

Final assembly

This section describes the final assembly of the KUKATE34. This can also be done in other suitable ways.

The construction of the sleeper foundation recommended here is possible practically anywhere in the world.

The beauty of the KUKATE34 is the possible variations:

Of course, a foundation made of concrete is also possible. The foundation cage is then provided with a mesh of reinforcing steel at the bottom. After it is precisely aligned, it is filled with a concrete slab at least 0.3 m thick. After hardening, soil or sand is poured onto the slab. The well pipe protrudes from the soil at least up to the frame of the mast. After compacting, a second 20cm thick concrete slab, also reinforced with reinforcing steel, can be poured on top. This guarantees clean conditions in the well and mast base area.

However, before the equipment is erected, all assemblies must be painted with anti-rust paint.

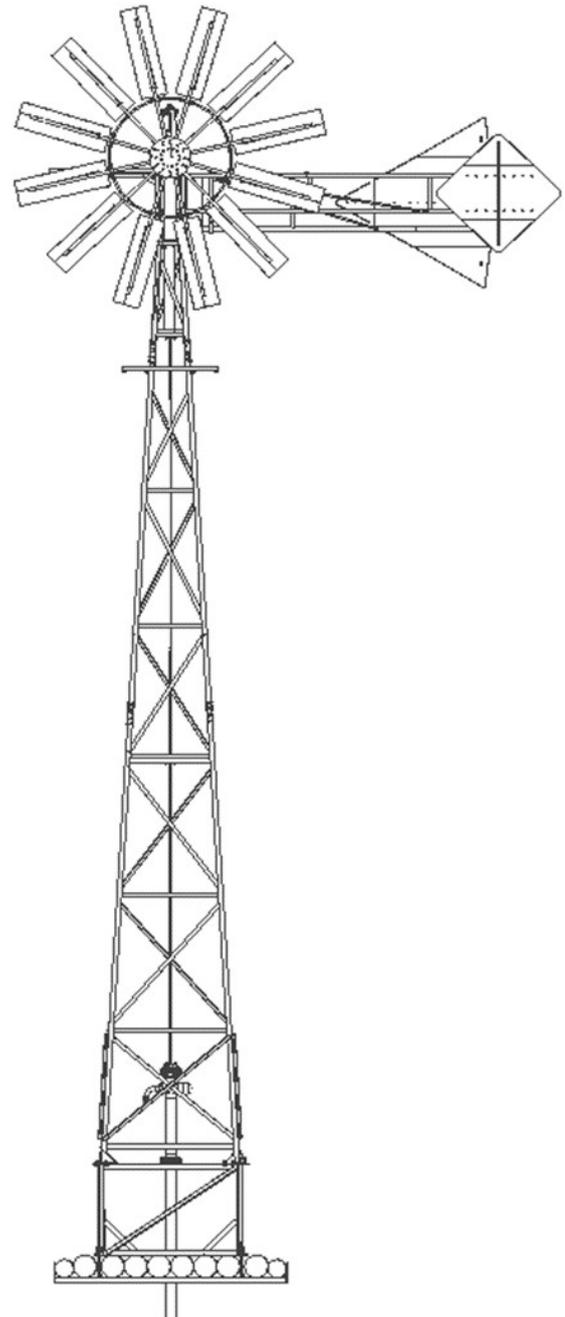
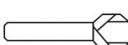


Figure 1 - KUKATE 34 final assembly

Tools

				
		Wood	WS	90°

Pos	Name	Criteria	Qty	Material
6 -1	Rope	60mmx30m, 3 rotated 3 times	2	Natural hemp
-2	Grease	For drilling		
-3	Pulley	min.3000N carrying capacity	1	
-4	Paint	Rustproof, weatherproof	2Kg RAL6038(Grün), 1Kg RAL1016(Gelb), 1Kg RAL5015(Blau)	

Table 1 – Bill of material 6 final assemblyConstruction

1. Produce, pipe and align wells

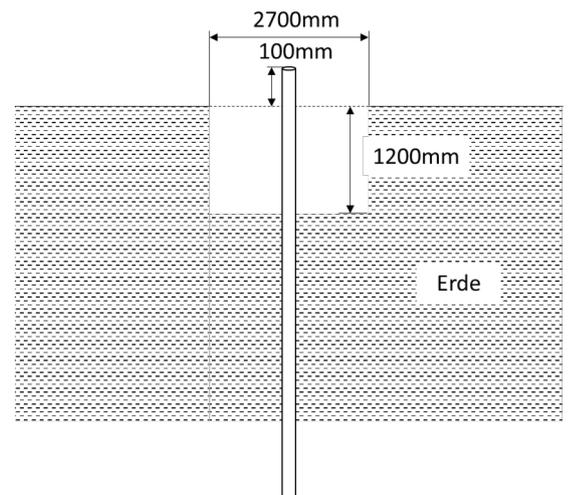
In the center of the footprint, drill, flush or dig a sufficiently deep well before or after excavation.

For the foundation, dig a square hole with dimensions 2700x2700x1200mm.

