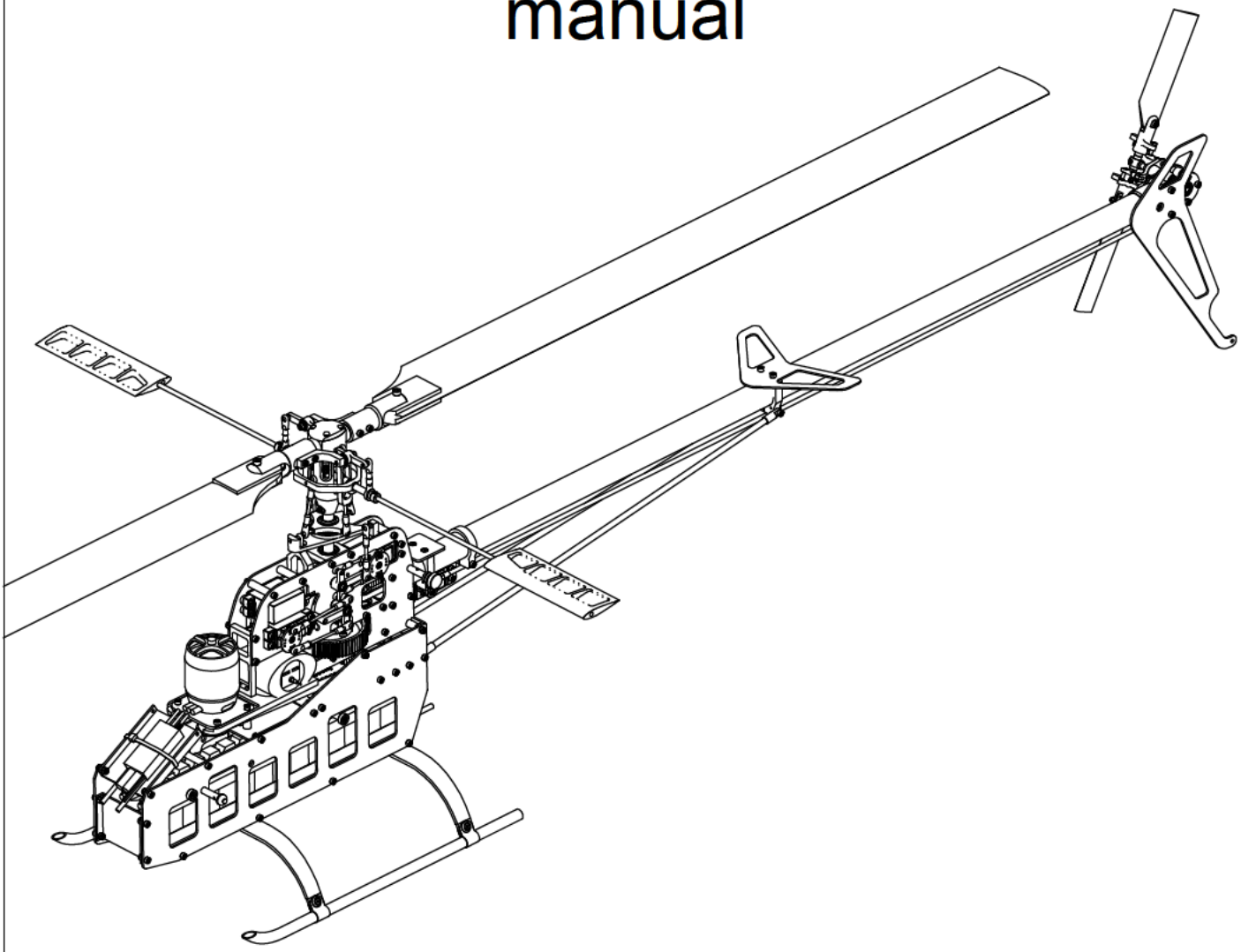
# Maxi-Joker 2

Ord.-No.: 2600

## manual




minicopter

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Version 3
Date: july 4th 2007

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Congratulations on the purchase of your *Maxi-Joker 2* - helicopter.
The successor of our popular Joker-series has got some new features to increase its span of usage. From beginners training over usage in scale bodies, as photo helicopter to 3D extrem flight is everything possible without modifications.
New items are a toothed belt in the first gear reduction, a better servo linkage to the swash plate, a simpler and more efficient construction and a better protection of the flight battery. Our classic MFS rotorhead is standard like before and also the quality of all parts and the long life expectancy of the model. So flying and servicing will give you a great deal of fun for a long time.
The manual contains many detailed graphics so that you should have no problems when building the helicopter. Please take a little time to study the manual before beginning. Then you get an overview of the building process.
The kit contains some hexagon wrenches. Additionally you need the following tools:

**Tools:**
Thin walled socket wrenches to fit 5,5 and 7 mm nuts.
Open wrench 4,5/5,5 mm
Hexagon wrenches for 2/2,5/3 mm bolts
Hexagon wrench 4 mm a.f. (2 required for the feathering spindle)
Sharp tongs with 45° cranked head
Phillips screwdriver small
Screwdriver flat
Screw lock Loctite 243 blue

**Special Tools:**
Special open wrench 5,5mm for restricted access to the nuts Ord.-No. 707
Ball joint tongs e.g. Robbe S 1360
Pitch gauge e.g. Robbe S1366
Paddle gauge e.g. Robbe S1368

**Lubricants:**
Axial bearings: normal machine lubricant (from tool suppliers)
Autorotation coupling: grease or synthetic motor oil
The gear wheels and the belt drives don't use lubricant.

**Recommended RC-equpiment:**
Receiver: Dual conversion PCM-system
RC-battery: 4 cells Sanyo KR 1700AU or cells with similar capacity
Swash-plate servos: Futaba S9252, S9206, S9202 or similar
Gyro: Futaba GY 401 with servo S9253/4 or GY 601 with servo S9251

If you have problems when building your model please contact us. We will help you!

And now: Much fun by building your *Maxi-Joker 2* !

## ***Safety rules:***

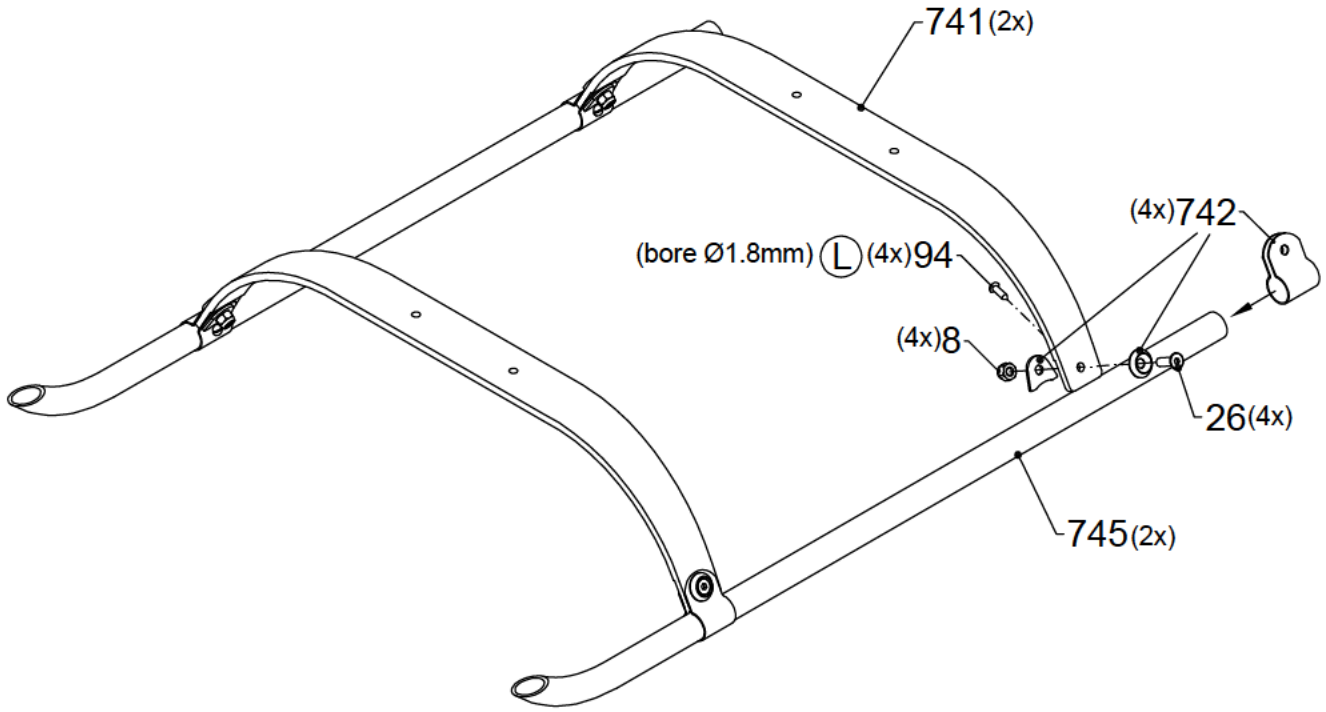
Radio controlled helicopters are **no toys**. A wrong use of such models can cause accidents with heavy injuries.
Therefore please bear following rules in your mind:

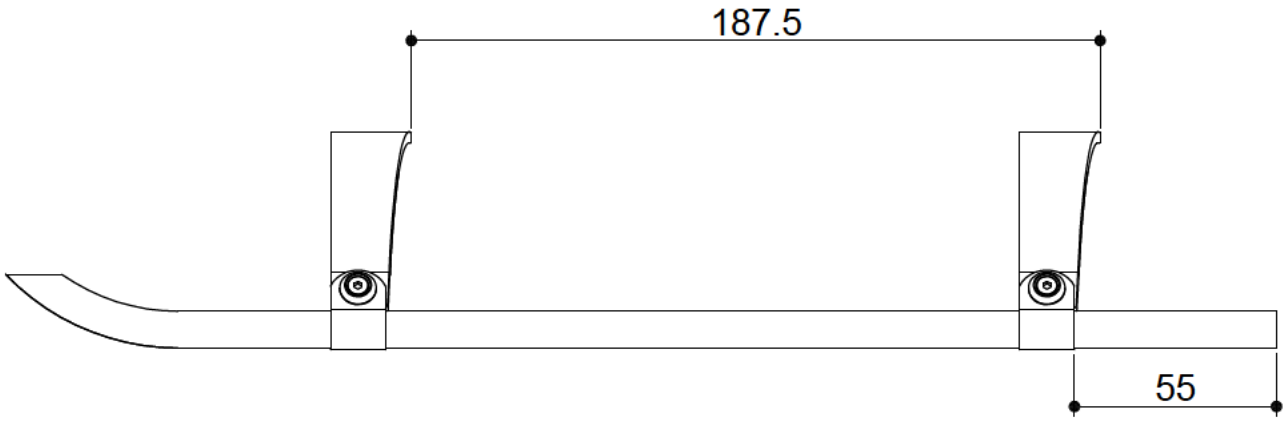
- For engine running tests on your workbench remove the complete mainrotor including all rods and the tailrotor blades. Consider that nothing can come in the tailrotor.
- You can´t assess by an electric helicopter the danger of a suddenly starting engine. So remove the dangerous areas of main- and tailrotor after connecting the battery packs.
- Don´t switch the controller suddenly off and on by running up. Wait some seconds if retrying.
- In hovering flight please keep a distance of at least 5 metres to the helicopter.
- Don´t aim in flight persons or other creatures and keep a security distance of at least 20 metres.
- Don´t fly your battery in forward flight empty, if you can´t autorotate in all situations. For landing calculate a security reserve of at least 30 seconds or better one minute. Empty the battery while hovering. For safety rules for Lipo batteries please follow the rules added to the packs.
- If using Lipos add the Lipo battery just before the flight and remove it just after the flight to contain the battery always in a special metal case.
- Don´t empty the battery with the last force in hovering, otherwise the battery can be damaged.
- For the first flight a partner should say you the flown time in intervals of 30 seconds so that you get a feeling for electric flight. After some time you feel an empty battery by giving full pitch for a moment. When the rotorspeed shuts down then you should search the ground for landing.
- Train autorotations with running engine as soon as possible.
- When you see that a crash is unavoidable try to stop the engine before having ground contact.

Liability exclusion:

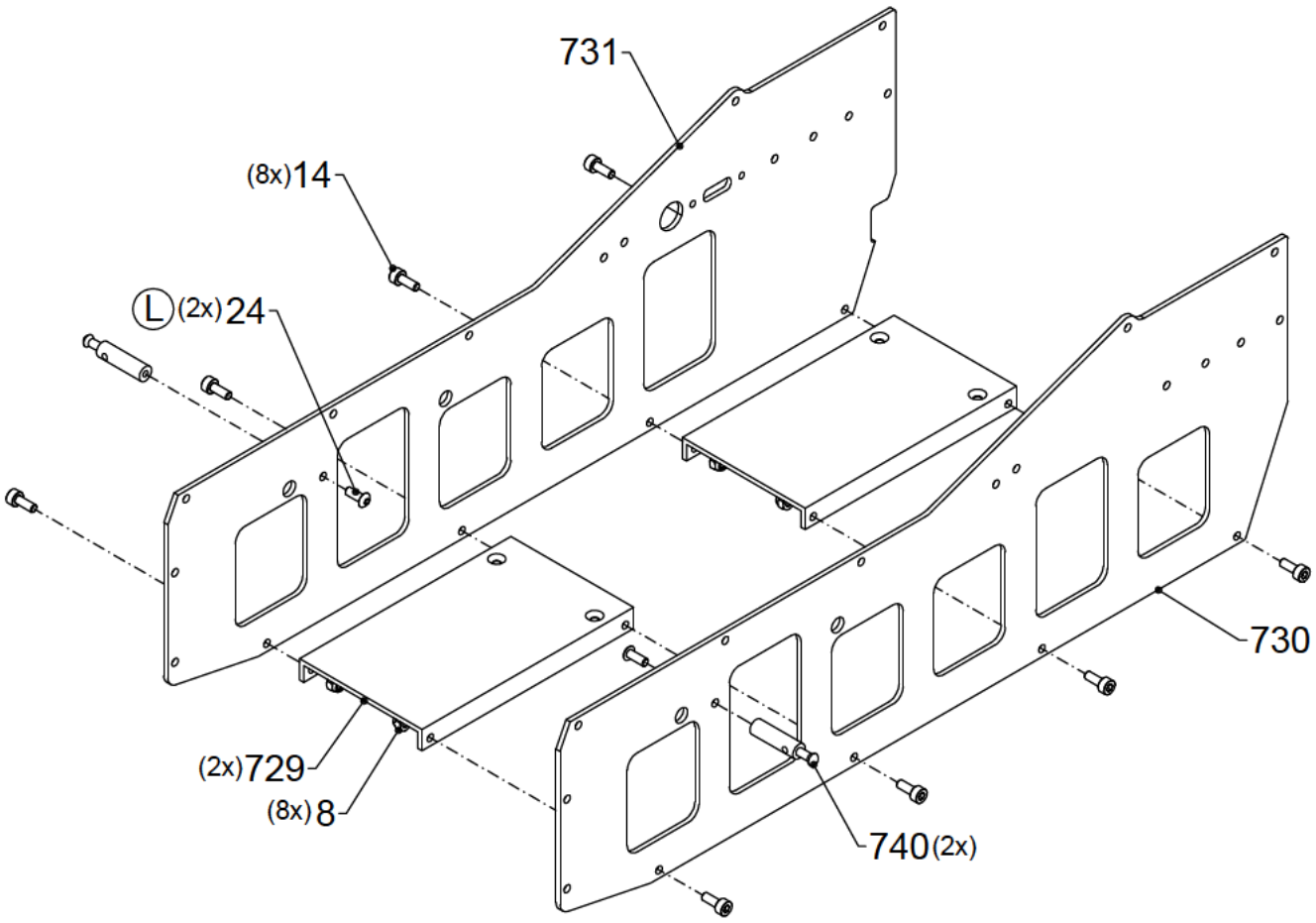
We can´t observe a correct mounting, justation, maintanence and usage.
So **no guarantee is possible**.

Vellmar, in september 2004



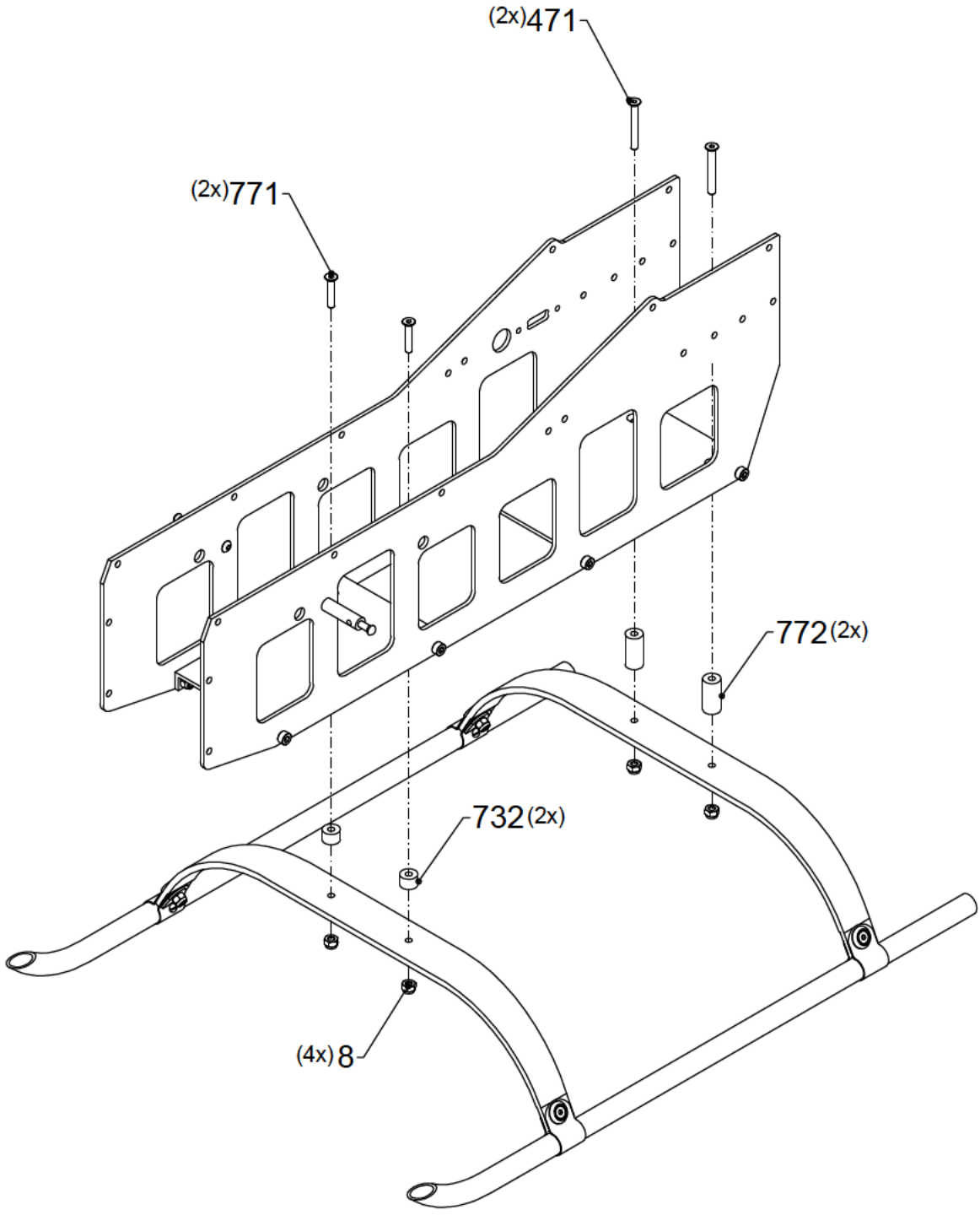




Ⓛ = use Loctite



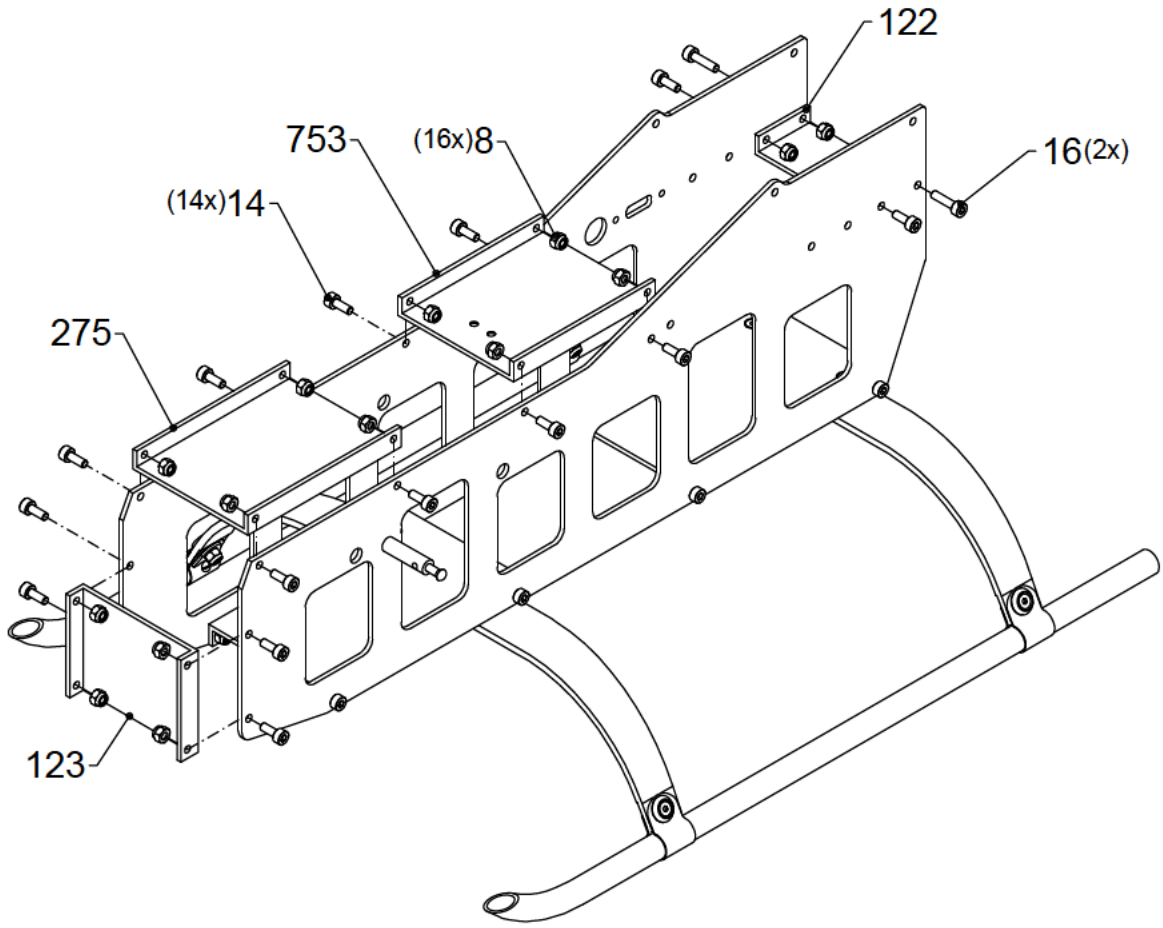

8 = lock nut M3
14 = hexagon socket screw M3 x 8

Ⓛ = use Loctite




8 = lock nut M3
471 = hexagon flat head screw M3 x 16
771 = hexagon flat head screw M3 x 25

