

Compacting module

CM-D190A

CM-D300A

CM-D500A

CM-D700A

OPERATING INSTRUCTIONS



Appendix:

- Safety regulations
- General information on resistance welding
- Contact addresses

Version	Date	Reason for the revision
1.0	2023-01	New
1.1	2023-05	More compacting module versions added

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The illustrations (photos and drawings) contained in these instructions are examples, i.e. they may differ from the actual condition of the respective system.

1 Safety instructions



Please refer to the appendix of the operating instructions for information on safety regulations, copyrights and property rights, symbols, conditions for the place of use, usual information on resistance welding as well as contact addresses.

Read these carefully before familiarising yourself with the unit-specific operating instructions.

These operating instructions are intended to make it easier for you to get to know the unit and to use it as intended.

It contains important information on how to operate the units safely, properly and economically.

Observing them helps to avoid hazards, reduce repair costs and downtimes and increase the reliability and service life of the equipment.



Warning

The principle is: **safety first!**



Danger

Incorrect or improper configuration, installation, adjustment, handling or operation can result in mechanical, electrical and thermal hazards that can cause serious damage and injury.

Therefore, make sure that the above points are carried out correctly and follow the corresponding instructions in the operating manuals.



Do not put the unit into operation until you have read the **operating instructions!**



Danger

Persons with **pacemakers** and **implants made of metal** are not allowed to stay near welding equipment within a radius of **at least 5 m!**



Warning

Danger of crushing

Within the infeed movement of welding heads, there is a risk of crushing at the closing electrodes, the stops for limiting the infeed or stroke movement, as well as at the stop of the basic gun unit.



Warning

Risk of injury due to heavy weight (> 200 kg)!

Only lift or move with mechanical support and at least 2 persons.



Danger of tipping over!

After unpacking/installing, immediately fix to the surface with screws.

Warning



This **Class A welding equipment** is not intended for use in residential areas where power is supplied by a public low-voltage power supply system. It may be difficult, due to both conducted and radiated interference, to ensure electromagnetic compatibility in these areas.

Warning

2 Technical description

The compacting device CM-D is used for compacting copper strands. During the compacting process, the copper strand is automatically pressed into a rectangular or square shape.

It is preferably operated in conjunction with AMADA WELD TECH control units.

2.1 Variants

The series differ in design (single or double sided) as well as in different jaws of the compacting device suitable for length, shape and cross-section.

2.2 Technical data

	CM-D190A (single cylinder)	CM-D300A	CM-D500A	CM-D700A
Operating pressure	max. 6 bar	max. 6 bar	max. 6 bar	max. 6 bar
Electrode stroke	50mm	50mm	50mm	50mm
Ceramic stroke	3mm	3mm	3mm	3mm
Electrode force at 6 bar	19kN	30kN	50kN	70kN
Ambient temperature	0 - 40 °C	0 - 40 °C	0 - 40 °C	0 - 40 °C
Cooling	water-cooled	water-cooled	water-cooled	water-cooled

3 Adjustment

3.1 General

Adjustment is best done at the factory using samples provided by the customer.



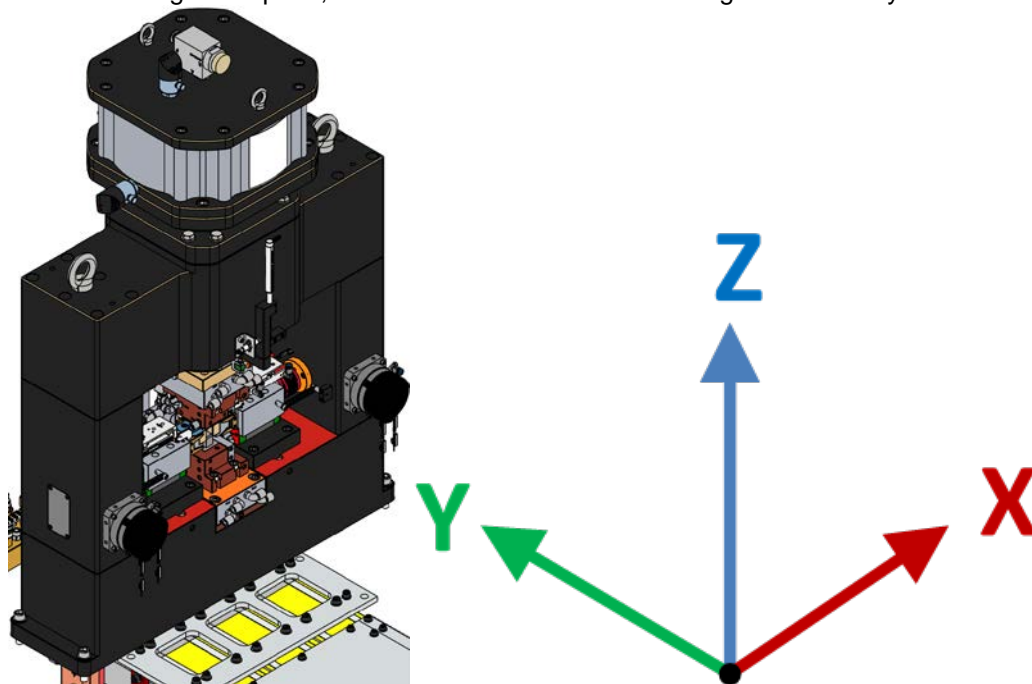
Attention

If the compacting device is installed by the customer, make sure that the ceramic jaws are absolutely parallel to each other and to the electrode (electrode wear and collisions)!

If not already done, connect cooling water and compressed air.

3.1.1 Coordinate system

In the following description, reference is made to the following coordinate system:



3.1.2 Iterative process

Adjusting the components of the CM-D is an iterative process, i.e. going back to previous steps may be necessary several times until the desired end result is achieved.

Furthermore, the adjustment steps may not be completely decoupled from each other.



When going back or back and forth between the individual steps, make sure that the prerequisites (e.g. which screws are loosened) are observed in each case.

3.2 Test drive

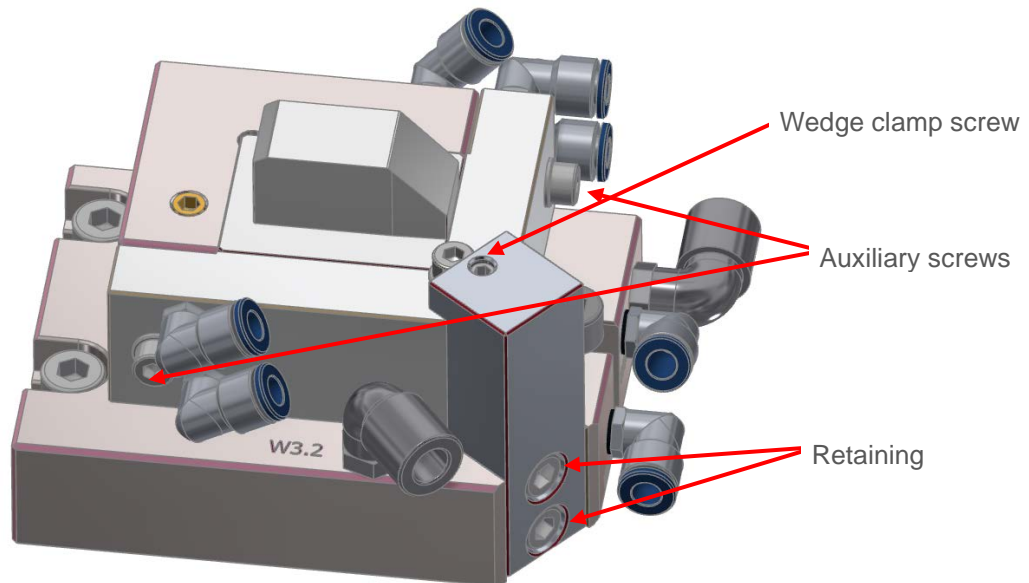


Attention

The test run must be carried out after each of the compacting device (electrode change, quick coupler change).

First, a test drive is carried out.

For this, the electrodes are pre-assembled in the quick coupler (active, passive) by clamping the electrodes over the wedge and the auxiliary screws (see illustration).



