# Table of contents

1 **Introduction** ................................................................................................................. 4  
   1.1 Switching concept .................................................................................................................. 4  
   1.2 Commutation .......................................................................................................................... 6  
   1.3 The COMTAP® ARS name ..................................................................................................... 8  

2 **Technical data** .................................................................................................................... 9  
   2.1 Technical data .......................................................................................................................... 9  
   2.2 Insulating performance ............................................................................................................ 10  
   2.3 Contact life ............................................................................................................................. 12  
   2.4 Permissible ambient conditions ............................................................................................... 13  

3 **Drive** ................................................................................................................................ 14  

4 **Protective devices** ............................................................................................................... 15  

5 **Mounting** ............................................................................................................................ 16  

6 **Drawings** ............................................................................................................................ 17  
   6.1 COMTAP® ARS I 1000 – 123-170 kV, dimensional drawing (734007) ........................................ 17  
   6.2 COMTAP® ARS I 1822 – 123-170 kV, dimensional drawing (734008) ........................................ 18  
   6.3 COMTAP® ARS, ARS I 2433 – 123-170 kV, dimensional drawing (734009) ......................... 19  
   6.4 COMTAP® ARS, ARS III 1000 – 123-170 kV, dimensional drawing (734010) ...................... 20  
   6.5 COMTAP® ARS, ARS III 1822 – 123-170 kV, dimensional drawing (734011) ...................... 21  
   6.6 COMTAP® ARS, adjustment plan for ARS (734102) ............................................................ 22  
   6.7 COMTAP® ARS, mounting of the COMTAP® ARS on the lower cage ring (user-specific, 732773_1) ........................................................................................................................................................... 23  
   6.8 COMTAP® ARS, mounting of the COMTAP® ARS on the lower cage ring (user-specific, 732773_2) ........................................................................................................................................................... 24  
   6.9 COMTAP® ARS, head with upper gear unit (725737) ............................................................. 25  
   6.10 COMTAP® ARS, installation drawing bell-type tank design (733023) ..................................... 26  
   6.11 COMTAP® ARS, connection contact (734095) ....................................................................... 27  
   6.12 COMTAP® ARS, connecting leads (10015335) ....................................................................... 28  
   6.13 COMTAP® ARS, horizontal drive shaft (732769_1) .............................................................. 29  
   6.14 COMTAP® ARS, horizontal drive shaft (732769_2) .............................................................. 30  
   6.15 COMTAP® ARS, tap-change supervisory control (726977) ................................................... 31  
   6.16 Lifting traverse (72673703) .................................................................................................. 32
1 Introduction

This technical file contains detailed information about the technical properties of the product. Basic information is given in the "Technical Data (TD 61) - General Section".

1.1 Switching concept

The COMTAP® ARS is used to reverse the polarity of a winding during transformer operation. The COMTAP® ARS always has 2 operating positions.

The COMTAP® ARS is changed over from one operating position to the next by rotating an insulating drive shaft. This insulating drive shaft is operated via a 60° control gear that is driven via a TAPMOTION® ED motor-drive unit. A change in operating position requires a 120° tap change.

Two motor-drive unit switching operations (tap change is performed twice) are therefore needed for one COMTAP® ARS tap-change operation.

The COMTAP® ARS contact system has a contact circle diameter of 850 mm. During a COMTAP® ARS operation the through-current is commutated from one current path to another current path with the same potential. The contact system is equipped with special contacts for this purpose.

The COMTAP® ARS can be used for different applications in combination with an on-load tap-changer. The COMTAP® ARS is primarily used to reverse the polarity of the regulating voltage in applications with large regulating ranges, e.g. phase shifter transformers (see following figure).

![Figure 1: COMTAP® ARS for reversing the polarity of a winding](image)

| a | COMTAP® ARS in operating position 1 |
| b | COMTAP® ARS during tap-change operation |
| c | COMTAP® ARS in operating position 2 |
In on-load tap-changer applications with reversing change-over selector where the change-over selector capacity is outside the permitted range, a combination of on-load tap-changer without reversing change-over selector and COMTAP® ARS can be used as a substitute (see figure below).

