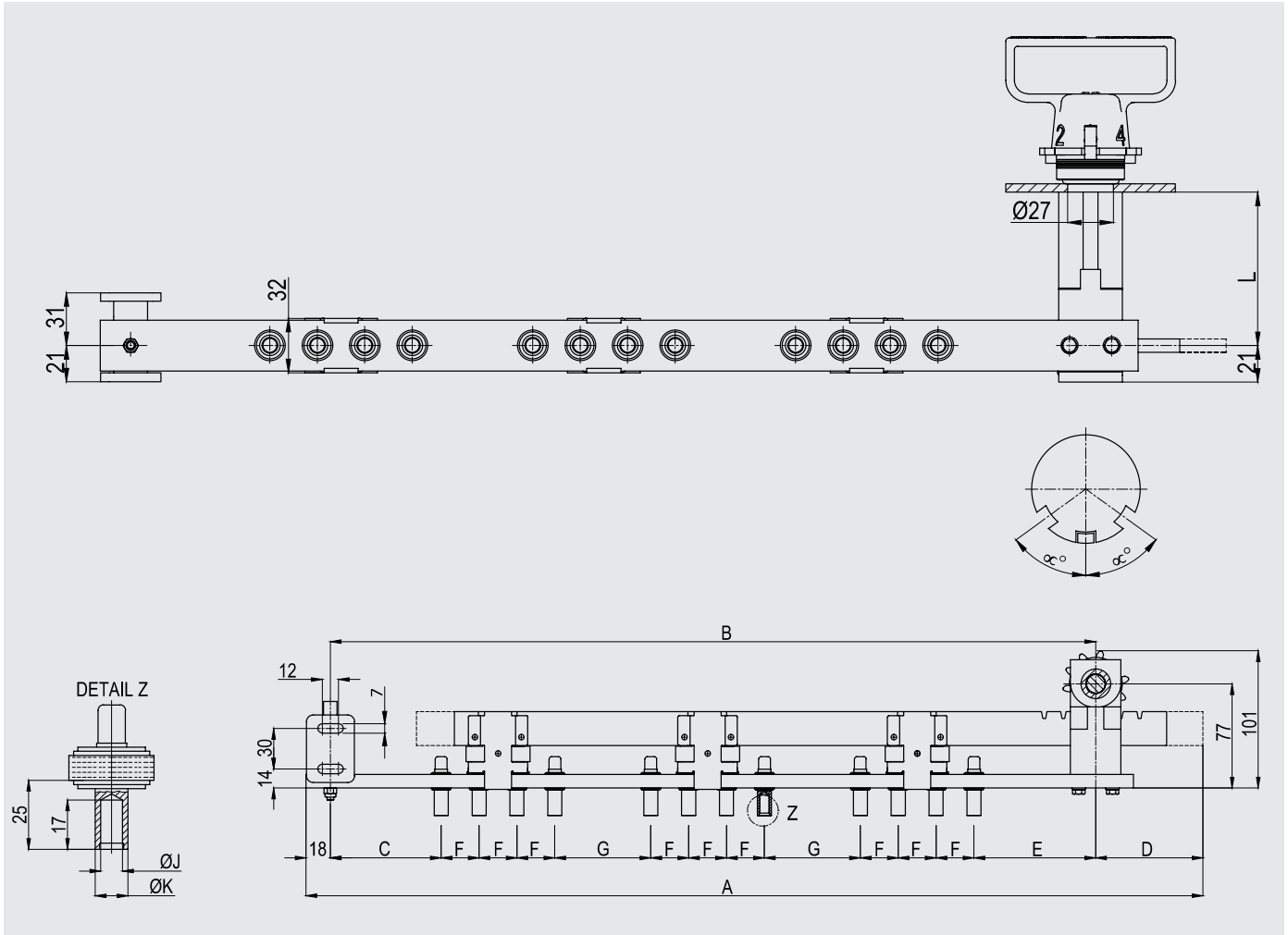
Delta Diagram 20 - 30 kV / 120 A / 3 - 5 Positions / Setting 2.5 % per Position



