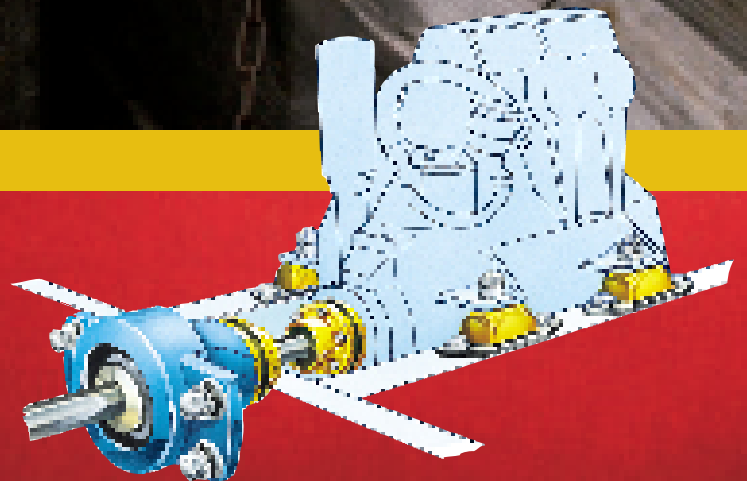


“Marine inventions have been
in Norwegian genes for a very long time!”



THE HYDRADRIVE
PROPULSION
THRUST DRIVE
SYSTEM



HYDRADRIIVE

The perfect solution for propulsion of a boat with propeller shaft.

How is Hydradrive constructed?

The idea is based on a simple principle. The engine mounts can be very soft and thereby isolate well against noise and vibrations. For optimal result the thrust forces from the propeller must be transferred directly to the hull via the thrust bearing, independent of the gearbox and engine. Normally the propeller thrust is transferred to the hull via the engine mounts. With Hydradrive the thrust forces goes directly to the hull via the thrust bearing on the propeller shaft. The rotation movement is transferred thru a CV shaft (Constant Velocity shaft).

A complete Hydradrive installation includes CV shaft, thrust bearing, adapter between gearbox and CV shaft and engine mounts.

The CV shaft is the main component in the installation and functions like the drive shaft on a car. In a boat this means that the torsional power is transferred via balls, and the shaft absorbs axial movements in the system. This leads to practically no resistance in any direction when the boat moves through the waves. The result is strongly reduced noise, and vibration levels in the boat.

For work boats, with high running hours and higher workloads than pleasure crafts, we have chosen to deliver the system with normal cardan shafts instead of CV shafts. The reason for this is two important facts: The life expectancy is much longer and the dimensions are smaller. But for smaller vessels, however, with moderate power (less than 500 BHP) we recommend CV shafts. Smaller dimensions are of importance since normally there is limited space for the joints at the gearbox.

The Thrust Bearing

The thrust bearing is mounted directly in the hull. All sizes up to HD 130 (approx. 280 Bhp) are supplied with spherical bearings that absorb small angular displacements in the installations. All our thrust bearings for CV shafts have clamping units built in. This saves space. For work boats with power over 500 hp we use ordinary flanges.

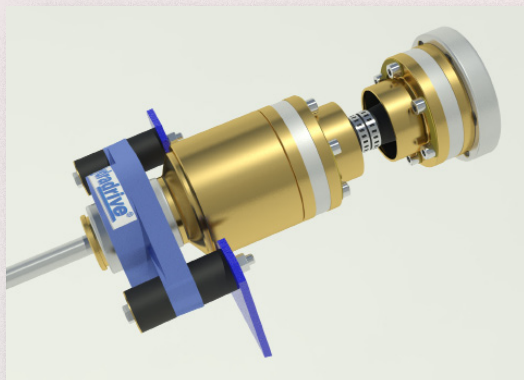
Adaptors for gearbox mounts

All CV shafts require an adaptor for connection to the gearbox. We have a large variety of flanges that enables us to connect our CV shafts to all well-known gearboxes. Bolts and nuts are supplied with each flange.

Engine mounts

Engine mounts might be the most difficult part of the installation. We recommend using the original mounts if possible to begin with. For those who would like new mounts you can contact our customer service, or contact closest dealer. We supply engine mounts that are adapted to our system. They are chosen due to their stiffness of the rubber. We supply premium quality engine mounts with a built in safety device, this enables you to a certain degree to operate the vessel even if the mounts should break.

