NEWS AND MODIFICATIONS

TAP CHANGERS SERIES 099

MEMBER OF REINHAUSEN GROUP

SUMMARY

TAP CHANGERS TYPE 099

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099-06-72	03	Three phase tap changer	Linear	30/60 A	24/36 kV	3-7	8
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c.a.p.t.
MEMBER OF REINHAUSEN GROUP

INTRODUCTION

TAP CHANGERS TYPE 099

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 oil immersed tap changer series are:
• Slimness.
• Easy fixing and installation between tank wall and magnetic core clamp or between transformer cover and upper joke of magnetic core.
• Knob on cover separate by tap changer body, positioned on better place of cover, connected to tap changer with two steel cables and steel/plastic sheath.
• Assembling though specific holes by metallic and/or insulating(*) material.

In the catalogue are performed the standard appliances and devices.
On request is possible to satisfy special requirements as: Single and bi-phase tap changers; multi-stage tap changers; 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 cable operated tap changers type 099, the electrical part is separated from the mechanical control. The electrical part is composed by two insulated Bakelite plates that contains the fixed contacts; in the middle there is the moving Bakelite strip carrying the moving contacts that slides parallel to the plates, operated by the steel cables.
The cables curvature should not be excessive. The minimum radius must be of about 140 mm.

DRIVE-HANDLE AND OPERATING CONTROL
The operating device consist of a drum fixed to the operating handle; steel cables wound around it. On drum casing there are two setting screws that permit the position adjusting of moving strip and eliminate any transmission clearance. Each position is marked by a specific notch that block the tap changer in correct position.
To change position is necessary to lift axially the knob, turn the knob and insert it in the new position. The action of a spring facilitate this last operation.

POSITION:
Standard from 3 to 7 positions.

INTRODUCTION

TAP CHANGERS TYPE 099

VOLTAGES
Voltage classes are allowed:

voltage class	*Earth withstand voltage*	
	Industrial frequency 50 Hz	*Impulse 1/50*
kV	*kV*	*kV*
24	*50*	*125*
36	*70*	*170*

CURRENTS:
30 A – 60 A – 150 A – 200 A.

METALLIC PARTS
The metallic parts that mainly compose drive control of the tap-changer are normally made of galvanized steel and brass. The galvanized still parts exposed to external environment on request can be made of stainless steel. On request, control knob can be supplied made of aluminium and the eventual protective cover in "Zama 15".

FIXED CONTACTS
Made of copper with following internal diameters: Ø=3,1mm for 30 A rating - Ø=5,1mm for 60 A rating – Ø=8,1 for 150 A rating – M8 for 150 A rating – Ø=11,5mm for 200 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.
On request contacts can be silver-plated.

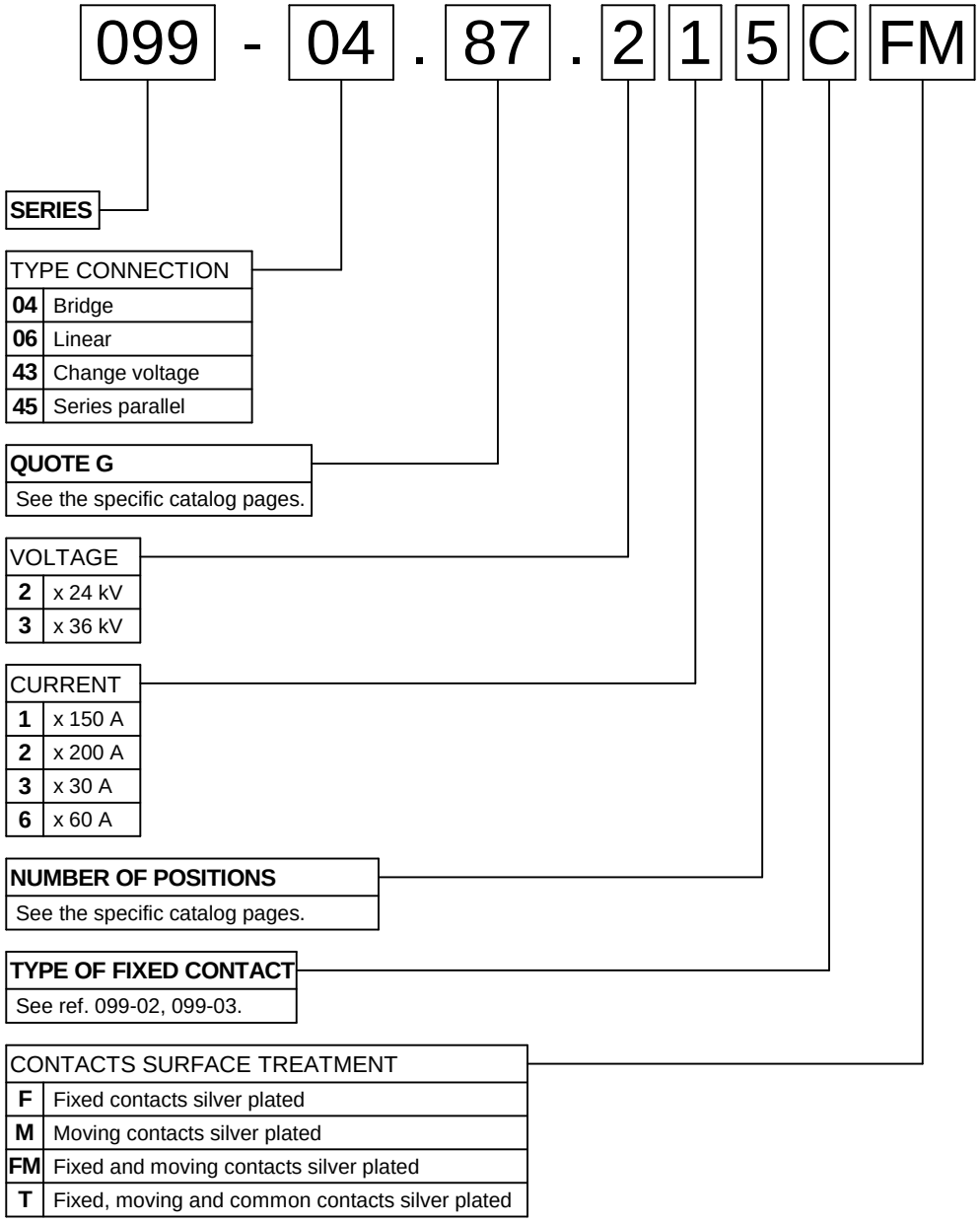
MOVING CONTACTS
They are made of brass for bridge and change over connection and bronze for common output for phase connection. On request, contacts can be supplied silver plated.

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.*

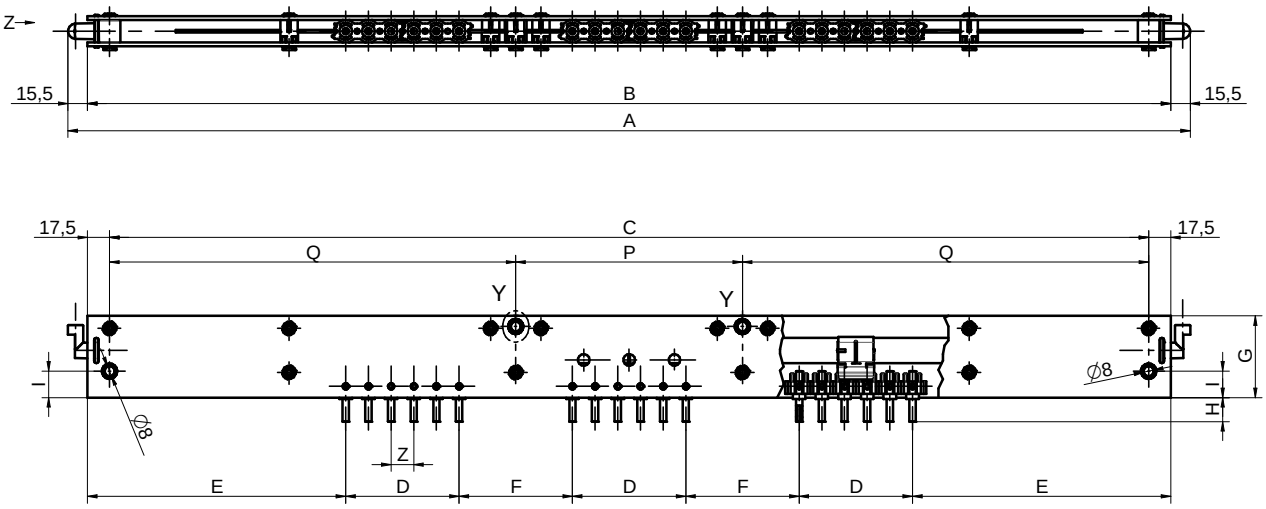
- CODE CONSTRUCTION

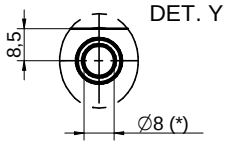


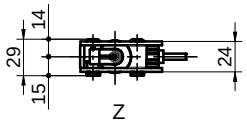
DETC THREE-PHASE TAP CHANGERS SERIES 099 TYPE 04.65

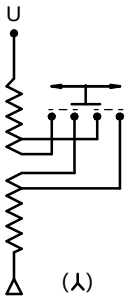
- *De-energized operation*
- *For oil immersed transformer*
- *Bridge connection*
- *24 kV / 36 kV*
- *30 A / 60 A*
- *From 3 to 7 positions*
- *Regulation 2,5% per position*

