

# NEWS AND MODIFICATIONS

TAP CHANGERS SERIES 090



MEMBER OF REINHAUSEN GROUP

# SUMMARY

## TAP CHANGERS TYPE 090

REF.	REV.	DESCRIPTION	CONNECTION	CURRENT	VOLTAGE	N° POS.	PAG.
090	02	Introduction					3 , 4
090-60	01	Code construction					5
090-01	04	Two phase tap changer	Bridge	10/30/65 A	24/36 kV	3-7	6
090-02	04	Single phase tap changer	Bridge	10/30/65 A	24/36 kV	3-7	7
090-03	04	Single phase tap changer	Linear	10/30/65 A	24/36 kV	3-7	8
090-04	06	Three phase tap changer	Bridge	10/30/65 A	24/36 kV	3-7	9
090-05	06	Three phase tap changer	Star	10/30/65 A	24/36 kV	3-7	10
090-06	06	Three phase tap changer	Linear	10/30/65 A	24/36 kV	3-7	11
090-07	06	Three phase tap changer	Linear	10/30/65 A	24/36 kV	3-7	12
090-08	04	Triple three phase tap changer vertical	N°2 Bridge + N°1 S/P	30/65 A	24 kV	3-7	13
090-08-36	02	Triple three phase tap changer vertical	N°2 Bridge + N°1 S/P	30/65 A	36 kV	3-7	14
090-09-20	05	Double three phase tap changer vertical	N°1 Bridge + N°1 C/T	30/65 A	24 kV	3-7	15
090-10	05	Quadruple three phase tap changer vertical	N°2 Bridge + N°2 S/P	30/65 A	24 kV	3-7	16
090-11	04	Quadruple three phase tap changer vertical	N°2 Bridge + N°1 S/P + N°1 C/T	30/65 A	24 kV	3-7	17
090-12	05	Quintuple three phase tap changer vertical	N°2 Bridge + N°1 S/P + N°2 C/T	30/65 A	24 kV	3-7	18
090-13	07	Double three phase tap changer vertical	N°2 Bridge	10/30/65 A	24/36 kV	3-7	19
090-14	05	Double three phase tap changer vertical	N°1 Linear + N°1 C/T 4p	30/65 A	24 kV	3-6	20
090-15	04	Double three phase tap changer vertical	N°1 Linear + N°1 S/P	30/65 A	24 kV	3-6	21
090-16-20	04	Double three phase tap changer vertical	N°1 Bridge + N°1 S/P	30/65 A	24 kV	3-7	22
090-16-36	05	Double three phase tap changer vertical	N°1 Bridge + N°1 S/P	30/65 A	36 kV	3-7	23
090-17	05	Double three phase tap changer vertical	N°1 Linear + N°1 C/T	30/65 A	24 kV	3-6	24
090-18	04	Double three phase tap changer vertical	N°1 Bridge + N°1 C/T 4p	30/65 A	24 kV	3-7	25
090-19	06	Double three phase tap changer vertical	N°2 Linear	10/30/65 A	24/36 kV	3-7	26
090-21	04	Triple three phase tap changer vertical	N°2 Linear + N°1 S/P	30/65 A	24 kV	3-6	27
090-22	04	Triple three phase tap changer vertical	N°2 Linear + N°1 C/T	30/65 A	24 kV	3-6	28
090-27	04	Double three phase tap changer horizontal	N°1 Bridge + N°1 S/P	30/65 A	24 kV	3-7	29
090-28	04	Triple three phase tap changer horizontal	N°2 Bridge + N°1 S/P	30/65 A	24 kV	3-7	30
090-29-20	05	Double three phase tap changer horizontal	N°1 Bridge + N°1 C/T	30/65 A	24 kV	3-7	31
090-29-36	06	Double three phase tap changer horizontal	N°1 Bridge + N°1 C/T	30/65 A	36 kV	3-7	32
090-30	05	Double three phase tap changer vertical	N°2 Bridge	10/30/65 A	24/36 kV	3-7	33
090-31	06	Three phase tap changer with clamp	Bridge	10/30/65 A	24/36 kV	3-7	34
090-32	06	Double three phase tap changer vertical	N°1 C/T + N°1 S/P	30/65 A	24 kV	2	35
090-35	01	Three phase tap changer with bracket	Star	10/30/65 A	24/36 kV	3-7	36
090-36	01	Three phase tap changer with bracket	Linear	10/30/65 A	24/36 kV	3-7	37
090-37	01	Three phase tap changer with bracket	Linear	10/30/65 A	24/36 kV	3-7	38
090-43	06	Three phase tap changer	C/T	30/65 A	24 kV	2	39
090-43-36	02	Three phase tap changer	C/T	30/65 A	36 kV	2	40
090-44	05	Three phase tap changer	C/T 4p	30/65 A	24 kV	2	41
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### LEGEND:

**C/T** stand for the possibilities to change the voltages using 3 fixed contacts and 1 moving contact for each phase.

**C/T 4p** stand for the possibilities to change the voltages using 4 fixed contacts and 1 moving contact for each phase.

**S/P** stand for series parallel.



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# INTRODUCTION

## TAP CHANGERS TYPE 090

### MAIN CHARACTERISTIC

This is a de-energized tap changer. It means all switching manoeuvre must be performed after disconnecting transformer by the electrical net opening the sectionalising switches, both HV and LV side, so transformer becomes off-circuit. Main characteristics of this tap-changer series are:

- dimensional compactness
- only 4 components to assemble for customers
- only one rotative movement
- self centering moving contacts

In the catalogue are performed the standard appliances and devices. On request is possible to satisfy special requirements as: - multi-stage tap changers - mirror like assembling - insulated intermediate clamp for different dimension of the shaft "L" - special executions.

### DIMENSION

All dimension reported in the following pages are in millimeters (mm).

### MODIFICATIONS

In case we need to modify some particulars, in order to improve the quality of our products, C.A.P.T. firma reserve an option to change without a previous warning. Substantial modification will be surely communicated.

### TRANSFORMER OIL

All our tap changers are suitable to work in oil immersed transformers according to standard IEC 60296. In case user need to use specific oil (silicon, synthetic or vegetal) it is necessary consulted C.A.P.T. technical office who verify the functionality of tap in all the mechanicals, electrical and chemical characteristics.

### INSULATION MATERIAL

The insulating materials used are bakelite (paper laminates and phenoplastic resin) of "E" thermal class.

### GASKET

The standard gaskets supplied by C.A.P.T. for all drives are suitable for use in mineral oil according to IEC 60296 at operating temperatures between -25°C and +105°C and in air at temperatures between -25°C and +40°C.

On request, depending on the conditions of use C.A.P.T. can provide gaskets suitable for lower temperatures up to -60°C or higher up to +200°C.

### MECHANICAL CHARACTERISTICS

On the tap-changers type 090 fixed contacts are mounted in the fixed strips perpendicular to the support, while in the moving strips are installed moving contacts. The fixed strip is bolted to the bearing in which the moving strip slides, driven by a pinion.

### DRIVE-HANDLE AND OPERATING CONTROL

The knob normally in polyamide (see pages 090-60-3 and 090-60-2) must be inserted only when the 2 milled centering parts have been aligned. One is positioned on the shaft and the other is positioned on the metallic section of the support. To change the position, after having released the locking-device up to its stroke-end, you only have to rotate the knob without pulling it up and continue the operation up to reach the wanted new position, than close locking-device. The knob can be padlocked in any position by utilizing the appropriate rectangular hole on the positioning-ring and inserting the shackle of the padlock (8 mm max.) in the corresponding hollow space of the knob. On request, control knob can be supplied made of aluminum and the eventual protective cover in "Zama 15". For more information please request the operation instruction manual to C.A.P.T.

### POSITION RANGE:

Standard from 3 to 7 positions, some kinds from 3 to 6.

### VOLTAGES

Voltage classes are allowed:

Voltage class	Earth withstand voltage	
	AV	LI 1,2/50 $\mu$ s
24 kV	50 kV	125 kV
36 kV	70 kV	170 kV



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# INTRODUCTION

## TAP CHANGERS TYPE 090

Voltage test between adjacent contacts

<b>Pitch</b>	<b>AV</b>	<b>LI 1,2/50 <math>\mu</math>s</b>	<b>LIC</b>
18 mm	12 kV	30 kV	33 kV
36 mm	40 kV	100 kV	110 kV

### **CURRENTS**

10 A (lead 2,5 mm<sup>2</sup>) – 30 A (lead 6 mm<sup>2</sup>) – 65 A (lead 16 mm<sup>2</sup>).

### **METALLIC PARTS**

The metallic parts that mainly compose drive control of the tap-changer are normally made of stainless steel and brass. The brass parts exposed to external environment on request can be made of stainless steel (see different solutions on page 090-60-3).

### **POLYAMIDE PARTS**

Lower part of the bearing gear and control knob are normally made of polyamide.

### **FIXED CONTACTS**

Made of copper with following internal diameters:  $\varnothing=2,1$ mm for 10 A rating -  $\varnothing=3,1$ mm for 30 A rating -  $\varnothing=5,1$ mm for 65 A rating. The connection of the conductors is provided by crimping of flexible cables. It can also be carried out by tin soldering, if so, care should be taken to avoid damages on the insulation parts. Fix the leads to avoid any forcing to the tap changer. On request contacts can be silver-plated.

### **MOVING CONTACTS**

They are made of brass with wave shape to obtain an higher contact section (lower rise-temperature) and aid the tap changer self-positioning. On request, contacts can be supplied silver plated.

### **DRYING PROCESS**

Different drying treatment can be process by customer: oven, in a vacuum autoclave, vapour-phase or other. In this process is normally included tap changer too. The maximum temperature suggested by C.A.P.T. for our tap changers is 100°C-120°C for 24-36 hours.

### **DRYING PROCESS IN CASE OF BEVEL GEAR AND DRIVE HANDLE**

It is better to leave out from drying treatment the drive handle and bevel gear. In case it is impossible to leave them out, we suggest to strictly respect the temperature recommended.

When you need drive handle with micro switch for electrical lock or electrical position transmitter it is recommended to do the treatment without the drive.

### **WHEN CONTACT C.A.P.T.**

In the following cases please contact C.A.P.T.

- for temperature condition higher/lower then suggest
- for hard environment conditions, with possibility of snow or sand storming, or in potential seismic area.



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# DETC THREE-PHASE TAP CHANGERS SERIES 090

- CODE CONSTRUCTION

**090** - **04** . **07** . **2** **1** **5** **FM** - **I** **C** **R**

**SERIES**

**TAP CHANGER TYPE**

LENGTH SUPPORT "L"	
<b>05</b>	50 mm (Only for 24 kV)
<b>07</b>	70 mm
<b>09</b>	90 mm
<b>10</b>	100 mm
<b>13</b>	130 mm
<b>15</b>	150 mm
<b>18</b>	180 mm
<b>20</b>	200 mm

**VOLTAGE**

<b>2</b>	x 24 kV
<b>3</b>	x 36 kV

**CURRENT**

<b>1</b>	x 10 A
<b>3</b>	x 30 A
<b>6</b>	x 65 A

**NUMBER OF POSITIONS**

See the specific catalog pages.

**CONTACTS SURFACE TREATMENT**

<b>F</b>	Fixed contacts silver plated
<b>M</b>	Moving contacts silver plated
<b>FM</b>	Fixed and moving contacts silver plated
<b>T</b>	Fixed, moving and common contacts silver plated

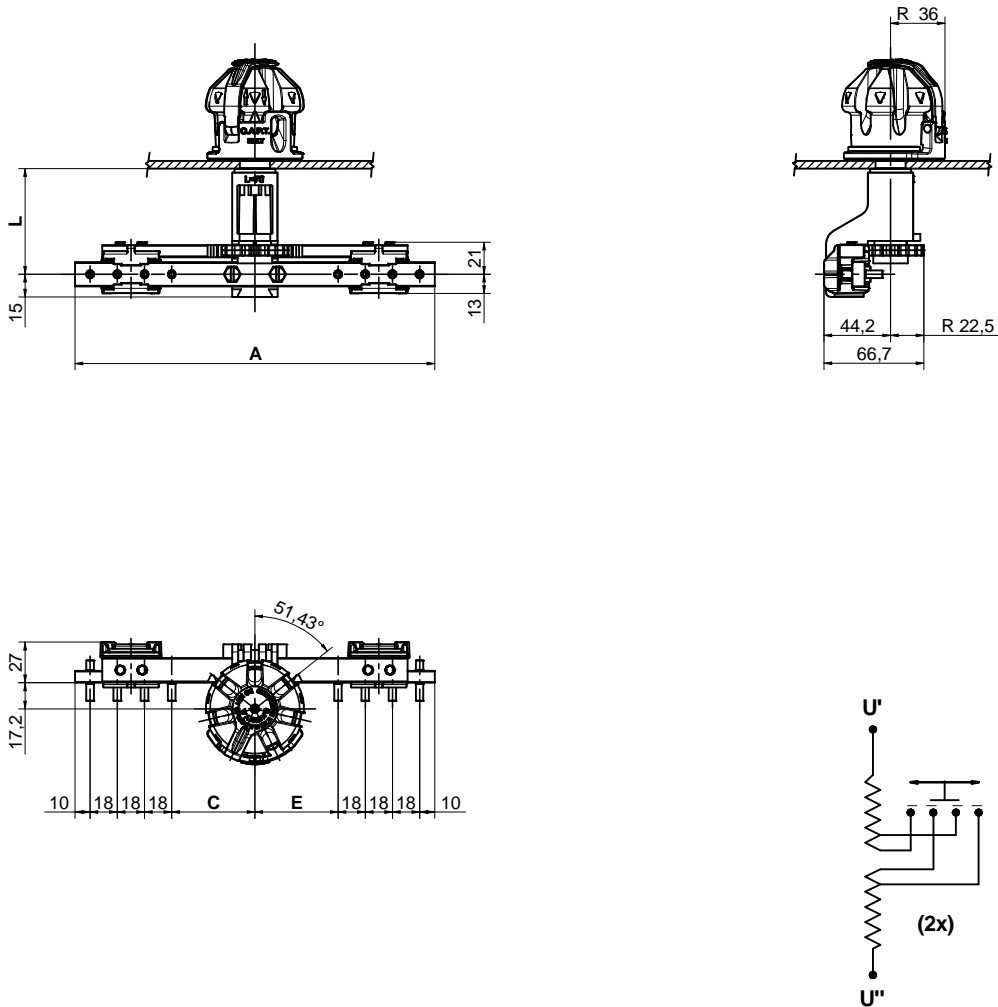
**ON REQUEST**

<b>C</b>	Stainless steel threaded bushing support (see ref. 090-60-02 par. 1a)
<b>I</b>	Drive shaft mirror like
<b>R</b>	Copper rope crimped

## DETC TWO-PHASE TAP CHANGERS SERIES 090 TYPE 01

- De-energized operation
- For oil immersed transformer
- For bridge connection
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm

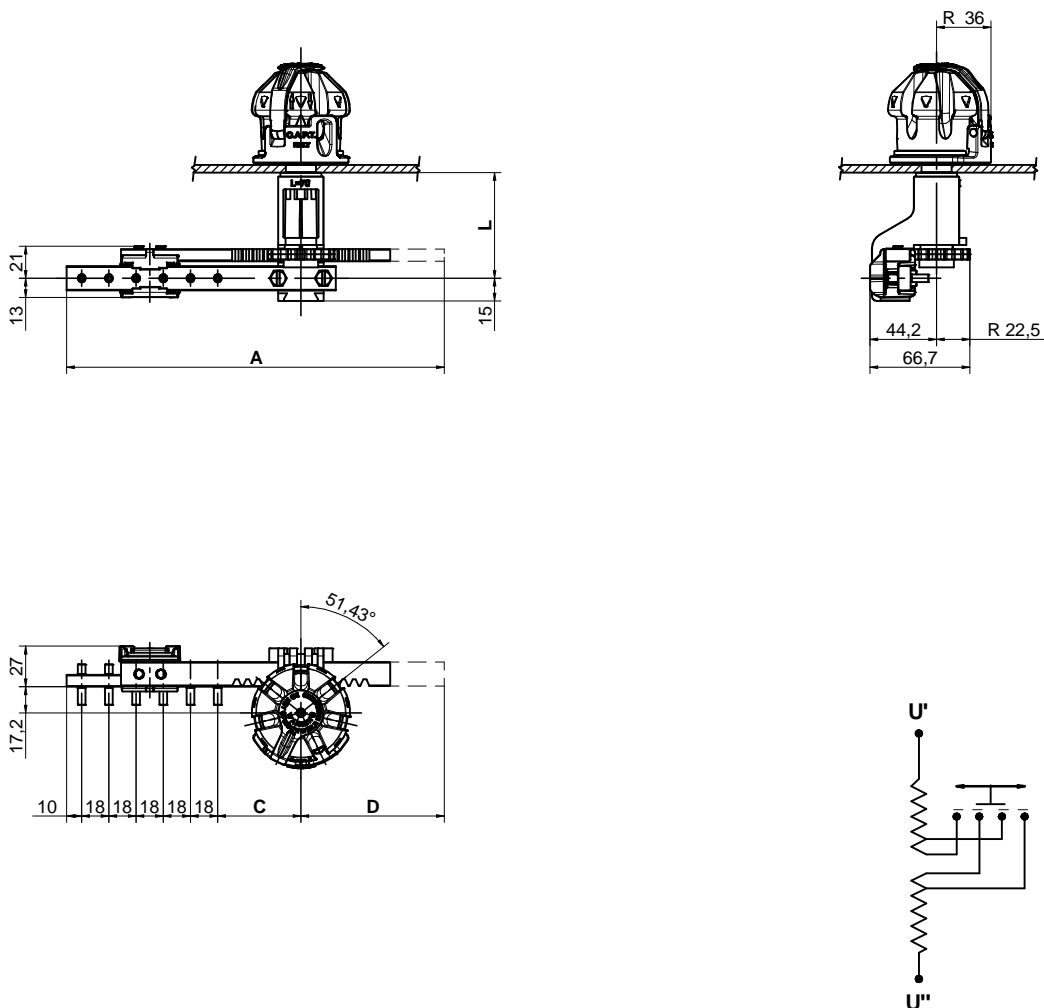


L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)			
		C		E		C		E	
		55		55		80		80	
		A	PRODUCT CODE			A	PRODUCT CODE		
10 A	30 A		65 A	10 A	30 A		65 A		
50 (only for 24 kV)	3	238	01...213	01...233	01...263	288	01...313	01...333	01...363
70 - 90	4	274	01...214	01...234	01...264	324	01...314	01...334	01...364
100 - 130	5	310	01...215	01...235	01...265	360	01...315	01...335	01...365
	6	346	01...216	01...236	01...266	396	01...316	01...336	01...366
150 - 180 - 200	7	382	01...217	01...237	01...267	432	01...317	01...337	01...367

## DETC SINGLE-PHASE TAP CHANGERS SERIES 090 TYPE 02

- De-energized operation
- For oil immersed transformer
- For bridge connection
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm

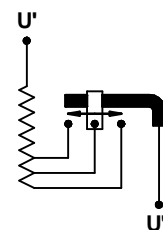
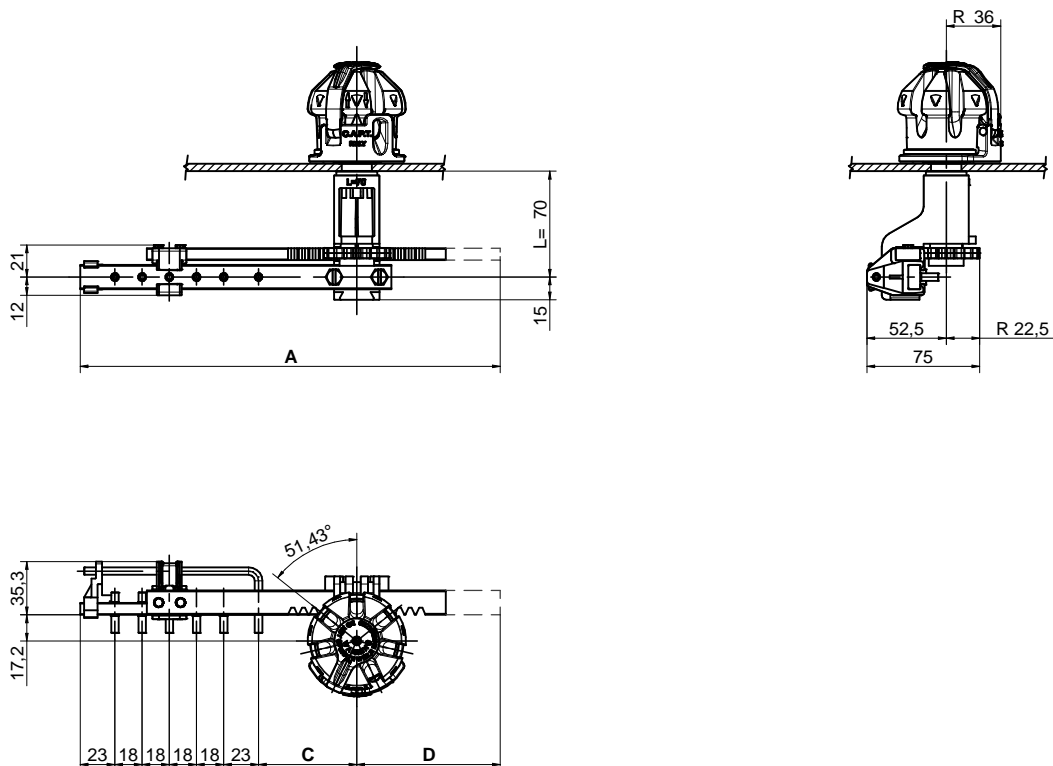


L	N° POS.	D	24 kV (BIL= 125 kV)			36 kV (BIL= 170 kV)				
			C			C				
			55			80				
			A	PRODUCT CODE			A	PRODUCT CODE		
	10 A	30 A	65 A		10 A	30 A	65 A			
50 (only for 24 kV)	3	59	178	02 .-. .213	02 .-. .233	02 .-. .263	203	02 .-. .313	02 .-. .333	02 .-. .363
70 - 90	4	77	214	02 .-. .214	02 .-. .234	02 .-. .264	239	02 .-. .314	02 .-. .334	02 .-. .364
	5	95	250	02 .-. .215	02 .-. .235	02 .-. .265	275	02 .-. .315	02 .-. .335	02 .-. .365
100 - 130	6	113	286	02 .-. .216	02 .-. .236	02 .-. .266	311	02 .-. .316	02 .-. .336	02 .-. .366
150 - 180 - 200	7	131	322	02 .-. .217	02 .-. .237	02 .-. .267	347	02 .-. .317	02 .-. .337	02 .-. .367

## DETC SINGLE-PHASE TAP CHANGERS SERIES 090 TYPE 03

- De-energized operation
- For oil immersed transformer
- For linear connection with a common for each phase
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