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>COMTAP® ARS in position 1</td>
</tr>
<tr>
<td></td>
<td>OLTC switches, COMTAP® ARS blocked</td>
</tr>
<tr>
<td>b</td>
<td>COMTAP® ARS during tap-change operation, OLTC blocked</td>
</tr>
<tr>
<td>c</td>
<td>COMTAP® ARS in position 2</td>
</tr>
<tr>
<td></td>
<td>OLTC switches, COMTAP® ARS blocked</td>
</tr>
</tbody>
</table>

Figure 2: COMTAP® ARS as replacement for reversing change-over selector
1.2 Commutation

During a COMTAP® ARS tap-change operation the current I must be commutated against an impedance Z, consisting of R and X. The contact erosion caused by the commutation depends on the current I that flows through the COMTAP® ARS contacts during the commutation and the impedance Z against which the current I has to be commutated. This impedance is formed by the cable route from the COMTAP® ARS to the on-load tap-changer and back (commutation loop).

The following figure shows the switchover sequence from one operating position to another. Fig. a shows one of the two COMTAP® ARS operating positions. The intermediate position shown in Fig. b is reached first during a tap-change operation, where current I flows unchanged via the commutation loop. Next the position shown in Fig. c is approached. In this case the current I in the commutation loop reduces to 0 A. The current I mainly flows via the contacts of the COMTAP® ARS which are now connected in parallel. In the next step, one of these contacts is opened (Fig. d) so that almost the whole current I has to be commutated onto the commutation loop via the COMTAP® ARS contact that opens last (Fig. e). The current I 1 has changed its direction in the commutation loop. Via the position shown in Fig. f the COMTAP® ARS now reaches the other operating position (Fig. g).

![Diagram showing Commutation Sequence]

Figure 3: COMTAP® ARS tap-change sequence

The COMTAP® ARS is dimensioned for a through-current of 1,000 A per contact plane. For through-currents > 1,000 A contact planes are connected in parallel. For applications with parallel current paths additional current division assessment during the COMTAP® ARS tap-change operation is required. Please note that due to geometrical deviations the parallel COMTAP® ARS current paths will not commutate the current simultaneously.

The current division should be considered under the aspect that one current path has already commutated (Fig.: contact plane II) while the other current path is about to reach the commutation phase (Fig.: contact plane I). If the current division is not perfectly symmetric during the tap-change operation, the effect is the same as that of a current increase, resulting in a reduced number of permitted operations. The commutation current I (see Fig.) therefore has to be taken into account for determining the permitted number of operations.
during the tap-change operation. Consideration of steady-state current splitting (COMTAP® ARS in end position) is therefore not sufficient. For parallel current paths no contact bridges may be used in the COMTAP® ARS, because they would cancel the required current splitting.

Figure 4: ARS application example (single-phase diagram). COMTAP® ARS with parallel contact planes I and II during commutation.
1.3 The COMTAP® ARS name

The name of the COMTAP® ARS provides information on the number of phases, the maximum rated through-current, the highest voltage for equipment $U_m$ and the basic connection diagram.

Every COMTAP® ARS is therefore uniquely identified.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>COMTAP® ARS I 1000-123-18 02 0 DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMTAP® ARS</td>
<td>Advanced retard switch type</td>
</tr>
<tr>
<td>I</td>
<td>Number of phases</td>
</tr>
<tr>
<td>1,000</td>
<td>Maximum rated through-current $I_{um}$ in A</td>
</tr>
<tr>
<td>123</td>
<td>Highest voltage for equipment $U_m$ (in kV)</td>
</tr>
<tr>
<td>18 02 0 DW</td>
<td>Basic connection</td>
</tr>
</tbody>
</table>

The corresponding basic connections differ in terms of contact circle pitch, number of operating positions, number of mid-positions and connection type.

<table>
<thead>
<tr>
<th>Designation of basic connection</th>
<th>18 02 0 DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Contact circle pitch</td>
</tr>
<tr>
<td>02</td>
<td>Number of operating positions</td>
</tr>
<tr>
<td>0</td>
<td>Number of mid-positions</td>
</tr>
<tr>
<td>DW</td>
<td>Connection type (DW=double reversing change-over selector switching concept)</td>
</tr>
</tbody>
</table>

Current splitting on parallel paths

Current splitting onto parallel paths is required with COMTAP® ARS versions for currents greater than 1,000 A, which must be forced by the transformer winding for example. Please specify how current splitting is ensured in the order.

