## SUMMARY

### TAP CHANGERS TYPE 099

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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:

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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 steel 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.
099 - 04 . 87 . 2 1 5 C FM

- SERIES

- TYPE CONNECTION
  04 Bridge
  06 Linear
  43 Change voltage
  45 Series parallel

- QUOTE G
  See the specific catalog pages.

- VOLTAGE
  2 x 24 kV
  3 x 36 kV

- CURRENT
  1 x 150 A
  2 x 200 A
  3 x 30 A
  6 x 60 A

- NUMBER OF POSITIONS
  See the specific catalog pages.

- TYPE OF FIXED CONTACT
  See ref. 099-02, 099-03.

- CONTACTS SURFACE TREATMENT
  F Fixed contacts silver plated
  M Moving contacts silver plated
  FM Fixed and moving contacts silver plated
  T Fixed, moving and common contacts silver plated
### 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**

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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

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* Fixing with insulating support.
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

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<th>PRODUCT CODE</th>
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Pag. 9/25
- De-energized operation
- For oil immersed transformer
- Series parallel connection
- 10/20 kV
- 30 A / 60 A
- 2 positions

**Table**

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* 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

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<th>VOLTAGE</th>
<th>Nº POS.</th>
<th>PRODUCT CODE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<td>5</td>
<td>04.87.215</td>
<td>04.87.225</td>
<td>996.5</td>
<td>962</td>
<td>929</td>
<td>140</td>
<td>199</td>
<td>72</td>
<td>87</td>
<td>35</td>
</tr>
<tr>
<td>36 kV</td>
<td>3</td>
<td>04.87.313</td>
<td>04.87.323</td>
<td>884.5</td>
<td>850</td>
<td>817</td>
<td>84</td>
<td>199</td>
<td>100</td>
<td>87</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>04.87.315</td>
<td>04.87.325</td>
<td>1129.5</td>
<td>1095</td>
<td>1062</td>
<td>140</td>
<td>237.5</td>
<td>100</td>
<td>87</td>
<td>35</td>
</tr>
</tbody>
</table>
**FIXED CONTACTS 099**

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

---

**Threading Contacts**

<table>
<thead>
<tr>
<th>Current</th>
<th>Type</th>
<th>Dimension in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 A</td>
<td>C</td>
<td>J 10 W 27 X 54.5</td>
</tr>
<tr>
<td>200 A</td>
<td>C</td>
<td>J 12 W 33 X 60.5</td>
</tr>
</tbody>
</table>

---

**Tubular Contacts**

<table>
<thead>
<tr>
<th>Current</th>
<th>Contact Type</th>
<th>Section of Flexible Copper Strand Leads</th>
<th>Dimension in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 A</td>
<td>S</td>
<td>25 mm²</td>
<td>J 8.1 W 17.5 X 25 Y 52.5</td>
</tr>
<tr>
<td>200 A</td>
<td>S3</td>
<td>35 mm²</td>
<td>J 10 W 20 X 47 Y 74.5</td>
</tr>
<tr>
<td>50 A</td>
<td>S</td>
<td>50 mm²</td>
<td>J 11.5 W 20 X 47 Y 74.5</td>
</tr>
</tbody>
</table>

* ON REQUEST WE CAN PROVIDE THE COPPER ROPE CRIMPED INSIDE THE CONTACTS
NEW REMOVABLE FIXED CONTACTS 099

DIMENSION in mm

ONLY FIXED CONTACTS FOR TAP-CHANGER TYPE: 04.87

REMovable tubular contacts

<table>
<thead>
<tr>
<th>CURRENT</th>
<th>* Section of flexible cooper strand leads</th>
<th>CONTACT TYPE</th>
<th>DIMENSION in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 A</td>
<td>25 mm² R Ø 8,1 17,5 Ø 12 40,5 68</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>35 mm² R3 Ø 10 20 Ø 14 47,5 75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 A</td>
<td>50 mm² R Ø 11,5 20 Ø 14 47,5 75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* ON REQUEST WE CAN PROVIDE THE COPPER ROPE CRIMPED INSIDE THE CONTACTS
DRIVES HANDLE ON COVER 060-99

- 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

- 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
TAP CHANGER DRIVE HANDLE TYPE 060-99.5000

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

Dimension in mm

COVER

min. 150 / Max. 170

For padlock

099-5000
Rev. 03 - 06/04/2017
TAP CHANGER DRIVE HANDLE TYPE 060-99.5020

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

Dimension in mm

For padlock: 4.5 (2x)

min. 150 / Max. 170
TAP CHANGER DRIVE HANDLE TYPE 060-99.8000

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

Dimension in mm

WARNUNG: DO NOT OPERATE WHILE THE TRANSFORMER IS ENERGIZED.

For padlock

min. 150 / Max. 170
TAP CHANGER DRIVE HANDLE TYPE 060-99.9000

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

Dimension in mm

WARNING: DO NOT OPERATE WHILE THE TRANSFORMER IS ENERGIZED

099-9000
Rev. 01 - 06/04/2017

Pag. 22/25
DOUBLE OUTPUT CONTROL DEVICE FOR THE SIMULTANEOUS OPERATION OF TWO TAP CHANGERS.

ONLY FOR MODELS 060-99.4000 e 060-99.7000

060-99._1_  

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

060-99._3_  

TIE ROD VARIANTS

060-99._0_  

099-08  
Rev. 00 - 06/04/2017
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 thickness; 2pcs for 8mm thickness; etc.)
F) Zinc galvanized steel positioning ring
G) Zinc galvanized steel nut (tightening torque 15 Nm)
H) EPDM rubber 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
**NUMBERING KNOB**

**.SO**

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

**.SA**

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

Dimension in mm