Now the quick couplers can be installed in the compacting module.



Caution

Before moving the active electrode, be sure to check whether there could be **collisions** when moving down (e.g. with ceramics, hoses, water connections, insertion aid, etc.).

For the test drive, only the **secondary cylinder** is used for the stroke.

The ceramics are **OPEN**.

With low pressure (0.5 bar difference to holding pressure) the active electrode is slowly set in motion.

The active electrode is driven at low speed and low pressure until it touches down on the passive electrode.

After fitting, the pressure can be increased (up to max. 5 bar).



In this position, check the alignment of the electrodes to each other:

Are the end faces of the electrodes approximately in one plane (XZ plane)?

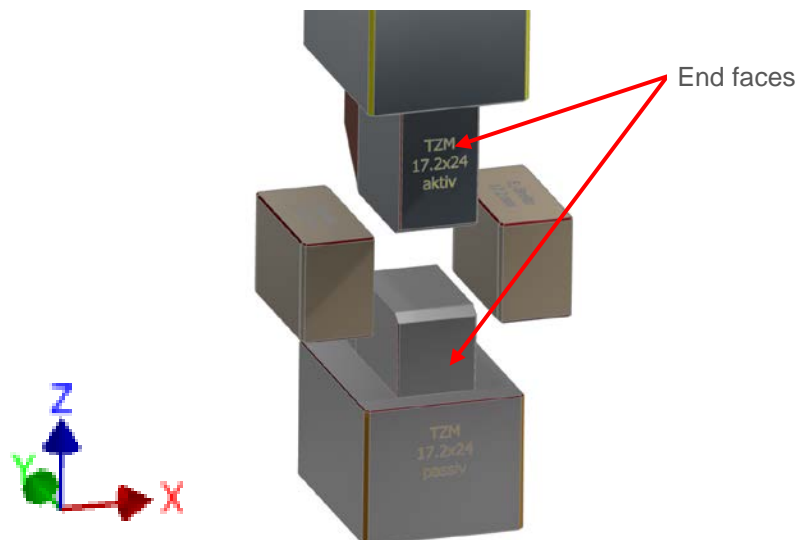
→ See chap. 3.5

Do the electrodes have a lateral offset (X-direction)?

→ See chap. 3.7

Are the electrodes rotated in relation to each other around the Z-axis?

→ See Chap. 3.4.2



Then activate the return stroke of the auxiliary cylinder so that the active electrode moves back to its starting position.

In case of excessive misalignments, first roughly readjust before starting the actual fine adjustment.

If the alignment is OK, the electrode is driven onto each other several times with medium pressure (e.g. 2 bar) to ensure that the drive train is set.

Then retighten the involved screws on the electrode clamp in the following order on the active and passive quick coupler:

1. Retaining screws (2x)
2. Wedge clamp screw (1x)
3. Auxiliary screws (2x)

3.3 Adjustment of spherical cap



Caution

Before adjusting the spherical cap, a test run **must** have been carried out (see chap. 3.2).



The adjustment of the spherical cap only has to be repeated if there are deviations in the plane-parallelism of the upper and lower compacted surfaces to each other.

After the test drive, the alignment of the spherical cap can be started.

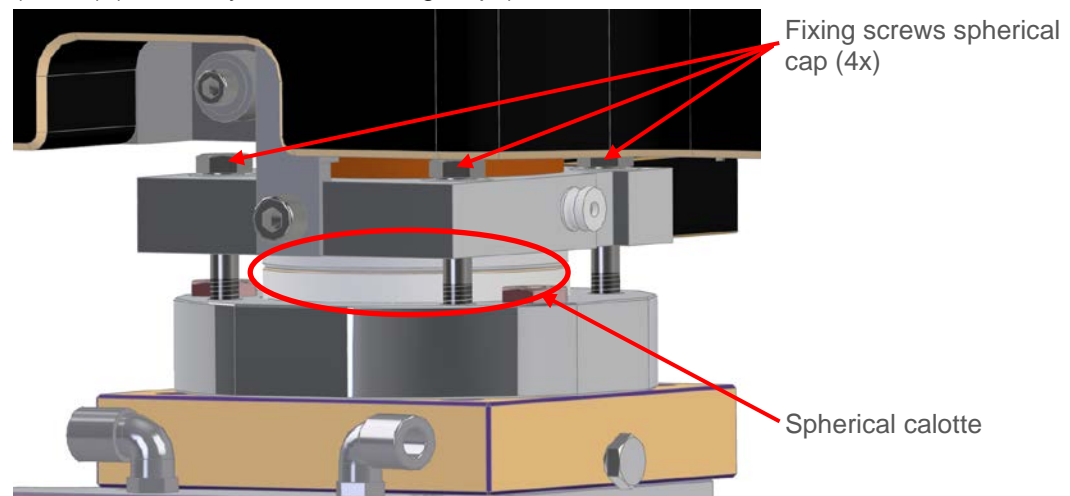
The set-up is also done only with the slave **cylinder and open ceramic jaws**.

The following steps must be carried out:

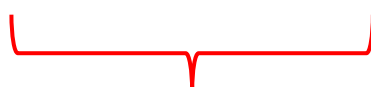
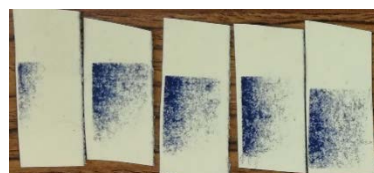
1. Retighten the fastening screws of the spherical cap, if necessary.
2. Place strip of blue paper on passive electrode
3. Feed stroke with low pressure (e.g. 0.5 bar) until touchdown to produce a visible impression
4. Examine impression
 - Where the impression is weaker, loosen the fastening screws.
 - Tighten the fastening screws where the imprint is clearly visible.

Repeat steps 1 to 4 until an even blue paper print is achieved.

Note the rotation of the active electrode to the passive electrode around the vertical axis (Z-axis) (necessary for the following steps).



Adjustment example:



Not ok



ok

3.4 Setting Rotation around Z-axis

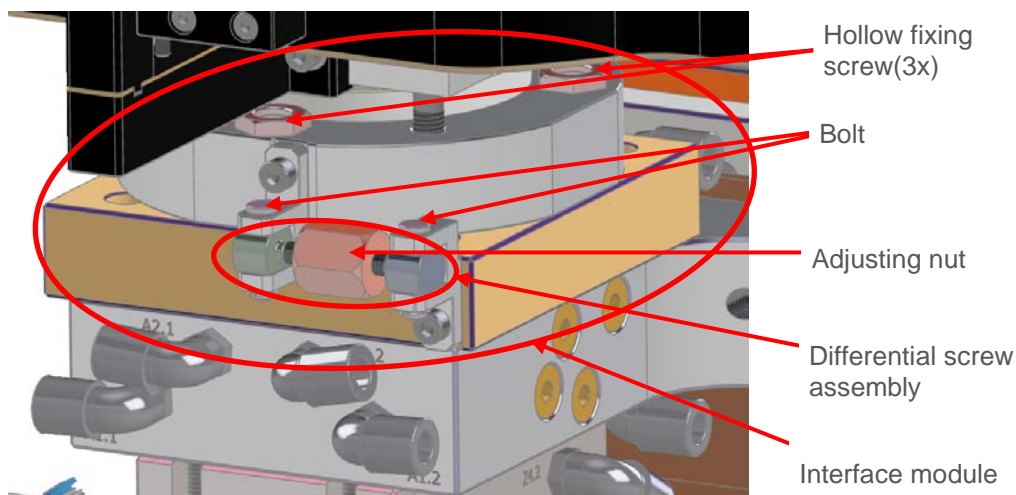


After the set-up (electrode change, quick coupler change), the rotation around the Z-axis of the active electrode must be adjusted according to the fine adjustment (see chap. 3.4.2).

After adjusting the spherical cap, -carry out the adjustment of the rotation around the -Z-axis.

The ceramic jaws are **OPEN**.

The setting for rotation around the -Z-axis is located on the interface assembly -(see illustration).



3.4.1 Initial setting

The following procedure is to be carried out only for the initial setting of the rotation around the Z-axis.