The type ID then indicates the number of required current splittings and the ARS switching planes. The following example explains the make-up of the type identifier of a three-phase COMTAP® ARS for a max. rated through-current of 1,800 A with winding division.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>COMTAP® ARS III 1822</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMTAP® ARS</td>
<td>Advanced retard switch type</td>
</tr>
<tr>
<td>III</td>
<td>Number of phases</td>
</tr>
<tr>
<td>1822</td>
<td>Maximum rated through-current $I_{um}$ 1 800 A with 2-way current splitting (1822) and 2 parallel planes per phase (1822)</td>
</tr>
</tbody>
</table>
# Technical data

## 2.1 Technical data

<table>
<thead>
<tr>
<th>COMTAP®</th>
<th>ARS I 1000</th>
<th>ARS I 1822</th>
<th>ARS I 2433</th>
<th>ARS III 1000</th>
<th>ARS III 1822</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current splitting required</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Number of phases</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Max. rated through-current $I_{\text{um}}$ [A]</td>
<td>1,000</td>
<td>1,800</td>
<td>2,400</td>
<td>1,000</td>
<td>1,800</td>
</tr>
<tr>
<td>Rated short-time current [kA]</td>
<td>10</td>
<td>18</td>
<td>24</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>Rated duration of short-circuits [s]</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rated peak withstand current [kA]</td>
<td>25</td>
<td>45</td>
<td>60</td>
<td>25</td>
<td>45</td>
</tr>
<tr>
<td>Rated frequency [Hz]</td>
<td></td>
<td></td>
<td></td>
<td>50...60</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Electrical data

<table>
<thead>
<tr>
<th>COMTAP®</th>
<th>ARS I 1000</th>
<th>ARS I 1822</th>
<th>ARS I 2433</th>
<th>ARS III 1000</th>
<th>ARS III 1822</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of operating positions</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
<td></td>
<td>See dimensioned drawings in the appendix (page).</td>
<td></td>
</tr>
<tr>
<td>Installation length [mm]</td>
<td>max. 1,104</td>
<td>max. 1,299</td>
<td>max. 1,494</td>
<td>max. 2,124</td>
<td>max. 2,709</td>
</tr>
<tr>
<td>Weight [kg]</td>
<td>max. 135</td>
<td>max. 160</td>
<td>max. 185</td>
<td>max. 235</td>
<td>max. 315</td>
</tr>
</tbody>
</table>

Table 2: Mechanical data
2.2 Insulating performance

The insulating performance of the COMTAP® ARS insulation distances is determined by the rated withstand voltages which correspond to the graduations needed in practice. The inner COMTAP® ARS insulation distances are loaded in particular during the impulse voltage test and induced voltage test of the transformer.

Insulation distances

The insulation distances of the COMTAP® ARS are shown below.

![Insulation distances diagram](image)

**Figure 5: Insulation distances**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>between beginning and end of winding</td>
</tr>
<tr>
<td>b</td>
<td>between the contacts for different phases</td>
</tr>
<tr>
<td>f</td>
<td>between the contacts for phase U (top contact plane) and ground</td>
</tr>
</tbody>
</table>

**Rated insulation level**

The following table shows the rated withstand voltages of the COMTAP® ARS.
## 2 Technical data

<table>
<thead>
<tr>
<th>COMTAP®</th>
<th>ARS I 1000</th>
<th>ARS I 1822</th>
<th>ARS I 2433</th>
<th>ARS III 1000</th>
<th>ARS III 1822</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest voltage for equipment $U_m$&lt;sup&gt;1&lt;/sup&gt; [kV] at insulation distances f and b&lt;sup&gt;2&lt;/sup&gt;</td>
<td>123</td>
<td>123</td>
<td>145</td>
<td>170</td>
<td>170</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage (1.2/50) [kV] at the insulation distances f and b&lt;sup&gt;2&lt;/sup&gt;</td>
<td>550</td>
<td>550</td>
<td>650</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>Rated short-duration power frequency withstand voltage (50 Hz, 1 min) [kV] at insulation distances f and b&lt;sup&gt;2&lt;/sup&gt;</td>
<td>230</td>
<td>230</td>
<td>275</td>
<td>325</td>
<td>325</td>
</tr>
<tr>
<td>Max. operating voltage [kV] at insulation distance a</td>
<td>123</td>
<td>123</td>
<td>145</td>
<td>145</td>
<td>145</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage (1.2/50) [kV] at insulation distance a</td>
<td>550</td>
<td>550</td>
<td>650</td>
<td>650</td>
<td>650</td>
</tr>
<tr>
<td>Rated short-duration power frequency withstand voltage (50 Hz, 1 min.) [kV] at insulation distance a</td>
<td>230</td>
<td>230</td>
<td>275</td>
<td>290</td>
<td>290</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage between parallel planes of a phase (1.2/50) [kV]</td>
<td>400</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Rated withstand voltages

<sup>1</sup>In accordance with IEC 60214-1: Effective value of the conductor-conductor voltage for which equipment is dimensioned in terms of its insulation.

