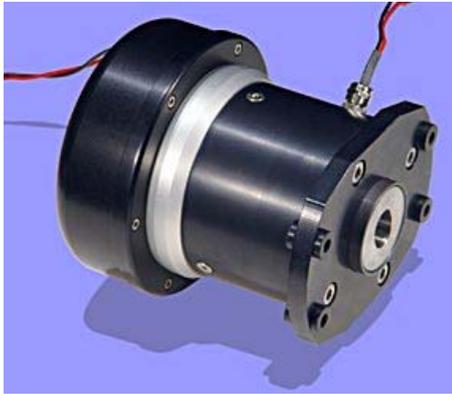


Transmission drive unit 200 Nm (12V)



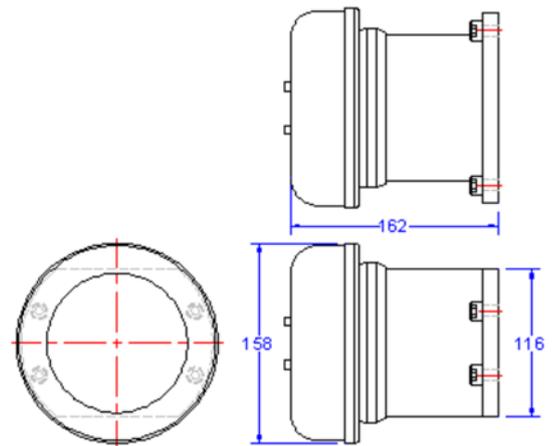
Jefa 200 Nm transmission autopilot drive unit

The Jefa transmission drive is one of the most compact autopilot drives in the world. It's as strong as a human being (the max. output torque of 200 Nm is equivalent to 40 Kg on the rim of a 1 meter wheel) and is build for 24 hours per day continuous operation with a total weight of only 6 Kgs. The combination of the specially designed electric motor with the ultra efficient 3 stage planetary gearbox results in an extremely efficient drive unit to keep the battery charging time to the minimum. The drive can be used on boats from 30 to 60 foot (or with a rudder torque up to 525 KgM) equipped with a Jefa transmission steering system. Please click on the pictures for a larger view.

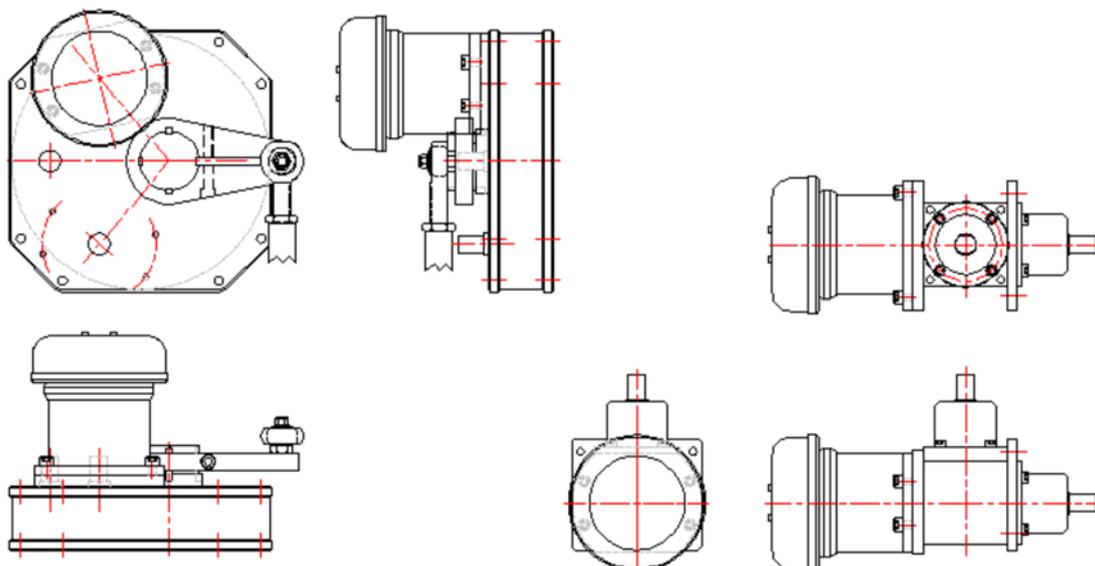


Main dimensions

The Jefa transmission drive is very compact with a length of 162 mm and a maximum diameter of 158 mm. As space is always a problem on sailing yachts, the compact drive unit can be integrated into the steering system even when a very limited space is available. The drive can be mounted on the BG11 and BG14 bevel gearboxes or directly on the RG10 reduction gearboxes. Please remind that a preparation for the autopilot integration is required when ordering the steering system.