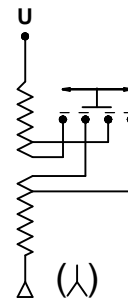
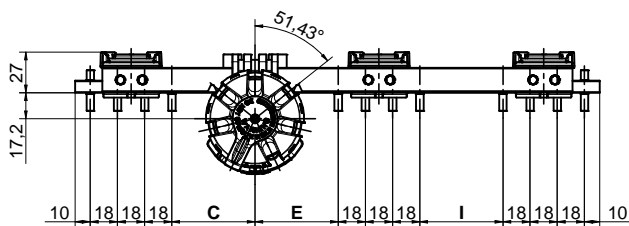
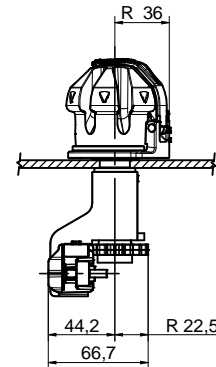
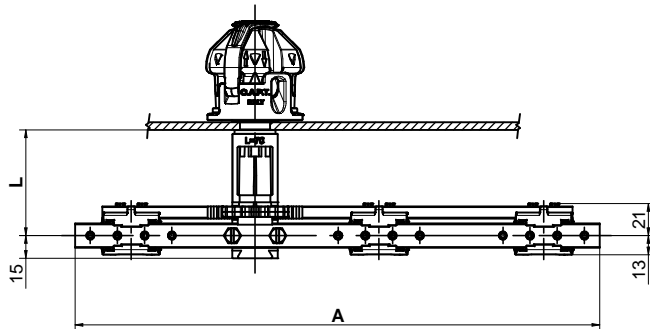
L	N° POS.	D	24 kV (BIL= 125 kV)			36 kV (BIL= 170 kV)				
			C			C				
			65			90				
			A	PRODUCT CODE			A	PRODUCT CODE		
	10 A	30 A	65 A		10 A	30 A	65 A			
50 (only for 24 kV)	3	59	206	03 .-. 213	03 .-. 233	03 .-. 263	231	03 .-. 313	03 .-. 333	03 .-. 363
70 - 90	4	77	242	03 .-. 214	03 .-. 234	03 .-. 264	267	03 .-. 314	03 .-. 334	03 .-. 364
	5	95	278	03 .-. 215	03 .-. 235	03 .-. 265	303	03 .-. 315	03 .-. 335	03 .-. 365
100 - 130	6	113	314	03 .-. 216	03 .-. 236	03 .-. 266	339	03 .-. 316	03 .-. 336	03 .-. 366
150 - 180 - 200	7	131	350	03 .-. 217	03 .-. 237	03 .-. 267	375	03 .-. 317	03 .-. 337	03 .-. 367



## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 04

- De-energized operation
- For oil immersed transformer
- For bridge connection
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm

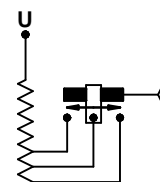
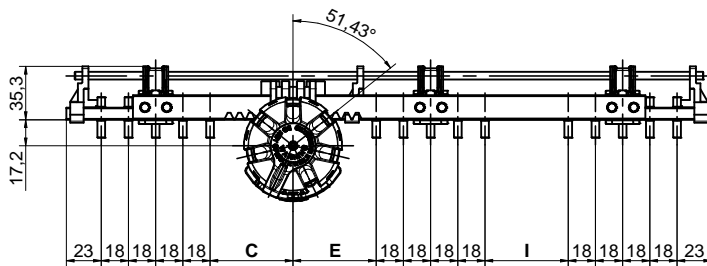
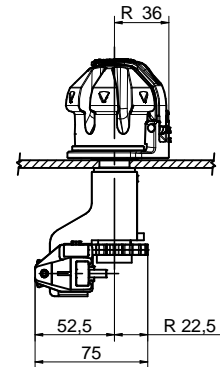
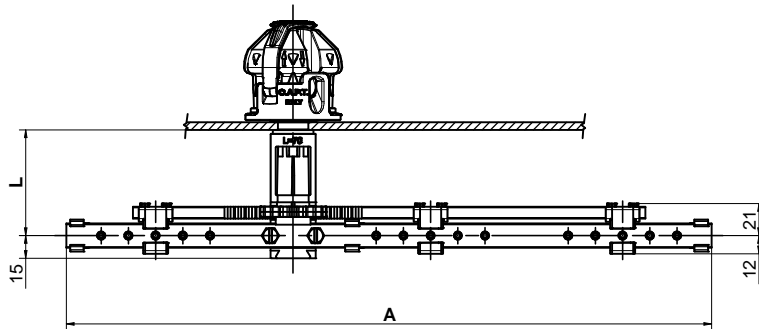


L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)			
		C	E	I	C	E	I		
		55	55	55	80	80	80		
		A	PRODUCT CODE			A	PRODUCT CODE		
			10 A	30 A	65 A		10 A	30 A	65 A
50 (only for 24 kV)	3	347	04 .-. 213	04 .-. 233	04 .-. 263	422	04 .-. 313	04 .-. 333	04 .-. 363
	4	401	04 .-. 214	04 .-. 234	04 .-. 264	476	04 .-. 314	04 .-. 334	04 .-. 364
70 - 90	5	455	04 .-. 215	04 .-. 235	04 .-. 265	530	04 .-. 315	04 .-. 335	04 .-. 365
100 - 130	6	509	04 .-. 216	04 .-. 236	04 .-. 266	584	04 .-. 316	04 .-. 336	04 .-. 366
	7	563	04 .-. 217	04 .-. 237	04 .-. 267	638	04 .-. 317	04 .-. 337	04 .-. 367

## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 05

- De-energized operation
- For oil immersed transformer
- For wye connection without take off terminal
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm

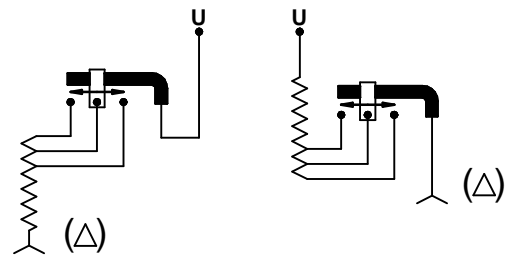
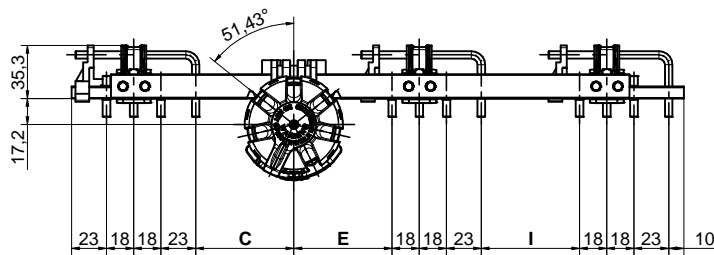
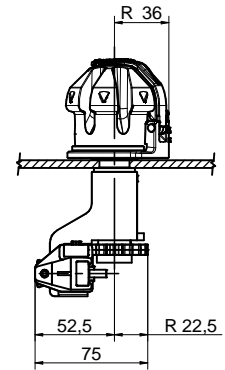
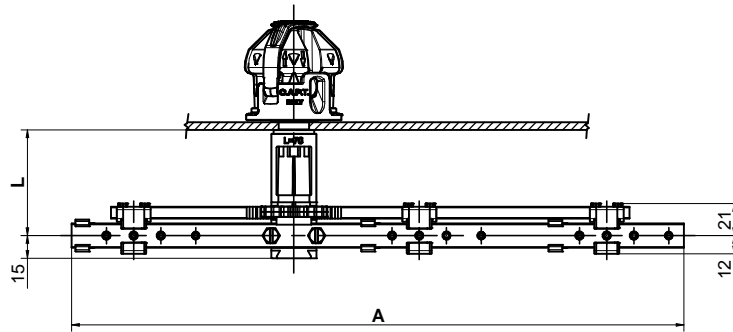


L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)			
		C	E	I	C	E	I		
		55	55	55	90	90	90		
		A	PRODUCT CODE			A	PRODUCT CODE		
		10 A	30 A	65 A	10 A	30 A	65 A		
50 (only for 24 kV)	3	319	05...213	05...233	05...263	424	05...313	05...333	05...363
	4	373	05...214	05...234	05...264	478	05...314	05...334	05...364
70 - 90	5	427	05...215	05...235	05...265	532	05...315	05...335	05...365
100 - 130	6	481	05...216	05...236	05...266	586	05...316	05...336	05...366
	7	535	05...217	05...237	05...267	640	05...317	05...337	05...367

## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 06

- De-energized operation
- For oil immersed transformer
- For linear connection with a common for each phase
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm

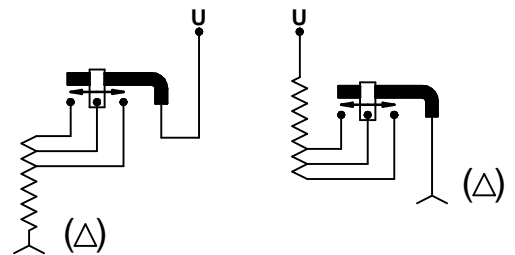
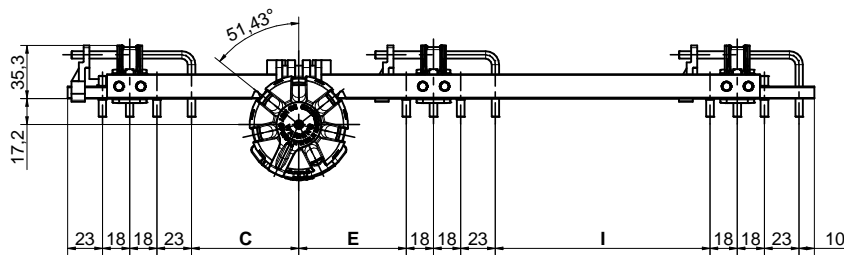
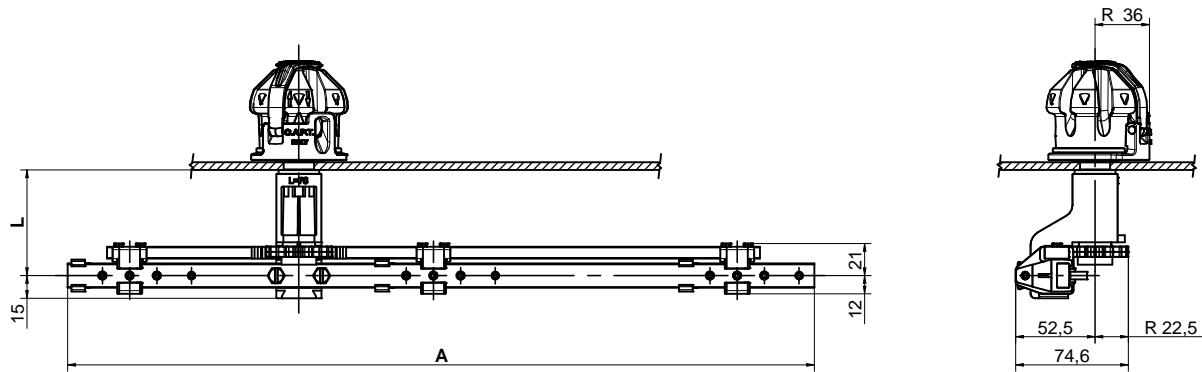


L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)			
		C	E	I	C	E	I		
		65	65	65	90	90	90		
		A	PRODUCT CODE			A	PRODUCT CODE		
			10 A	30 A	65 A		10 A	30 A	65 A
50 (only for 24 kV)	3	405	06 .-. 213	06 .-. 233	06 .-. 263	480	06 .-. 313	06 .-. 333	06 .-. 363
	4	459	06 .-. 214	06 .-. 234	06 .-. 264	534	06 .-. 314	06 .-. 334	06 .-. 364
70 - 90	5	513	06 .-. 215	06 .-. 235	06 .-. 265	588	06 .-. 315	06 .-. 335	06 .-. 365
100 - 130	6	567	06 .-. 216	06 .-. 236	06 .-. 266	642	06 .-. 316	06 .-. 336	06 .-. 366
	7	621	06 .-. 217	06 .-. 237	06 .-. 267	696	06 .-. 317	06 .-. 337	06 .-. 367

## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 07

- De-energized operation
- For oil immersed transformer
- Linear connection with a common for each phase
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm

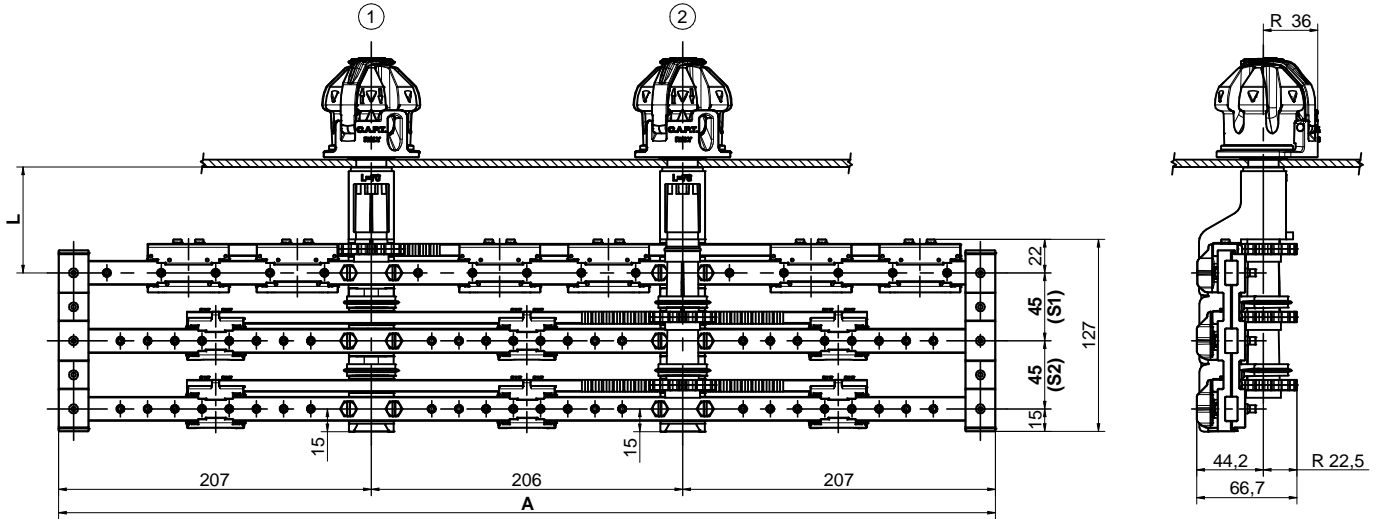


L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)			
		C	E	I	C	E	I		
		71	71	142	90	90	142		
		A	PRODUCT CODE			A	PRODUCT CODE		
			10 A	30 A	65 A		10 A	30 A	65 A
50 (only for 24 kV)	3	494	07.-.213	07.-.233	07.-.263	532	07.-.313	07.-.333	07.-.363
	4	548	07.-.214	07.-.234	07.-.264	586	07.-.314	07.-.334	07.-.364
70 - 90	5	602	07.-.215	07.-.235	07.-.265	640	07.-.315	07.-.335	07.-.365
100 - 130	6	656	07.-.216	07.-.236	07.-.266	694	07.-.316	07.-.336	07.-.366
	7	710	07.-.217	07.-.237	07.-.267	748	07.-.317	07.-.337	07.-.367

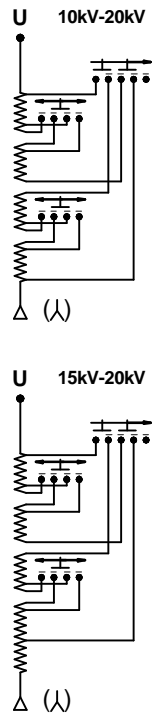
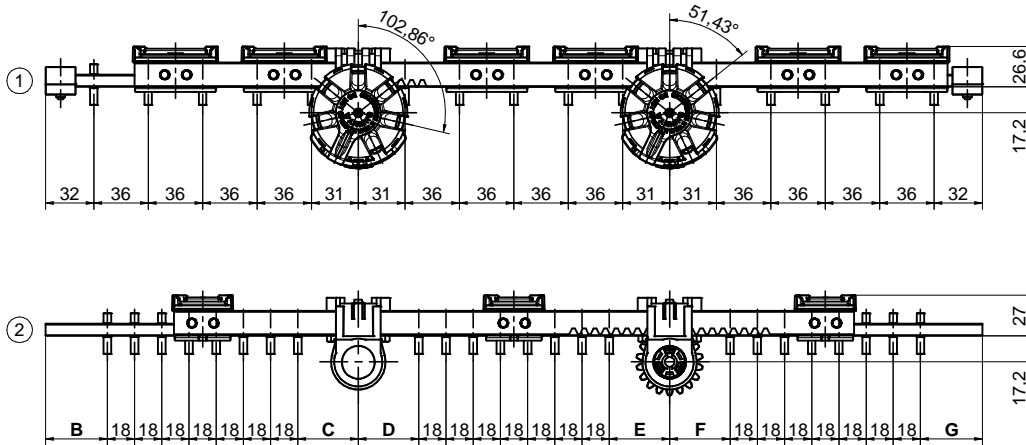
# DETC TRIPLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 08

- De-energized operation
- For oil immersed transformer
- 1: N°1 For series parallel connection
- 2: N°2 For bridge connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
C/V vs. BRIDGE (S1)	125 kV	140 kV	65 kV
BRIDGE vs. BRIDGE (S2)	100 kV	110 kV	60 kV

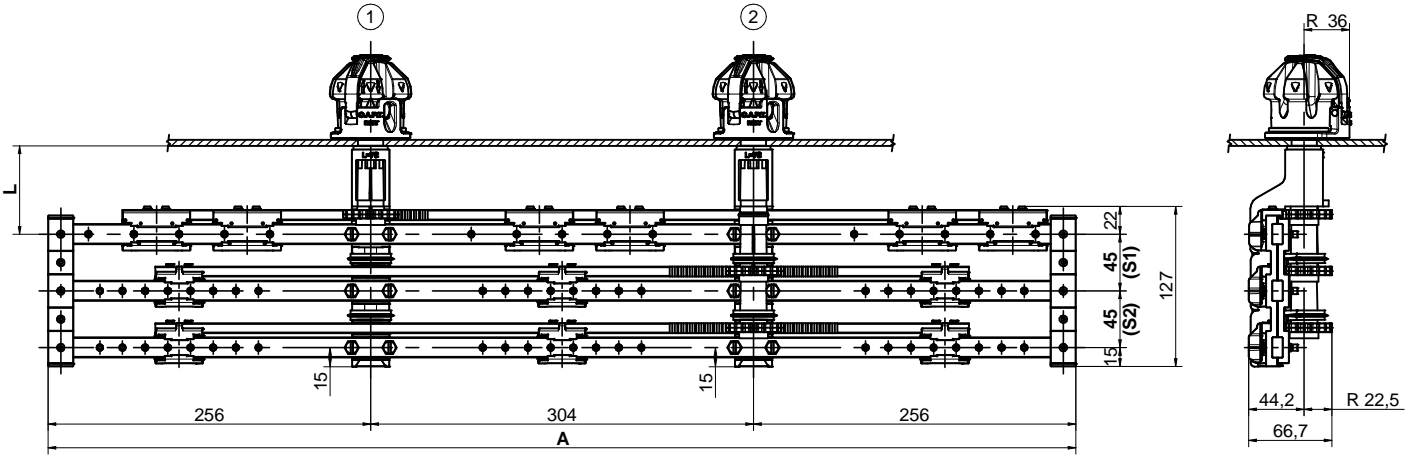


L	N° POS.	24 kV (BIL= 125 kV)								
		A	B	C	D	E	F	G	PRODUCT CODE	
									30 A	65 A
50 - 70	3	620	77	76	76	76	76	77	08...233	08...263
90 - 100	4	620	77	58	76	58	76	59	08...234	08...264
130 - 150	5	620	59	58	58	58	58	59	08...235	08...265
	6	620	59	40	58	40	58	41	08...236	08...266
180 - 200	7	620	41	40	40	40	40	41	08...237	08...267

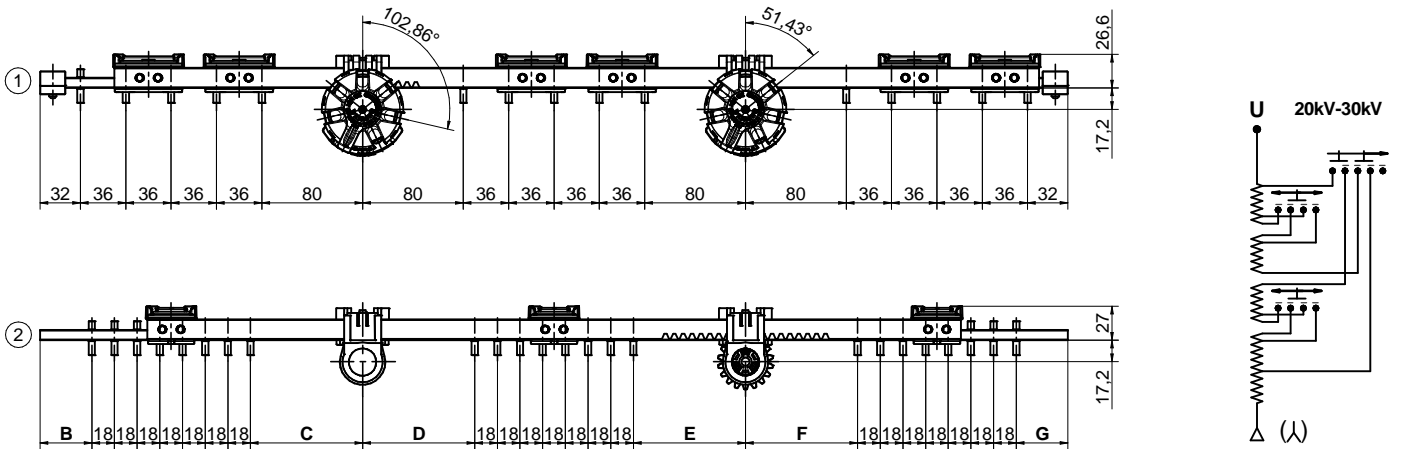
# DETC TRIPLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 08

- De-energized operation
- For oil immersed transformer
- 1: N°1 For series parallel connection
- 2: N°2 For bridge connection
- 36 kV (BIL= 170 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
C/V vs. BRIDGE (S1)	125 kV	140 kV	65 kV
BRIDGE vs. BRIDGE (S2)	100 kV	110 kV	60 kV



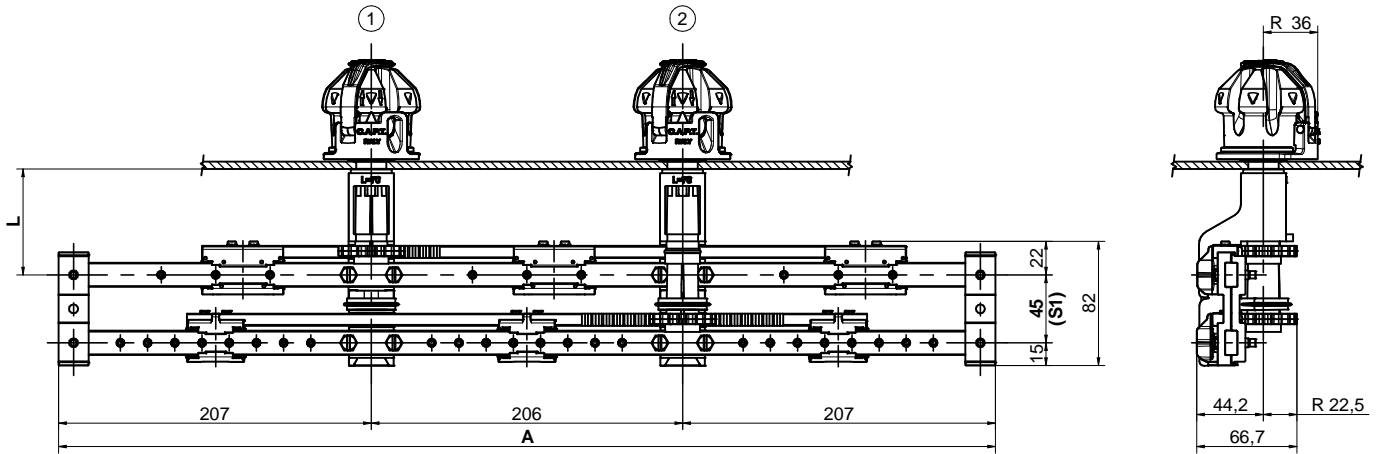
**N.B.** Maximum impulse voltage between adjacent contacts of series/parallel connection BIL= 100 kV.