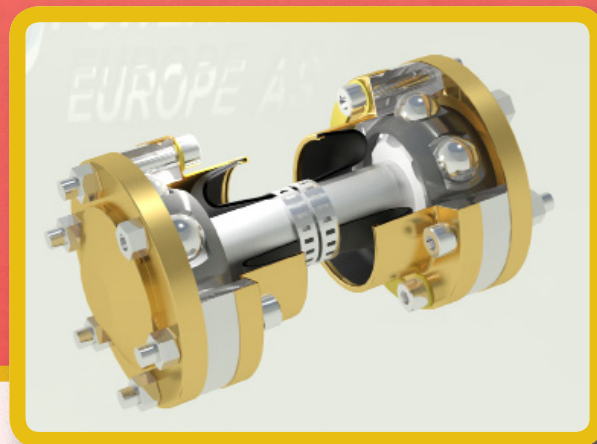
The complete unit



Engine mounts



The CV-shaft, the Hydradrive System's heart



A system giving an outstanding technology that brings the vibration and noise level to a minimum. It simplifies the installation considerably. We recommend especially the system for people who are going to re power with another type of engine with other brackets etc. A professional Company saves a lot of time if installing new engines, a private handyman would save a lot more. Alignment can be done by visual estimate.

What is the reason for noise and vibrations?

A traditional installation without Hydradrive brings high levels of vibration to the hull, even when perfectly aligned. The propeller is pushing on the engine mounts. The engine is moving forwards, and the tension between the propellershaft and the transmission increases. The engine has then a tendency to bend upwards. This is the case particularly if the transmission has a dropdown. The noise and the vibration from the propeller itself will be transmitted to the hull, and will often be an extra disturbing noise.

Hydradrive means softer engine mounts.

If using extra soft engine mounts, the result of isolation from the source of noise will be considerably improved. The thrust bearing unit is also mounted with rubber pads. It is supposed to take the thrust forces from the propeller. The CV – shaft is transmitting the torque. The unique construction of the CV – shaft isolates the engine from the propellershaft. The flexibility in the cv-joints is a fantastic solution. It's such a unique solution for use in boats, that one could think they are invented for this purpose alone! (The construction was meant for use in cars, and done by a Ford engineer with the name Rzeppa around 1925)

Simpler Installation

Both the CV – joints can take up to 8°. This simplifies the installation dramatically. The alignment can be done by visual estimate.

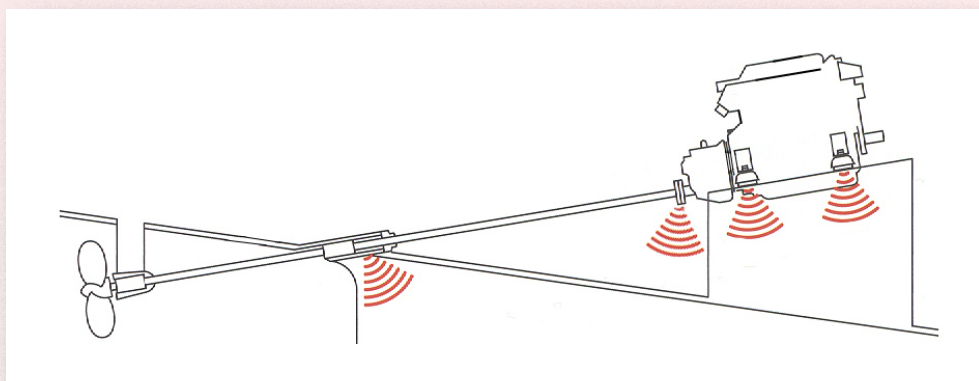
Torsional Vibration.

In traditional installations with a gearbox (Transmission), there will normally be a rubber based torsional damper between the gearbox and the engine. In systems without transmission, a torsional damper can be done in two different ways. As a resilient tubing on longer shafts, or as damper directly on the flywheel. We please ask you to contact Customer service.

Dimensioning of Hydradrive

To decide a correct dimension is dependant of many factors influencing each other. To feel safe with your Hydradrive, we recommend to ask Customer service. Some of the factors can still be assumed. Please remember that all given information for performance and angles are approximate. Next page has tables on many of the important numbers for selection of size. If the numbers are close to next size, we please ask you to oversize.