For initial adjustment, remove the two bolts (circlips) and remove the differential screw assembly.

Loosen the three hollow fastening screws only slightly. This releases the rotational degree of freedom.

Now close the ceramic jaws manually (see chap. 3.8) without applying any pretension, i.e. the ceramic jaws must be in straight contact with the passive electrode.

If there is an inconsistency in the rotation, the active electrode will be roughly pre-aligned with the ceramic jaws.

Now reinstall the differential bolt assembly, first securing only one side using the bolt and then adjusting the required length by turning the adjusting nut so that the second bolt can be fitted.

Secure both bolts again with the circlips.

3.4.2 Fine-tuning



After set-up (electrode change, quick change), fine adjustment of the rotation about the Z-axis may be necessary.

With the help of millimetre sheet/feeler gauge tape in thickness 0.01 or 0.02 mm, the gap between the active electrode and the ceramic jaws (right and left) is checked over the entire length.

On both sides, the feeler gauge band must fit between the active electrode and the ceramic jaws over the entire length of the electrode to ensure collision-free immersion.

If necessary, fine-tune the rotation around the Z-axis even further by operating the adjusting nut:

- Turning the adjusting nut upwards extends the differential screw assembly and results in a positive rotation (according to the right-hand rule) about the Z-axis.
- Turning the adjusting nut downwards shortens the differential screw assembly and results in a negative rotation (according to the right-hand rule) about the Z-axis.

If the required travel is not sufficient, disassemble the differential screw assembly and change the position of the adjusting nut on the two fine-thread screws accordingly.

The front surface of the active and passive electrode can also serve as an alignment aid with the aid of a gauge block.

Finally, retighten the three hollow fixing screws and check the gaps to the right and left of the ceramic jaws with a millimetre plate/feeler gauge tape so that there are still continuous gaps.

3.5 Adjustment of the face planarity of the electrodes

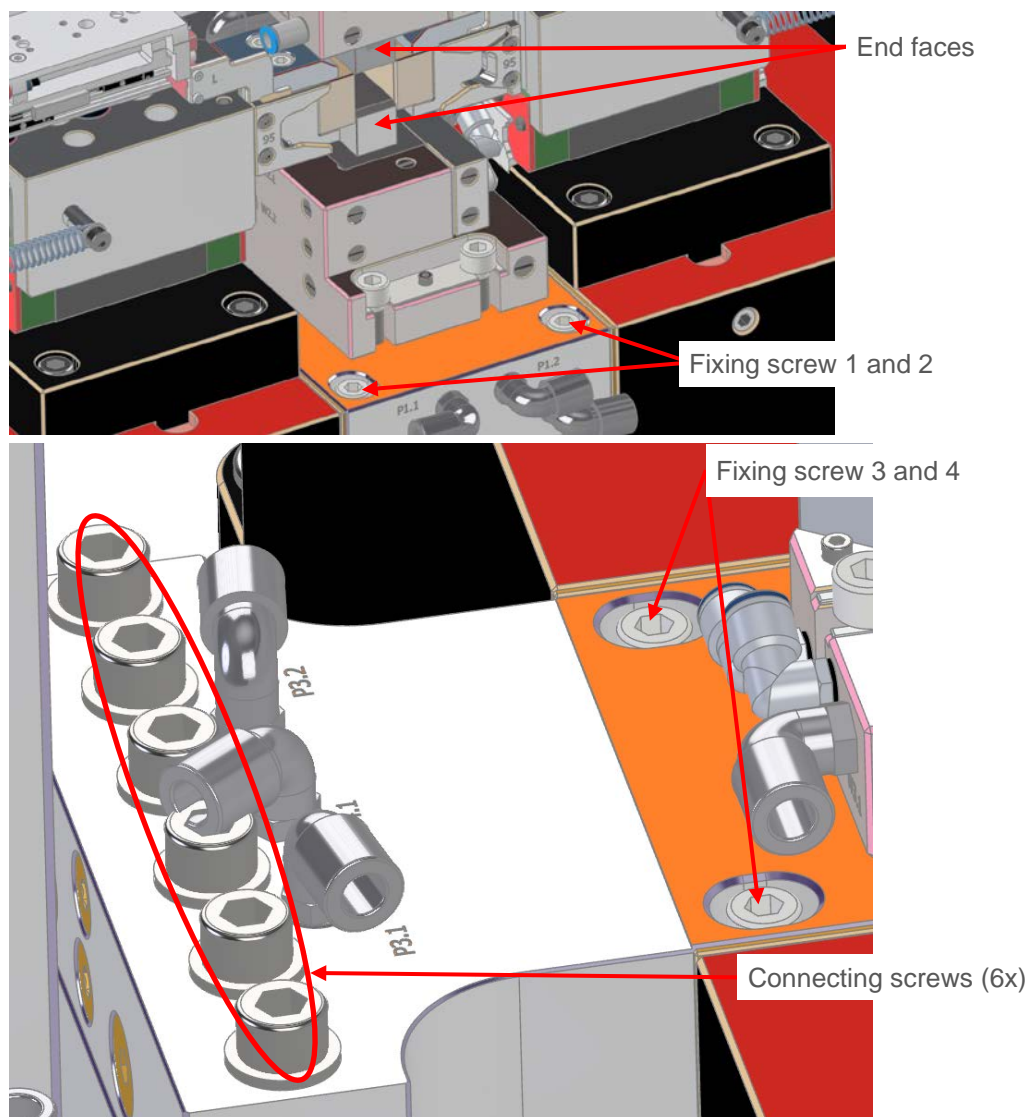


After set-up (electrode change, quick coupler change), the face planarity of the electrodes must be readjusted if necessary.

Following the adjustment of the rotation around the Z-axis, carry out the adjustment of the planarity of the front surfaces of the active and passive electrode.

The ceramic jaws are **OPEN**.

Loosen the four fastening screws of the passive busbar and the connecting screws to the vertical busbar of the transformer (see illustrations).



Use the adjusting screw to move the passive electrode in Y- direction.

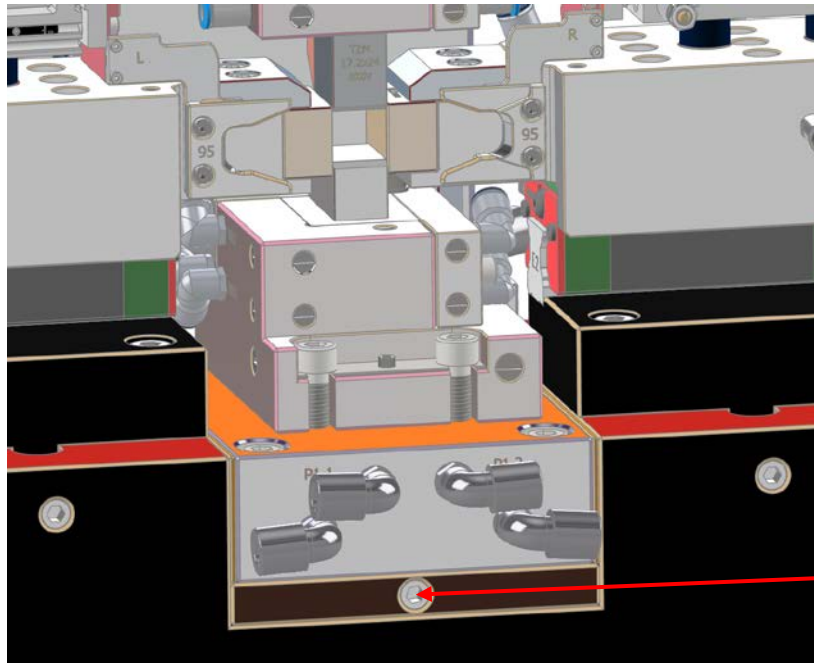
Clockwise rotation of the adjusting screw shifts the package to the "back" (positive Y-direction).

(positive Y-direction)

Counterclockwise rotation of the adjusting screw shifts the package to the operating side (negative Y-direction)



The adjusting screw has a backlash.



Adjusting

The face planarity can be checked e.g. with a gauge block.

If necessary, adjust with the set screw.