After that, a well pipe with an inner diameter of 250mm to a maximum of 500mm, prepared in a suitable way for the water inflow at the bottom, is to be sunk into the groundwater as deep as necessary and fixed in the center.

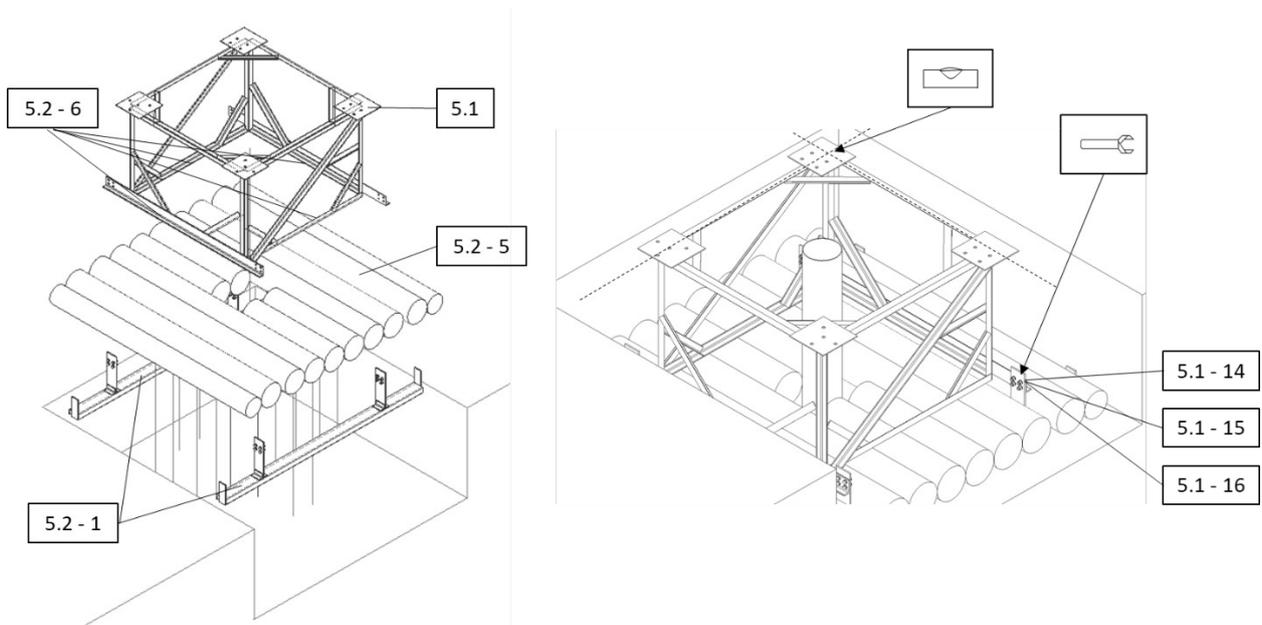
It must be ensured that the system in this application is designed for a pumping height of up to 10m lifting height. Sufficient water volume capacity at the bottom of the well must be ensured by perforating the well casing, grid inserts or similar.

The well pipe must be designed so that it protrudes at least 100mm from the ground at the top. It is particularly important that the pipe is aligned vertically.



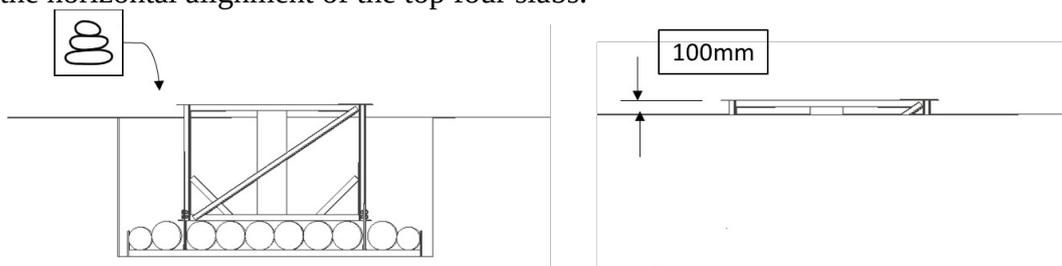
2. Mount and position foundation

The next step is to build the foundation of the KUKATE34. Follow the sequence shown in the illustration. First, align the U-profiles [5.2] horizontally on the foundation base and cover them with the wooden planks [5.2-5]. Then screw the foundation frame [5.1] to the plates [5.2-3] inserted between the wooden planks by the U-profiles below. Carefully align and fix the entire foundation again. At this point in the setup, it is especially important that all four sides are laid out horizontally, as the alignment affects the entire system.



3. Filling the shaft

Next, fill the excavation area. Earth or sand (also with large stones) can be used. However, special care should be taken to compact the backfill as best as possible every 15cm - 20cm - without changing the horizontal alignment of the top four slabs.