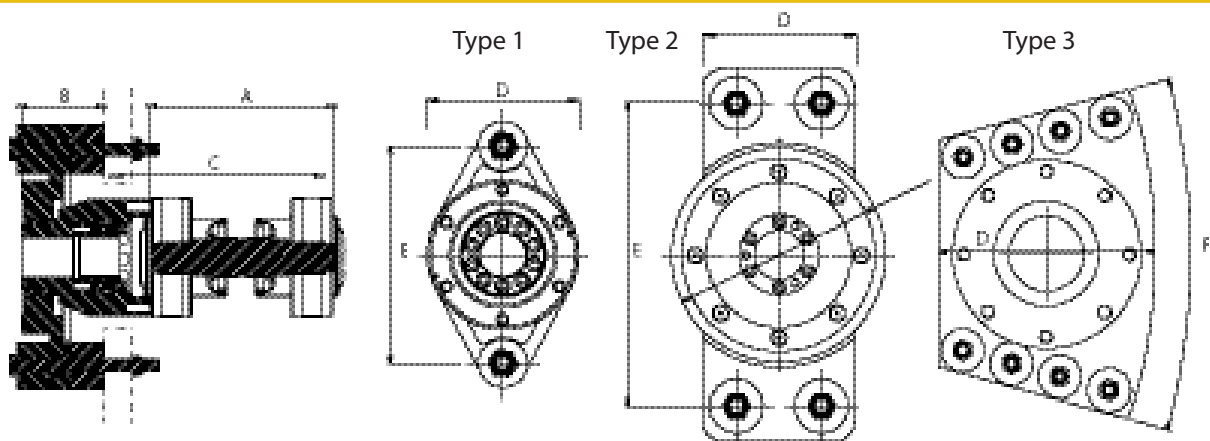
Invented and made in Norway



Hydradrive - General View

Dimensions – All numbers in mm – All lengths are shortest version

	Type	A	B	C	D	E	F	G	H	I	J
CV 105	1	130	80	152	86	143	175				
CV 108	1	155	80	187	100	143	175				
CV 113	1	155	110	195	100	184	224				
CV 115	1	170	145	232	110	202	250				
CV 121	1	210	197	280	130	216	265				
CV 130	1	245	197	315	150	233	290				
CV 142	2	270	205	371	195	300	370	85			
Cardan 150	2	300	205	400	205	300	370	85			
Cardan 160	3	420	285	x	287	340	432	x	250	69	244
Cardan 180	3	560	285	x	287	340	432	x	250	69	244
Cardan 200	3	640	285	x	287	400	432	x	250	75	270



Hydradrive - Performance

	Max practical torque in Nm	Expected normal propeller rpm	Thrust in Newton (Kg)	Engine power	Shortest length CV-shaft/ Cardanshaft	Min. length at special lengths (Max. 2 m)
CV 105	180 Nm	1000 - 1500	3000 N (290 Kg)	10 - 40 Hp	130mm	240mm
CV 108	240 Nm	1000 - 1500	3600 N (350 Kg)	30 - 60 Hp	155mm	240mm
CV 113	300 Nm	1000 - 1500	5750 N (570 Kg)	40 - 75 Hp	155mm	270mm
CV 115	580 Nm	1000 - 1500	8500 N (840 Kg)	60 - 115 Hp	170mm	270mm
CV 121	750 Nm	1000 - 1500	17000N (1650 Kg)	100 - 235 Hp	210mm	280mm
CV 130	1300 Nm	1000 - 1500	20000N (1950Kg)	180 - 270 Hp	245mm	280mm
CV 142	2000 Nm	1000 - 1500	32000N (3100Kg)	270 - 420 Hp	270mm	420mm
Cardan 150	3500 Nm	1000 - 1500	32000N (3100Kg)	350 - 480 Hp	300mm	All lengths
Cardan 160	4700 Nm	1000 - 1500	50000N (4850Kg)	450 - 600 Hp	420mm	All lengths
Cardan 180	6000 Nm	1000 - 1500	50000N (4850Kg)	550 - 800 Hp	560mm	All lengths
Cardan 200	9000 Nm	1000 - 1500	100000N (9600Kg)	700 - 1400 Hp	640mm	All lengths