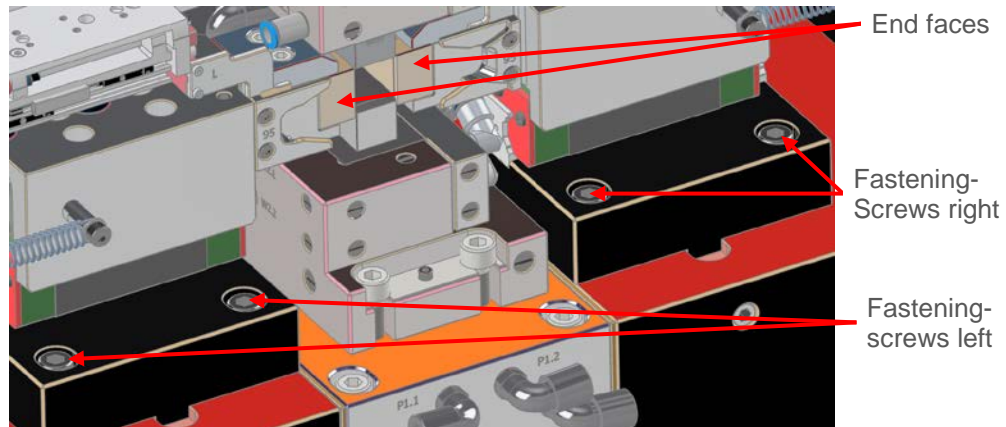
Make sure that the active electrode is not twisted around the Z-axis.

If there is no longer any misalignment between the two end faces of the electrodes, fix the passive busbar with the four fastening screws and also retighten the six connecting screws.

3.6 Adjustment of the end-face planarity of the ceramic jaws

In the next step, the end faces of the ceramic jaws are aligned with the passive electrode.

First loosen the two fastening screws of the ceramic jaw adjustment (see illustration).

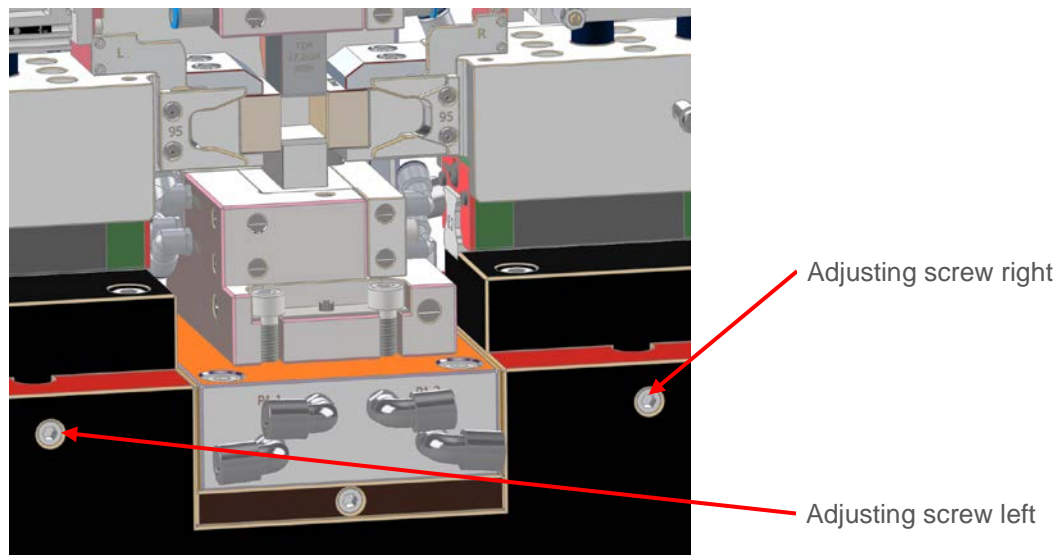


With the help of the adjusting screws on the right and left in the base, the ceramic jaw infeeds can be -moved in the Y-direction.

- Clockwise rotation of the adjusting screw moves the package to the "back" (positive Y-direction-).
- Turning the adjusting screw to the left moves the package to the operating side (negative Y-direction-).



The adjusting screw has a backlash.



3.7 Setting the centre position of the active electrode

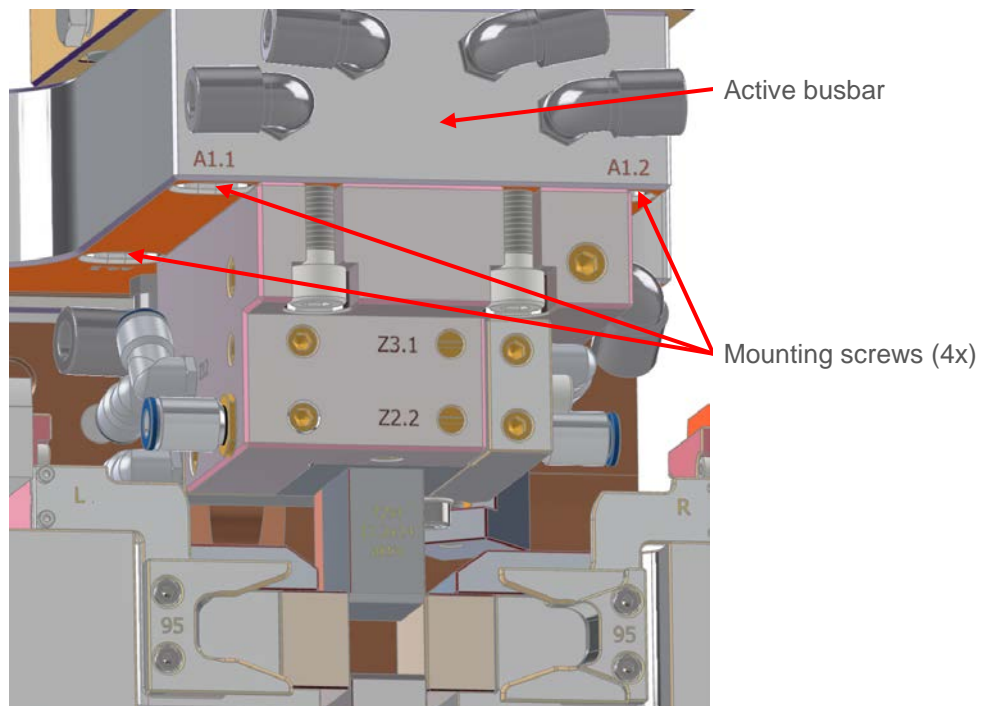


After setting up (electrode change, quick changer change, ceramic jaw change), the centre position of the active electrodes must be readjusted if necessary.

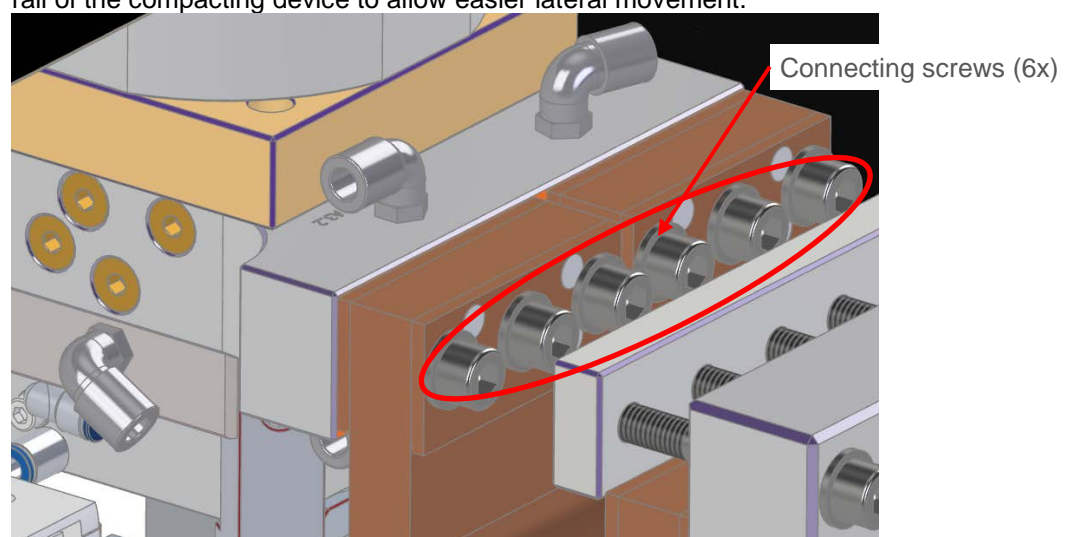
Loosen the four fastening screws of the active busbar.