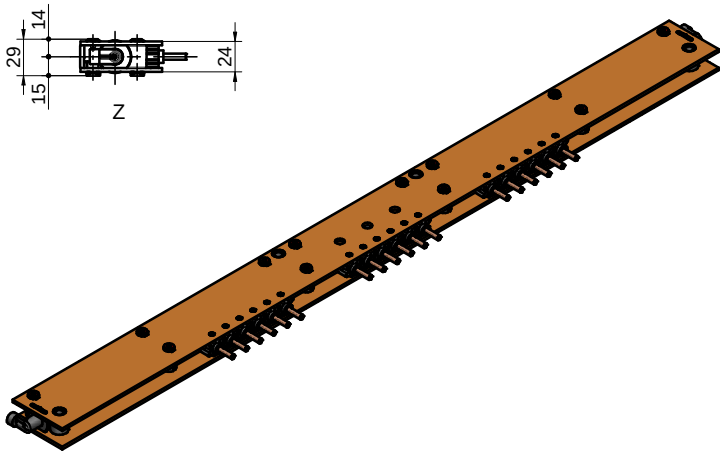
Dimension in mm









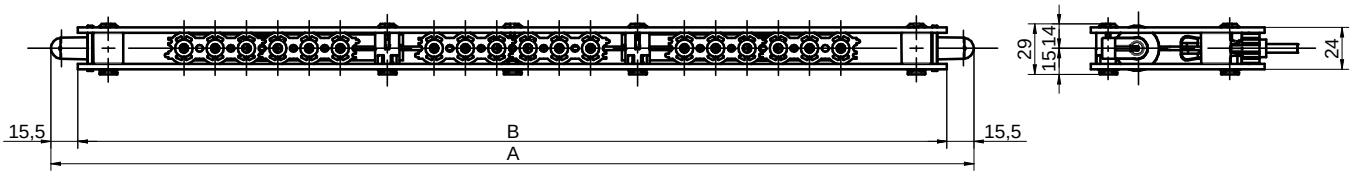


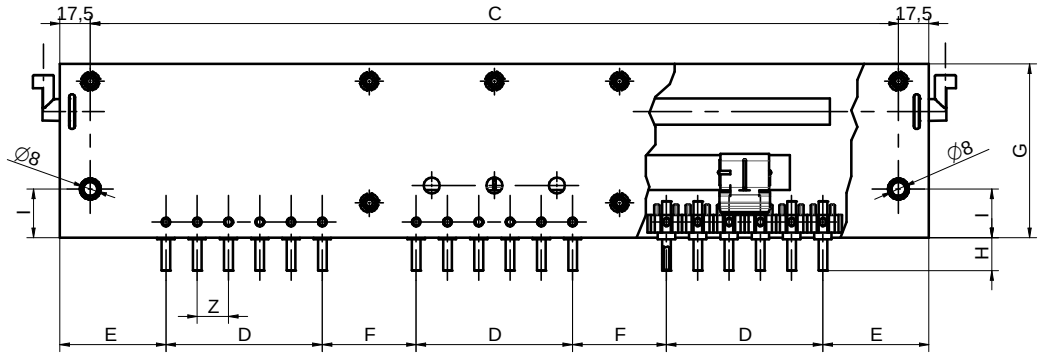
VOLTAGE	N° POS.	PRODUCT CODE		A	B	C	D	E	F	G	H	I	P	Q	Z
		30 A	60 A												
24 kV	3	04.65.233	04.65.263	531	500	465	54	115	54	65	20	21	/	/	18
	4	04.65.234	04.65.264	621	590	555	72	133	54	65	20	21	/	/	18
	5	04.65.235	04.65.265	711	680	645	90	151	54	65	20	21	/	/	18
	6	04.65.236	04.65.266	801	770	735	108	169	54	65	20	21	/	/	18
	7	04.65.237	04.65.267	891	860	825	126	187	54	65	20	21	180	322,5	18
36 kV	3	04.65.333	04.65.363	711	680	645	54	169	90	65	20	21			18
	4	04.65.334	04.65.364	801	770	735	72	187	90	65	20	21			18
	5	04.65.335	04.65.365	891	860	825	90	205	90	65	20	21	180	322,5	18
	6	04.65.336	04.65.366	981	950	915	108	223	90	65	20	21	198	358,5	18
	7	04.65.337	04.65.367	1071	1040	1005	126	241	90	65	20	21	216	394,5	18

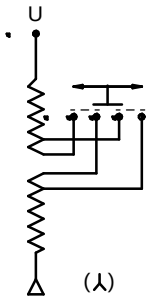
DETC THREE-PHASE TAP CHANGERS SERIES 099 TYPE 04.100

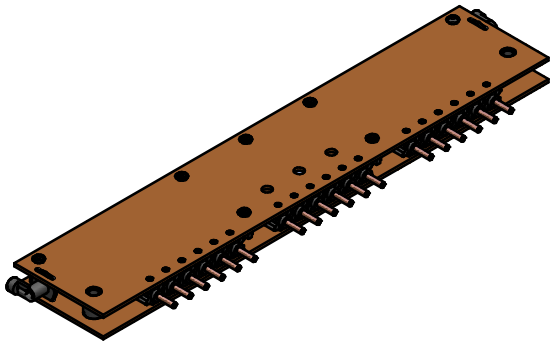
- *De-energized operation*
- *For oil immersed transformer*
- *Bridge connection*
- *24 kV / 36 kV*
- *30 A / 60 A*
- *From 3 to 7 positions*
- *Regulation 2,5% per position*

Dimension in mm









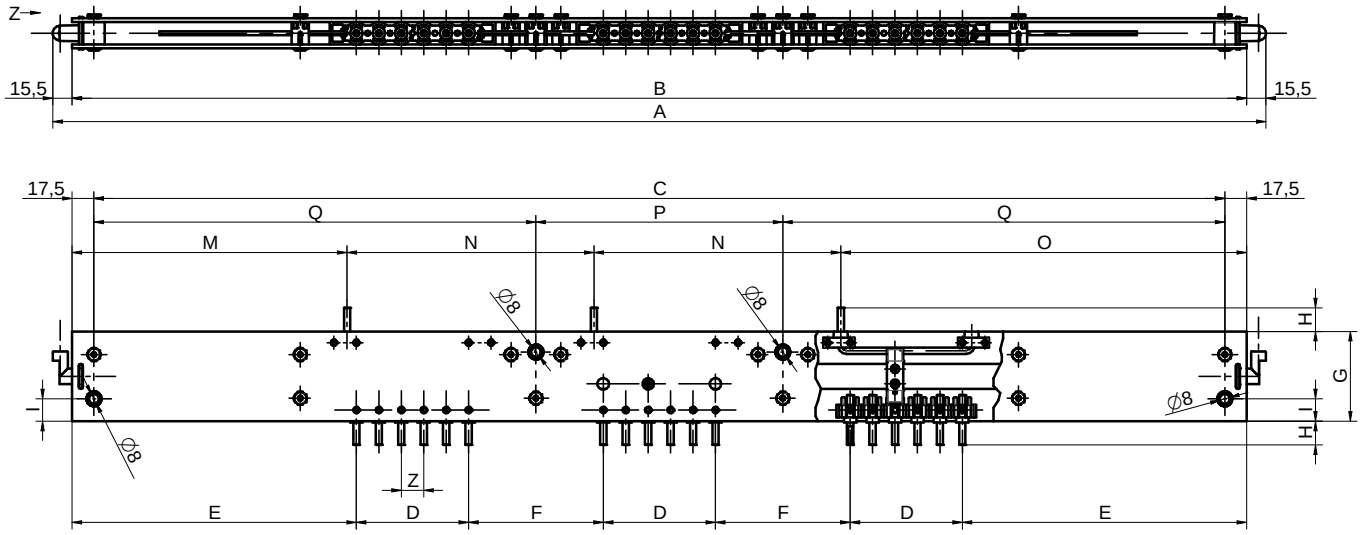
VOLTAGE	N° POS.	PRODUCT CODE		A	B	C	D	E	F	G	H	I	Z
		30 A	60 A										
24 kV	3	04.100.233	04.100.263	423	392	357	54	*61	54	100	20	28	18
	4	04.100.234	04.100.264	477	446	411	72	*61	54	100	20	28	18
	5	04.100.235	04.100.265	531	500	465	90	*61	54	100	20	28	18
	6	04.100.236	04.100.266	585	554	519	108	*61	54	100	20	28	18
	7	04.100.237	04.100.267	639	608	573	126	*61	54	100	20	28	18
36 kV	3	04.117.333	04.117.363	643	612	577	54	135	90	117	20	30	18
	4	04.117.334	04.117.364	697	666	631	72	135	90	117	20	30	18
	5	04.117.335	04.117.365	751	720	685	90	135	90	117	20	30	18
	6	04.117.336	04.117.366	805	774	739	108	135	90	117	20	30	18
	7	04.117.337	04.117.367	859	828	793	126	135	90	117	20	30	18

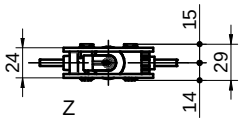
* Fixing with insulating support.

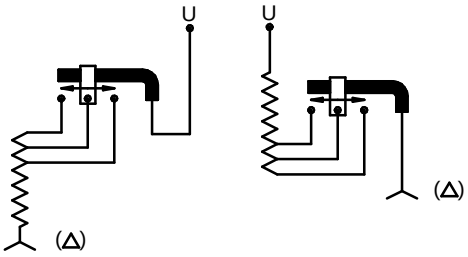
DETC THREE-PHASE TAP CHANGERS SERIES 099 TYPE 06.72

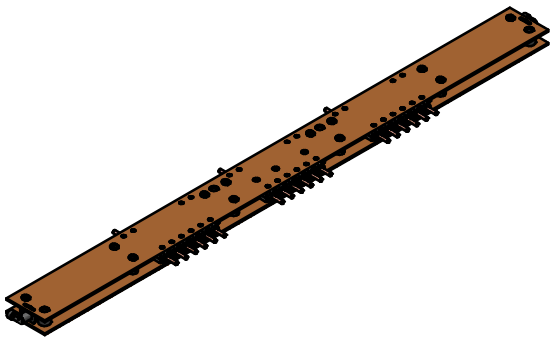
- De-energized operation
- For oil immersed transformer
- Linear connection with a common for each phase
- 24 kV / 36 kV
- 30 A / 60 A
- From 3 to 7 positions
- Regulation 2,5% per position