L	N° POS.	36 kV (BIL= 170 kV)								PRODUCT CODE	
		A	B	C	D	E	F	G	30 A	65 A	
		70 - 90	3	816	77	125	125	125	125	77	08...333
100 - 130	4	816	77	107	125	107	125	59	08...334	08...364	
	5	816	59	107	107	107	107	59	08...335	08...365	
150 - 180 - 200	6	816	59	89	107	89	107	41	08...336	08...366	
	7	816	41	89	89	89	89	41	08...337	08...367	

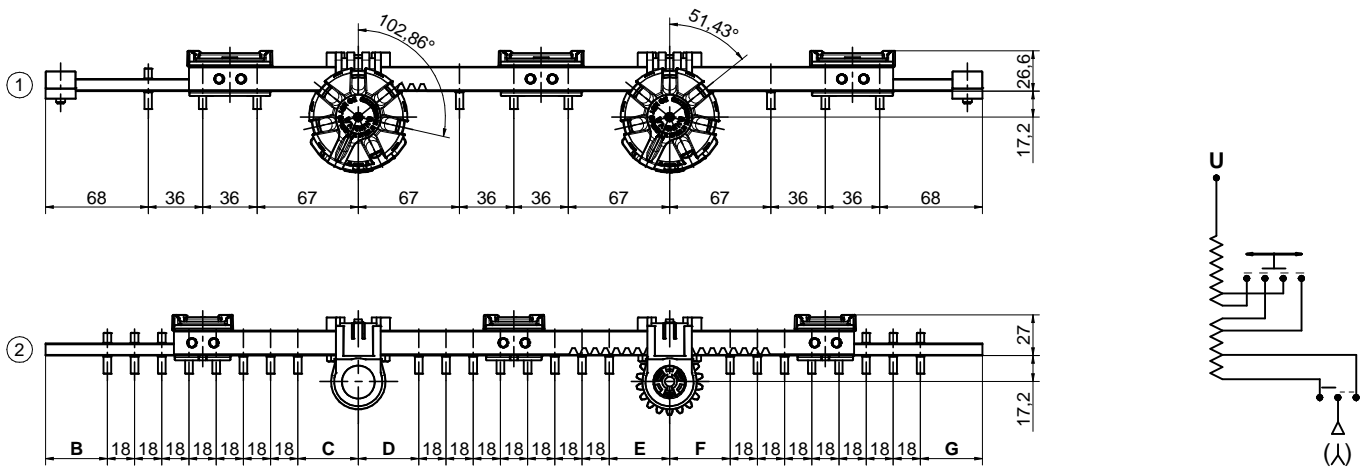
# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 09

- De-energized operation
- For oil immersed transformer
- 1: N°1 For change voltage connection
- 2: N°1 For bridge connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
C/V vs. BRIDGE (S1)	125 kV	140 kV	65 kV



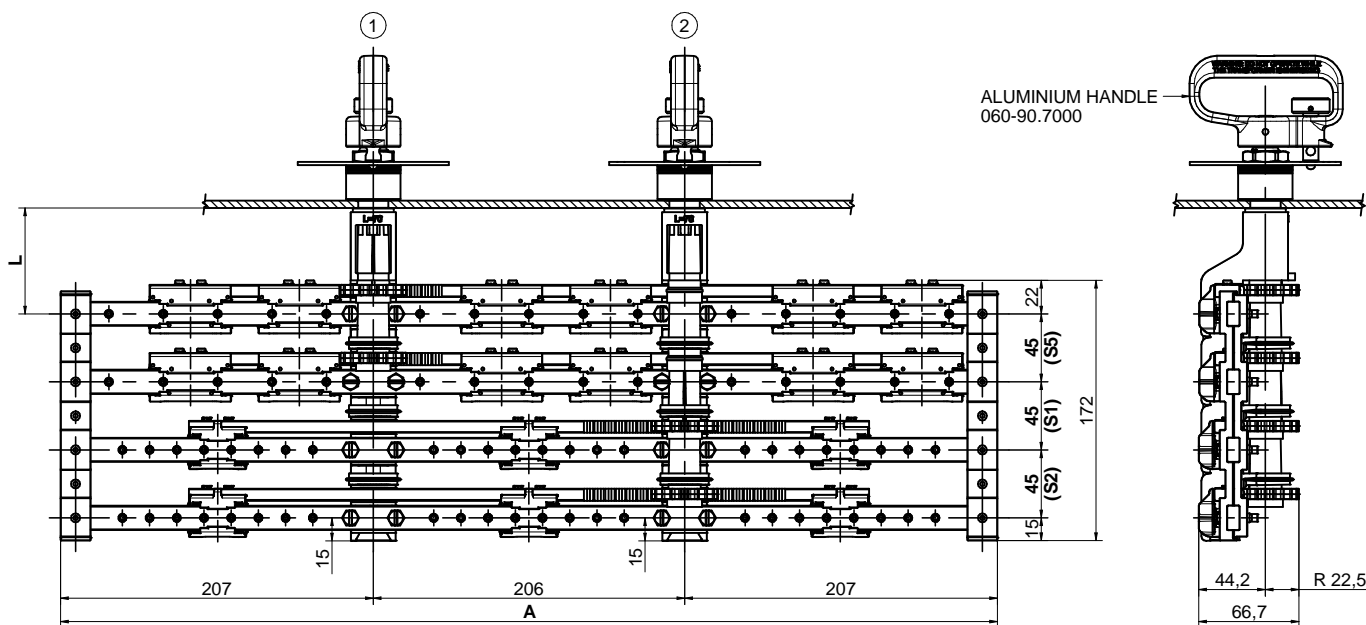
**N.B.** Maximum impulse voltage between adjacent contacts of series/parallel connection BIL= 100 kV.

L	N° POS.	24 kV (BIL= 125 kV)								
		A	B	C	D	E	F	G	PRODUCT CODE	
									30 A	65 A
50 - 70	3	620	77	76	76	76	76	77	09...233	09...263
90 - 100	4	620	77	58	76	58	76	59	09...234	09...264
130 - 150	5	620	59	58	58	58	58	59	09...235	09...265
	6	620	59	40	58	40	58	41	09...236	09...266
180 - 200	7	620	41	40	40	40	40	41	09...237	09...267

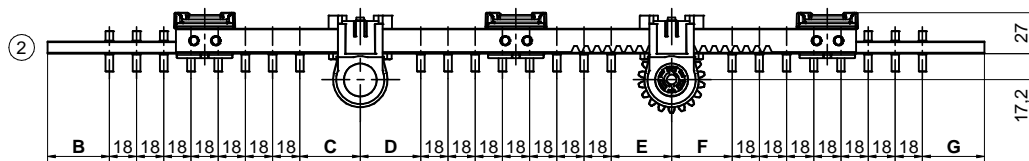
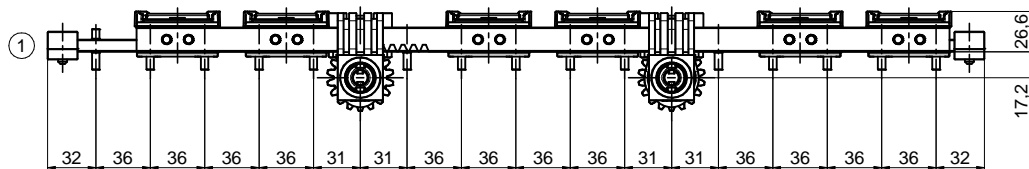
# DETC QUADRUPLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 10

- De-energized operation
- For oil immersed transformer
- 1: N°2 For series parallel connection
- 2: N°2 For bridge connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
C/V vs. BRIDGE (S1)	125 kV	140 kV	65 kV
BRIDGE vs. BRIDGE (S2)	100 kV	110 kV	60 kV
C/V vs. C/V (S5)	110 kV	120 kV	50 kV



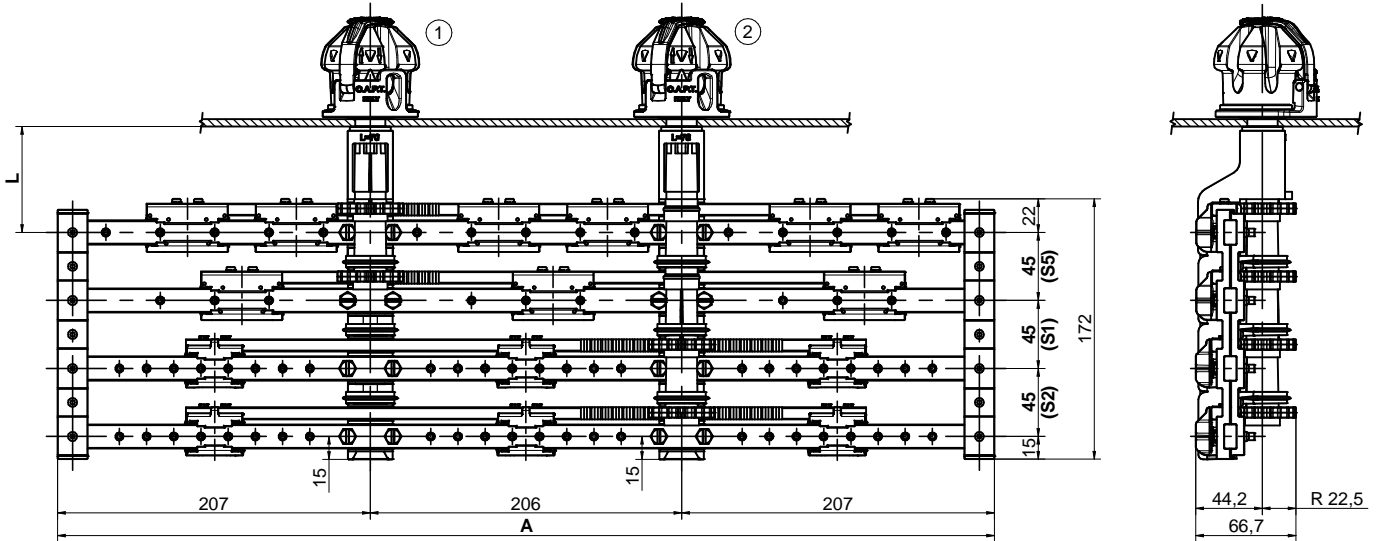
L	N° POS.	24 kV (BIL= 125 kV)								
		A	B	C	D	E	F	G	PRODUCT CODE	
									30 A	65 A
50 - 70	3	620	77	76	76	76	76	77	10...233	10...263
90 - 100	4	620	77	58	76	58	76	59	10...234	10...264
	5	620	59	58	58	58	58	59	10...235	10...265
130 - 150	6	620	59	40	58	40	58	41	10...236	10...266
180 - 200	7	620	41	40	40	40	40	41	10...237	10...267



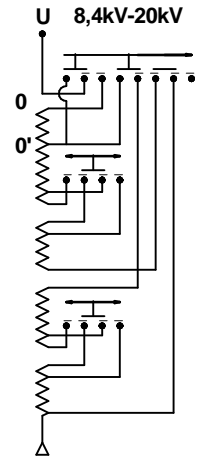
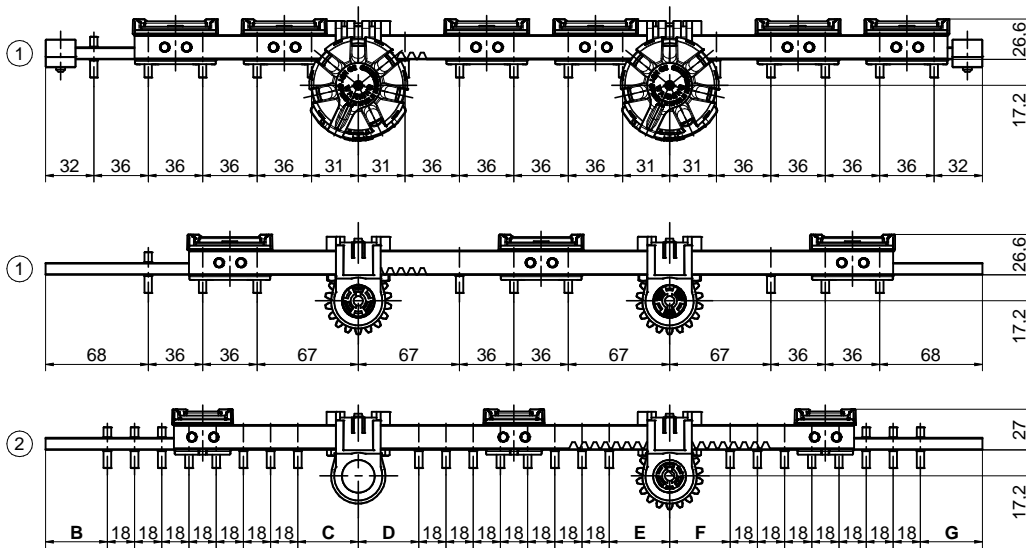
# DETC QUADRUPLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 11

- De-energized operation
- For oil immersed transformer
- 1: N°1 For series parallel connection, N°1 for change voltage connection
- 2: N°2 For bridge connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
C/V vs. BRIDGE (S1)	125 kV	140 kV	65 kV
BRIDGE vs. BRIDGE (S2)	100 kV	110 kV	60 kV
C/V vs. C/V (S5)	110 kV	120 kV	50 kV

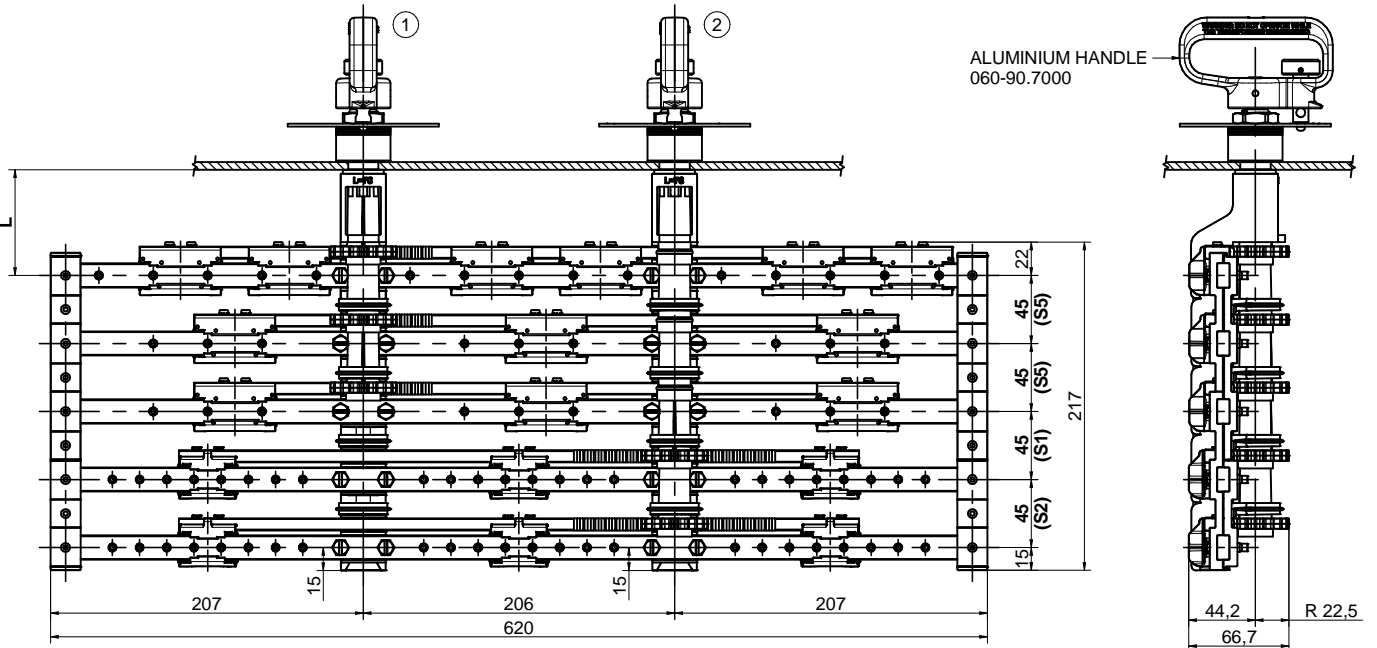


L	N° POS.	24 kV (BIL= 125 kV)								PRODUCT CODE	
		A	B	C	D	E	F	G	30 A	65 A	
		50 - 70	3	620	77	76	76	76	76	77	11...233
90 - 100	4	620	77	58	76	58	76	59	11...234	11...264	
130 - 150	5	620	59	58	58	58	58	59	11...235	11...265	
180 - 200	6	620	59	40	58	40	58	41	11...236	11...266	
	7	620	41	40	40	40	40	41	11...237	11...267	

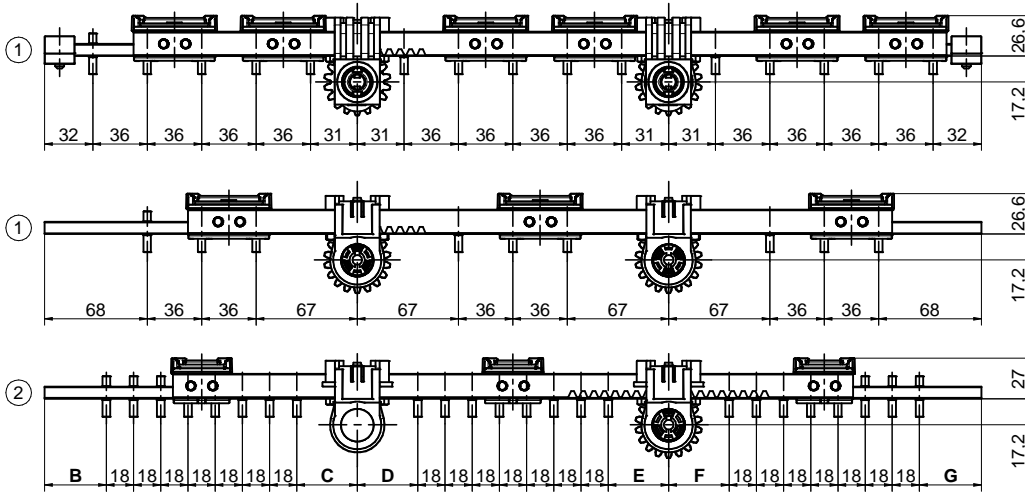
# DETC QUINTUPLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 12

- De-energized operation
- For oil immersed transformer
- 1: N°1 For series parallel connection, N°2 for change voltage connection
- 2: N°2 For bridge connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
C/V vs. BRIDGE (S1)	125 kV	140 kV	65 kV
BRIDGE vs. BRIDGE (S2)	100 kV	110 kV	60 kV
C/V vs. C/V (S5)	110 kV	120 kV	50 kV

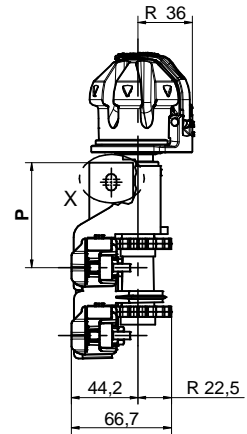
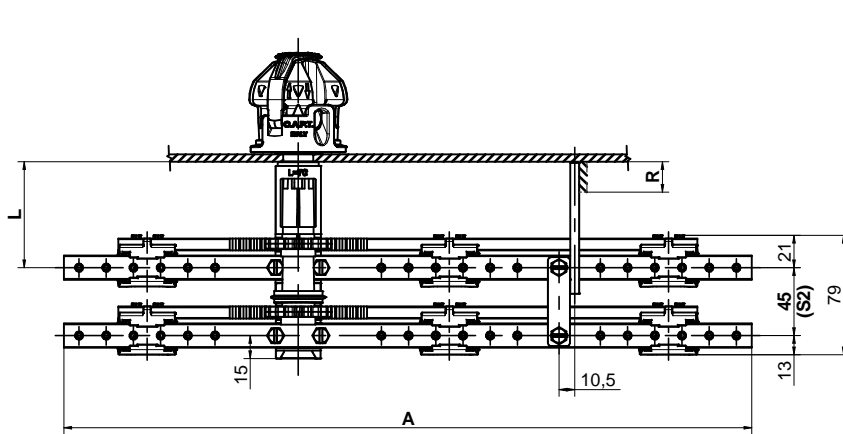


L	N° POS.	24 kV (BIL= 125 kV)							PRODUCT CODE	
		A	B	C	D	E	F	G	30 A	65 A
		50 - 70	3	620	77	76	76	76	76	77
90 - 100	4	620	77	58	76	58	76	59	12...234	12...264
130 - 150	5	620	59	58	58	58	58	59	12...235	12...265
180 - 200	6	620	59	40	58	40	58	41	12...236	12...266
	7	620	41	40	40	40	40	41	12...237	12...267

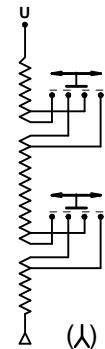
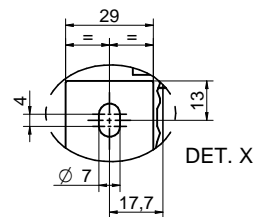
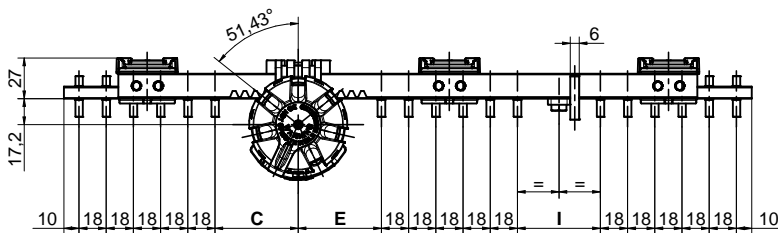
# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 13

- De-energized operation
- For oil immersed transformer
- For bridge connection
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
BRIDGE vs. BRIDGE (S2)	100 kV	110 kV	60 kV



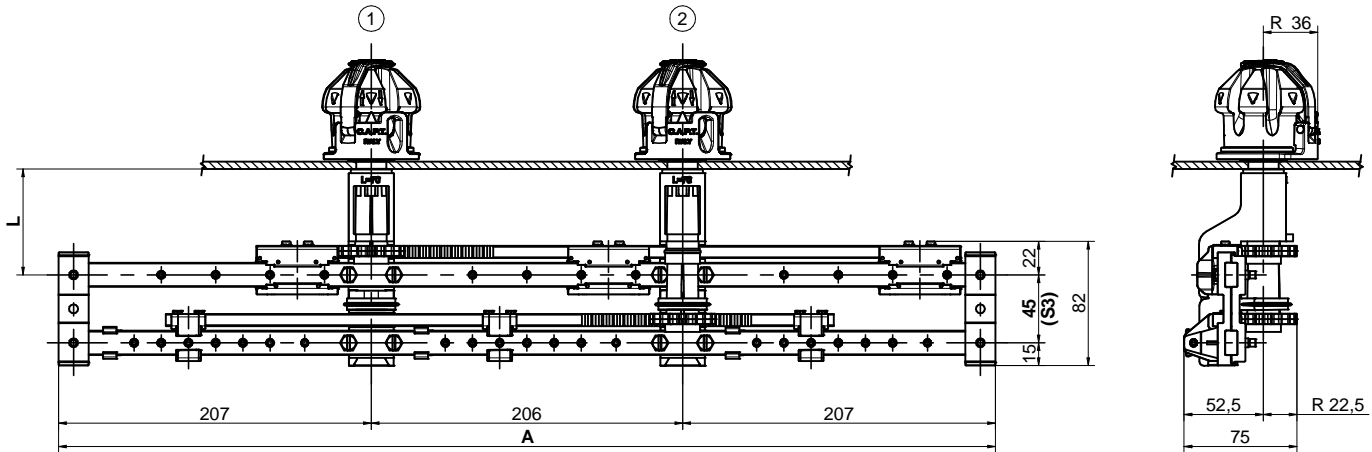
<b>L</b>	<b>50</b>	<b>70</b>	<b>90</b>	<b>100</b>	<b>130</b>	<b>150</b>	<b>180</b>	<b>200</b>
<b>P</b>	49,5	69,5	89,5	99,5	129,5	149,5	149,5	149,5
<b>R</b>	20	20	20	25	25	25	55	75

L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)									
		C		E		C		E							
		I		I		I		I							
		55	55	55	55	80	80	80	80						
		A		PRODUCT CODE				A		PRODUCT CODE					
				10 A	30 A	65 A			10 A	30 A	65 A				
50 (only for 24 kV)	3	347		13.-.213	13.-.233	13.-.263	422		13.-.313	13.-.333	13.-.363				
70 - 90	4	401		13.-.214	13.-.234	13.-.264	476		13.-.314	13.-.334	13.-.364				
	5	455		13.-.215	13.-.235	13.-.265	530		13.-.315	13.-.335	13.-.365				
100 - 130	6	509		13.-.216	13.-.236	13.-.266	584		13.-.316	13.-.336	13.-.366				
150 - 180 - 200	7	563		13.-.217	13.-.237	13.-.267	638		13.-.317	13.-.337	13.-.367				