One of the screws is only accessible when the quick coupler is removed.



If necessary, loosen the six connecting screws of the power straps on the active power rail of the compacting device to allow easier lateral movement.

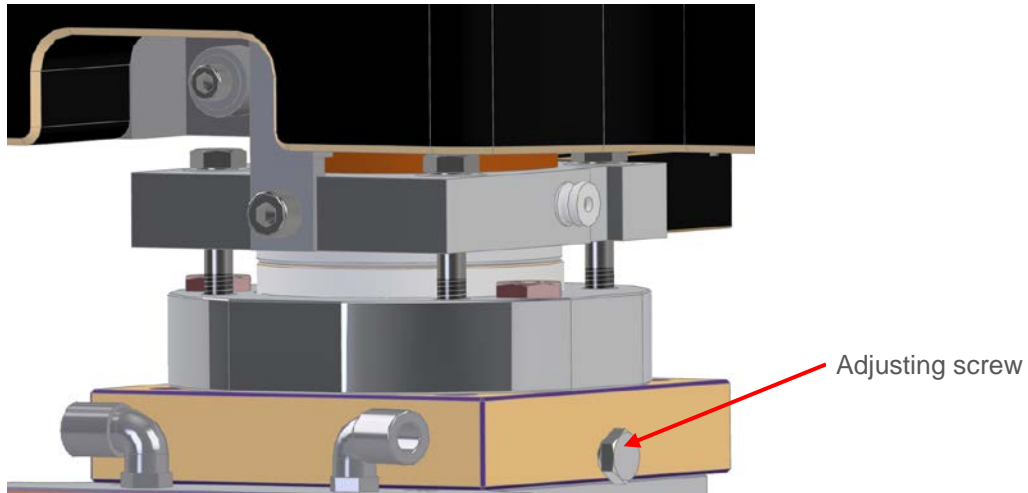


Use the adjusting screw to -move the active conductor rail incl. quick coupler in X-direction -(right/left).

- Clockwise rotation of the adjusting screw shifts the package to the "left" (negative X-direction-).
- Turning the adjusting screw to the left moves the package to the "right" (positive X-direction-).



The adjusting screw has a backlash.



Make a rough central positioning by eye with the help of the adjusting screw.

Close the ceramic jaws manually (knurled adjusting nut on the right and left) until they are just in contact with the passive electrode (see chapter 3.8). 3.8) without applying pretension.

To do this, loosen the four grub screws on each of the two knurled adjusting nuts and turn the adjusting nuts so that the ceramic jaws move towards the passive electrode.

Shine a torch from behind into the gap between the active electrode and the ceramic jaw.

There should be an equally large continuous gap on both sides so that there is no collision when the active electrode is dipped between the closed ceramic jaws.

Correct the position using the adjusting screw until a central position is achieved and the gaps to the right and left of the active electrodes are the same size.

Millimetre sheet/feeler gauge tape (max. 0.02 mm) can be used as an adjustment aid:

Slide the millimetre sheet/feeler gauge tape between the active electrode and the ceramic jaw to check the distance or the continuous gap.

Once the central position of the active electrode between the two ceramic jaws is set, fix the active current bar with the four fixing screws and retighten the six connecting screws of the current band.

Then check the column again.

3.8 Adjusting the preload of the ceramic jaws



After setting up (electrode change, quick changer change, ceramic jaw change), the pretension of the ceramic jaws must be readjusted if necessary.

The pretensioning of the ceramic jaws, which counteracts a change in the width of the compact, is carried out on the knurled adjusting nut (see illustration).



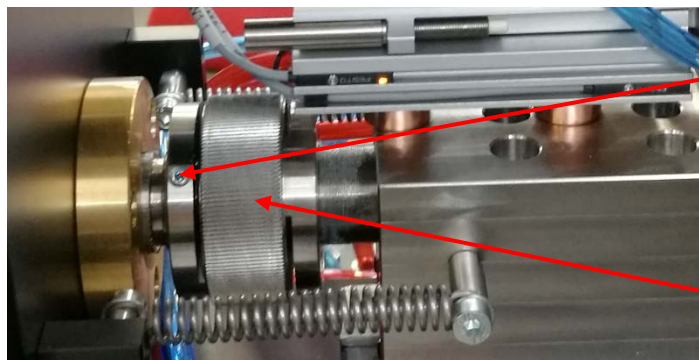
The preload of the ceramic jaws only needs to be adjusted if:

- the width tolerance of the compaction is exceeded
- there is excessive burr formation at the corners of the compaction
- there is lateral abrasion on the active electrode due to contact with the ceramic jaws

The ceramic jaws must be **OPEN**.

The active electrode is in the home position.

First loosen each of the four grub screws on the knurled adjusting nut.



Grub screw

Knurled adjusting nut

Now turn the knurled adjusting nut so that the ceramic jaws move away from the electrode.

If there is sufficient distance to the electrode, the ceramic jaws are closed pneumatically.



Caution

Risk of collision when closing the ceramic jaws with the passive electrode.

When closed, turn the knurled adjusting nut so that the ceramic jaw just comes into contact with the passive electrode - do not turn any further.

If necessary, check the even contact of the ceramic jaw with the passive electrode by means of a blue paper impression.

Repeat the previous steps on the other side for the ceramic jaw.

If both ceramic jaws now touch the passive electrode straight on, pretension can be applied.

To do this, carefully turn the two knurled adjusting nuts a little further in the direction of the passive electrode.



Caution

Excessive pretension can cause the ceramic jaws to tilt.

This means that the active electrode can no longer dip between the ceramic jaws without contact. This leads to excessive wear of the electrodes.

Finally, fix the pretension setting by tightening each of the four grub screws in the knurled adjusting nut.

3.9 Setting the stroke length of the ceramic jaws Stroke length

The stroke length is adjusted on the pneumatic swivel cylinder.

The stop closing stroke is fixed and may not be changed. Here the eccentric driven by the swivel cylinder is at the dead centre (maximum deflection). This is necessary to absorb the lateral forces during compacting.



Caution

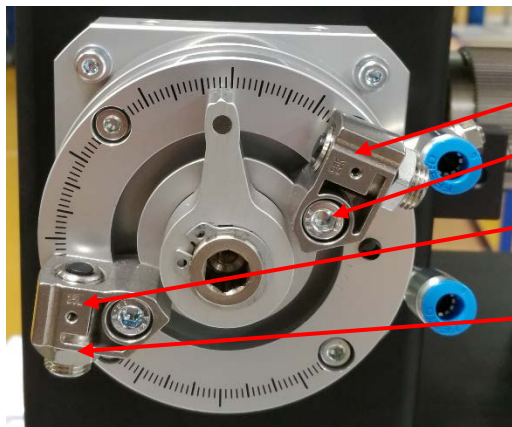
The stop closing stroke is set at the factory and **must not be changed**.

The maximum stroke per side is 3 mm.

The stroke can be reduced with the help of the return stroke stop.

With the coarse adjustment, the swivel angle of the swivel cylinder and thus the stroke length is roughly adjusted along the concentrically mounted scale.

With the tangential fine adjustment in the concentrically arranged stops, the stroke length can - if necessary - still be finely adjusted. This is only necessary if the accuracy of the coarse adjustment is not sufficient for the application.