Dimension in mm







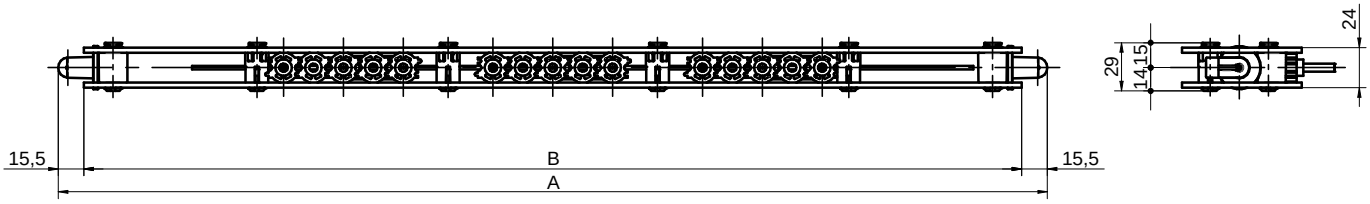


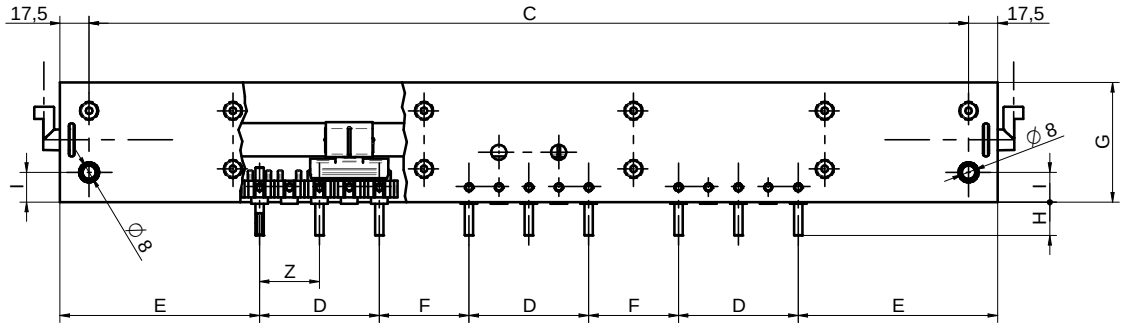
VOLTAGE	N° POS.	PRODUCT CODE		A	B	C	D	E	F	G	H	I	M	N	O	P	Q	Z
		30 A	60 A															
24 kV	3	06.72.233	06.72.263	571	540	505	36	144	72	72	20	18	137	108	187	/	/	18
	4	06.72.234	06.72.264	661	630	595	54	162	72	72	20	18	155	126	223	/	/	18
	5	06.72.235	06.72.265	751	720	685	72	180	72	72	20	18	173	144	259	/	/	18
	6	06.72.236	06.72.266	841	810	775	90	198	72	72	20	18	191	162	295	/	/	18
	7	06.72.237	06.72.267	931	900	865	108	216	72	72	20	18	209	180	331	/	/	18
36 kV	3	06.72.333	06.72.363	703	672	637	36	174	108	72	20	18	167	144	217	144	246,5	18
	4	06.72.334	06.72.364	793	762	727	54	192	108	72	20	18	185	162	253	162	282,5	18
	5	06.72.335	06.72.365	883	852	817	72	210	108	72	20	18	203	180	289	180	318,5	18
	6	06.72.336	06.72.366	973	942	907	90	228	108	72	20	18	221	198	325	198	354,5	18
	7	06.72.337	06.72.367	1063	1032	997	108	246	108	72	20	18	239	216	361	216	390,5	18

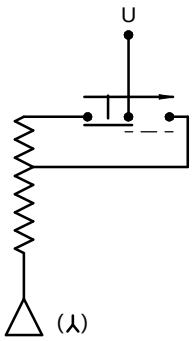
DETC THREE-PHASE TAP CHANGERS SERIES 099 TYPE 43.72

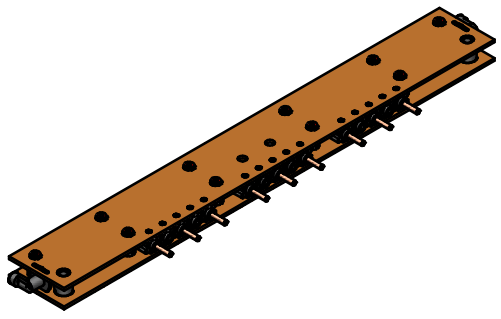
- *De-energized operation*
- *For oil immersed transformer*
- *Change voltage connection*
- *24 kV*
- *30 A / 60 A*
- *2 positions*

Dimension in mm







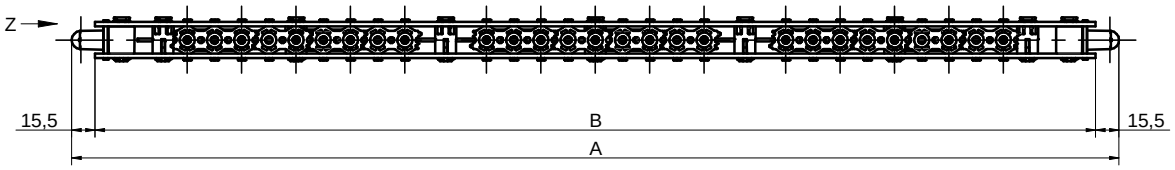


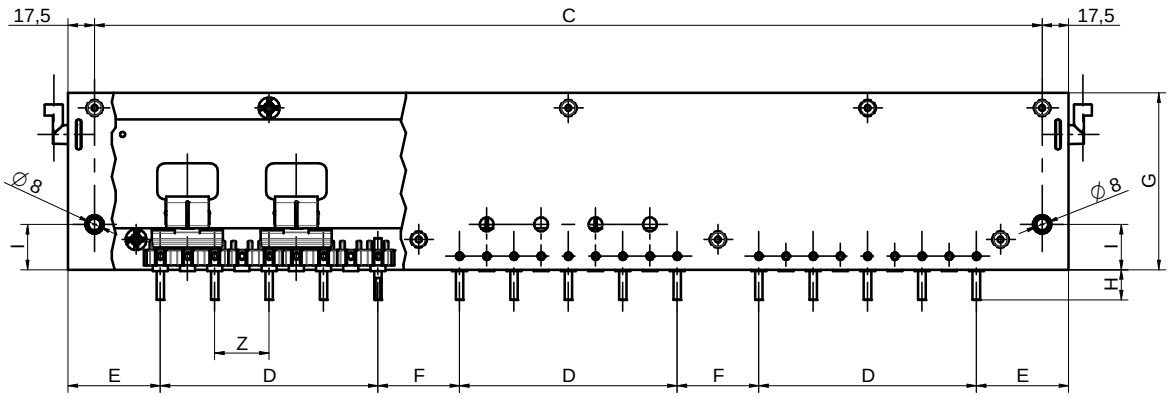
VOLTAGE	N° POS.	PRODUCT CODE		A	B	C	D	E	F	G	H	I	Z
		30 A	60 A										
24 kV													
	2	43.72.232	43.72.262	595	564	529	72	120	54	72	20	18	36

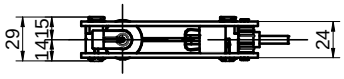
DETC THREE-PHASE TAP CHANGERS SERIES 099 TYPE 45.117

- *De-energized operation*
- *For oil immersed transformer*
- *Series parallel connection*
- *10/20 kV*
- *30 A / 60 A*
- *2 positions*

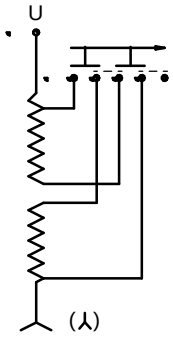
Dimension in mm

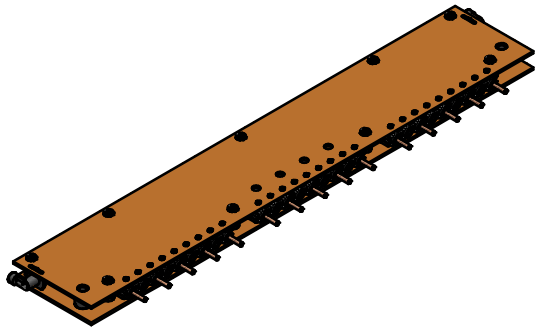






VIEW Z





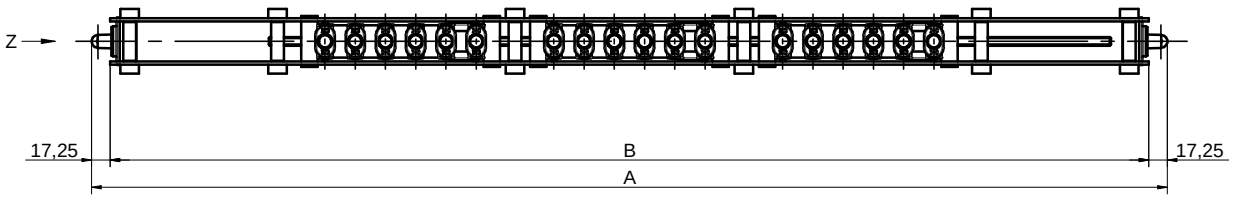
VOLTAGE	N° POS.	PRODUCT CODE		A	B	C	D	E	F	G	H	I	Z
		30 A	60 A										
10/20 kV	2	45.117.232	45.117.262	693	662	627	144	*61	54	117	20	30	36

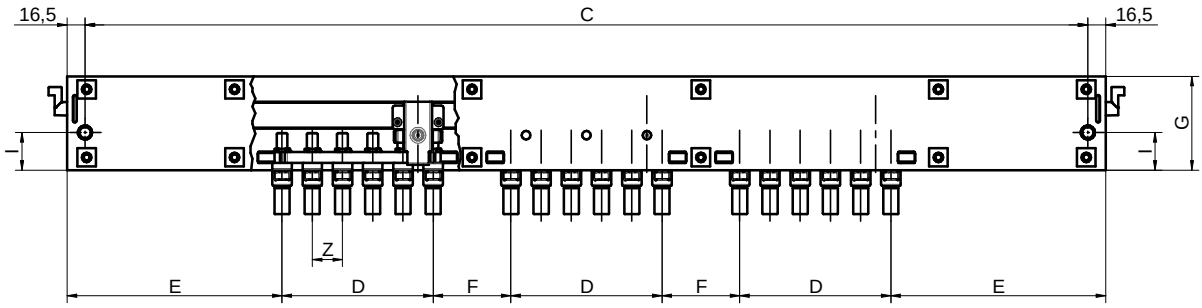
* Fixing with insulating support.