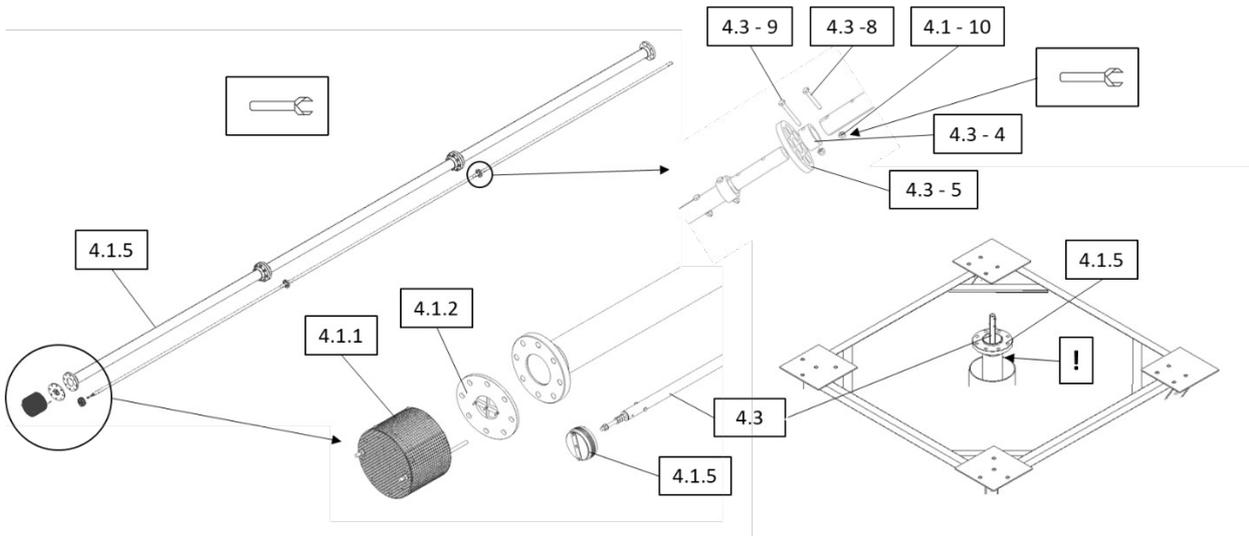
4. Mounting the pump

In the next step, screw the pipes [4.1.5], the foot valve [4.1.2] and the suction strainer [4.1.1] together.

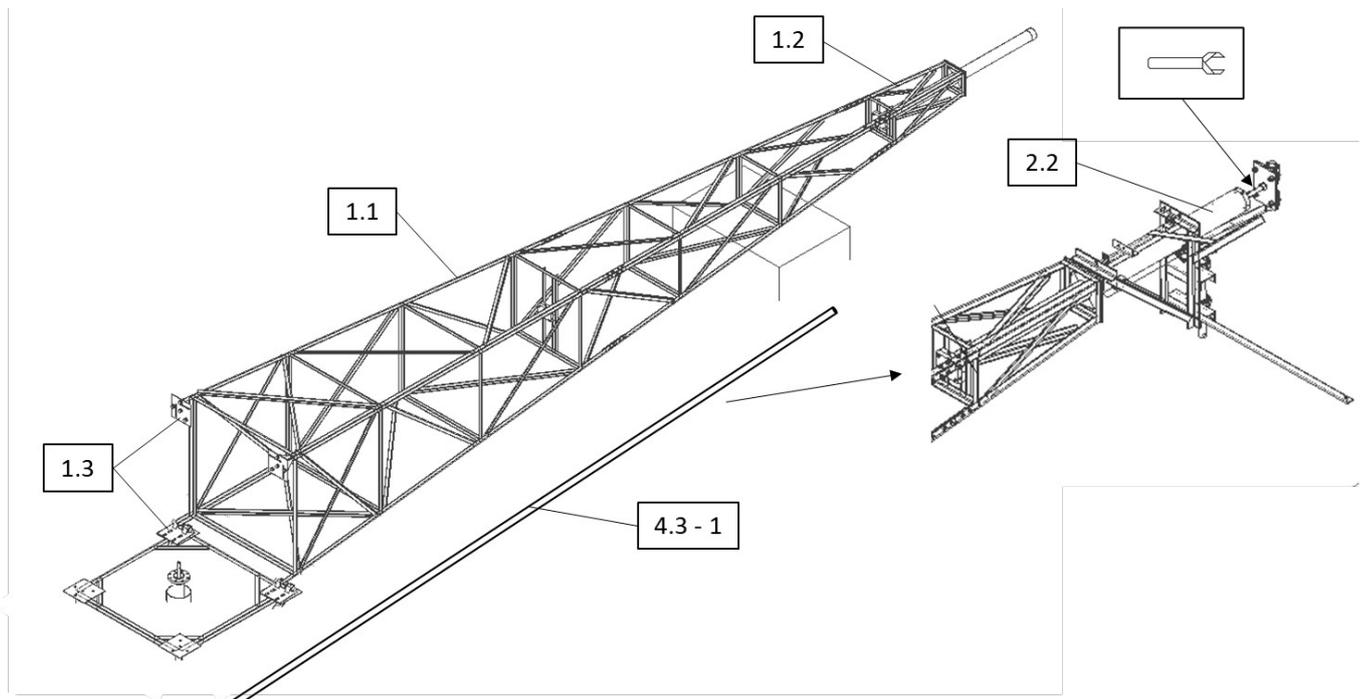
The piston [4.2] and the bearings [4.3-5] are to be mounted on the pump rod [4.3]. Before these are lowered into the well pipe, check whether the piston and rod can be moved up and down smoothly in the well pipe.