Ⓛ = use Loctite

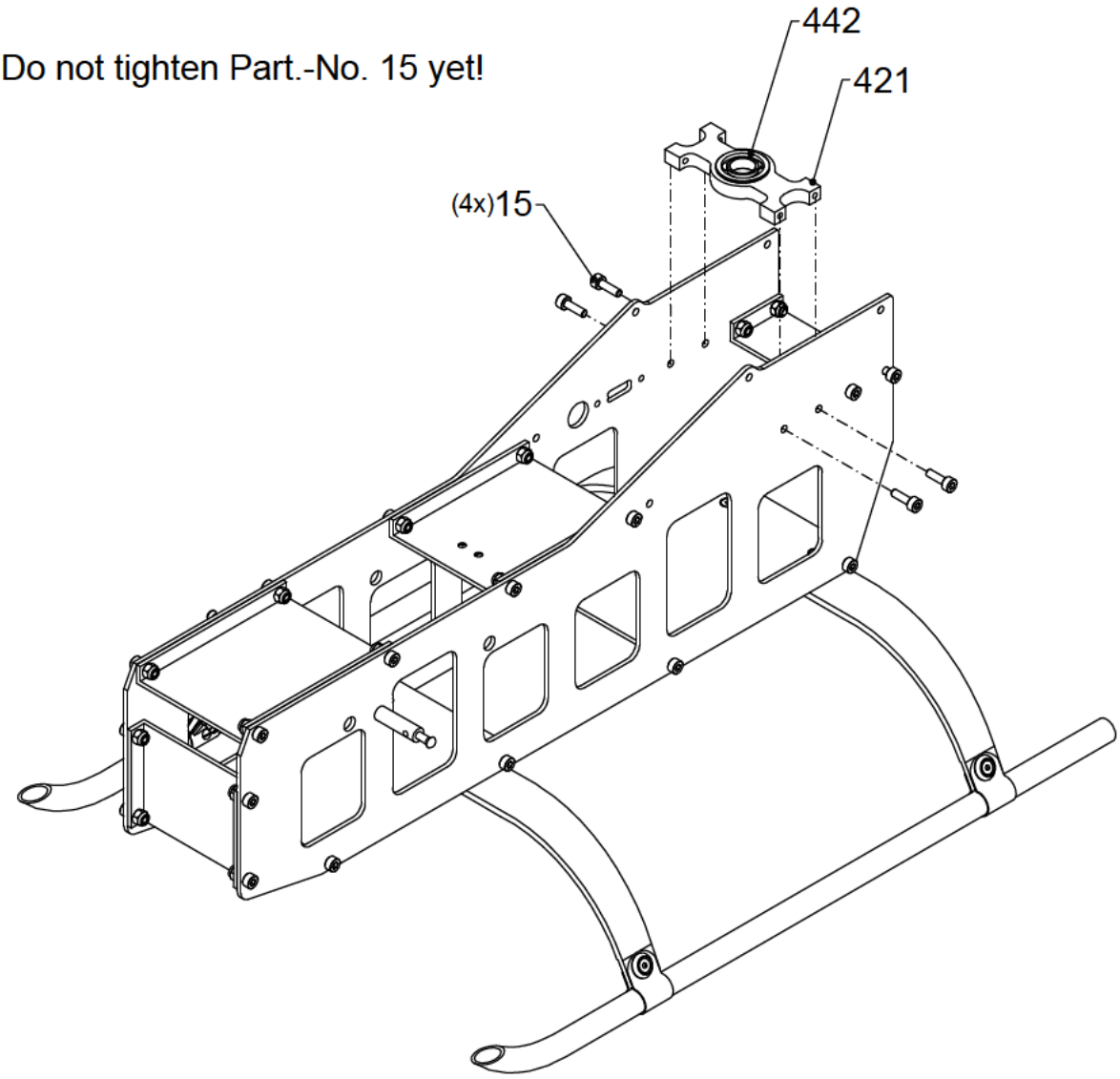



Tighten pos. 16 later!

8 = lock nut M3
14 = hexagon socket screw M3 x 8
16 = hexagon socket screw M3 x 12

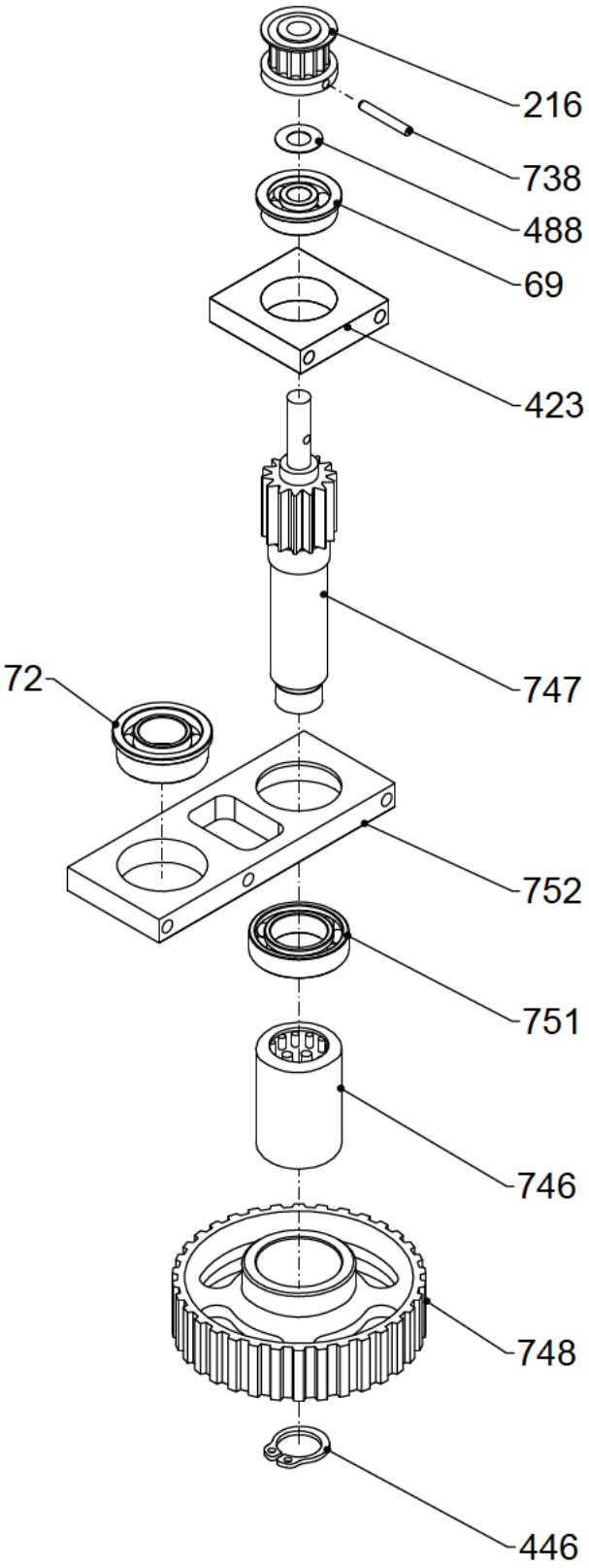
Ⓛ = use Loctite

Do not tighten Part.-No. 15 yet!




15 = hexagon socket screw M3 x 10

Ⓛ = use Loctite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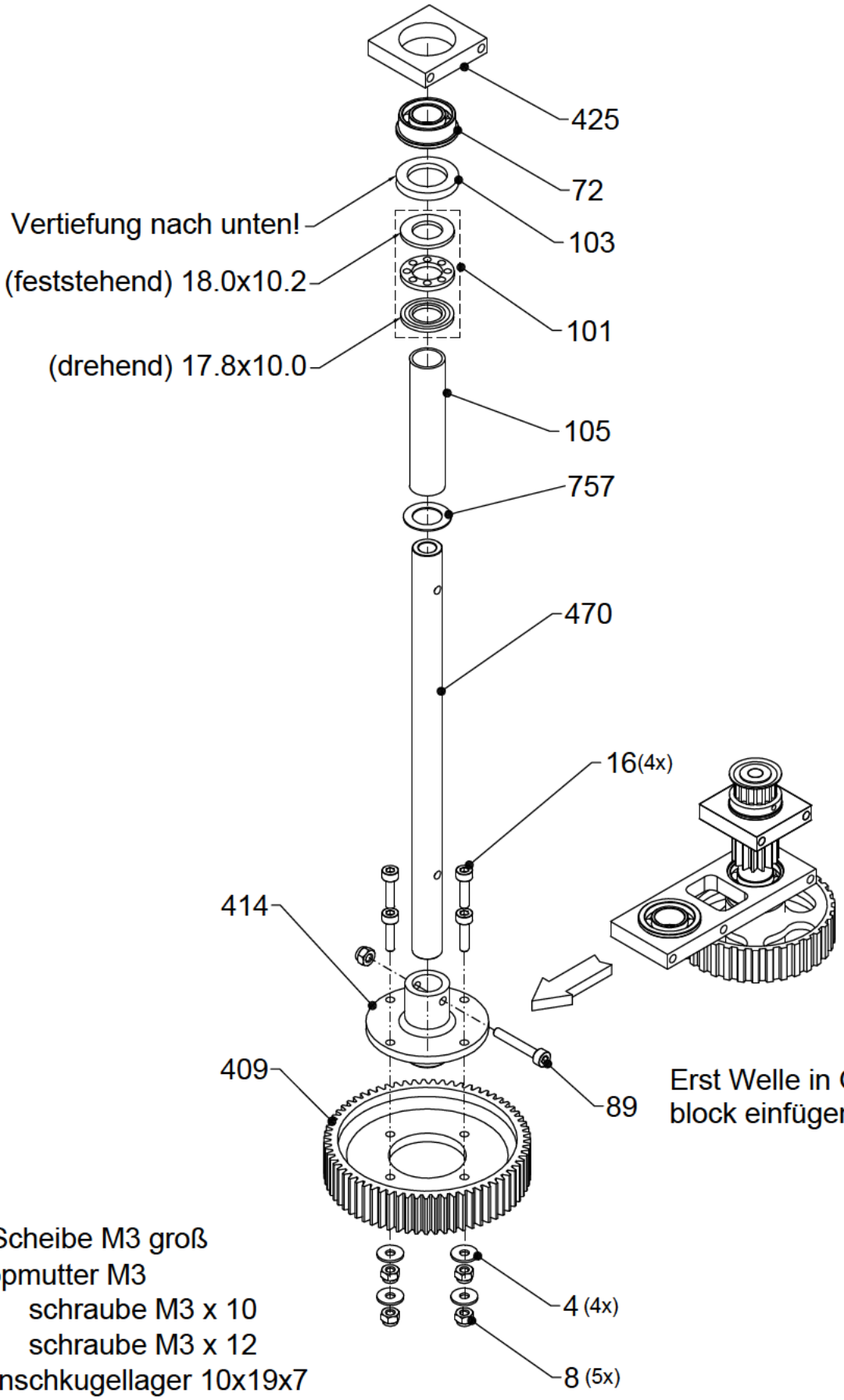
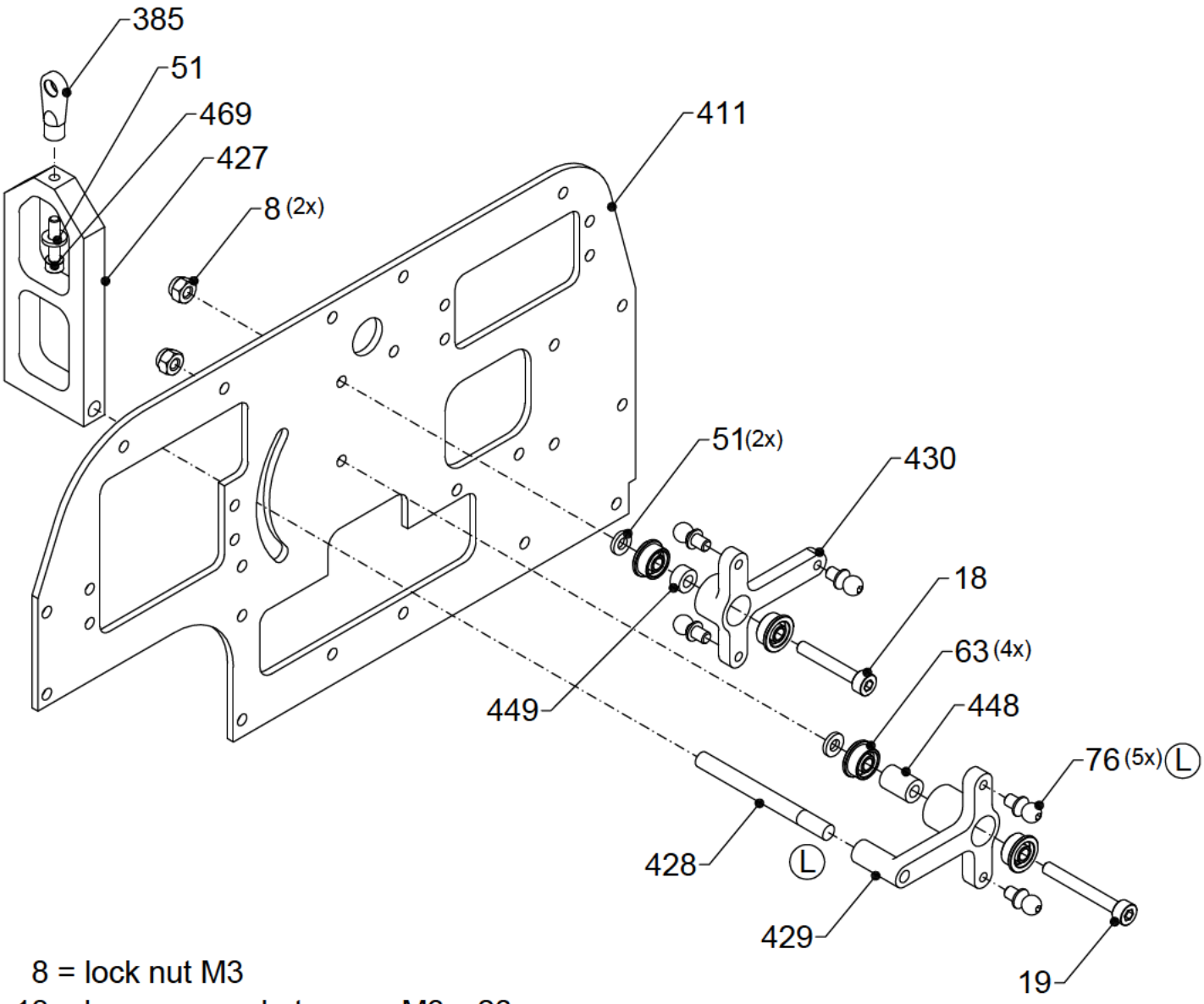



Erst Welle in Getriebe-block einfügen!