Stop closing stroke

Coarse adjustment

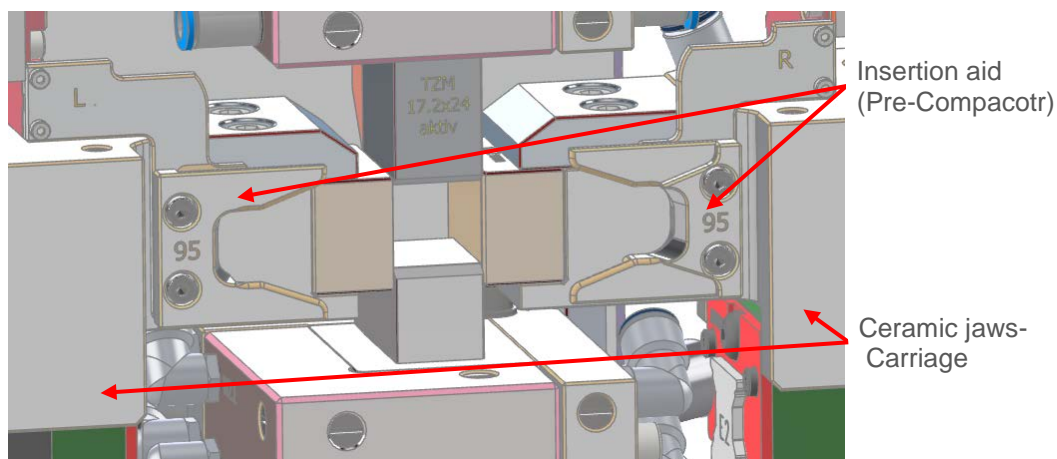
Stop return stroke

Fine adjustment
(damping element)

3.10 Insertion aid (Pre-Compactor)

The insertion aid can be used optionally with flat ribbon cables or with round cables that tend to fan out.

It ensures that the strands can be inserted into the compacting area from the operating side without, for example, individual strands snapping off.

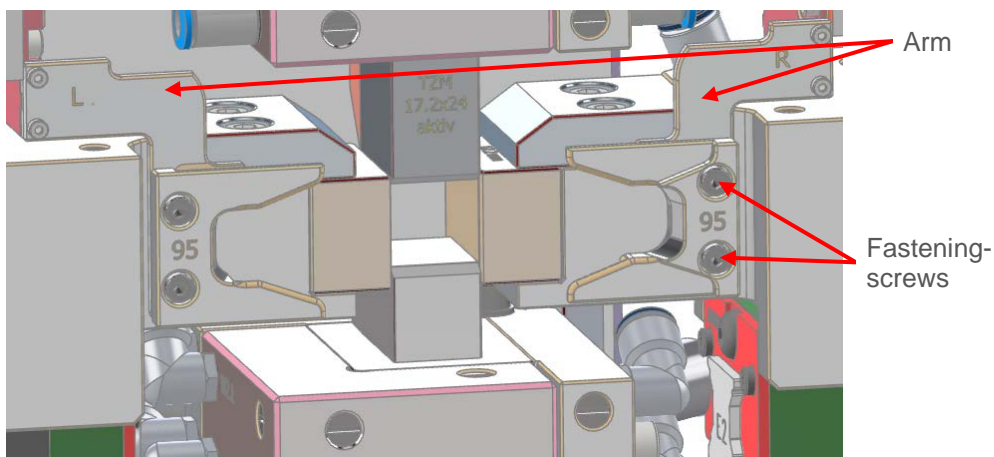


The insertion aid is operated by two lifting units (right and left) -mounted on the ceramic jaw slides.

This means that the end positions of the insertion aid do not have to be set again when changing the electrodes and installing the corresponding ceramic jaws.

3.10.1 Assembly/disassembly Insertion aid

The insertion aids are attached from the operating side on the right and left with two screws each to the arms marked "R" and "L".



3.10.2 Stroke setting

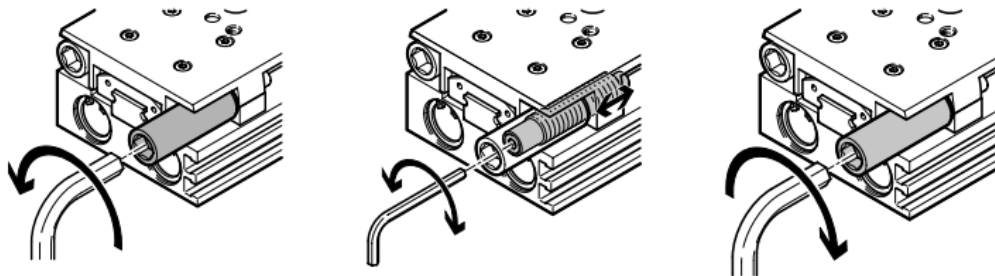
The end positions are set using the two damping elements on the lifting units.



Damping elements

The setting is carried out as follows:

1. Loosen the sleeve with a hexagonal spanner
2. Set the exact end position with a smaller hexagonal spanner
3. Fix the damping element by tightening the sleeve

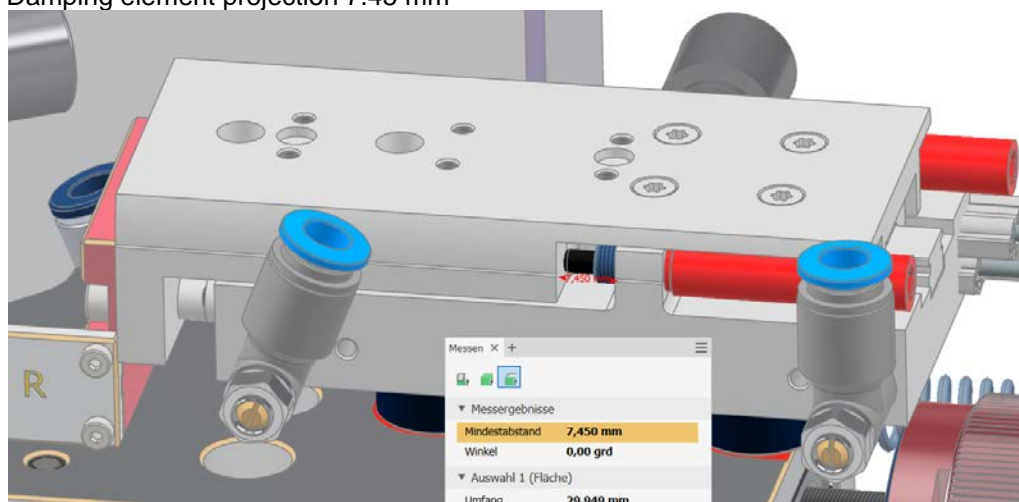


If the end positions are changed with the help of the damping elements, the switching positions of the proximity switches on the lifting units must also be corrected and checked accordingly.

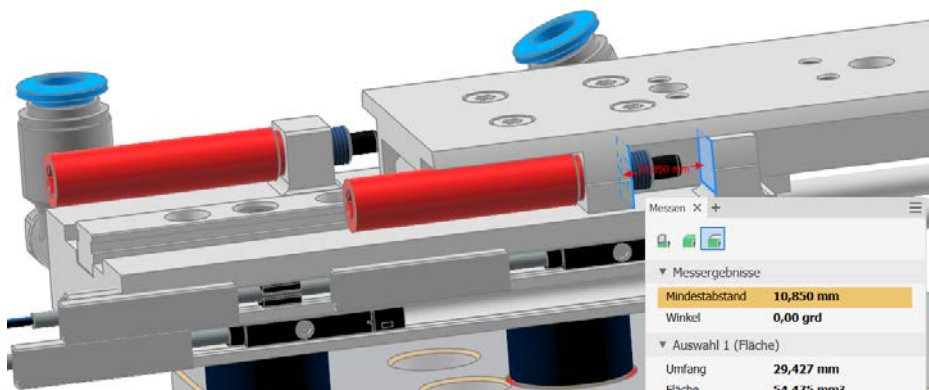
The following positions must be set for the **right-hand lifting unit**:

Damping element on **operating side**:

Damping element projection 7.45 mm

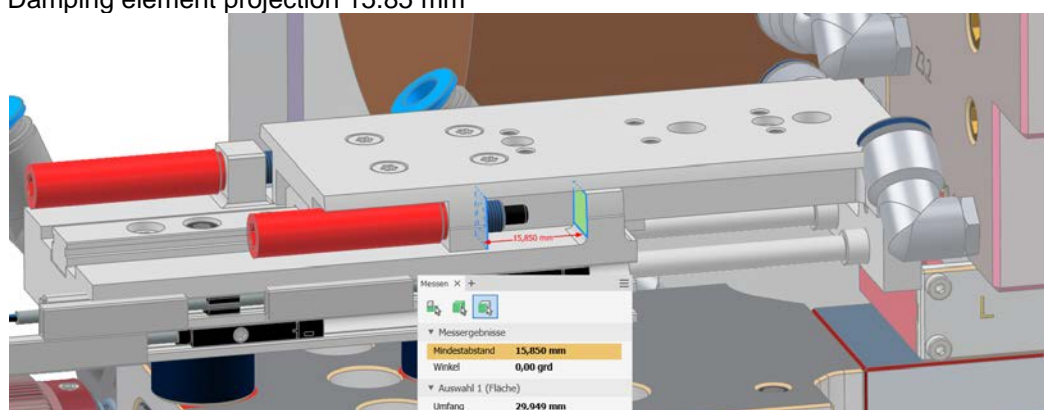


Damping element on **rear side**:
Damping element projection 10.85 mm

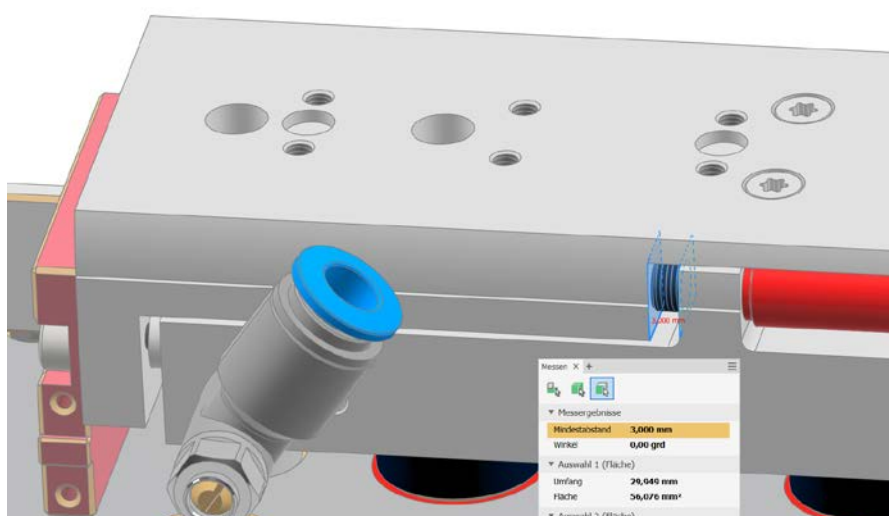


The following positions are to be set for the **left lifting unit**:

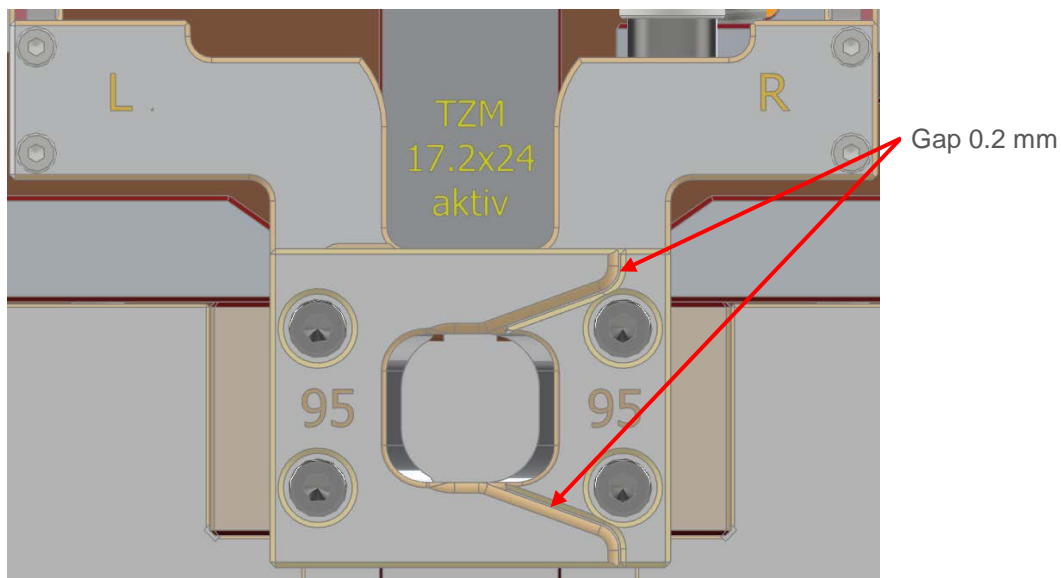
Damping element on **operating side**:
Damping element projection 15.85 mm



Damping element on **rear side**:
Damping element projection 3 mm



The two insertion aids just do not touch each other in the closed position (gap approx. 0.2 mm).



Caution

Danger of collision if the end positions are not set correctly.
Before pneumatic operation, check the end positions by manually moving the lifting units.

4 Changing electrodes



Please note:

When changing electrodes due to workpiece change, the **ceramic jaws** must also be changed in **addition** to the electrodes.



Attention

Please note:

If reworked electrodes are used, make sure that the correct washer is used for height compensation under the electrode according to the rework.



Attention

After changing the electrodes (set-up) a test run of the compacting device must be carried out (see chap. 3.2).



Attention

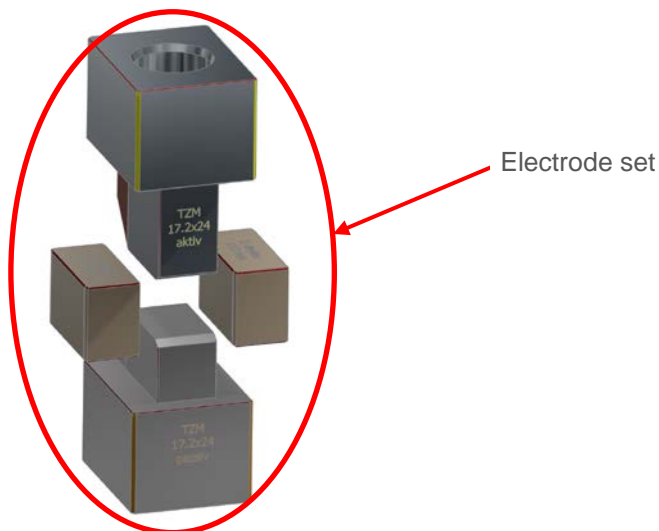
After the electrode change (set-up) the rotation around the -Z-axis (see chap. 3.4.2) and the centre position (see chap. 3.7) of the active electrode. Also check the pretension of the ceramic jaws and adjust if necessary (see chap. 3.8). 3.8).

The electrode is clamped in the electrode holder by a wedge clamping system. This ensures a firm mechanical clamping on the one hand and a defined current transfer on the other.

4.1 Electrode set

Each pair of electrodes (active, passive) is assigned a pair of ceramic jaws.

This must also be installed when changing electrodes due to workpiece changes.



4.2 Change electrode

First remove the quick coupler from the compacting device.

To change the electrode

- Remove hold down screw
- Loosen auxiliary screws (2x)
- Loosen the wedge clamp screw
- Loosen the retaining screws (2x)

Remove the electrode with moderate force upwards from the quick coupler.