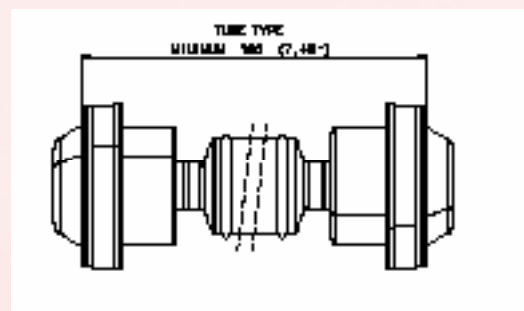
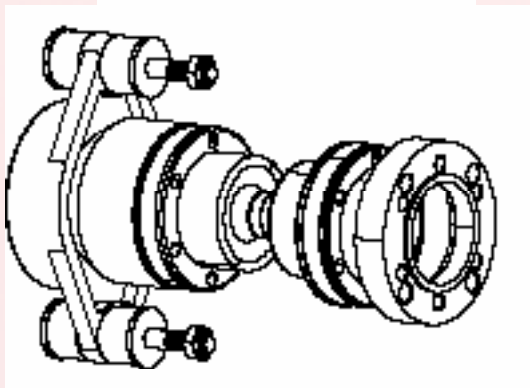
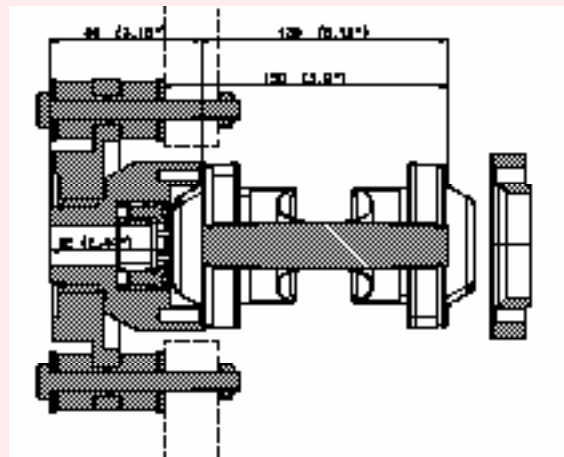
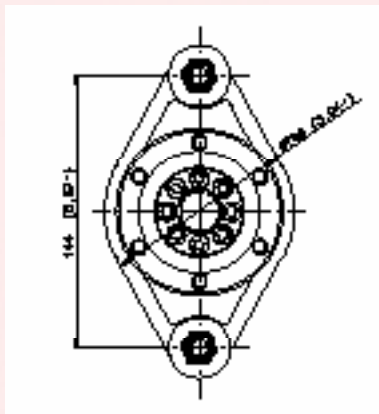
The 105 to 115 Series are designed mainly for pleasure craft.

The specifications given are for pleasure boats (used less than 200 hours per year). For commercial applications, we recommend going up one size. Thrust bearings for all models have bearings which allow misalignment, which greatly simplifies installation. The maximum allowable misalignment is around 4°. All models are made for shaft diameters indicated in the specifications. Any diameter can be supplied. The shafts must be cut to a length 2 – 5 mm longer than the distance to the end of the clamp unit. CAD drawings for all models are available on our homepage, www.powertrain.no.

Drive shafts can be supplied in any length. The shortest standard is shown in the specifications. Drive shafts with a center bearing are also available for extra long shafts. Adapters for most gearboxes are available, and are specified in the pricelist. Custom adapters can be made for all models.

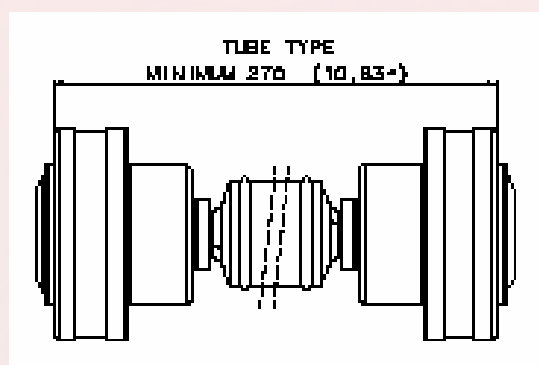
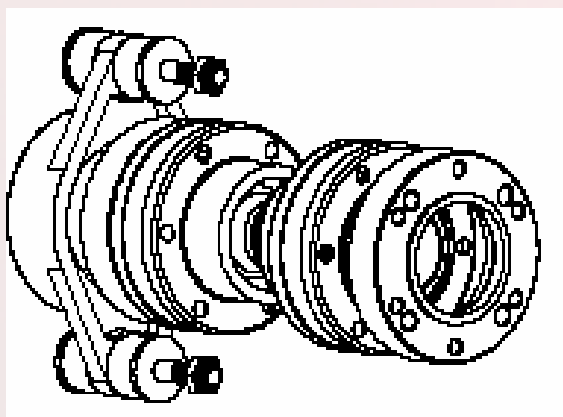
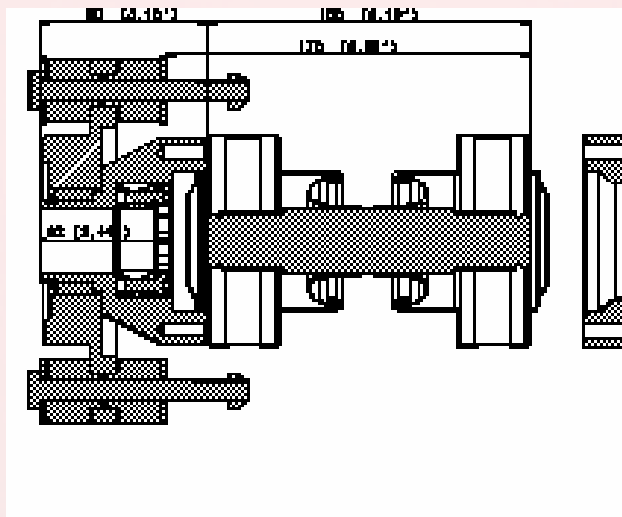
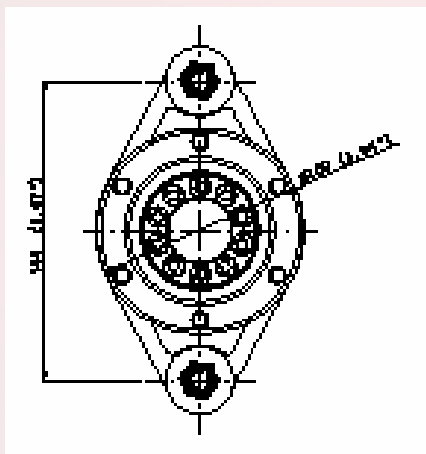
HD105