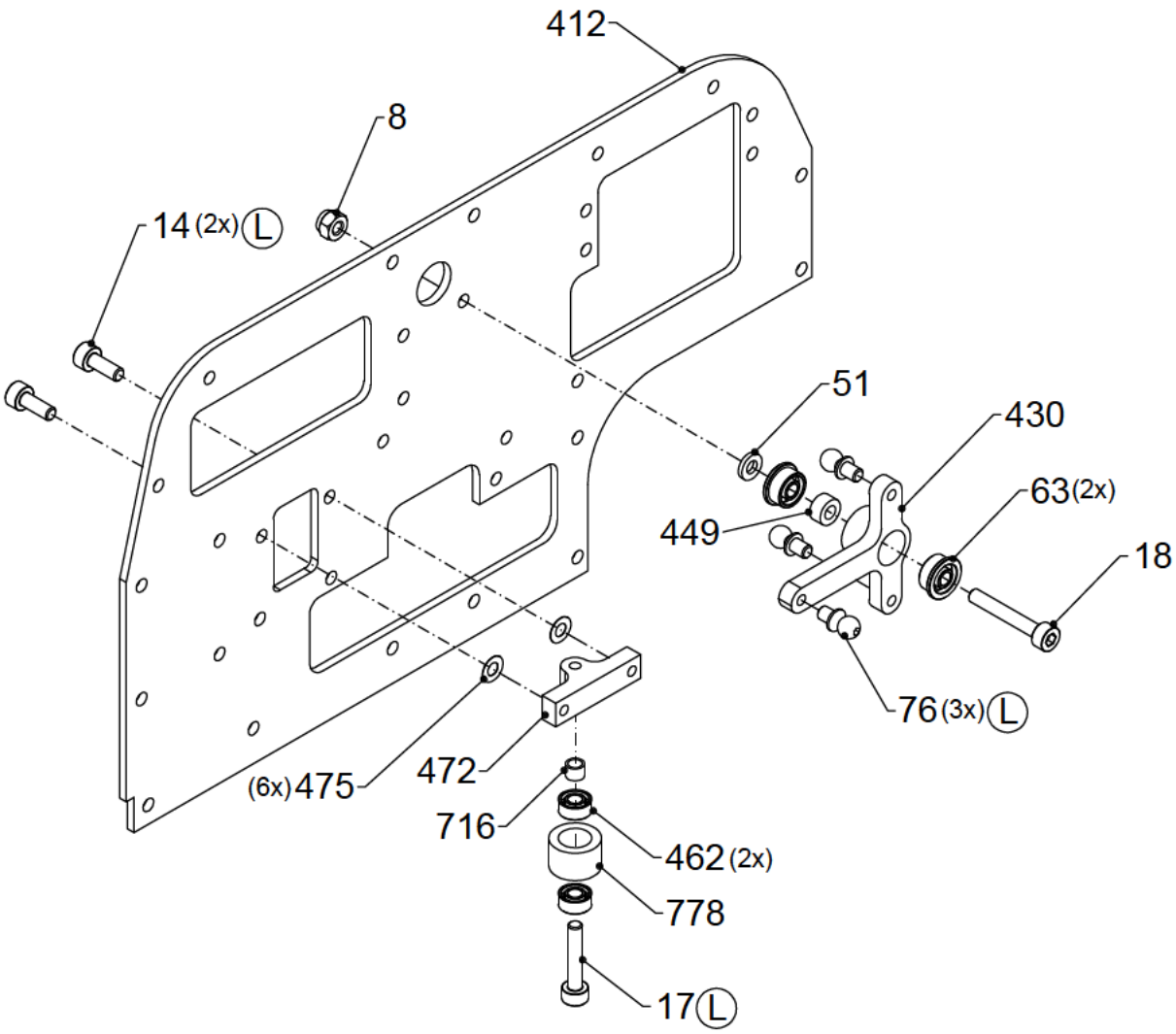
4 = U-Scheibe M3 groß
8 = Stopmutter M3
15 = schraube M3 x 10
16 = schraube M3 x 12
72 = Flanschkugellager 10x19x7

# 7a




8 = lock nut M3
18 = hexagon socket screw M3 x 20
19 = hexagon socket screw M3 x 25
41 = ball joint 2.5
51 = shim 3 x 6 x 1
63 = ball bearing with flange F3 x 8 x 4
76 = joint bolt M3 x 4
469 = hexagon socket screw M2.5 x 12

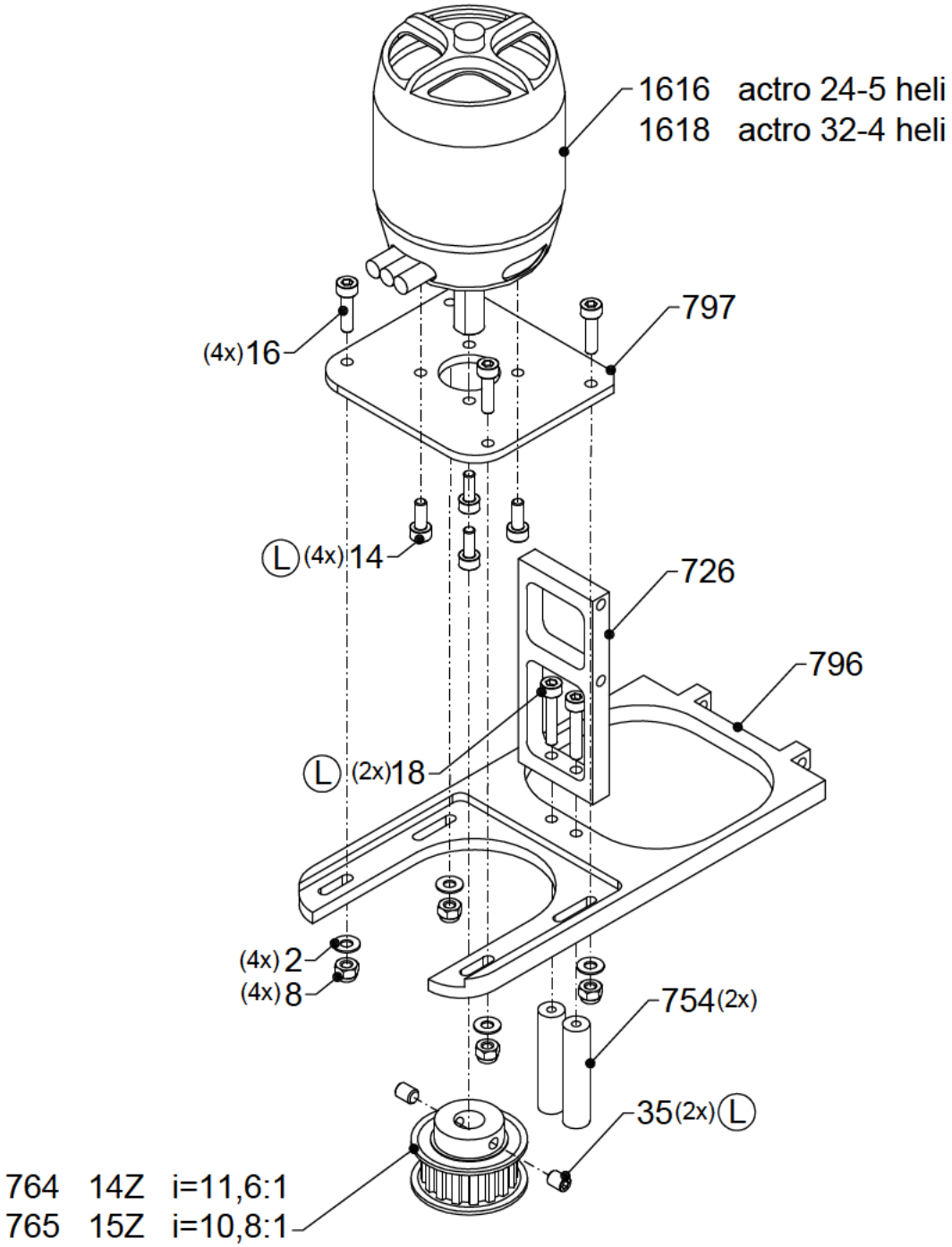
Ⓛ = use Loctite




Bearing carrier should be tightened up after the belt is fitted! Use shims 3x6x0.1 for the right distance to the belt! Distance between bearing and belt about 0.2-0.3mm! Bearing may NOT run with the belt during normal usage!!

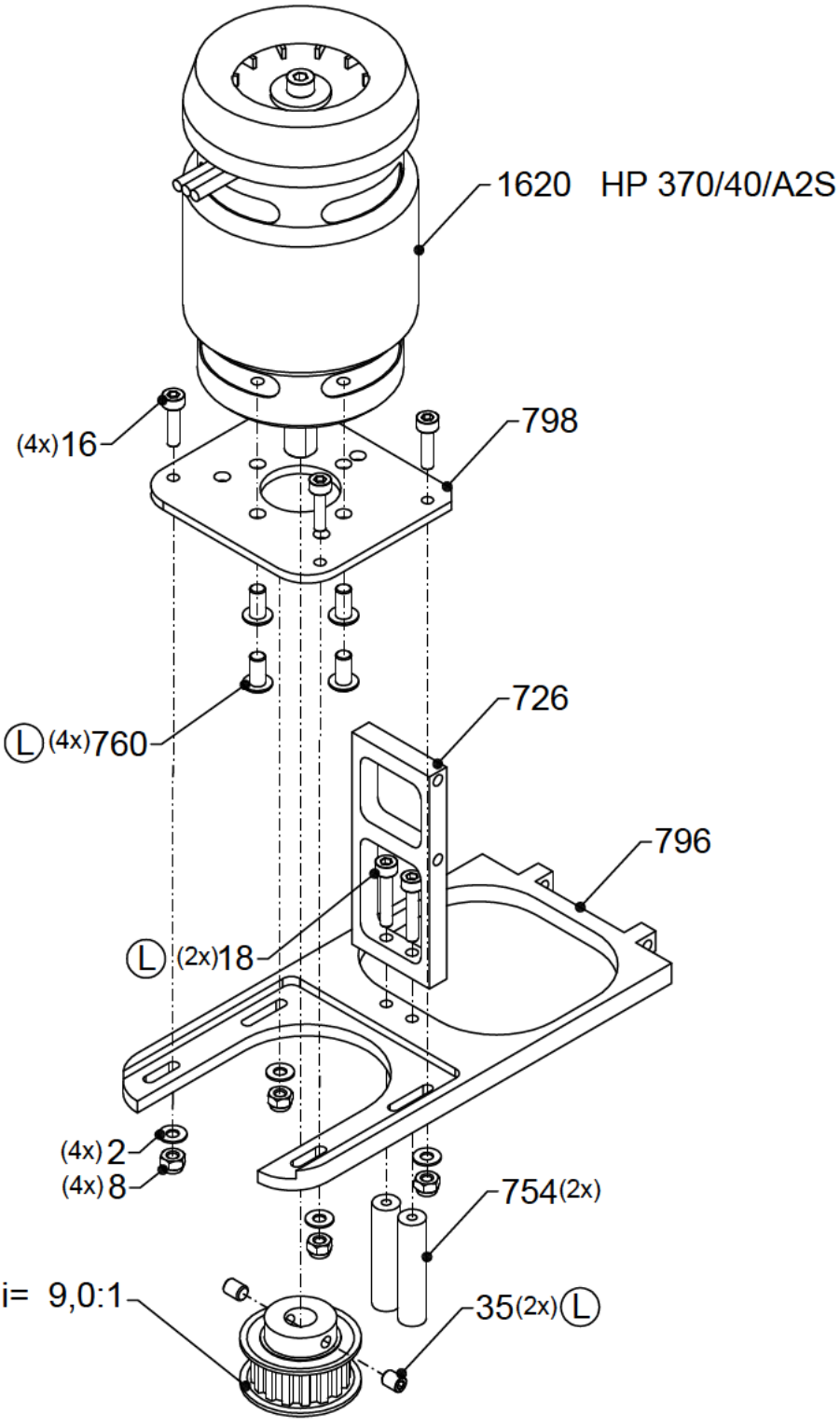
8 = lock nut M3
14 = hexagon socket screw M3 x 8
17 = hexagon socket screw M3 x 16
18 = hexagon socket screw M3 x 20
51 = shim 3 x 6 x 1
63 = ball bearing F3 x 8 x 4
76 = joint bolt M3 x 4

L = use Loctite




2 = washer M3
8 = Lock nut M3
14 = hexagon socket screw M3 x 8
16 = hexagon socket screw M3 x 12
18 = hexagon socket screw M3 x 20
35 = grub screw M4 x 5

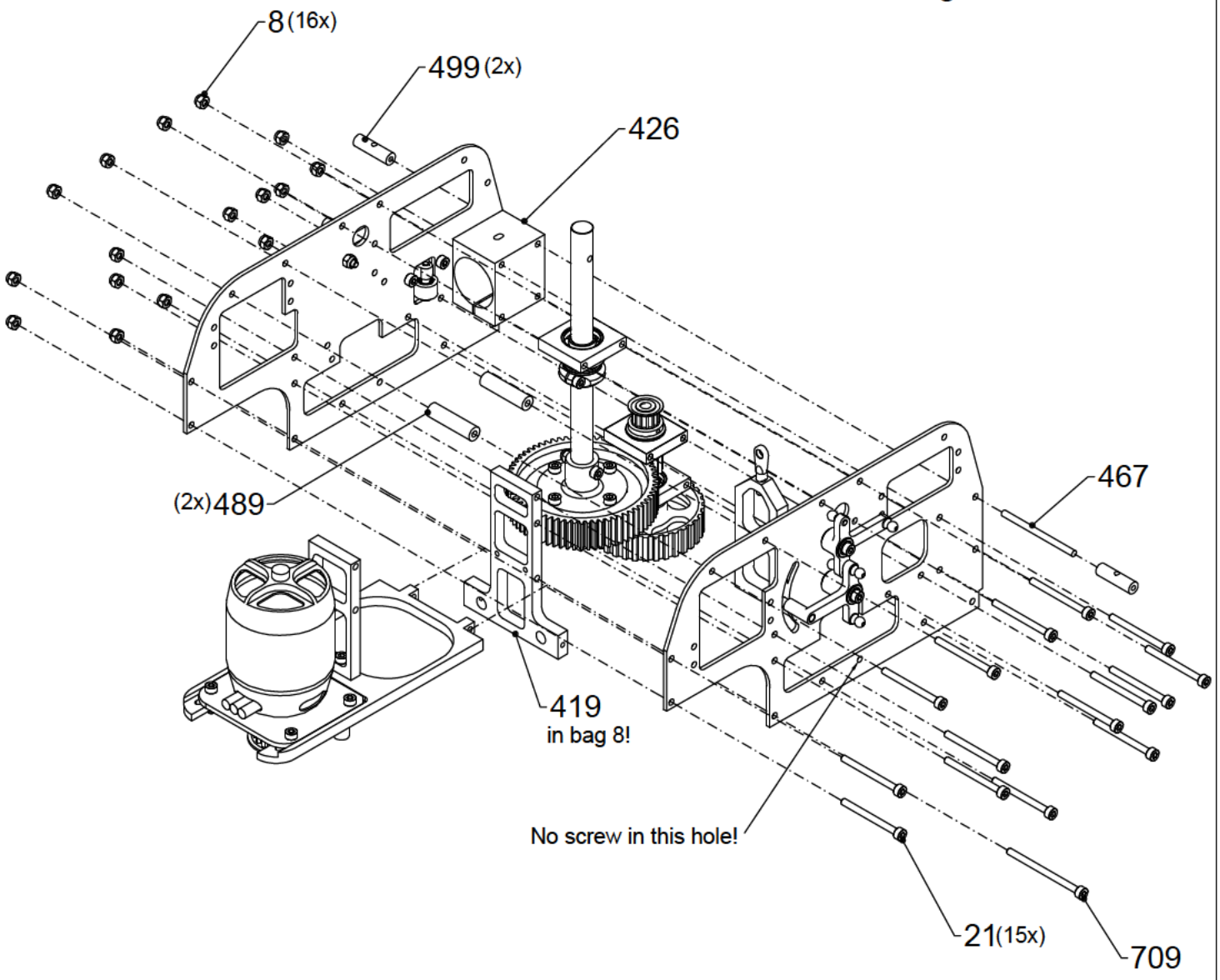
Ⓛ = use Loctite



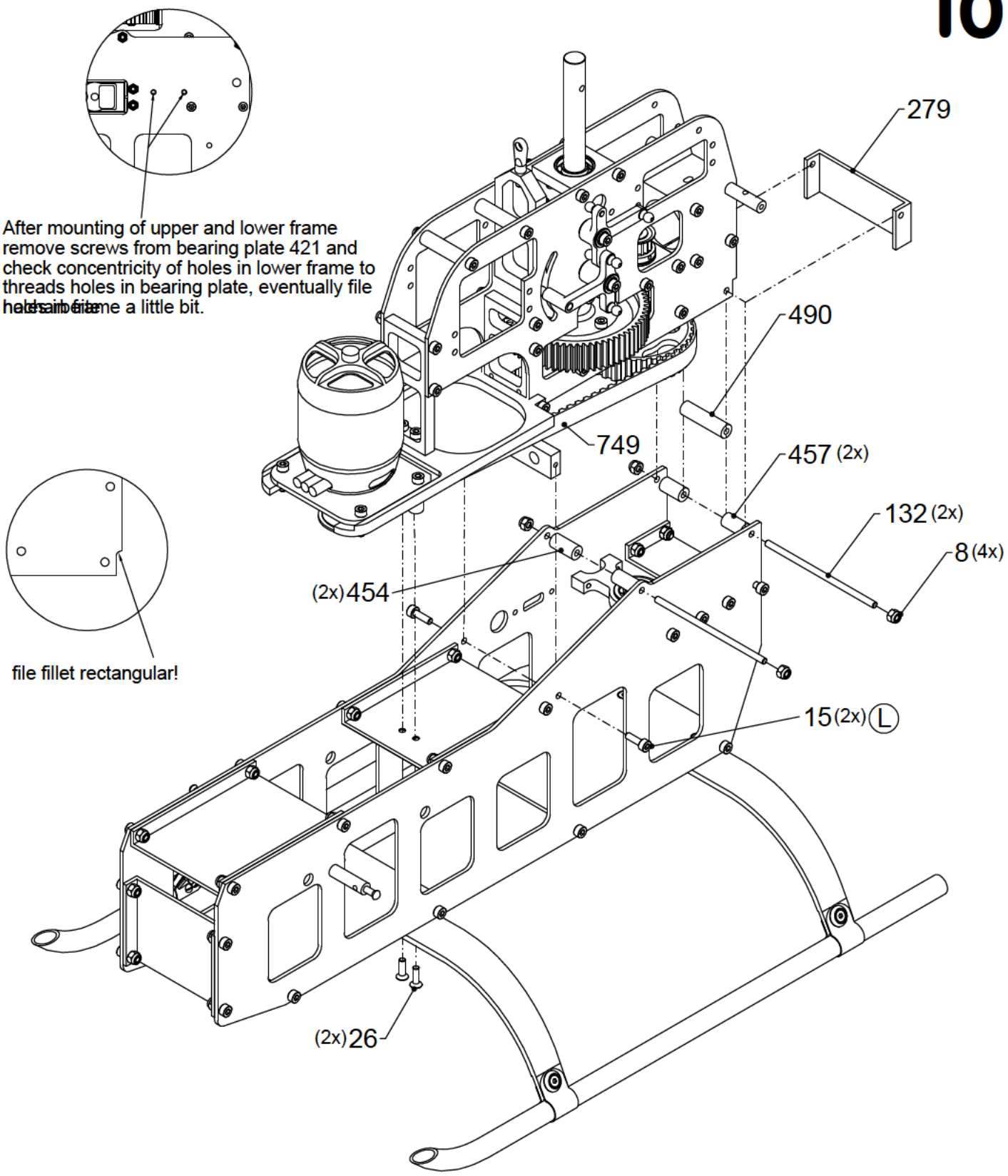

2 = washer M3
8 = Lock nut M3
14 = hexagon socket screw M3 x 8
16 = hexagon socket screw M3 x 12
18 = hexagon socket screw M3 x 20
35 = grub screw M4 x 5
760 = hexagon lense screw M4 x 8

Ⓛ = use Loctite

Mainshaft may not have any endplay!
Justate with collar ring!