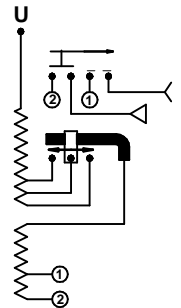
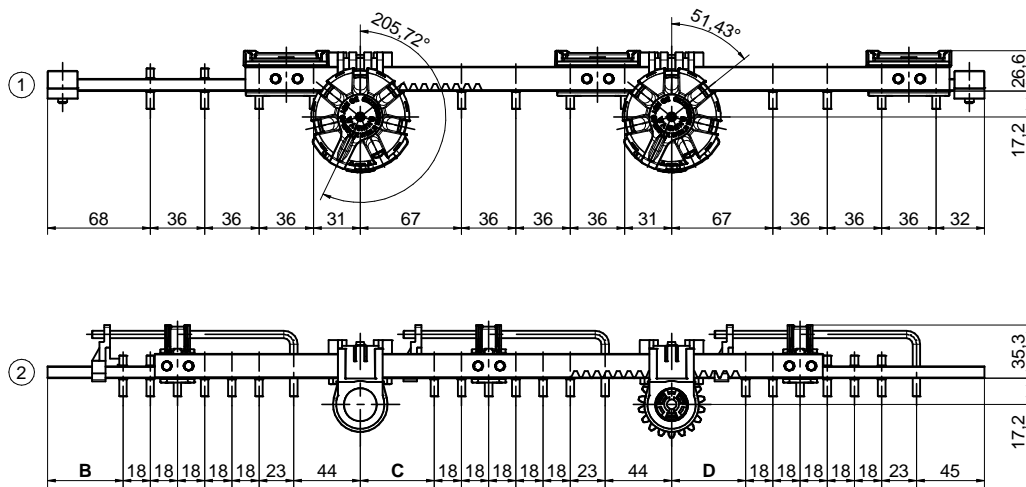
# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 14

- De-energized operation
- For oil immersed transformer
- 1: N°1 For change voltage connection
- 2: N°1 For linear connection with a common for each phase
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 6 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
LINEAR vs. C/V (S3)	105 kV	115 kV	55 kV



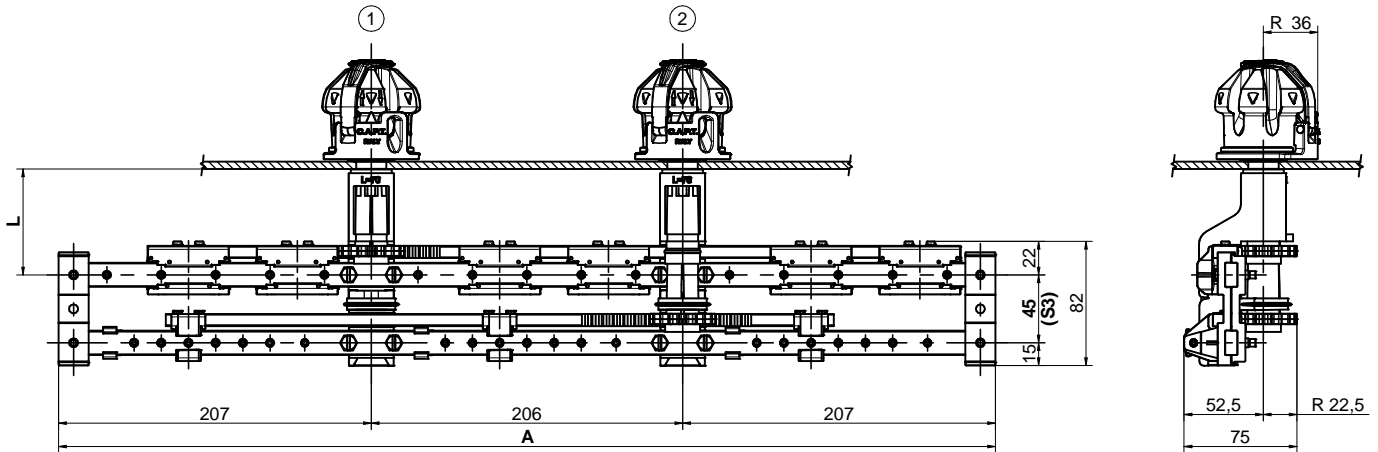
**N.B.** Maximum impulse voltage between adjacent contacts of series/parallel connection BIL= 100 kV.

L	N° POS.	24 kV (BIL= 125 kV)					
		A	B	C	D	PRODUCT CODE	
						30 A	65 A
50 - 70	3	620	104	103	103	14 . - . 233	14 . - . 263
90 - 100	4	620	86	85	85	14 . - . 234	14 . - . 264
130 - 150	5	620	68	67	67	14 . - . 235	14 . - . 265
180 - 200	6	620	50	49	49	14 . - . 236	14 . - . 266

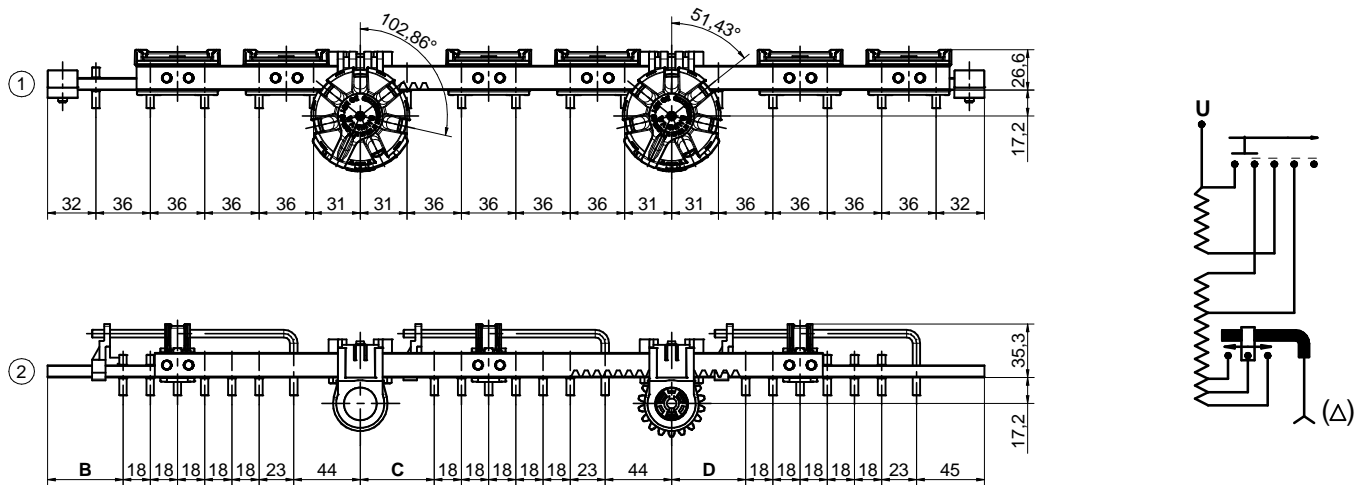
# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 15

- De-energized operation
- For oil immersed transformer
- 1: N°1 For series parallel connection
- 2: N°1 For linear connection with a common for each phase
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 6 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
LINEAR vs. C/V (S3)	105 kV	115 kV	55 kV

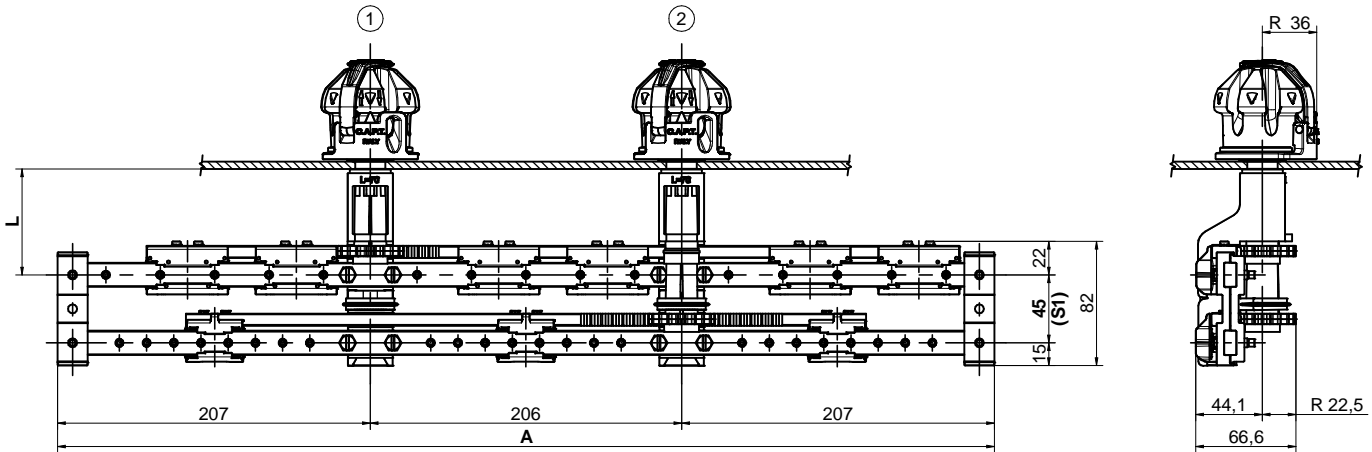


L	N° POS.	24 kV (BIL= 125 kV)					
		A	B	C	D	PRODUCT CODE	
						30 A	65 A
50 - 70	3	620	104	103	103	15.-.233	15.-.263
90 - 100	4	620	86	85	85	15.-.234	15.-.264
130 - 150	5	620	68	67	67	15.-.235	15.-.265
180 - 200	6	620	50	49	49	15.-.236	15.-.266

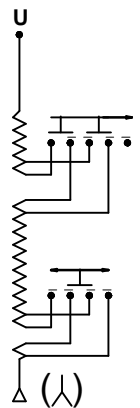
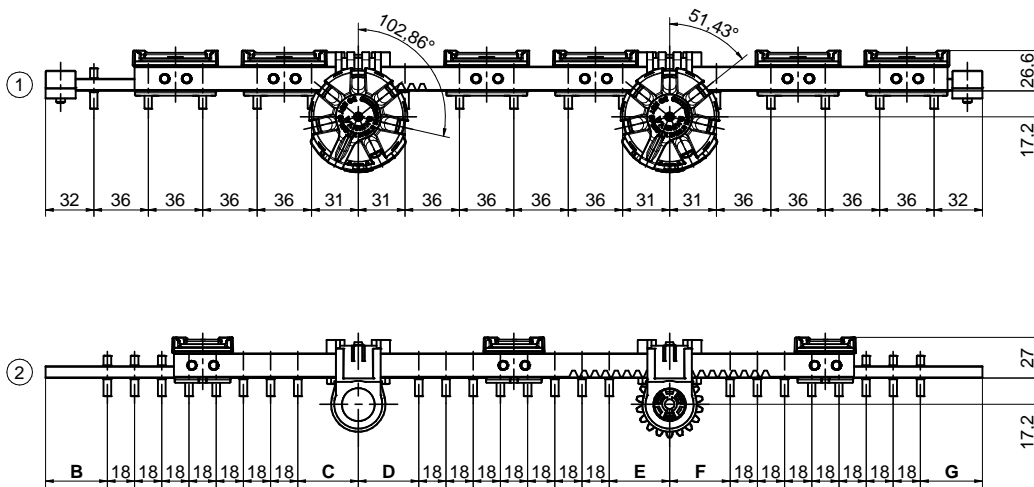
# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 16

- De-energized operation
- For oil immersed transformer
- 1: N°1 For series parallel connection
- 2: N°1 For bridge connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
C/V vs. BRIDGE (S1)	125 kV	140 kV	65 kV

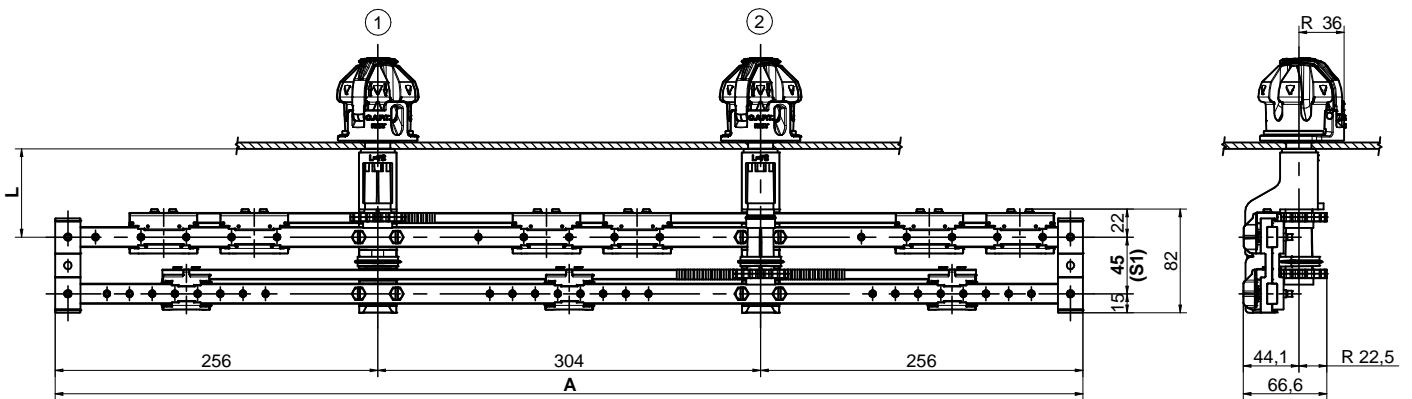


L	N° POS.	24 kV (BIL= 125 kV)								
		A	B	C	D	E	F	G	PRODUCT CODE	
									30 A	65 A
50 - 70	3	620	77	76	76	76	76	77	16...233	16...263
90 - 100	4	620	77	58	76	58	76	59	16...234	16...264
130 - 150	5	620	59	58	58	58	58	59	16...235	16...265
	6	620	59	40	58	40	58	41	16...236	16...266
180 - 200	7	620	41	40	40	40	40	41	16...237	16...267

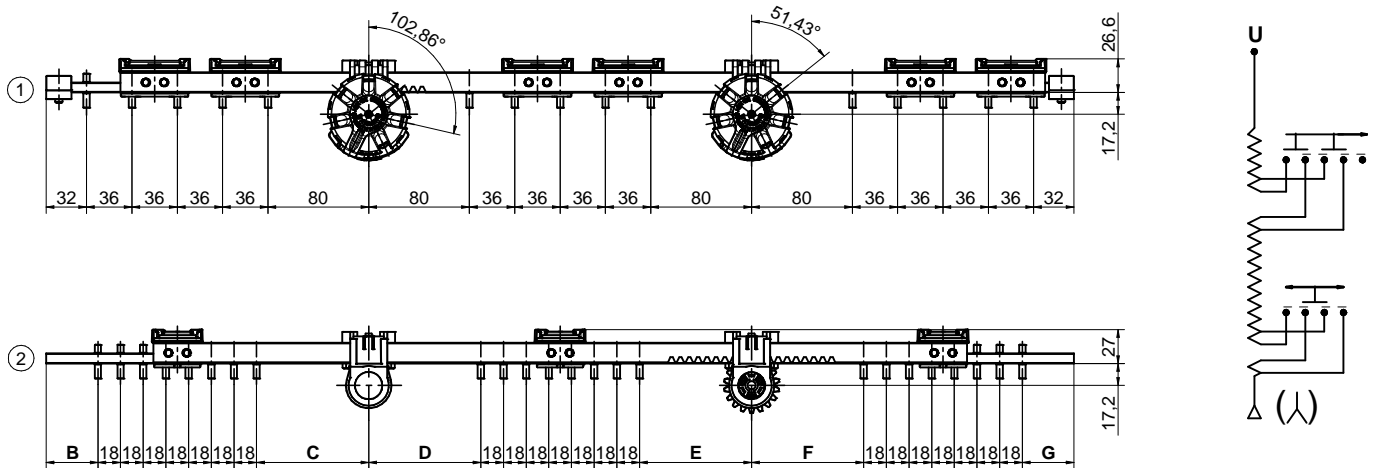
# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 16

- De-energized operation
- For oil immersed transformer
- 1: N°1 For series parallel connection
- 2: N°1 For bridge connection
- 36 kV (BIL= 170 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
C/V vs. BRIDGE (S1)	125 kV	140 kV	65 kV



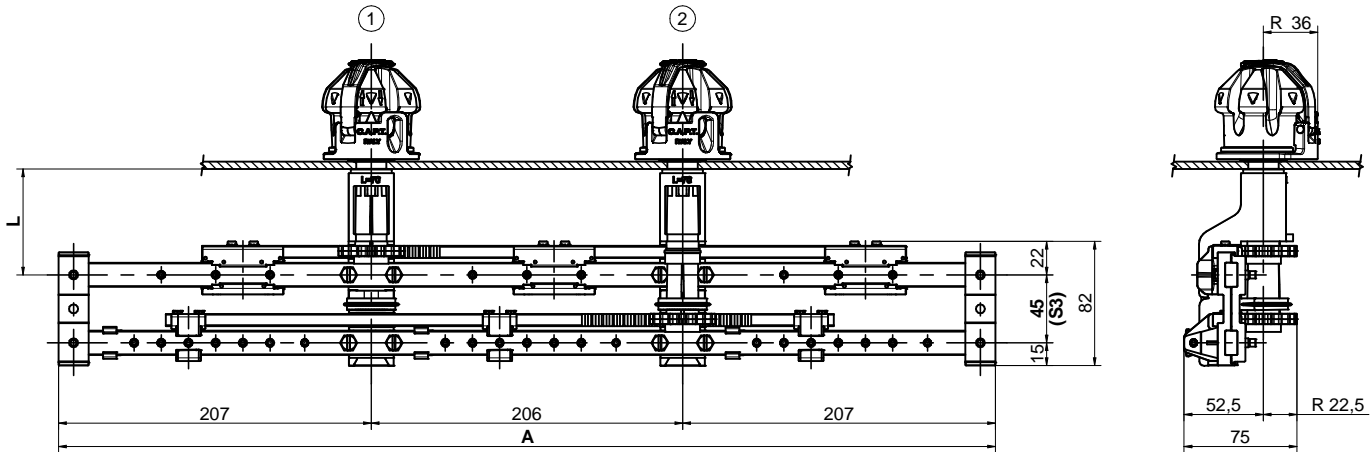
**N.B.** Maximum impulse voltage between adjacent contacts of series/parallel connection BIL= 100 kV.

L	N° POS.	36 kV (BIL= 170 kV)								
		A	B	C	D	E	F	G	PRODUCT CODE	
									30 A	65 A
70	3	816	77	125	125	125	125	77	16...333	16...363
	4	816	77	107	125	107	125	59	16...334	16...364
90 - 100	5	816	59	107	107	107	107	59	16...335	16...365
	6	816	59	89	107	89	107	41	16...336	16...366
130 - 150	7	816	41	89	89	89	89	41	16...337	16...367

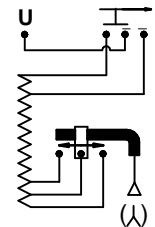
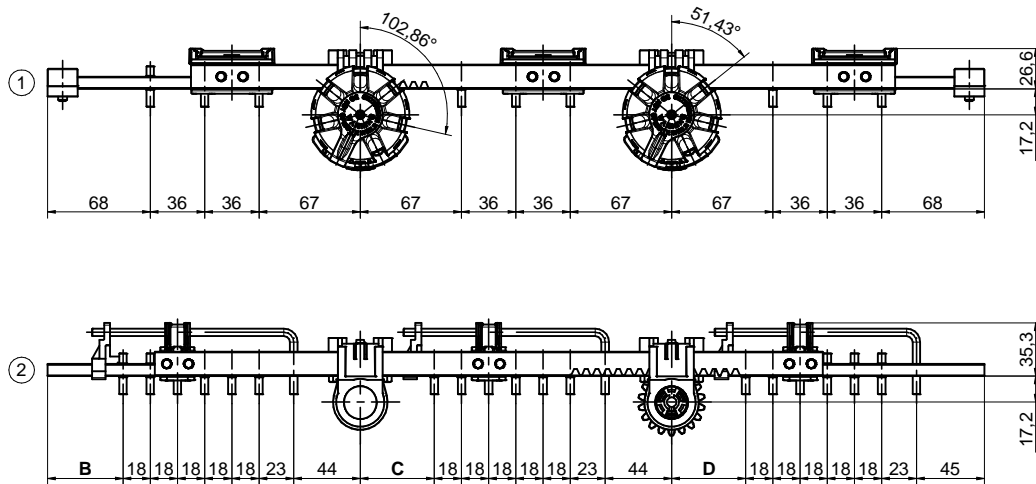
# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 17

- De-energized operation
- For oil immersed transformer
- 1: N°1 For change voltage connection
- 2: N°1 For linear connection with a common for each phase
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 6 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
LINEAR vs. C/V (S3)	105 kV	115 kV	55 kV



**N.B.** Maximum impulse voltage between adjacent contacts of series/parallel connection BIL= 100 kV.

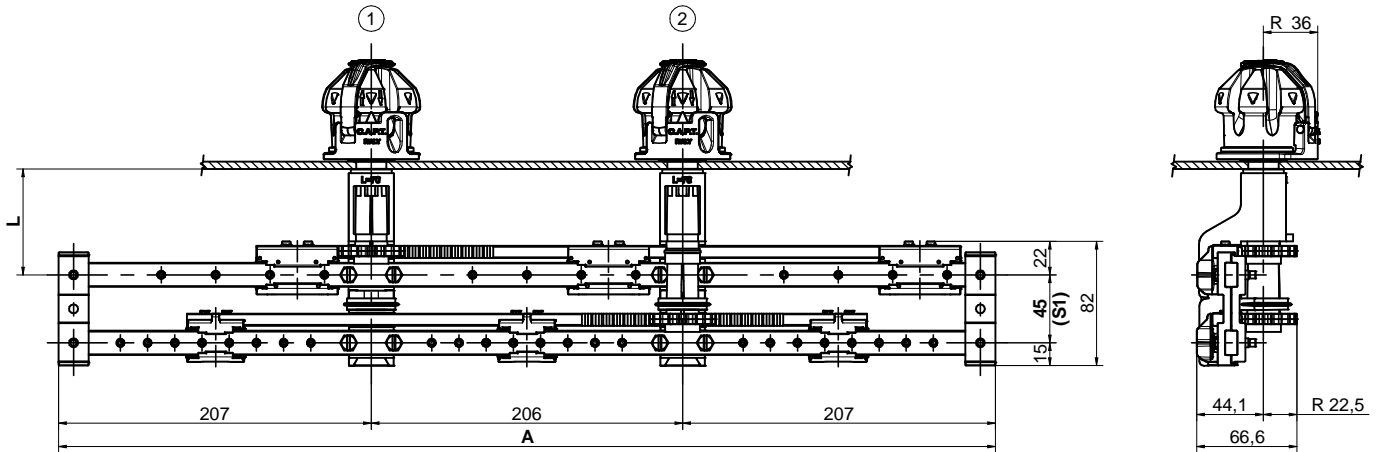
L	N° POS.	24 kV (BIL= 125 kV)					
		A	B	C	D	PRODUCT CODE	
						30 A	65 A
50 - 70	3	620	104	103	103	17.-.233	17.-.263
90 - 100	4	620	86	85	85	17.-.234	17.-.264
130 - 150	5	620	68	67	67	17.-.235	17.-.265
180 - 200	6	620	50	49	49	17.-.236	17.-.266



