

Linear Drive System (LDS) installation tips

System overview

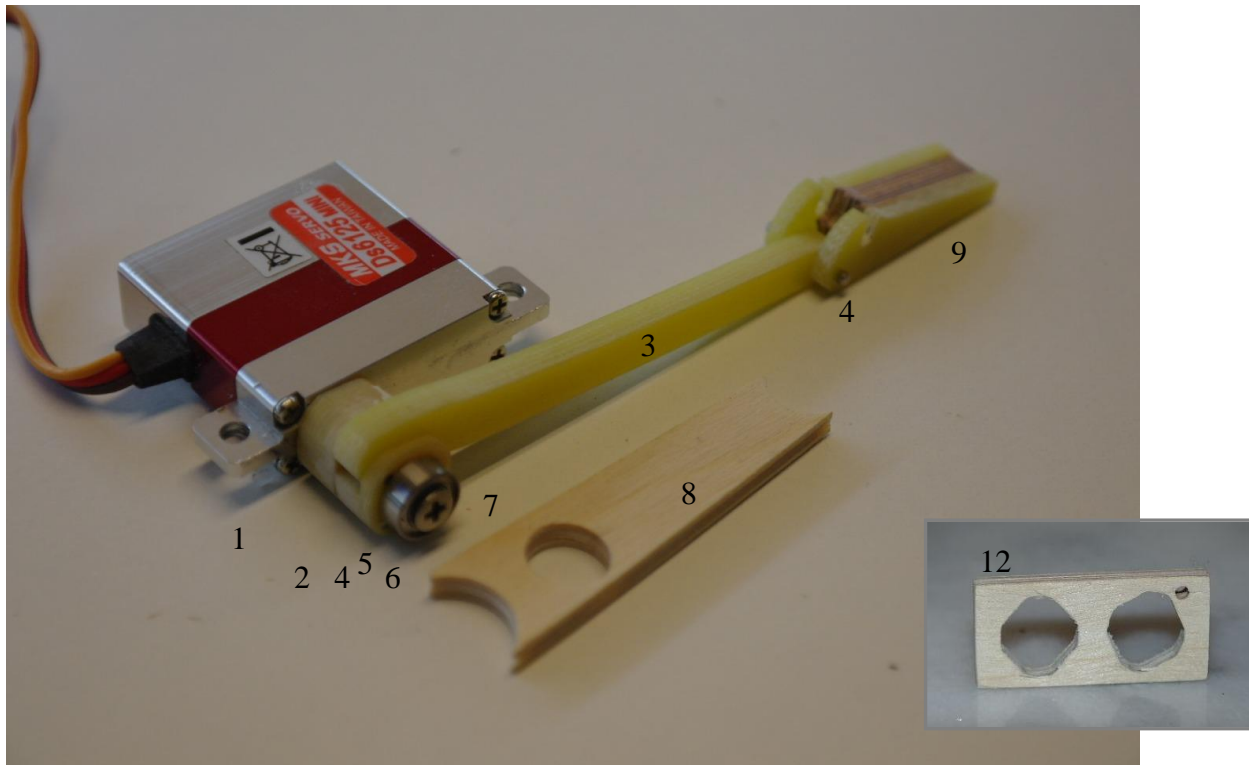


Fig. 1: LDS parts with example MKS DS6125mini servo (rear mounting clip removed).

Short version

For those who don't want to read the manual, at first the two most important Don't Forgets:

- Secure the bearing screws with Loctite or 5-min epoxy (after a dry-fit test)! Otherwise they could get loose and the bearing falls off.
- Remove a piece of the white epoxy gap seal lip, to simplify inserting the pin into the flap horns.

Detailed description

Set contents (per servo):

| Item | Number | Part designation / Teil-Bezeichnung | Comment / Kommentar |
|------|--------|--|--|
| 1 | 1 | excenter drive with servo spline / Exzenter mit Servo-Vielzahn | |
| 2 | 1 | recessed excenter / ausgefräster Exzenter | |
| 3 | 1 | pushrod / Schubstange | aileron resp. flap / QR bzw. WK |
| 4 | 4 | pins / Pins 1.5 x 12 mm | Third pin in excenter can be omitted, gaining reserve pins |
| 5 | 1 | sink head screw / Senkkopf-Schraube M3 x 16 (Graupner/JR, Futaba, Sanwa) resp. M2.5 x 16 (MKS, Graupner DES) | |

| | | | |
|----|----|---|---------------------------------|
| 6 | 1 | washer / Unterlegscheibe | |
| 7 | 1 | ball bearing / Kugellager | |
| 8 | 1 | bearing support rib / Lager-Support-Rippe | aileron resp. flap / QR bzw. WK |
| 9 | 2 | flap horns / Ruderhörner | aileron resp. flap / QR bzw. WK |
| 10 | 2 | servo mounting pads / Servo-Befestigungs-Plättchen | |
| 11 | 2* | upper servo mounting pads / obere Servo-Befestigungs-Streifen | *DS3288 only |

Furthermore per aircraft:

- 12 1x servo drive angle template / Winkelschablone für die Servo-Abtriebe.
 13 1x press-on screw M3 / Aufpress-Schraube M3

Preparations

Excenter assembly:

If not already performed, mount the excenters and pushrods. The larger pushrods are for the flaps, the shorter ones for the ailerons. Pay attention to left and right servos. (Using two pins in the excenters is sufficient, but to be on the safe side, also three pins can be used.)