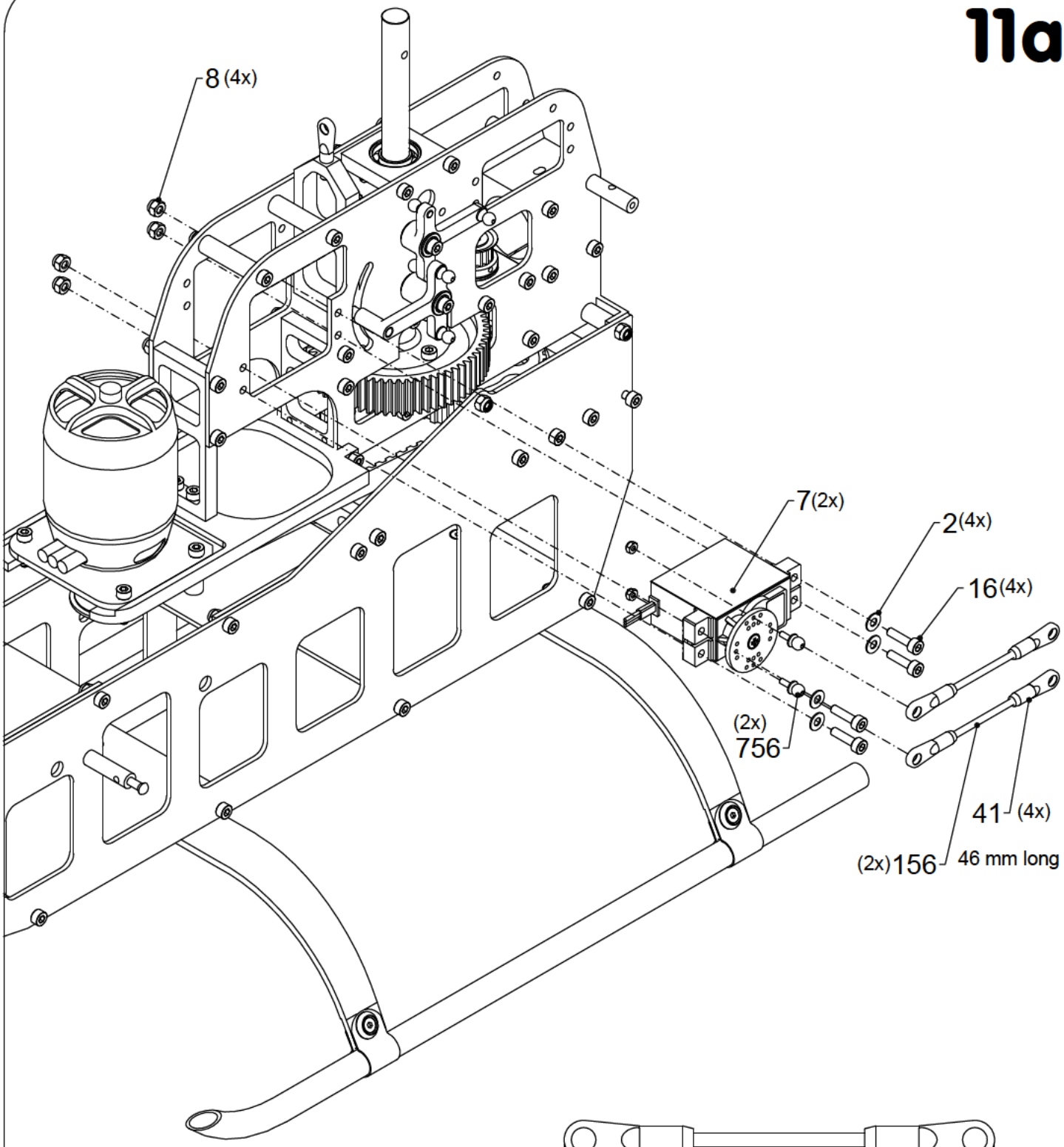

8 = lock nut M3
21 = hexagon socket screw M3 x 35
709 = hexagon socket screw M3 x 45

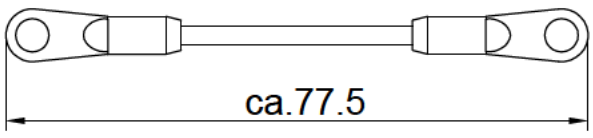



8 = lock nut M3
15 = hexagon socket screw M3 x 10
26 = hexagon flat head screw M3 x 10

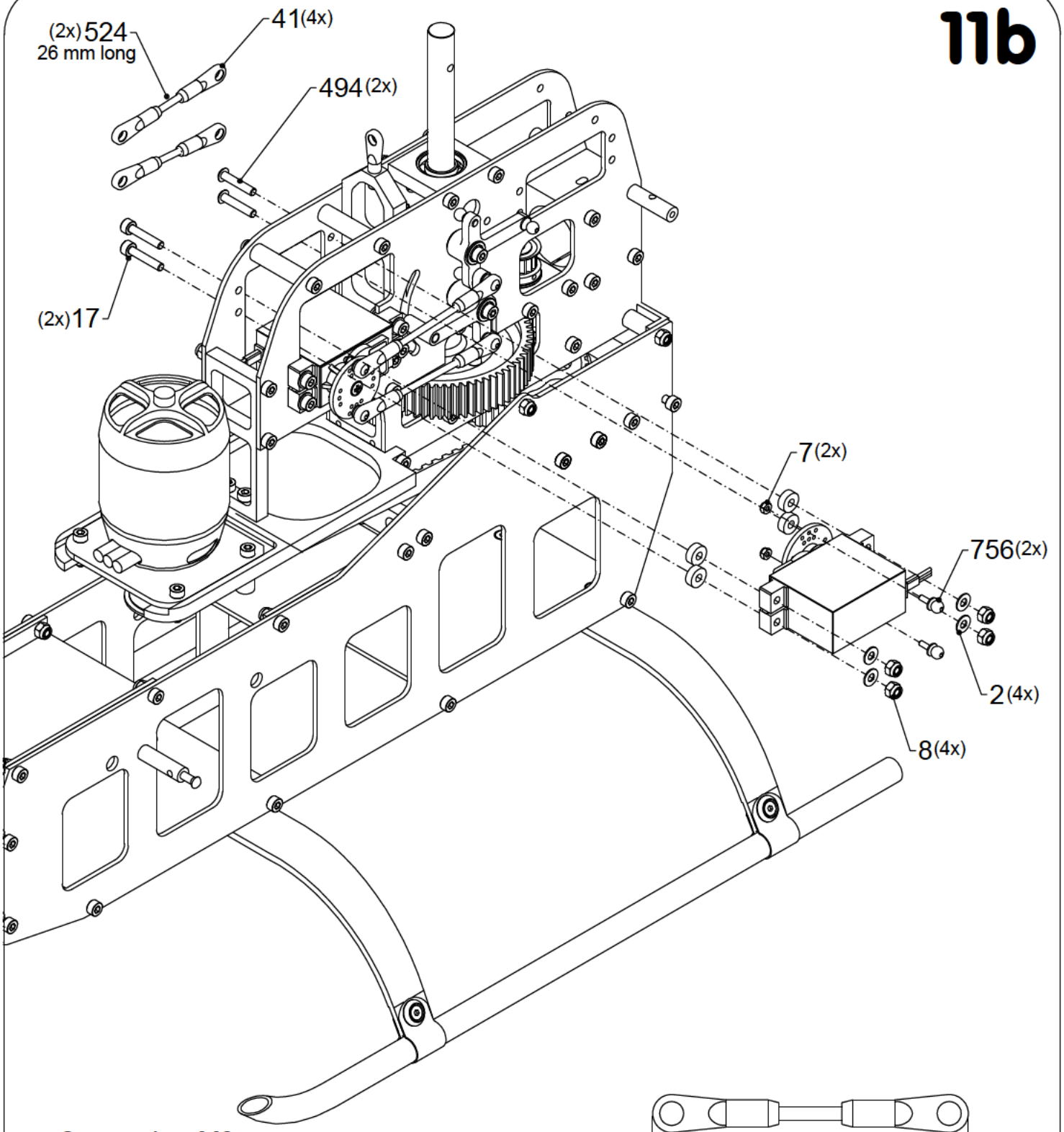
Ⓛ = use Loctite

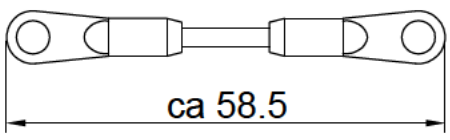
# 11a



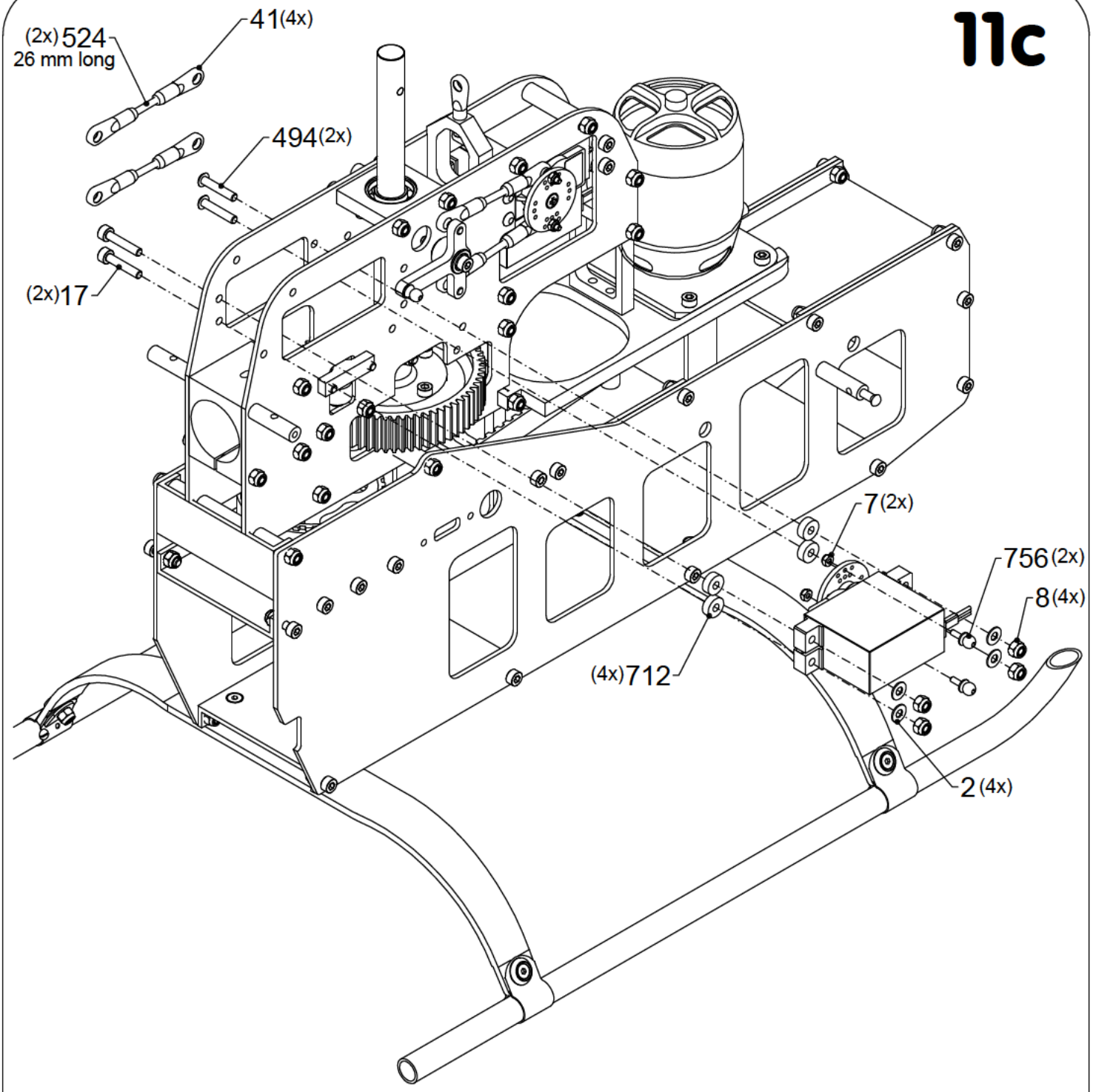

2 = washer M3
7 = lock nut M2
8 = lock nut M3
16 = hexagon socket screw M3 x 12
41 = ball joint 2.5

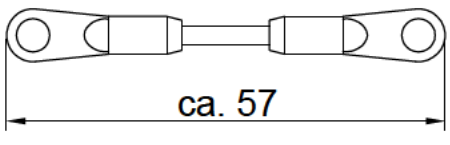


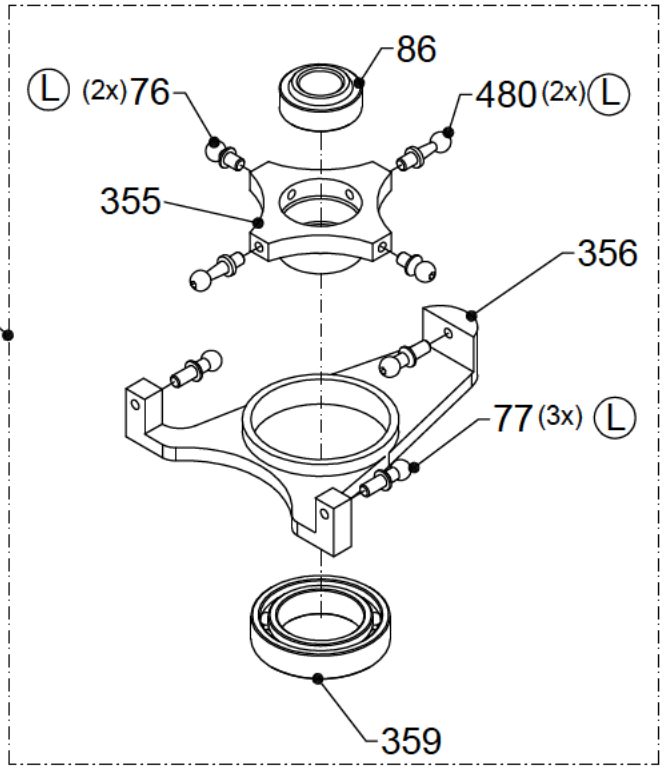

2 = washer M3
7 = lock nut M2
8 = lock nut M3
16 = hexagon socket screw M3 x 12
41 = ball joint 2.5
494 = hexagon lense screw M3 x 16

# 11c

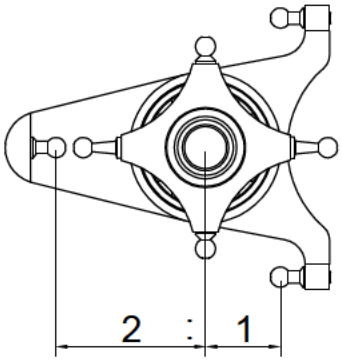


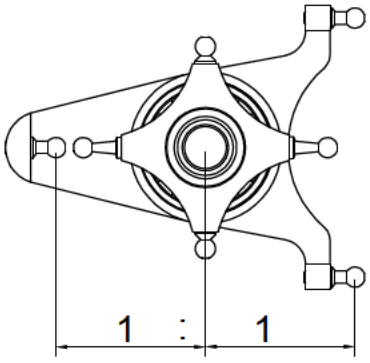

2 = washer M3
7 = lock nut M2
8 = lock nut M3
16 = hexagon socket screw M3 x 12
41 = ball joint 2.5
494 = hexagon lense screw M3 x 16




120°-mode (recommended)



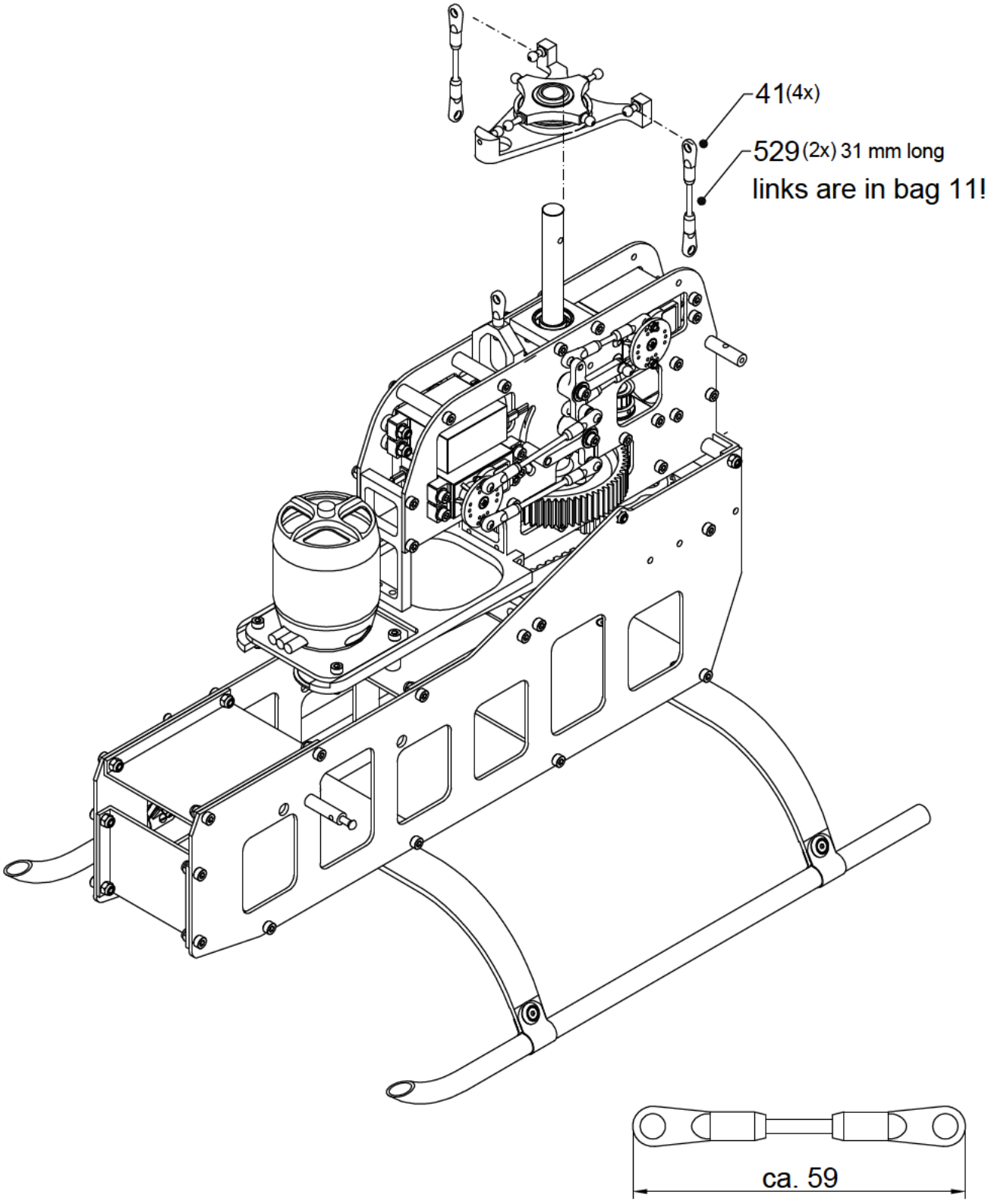

140°-mode



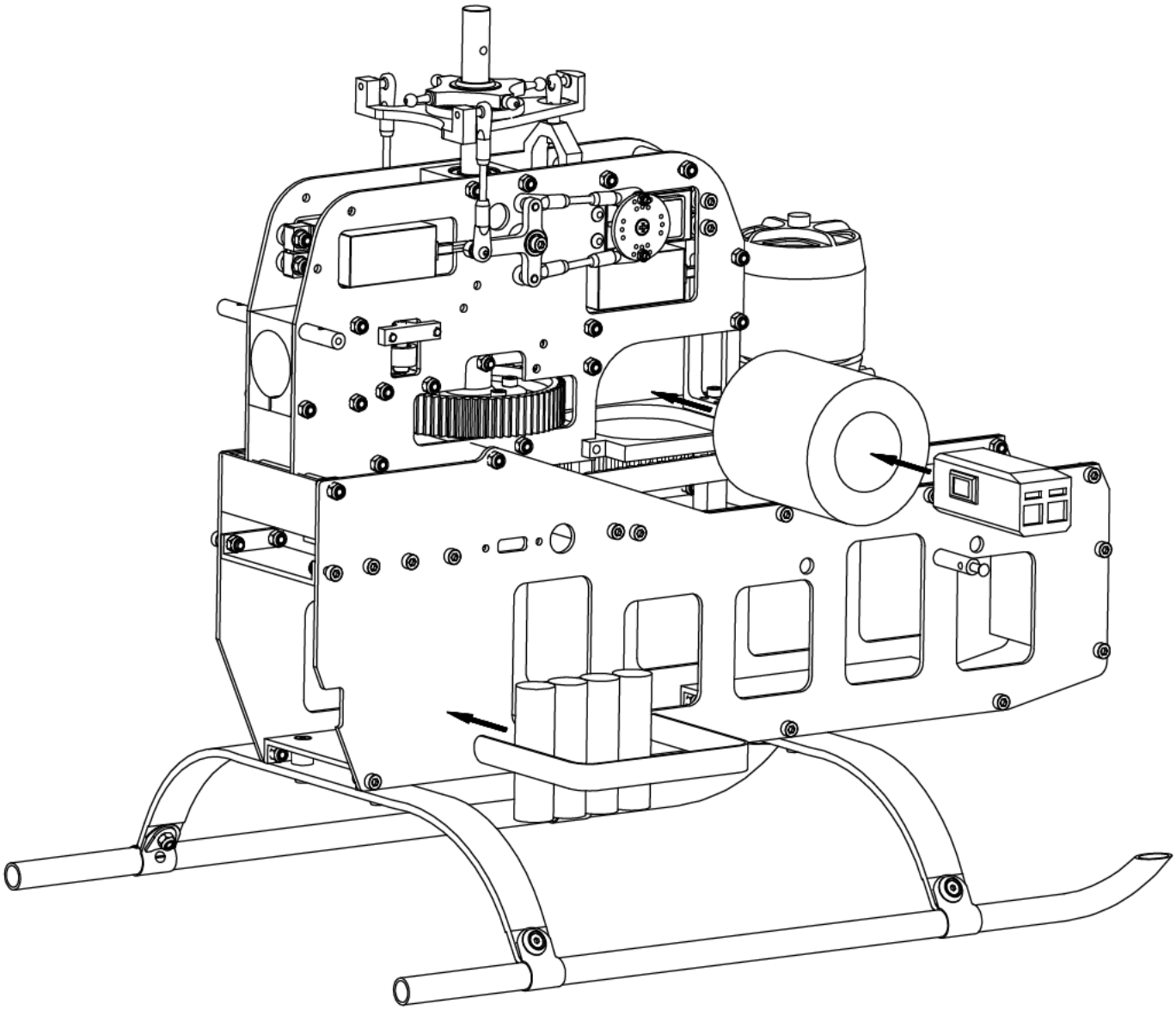

Screw the jount balls 480
with care!