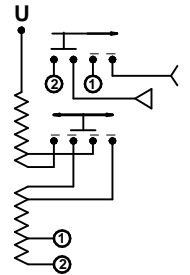
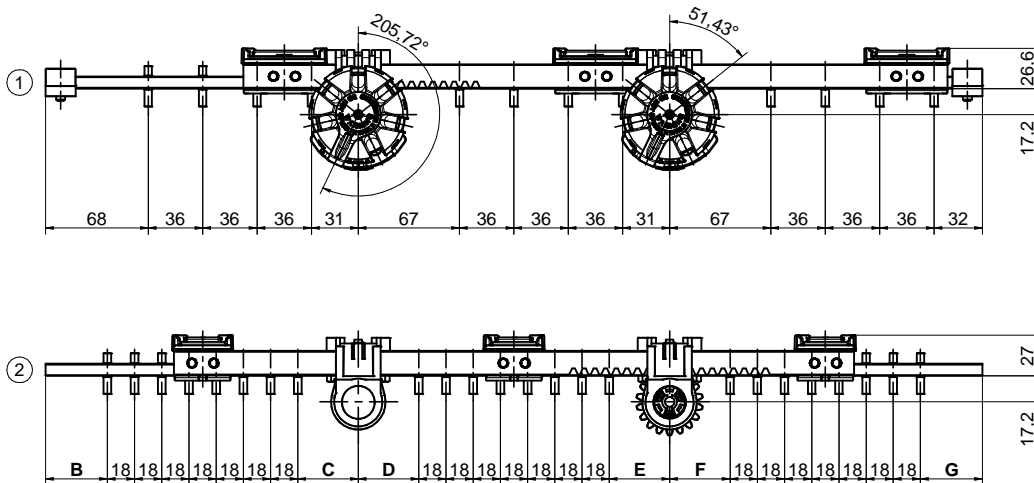
# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 18

- De-energized operation
- For oil immersed transformer
- 1: N°1 For change voltage connection
- 2: N°1 For bridge connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
C/V vs. BRIDGE (S1)	125 kV	140 kV	65 kV

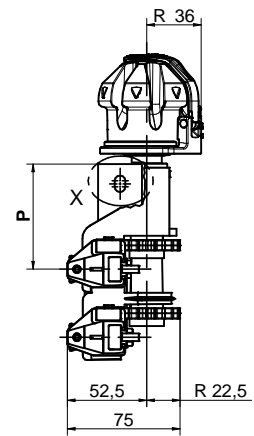
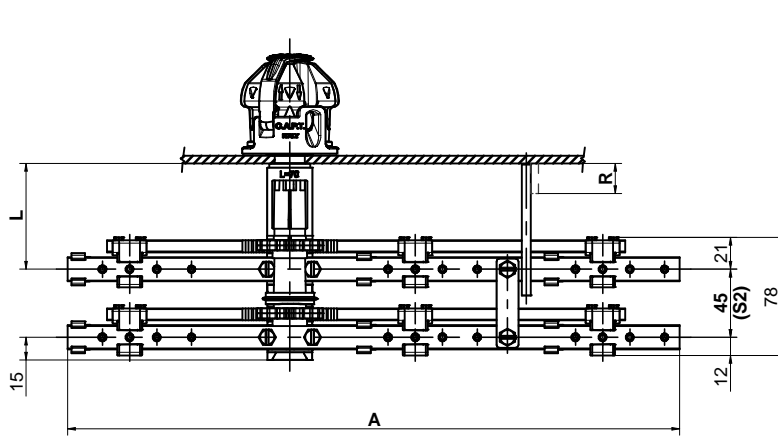


L	N° POS.	24 kV (BIL= 125 kV)								
		A	B	C	D	E	F	G	PRODUCT CODE	
									30 A	65 A
50 - 70	3	620	77	76	76	76	76	77	18...233	18...263
90 - 100	4	620	77	58	76	58	76	59	18...234	18...264
130 - 150	5	620	59	58	58	58	58	59	18...235	18...265
	6	620	59	40	58	40	58	41	18...236	18...266
180 - 200	7	620	41	40	40	40	40	41	18...237	18...267

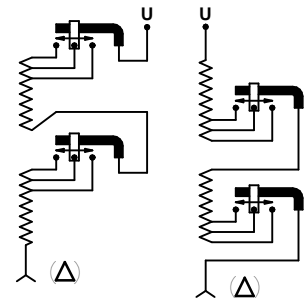
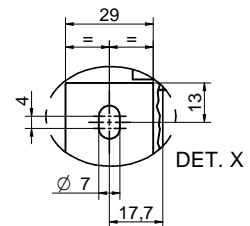
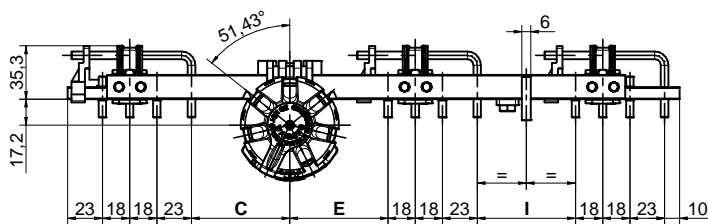
# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 19

- De-energized operation
- For oil immersed transformer
- For linear connection with a common for each phase
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 125 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
BRIDGE vs. BRIDGE (S2)	100 kV	110 kV	60 kV



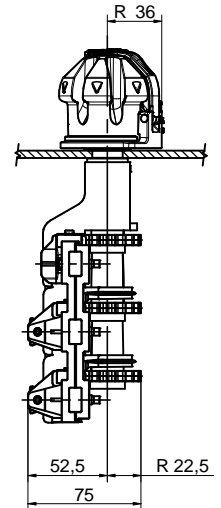
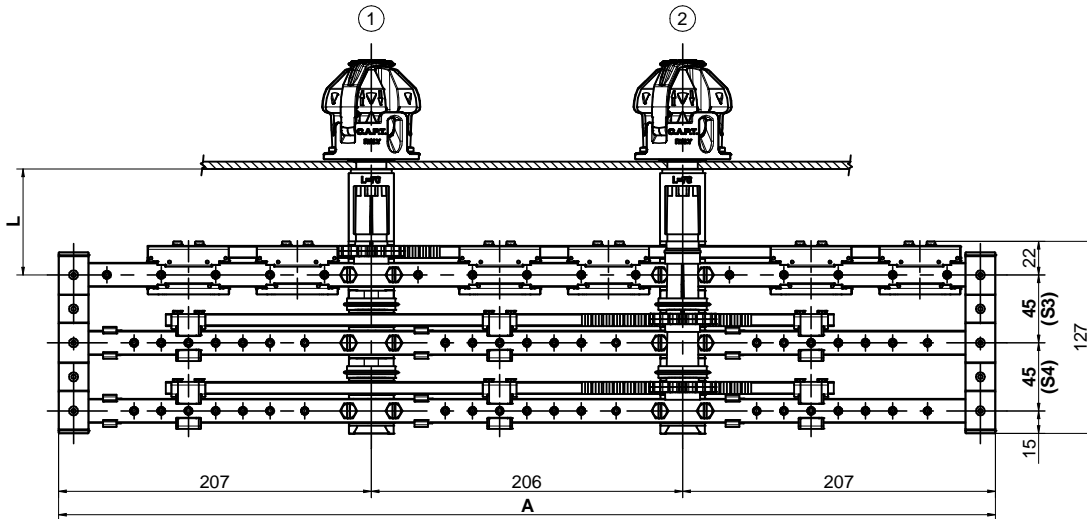
	L	50	70	90	100	130	150	180	200
P		49,5	69,5	89,5	99,5	129,5	149,5	149,5	149,5
R		20	20	20	25	25	25	55	75

L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)			
		C		E		I		I	
		65		65		65		90	
		A	PRODUCT CODE			A	PRODUCT CODE		
			10 A	30 A	65 A		10 A	30 A	65 A
50 (only for 24 kV)	3	405	19...213	19...233	19...263	480	19...313	19...333	19...363
70 - 90	4	459	19...214	19...234	19...264	534	19...314	19...334	19...364
	5	513	19...215	19...235	19...265	588	19...315	19...335	19...365
100 - 130	6	567	19...216	19...236	19...266	642	19...316	19...336	19...366
150 - 180 - 200	7	621	19...217	19...237	19...267	696	19...317	19...337	19...367

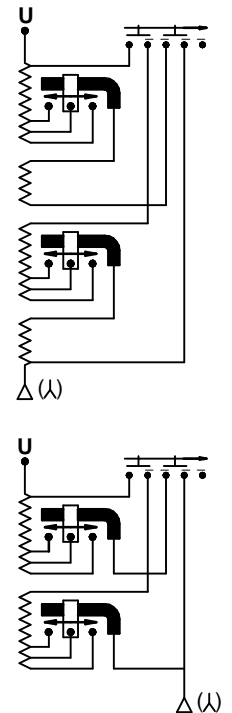
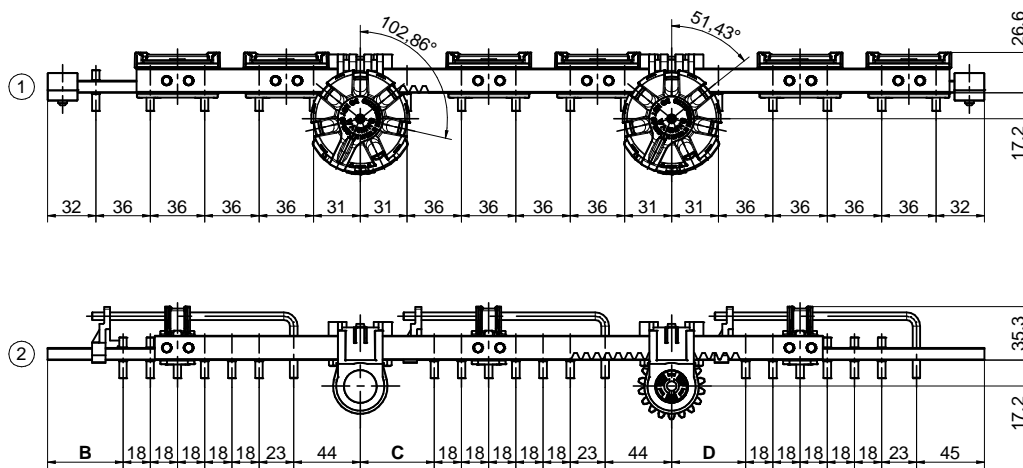
# DETC TRIPLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 21

- De-energized operation
- For oil immersed transformer
- 1: N°1 For series-parallel connection
- 2: N°2 For linear connection with a common for each phase
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 6 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
LINEAR vs. C/V (S3)	105 kV	115 kV	55 kV
LINEAR vs. LINEAR (S4)	90 kV	100 kV	50 kV

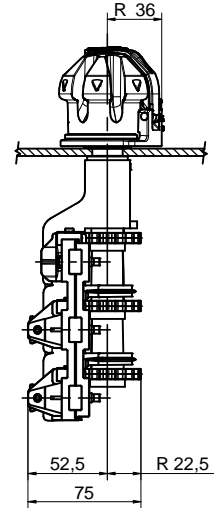
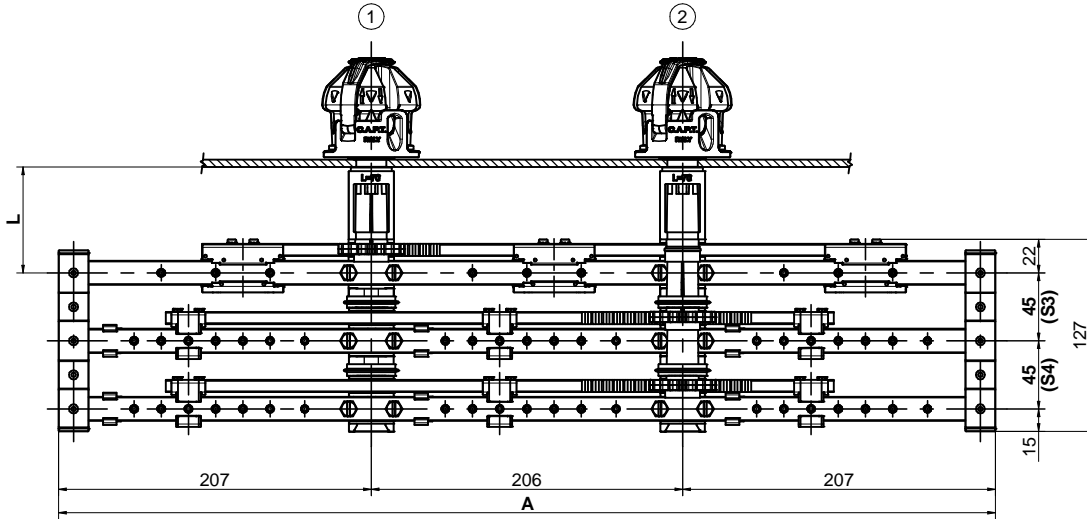


L	N° POS.	24 kV (BIL= 125 kV)					
		A	B	C	D	PRODUCT CODE	
						30 A	65 A
50 - 70	3	620	104	103	103	21 . - .233	21 . - .263
90 - 100	4	620	86	85	85	21 . - .234	21 . - .264
130 - 150	5	620	68	67	67	21 . - .235	21 . - .265
180 - 200	6	620	50	49	49	21 . - .236	21 . - .266

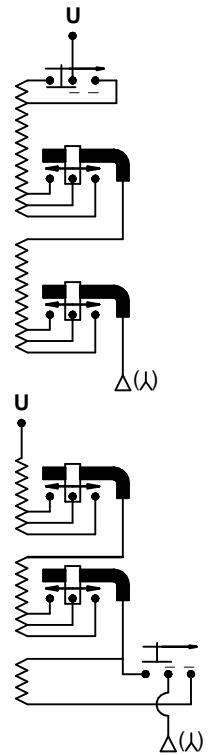
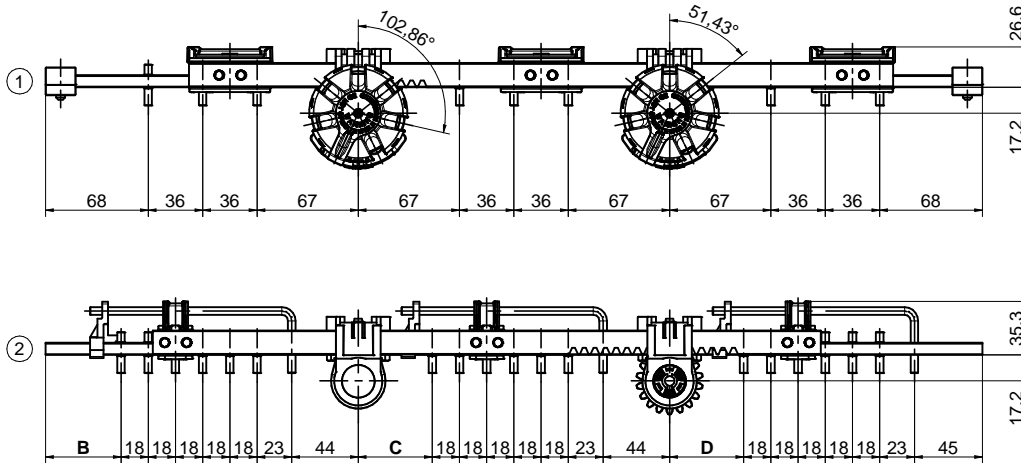
# DETC TRIPLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 22

- De-energized operation
- For oil immersed transformer
- 1: N°1 For change voltage connection
- 2: N°2 For linear connection with a common for each phase
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 6 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
LINEAR vs. C/V (S3)	105 kV	115 kV	55 kV
LINEAR vs. LINEAR (S4)	90 kV	100 kV	50 kV

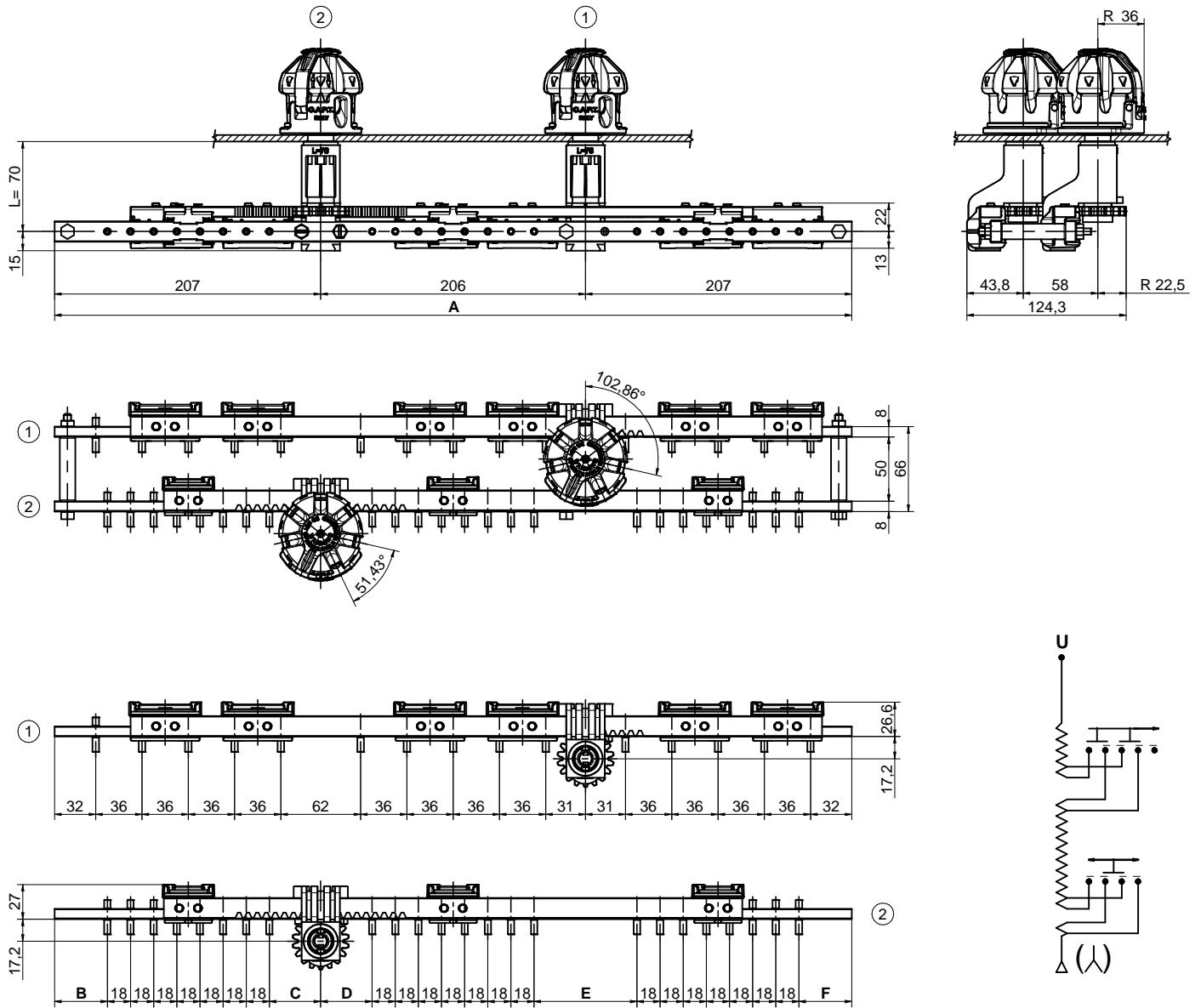


L	N° POS.	24 kV (BIL= 125 kV)					
		A	B	C	D	PRODUCT CODE	
						30 A	65 A
50 - 70	3	620	104	103	103	22...233	22...263
90 - 100	4	620	86	85	85	22...234	22...264
130 - 150	5	620	68	67	67	22...235	22...265
180 - 200	6	620	50	49	49	22...236	22...266

# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 27

- De-energized operation
- For oil immersed transformer
- 1: N°1 For series parallel connection
- 2: N°1 For bridge connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm

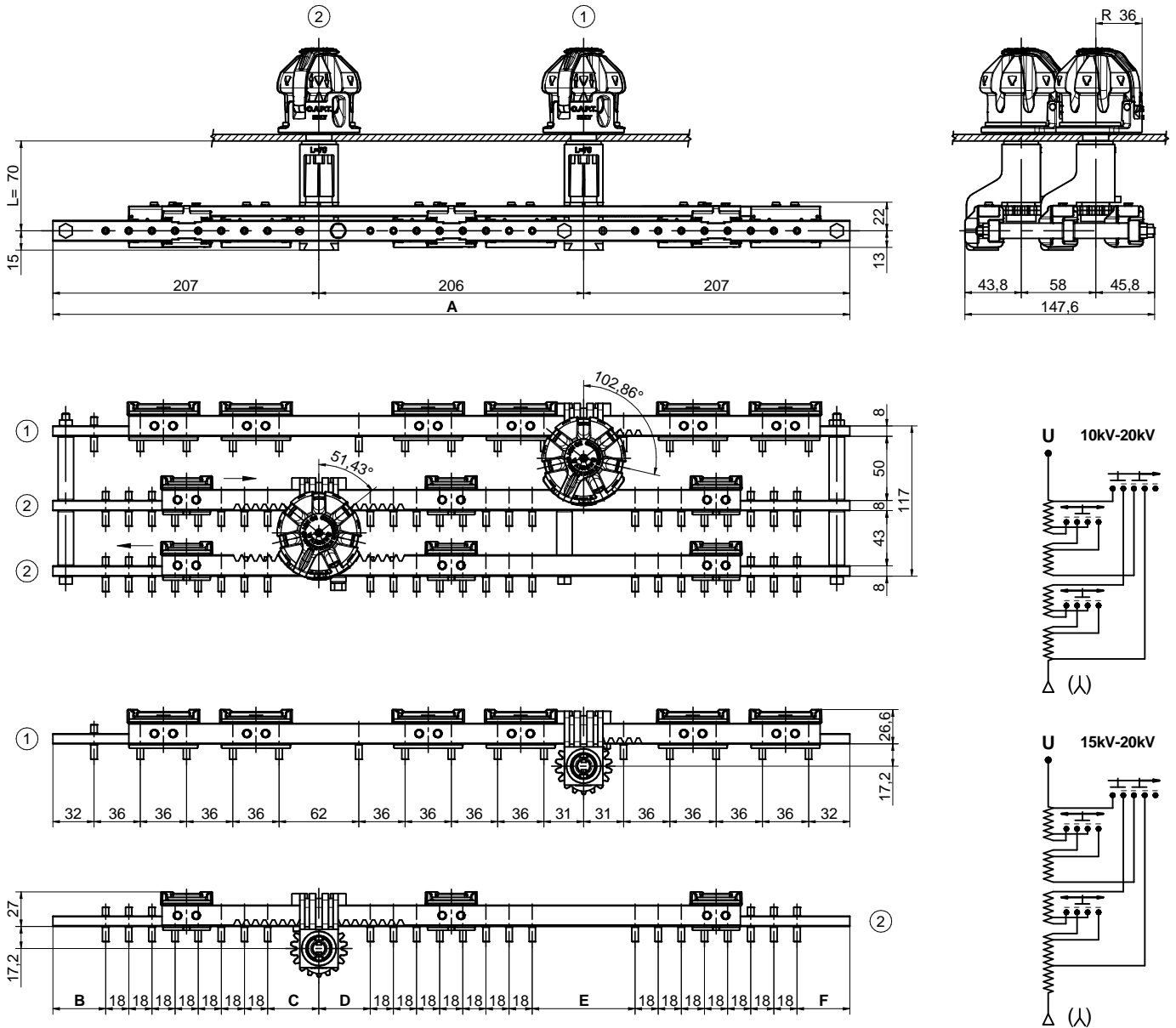


L	N° POS.	24 kV (BIL= 125 kV)						PRODUCT CODE	
		A	B	C	D	E	F	30 A	65 A
		50 - 70	3	620	77	76	76	152	77
90 - 100	4	620	77	58	76	134	59	27...234	27...264
	5	620	59	58	58	116	59	27...235	27...265
130 - 150	6	620	59	40	58	98	41	27...236	27...266
180 - 200	7	620	41	40	40	80	41	27...237	27...267

# DETC TRIPLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 28

- De-energized operation
- For oil immersed transformer
- 1: N°1 For series parallel connection
- 2: N°2 For bridge connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm