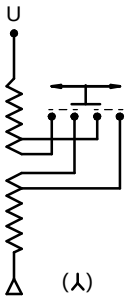
DETC THREE-PHASE TAP CHANGERS SERIES 099 TYPE 04.87

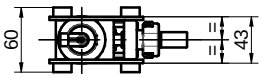
- De-energized operation
- For oil immersed transformer
- Bridge connection
- 24 kV / 36 kV
- 150 A / 200 A
- 3 and 5 positions
- Regulation 2,5% per position

Dimension in mm

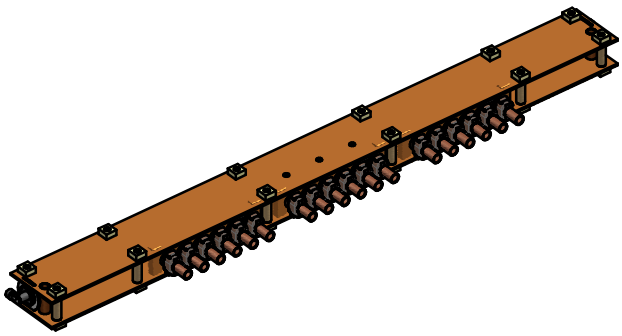








View Z

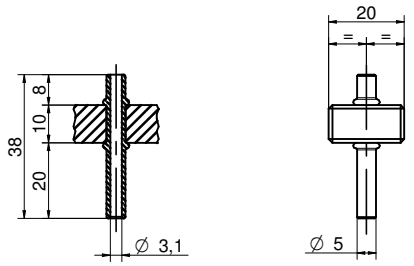


VOLTAGE	N° POS.	PRODUCT CODE		A	B	C	D	E	F	G	I	Z
		150 A	200 A									
24 kV	3	04.87.213	04.87.223	726,5	692	659	84	148	72	87	35	28
	5	04.87.215	04.87.225	996,5	962	929	140	199	72	87	35	28
36 kV	3	04.87.313	04.87.323	884,5	850	817	84	199	100	87	35	28
	5	04.87.315	04.87.325	1129,5	1095	1062	140	237,5	100	87	35	28

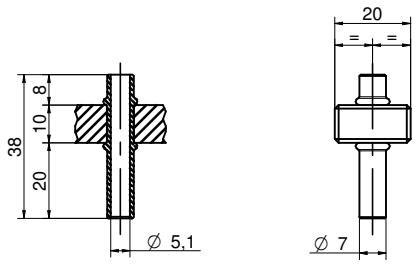
FIXED CONTACTS 099

Dimension in mm

FIXED CONTACTS ONLY FOR TAP-CHANGERS TYPE: 04.65, 04.100, 04.117, 06.72, 43.72, 45.117

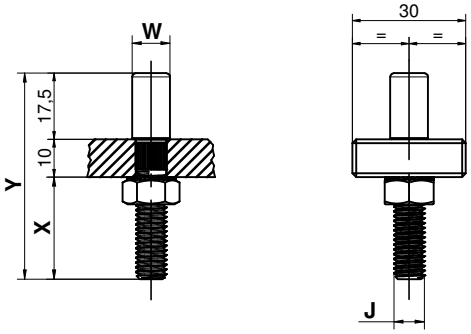


Tubular contact **30 A**

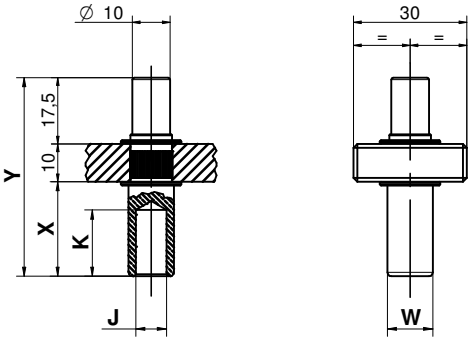


Tubular contact **60 A**

FIXED CONTACTS ONLY FOR TAP-CHANGERS TYPE: 04.87



THREADED CONTACTS					
CURRENT	TYPE CONTACT	DIMENSION in mm			
		J	W	X	Y
150 A	**C**	*M8*	*Ø 10*	*27*	*54,5*
200 A	**C**	*M10*	*Ø 12*	*33*	*60,5*

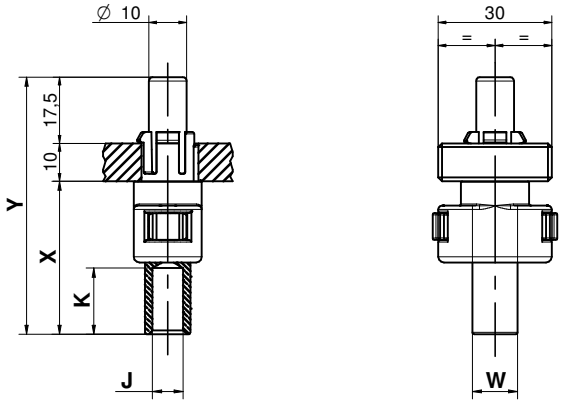


TUBULAR CONTACTS							
CURRENT	* Section of flexible cooper strand leads	CONTACT TYPE	DIMENSION in mm				
			J	K	W	X	Y
150 A	**25 mm²**	**S**	*Ø 8,1*	*17,5*	*Ø 12*	*25*	*52,5*
200 A	**35 mm²**	**S3**	*Ø 10*	*20*	*Ø 14*	*47*	*74,5*
	50 mm²	**S**	*Ø 11,5*	*20*	*Ø 14*	*47*	*74,5*

* ON REQUEST WE CAN PROVIDE THE COPPER ROPE CRIMPED INSIDE THE CONTACTS

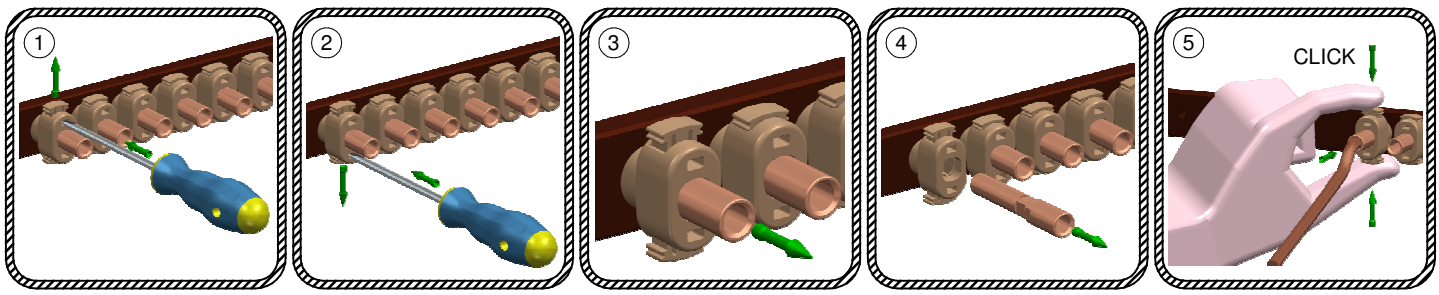
Dimension in mm

ONLY FIXED CONTACTS FOR TAP-CHANGER TYPE: 04.87

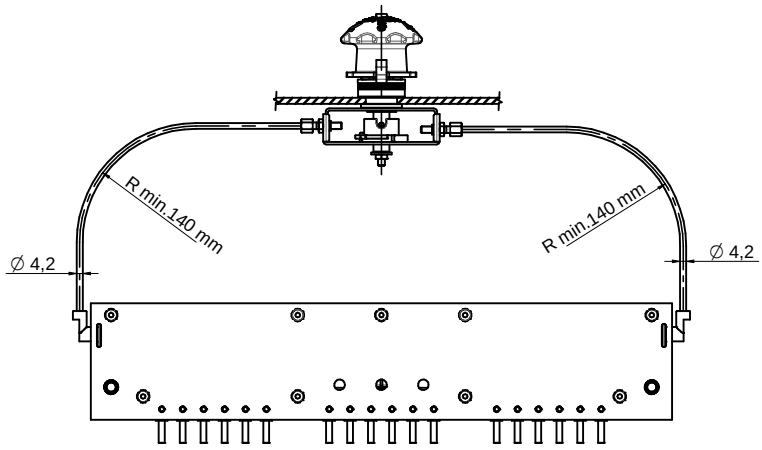


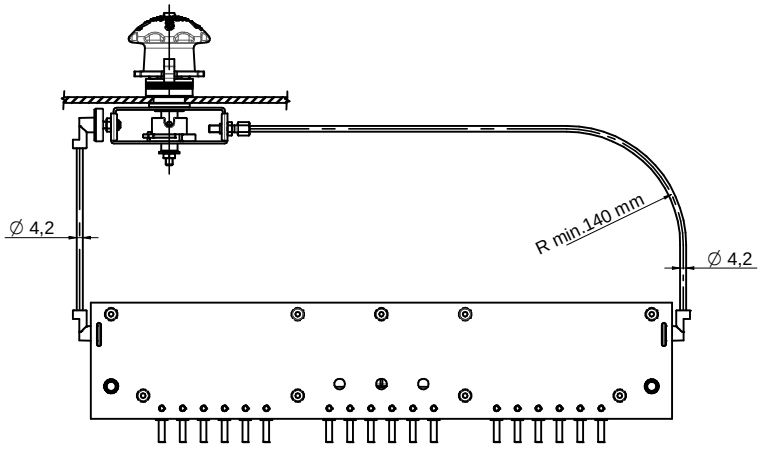
REMOVABLE TUBULAR CONTACTS							
CURRENT	* Section of flexible cooper strand leads	CONTACT TYPE	DIMENSION in mm				
			J	K	W	X	Y
150 A	**25 mm²**	**R**	*Ø 8,1*	*17,5*	*Ø 12*	*40,5*	*68*
	35 mm²	**R3**	*Ø 10*	*20*	*Ø 14*	*47,5*	*75*
200 A	**50 mm²**	**R**	*Ø 11,5*	*20*	*Ø 14*	*47,5*	*75*

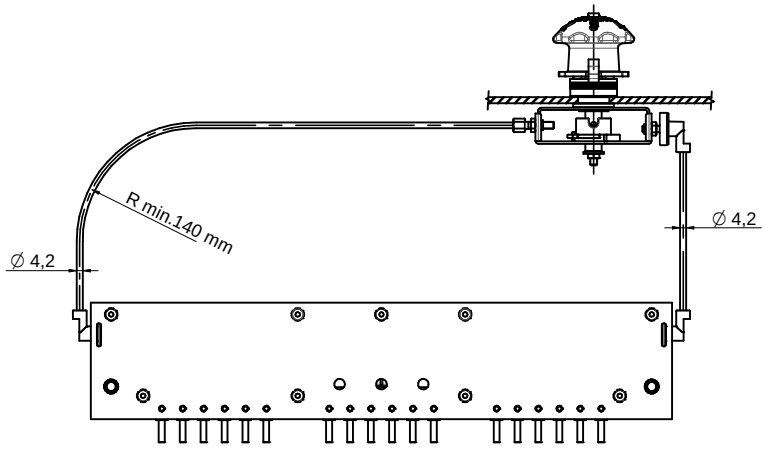
* ON REQUEST WE CAN PROVIDE THE COPPER ROPE CRIMPED INSIDE THE CONTACTS



Dimension in mm







- CODE CONSTRUCTION

060-99.[4][0][0][5].[SO3]-[D][V]

MODEL DRIVE
See the specific catalog pages.

TIE ROD OUTPUT VARIANTS (Ref. 099-08)	
0	Standard output control
1	Double output control
2	With a 90° angle to the right
3	With a 90° angle to the left
4	With 90° angle on both side

PROTECTIVE COVER	
0	No
2	Yes

TIE ROD SIZE (Ref. 099-08)	
0	x Ø 4,5
5	x Ø 7

NUMBERING KNOB
See the specific catalog pages 099-06.