SKIBLADNER



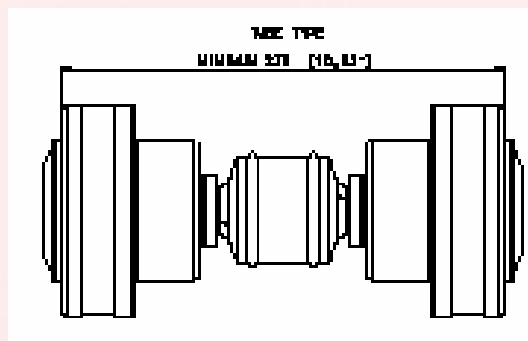
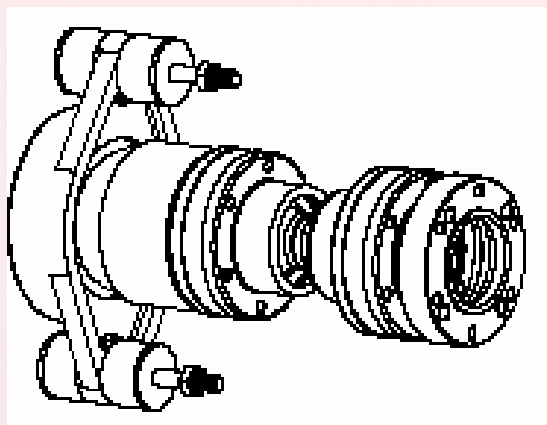
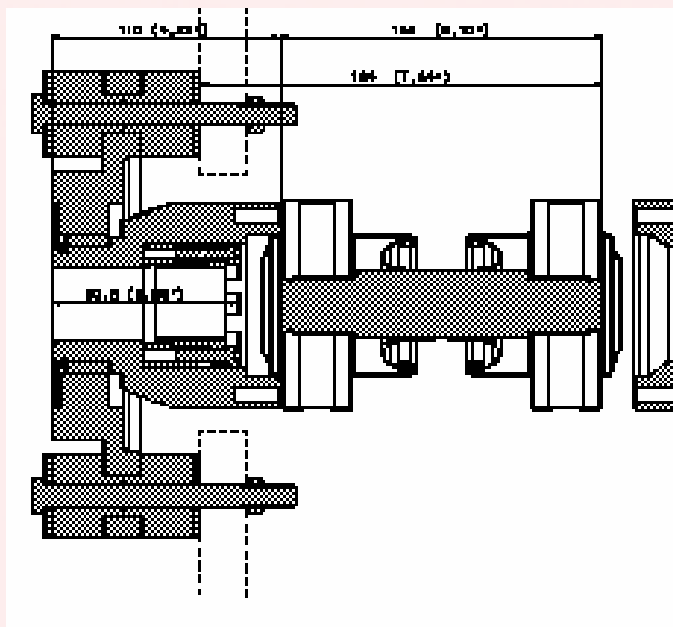
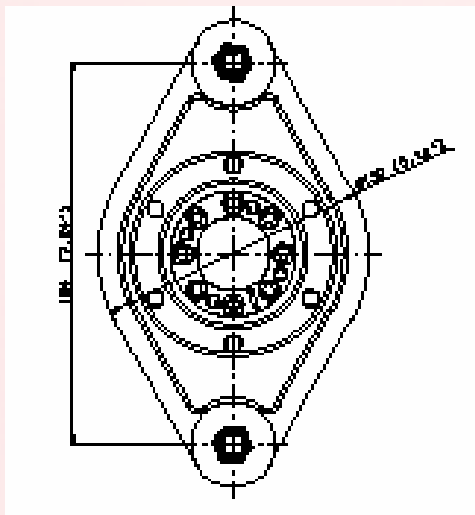
For practical purposes
suitable for enginepower
up to approx. 40 Hp