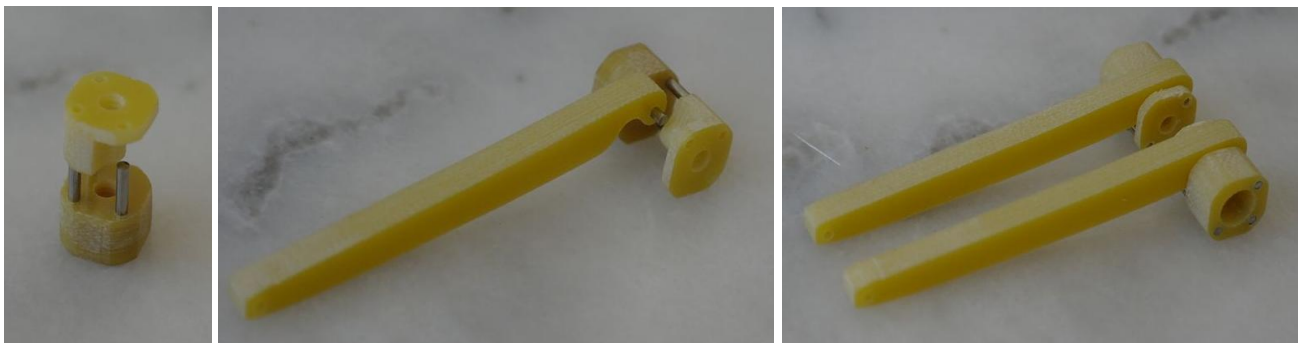


Fig. 2: Excenters and pushrods mounted. Pay attention to left and right...

Excenter mounting

Offsets: On the *ailerons*, *no mechanical offset* of the excenter and no electronic offset of the servo are applied. Set the aileron servo position to 0 in the transmitter before mounting the excenter, such that the pushrod pin is at 90° to the long side of the servo. You can slightly press the excenters on the drives by hand and tighten them later.

At the *flaps* an *electronic offset* is needed to achieve full downward deflection. Recommended range (for Graupner HoTT transmitter, for most other brands smaller values are sufficient):

Graupner DS3288 65%-80%

MKS DS6125mini 80%-85%

Futaba S3150

Set these values in your transmitter and adjust the servos, before continuing.

For the flaps, the pin shall have a *mechanical offset* towards the leading edge of the wing. A template (12) is supplied, which allows adjustment of this offset angle.

With factory-installed flap horns in the wings, the actual mechanical servo offset is given by the position of the bearing support rib and you do not need the template. Just make sure by trimming the servo before, that the electronic offsets do not deviate from the recommended range above.

When installing the system in an 'empty' wing, you should use the template (12) to align the drives in the correct angle (by fine-trimming the servo until the template edges are parallel to the servo sides). If the offsets leave the desired range, try shifting the excenter by one tooth.

For final mounting of the excenters, now slip the bearings and washers onto the screws. The quick option is to press the whole excenter assembly on the servo using the sink head screws. *Make sure, that the lower excenter is fully pressed on the servo, so that the screw doesn't lose tension after short time.* If there is doubt, that this would overstress the thin wall of the recessed excenters, dismount the upper excenter again and use the flat head screw (13) to create more pressure.

Finally, tighten the sink head screws as much as possible, but without clamping the recessed excenter so much, that it touches the pushrod side face and causes friction. When having checked, that everything fits, *secure the sink head screws with Loctite.*