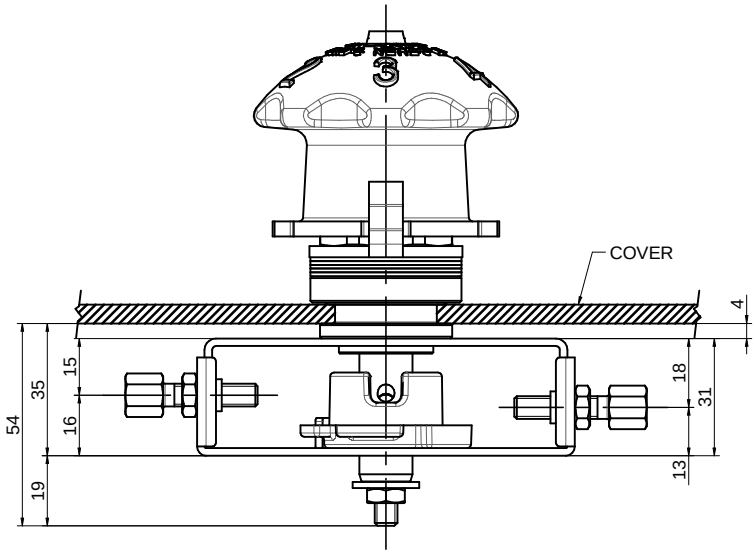
SURFACE TREATMENT	
D	x Geomet®

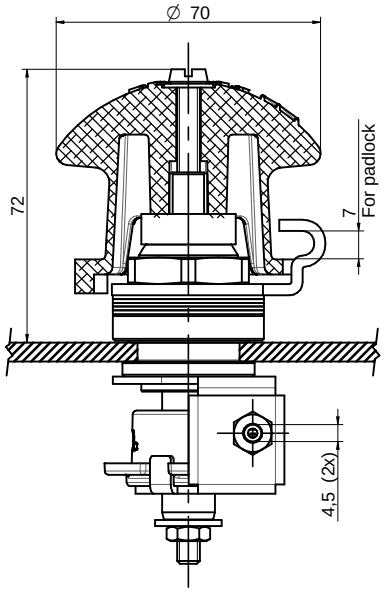
GASKET	
	-25°C / +105°C
G	For low temperature (-60°C)
V	For high temperature (+200°C)

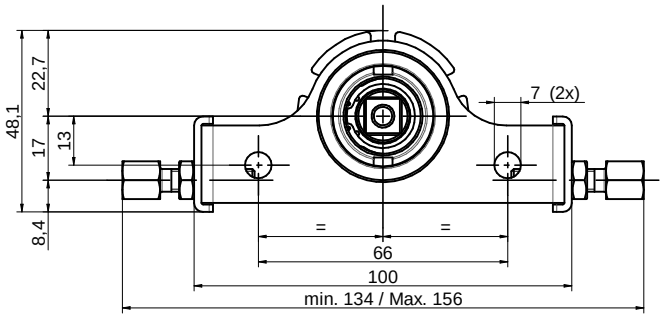
TAP CHANGER DRIVE HANDLE TYPE 060-99.4000

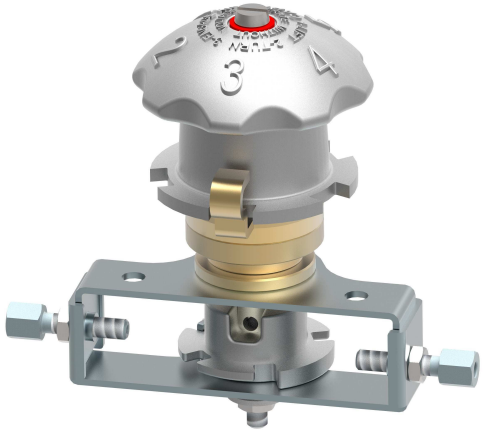
- *From 2 to 5 positions*
- *Only for pitches between fixed contacts 18 mm and 36 mm*

Dimension in mm





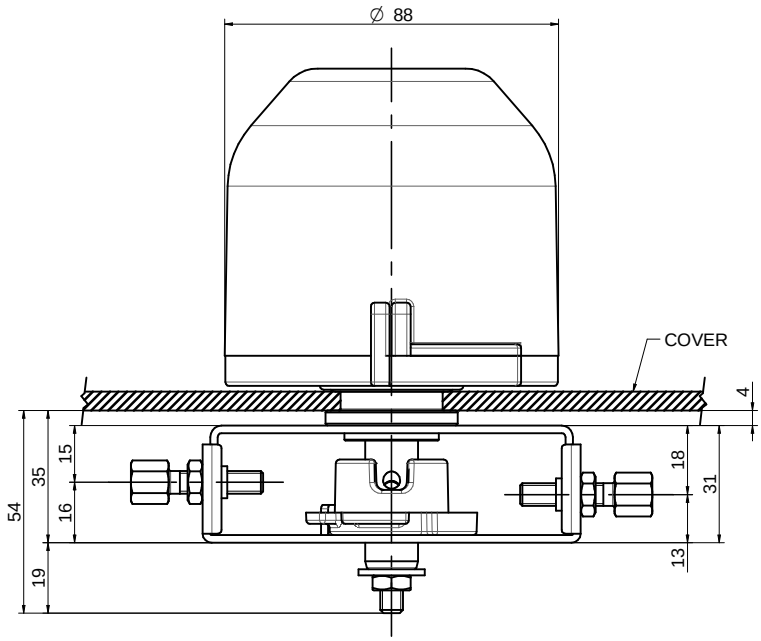


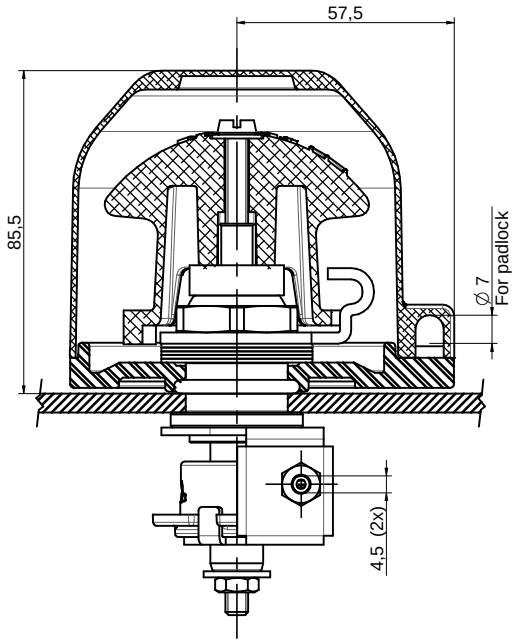


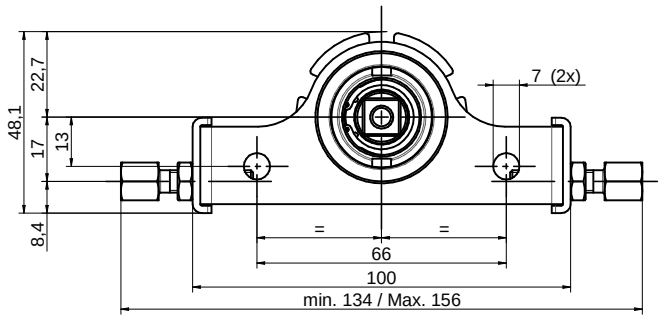
TAP CHANGER DRIVE HANDLE TYPE 060-99.4020

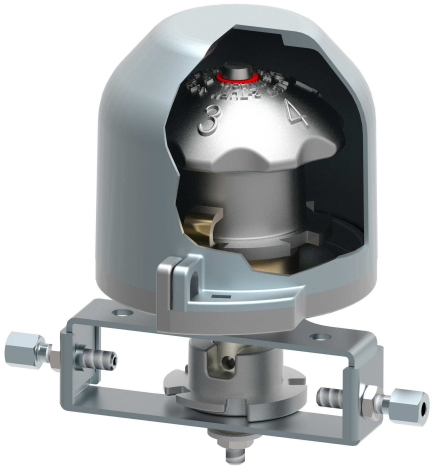
- *From 2 to 5 positions*
- *Only for pitches between fixed contacts 18 mm and 36 mm*

Dimension in mm





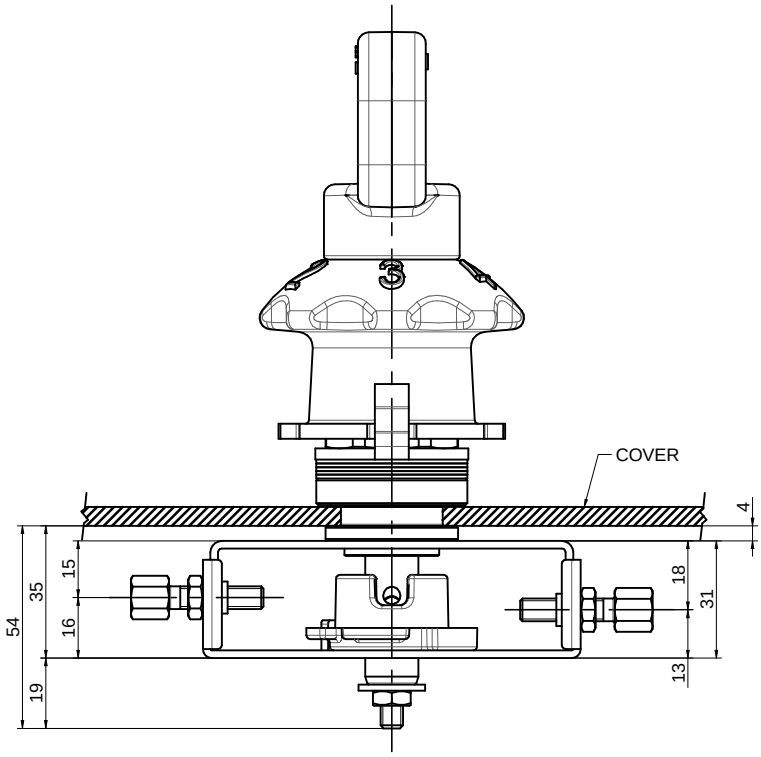


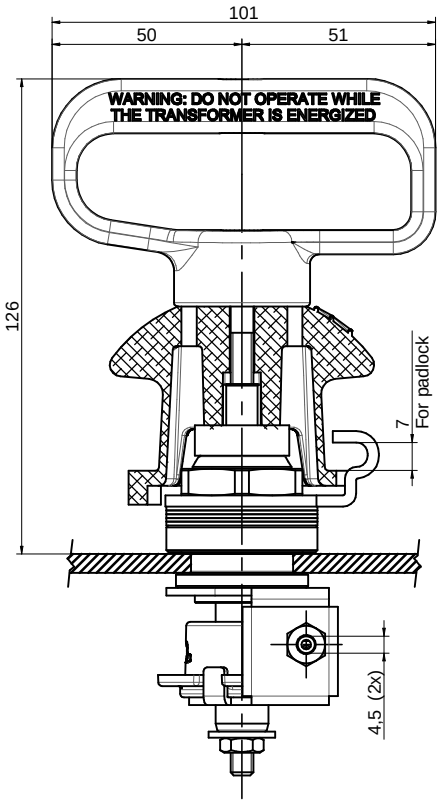


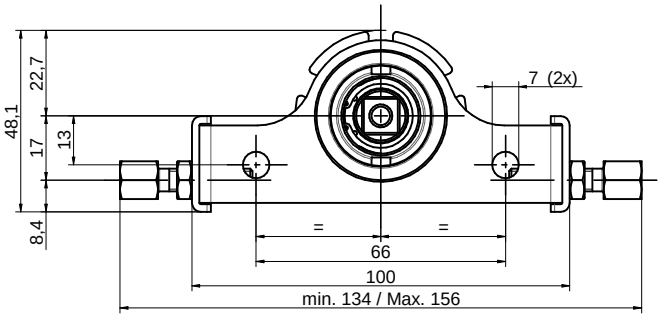
TAP CHANGER DRIVE HANDLE TYPE 060-99.7000