Max continuous thrust:	3000 N
For shaft diameters:	19/20/25mm - ¾", 1"
Max continuous torque:	180 Nm
Breakage torque:	600 Nm
Max rpm:	5000
Max angular displacement pr joint	8°
Max Hp at 1000 rpm:	27 Hp



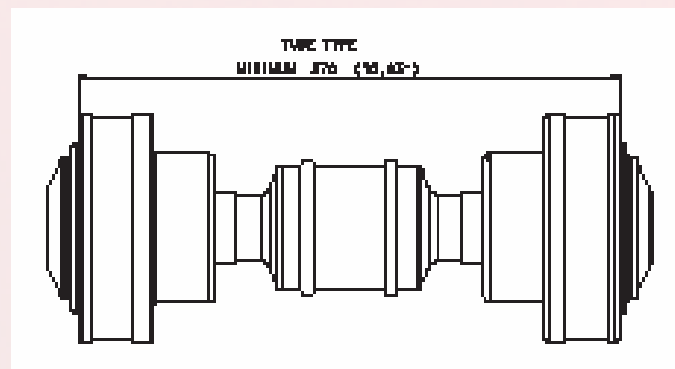
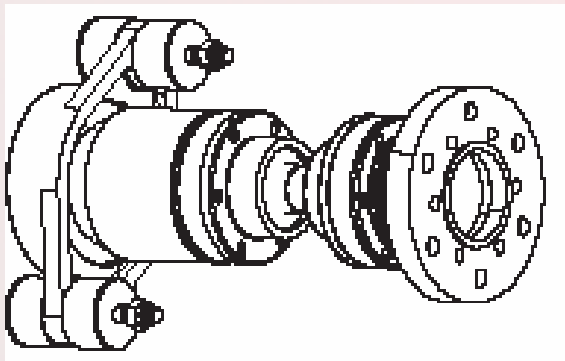
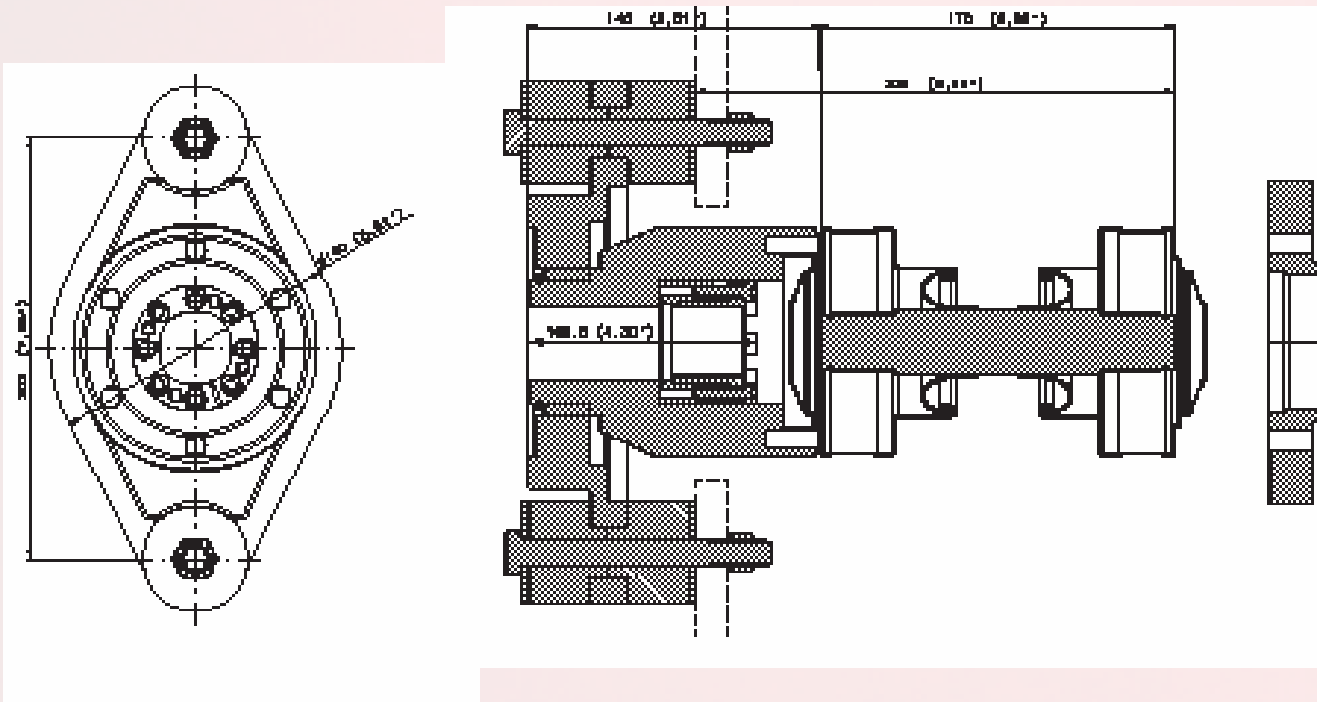
For practical purposes
suitable for enginepower
up to approx. 50 Hp