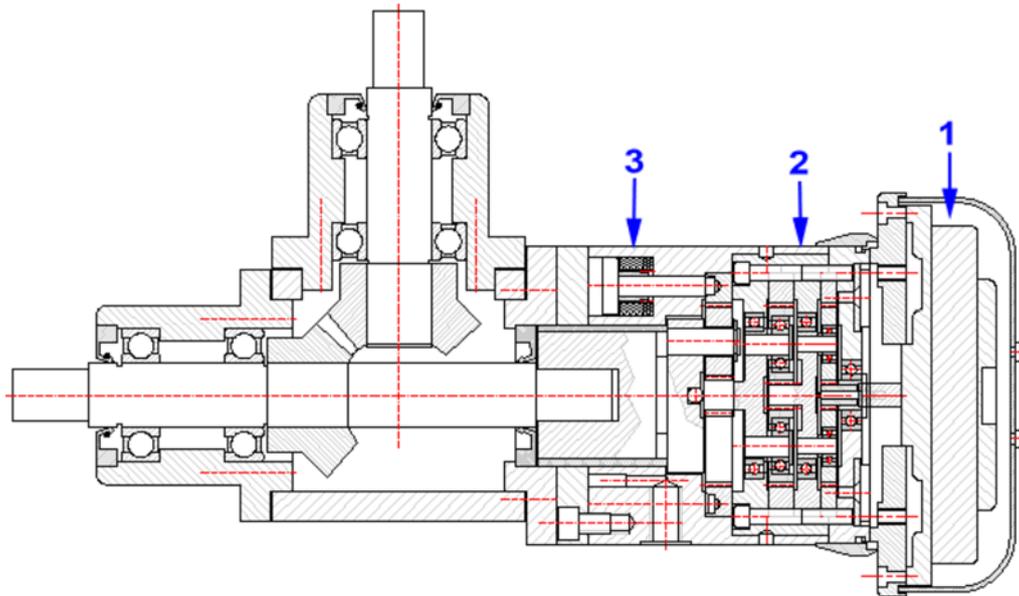


The mounting possibilities:



The transmission drive can be mounted on every (prepared) bevel gearbox in the steering system or directly on the RG type reduction boxes with multiple input shafts.

The construction:

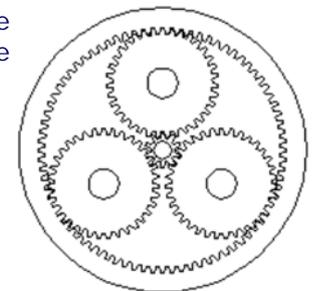


The above assembly drawing shows a transmission drive mounted on a bevel gearbox. The drive can be separated in 3 main parts: The electric motor (1), the three stage planetary gearbox (2) and the electro-magnetic clutch (3). The Jefa transmission drive has multiple advantages over existing integrated drive units. These advantages will be explained per section of the drive:

Electric Motor: The flat wound electric motor (pancake motor) used in the Jefa drive units is carefully selected for this application. Pancake motors have multiple advantages over normal electric DC motors:

- A large flat wound rotor to achieve a high starting torque and an immediate response to the autopilot speed control signal.
- A motor efficiency of 72,5% to achieve a minimal power consumption and maximal mechanical power output (compared to max. 50% efficiency of a normal DC motor).
- Compact main dimensions compared to achievable output.
- Aluminium motor housing in stead of sheet steel plate to avoid corrosion.

Planetary gearbox: To achieve a correct rudder travel speed (hard over time) the electric motor has to be reduced in speed with a factor 486:1. Some autopilot drive producers use a worm reduction box, but the efficiency is extremely low as the gears rub each other. Some producers use a combination of a planetary gearbox with a 2 stage spur gear set (one small gear and one big gear), but this creates a much bigger unit with an offset to the centre and much heavier loaded gears. The best way to achieve this high reduction in combination with a high torque is a 3 stage planetary gearbox. It's also the most expensive way as every gear step has 4 gears in stead of 2 gears but the huge advantages overrule the higher price:



- The highest possible efficiency compared to any other gearbox.
- All forces are equally spread over 3 gear teeth in stead of one allowing a much compacter and stronger solution.
- The forces and torques from the motor to the output shaft remain in the centre line of the drive unit, resulting in a higher efficiency and extremely reduces the loads on the housing and other internal parts.