- *From 2 to 5 positions*
- *Only for pitches between fixed contacts 18 mm and 36 mm*

Dimension in mm







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de-energized tap changers

099-7000
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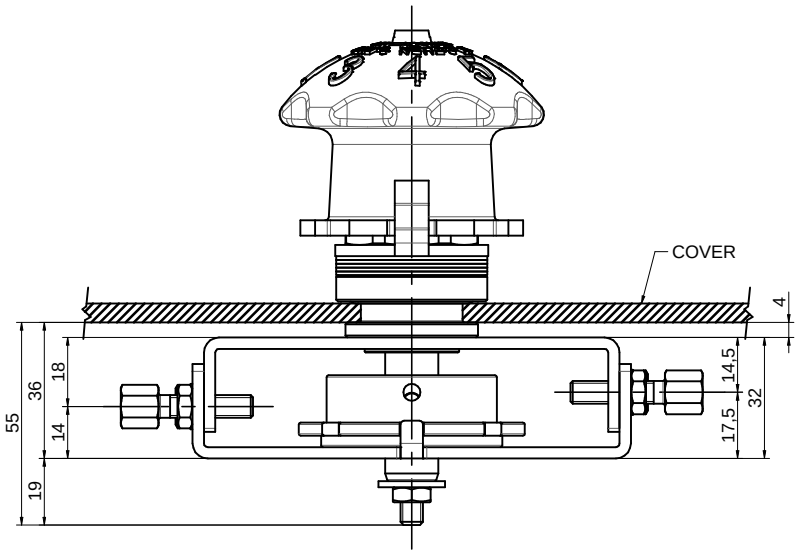
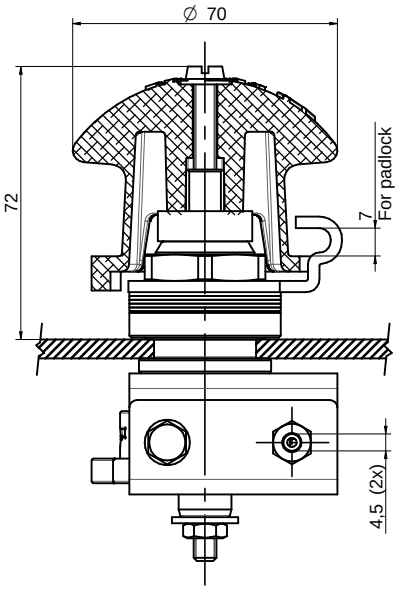
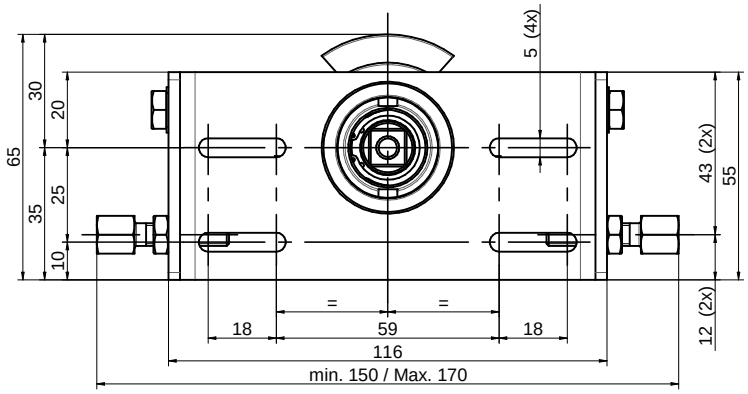
TAP CHANGER DRIVE HANDLE TYPE 060-99.5000

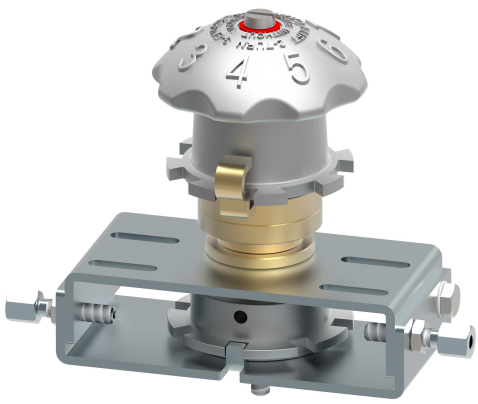
- *From 6 to 7 positions*
- *Only for pitches between fixed contacts 18 mm*

Dimension in mm





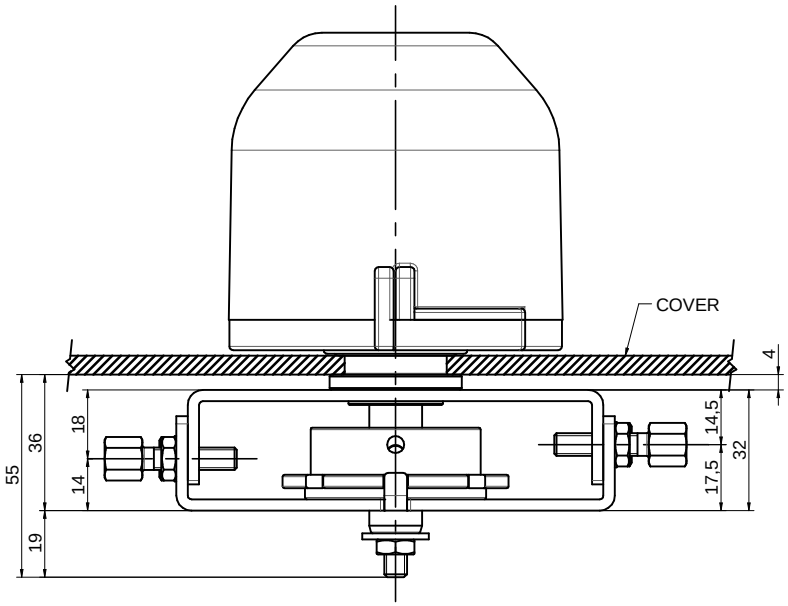


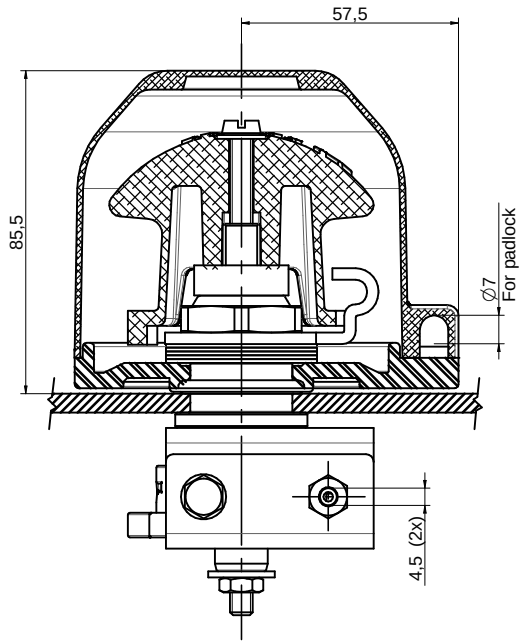


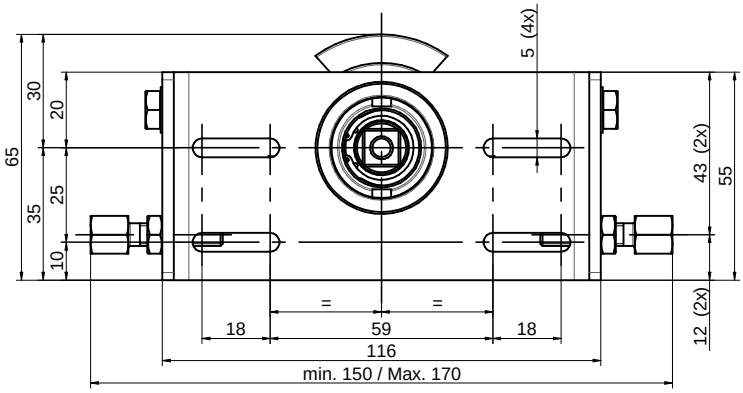
TAP CHANGER DRIVE HANDLE TYPE 060-99.5020

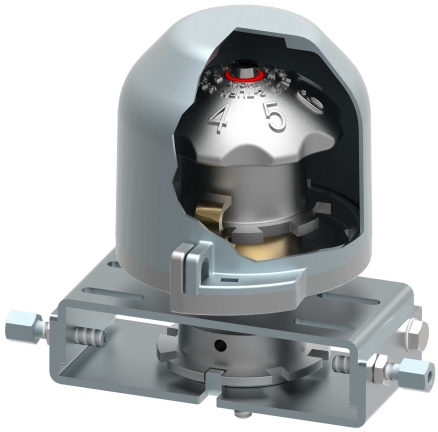
- *From 6 to 7 positions*
- *Only for pitches between fixed contacts 18 mm*