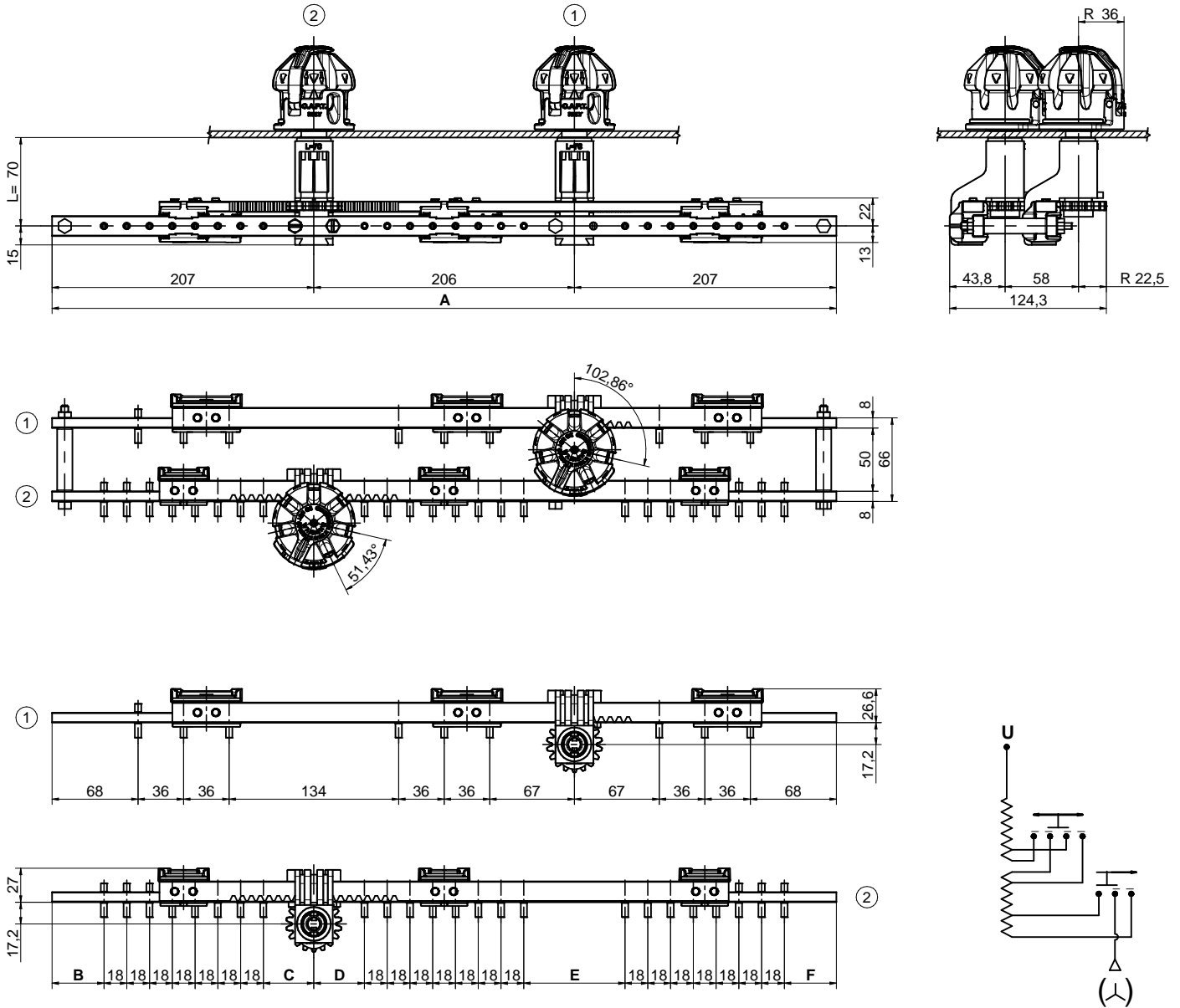


L	N° POS.	24 kV (BIL= 125 kV)						PRODUCT CODE	
		A	B	C	D	E	F	30 A	65 A
		50 - 70	3	620	77	76	76	152	77
90 - 100	4	620	77	58	76	134	59	28...234	28...264
	5	620	59	58	58	116	59	28...235	28...265
130 - 150	6	620	59	40	58	98	41	28...236	28...266
180 - 200	7	620	41	40	40	80	41	28...237	28...267

# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 29

- De-energized operation
- For oil immersed transformer
- 1: N°1 For change voltage connection
- 2: N°1 For bridge connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm

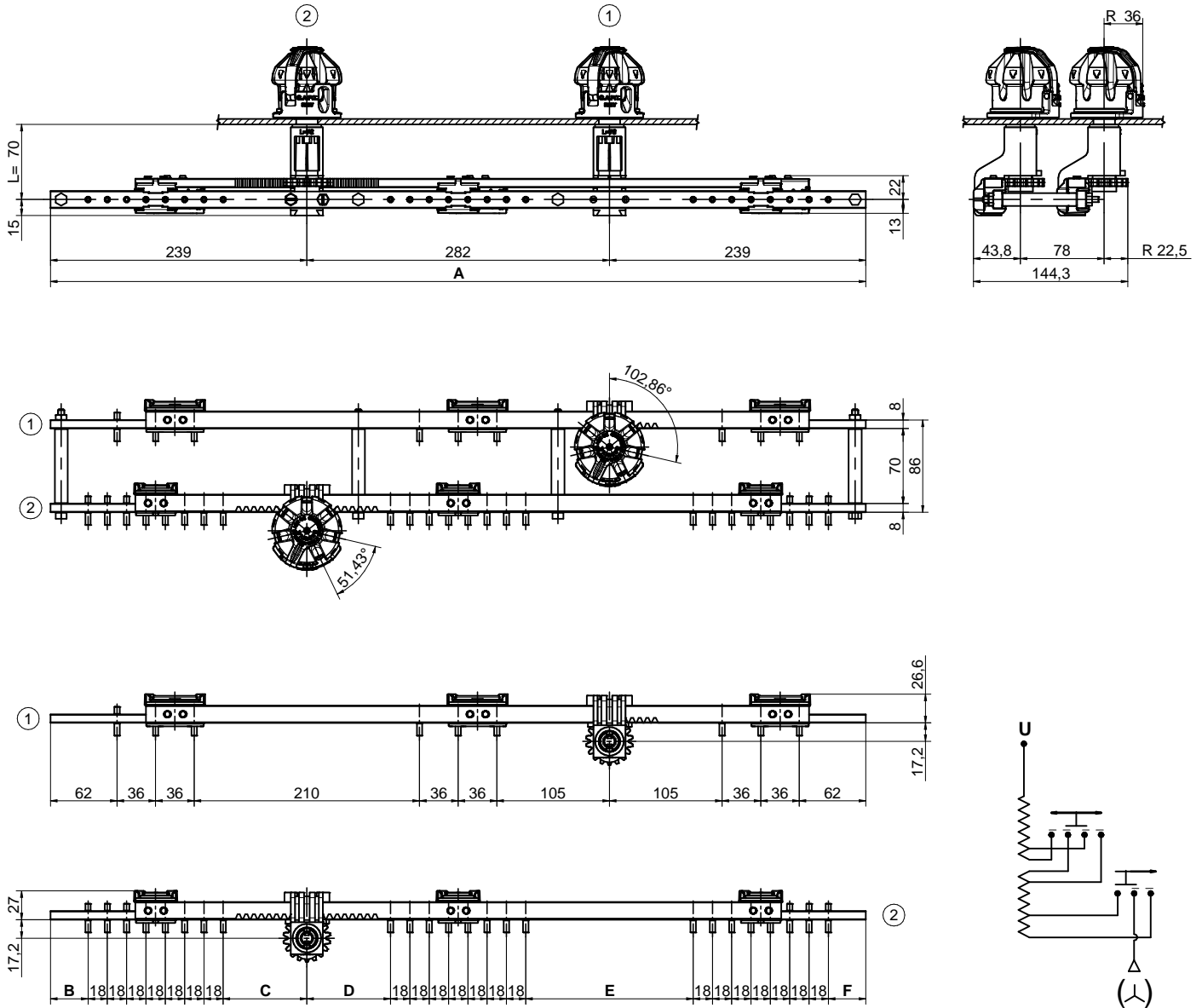


L	N° POS.	24 kV (BIL= 125 kV)						PRODUCT CODE	
		A	B	C	D	E	F	30 A	65 A
		50 - 70	3	620	77	76	76	152	77
90 - 100	4	620	77	58	76	134	59	29...234	29...264
	5	620	59	58	58	116	59	29...235	29...265
130 - 150	6	620	59	40	58	98	41	29...236	29...266
180 - 200	7	620	41	40	40	80	41	29...237	29...267

# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 29

- De-energized operation
- For oil immersed transformer
- 1: N°1 For change voltage connection
- 2: N°1 For bridge connection
- 36 kV (BIL= 170 kV)
- 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



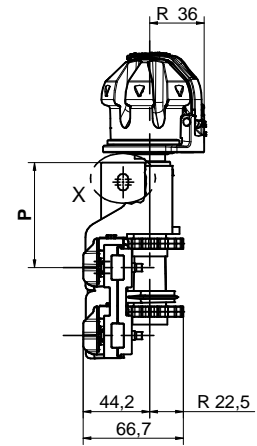
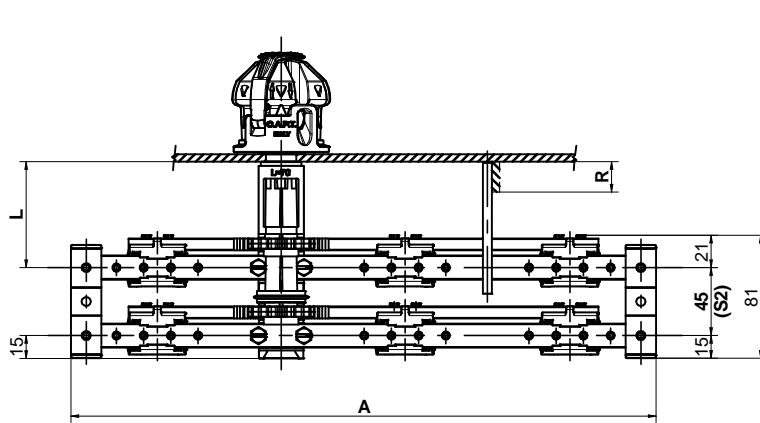
L	N° POS.	36 kV (BIL= 170 kV)							PRODUCT CODE	
		A	B	C	D	E	F	30 A	65 A	
		760	71	114	114	228	71	29...333	29...363	
70 - 90	4	760	71	96	114	210	53	29...334	29...364	
	5	760	53	96	96	192	53	29...335	29...365	
100 - 130	6	760	53	78	96	174	35	29...336	29...366	
	7	760	35	78	78	156	35	29...337	29...367	



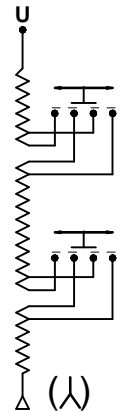
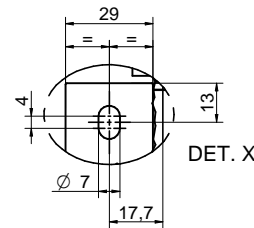
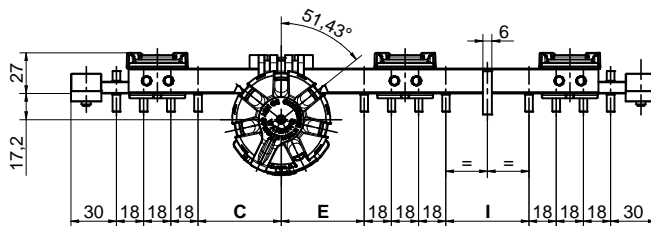
# DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 30

- De-energized operation
- For oil immersed transformer
- For bridge connection
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



INSULATION LEVEL BETWEEN LAYERS			
DISTANCE	LI	CLI	AC
BRIDGE vs. BRIDGE (S2)	100 kV	110 kV	60 kV



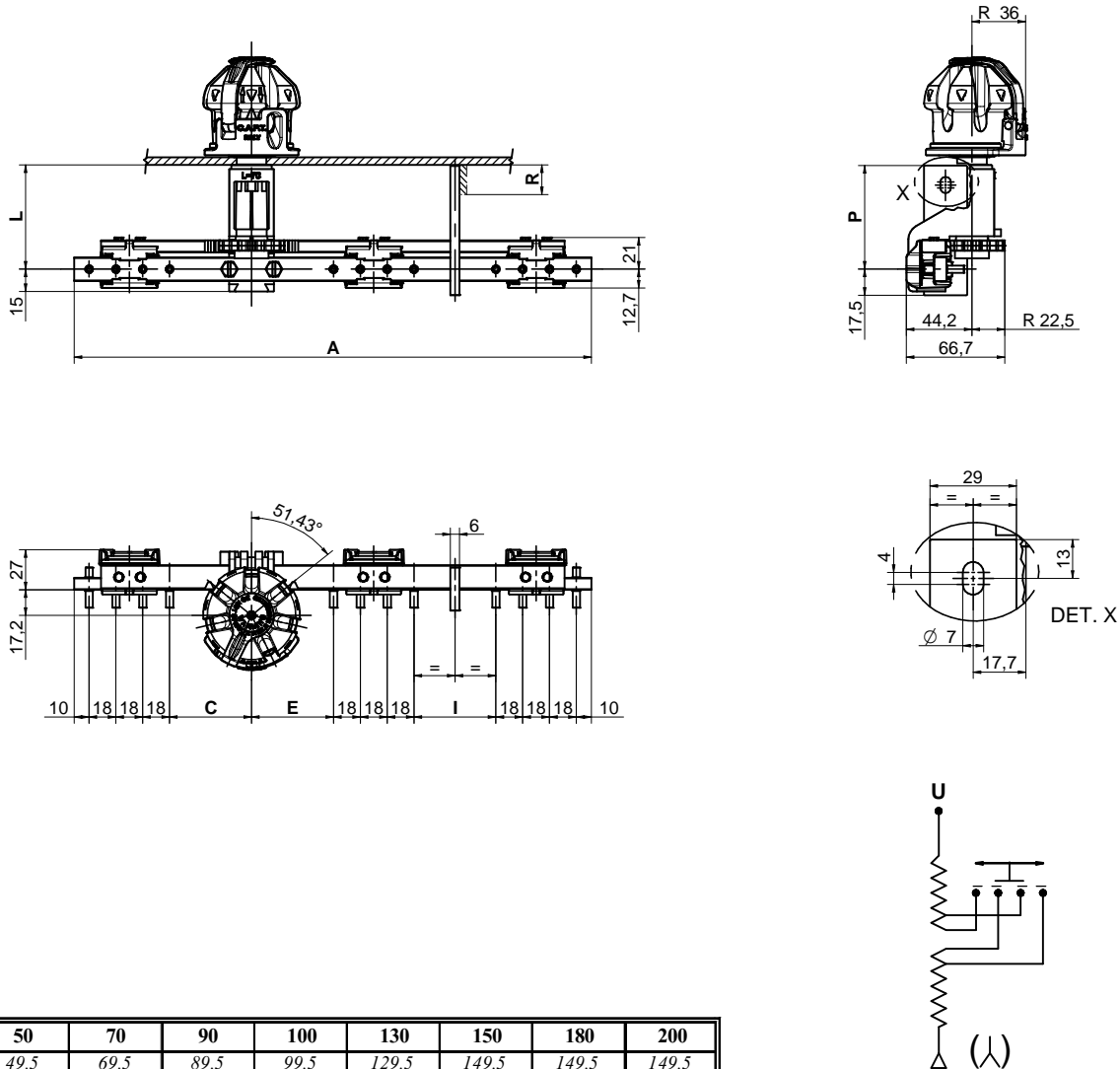
	50	70	90	100	130	150	180	200
L	50	70	90	100	130	150	180	200
P	49,5	69,5	89,5	99,5	129,5	149,5	149,5	149,5
R	20	20	20	25	25	25	55	75

L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)			
		C		E		C		E	
		I		I		I		I	
		55	55	55	55	80	80	80	80
		A		PRODUCT CODE					
				10 A		30 A		65 A	
50 (only for 24 kV)	3	387	30 .-. .213	30 .-. .233	30 .-. .263	462	30 .-. .313	30 .-. .333	30 .-. .363
70 - 90	4	441	30 .-. .214	30 .-. .234	30 .-. .264	516	30 .-. .314	30 .-. .334	30 .-. .364
	5	495	30 .-. .215	30 .-. .235	30 .-. .265	570	30 .-. .315	30 .-. .335	30 .-. .365
100 - 130	6	549	30 .-. .216	30 .-. .236	30 .-. .266	624	30 .-. .316	30 .-. .336	30 .-. .366
150 - 180 - 200	7	603	30 .-. .217	30 .-. .237	30 .-. .267	678	30 .-. .317	30 .-. .337	30 .-. .367

## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 31

- De-energized operation
- For oil immersed transformer
- For bridge connection
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



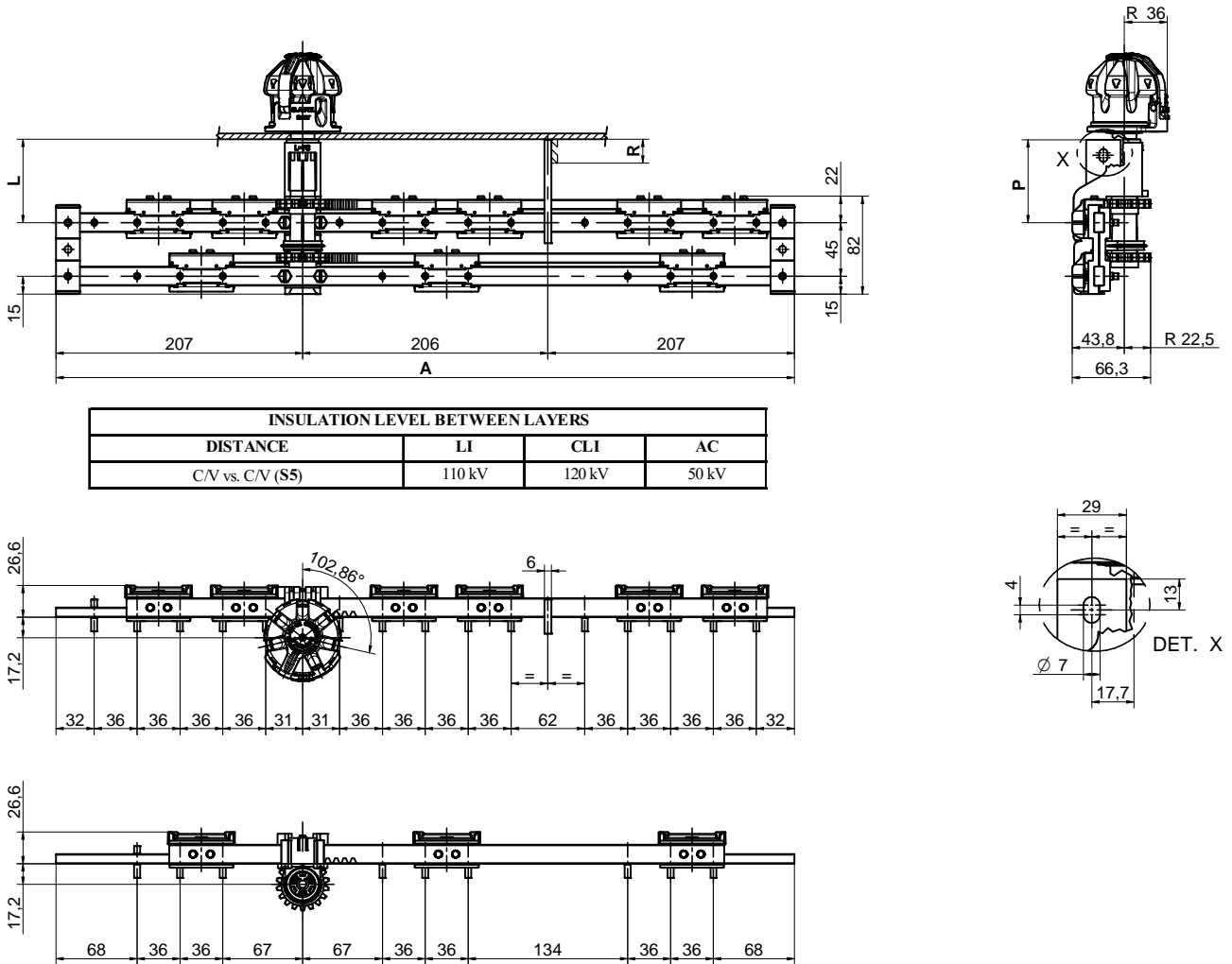
L	50	70	90	100	130	150	180	200
P	49,5	69,5	89,5	99,5	129,5	149,5	149,5	149,5
R	20	20	20	25	25	25	55	75

L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)			
		C	E	I	C	E	I		
		55	55	55	80	80	80		
		A	PRODUCT CODE			A	PRODUCT CODE		
			10 A	30 A	65 A		10 A	30 A	65 A
50 (only for 24 kV)	3	347	31...213	31...233	31...263	422	31...313	31...333	31...363
70 - 90	4	401	31...214	31...234	31...264	476	31...314	31...334	31...364
	5	455	31...215	31...235	31...265	530	31...315	31...335	31...365
100 - 130	6	509	31...216	31...236	31...266	584	31...316	31...336	31...366
150 - 180 - 200	7	563	31...217	31...237	31...267	638	31...317	31...337	31...367

## DETC DOUBLE THREE-PHASE TAP CHANGERS SERIES 090 TYPE 32

- De-energized operation
- For oil immersed transformer
- N°1 For series parallel connection
- N°1 For change voltage connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- 2 positions

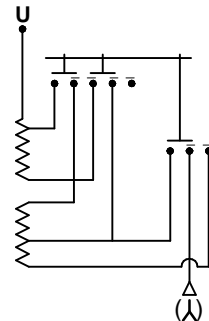
Dimension in mm



N.B. Maximum impulse voltage between adjacent contacts of change voltage connection BIL= 100 kV.