<sup>2</sup>b distance only for three-phase COMTAP® ARS
2.3 Contact life

The following table shows the theoretical number of tap-change operations for the COMTAP® ARS from a contact life perspective. It enables the user and the transformer manufacturer to estimate the effect of the commutation current $I$ and the impedance $Z$ on the permitted erosion for different load conditions. For example, the contact life is reached after 100,000 tap-change operations with a commutation loop impedance of $Z = (9 + j4) \text{ m} \Omega$ and a commutation current $I = 1,000 \text{ A}$.

<table>
<thead>
<tr>
<th>Commutation current $I$ per current path</th>
<th>Impedance $Z$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$(5 + j4) \text{ m} \Omega$</td>
</tr>
<tr>
<td>700 A</td>
<td>330,000$^1$</td>
</tr>
<tr>
<td>1,000 A (rated current)</td>
<td>130,000$^1$</td>
</tr>
<tr>
<td>1,300 A (overload)</td>
<td>65,000</td>
</tr>
</tbody>
</table>

Table 4: Theoretical number of COMTAP® ARS tap-change operations from an erosion perspective

$^1$ For mechanical reasons the permitted number of COMTAP® ARS operations is limited to 100,000 tap-change operations.

In practice the transformer load is variable, which means the commutation current is also variable. The resulting effect on contact life can also be determined from the table above. For example, with an impedance of $Z = (9 + j4) \text{ m} \Omega$ it is possible to reach 70,000 tap-change operations at a commutation current of $I = 700 \text{ A}$ (70,000 / 280,000 tap-change operations = 1/4 of contact life used) and 30,000 tap-change operations at a commutation current of $I = 1,300 \text{ A}$ (30,000 / 40,000 tap-change operations = 3/4 of contact life used).

This option is shown in the following diagram, among others.

![Figure 6: Contact life examples (Z = (9 + j4) mohms)](image-url)
2.4 Permissible ambient conditions

When using a vegetable oil as insulating fluid, the permissible temperature range for operation of the DEETAP® DU/COMTAP® ARS is limited. Please observe the relevant information in the specific order documents and on the indicator plate on the drive.

<table>
<thead>
<tr>
<th>Permissible ambient conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
</tr>
<tr>
<td>See technical data TD 61 – general section</td>
</tr>
<tr>
<td>Drying temperature</td>
</tr>
<tr>
<td>Storage temperature</td>
</tr>
<tr>
<td>Drying temperatures</td>
</tr>
<tr>
<td>See installation and commissioning instructions</td>
</tr>
<tr>
<td>Compressive strength</td>
</tr>
<tr>
<td>The COMTAP® ARS head is vacuum-proof and pressure-proof up to 0.5 bar of continuous differential pressure.</td>
</tr>
<tr>
<td>Installation height above sea level</td>
</tr>
<tr>
<td>See technical data TD 61 – general section</td>
</tr>
</tbody>
</table>

Table 5: Permissible ambient conditions
3 Drive

The COMTAP® ARS may only be used in conjunction with a motor-drive unit. Safety equipment for automatic tripping of the transformer circuit breaker and for monitoring coincidence of the operating positions of the COMTAP® ARS and the motor-drive unit must be installed.
4 Protective devices

Tap-change supervisory control

The COMTAP® ARS is equipped with a tap-change supervisory control, which is fitted in a housing on the head of the COMTAP® ARS (see page [► 31]).

Depending on the application, the tap-change supervisory control may have different safety functions in conjunction with the motor-drive unit and the associated on-load tap-changer units.

These safety functions are specified individually in a binding manner for each delivery depending on application and documented in an associated functional description.

Electrical tripping contact/interlocking contact

When combining the COMTAP® ARS with on-load tap-changers, the COMTAP® ARS may only be actuated in a certain on-load tap-changer position. This means that it may only be actuated when all windings of the on-load tap-changer tap winding are disconnected and the voltage at the relevant winding is therefore zero.

For this reason, non-permitted switching operations are prevented by a mutual electrical interlock of the on-load tap-changer and COMTAP® ARS.