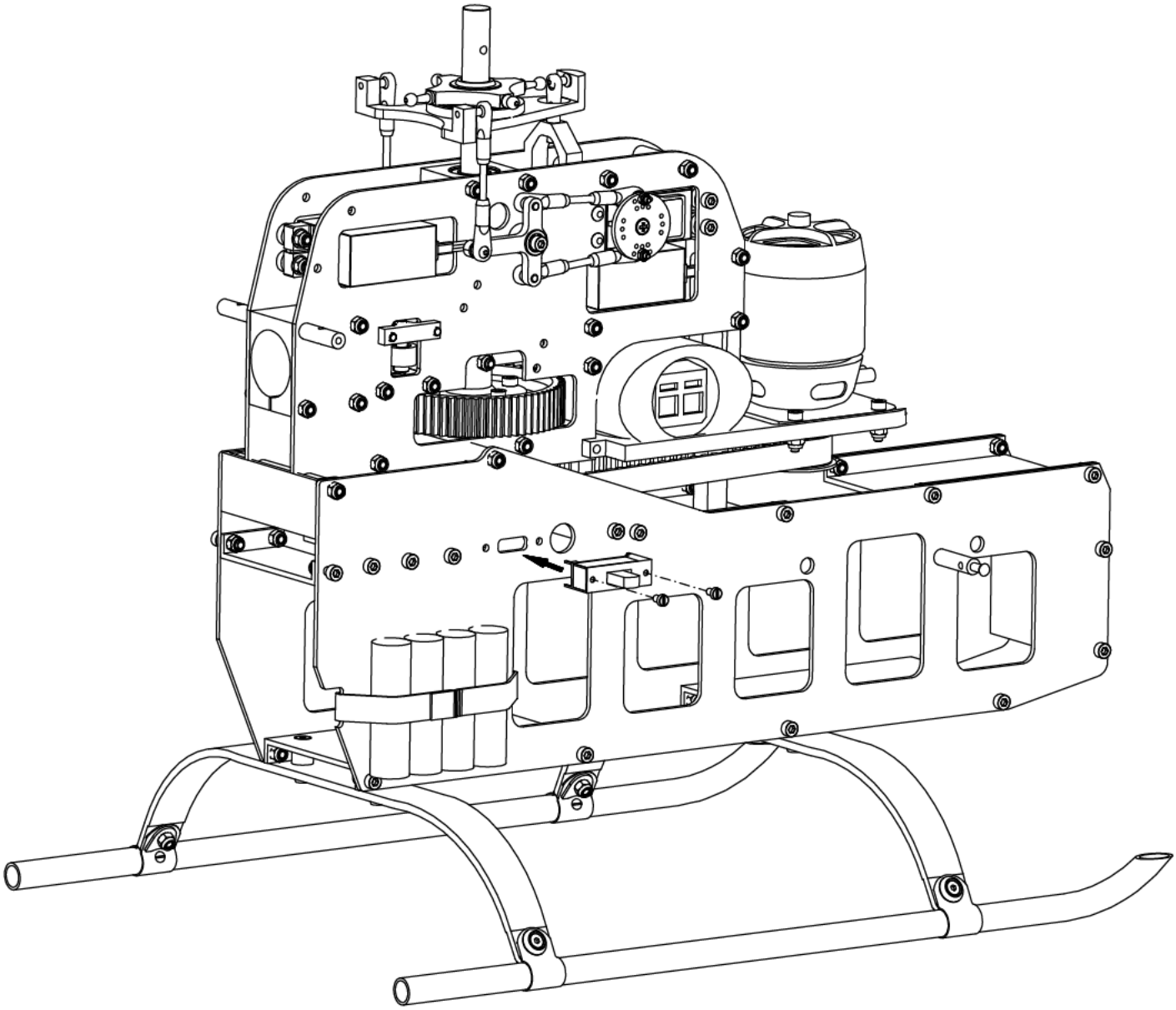
51 = washer 3 x 6 x 1
76 = joint bolt M 3 x 4
77 = joint bolt M 3 x 6
78 = joint bolt M 3 x 9

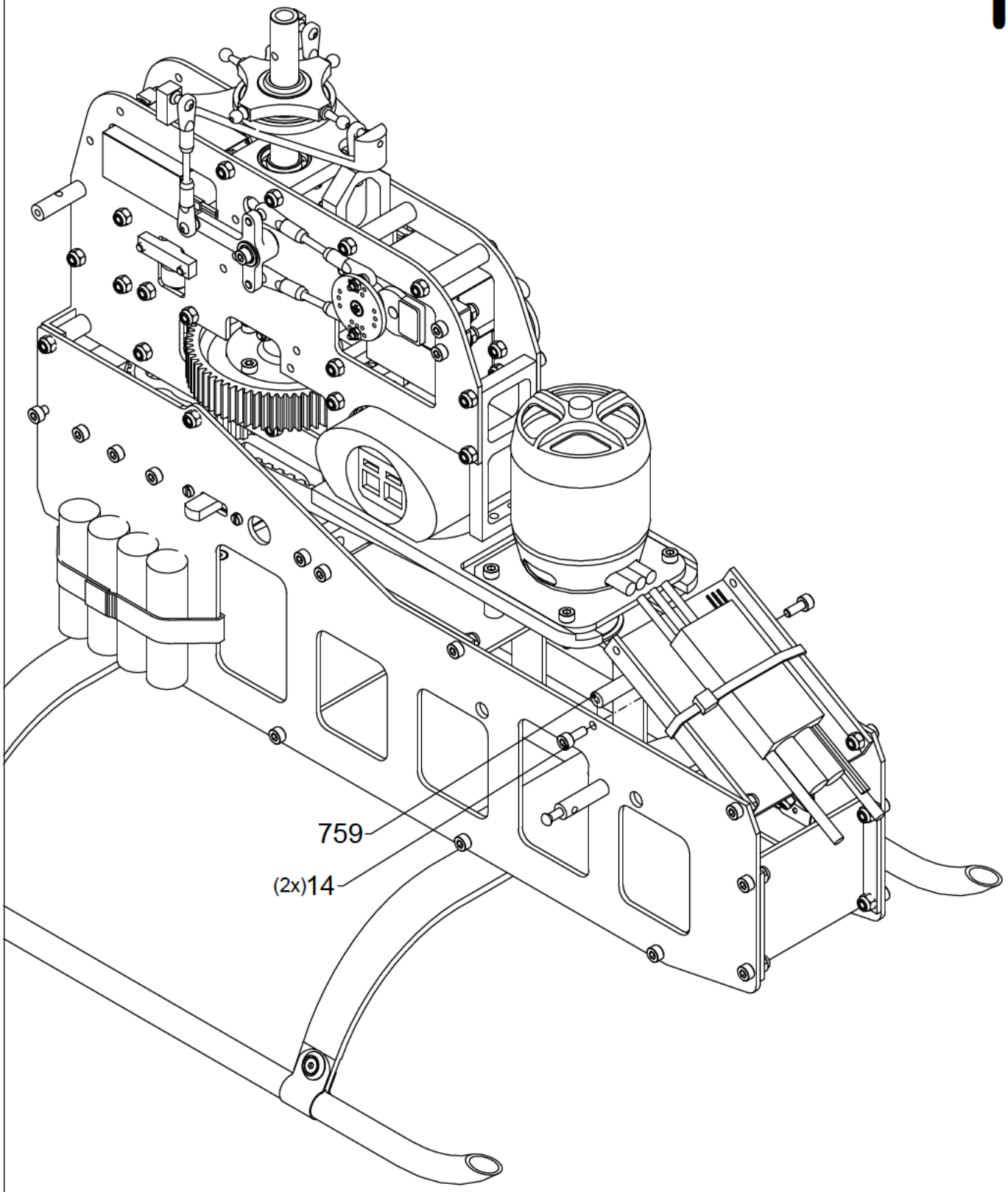
Ⓛ = use Loctite




41 = ball joint 2.5



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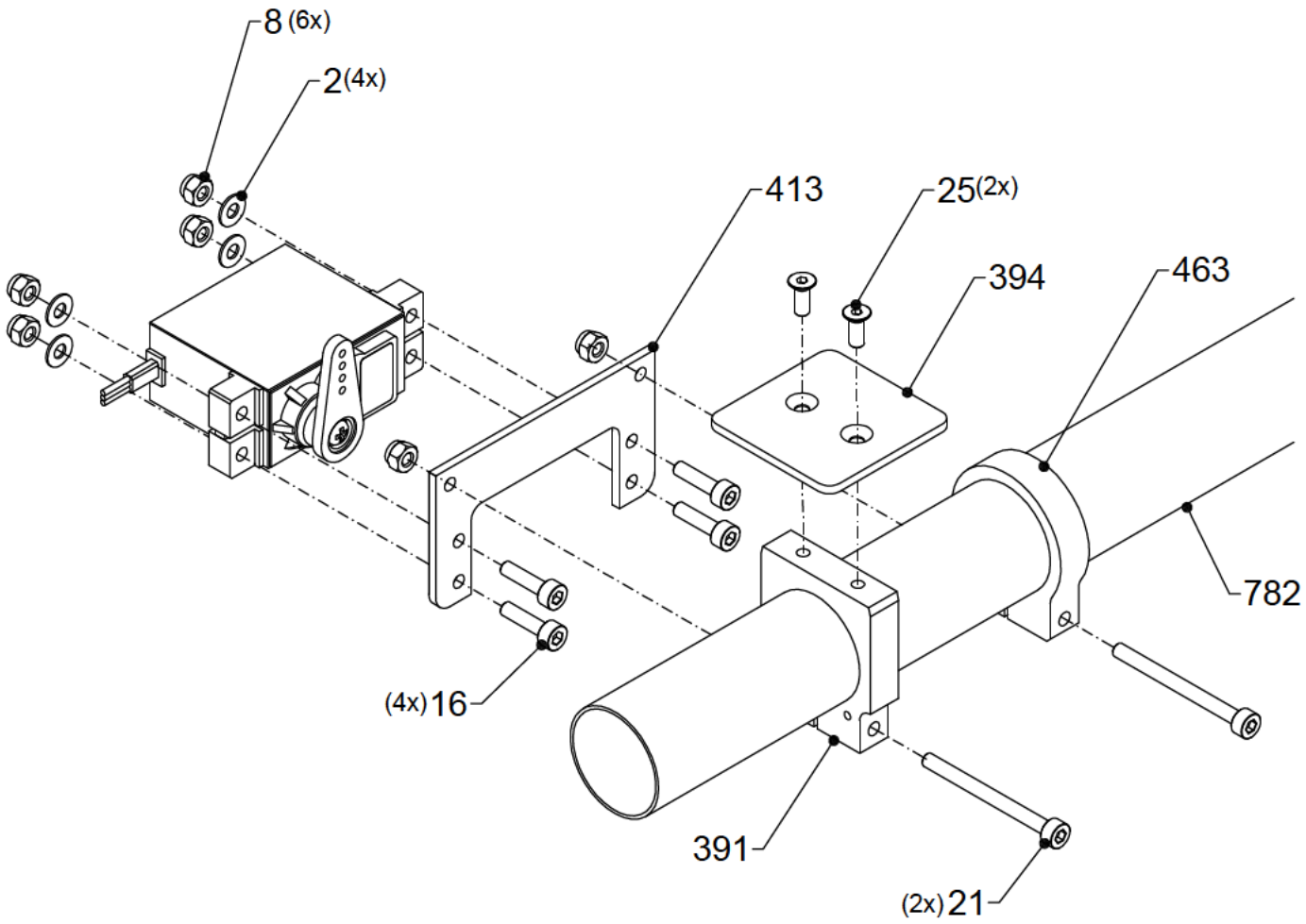
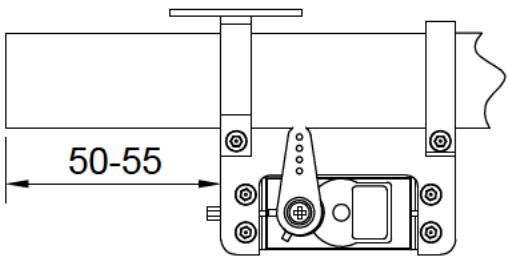
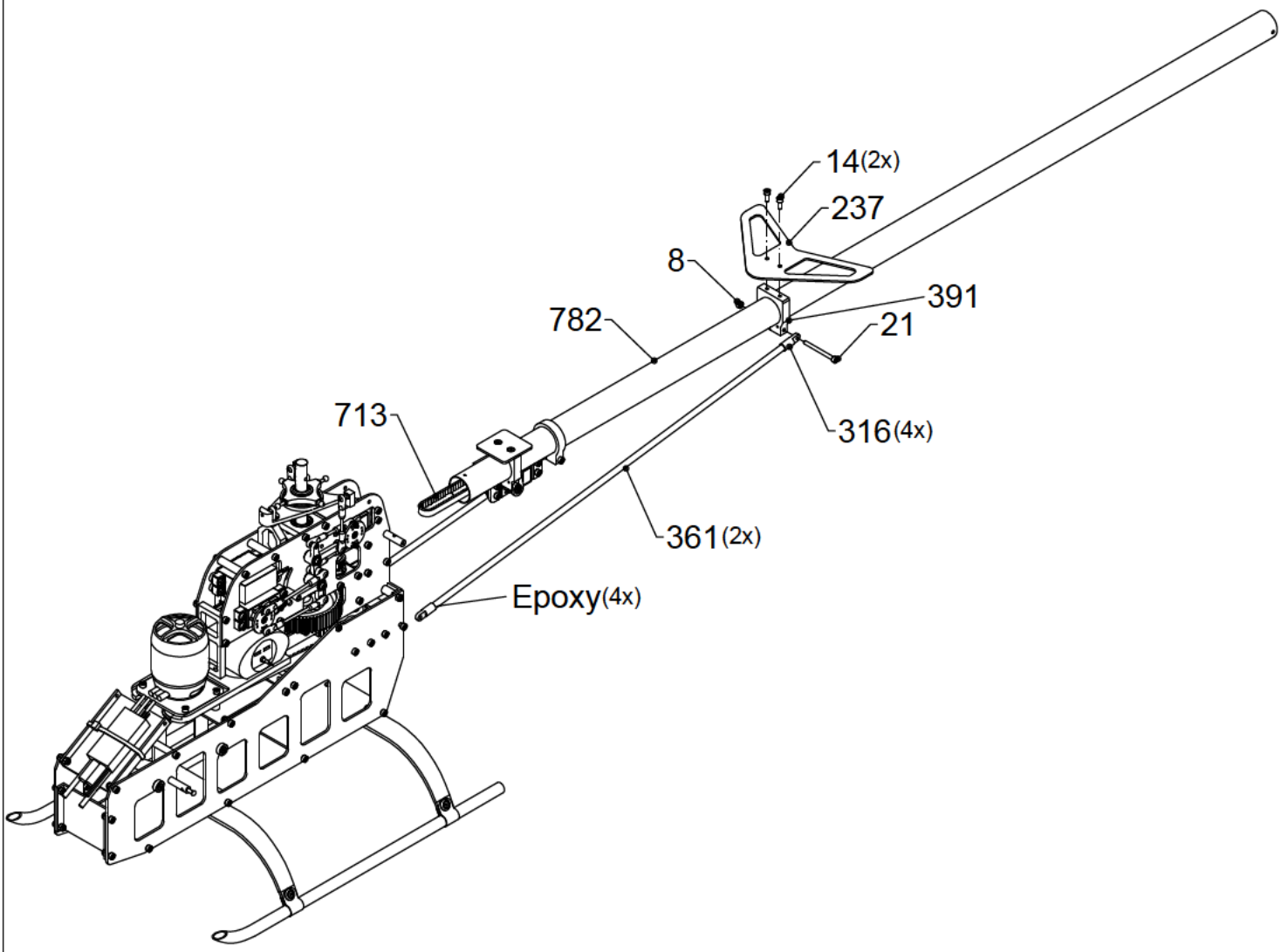
(2x)14



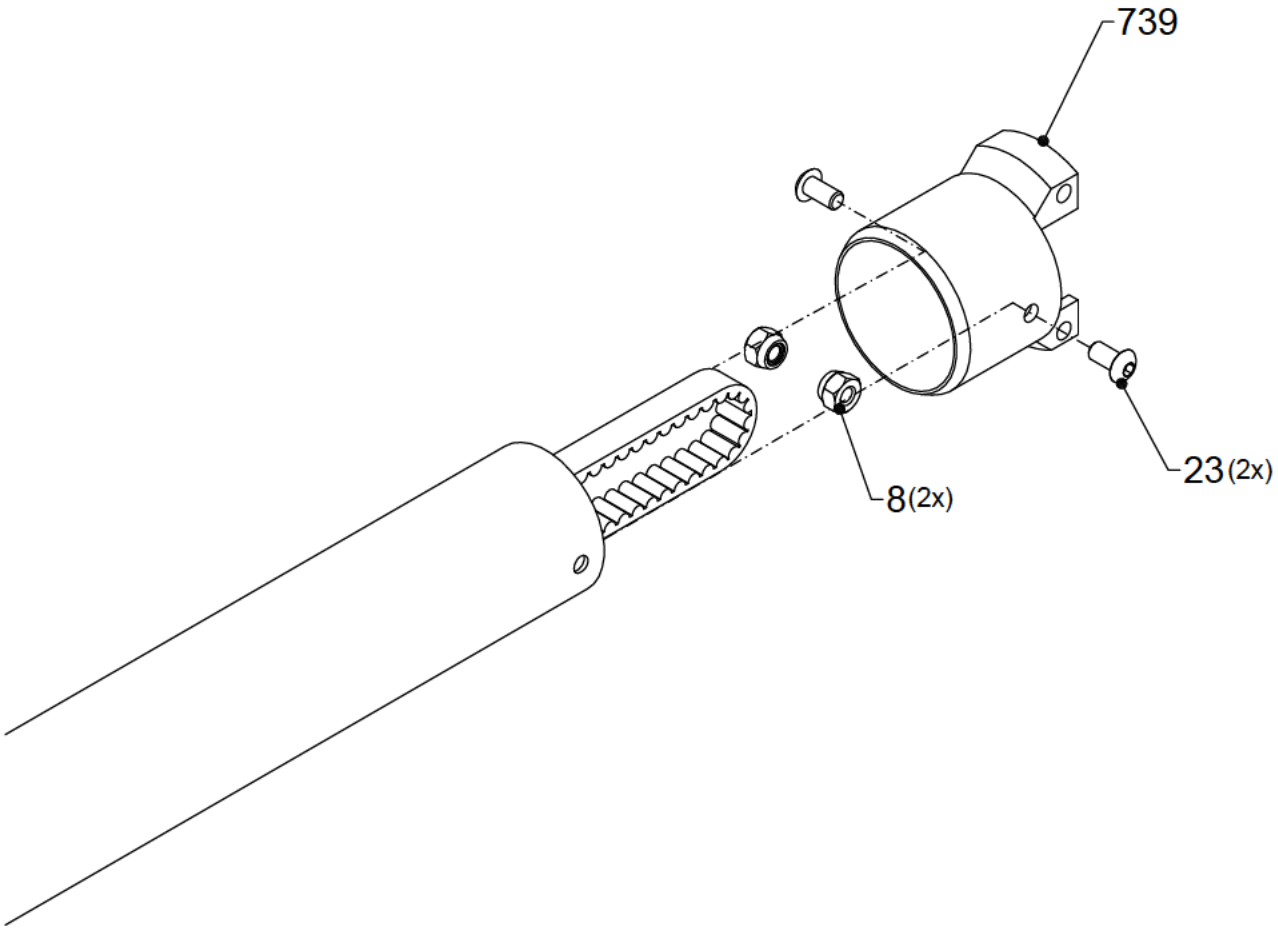




2 = washer M3
8 = lock nut M3
16 = hexagon socket screw M3 x 12
21 = hexagon socket screw M3 x 35
25 = hexagon flat head screw M3 x 8