L	50	70	90	100	130	150	180	200
P	49,5	69,5	89,5	99,5	129,5	149,5	149,5	149,5
R	20	20	20	25	25	25	55	75

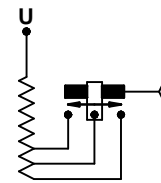
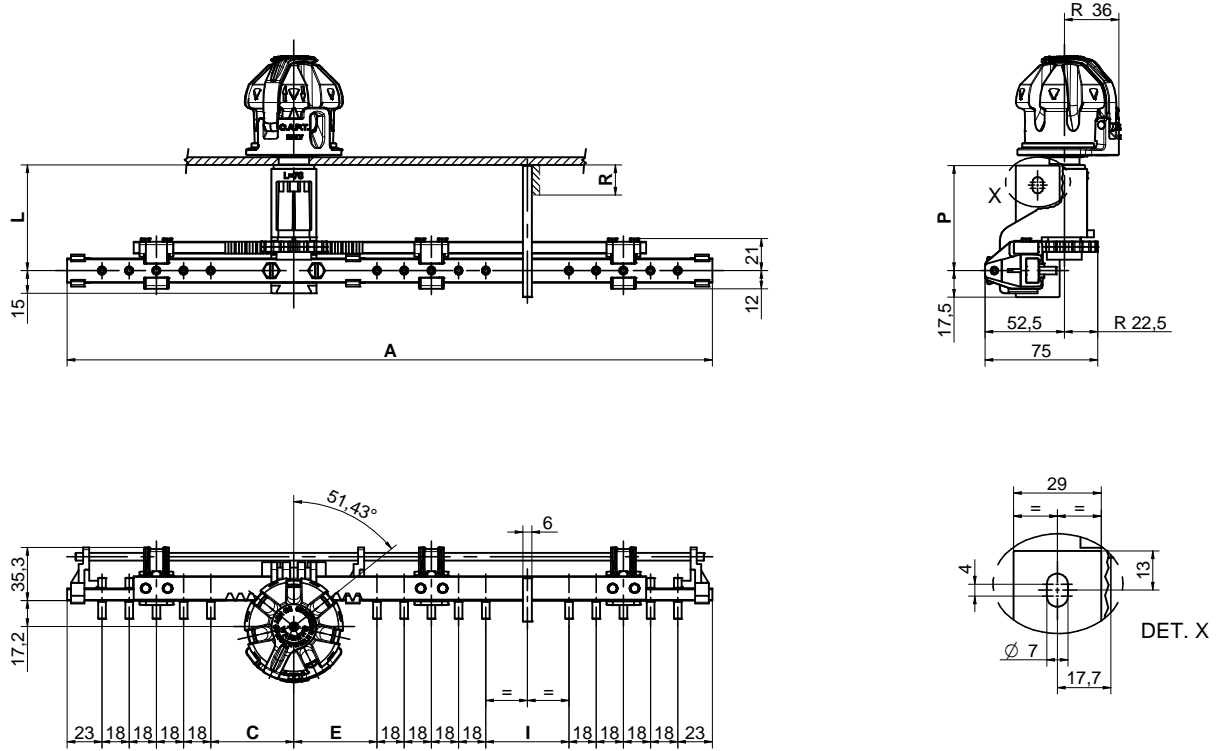
L	N° POS.	24 kV (BIL= 125 kV)		
		A	PRODUCT CODE	
			30 A	65 A
50 - 70	2	620	32 .-. .232	32 .-. .262
90 - 100				
130 - 150				
180 - 200				



## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 35

- De-energized operation
- For oil immersed transformer
- For wye connection without take off terminal
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



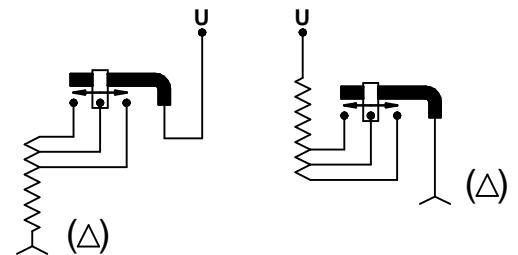
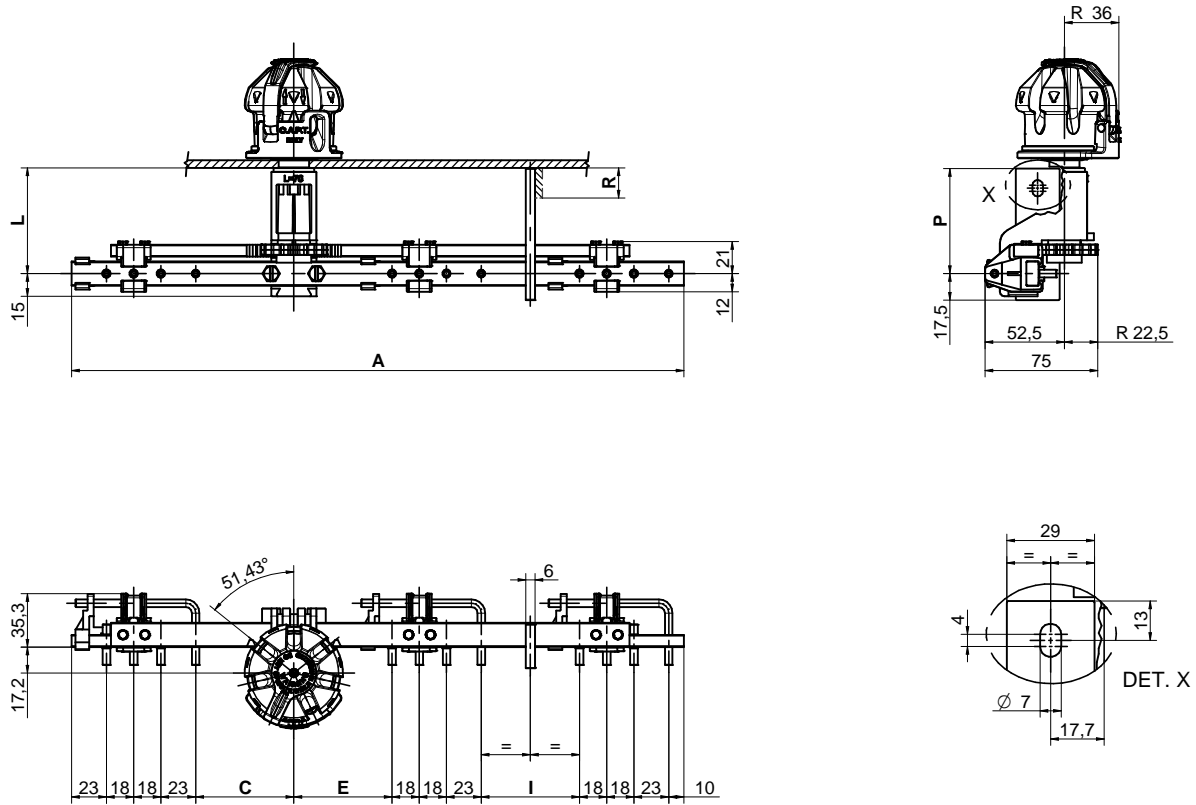
<b>L</b>	<b>50</b>	<b>70</b>	<b>90</b>	<b>100</b>	<b>130</b>	<b>150</b>	<b>180</b>	<b>200</b>
<b>P</b>	49,5	69,5	89,5	99,5	129,5	149,5	149,5	149,5
<b>R</b>	20	20	20	25	25	25	55	75

L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)			
		C	E	I		C	E	I	
		55	55	55		90	90	90	
		A	PRODUCT CODE			A	PRODUCT CODE		
			10 A	30 A	65 A		10 A	30 A	65 A
50 (only for 24 kV)	3	319	35...213	35...233	35...263	424	35...313	35...333	35...363
70 - 90	4	373	35...214	35...234	35...264	478	35...314	35...334	35...364
	5	427	35...215	35...235	35...265	532	35...315	35...335	35...365
100 - 130	6	481	35...216	35...236	35...266	586	35...316	35...336	35...366
150 - 180 - 200	7	535	35...217	35...237	35...267	640	35...317	35...337	35...367

## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 36

- De-energized operation
- For oil immersed transformer
- For linear connection with a common for each phase
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



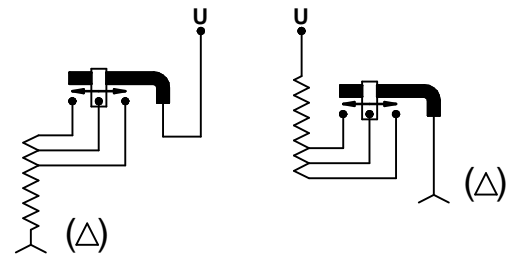
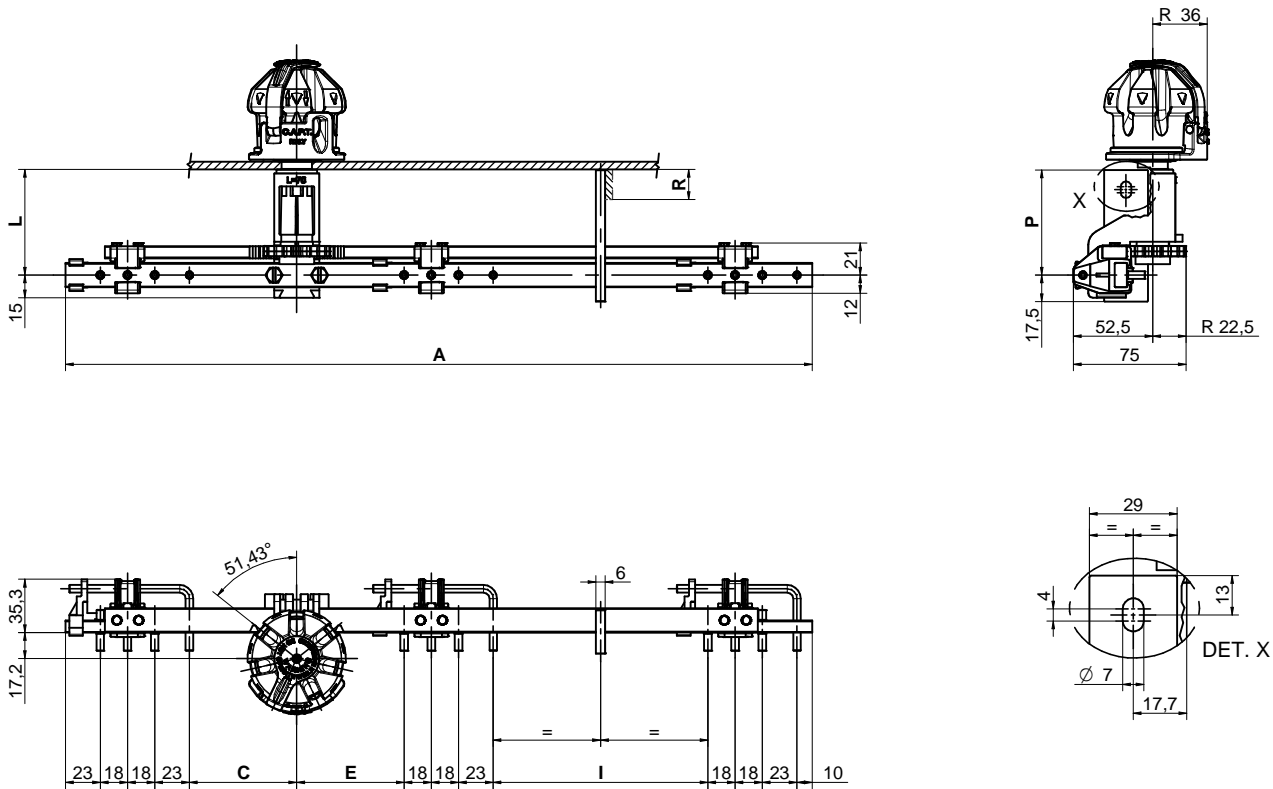
<b>L</b>	<b>50</b>	<b>70</b>	<b>90</b>	<b>100</b>	<b>130</b>	<b>150</b>	<b>180</b>	<b>200</b>
<b>P</b>	49,5	69,5	89,5	99,5	129,5	149,5	149,5	149,5
<b>R</b>	20	20	20	25	25	25	55	75

L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)			
		C	E	I	C	E	I		
		65	65	65	90	90	90		
		A	PRODUCT CODE			A	PRODUCT CODE		
			10 A	30 A	65 A		10 A	30 A	65 A
50 (only for 24 kV)	3	405	36.-.213	36.-.233	36.-.263	480	36.-.313	36.-.333	36.-.363
70 - 90	4	459	36.-.214	36.-.234	36.-.264	534	36.-.314	36.-.334	36.-.364
	5	513	36.-.215	36.-.235	36.-.265	588	36.-.315	36.-.335	36.-.365
100 - 130	6	567	36.-.216	36.-.236	36.-.266	642	36.-.316	36.-.336	36.-.366
150 - 180 - 200	7	621	36.-.217	36.-.237	36.-.267	696	36.-.317	36.-.337	36.-.367

## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 37

- De-energized operation
- For oil immersed transformer
- For linear connection with a common for each phase
- 24 kV (BIL= 125 kV) / 36 kV (BIL= 170 kV)
- 10 A / 30 A / 65 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm



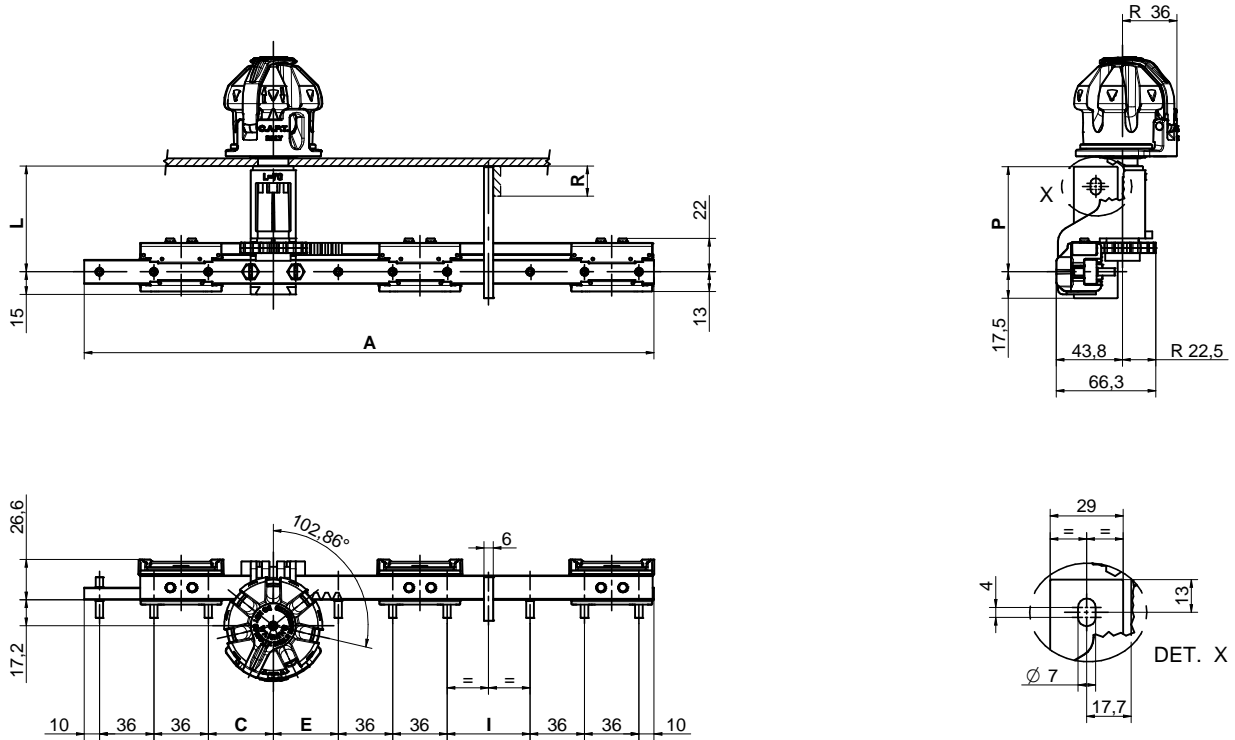
<b>L</b>	<b>50</b>	<b>70</b>	<b>90</b>	<b>100</b>	<b>130</b>	<b>150</b>	<b>180</b>	<b>200</b>
<b>P</b>	49,5	69,5	89,5	99,5	129,5	149,5	149,5	149,5
<b>R</b>	20	20	20	25	25	25	55	75

L	N° POS.	24 kV (BIL= 125 kV)				36 kV (BIL= 170 kV)				
		C		E		C		E		
		I		I		I		I		
		71		71		142		142		
		A		PRODUCT CODE						
				10 A		30 A		65 A		
50 (only for 24 kV)	3	494		37...213	37...233	37...263	532	37...313	37...333	37...363
70 - 90	4	548		37...214	37...234	37...264	586	37...314	37...334	37...364
	5	602		37...215	37...235	37...265	640	37...315	37...335	37...365
100 - 130	6	656		37...216	37...236	37...266	694	37...316	37...336	37...366
150 - 180 - 200	7	710		37...217	37...237	37...267	748	37...317	37...337	37...367

## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 43

- De-energized operation
- For oil immersed transformer
- For change voltage connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- 2 positions

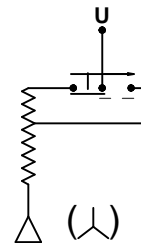
Dimension in mm



N.B. Maximum impulse voltage between adjacent contacts of change voltage connection BIL= 100 kV.

<b>L</b>	<b>150</b>	<b>180</b>	<b>200</b>
<b>P</b>	149,5	149,5	149,5
<b>R</b>	25	55	75

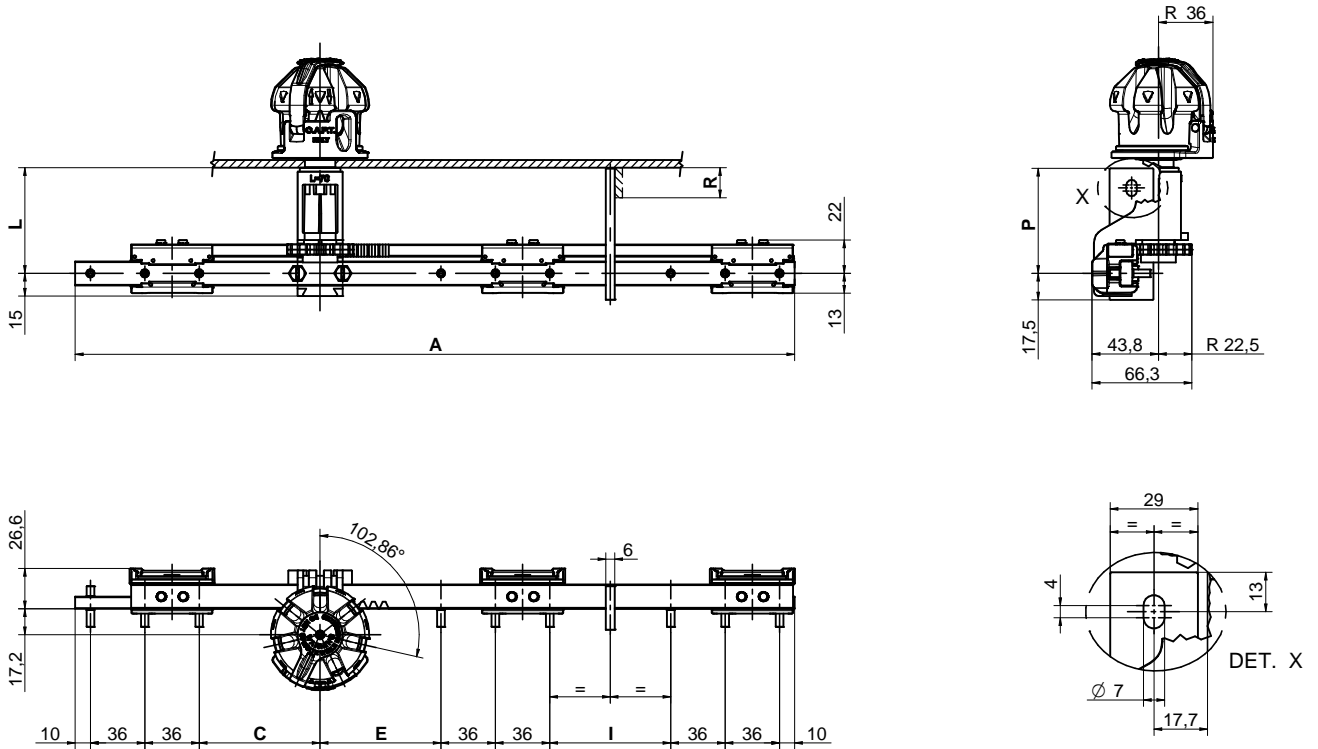
L	N° POS.	24 kV (BIL= 125 kV)		
		C	E	I
		43	43	55
		A	PRODUCT CODE	
			30 A	65 A
50 - 70	2	377	43 .-. .232	43 .-. .262
90 - 100				
130 - 150				
180 - 200				



## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 43

- De-energized operation
- For oil immersed transformer
- For change voltage connection
- 36 kV (BIL= 170 kV)
- 30 A / 65 A
- 2 positions

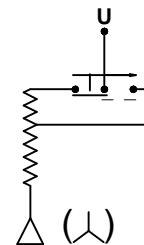
Dimension in mm



N.B. Maximum impulse voltage between adjacent contacts of change voltage connection BIL= 100 kV.

<b>L</b>	150	180	200
<b>P</b>	149,5	149,5	149,5
<b>R</b>	25	55	75

L	N° POS.	36 kV (BIL= 170 kV)		
		C	E	I
		80	80	80
		A	PRODUCT CODE	
			30 A	65 A
70 - 90	2	476	43 .-. .332	43 .-. .362
100 - 130				
150 - 180 - 200				

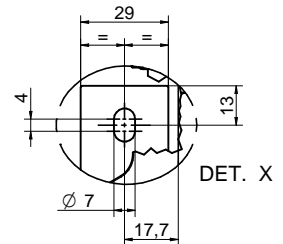
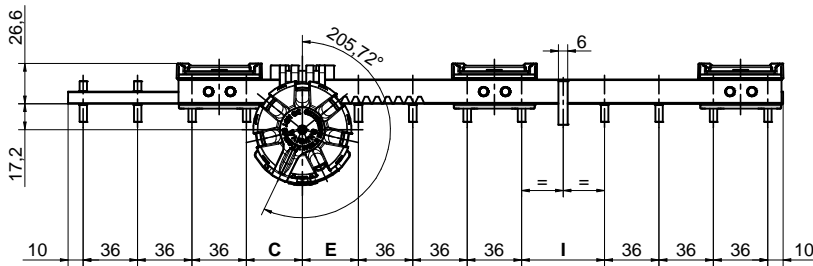
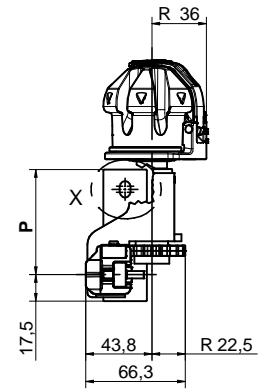
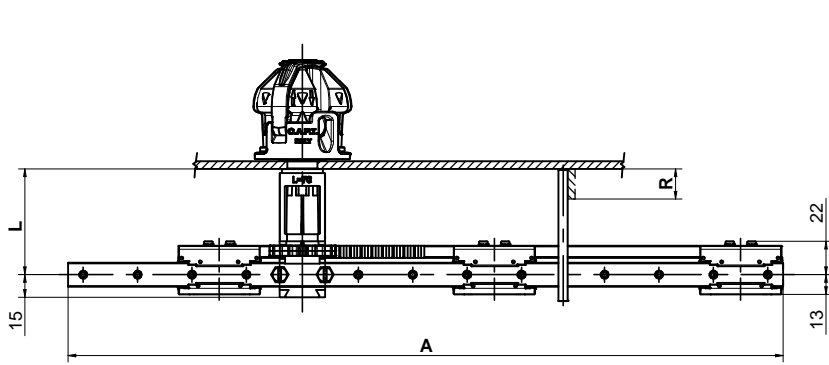




# DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 44

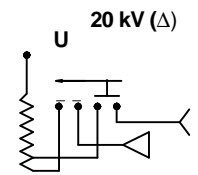
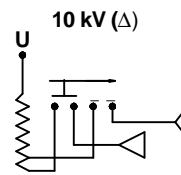
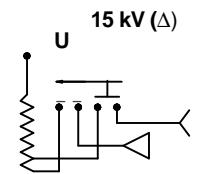
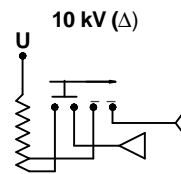
- De-energized operation
- For oil immersed transformer
- For change voltage connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- 2 positions