Electro magnetic clutch: On the moment the transmission steering system on the yacht is manually operated, the autopilot drive has to be disconnected from the steering system. This is achieved with the electro-magnetic clutch (4) and controlled automatically by the autopilot junction box. Jefa has developed a unique and patented engagement clutch. The solution is based on two electrically operated spring loaded clutch pins that engage and disengage the outer gear ring of last planetary gear step. This solution has multiple advantages over the existing friction plate clutches:

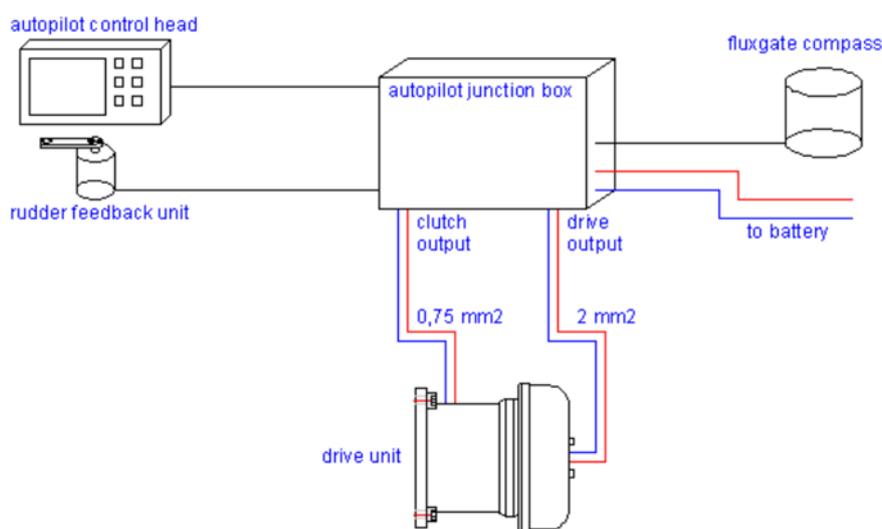
- Less friction to back drive the unit.
- Lower power consumption (1.4 Amp. at 12 Volt, 0.7 Amp at 24 Volt). When the clutch isn't powered, it's disengaged and engaged when powered.
- The clutch doesn't wear in time.
- More compact than any friction clutch.
- When the autopilot is switched off, the helmsman isn't suddenly confronted with the full rudder torque, but has to put loading on the wheel to equalise the forces so the the clutch can disengage,

making the manual take over much safer.

200 Nm transmission drive DU-TS8-12 performance table: (in combination with the 1:7 reduction box RG10-70)

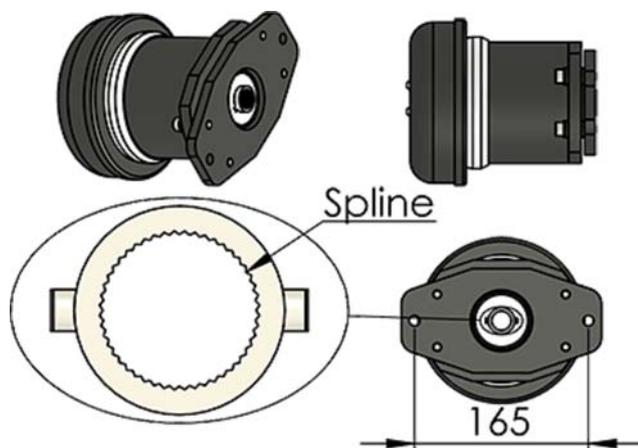
rudder torque full rudder (KgM)	rudder torque midships (KgM)	power usage (amps)	rudder rotation per second (degrees/sec.)	time for 72° rudder (sec)
0 (no load)	0	0.2	4.5	16
145	73	5	3.8	19
218	109	7.5	3.4	21
364	182	13	2.5	29
436	218	15	2.3	32
582	291	21	1.3	55

Connections:



This illustration shows the minimal components for a working autopilot configuration. Jefa autopilot drives work together with all major autopilot electronics. The connection of the Jefa autopilot drive to the autopilot junction box is quite simple. The two 0.75 mm² red and black wires have to be connected to the plus and minus of the autopilot clutch line. This will make sure that when the autopilot user engages the autopilot on the control screen, the clutch will engage and allow the autopilot motor to drive the steering system. The two 2 mm² red and black drive wires have to be connected to the autopilot drive output connection. Now the Jefa autopilot drive is integrated into the system.