Max continuous thrust:	3600 N
For shaft diameters:	20/25/30mm – 1"/1,25"
Max continuous torque:	240 Nm
Breakage torque:	1600 Nm
Max rpm:	5000
Max angular displacement pr joint	8°
Max Hp at 1000 rpm:	40 Hp



For practical purposes
suitable for enginepower
up to approx. 65 Hp

Max continuous thrust:	9500 N
For shaft diameters:	30/35mm – 1,25"/1,375"/1,5"
Max continuous torque:	300 Nm
Breakage torque:	1600 Nm
Max rpm:	5000
Max angular displacement pr joint	8°
Max Hp at 1000 rpm:	55 Hp



For practical purposes
suitable for enginepower
up to approx. 90 Hp.

For full planing vessels
135 Hp

Max continuous thrust:	12500 N
For shaft diameters:	35/40/45/50mm 1,25"/1,375"/1,5"/1,75"
Max continuous torque:	580 Nm
Breakage torque:	2100 Nm
Max rpm:	5000
Max angular displacement pr joint	8°
Max Hp at 1000 rpm:	75 Hp

THE 121 TO 150 SERIES ARE BUILT FOR PLEASURE AND COMMERCIAL CRAFTS.

The numbers given are for pleasure boats which are used less than 200 hours pr year. If one intend to use these sizes for commercial boats, the numbers must be reduced by 25%. Models 121 and 130 have spherical bearings. That makes the installation a lot easier. Max angle is around 4° Type 142 and 150 have none-spherical bearings. Need of a lifetime calculation? Call customer service.

All models are made for one specific shaft diameter. Principally any diameter can be supplied. The shafts have to be cut for a length 2 – 5 mm longer than to the end of the clamp unit. All models are available as CAD drawings on our homepage www.powertrain.no

The driveshafts can be supplied in any length. The type given is the standard shortest version. Driveshafts with center bearing are also available for extra long shafts.

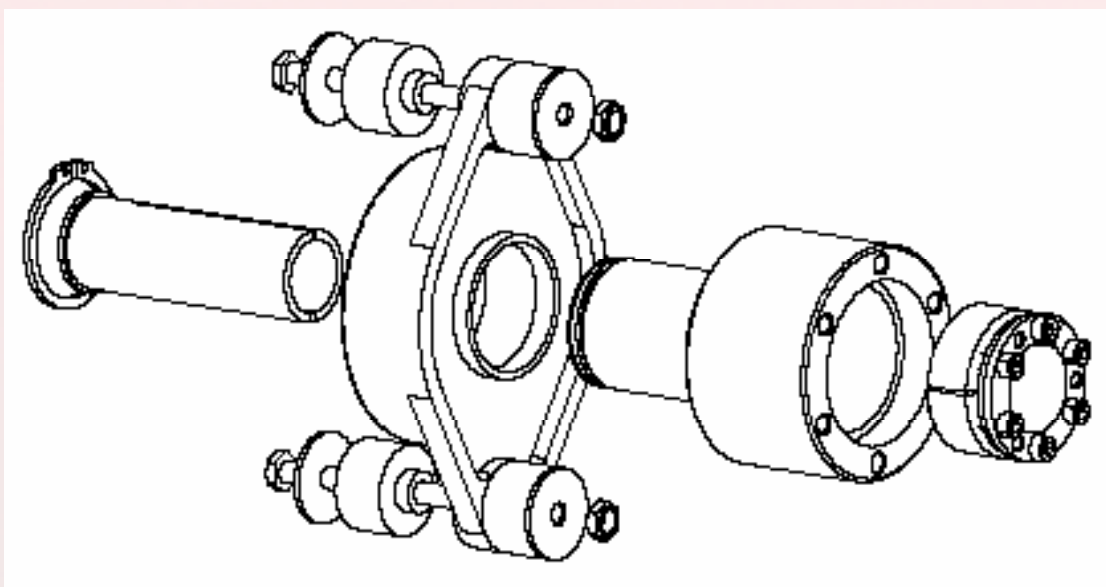
Adapters for all types of gearboxes are available. All types are specified in the pricelist.