Please refer to the order-specific technical documentation, safety instructions, and functional description.
5 Mounting

You can install the COMTAP® ARS in a standard or bell-type tank transformer. Always install the COMTAP® ARS in the transformer in accordance with operating instructions.

Note the following points:

- Only use the COMTAP® ARS with the transformer specified in the order.
- Only trained and qualified personnel may install the COMTAP® ARS, connect it to the electrical system, and put it into operation.
- The maximum permissible deviation for vertical installation is 1°
- The wiring diagram is prepared based on the order and is enclosed with the delivery
- For certain COMTAP® ARS designs, due to the large installation length, you must provide for and install an insulating attachment between the lower cage ring and the transformer. The attachment must center the COMTAP® ARS and ensure the device does not twist. Thermal deformation in length of L = +6/-6 mm must be taken into account.
- If differences of more than 5 m exist between the COMTAP® ARS head and the oil level in the oil conservator, due to the static overpressure, please contact Maschinenfabrik Reinhausen GmbH.
6.1 COMTAP® ARS I 1000 – 123-170 kV, dimensional drawing (734007)

MAX. RATED THROUGH-CURRENT 1000 A

<table>
<thead>
<tr>
<th>Um in kV</th>
<th>e</th>
<th>p</th>
<th>l</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>434</td>
<td>-</td>
<td>949</td>
</tr>
<tr>
<td>145</td>
<td>464</td>
<td>-</td>
<td>1009</td>
</tr>
<tr>
<td>170</td>
<td>569</td>
<td>-</td>
<td>1104</td>
</tr>
</tbody>
</table>

WEIGHT MAX. APPROX. 160 KG

THE CONNECTION DIAGRAM APPLICABLE TO THE ORDER IS BINDING FOR THE DESIGNATION OF THE TERMINALS AND PHASES. FOR CORRESPONDING DRAWINGS REFER TO 734087.

DESIGN FOR BELL-TYPE TANK MOUNTING 739023 – AVAILABLE ON REQUEST (Etc.-Head and Cage have to be separated for assembly.

CAUTION

WITH COMBINATIONS BETWEEN COMTAP® ARS AND ON LOAD TAP-CHANGER, THE COMTAP® ARS MAY ONLY BE ACTUATED IN A CERTAIN POSITION OF THE ON-LOAD TAP-CHANGER. THIS MEANS THAT IT MAY ONLY BE ACTUATED WHEN ALL WINDINGSオF THE ON-LOAD TAP-CHANGER REGULATING WINDING ARE DISCONNECTED.

COMTAP® ARS
6.2 COMTAP® ARS I 1822 – 123-170 kV, dimensional drawing (734008)

**Diagram Description:**
- **COMTAP® ARS HEAD**
- **2 SERVICE POSITIONS**
- **MAX. RATED THROUGH-CURRENT:** 1800 A
- **WITH CURRENT SPLITTING:** 1022
- **SERVICE POSITIONS MAX. 2**

<table>
<thead>
<tr>
<th>Um in kV</th>
<th>e</th>
<th>p</th>
<th>l</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>934</td>
<td>-</td>
<td>1144</td>
</tr>
<tr>
<td>145</td>
<td>934</td>
<td>-</td>
<td>1204</td>
</tr>
<tr>
<td>170</td>
<td>569</td>
<td>-</td>
<td>1299</td>
</tr>
</tbody>
</table>

**Dimensions in mm**

- **M** - DRIVE SIDE
- **W** - DRIVE SHAFT
- **E** - BLEEDING FACILITY
- **S** - MONITORING CONTACT
- **PI** - POSITION INDICATOR

**Weight:** Max. approx. 200 kg

The connection diagram applicable to the order is binding for the designation of the terminals and phases. For corresponding drawings, refer to 734087.

Design for bell-type tank mounting 734023 – Available on request.

**COMTAP® ARS HEAD (TOP VIEW)**

**COMTAP® ARS HEAD**

**Bottom is composed of insulating parts**

**CAUTION:**
With combinations between COMTAP® ARS and on-load tap-changer, the COMTAP® ARS may only be actuated in a certain position of the on-load tap-changer. This means that it may only be actuated when all windings of the on-load tap-changer regulating winding are disconnected.