After that, the following sections of the rodding with the mounted support discs [4.3-5] are to be let into the well pipe.

Particular care should be taken to ensure that this structure does not slip into the well. It is important to secure the pipes and the rod against falling in.



5. Next, screw the lower mast segment [1.1] to the foundation through the mast feet with hinge [1.3]. After that, mount the middle and upper mast segments. The entire mast is to be supported with a platform (for example padded pallet stacks or trestle) and aligned so that the tube at the mast head [1.2] is horizontal. Now carefully grease the sliding bearings of the nacelle-mast connection. Then push the nacelle frame [2.2] with rotor shaft and crank drive [2.3] onto the tube and check for smooth running. The pump linkage [4.3-1] must now be mounted. It is pushed up from below through the bearings and mounted on the journal connection of the crank drive.



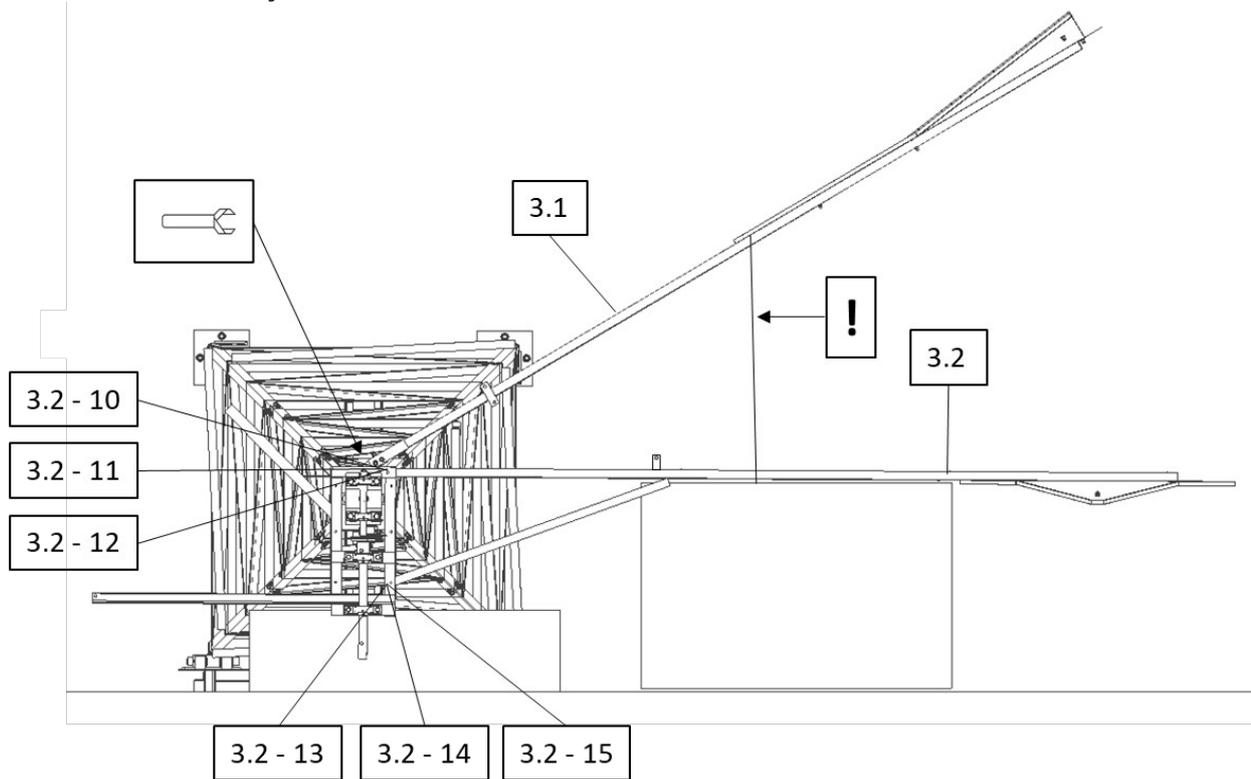
6. Assemble mast, nacelle and pumping rods

Next, screw the lower mast segment [1.1] lying through the mast feet to the foundation with the hinge [1.3].

Then mount the middle and upper mast segments. The entire mast must be supported and raised with a platform (for example, padded pallet stack or trestle). The tube at the mast head must be horizontal at least [1.2].