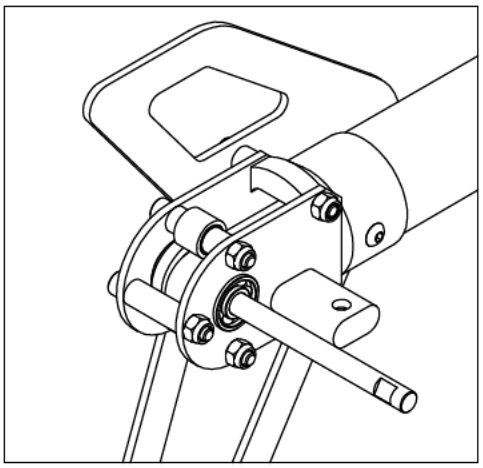


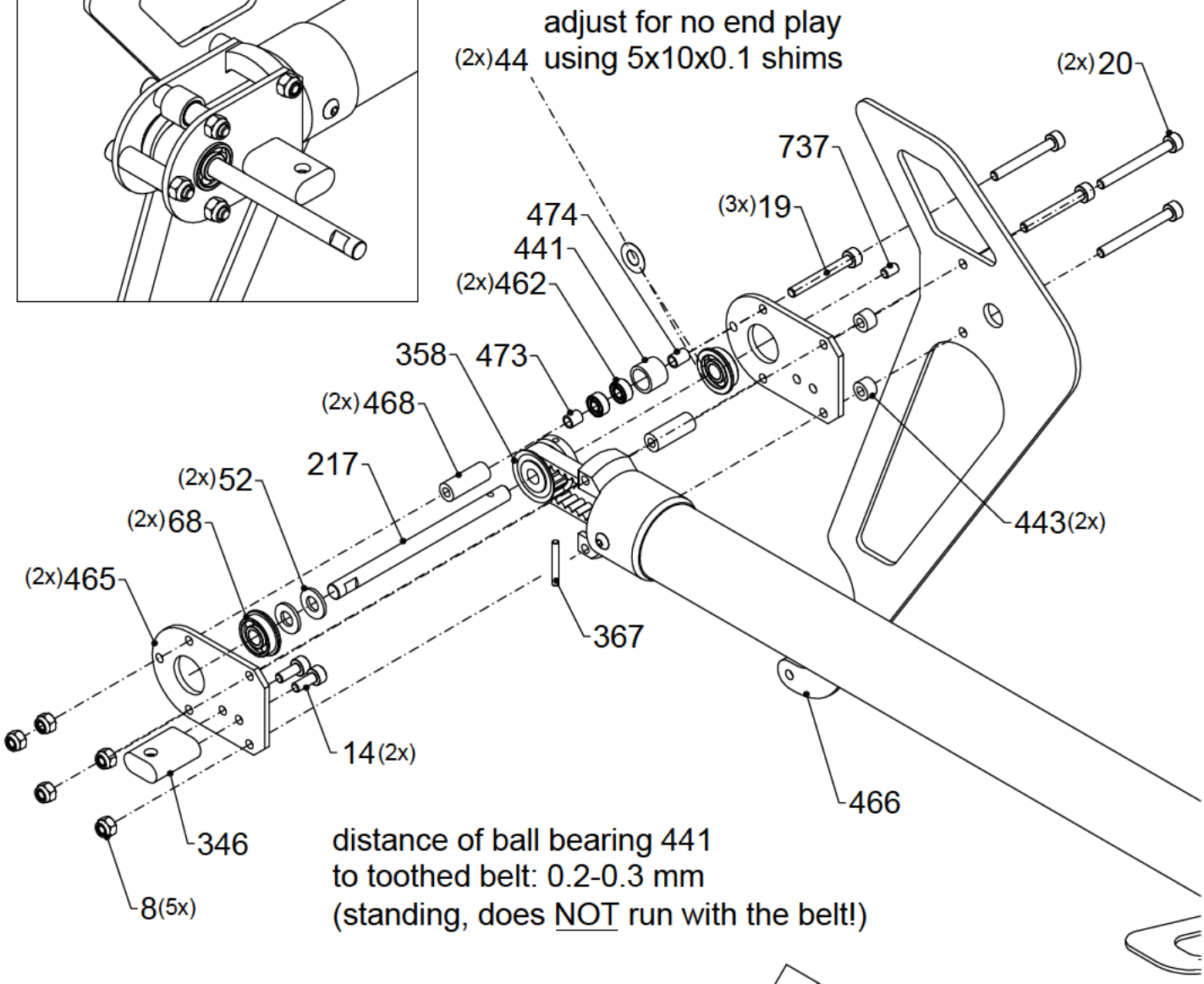

Tip: Pull belt with a cranked steel wire thru the tube!

14 = hexagon socket screw M3 x 8
21 = hexagon socket screw M3 x 35



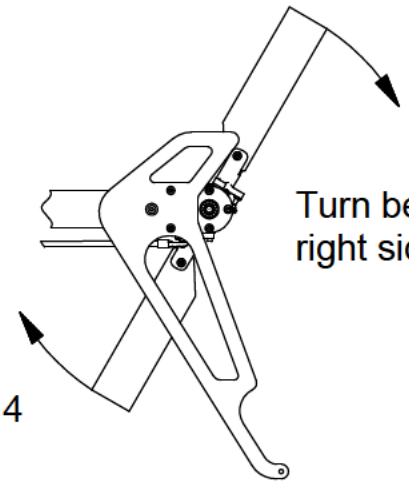

8 = lock nut M3
23 = hexagon lense screw M3x6



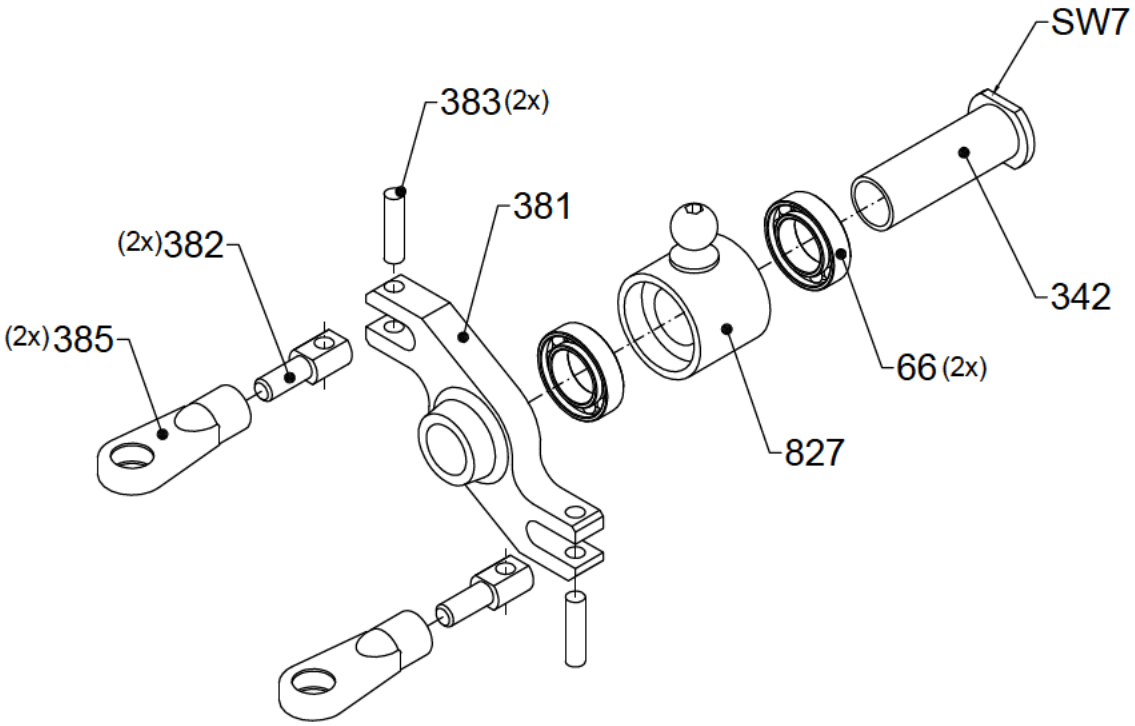



distance of ball bearing 441
to toothed belt: 0.2-0.3 mm
(standing, does NOT run with the belt!)

8 = lock nut M3
14 = hexagon socket screw M3x8
19 = hexagon socket screw M3 x 25
20 = hexagon socket screw M3 x 30
38 = rolled pin 2 x 16
52 = shim 5 x 10 x 1
68 = ball bearing with flange F5 x 13 x 4
443 = distance bush 3 x 6 x 4
473 = distance bush 3 x 6 x 5



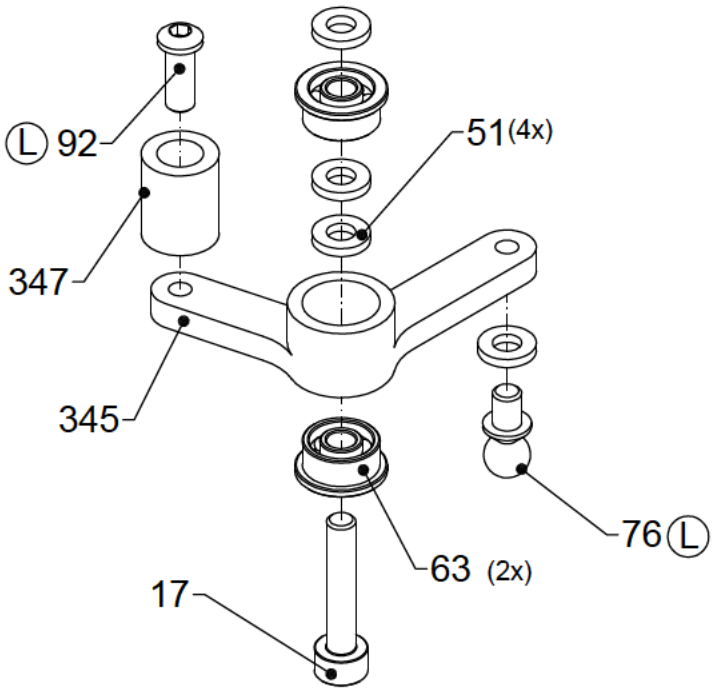
Turn belt 90 degree to the
right side (view from behind)!




Oil bearings frequently!

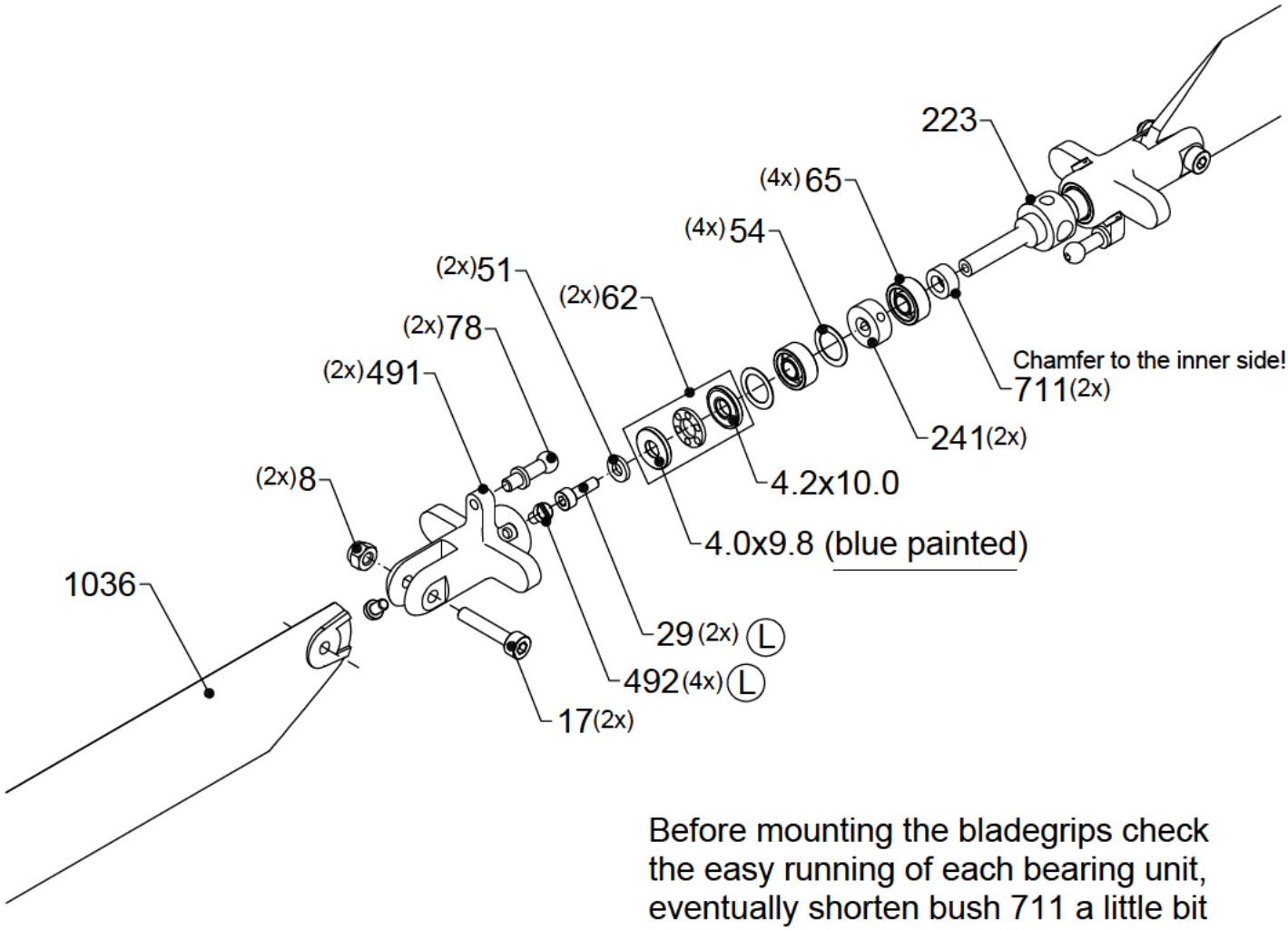
Tip: Don´t screw in by hand,
but press bridge on in a vice
(check for squareness)!

66 = ball bearing 6 x 10 x 2,5




17 = hexagon socket screw M3 x 16
51 = shim 3 x 6 x 1
63 = ball bearing with flange F3 x 8 x 4
76 = joint bolt M3 x 4
92 = hexagon lense screw M3 x 8 Spezial

Ⓛ = use Loctite



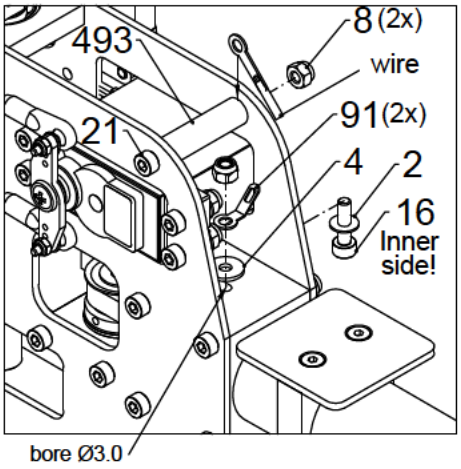

Before mounting the bladegrips check the easy running of each bearing unit, eventually shorten bush 711 a little bit (remove from side with chamfer with sandpaper)!

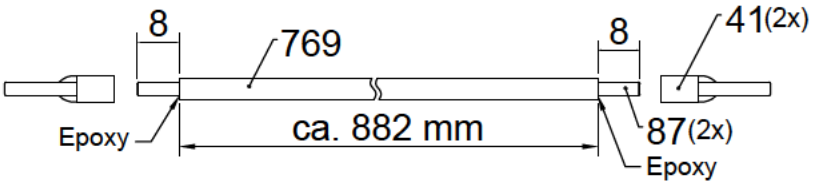
Important: Blue painted thrust bearing washer must be mounted at the outside!

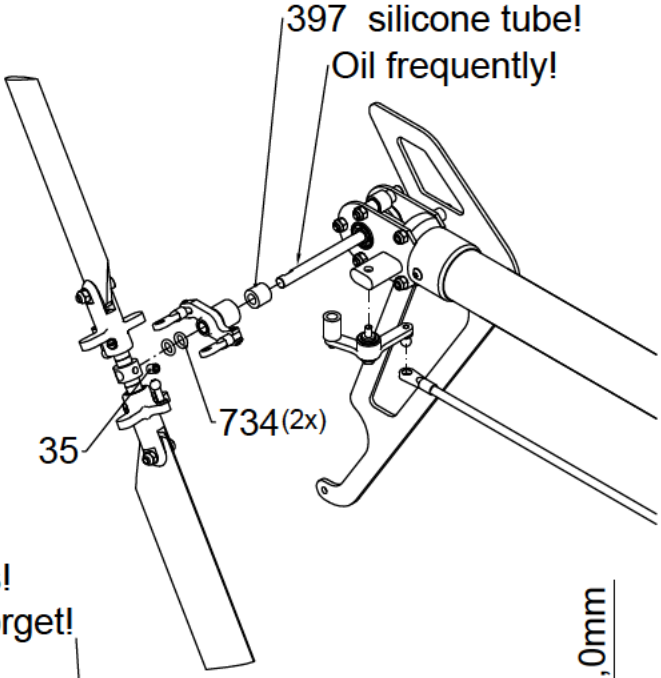
8 = lock nut M3
17 = hexagon socket screw M3 x 16
29 = hexagon socket screw M 2,5 x 8
30 = hexagon flat head screw M2,5 x 5
51 = shim 3 x 6 x 1
54 = shim 7 x 10 x 0,2
62 = axle bearing B4
65 = ball bearing 4 x 10 x 4
78 = joint bolt M3 x 9
492= cylindric screw M2.5 x 4

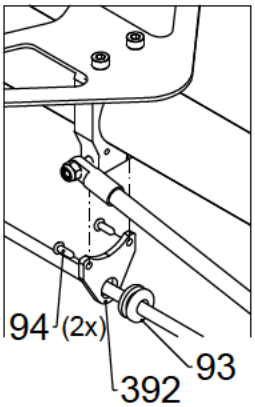
Ⓛ = use Loctite

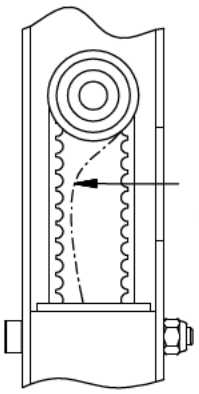
ground strap



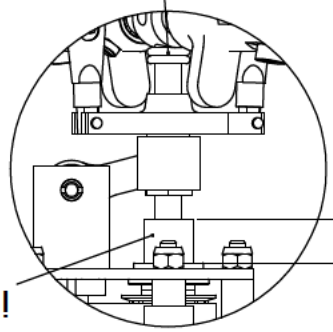



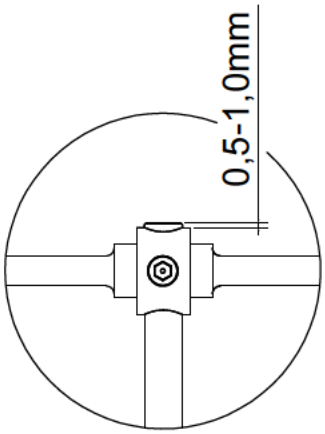



belt should not touch other side of belt (press with thumb)

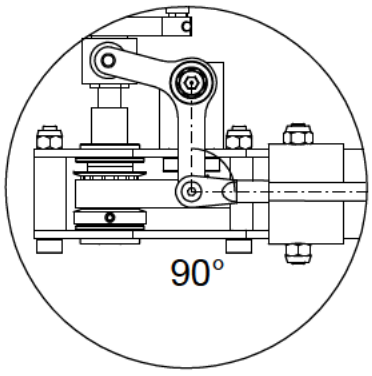
O-Rings!
Don´t forget!