Dimension in mm



L	150	180	200
P	149,5	149,5	149,5
R	25	55	75

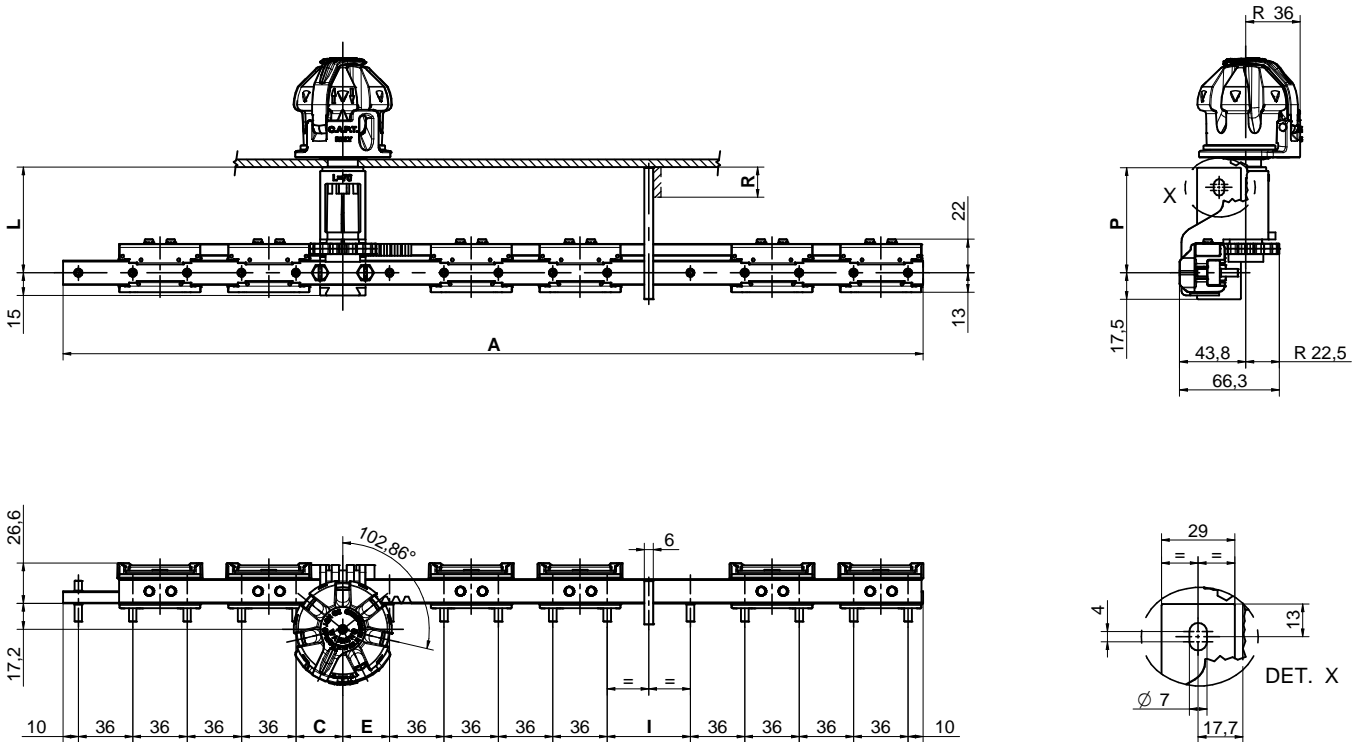
L	N° POS.	24 kV (BIL= 125 kV)		
		C	E	I
		37	37	55
		A	PRODUCT CODE	
			30 A	65 A
50 - 70	2	473	44 .-. .232	44 .-. .262
90 - 100				
130 - 150				
180 - 200				



## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 45

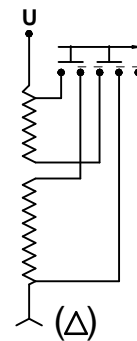
- De-energized operation
- For oil immersed transformer
- For series parallel connection
- 24 kV (BIL= 125 kV)
- 30 A / 65 A
- 2 positions

Dimension in mm



L	50	70	90	100	130	150	180	200
P	49,5	69,5	89,5	99,5	129,5	149,5	149,5	149,5
R	20	20	20	25	25	25	55	75

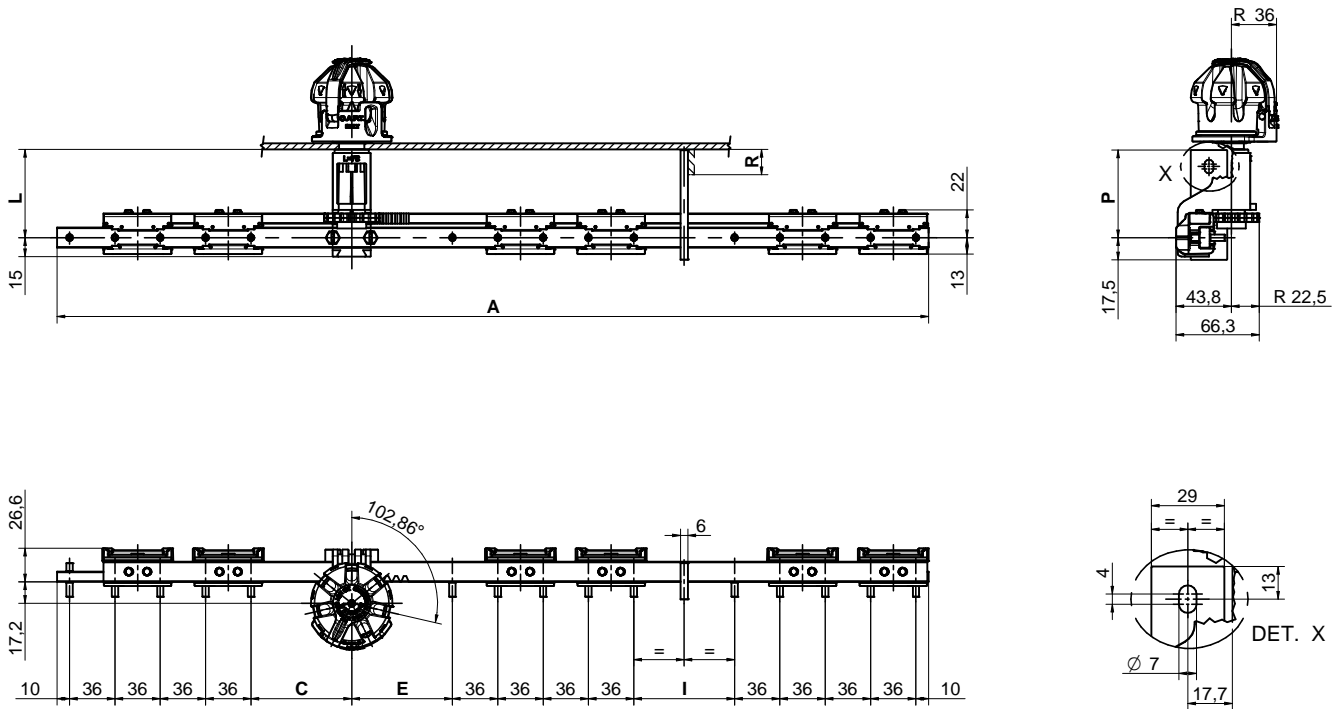
		24 kV (BIL= 125 kV)		
L	N° POS.	C	E	I
		31	31	55
		PRODUCT CODE		
		A	30 A	65 A
50 - 70	2	569	45...232	45...262
90 - 100				
130 - 150				
180 - 200				



## DETC THREE-PHASE TAP CHANGERS SERIES 090 TYPE 45

- De-energized operation
- For oil immersed transformer
- For series parallel connection
- 36 kV (BIL= 170 kV)
- 30 A / 65 A
- 2 positions

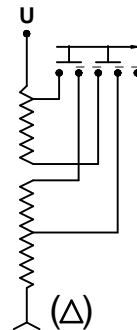
Dimension in mm



N.B. Maximum impulse voltage between adjacent contacts of change voltage connection BIL= 100 kV.

L	70	90	100	130	150	180	200
P	69,5	89,5	99,5	129,5	149,5	149,5	149,5
R	20	20	25	25	25	55	75

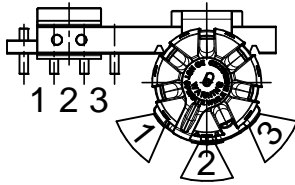
<b>L</b>	<b>N° POS.</b>	<b>36 kV (BIL= 170 kV)</b>		
		<b>C</b>	<b>E</b>	<b>I</b>
		80	80	80
		<b>A</b>	<b>PRODUCT CODE</b>	
		<b>30 A</b>	<b>65 A</b>	
70 - 90	2	692	45 .-. .332	45 .-. .362
100 - 130				
150 - 180 - 200				



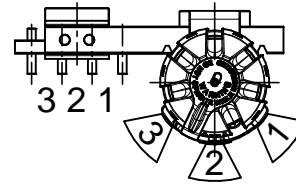
# TAP CHANGER DRIVE - NUMERATION -

Dimension in mm

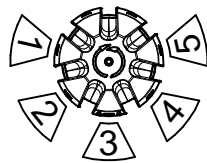
## REGULATION



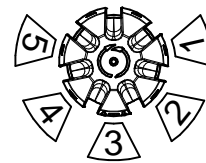
SO1



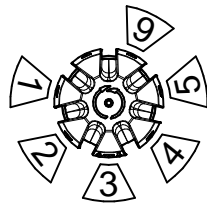
SA1



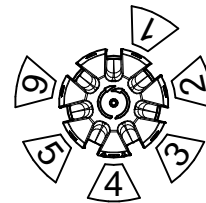
SO2



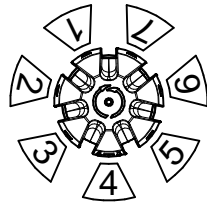
SA2



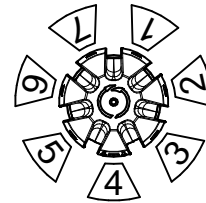
SO3



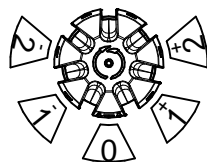
SA3



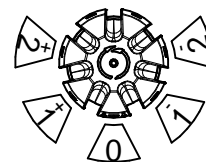
SO4



SA4

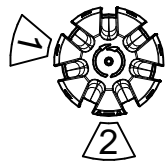


SO7

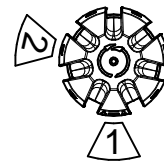


SA7

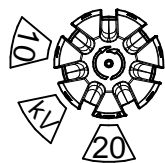
## CHANGE VOLTAGE



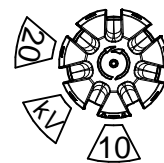
SO5



SA5



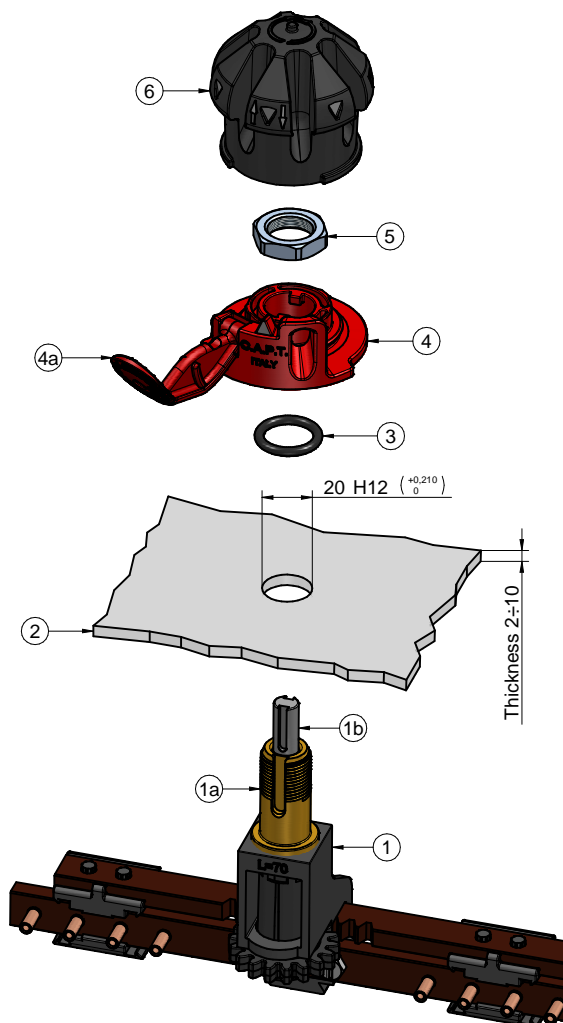
SO6



SA6

## ASSEMBLING SEQUENCE DIAGRAM

Dimension in mm



- 1) Insert the bearing into the cover hole (2)  
1a- brass threaded bushing support  
1b- stainless steel shaft

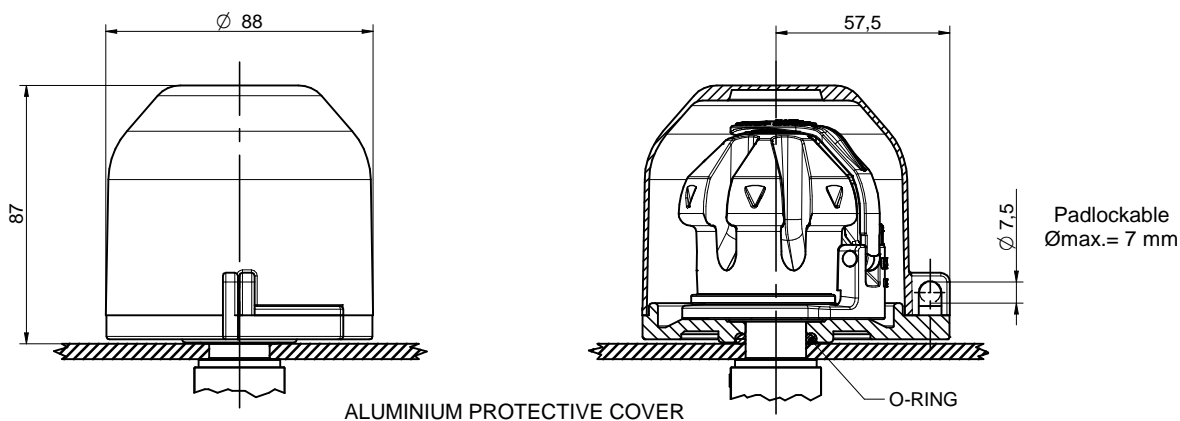
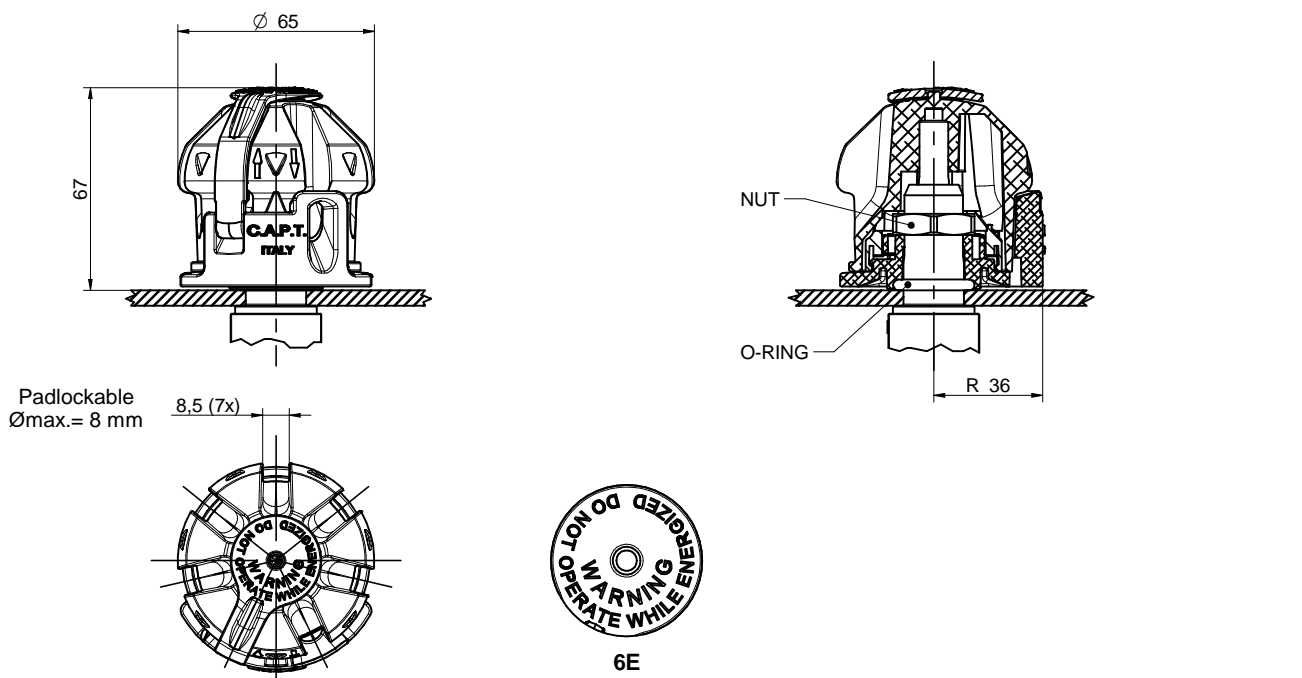
### Fit in the following order:

- 3) The R16 seal
- 4) The positioning ring  
4a- locking lever
- 5) The zinc-plated steel nut M20x1,5 AVP (tightening torque 15 Nm)
- 6) The control knob up to 7 positions

**N.B.** particulars (1a) and (5) stainless steel made on request

# DRIVE HANDLE ON COVER 060-90

Dimension in mm



ORDER CODES **060-90. 6E 0 2 0 SO1 - A V**

LEVER LANGUAGE	
<b>6E</b>	English

KNOB MATERIAL	
<b>0</b>	Polyamide
<b>3</b>	Aluminum

PROTECTIVE COVER	
<b>0</b>	No
<b>2</b>	Yes

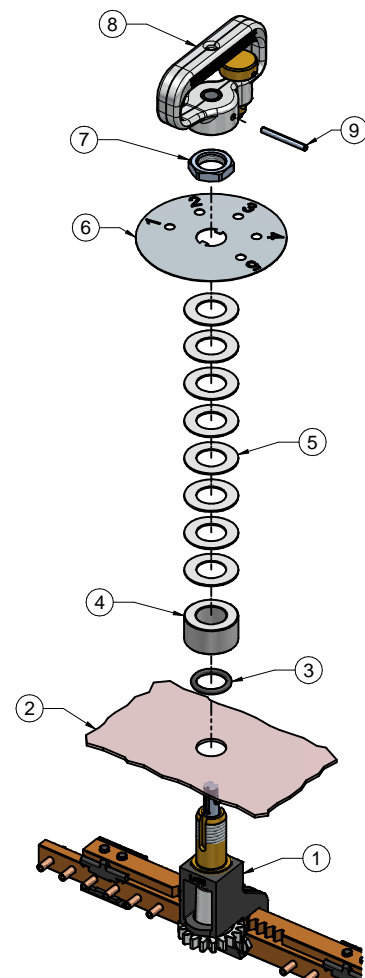
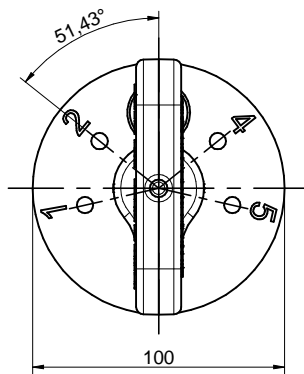
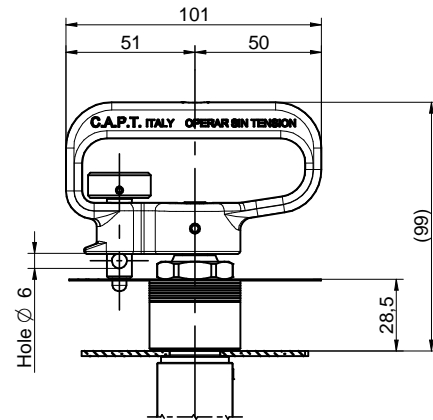
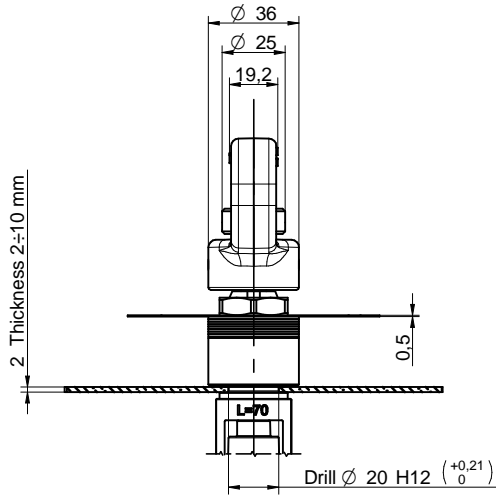
NUMBERING KNOB	
	See page 090-60-01

NUT MATERIAL	
	Zinc plated steel
<b>A</b>	Stainless steel

GASKET	
	-25°C / +105°C
<b>G</b>	For low temperature (-60°C)
<b>V</b>	For high temperature (+200°C)

# DRIVE HANDLE ON COVER 060-90.7000

Dimension in mm

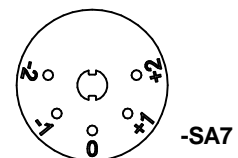
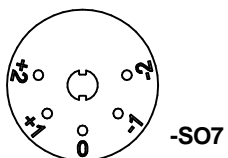
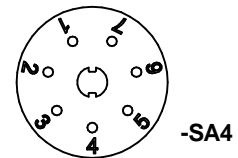
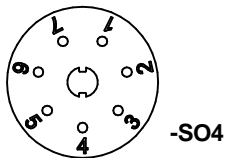
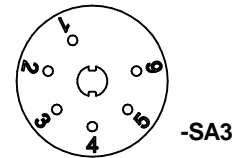
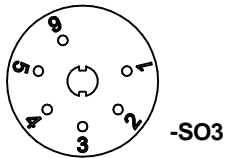
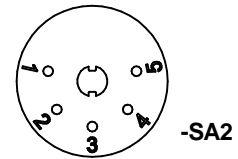
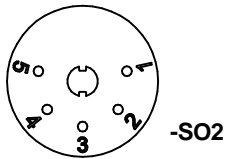
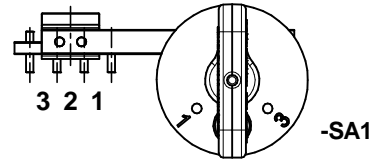
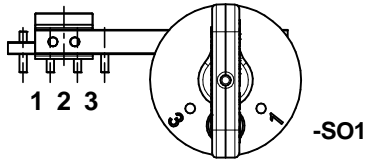


- 1) Tap-changer
- 2) Transformer cover
- 3) OR R16 seal
- 4) Tightener O-Ring washer
- 5) N° 8 Thickness washers  
(To be used depending on cover thickness)
- 6) Stainless steel disc numbered
- 7) Zinc plated steel nut M20x1,5 (tightening torque 15 Nm)
- 8) Aluminium handle
- 9) Spring pin Ø4x36 UNI6873

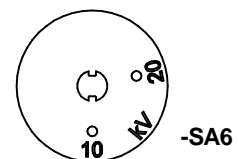
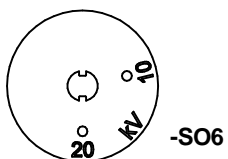
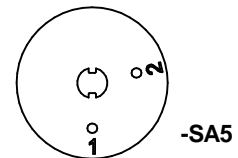
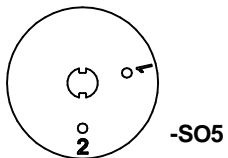
# TAP CHANGERS DRIVE - NUMERATION -

Dimension in mm

## REGULATION



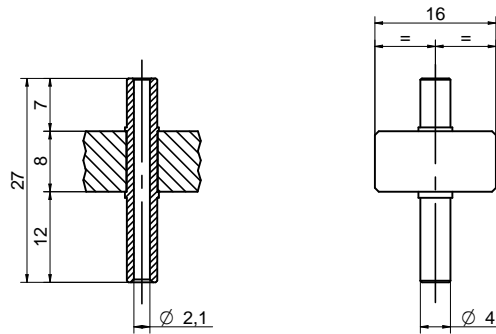
## CHANGE VOLTAGE



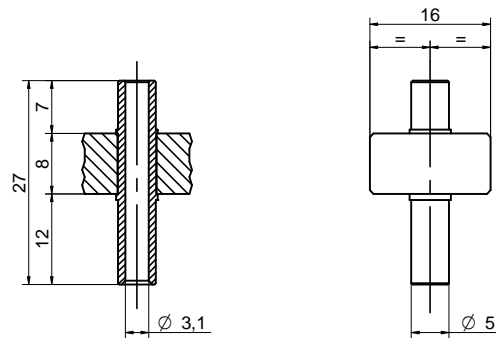


# FIXED CONTACTS 090

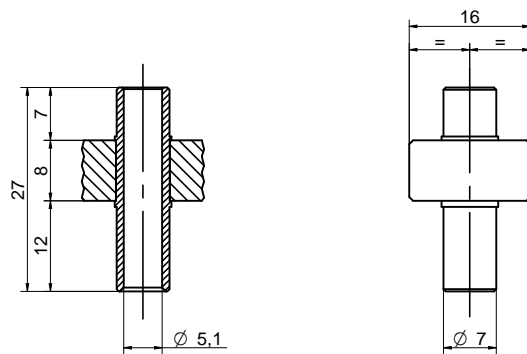
Dimension in mm



Tubular contact **10 A**



Tubular contact **30 A**



Tubular contact **65 A**