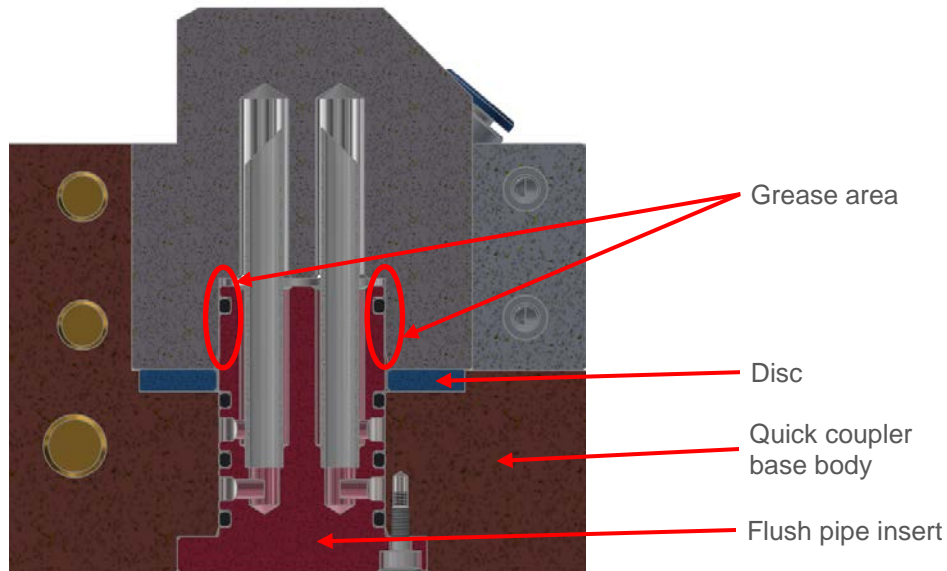
Clean the quick coupler in the area of the electrode, e.g. with a cloth:

- Remove water
- Remove dirt

4.3 Insert electrode

Insert the disc into the quick coupler base body.

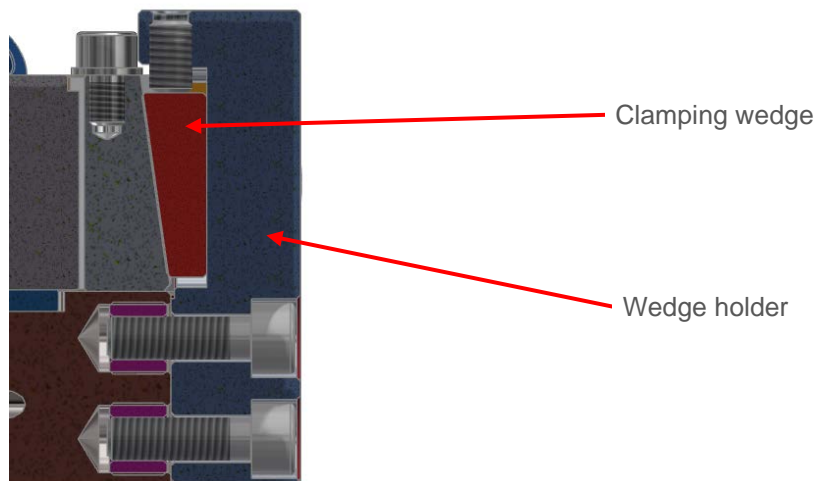
Grease the flush pipe insert.



The electrode is inserted from above via the flush tube insert and pressed down into the quick coupler with moderate force.

Lightly tighten the auxiliary screws (tightening torque 6 Nm).

Clean the clamping wedge and grease it again.

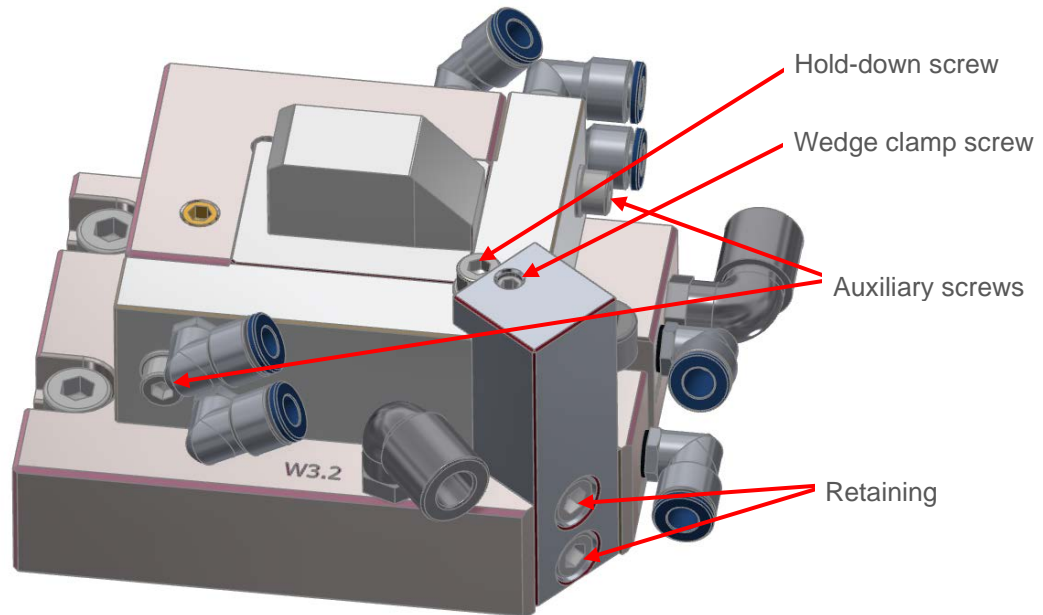


Insert the wedge holder incl. clamping wedge into the fitting groove and fix it in place using the retaining screws.

Apply clamping force acting on the electrode by wedge clamping screw.

Then hand-tighten the auxiliary screws again.

Fit the hold-down screw.



Caution

The wedge effect generates very high clamping forces on the electrode. Therefore, do **not overtighten** the **auxiliary screws (tightening torque 6 Nm)**, as this would result in increased wear of the mechanical components.

Now the quick coupler incl. new electrode can be reinstalled in the compacting device. Carry out a test drive.



Attention

If the result of the compacting device is not satisfactory after the electrode change (set-up), rotate around the Z-axis. is not satisfactory, the rotation around the Z-axis (see chap. 3.4.2) and the centre position (see chap. 3.7) of the active electrode must be checked. Also check the pretension of the ceramic jaws and adjust if necessary (see chap. 3.8). 3.8).

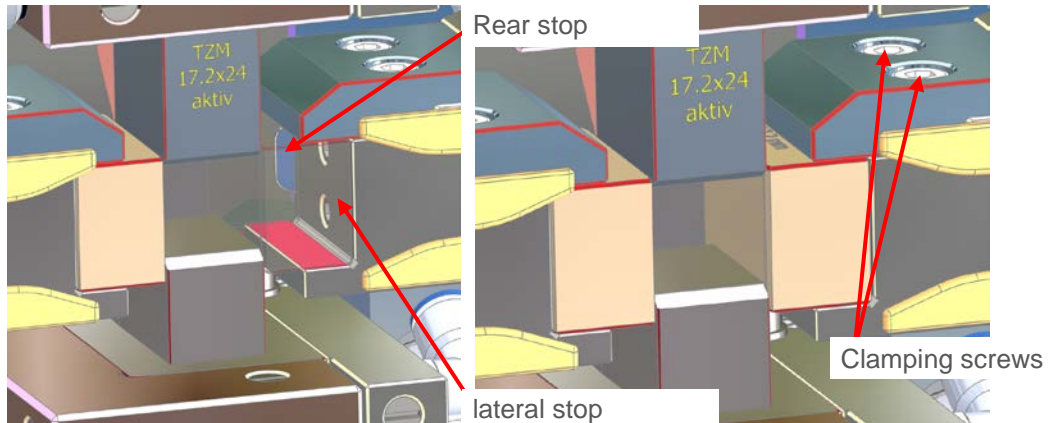
4.4 Change ceramic jaws

To change the ceramic jaws, the ceramic jaws are open and not in contact with the passive electrode.

After the two clamping screws have been loosened, the ceramic jaws can be removed to the operating side.

Next, the ceramic jaws belonging to the pair of electrodes can be inserted.

The ceramic jaws are pressed against the rear stop and, when tightening the clamping screws, also against the side stop to achieve a flat fit.



Attention

After changing the ceramic jaws (setting up) the pretension of the ceramic jaws must be checked (see chap. 3.8).

5 Process description

The compacting device is open.

The "lift cylinder back" initiator is interrogated and lights up when the device has retracted to the stop.

After the start, the device closes.

When the weld metal is inserted, it is pressed into the desired shape.

The initiator "Lifting cylinder forward" is queried. If it is connected (illuminated), the start release for the actual welding is given.

The welding cylinder moves onto the weld metal and the remaining welding programme runs.

The welding head returns to the starting position after the welding programme has been completed.

The compacting device opens, the initiator lights up, the weld metal can be removed.

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