---

**Translation:**

- **COMTAP® ARS**
- **1889046/04 EN**
- **Maschinenfabrik Reinhausen GmbH 2016**
6.3 COMTAP® ARS, ARS I 2433 – 123-170 kV, dimensional drawing (734009)

![Diagram of COMTAP® ARS](image)

**MAX. RATED THROUGH-CURRENT:** 2400 A
**WITH CURRENT SPLITTING:** 2433

<table>
<thead>
<tr>
<th>Um in kV</th>
<th>t</th>
<th>p</th>
<th>l</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>434</td>
<td>-</td>
<td>1399</td>
</tr>
<tr>
<td>145</td>
<td>494</td>
<td>-</td>
<td>1999</td>
</tr>
<tr>
<td>170</td>
<td>509</td>
<td>-</td>
<td>1434</td>
</tr>
</tbody>
</table>

**SERVICE POSITIONS MAX. 2**

- M: DRIVE SIDE
- W: DRIVE SHAFT
- E: BLEEDING FACILITY
- S: MONITORING CONTACT
- AP: ADJUSTMENT POSITION TERMINAL
- PI: POSITION INDICATOR
- 1: TERMINAL
- 2: THIS SCREENING RING IS THE LOWEST PART CONNECTED TO VOLTAGE.

**CAUTION**

WITH COMBINATIONS BETWEEN COMTAP® ARS AND ON-LOAD TAP-CHANGER, THE COMTAP® ARS MAY ONLY BE ACTUATED IN A CERTAIN POSITION OF THE ON-LOAD TAP-CHANGER. THIS MEANS THAT IT MAY ONLY BE ACTUATED WHEN ALL WINDINGS OF THE ON-LOAD TAP-CHANGER REGULATING WINDING ARE DISCONNECTED.

**WARNING**

THE CONNECTION DIAGRAM APPLICABLE TO THE ORDER IS BINDING FOR THE DESIGNATION OF THE TERMINALS AND PHASES.

FOR CORRESPONDING DRAWINGS REFER TO 734007:

DESIGN FOR BELL-TYPE TANK MOUNTING 733023 – AVAILABLE ON REQUEST

DIE-T HEAD AND CONDUIT HAVE TO BE SEPARATED FOR ASSEMBLY.

**WEIGHT MAX. APPROX. 240 KG**
6.4 COMTAP® ARS, ARS III 1000 – 123-170 kV, dimensional drawing (734010)

If L ≥ 1300mm the COMTAP®ARs has to be fixed on the bottom cage ring. Refer to drawing 732773.

Service Positions Max. 2

<table>
<thead>
<tr>
<th>Um in kV</th>
<th>e</th>
<th>p</th>
<th>l</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>434</td>
<td>355</td>
<td>1659</td>
</tr>
<tr>
<td>165</td>
<td>444</td>
<td>415</td>
<td>1839</td>
</tr>
<tr>
<td>170</td>
<td>589</td>
<td>510</td>
<td>2124</td>
</tr>
</tbody>
</table>

Dimensions in mm

- **M**: Drive side
- **W**: Drive shaft
- **E**: Bleeding facility
- **S**: Monitoring contact
- **AP**: Adjustment position terminal
- **P**: Position indicator

**MAX RATED THROUGH-CURRENT**: 1000 A

Weight max. approx. 290 kg

The connection diagram applicable to the order is binding for the designation of the terminals and phases. For corresponding drawings refer to 734027.

Design for bell-type tank mounting 733023 – available on request.

Detr.-Head and cage have to be separated for assembly.

**CAUTION**

With combinations between COMTAP® ARS and on-load tap-changer, the COMTAP® ARS may only be actuated in a certain position of the on-load tap-changer. This means that it may only be actuated when all windings of the on-load tap-changer regulating windings are disconnected.
6.5 COMTAP® ARS, ARS III 1822 – 123-170 kV, dimensional drawing (734011)

**PLANEs α-f**

**2 SERVICE POSITIONS**

---

**MAX. RATED THROUGH-CURRENT** 1600 A
**WITH CURRENT SPLITTING** 1822

<table>
<thead>
<tr>
<th>Un in kV</th>
<th>e</th>
<th>p</th>
<th>l</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>436</td>
<td>355</td>
<td>2244</td>
</tr>
<tr>
<td>145</td>
<td>454</td>
<td>415</td>
<td>2424</td>
</tr>
<tr>
<td>170</td>
<td>589</td>
<td>510</td>
<td>2709</td>
</tr>
</tbody>
</table>

**DIMENSIONS IN MM**

---

**M** – DRIVE SIDE
**W** – DRIVE SHAFT
**E** – BLEEDING FACILITY
**S** – MONITORING CONTACT
**AP** – ADJUSTMENT POSITION TERMINAL
**PI** – POSITION INDICATOR