Special Whitlock/Lewmar connector:



The Jefa transmission drive unit is available with a special front end so it can be fitted to existing Whitlock/Lewmar transmission systems using the 3/4" (19.22 mm) 48 teeth splined shaft. Please order extra code DU-TS-LEW.

Compatibility in 12 Volts. (not available in 24 volts, use the [300 NM version](#))

Following table shows the maximum rudder torques at midships and full rudder that can be generated by the Jefa 200 Nm transmission drive in combination with various autopilot junction boxes and reduction gearboxes. As the transmission drive drives the steering system, the maximum rudder torque depends on the type of reduction box used in the system. The hard over time (HO-time) states the time it takes the drive to travel the full 72 degrees of rudder travel when the speed control of the pilot is set to maximum speed.

Autopilot junction box 12 Volt version.	Max. output (Amp.)	BRG10-50 & RG10-50 midships (KgM)	BRG10-50 & RG10-50 full rudder (KgM)	RG10-70 midships (KgM)	RG10-70 full rudder (KgM)	BRG10-67 midships (KgM)	BRG10-67 full rudder (KgM)
DU-TS8-12	8 revs/min	11 sec.		16 sec.		15 sec.	
Garmin GHP12 sailboat APS (*1)	40	169	321	237	449	226	430
Simrad AC12	12	too small, don't use in combination with this drive					
Simrad AC42	30	169	321	237	449	226	430
Raymarine ACU-200	15	too small, don't use in combination with this drive					
Raymarine ACU-400(*2)	30	169	321	237	449	226	430
NKE gyropilot 2 RVP (*3)	25	169	321	237	449	226	430
Furuno Navpilot	not advisable due to lack in speed control and dynamic braking see this page						
B&G H5000 Pilot (*4)	30	169	321	237	449	226	430
B&G Triton Pilot - High Current	same as Simrad AC42 - see above						

(*1) A special Garmin version of the transmission drive is available with extra codes DU-TS-RFB1 & DU-CAB-G. The Garmin rudder feedback unit is integrated and special Garmin cables and plugs are wired to the drive unit. Please note the maximum revolutions of the output shaft of the drive should not exceed 2,5 turns for the rudder feedback unit to work properly. See below pricelist for the surcharge.

(*2) An internal rudder feedback unit is available for this pilot which saves installation time and a separate fundament for the external rudder feedback is not required. See below pricelist for the surcharge. Please note the maximum revolutions of the output shaft of the drive should not exceed 2,5 turns for the rudder feedback unit to work properly. See below pricelist for the surcharge.

(*3) Please read the special installation instructions for the clutch available on our FTP server via [this direct link](#).

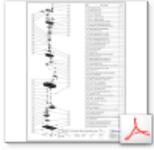
(*4) From software release 1.1.84 onwards. Older H5000 pilots should be software upgraded. For a complete list of compatible B&G autopilots please [follow this link](#).

Pricing

Jefa transmission drive units		
Part No.	Description	Price in Euro
DU-TS8-12	Transmission autopilot drive unit 200 Nm 12 Volts - 8 rev/min	€ 1.827
DU-TS-RFB1	TS integrated rudder feedback for Garmin and NKE autopilots (10 kΩ)*1	€ 182
DU-TS-RFB2	TS integrated rudder feedback for Raymarine autopilots (5 kΩ)*1	€ 182
DU-TS-RFB3	TS integrated rudder feedback for B&G (NAC-2) autopilots (5 kΩ)*1	€ 182
DU-CAB-G	Garmin cables and plugs mounted to drive units	€ 55
DU-TS-LEW	Adapter for Whitlock/Lewmar autopilot flange	€ 132

*1: Please note the maximum revolutions of the output shaft of the drive should not exceed 2,5 turns for the rudder feedback unit to work properly.

Service information:



Please click the left picture to open the Jefa 200 Nm transmission drive explosion drawing and parts lists.