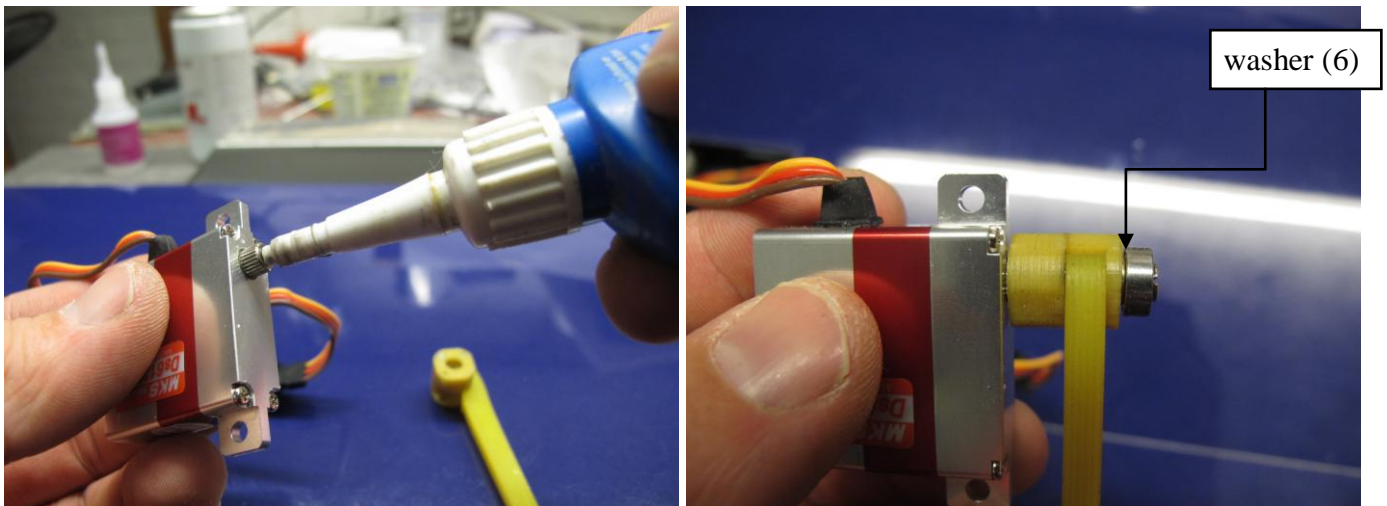


Fig. 3: Apply a drop of Loctite before finally mounting the excenters on the servos.

Servo assembly mounting

- Remove ~12 mm of the hinge gap seal material for easier pin insertion / ~12 mm Dichtlippe von Klappe entfernen
- Insert a pin into one flap horn until it is about to exit in the gap between horn halves / Pin in Ruderhorn einseitig einsetzen, bis er anfängt in der Mitte hervorzustehen
- Insert servo with pushrod assembly into the servo bay (deflect flap down), such that the bearing sits in the rib hole / Servo und Schubstange einfädeln (Ruder dazu nach unten klappen), bis das Lager im Loch in der Rippe sitzt
- Move the flap up, until pushrod is centered in the flap horns (manually turning the servo down simplifies this) / Ruder hochklappen, bis Schubstange zwischen den Ruderhörnern zentriert ist (Servo manuell Richtung Ausschlag nach unten drehen erleichtert dies)

- Press in the pin (already attached to the horn) / Pin (schon am Ruderhorn angesetzt) hinein drücken
- Insert the mounting pads (10) below the servo clips and screw them to the servo / Klötzchen hinterher fädeln und ans Servo schrauben
- Align the servo and check deflections. If ok, glue the mounting pads with small drops of CA glue / Servo ausrichten, Ausschläge checken und wenn's passt Klötzchen mit Sekundenkleber fest kleben
- Mount servo bay covers / Servo-Abdeckungen montieren
- Finally cover the hole in the hinge seal with self-adhesive tape (if pushrod grinds at the wing, use a strip of sand paper to remove friction) / abschließend das Loch in der Dichtlippe noch mit Tape schließen (wenn Schubstange an Fläche reibt, mit Schleifpapier Abhilfe schaffen, sonst kann das Tape Falten werfen)

Installation in 'empty' wings

Additional steps for installation into wings not yet prepared with flap horns and bearing support ribs from factory (do-it-yourself installation) to follow later...

General hints & tricks

It is easier to replace the pushrods than the flap horns. Therefore try to make sure, that the pin is moving with less force in the pushrod. Increasing hole diameter is easy by inserting a pin in a Dremel and pushing it in the hole spinning.

Put some grease on the pins to delay wear.

For removal of pins in the flap horns, make an angled 'pin pusher' from 1 mm steel wire. Pulling at the pins is generally less easy than pushing them.

Various pictures

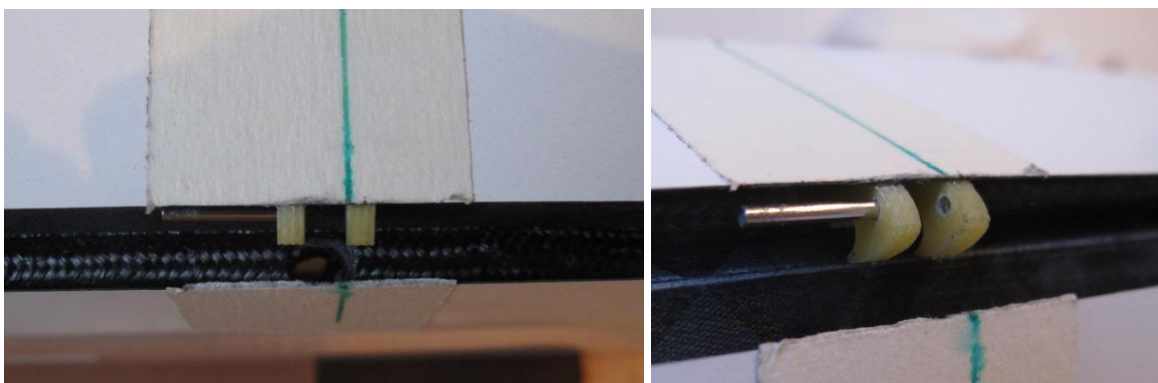


Fig. 4: Pin prepared for installing pushrod.