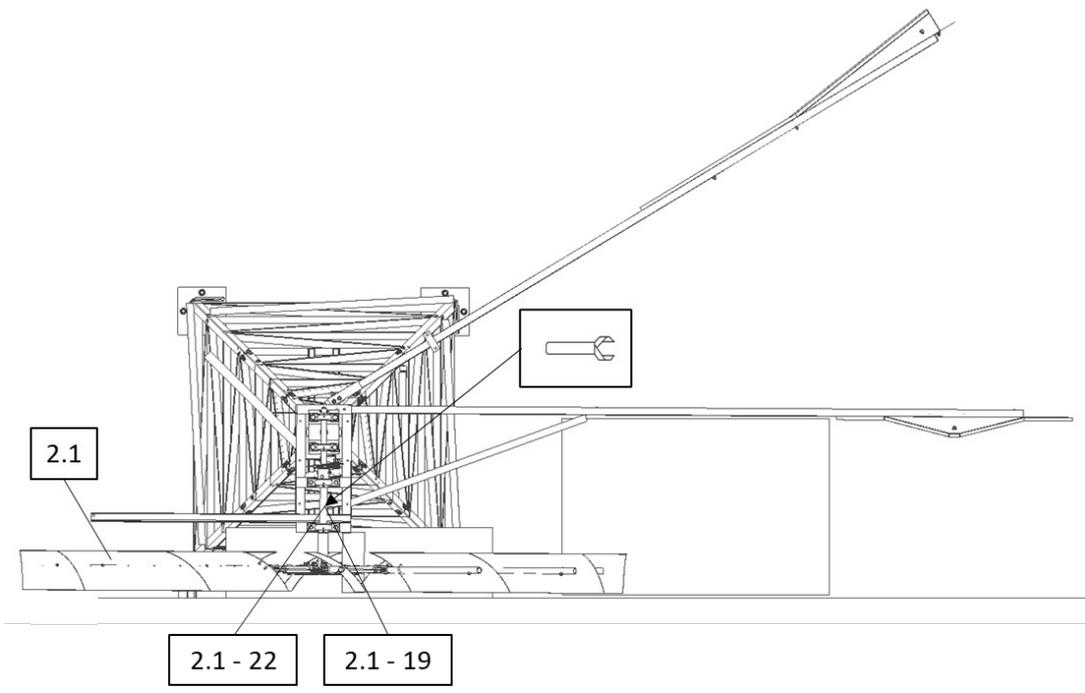
A good position for working is important here. Now the slide bearings of the nacelle-mast connection are carefully greased. Then push the nacelle frame [2.2] with rotor shaft and crank drive [2.3] onto the tube. The nacelle must turn easily.

The pump linkage [4.3-1] must now be mounted. It is pushed up from below through the bearings and mounted on the journal connection of the crank drive.



7. Mount rotor

The pre-assembled rotor is to be pushed onto the shaft from below and screwed together. After assembly, a function test must be carried out and the rotor must be secured against turning.



8. Install control cables and jerk dampers

When installing the wire rope hoist, the eyelets of the ropes must be made first. It is important here that the rope is wound around itself several times when tying the thimble and tightened with at least 5 (!) rope clamps per thimble. This is for safety reasons. In this way, the rope cannot come loose.

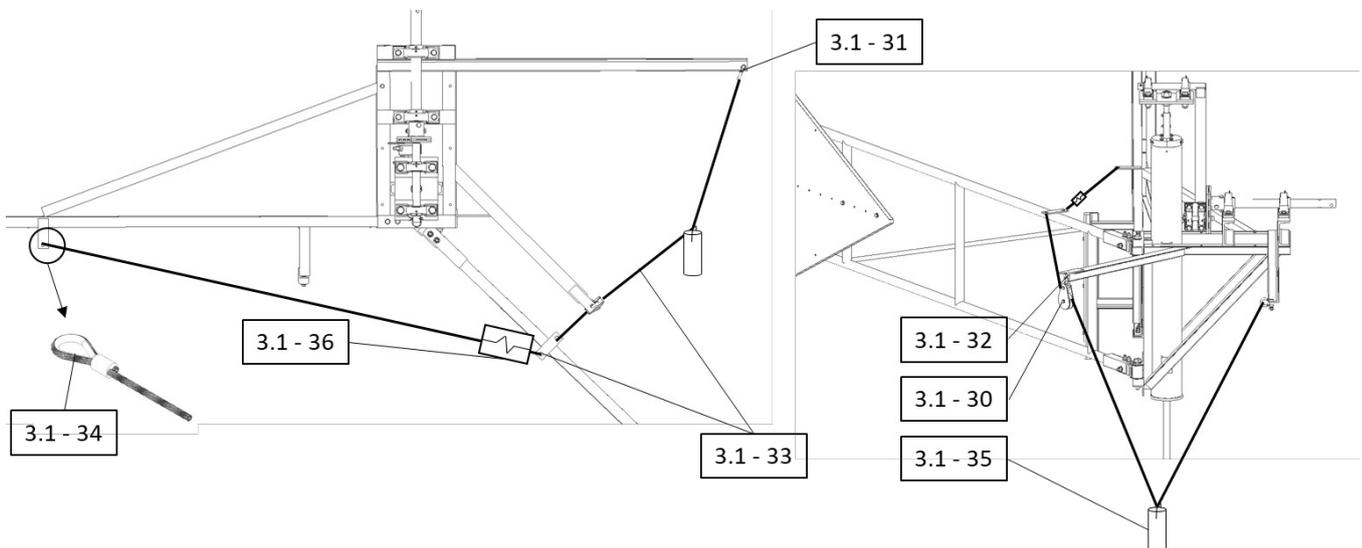
Assembly note: It is difficult to tighten the small rope clamp screws to the correct torque. Only experienced experts should do this work.