Voltage Class kV	Current A	Number of Positions	A	B	D	E	F	G	I	&°	Unit No.	
											120 A / J= 8,1 / K= 12	
											L= 91 X= 85	L= 131 X= 120
20	120	3	587	364	86	90	28	71	71	72°	KB333D344	KA333D344
		4	699	420	114	90	28	71	71	72°	KB333D444	KA333D444
		5	811	476	142	90	28	71	71	72°	KB333D544	KA333D544
30	120	3	675	440	86	130	28	95	95	72°	KB333D354	KA333D354
		4	787	496	114	130	28	95	95	72°	KB333D454	KA333D454
		5	899	552	142	130	28	95	95	72°	KB333D554	KA333D554

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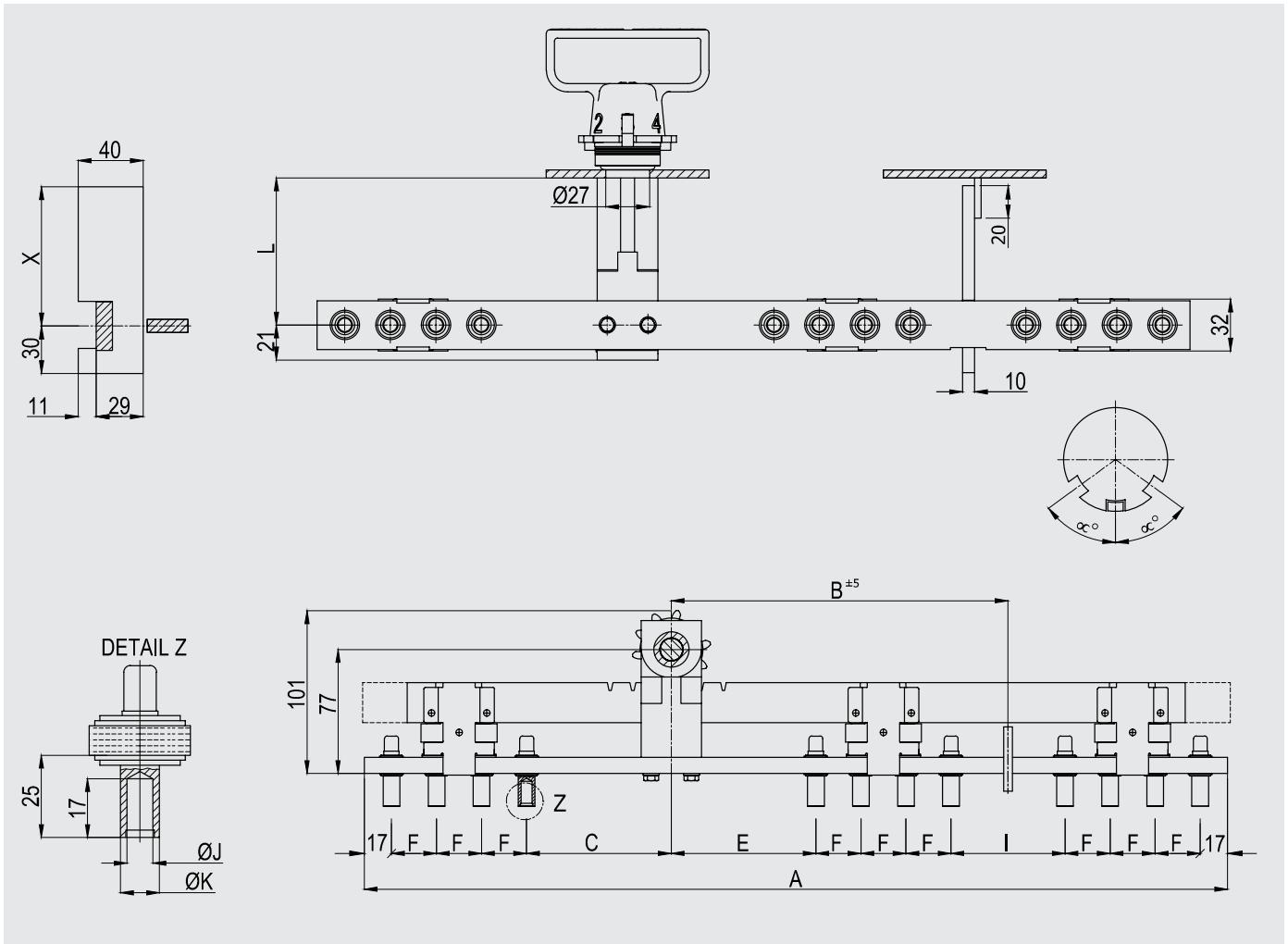
Delta Diagram 20 - 30 kV / 120 A / 3 - 5 Positions / Setting 2.5 % per Position



