NOTE

These technical data are intended for the calculator and designer of the transformer. These type-specific data are only valid in connection with the information contained in the general section (TD 61) since this section contains important information on such subjects as potential connection, leakage inductance, current division, and so on. Dimensional drawings and connection diagrams are subject to change without prior notice. Drawings submitted during bidding and ordering are always binding.

Since the on-load tap-changer is delivered to the specifications of the transformer manufacturer, the transformer manufacturer is responsible for selecting the correct properties of the on-load tap-changer so that the requirements of the transformer are met.
1 General

1.1 Summary of technical data

The on-load tap-changers in all their specifications are subject to all relevant international and national guidelines and standards, particularly IEC Publication 60214 3ED 89 and the VDE standard DIN EN 60214 (VDE 0532 Teil 30): 1998-06.

<table>
<thead>
<tr>
<th>On-load tap-changer</th>
<th>VT I 500</th>
<th>3 x VT I 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of poles</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Max. rated through-current $I_{um}$ (A)</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Rated short-time withstand current, r.m.s. value (kA)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Rated short-circuit duration (s)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rated peak withstand current (kA)</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>Max. rated step voltage $U_{im}$ (V)</td>
<td>900</td>
<td></td>
</tr>
<tr>
<td>Step capacity ($P_{StN}$) kVA</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Operating positions max. 9, no change-over selector available</td>
<td>max. 9, no change-over selector available</td>
<td></td>
</tr>
<tr>
<td>Rated frequency (Hz)</td>
<td>50 ... 60</td>
<td></td>
</tr>
<tr>
<td>Rated insulation level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest voltage for equipment $U_m$ (kV)</td>
<td>40.5</td>
<td>200</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage to ground and between phases (for VT I 500 only to ground) kV, 1.2150 µs</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Rated AC withstand voltage to ground and between phases (for VT I 500 only to ground) kV, 50 Hz, 1 min</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage between any two adjacent contacts of the tap selector (kV, 1.2150 µs)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Rated AC withstand voltage between any two adjacent contacts of the tap selector (kV, 50 Hz, 1 min)</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage between the first and last contacts of the tap selector (kV, 1.2150 µs)</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Rated AC withstand voltage between the first and last contacts of the tap selector (kV, 50 Hz, 1 min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation position</td>
<td>vertical, attachment of the on-load tap-changer is provided on top only</td>
<td></td>
</tr>
<tr>
<td>Environmental medium</td>
<td>air</td>
<td></td>
</tr>
<tr>
<td>Operating conditions (ambient class E0 in acc. with IEC 60076-11)</td>
<td>indoor installation; max. 1000 m amsl</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Can be operated in the rated load range at temperatures of $-25 , ^\circ C$ to $+65 , ^\circ C$</td>
<td></td>
</tr>
<tr>
<td>Frequency of operation</td>
<td>max. 1 switching operation per minute</td>
<td></td>
</tr>
<tr>
<td>Running time per operation in s (with motor drive unit ED)</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>ca. 70</td>
<td>ca. 210</td>
</tr>
<tr>
<td>Drive mechanism</td>
<td>Motor drive unit ED, protective housing in outdoor design, motor for 3 AC 230/400 V, 50 Hz, 0.75 kW, step-by-step operation with local/remote control, electrical/mechanical end position limit, connection facility for remote position indication, hand crank for adjustment purposes and emergency operation</td>
<td></td>
</tr>
</tbody>
</table>
2 Technical Data

2.1 Rated through-current ($I_u$), rated step voltage ($U_i$), rated step capacity ($P_{SN}$)

<table>
<thead>
<tr>
<th>On-load tap-changer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated through-current $I_u$ (in A)</td>
</tr>
<tr>
<td>Relevant rated step voltage $U_i$ (in V)</td>
</tr>
<tr>
<td>Step capacity $P_{SN}$ (in kVA)</td>
</tr>
</tbody>
</table>

Table: Rated through-currents ($I_u$), relevant rated step voltages ($U_i$) and rated switching capacity ($P_{SN}$), at highest and lowest rated step voltage of the step capacity curve (see fig. 1).

![Fig. 1 Rated step capacity ($I_u$, $U_i$)]

2.2 Contact life

The contact life of the vacuum interrupters amounts to 200,000 switching operations, regardless of step voltage and through-current. After 200,000 switching operations, the vacuum interrupters have to be replaced.
3 Appendix

On-load tap-changer VACUTAP® VT I 500, installation drawing .......................................................... 898312
On-load tap-changer VACUTAP® VT I 500, dimension drawing ................................................................. 897979
On-load tap-changer VACUTAP® VT I 500, switching sequence ................................................................ 899507
Motor drive unit ED-S, protective housing ............................................................................................. 898801
Bevel gear CD 6400, dimension drawing .................................................................................................... 892916
Motor drive unit ED-S with CD 6400, limit dimensions of vertical drive shaft ............................................ 898598
On-load tap-changer VACUTAP® VT I 500, drive shaft arrangements ..................................................... 897377
On-load tap-changer VACUTAP® VT I 500, adjustment plan ..................................................................... 898613
On-load tap-changer VACUTAP® VT I 500, determination of the insulating shaft length .......................... 897975
On-load tap-changer VACUTAP® VT I 500, connection diagrams ............................................................ ZS010157
On-load tap-changer VACUTAP® VT I 500
Installation drawing

Earth conductor must not extend into the earth distance!

Provide sufficient clearance!

Flexible round conductor (tap selector connecting leads not included in MR’s delivery)

M10 x 1.5
Tmd = 30 Nm
On-load tap-changer VACUTAP® VT I 500

Dimension drawing

Connected to ground

All metallic parts are connected to tap in service.