Mount the jerk damper between the control vane and the stop rope (135deg!) and tension the rope from there to the side vane. In the position of the control vane shown on the left, the rope must be tense and serves as the end pivot point. When the vane swings quickly to the normal position, the jerk damper avoids a hard jerk. **The control vane must not exceed an angle of 135° to the side vane.** The second rope is to be tensioned from the control vane over the pulley [3.1-30] to the shackle [3.1-31] also with eyes. The bucket as control weight is to be attached to a loose pulley between the deflection pulley and the shackle.

After setting up the equipment, fill it with weights.

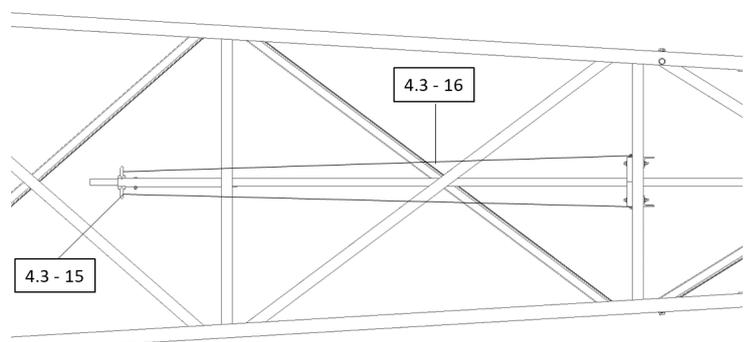
When the maximum operating wind speed is reached, the force of the wind pressing on the side vane exceeds the pulling force in the rope caused by the bucket. The bucket is then lifted and thus the turbine and thus the rotor turns automatically (usually only partially) out of the wind. The control vane then swings towards the side vane. If the wind pressure decreases, the cable pull of the bucket swings the control vane back into its normal position and the turbine turns again with the rotor into the wind. This weight is to be adjusted individually after setting up the system..

By adjusting the (initial) spread angle of the roller ropes above the bucket and its weight force, you can practically influence the characteristic curve of the swing out.



9. Install rubber ropes as weight compensation

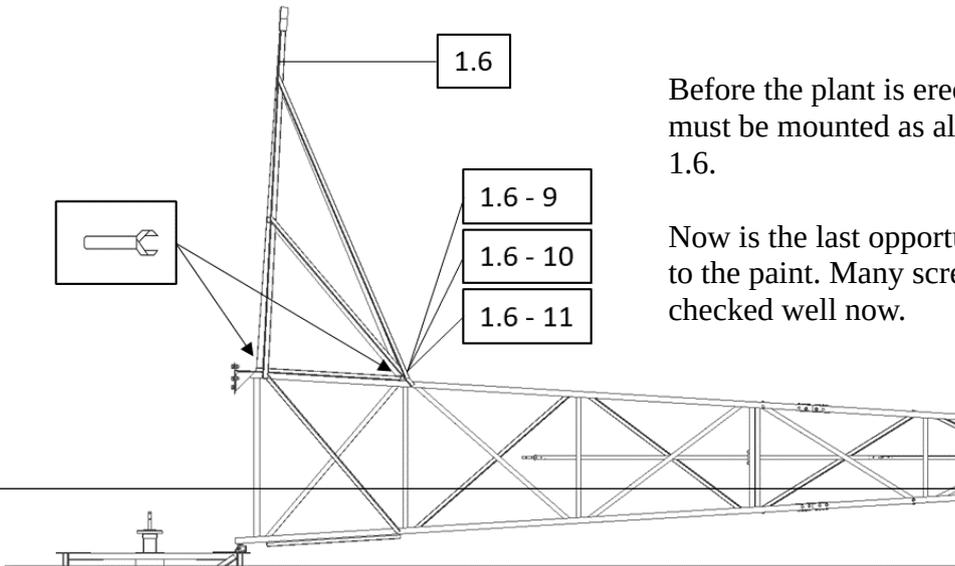
The rubber cables [4.3-16] are to be fastened from the middle bearing to the ring nuts shown [4.3-15] with shackles. Their (counter) force corresponds to the weight of the piston rod, the



water column standing on the piston and the eccentric bearing at the top of the crank mechanism. They should be approx. 2m - 3m long.

(These compensate for the weight of the linkage, thus facilitating start-up and performance of the unit. The tractive force of the rubber ropes should correspond to the approximate weight of the piston rod and upper crankshaft drive bearing with the two pillow blocks).

10. Screw on adjusting scissors



Before the plant is erected, the adjusting shear must be mounted as already described in chapter 1.6.

Now is the last opportunity to repair slight damage to the paint. Many screw connections can also be checked well now.