**WEIGHT MAX. APPROX. 420 KG**

**THE CONNECTION DIAGRAM APPLICABLE TO THE ORDER IS BINDING FOR THE DESIGNATION OF THE TERMINALS AND PHASES.**

---

**CAUTION**

WITH COMBINATIONS BETWEEN COMTAP® ARS AND ON LOAD TAP-CHANGER, THE COMTAP® ARS MAY ONLY BE ACTUATED IN A CERTAIN POSITION OF THE ON-LOAD TAP-CHANGER. THIS MEANS THAT IT MAY ONLY BE ACTUATED WHEN ALL WINDINGS OF THE ON-LOAD TAP-CHANGER REGULATING WINDING ARE DISCONNECTED.

---

**FOR CORRESPONDING DRAWINGS REFER TO 734087**
**DESIGN FOR BELL-TYPE TANK MOUNTING 733023 – AVAILABLE ON REQUEST**

**COMTAP® HEAD AND CAGE HAVE TO BE SEPARATED FOR ASSEMBLY**

---

**BOTTOM IS COMPOSED OF INSULATING PARTS**

---

**THE COMTAP® HEAD HAS TO BE FIXED ON THE BOTTOM CASE RING! REFER TO DRAWING 732273**

---

Maschinenfabrik Reinhausen GmbH 2016 1889046/04 EN COMTAP® ARS 21
6.6 COMTAP® ARS, adjustment plan for ARS (734102)

The connection diagram applicable to the order is binding for the designation of the positions.
6.7 COMTAP® ARS, mounting of the COMTAP® ARS on the lower cage ring (user-specific, 732773_1)

**CAUTION:**
THE TRANSFORMER MANUFACTURER MUST FIX THE COMTAP® ARS BY MEANS OF AN INSULATING SUPPORT AND PROVIDE THE COMTAP® ARS WITH CENTERING AND TORSIONAL PROTECTION, WHEREBY A THERMAL LENGTH L = +/- 6 MM MUST BE OBSERVED. ONLY NECESSARY FOR ESPECIALLY LONG COMTAP® ARS ACCORDING TO THE INSTRUCTIONS ON THE DIMENSION DRAWING.

- **COMTAP® ARS Manufactured According to Dimension Drawing of Individual Order**
- **Bottom Cage Ring**
  - View Z
  - Support Fastened to Active Part of the Transformer Insulation to Match Applicable Operating and Test Voltages.

- **COMTAP® ARS Head Topview**
  - Drive Side

- **Bottom is Composed of Insulating Parts**

- **Schematic in Dimension Drawing**
  - PLEASE NOTE PROTRUSING BOLTS!
6.8 COMTAP® ARS, mounting of the COMTAP® ARS on the lower cage ring (user-specific, 732773_2)
6.9 COMTAP® ARS, head with upper gear unit (725737)
6.10 COMTAP® ARS, installation drawing bell-type tank design (733023)
6.11 COMTAP® ARS, connection contact (734095)
6.12 COMTAP® ARS, connecting leads (10015335)

The cable connection must be made to the screw with blue coated thread.
6.13 COMTAP® ARS, horizontal drive shaft (732769_1)

**Diagram Description:**

- **H1 - H4**: Minimal distances for dimensioning the drive shaft arrangement.
- **COMTAP® ARS**: Dimensions of the COMTAP® ARS, which are necessary for dimensioning the transformer tank, have to be taken from the dimension drawing or additional drawings (734087).
- **Insulating distance between contacts**: Has to be taken into account.
- **Drive Side M**: Notes for the drive side.

**Contact Circle Dimensions:**

<table>
<thead>
<tr>
<th>ø (mm)</th>
<th>H1</th>
<th>H1R</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>710</td>
<td>660</td>
<td>500</td>
<td>1000</td>
<td>1000</td>
</tr>
</tbody>
</table>

**Intermediate bearing for H1 - H4**: 2254 mm.
6.14 COMTAP® ARS, horizontal drive shaft (732769_2)

SWIVELLING RANGE TO THE RIGHT

SWIVELLING RANGE TO THE LEFT

INDICATING DISC NOT COVERED BY SHAFT!
6.15 COMTAP® ARS, tap-change supervisory control (726977)
6.16 Lifting traverse (72673703)
MR worldwide