Dimension in mm





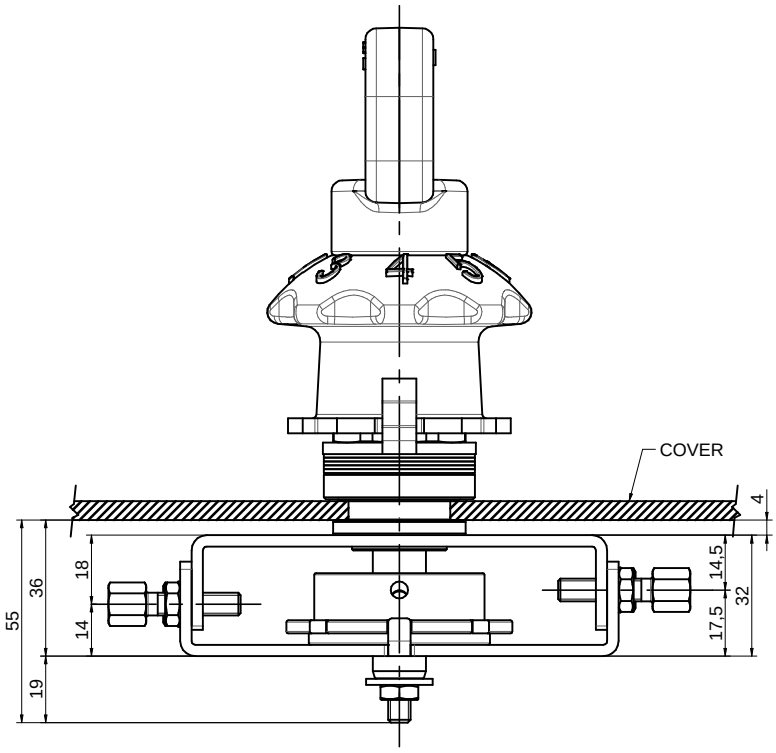


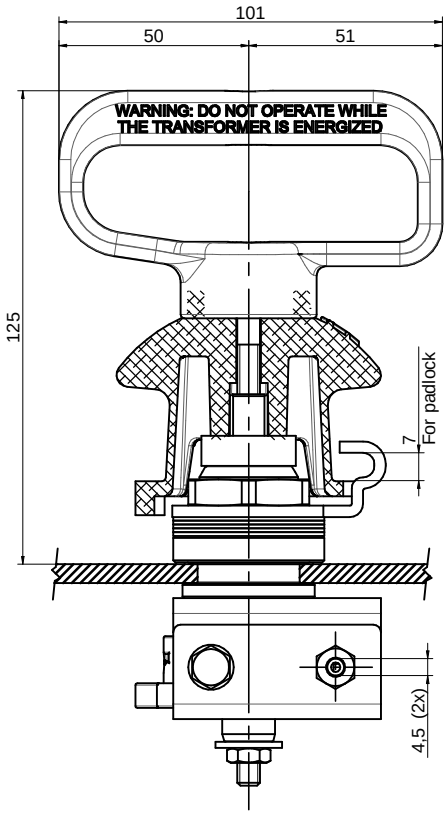


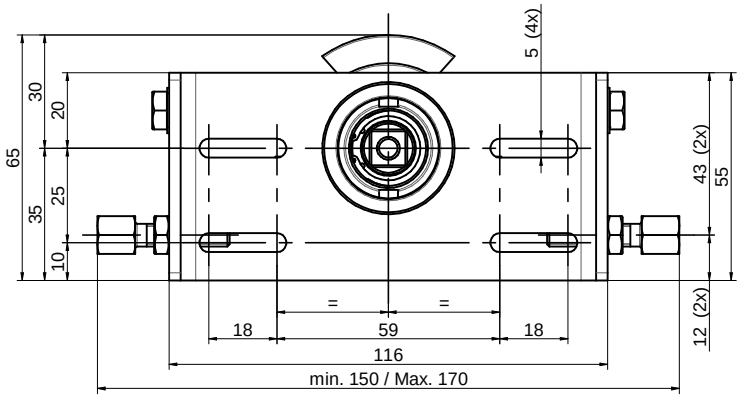
TAP CHANGER DRIVE HANDLE TYPE 060-99.8000

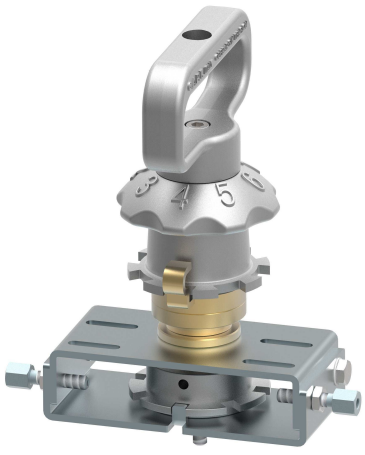
- *From 6 to 7 positions*
- *Only for pitches between fixed contacts 18 mm*

Dimension in mm





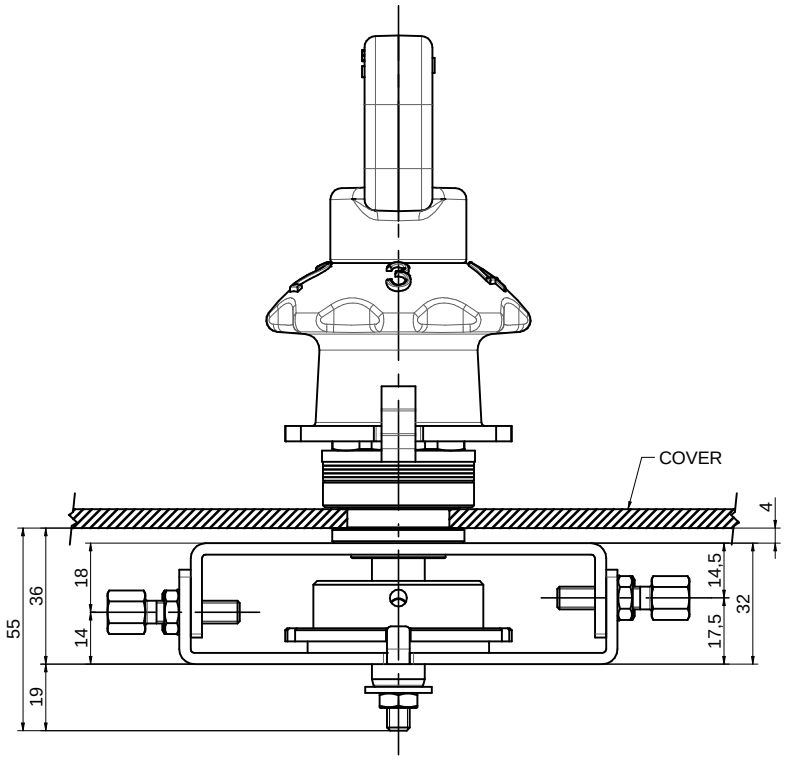


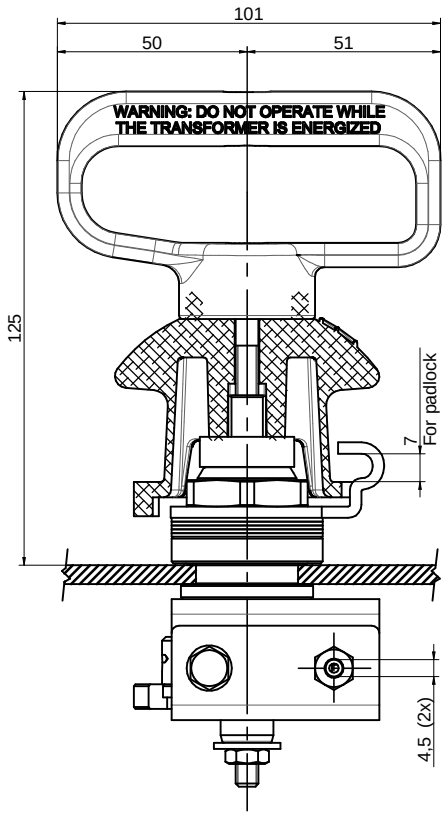


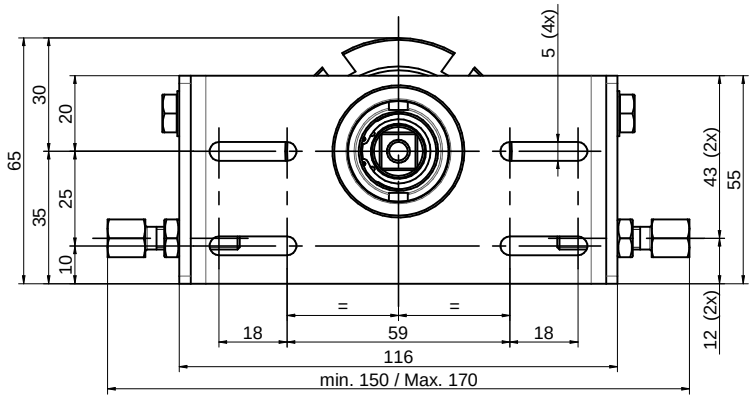
TAP CHANGER DRIVE HANDLE TYPE 060-99.9000

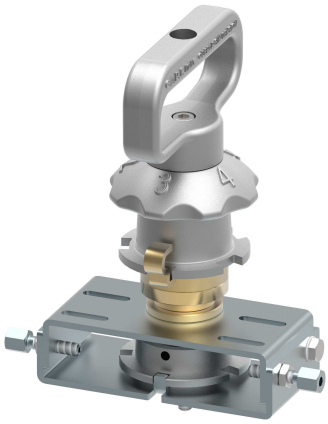
- *From 2 to 5 positions*
- *Only for pitches between fixed contacts 28 mm*

Dimension in mm







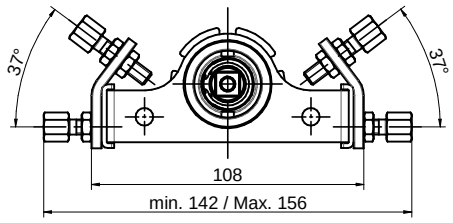


MANEUVER VARIANTS

Dimension in mm

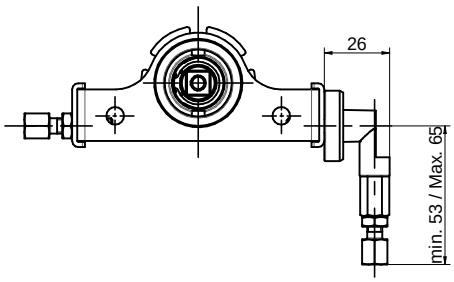
ONLY FOR MODELS 060-99.4000 e 060-99.7000

060-99._ 1 _ _

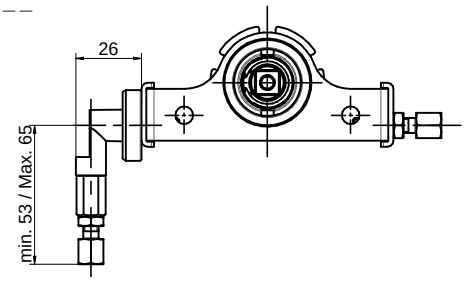


Double output control device for the simultaneous operation of two tap changers.