11. Raising the KUKATE34K

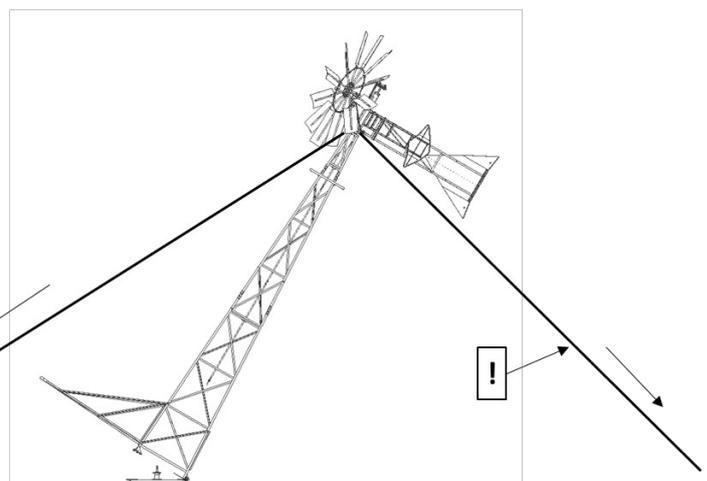
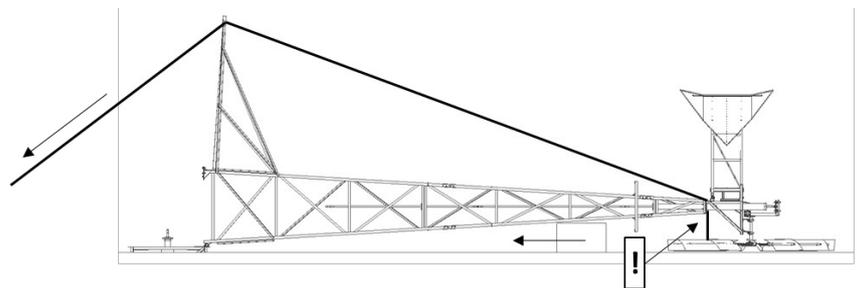
After the adjusting shear has been mounted, at least two ropes with a respective minimum length of 30m are to be attached to the tube of the nacelle frame. One rope is to be laid over the adjusting shear in the direction of pull. The other rope is to be used as a counter-tension and is also to be attached to the nacelle frame.

The rope must now be pulled with a force of at least 10,000N. A truck loaded with stones can apply this force.

The plant will then straighten up.

The pedestal supporting the mast must always be pushed back piece by piece to prevent the system from tipping back at the first shallow angles. At the beginning, the tensile force in the erection rope and the erection moment are the highest.

Supports - inserted between the cross struts and the floor - can also be helpful. The counter-tension rope is particularly important. This must be tensioned against the direction of pull. It must be held by at least five people. When the center of gravity of the system comes over the pivot point of the hinges, the system tilts into its



final position. **This counterforce must prevent rapid tilting and impact. Otherwise, damage can occur.**

If no truck is available to erect the KUKATE34, 30-40 people can - with extended rope - try to erect it. In doing so, it should always be supported up to an angle of 40degrees to prevent it from falling, e.g., due to the men slipping.

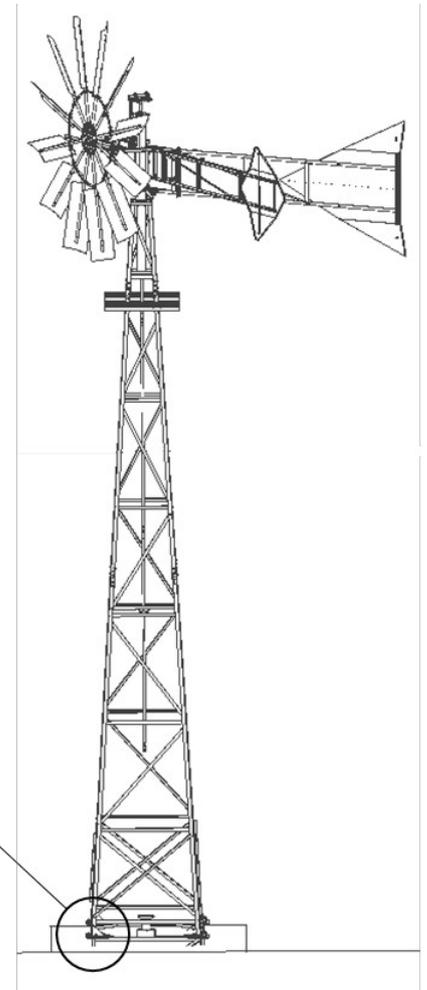
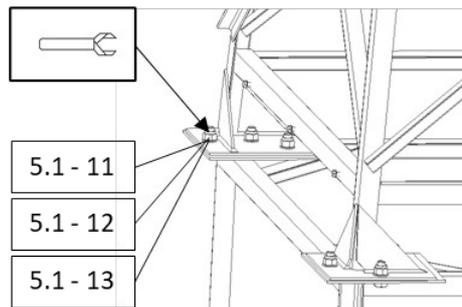
With a rope or pulley block of at least 30kN pulling force, you can also set up the plant step by step. This can take a long time and one must always support the wind turbine again in between when the rope must be shortened again and again position by position. The angles of the supports must be observed so that the mast cannot fold back.