Earthing screw M10

Min. distance to transformer

Output terminal "Y"

Tap selector terminal

For binding designation of terminals refer to the connection diagram of the tap-changer.
On-load tap-changer VACUTAP® VT I 500
Switching sequence

TTS - Tap selector contacts, transition path
TTV - Transition contacts (vacuum interrupter), transition path
MSV1 - Main switching contacts (vacuum interrupter), main path
MSV2 - Main switching contacts (safety vacuum interrupter), main path
MTS - Tap selector contacts, main path
STC - Sliding take-off contacts
R - Transition resistor
Ic - Circulating current

1. Basic position
2. Start of high-speed tap change operation
3. Start of reverse tap change operation

Diagram showing the switching sequence with steps 1 to 11, indicating the states of MTS, MSV1, MSV2, TTS, and TTV at each step.
Motor-drive unit ED-S
Protective housing

- Vertical guard plate with spacing ring
- Hand crank
- 3 dummy plates for packing glands
- Special design with OLTC monitoring required
- Vertical guard plate with spacing ring
- Wall of transformer tank
- Shim
- Attachment of protective housing
- Aperture of fixing holes on protective housing
- Aperture in protective housing for cables

The cover can be opened to the left or to the right depending on the arrangement of the hinge pins.

Aperture of fixing holes on protective housing (rear view)
Aperture in protective housing for cables (underside view)
The direction of rotation is defined during ordering.

Der Drehsinn wird bei Bestellung festgelegt.
Motor-drive unit ED with CD 6400
Limit dimensions of vertical drive shaft

1. UNIT WITHOUT CARDAN SHAFT WITHOUT INSULATOR \( \theta \max = 2^\circ \)
   \[ \text{Configuration} \quad V_1 \text{ mm} \quad \text{Intermediate bearing necessary if} \quad V \text{ mm} \]
   \[ \begin{array}{lll}
   \text{Bevel gear} & 536 & V_1 \times 2472 \\
   \end{array} \]

2. UNIT WITHOUT CARDAN SHAFT WITH INSULATOR \( \theta \max = 2^\circ \)
   \[ \text{Configuration} \quad V_1 \text{ mm} \quad \text{Intermediate bearing necessary if} \quad V \text{ mm} \]
   \[ \begin{array}{lll}
   \text{Bevel gear} & 706 & V_1 \times 2472 \\
   \end{array} \]

3. UNIT WITH CARDAN SHAFT WITHOUT INSULATOR \( \theta \max = 20^\circ \)
   \[ \text{Configuration} \quad V_1 \text{ mm} \quad \text{Intermediate bearing necessary if} \quad V \text{ mm} \]
   \[ \begin{array}{lll}
   \text{Bevel gear} & 798 & V_1 \times 2564 \\
   \end{array} \]

4. UNIT WITH CARDAN SHAFT WITH INSULATOR \( \theta \max = 20^\circ \)
   \[ \text{Configuration} \quad V_1 \text{ mm} \quad \text{Intermediate bearing necessary if} \quad V \text{ mm} \]
   \[ \begin{array}{lll}
   \text{Bevel gear} & 978 & V_1 \times 2772 \\
   \end{array} \]
On-load tap-changer VACUTAP® VT I 500

Drive shaft arrangements

Arrangement G 12

Arrangement G 11

Arrangement G 8

Arrangement G 7

<table>
<thead>
<tr>
<th>OLTC</th>
<th>H₁, H₂</th>
<th>H₃, H₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT I 500</td>
<td>≥ 900</td>
<td>-</td>
</tr>
<tr>
<td>3 x VT I 500</td>
<td>≥ 900¹¹</td>
<td>≥ 900 ²¹</td>
</tr>
</tbody>
</table>

¹¹ H₁, H₂ may be dimensioned like H₃, H₄, if insulation distance between tap-changer and motor-drive unit is sufficient!

²¹ Determined by insulation distance between poles:
- For operating voltages up to 40.5 kV ≥ 900 mm
- For operating voltages up to 24 kV ≥ 740 mm permissible
- For operating voltages up to 12 kV ≥ 580 mm permissible
**On-load tap-changer VACUTAP® VT I 500**

**Adjustment plan**

---

**Settings on the motor drive unit ED for the operation of the OLTC VT 500**

33 rotations of the hand crank per operation (= 33 SSE) in the same direction
42 rotations of the hand crank per operation (= 42 SSE) when reversing
(9 rotations more when reversing)

Adjustment of motor-drive unit and OLTC VT according to Operating Instructions no. 138
Distance between energy accumulator action and zero position of motor-drive unit is approx. 4 – 3 SSE

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For binding designation of connection contacts refer to the connection diagram of the on-load tap-changer
On-load tap-changer VACUTAP® VT I 500

Determination of the insulating shaft length

L = C - 53 mm

<table>
<thead>
<tr>
<th>NO.</th>
<th>DESIGNATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COUPLING BOLT</td>
</tr>
<tr>
<td>2</td>
<td>SCREENING SLEEVE</td>
</tr>
<tr>
<td>3</td>
<td>COUPLING SLEEVE</td>
</tr>
<tr>
<td>4</td>
<td>CLAMPING PIECE</td>
</tr>
<tr>
<td></td>
<td>M16x1; SW=4, 9Nm</td>
</tr>
<tr>
<td>5</td>
<td>INSULATING SHAFT</td>
</tr>
</tbody>
</table>
Please note: The data in our publications may differ from the data of the devices delivered. We reserve the right to make changes without notice.

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