Voltage Class kV	Current A	Number of Positions	A	B	C	D	E	F	G	&°	Unit No.	
											120 A / J= 8,1 / K= 12	
											L= 91	L= 131
20	120	3	670	566	82	86	90	28	71	72°	KB331D344	KA331D344
		4	782	650	82	114	90	28	71	72°	KB331D444	KA331D444
		5	894	734	82	142	90	28	71	72°	KB331D544	KA331D544
30	120	3	798	694	122	86	130	28	95	72°	KB331D354	KA331D354
		4	910	778	122	114	130	28	95	72°	KB331D454	KA331D454
		5	1022	862	122	142	130	28	95	72°	KB331D554	KA331D554

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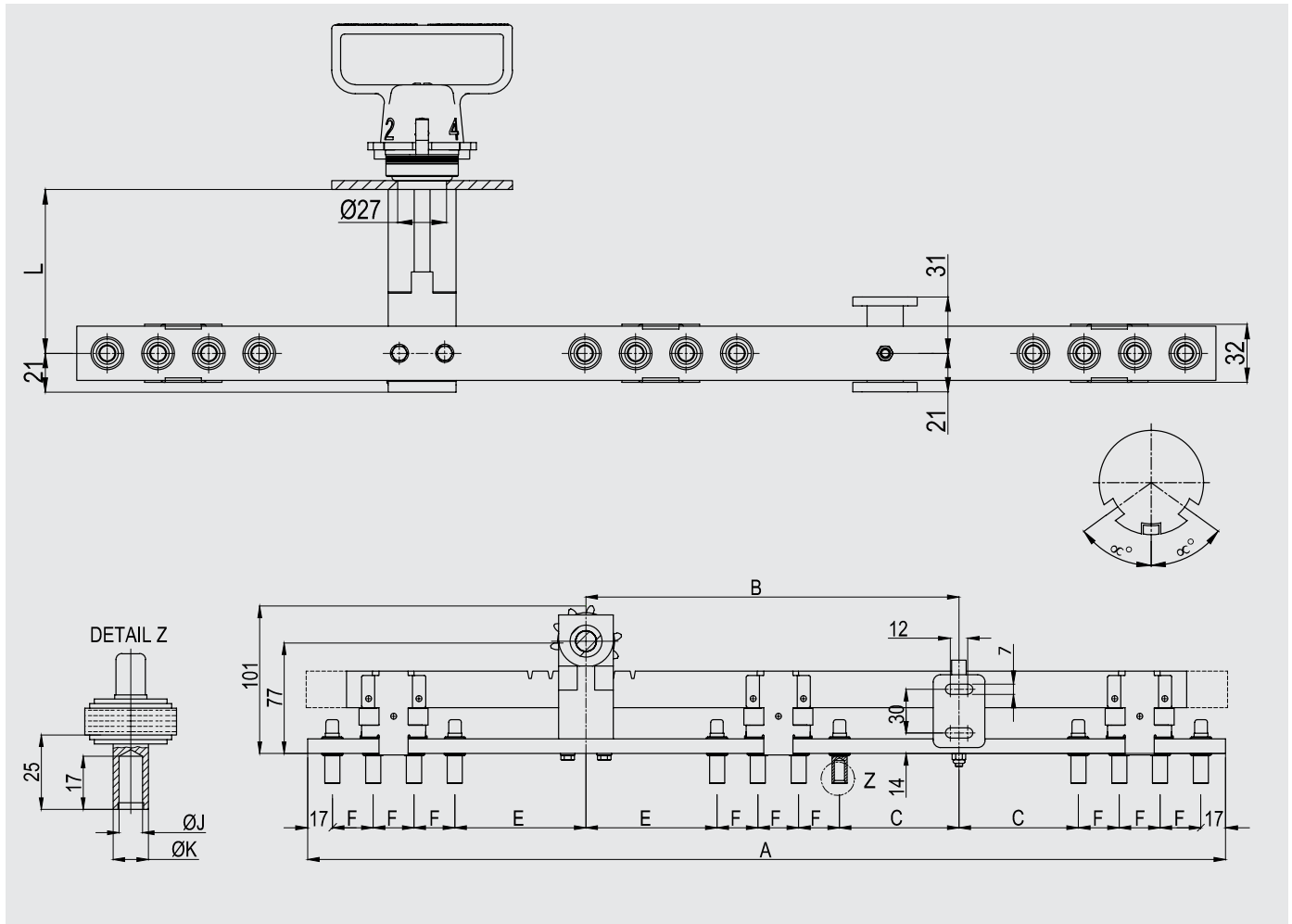
Delta Diagram 20 - 30 kV / 120 A / 3 - 5 Positions / Setting 2.5 % per Position