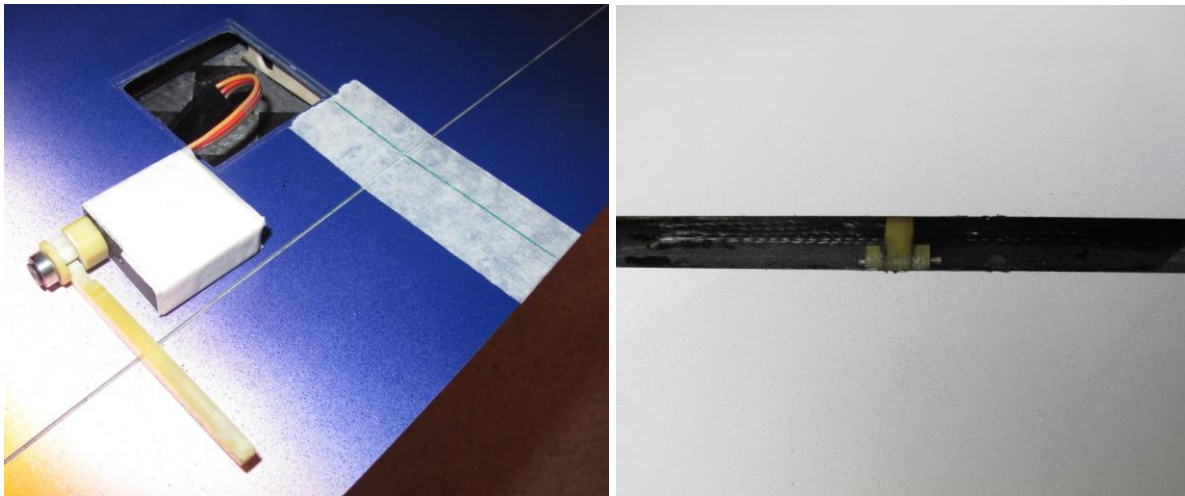


Fig. 5: DS3288 prepared for mounting (all clips removed and wrapped in tape). Pin fully mounted in flap horn.

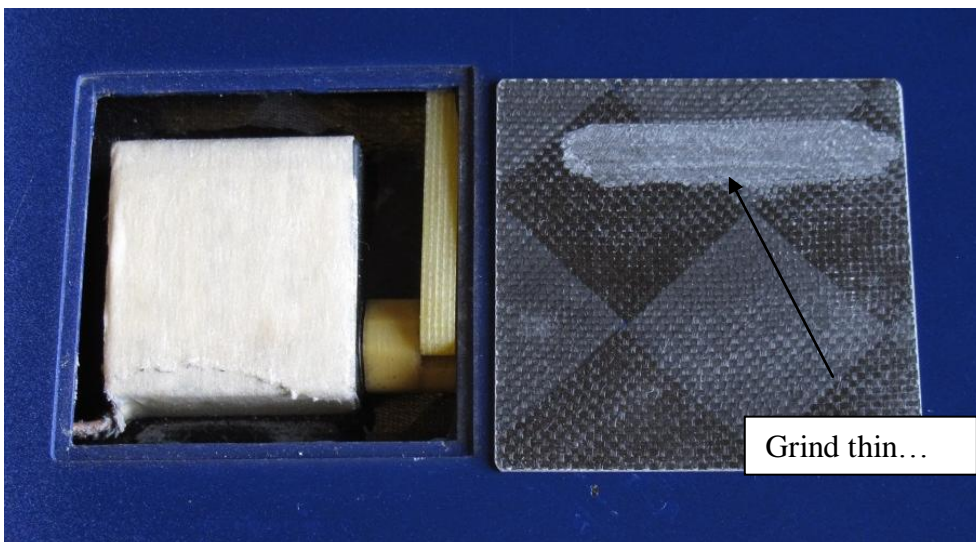


Fig. 6: Servo covers should be thinned locally in case of using thicker servos. Alternative mounting method with masking tape shown here.



Fig. 7: Left: Servo mounting pads for Graupner DS3288 (split such that top part can be removed for servo disassembly). Right: Mounting pads for MKS DS6125.