Australia
Reinhausen Australia Pty. Ltd.
17/20-22 St Albans Road
Kingsgrove NSW 2208
Phone: +61 2 9502 2202
Fax: +61 2 9502 2224
E-Mail: sales@au.reinhausen.com

Brazil
MR do Brasil Indústria Mecânica Ltda.
Av. Elias Yazzek, 465
CEP: 06803-000
Embu - São Paulo
Phone: +55 11 4785 2150
Fax: +55 11 4785 2185
E-Mail: vendas@reinhausen.com.br

Canada
Reinhausen Canada Inc.
3755, rue Java, Suite 180
Brossard, Québec J4Y 0E4
Phone: +1 514 370 3577
Fax: +1 514 659 3092
E-Mail: m.foata@ca.reinhausen.com

India
Easun-MR Tap Changers Ltd. (Joint Venture)
612, CTH Road
Thiruninravur, Chennai 600 024
Phone: +91 44 26300883
Fax: +91 44 26390881
E-Mail: service@easunmr.com

Indonesia
PT. Reinhausen Indonesia
German Center, Suite 6310,
BSD City, Tangerang
Phone: +62 21 5315-3183
Fax: +62 21 5315-3184
E-Mail: c.haering@id.reinhausen.com

Iran
Iran Transfo After Sales Services Co. (Joint Venture)
Zanjan, Industrial Township No. 1 (Aliabad)
Corner of Morad Str.
Postal Code 4533144551
E-Mail: info@iran-transfo.com

Italy
Reinhausen Italia S.r.l.
Via Alserio, 16
20159 Milano
Phone: +39 02 6943471
Fax: +39 02 69434766
E-Mail: sales@it.reinhausen.com

Japan
MR Japan Corporation
German Industry Park
1-18-2 Hakusan, Midori-ku
Yokohama 226-0006
Phone: +81 45 929 5728
Fax: +81 45 929 5741
E-Mail: sales@jp.reinhausen.com

Luxembourg
Reinhausen Luxembourg S.A.
72, Rue de Près
L-7333 Steinsel
Phone: +352 27 3347 1
Fax: +352 27 3347 99
E-Mail: sales@lu.reinhausen.com

Malaysia
Level 11 Chulan Tower
No. 3 Jalan Conlay
50450 Kuala Lumpur
Phone: +60 3 2142 6481
Fax: +60 3 2142 6422
E-Mail: mr_rap@my.reinhausen.com

P.R.C. (China)
MR China Ltd. (MRT)
开德贸易（上海）有限公司
中国上海浦东新区浦东南路360号
新上海国际大厦4楼E座
邮编: 200120
电话: +86 21 61634588
传真: +86 21 61634582
E-Mail: mr-sales@cn.reinhausen.com
mr-service@cn.reinhausen.com

Russian Federation
OOO MR
Naberezhnaya Akademika Tupoleva
15, Bid. 2 ("Tupolev Plaza")
105005 Moscow
Phone: +7 495 980 89 67
Fax: +7 495 980 89 67
E-Mail: mr@reinhausen.ru

South Africa
Reinhausen South Africa (Pty) Ltd.
No. 15, Third Street, Booyens Reserve
Johannesburg
Phone: +27 11 8352077
Fax: +27 11 8353806
E-Mail: support@za.reinhausen.com

South Korea
Reinhausen Korea Ltd.
21st floor, Standard Chartered Bank Bldg.,
47, Chongro, Chongro-gu,
Seoul 110-702
Phone: +82 2 767 4909
Fax: +82 2 736 0049
E-Mail: you-mi.jang@kr.reinhausen.com

U.S.A.
Reinhausen Manufacturing Inc.
2549 North 9th Avenue
Humboldt, TN 38343
Phone: +1 731 784 7681
Fax: +1 731 784 7682
E-Mail: sales@reinhausen.com

United Arab Emirates
Reinhausen Middle East FZE
Dubai Airport Freezone, Building Phase 6
3rd floor, Office No. 6EB, 341 Dubai
Phone: +971 4 2368 451
Fax: +971 4 2368 225
Email: service@ae.reinhausen.com

Maschinenfabrik Reinhausen GmbH
Falkensteinstrasse 8
93059 Regensburg
1889046/04 EN • 11/16 • F0182603

www.reinhausen.com
+49 (0)941 4090-7001
sales@reinhausen.com

+49 (0)941 4090-0
Maschinenfabrik Reinhausen GmbH
Falkensteinstrasse 8
93059 Regensburg