Voltage Class kV	Current A	Number of Positions	A	B	C	E	F	I	&°	Unit No.	
										120 A / J= 8,1 / K= 12	
										L= 91 X= 85	L= 131 X= 120
20	120	3	537	209	90	90	28	71	72°	KB335D344	KA335D344
		4	621	237	90	90	28	71	72°	KB335D444	KA335D444
		5	705	265	90	90	28	71	72°	KB335D544	KA335D544
30	120	3	641	261	130	130	28	95	72°	KB335D354	KA335D354
		4	725	289	130	130	28	95	72°	KB335D454	KA335D454
		5	809	317	130	130	28	95	72°	KB335D554	KA335D554

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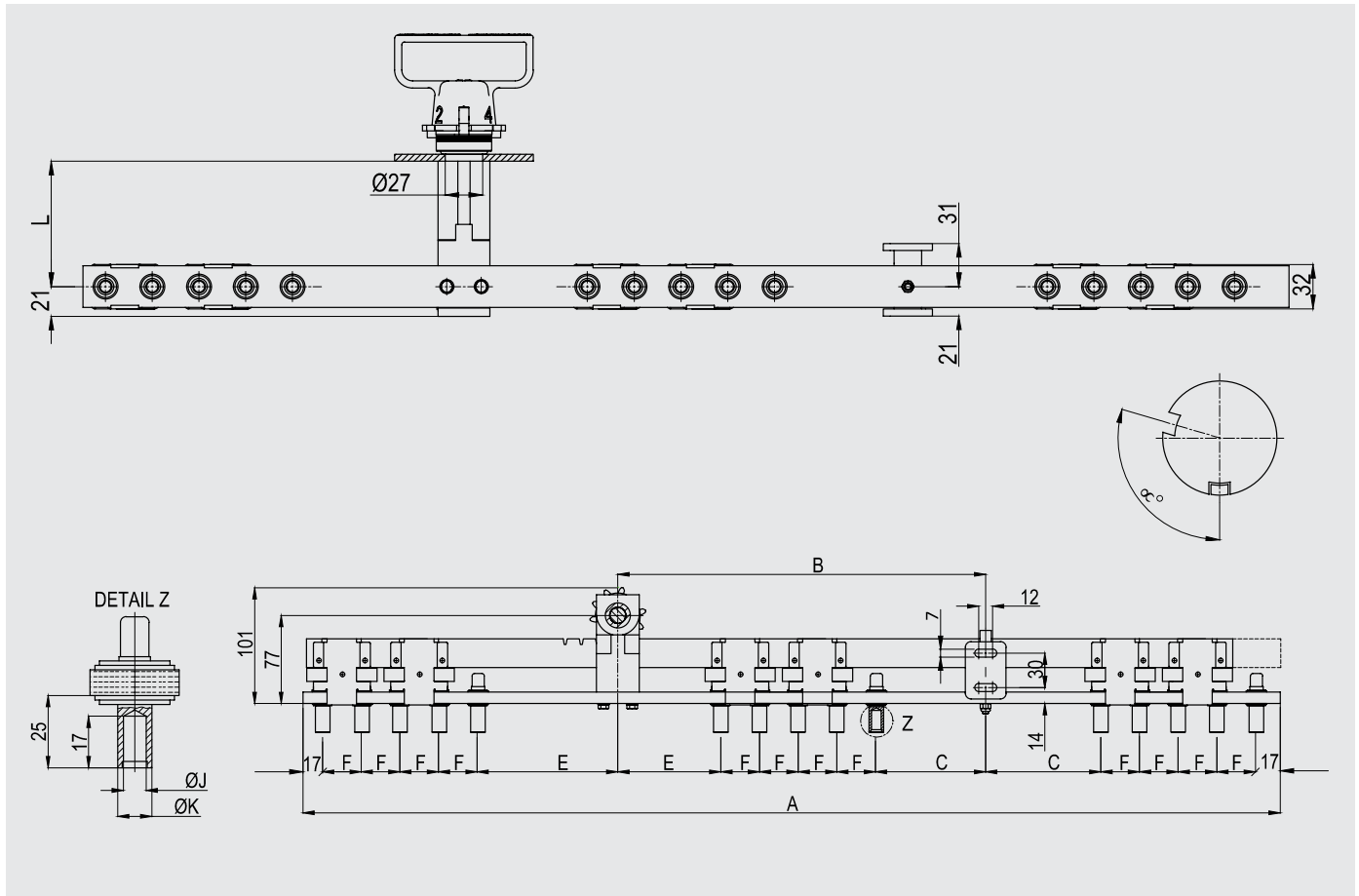
Delta Diagram 20 - 30 kV / 120 A / 3 - 5 Positions / Setting 2.5 % per Position



Voltage Class kV	Current A	Number of Positions	A	B	C	E	F	&°	Unit No.	
									120 A / J= 8,1 / K= 12	
									L= 91 X= 85	L= 131 X= 120
20	120	3	630	256	82	90	28	72°	KB334D344	KA334D344
		4	714	284	82	90	28	72°	KB334D444	KA334D444
		5	798	312	82	90	28	72°	KB334D544	KA334D544
30	120	3	790	336	122	130	28	72°	KB334D354	KA334D354
		4	874	364	122	130	28	72°	KB334D454	KA334D454
		5	958	392	122	130	28	72°	KB334D554	KA334D554