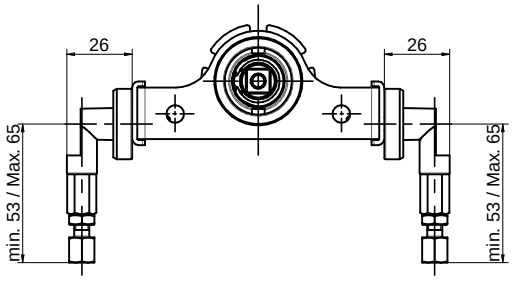
060-99._ 2 _ _



060-99._ 3 _ _

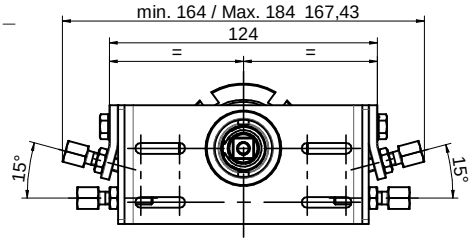


060-99._ 4 _ _



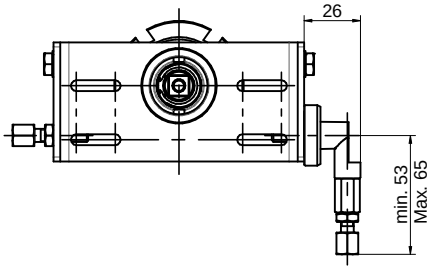
ONLY FOR MODELS 060-99.5000, 060-99.8000 e 060-99.9000

060-99._ 1 _ _

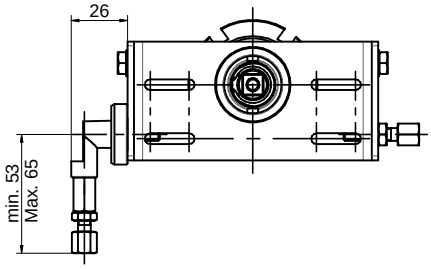


Double output control device for the simultaneous operation of two tap changers.

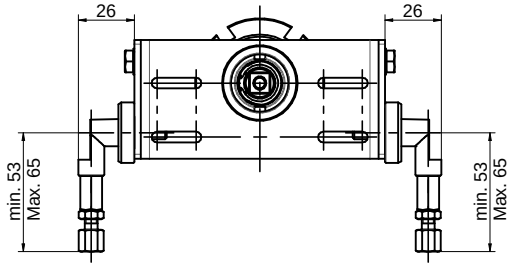
060-99._ 2 _ _



060-99._ 3 _ _

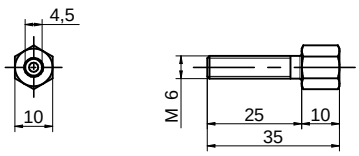


060-99._ 4 _ _

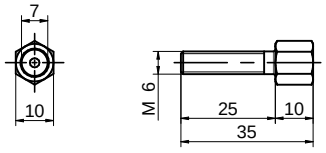


TIE ROD VARIANTS

060-99._ _ _ 0



060-99._ _ _ 5

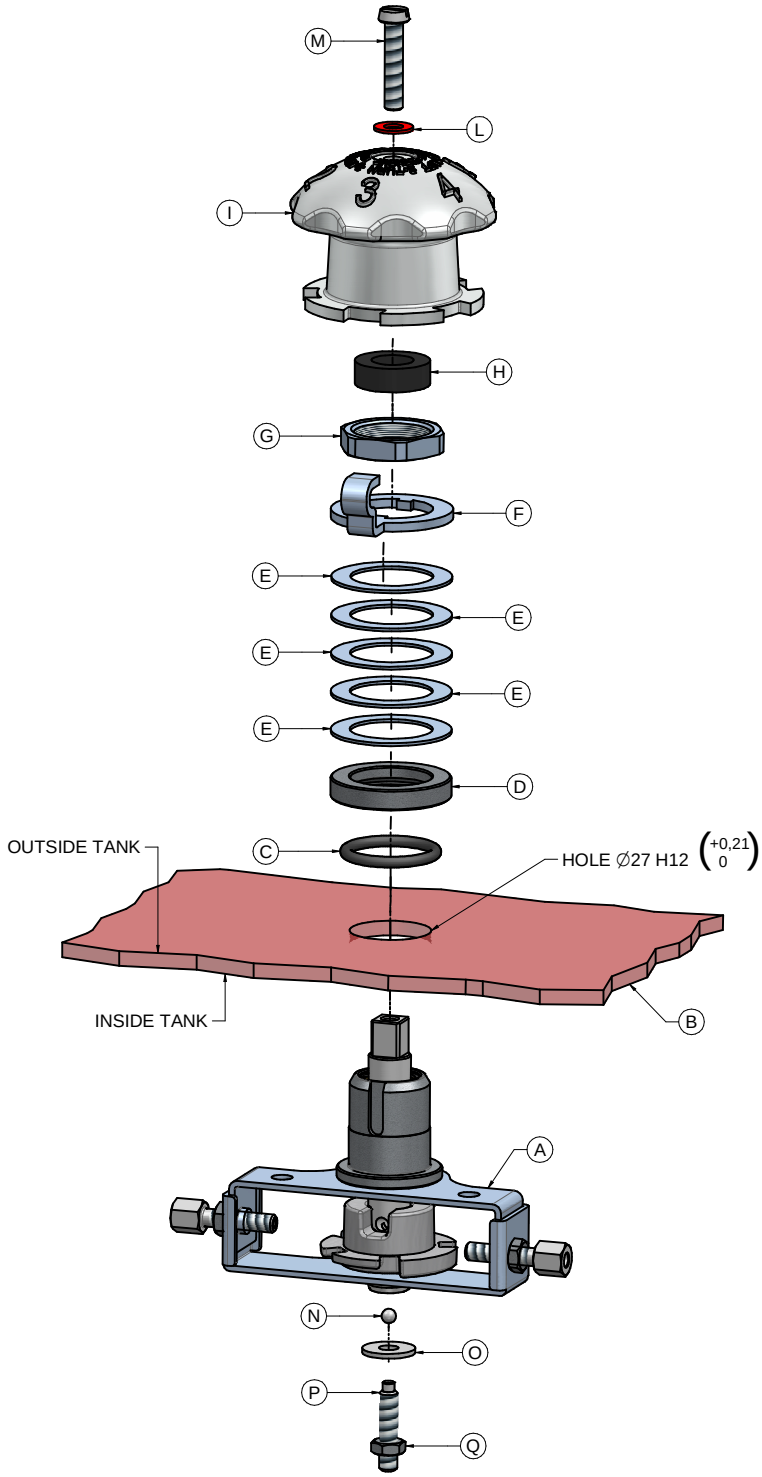


c.a.p.t. s.r.l.
de-energized tap changers

099-08
Rev. 00 - 06/04/2017

ASSEMBLING SEQUENCE DIAGRAM

Dimension in mm



A) *Gear group*

B) *Transformer cover*

C) *O-Ring R20*

D) *Zinc galvanized steel tightener O-Ring washer*

E) *N°8 zinc galvanized steel thickness washers*
(To be used depending on cover thickness - i.e. 5pcs for 5mm thickeness; 2pcs for 8mm thickeness; etc.)

F) *Zinc galvanized steel positioning ring*

G) *Zinc galvanized steel nut (tightening torque 15 Nm)*

H) *EPDM ruber Ø26xØ14x8*

I) *Aluminium numbering knob*

L) *Fiber red washer*

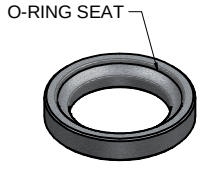
M) *Stainless steel screw M6x30 ISO1207*

N) *Steel sphere Ø4,8*

O) *Steel washer M6 ISO 7093*

P) *Steel screw M6x30 EN ISO 4028*

Q) *Steel nut M6 ISO 4035*

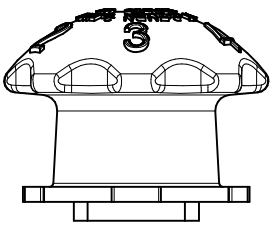


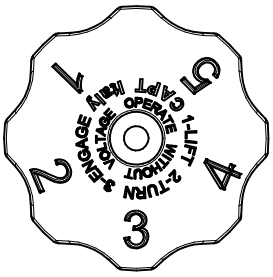
Part. D

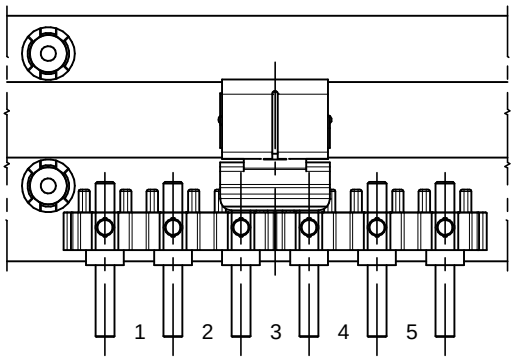
NUMBERING KNOB

Dimension in mm

.SO

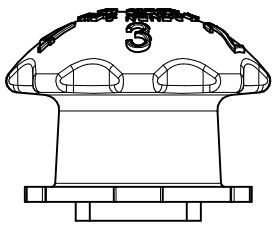


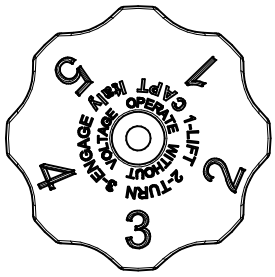


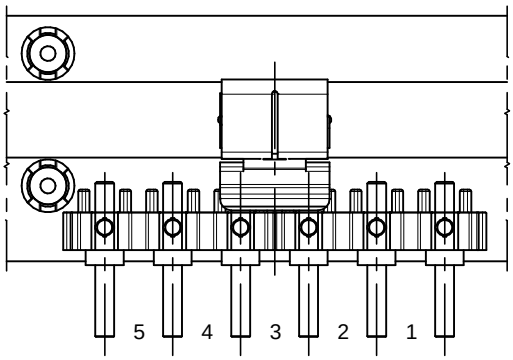


TYPE	NUMBERING
.SO1	1 - 2
.SO3	1-2-3
.SO4	1-2-3-4
.SO5	1-2-3-4-5
.SO6	1-2-3-4-5-6
.SO7	1-2-3-4-5-6-7

.SA







TYPE	NUMBERING
.SA1	2 - 1
.SA3	3-2-1
.SA4	4-3-2-1
.SA5	5-4-3-2-1
.SA6	6-5-4-3-2-1
.SA7	7-6-5-4-3-2-1