Silicone tube!
Don´t forget!




min. 8,5mm

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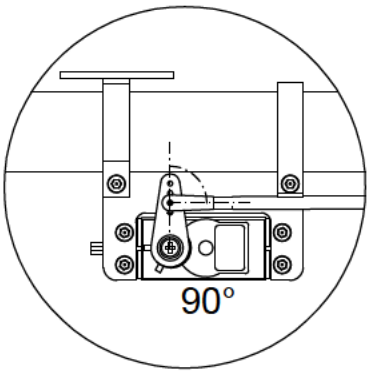
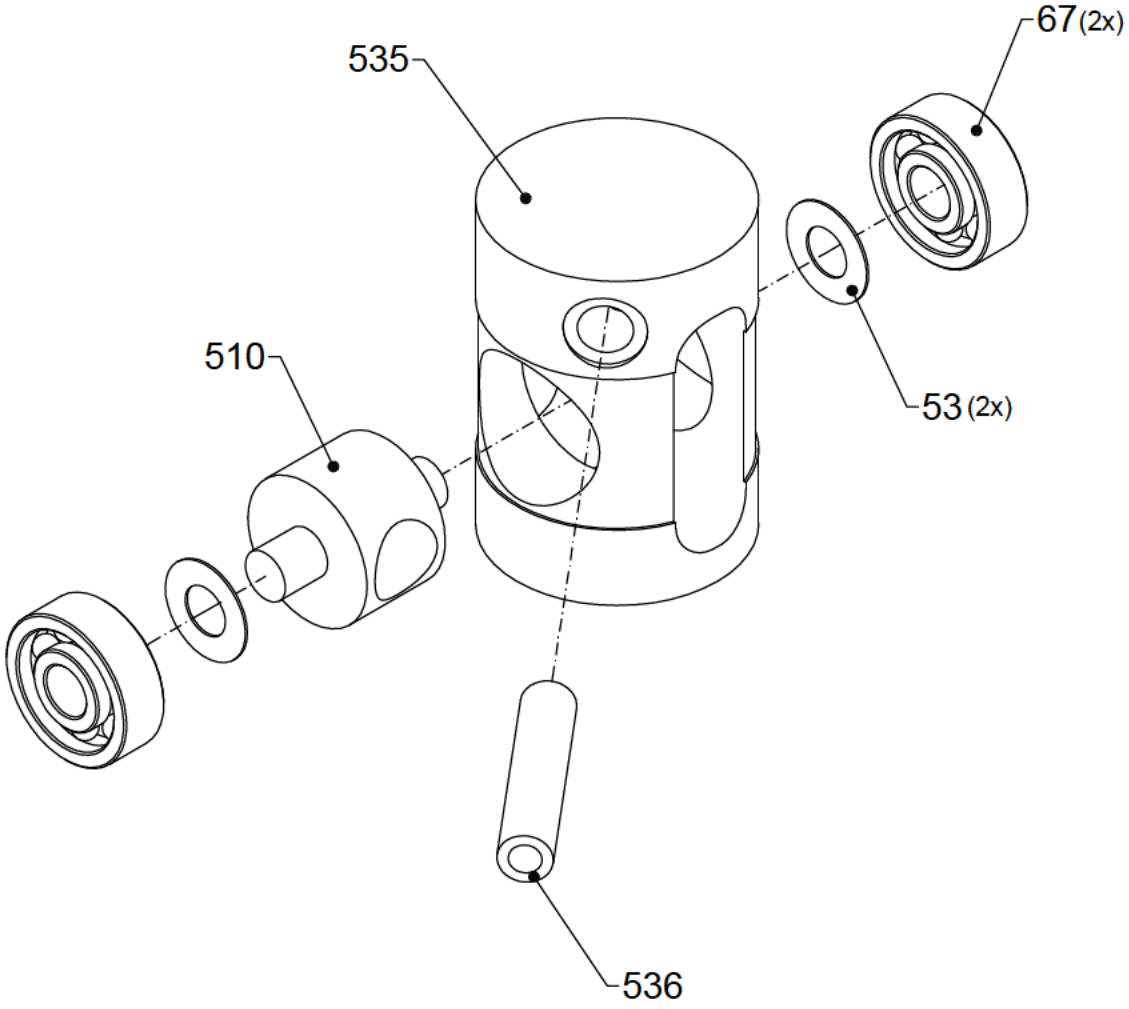
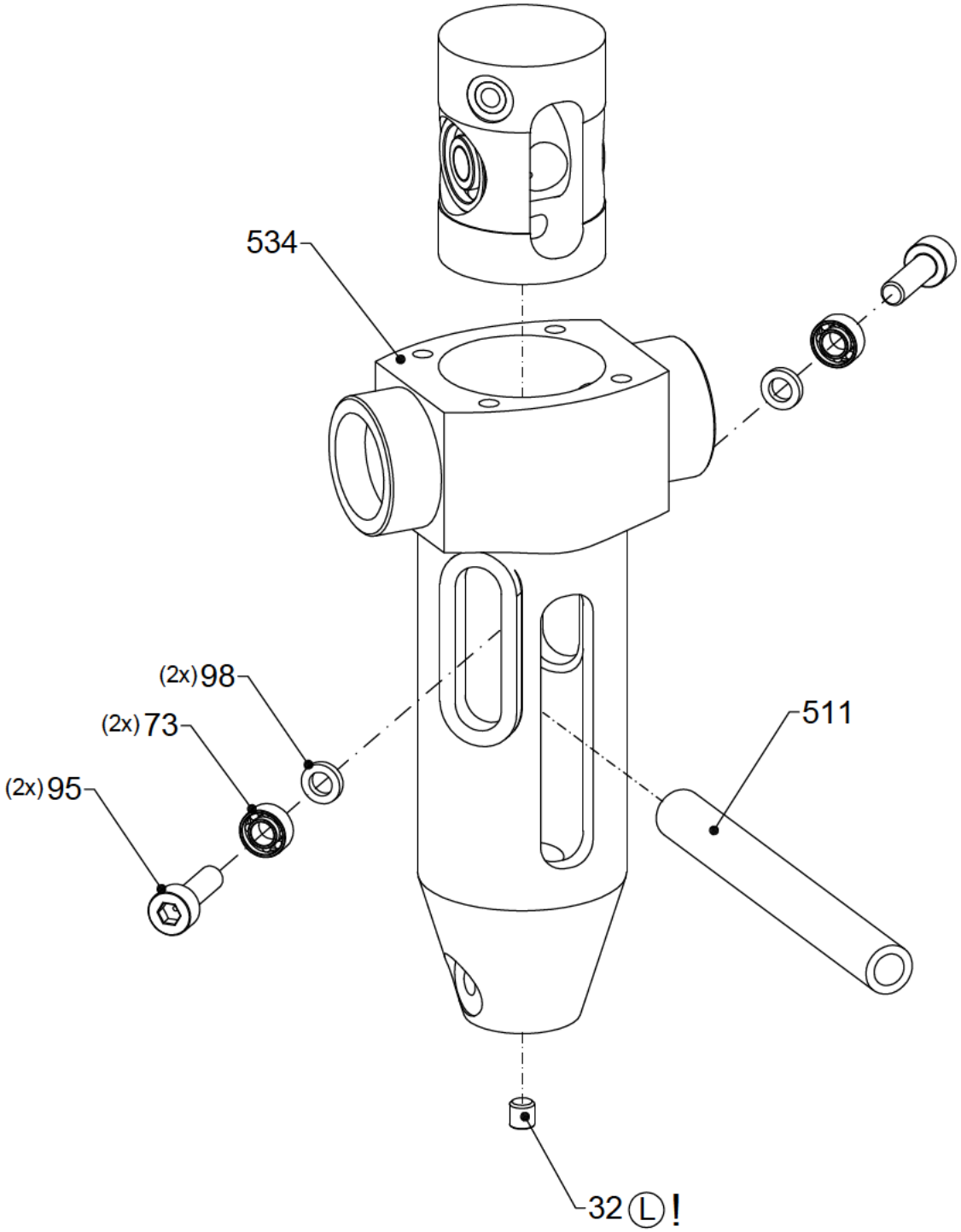



2 = washer M3
4 = washer M3 large
6 = clevis 2.5 PA
8 = lock nut M3
16 = hexagon screw M3 x 12
35 = grub screw M4 x 5
41 = ball joint 2.5
87 = control rod 2.5 x 26
94 = self tapping screw 2.2 x 6.5



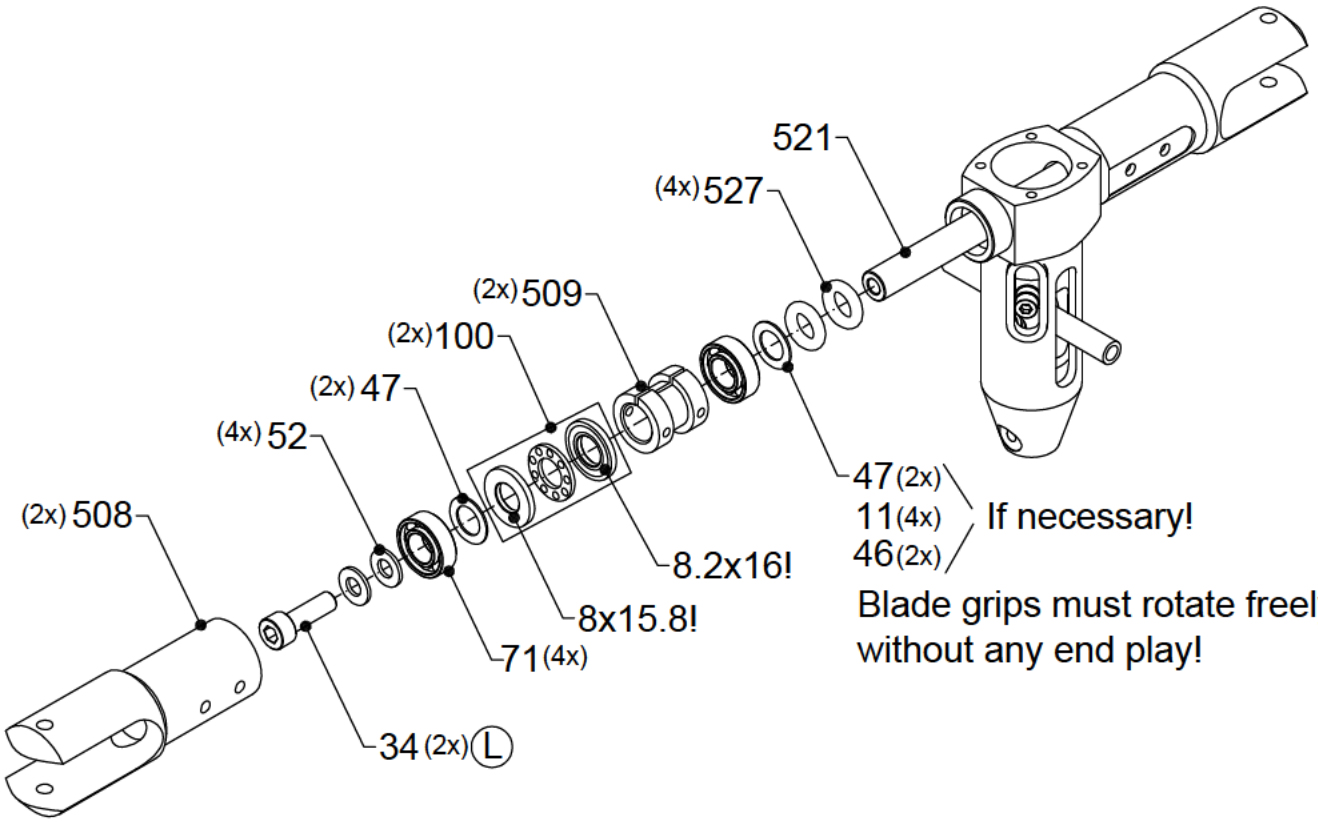

53 = shim 4x8x0.1
67 = ball bearing 4x12x4

Do not oil or lubricate piston!
Keep dry and clean!




95 = hexagon socket screw M3 x 10 alloy steel
32 = hexagon grub screw with cone point M4x5 alloy steel

Ⓛ = use Loctite



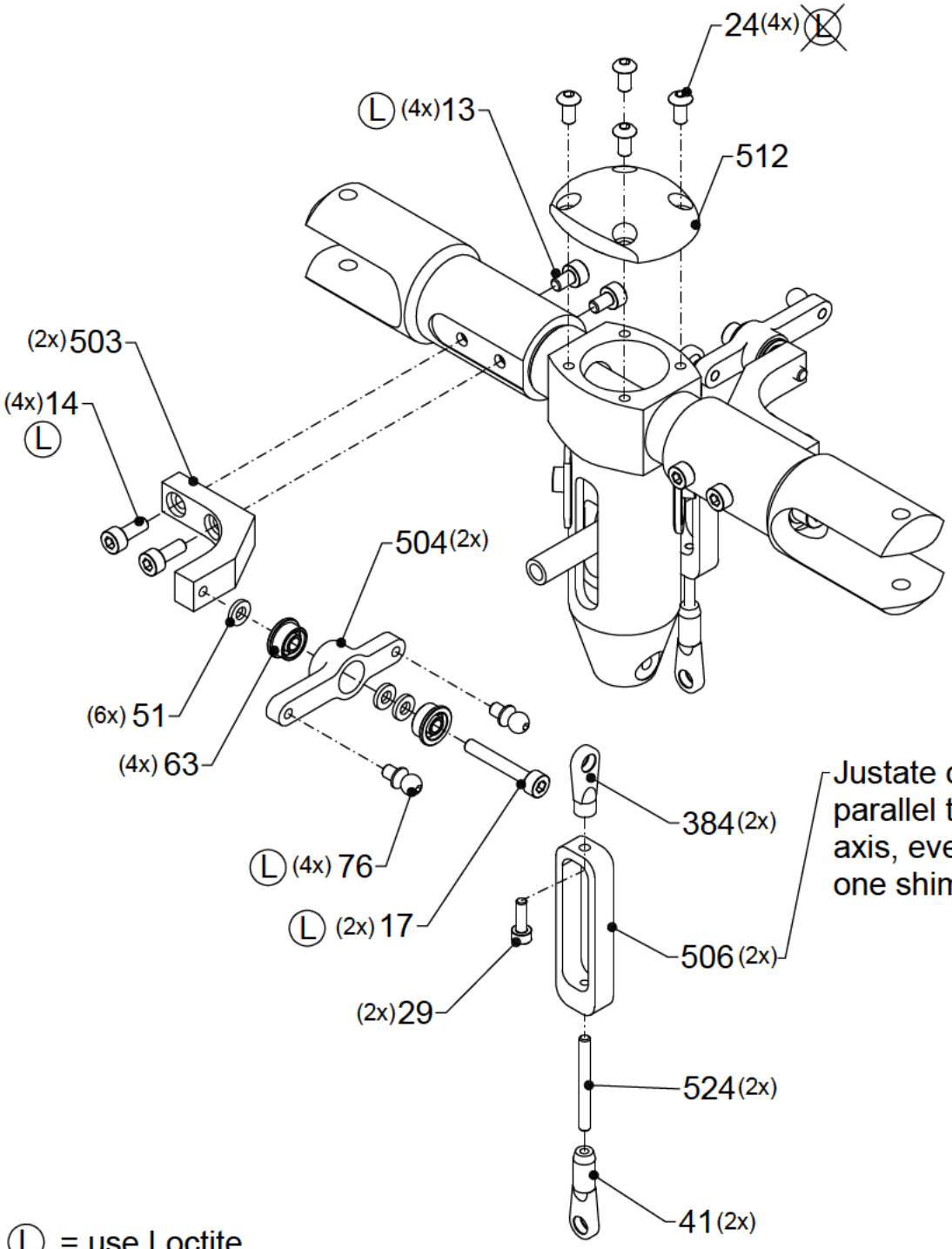

Blade grips must rotate freely but without any end play!

Lubricate O-Rings!
assembly may require the blade grips to be heated to 150°C/300°F

11 = shim 8x14x0.2
34 = hexagon socket screw M5x12 12.9
46 = shim 8x14x0.1
47 = shim 8x14x0.5
52 = shim 5x10x1
71 = ball bearing 8 x 16 x 5
100 = axle bearing B8

Ⓛ = use Loctite

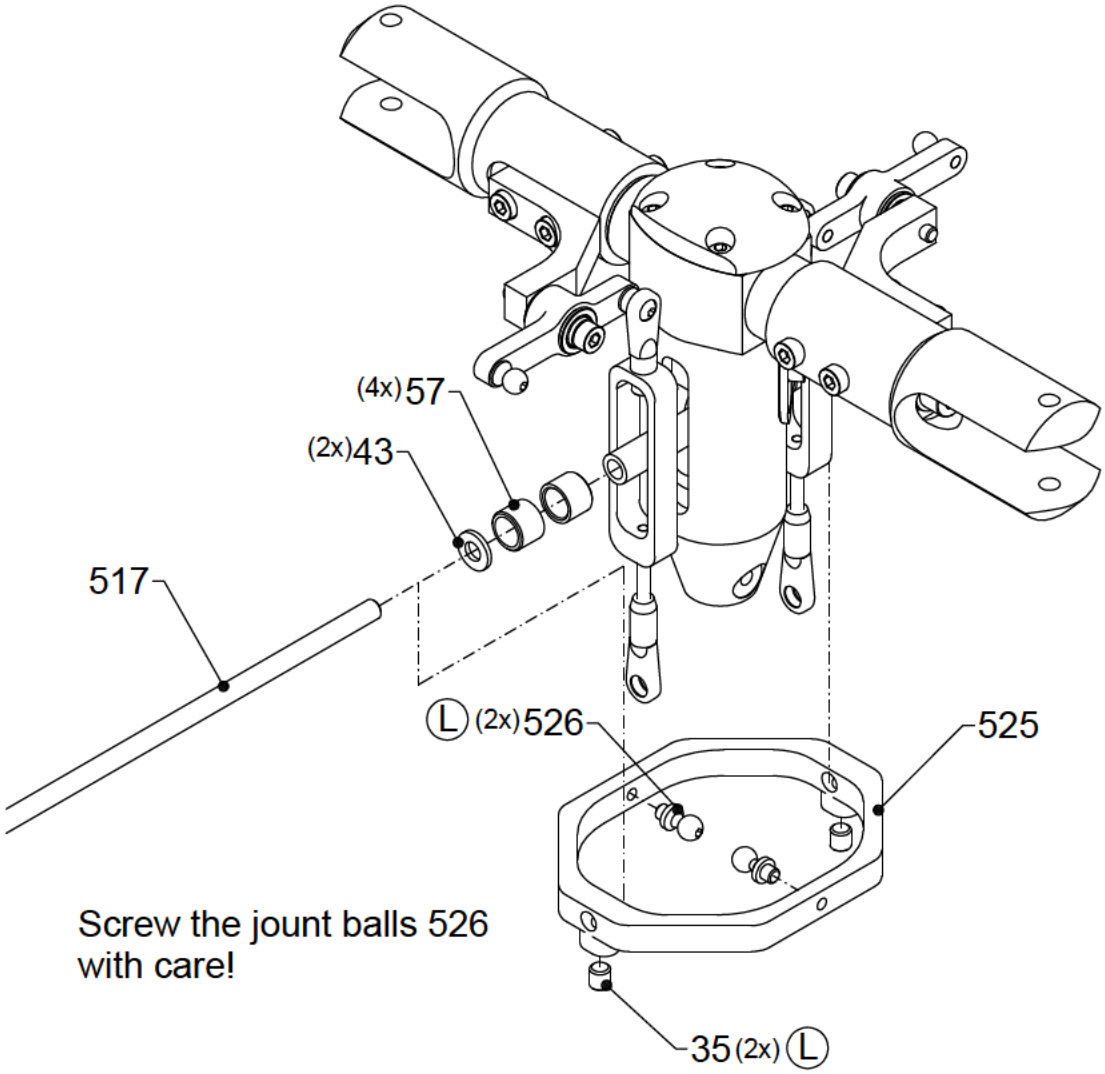
Note: Steering arm 503 is on the backside of the rotorblade!




Justate coupling 506 parallel to the hub or vertical axis, eventually remove one shim #51.

L = use Loctite
13 = hexagon socket screw M3 x 5
14 = hexagon socket screw M3 x 8
17 = hexagon socket screw M3 x16
24 = hexagon lense screw M3 x 8
29 = hexagon socket screw M2,5 x8

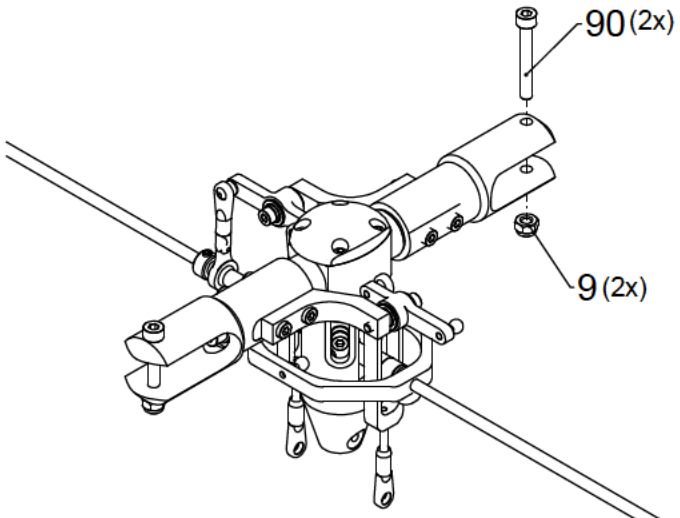
L = do not use Loctite
41 = ball joint 2.5
51 = shim 3x6x1
63 = flange bearing F3x8x4
76 = joint bolt M3 x 4



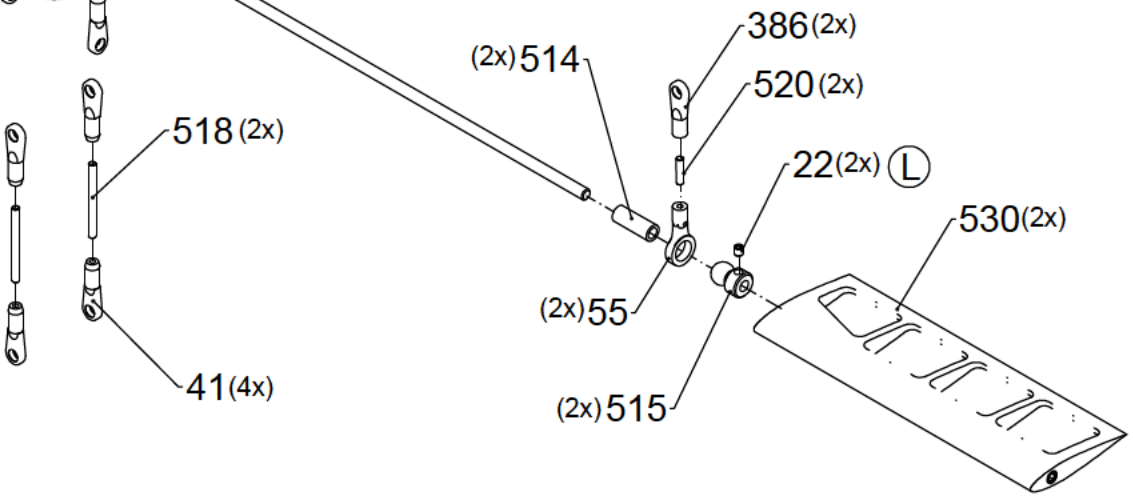

Screw the jount balls 526
with care!