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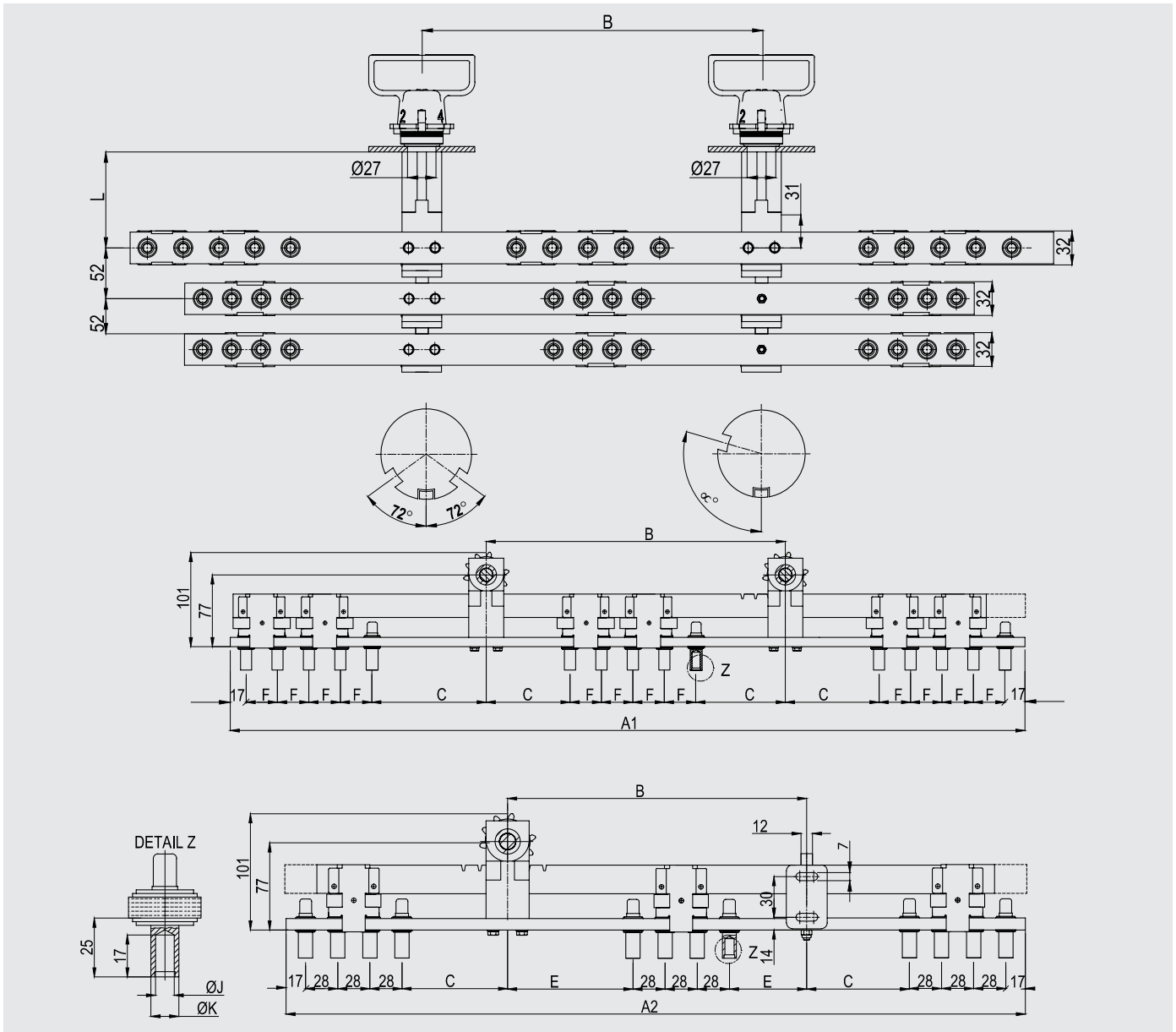
Series Parallel Coupling 20 - 30 kV / 120 A



Voltage Class kV	Current A	A	B	C	E	F	&°	Unit No.	
								120 A / J= 8,1 / K= 12	
								L= 91	L= 131
10 - 20	120	882	340	82	90	42	108°	KB334P272	KA334P274
25 - 30	120	1126	448	122	130	49	126°	KB334P284	KA334P284

Type KHM Threephase Tap Changer

1. Series Parallel Coupling 10 - 20 kV / 120 A
2. Delta Setting 20 - 30 kV / 120 A / Setting 2.5 % per Position



Voltage Class kV		Number of Positions	A1	A2	B	C	E	F	&°	Unit No.	
Series Parallel	Delta									120 A / J= 8,1 / K= 12	
										L= 91	L= 131
10 - 20	20	3		730			132		108 °	KB354K374	KA354K374
		4	898	786	348	90	118	42		KB354K474	KA354K474
		5		842				104			KB354K574
25 - 30	30	3		918			186		126 °	KB354K384	KA354K384
		4	1142	974	456	130	172	49		KB354K484	KA354K484
		5		1030				158			KB354K584