12. Bolting the mast bases to the foundation plates.

The next step is to screw the mast bases to the foundation, and then loosen all the rope connections.

Here is the last opportunity to adjust the KUKATE34 vertically.

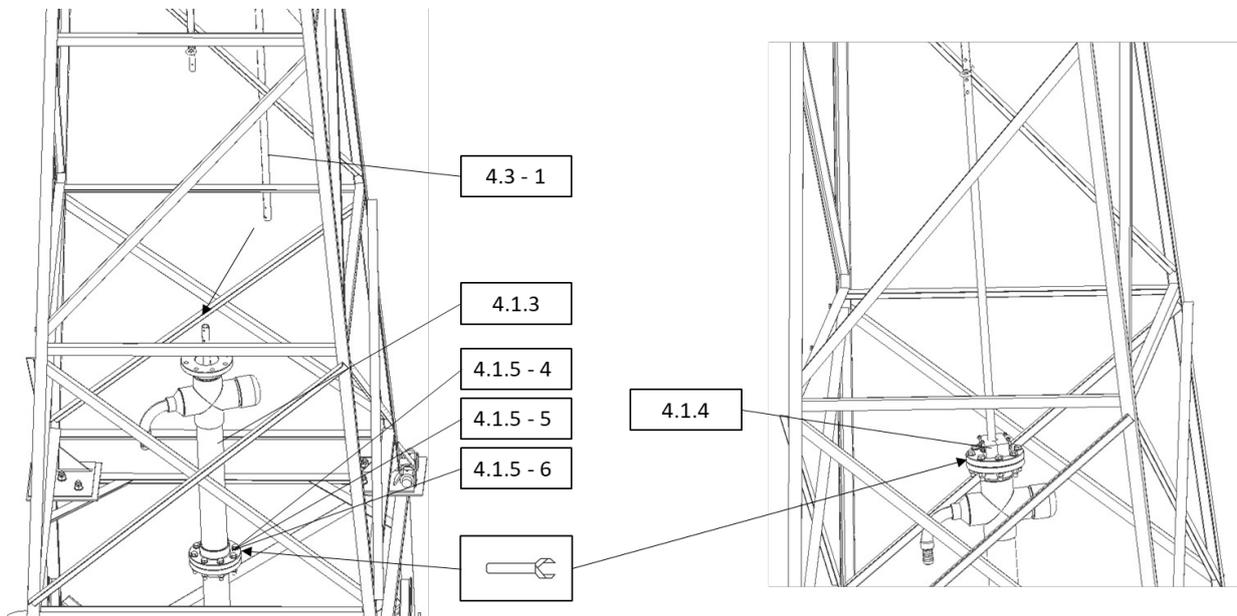
With plates between foundation plates and mast base plates you can change the distances. This way, the wind turbine can be adjusted exactly vertically.



13. Install pump outlet

The last step is to install the pump outlet. To do this, pull up the pump rod [4.3-1] with the screwed-on piston and screw the outlet [4.1.3] to the pump pipe above the foundation. Afterwards, the last missing pipe must be mounted between the hanging eccentric rod and the lower pump rod. Before this last pipe is screwed to the upper linkage, the cover [4.1.4] with its bearing must be pushed over the pipe and screwed to the outlet.

The KUKATE34K is now operational.



Maintenance

Since the KUKATE34 is in operation permanently and should be operational for a long time, it must be checked regularly. This includes checking the screw connections. These can become loose due to the settling behavior and possible vibrations.

Periodically, depending on the weather conditions, the anti-rust coating and also the wear of the brass bearings in the nacelle and for the control vane must be checked. In case of excessive wear, the safe operation of the installation is no longer guaranteed.

Likewise, the wooden slide bearings of the mast linkage must be oiled regularly and replaced if necessary.

If the pumping performance decreases, the rod must be pulled out of the well and the old piston seals replaced with new ones.

Due to the modular design, replacement of most wear parts is possible without laying down the entire system.

To climb the mast, a ladder can be (permanently) attached to the mast at the top, which can be reached by a second ladder leaning underneath.

Or you can weld stirrups to a mast stalk beforehand. This should be done on the mast side opposite to the most frequent wind. Then the rotor will not interfere with the ascent.

Stopping the KUKATE34

At the bottom of the bucket with the control weights, you attach a heavy 6m long rope with a large steel ring with a diameter of approx. 30cm (e.g. made of 10mm steel). If the system is not to run, you can hang a weight in addition to the control weight in the ring with a rod about 3m long. This then pulls the two flags together and the plant is permanently turned out of the wind.

It must be ensured that these ropes cannot get caught in the working platform or the lattice mast. It may be necessary to sufficiently extend the arms for the control weight rope at the top of the mast!