35 = grub screw M4 x 5
43 = shim 4 x 8 x 1
57 = teflon bearing

Ⓛ = use Loctite

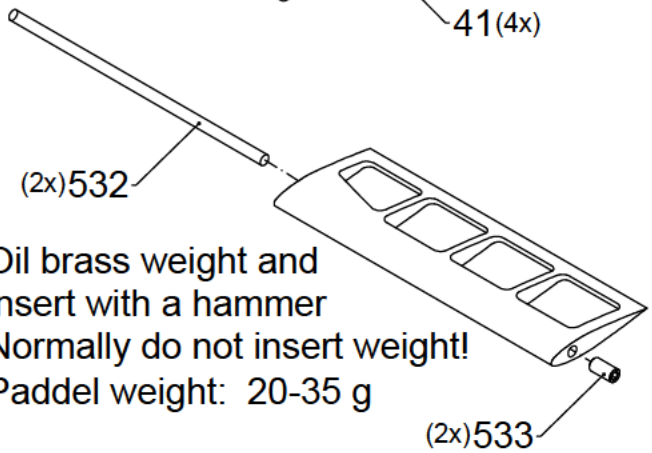



screw depth of paddles: 35 - 36 mm
screw both paddles at the same length!



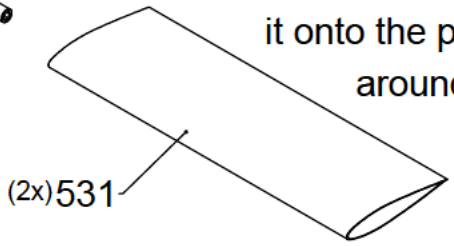






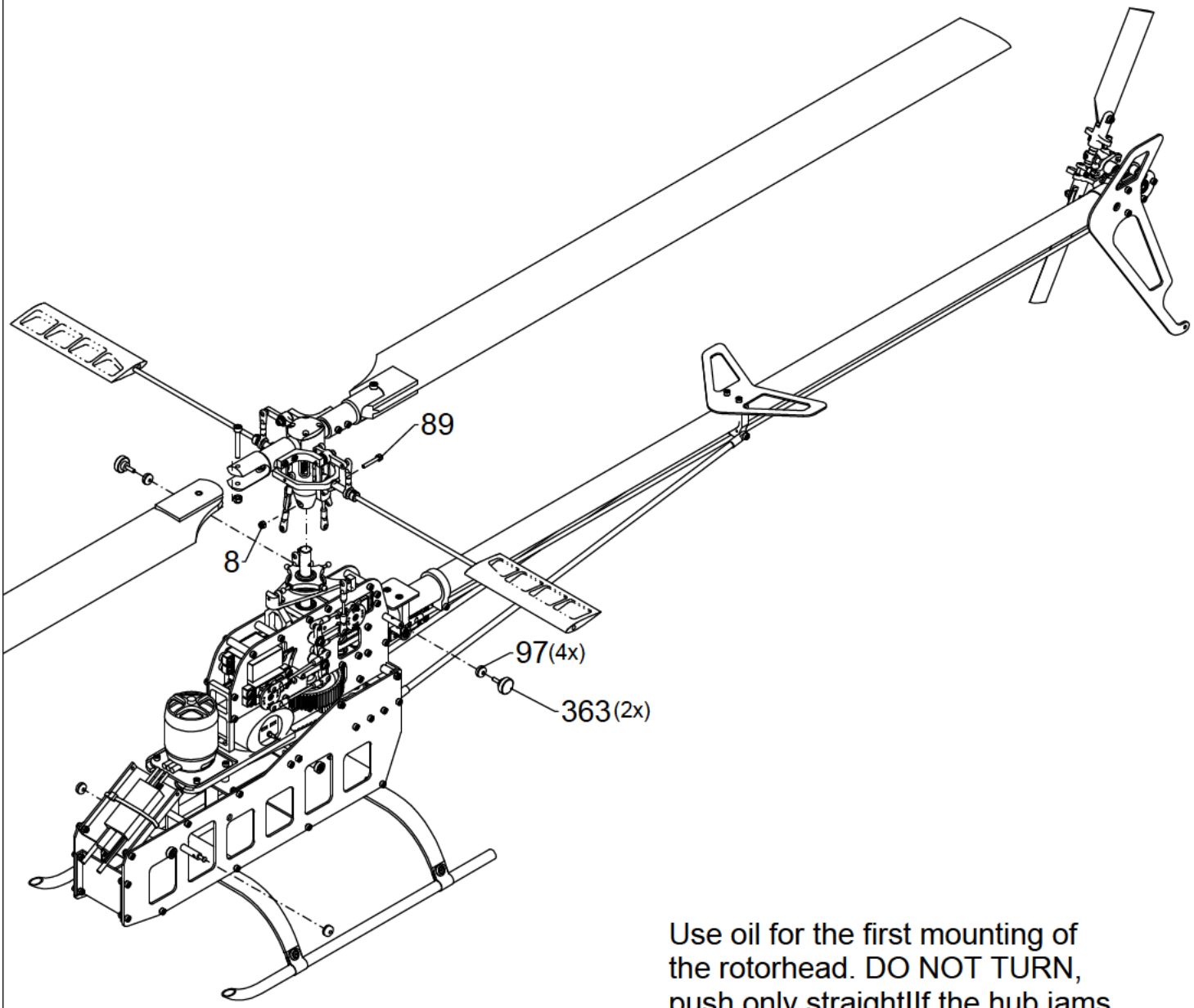

Oil brass weight and
insert with a hammer
Normally do not insert weight!
Paddel weight: 20-35 g

Cut the shrink tube with 8 mm overlap at each end and then use a hair dry to shrink it onto the paddle. Pull tube around the edges.



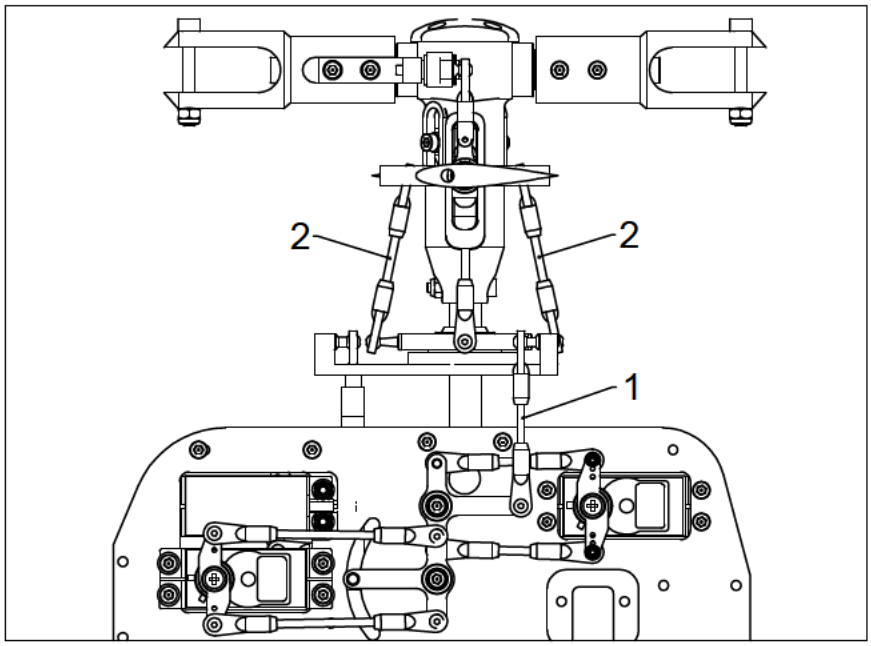

9 = nut with lock ring M4
22 = headless hexagon socket screw M3 x 3
41 = ball joint 2.5
55 = ball joint 8

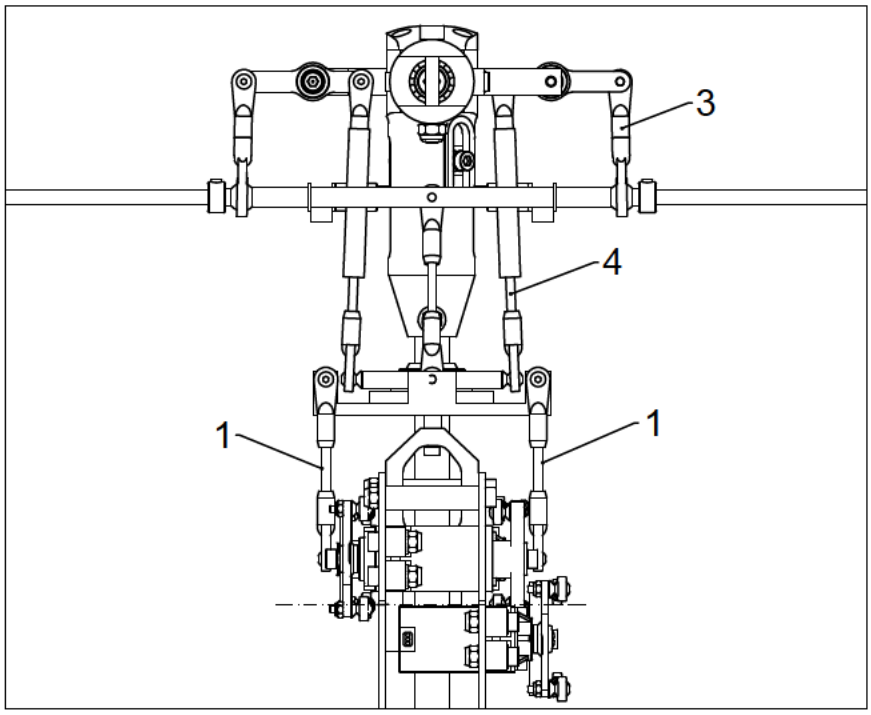
Ⓛ = use Loctite




Use oil for the first mounting of the rotorhead. DO NOT TURN, push only straight!If the hub jams, then remove, clean and try again!

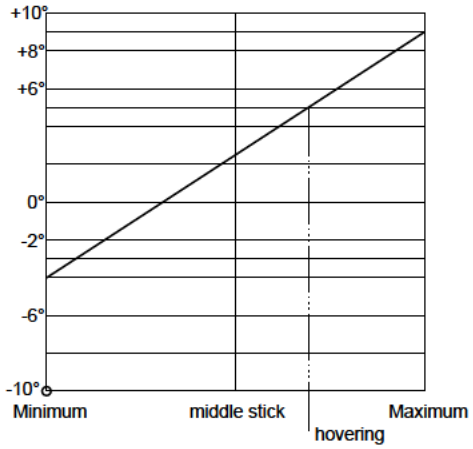
8 = lock nut M3
89 = hexagon socket screw M3 x19 Spezial
97 = rubber grommet 3 mm




1. All servo arms and bellcranks must be vertical or horizontal.
2. Adjust pushrods (1) to level the swashplate.
3. Adjust pushrods (2) to the Hiller bridge until the antorotation ball bearing is centered in its brass lined slot.
4. Double ball links (3) between flybar and mixer arm are 42 mm long.
5. Adjust the lower ball links (4) between swash plate and mixer arms until the mixer arms are horizontal.
6. With a pitch gauge check the actual blade pitch and adjust lower ball links of rod 4 until both blades are at zero degrees pitch.

## Pitch gauge

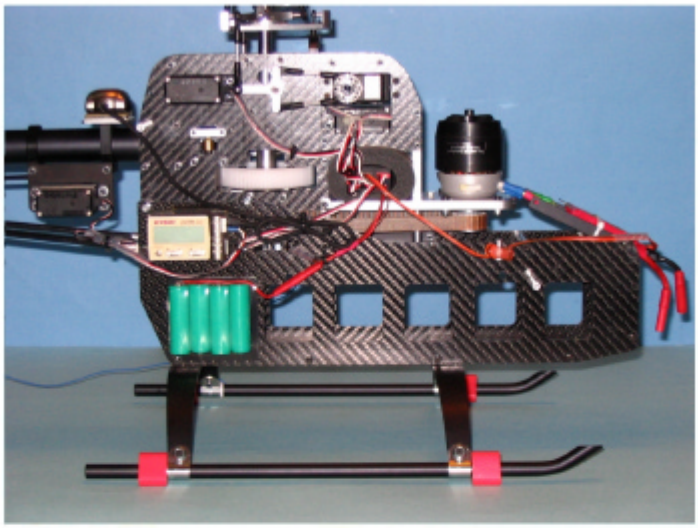


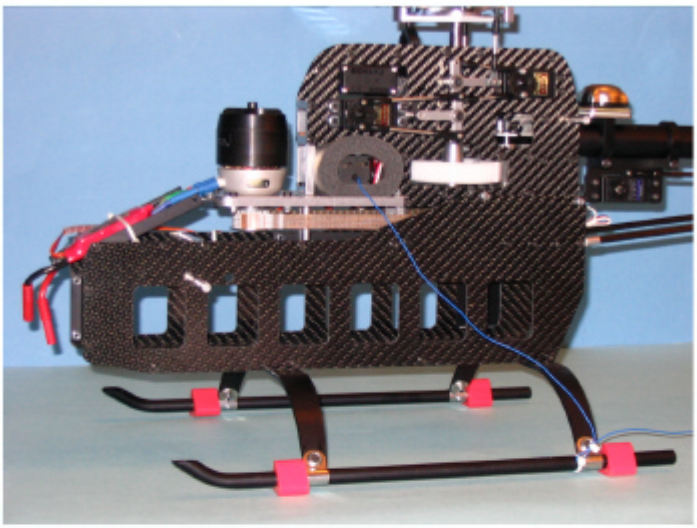

Recommended rotorspeed: 1200 - 1300 1/min

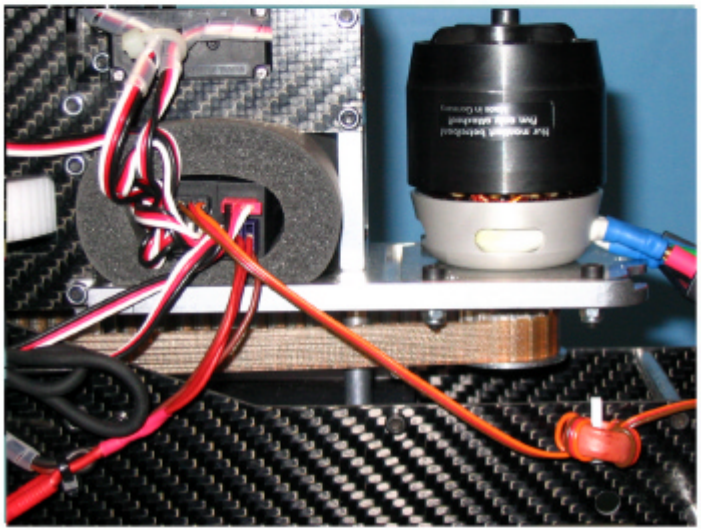
Highest allowed rotorspeed: 1400 1/min  Do not exceed!

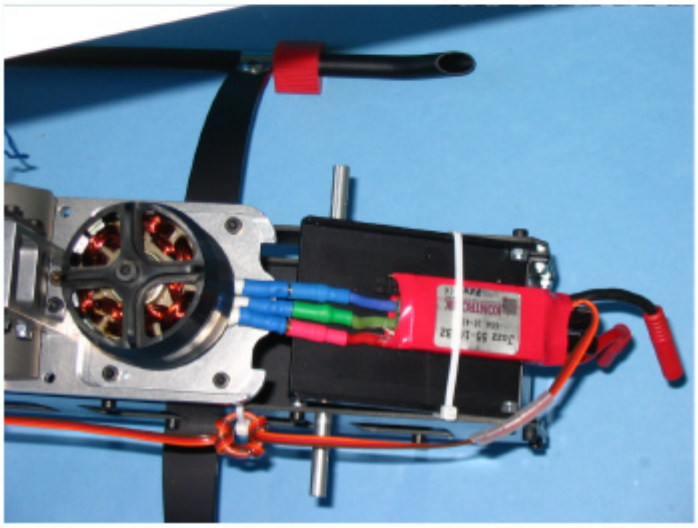
## Deflections:

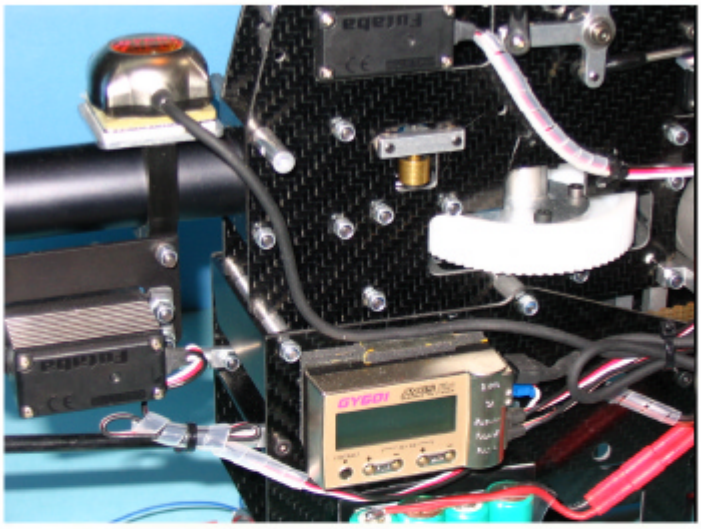
| | | | |
|---|---|---|---|
| Elevator: | Hovering 1350 1/min: | 10° | 25% Exponential |
| | Forward flight 1350 1/min: | 15° | 20% Exponential |
| Roll: | Hovering 1350 1/min: | 10° | 20% Exponential |
| | Forward flight 1350 1/min: | 15° | 10% Exponential |
| Tailrotor: | All Phases: | +26°/-10° | 30-50% Exponential |

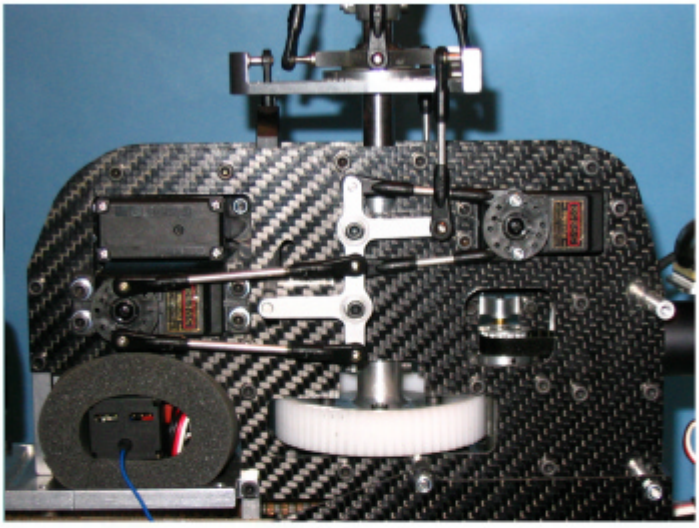


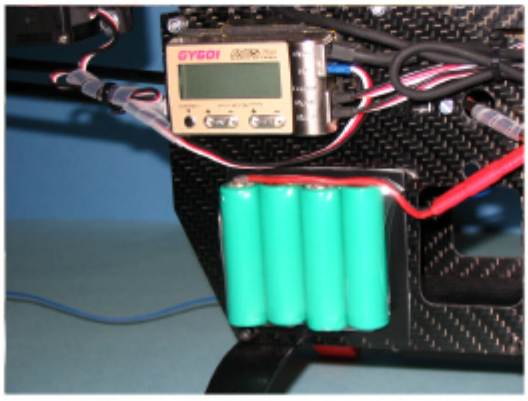












minicopter