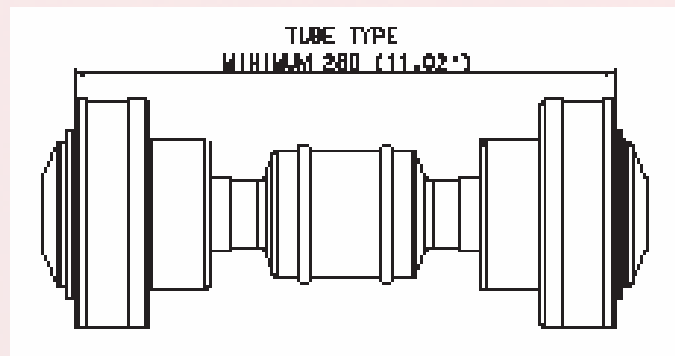
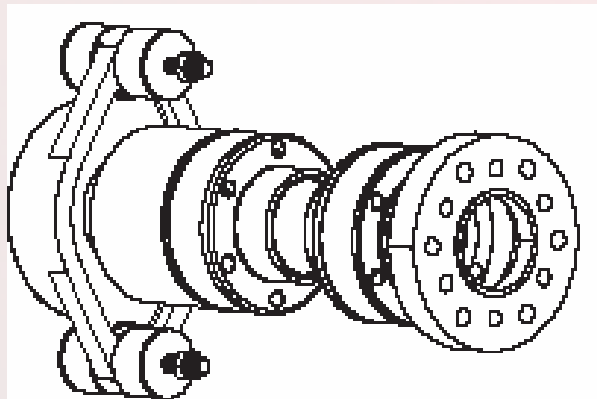
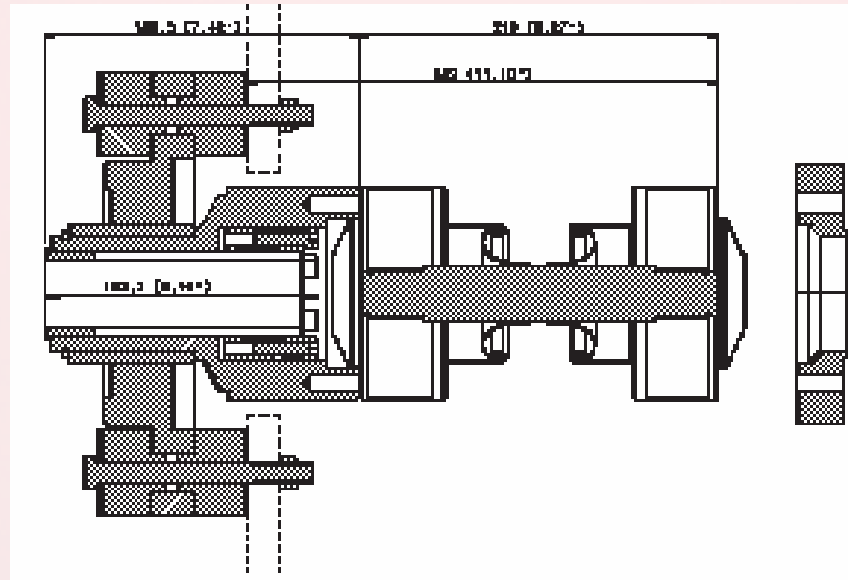
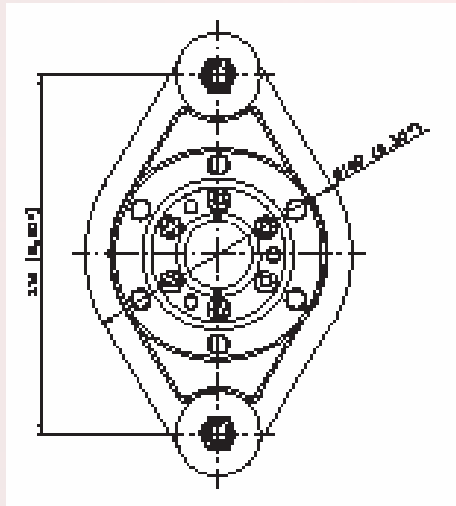
Specials can be custom made for all models.

The practical difference to the smaller versions (105-115) is the clamp cylinder for higher torques.

The model 150 is equipped with a cardan style driveshaft. This solution can transmit a much higher torque than a CV shaft. It has to be installed with two equal angles. The CV shafts can take two different angles. The CV shaft is a technically better solution, but the cardan type is more reliable. To achieve a very long lifetime (thousands of hours) the CV style is not a good solution, as the sizes then have to be very large, and very unpractical (and very expensive!)

HD121 – 130 Thrust Bearing Unit

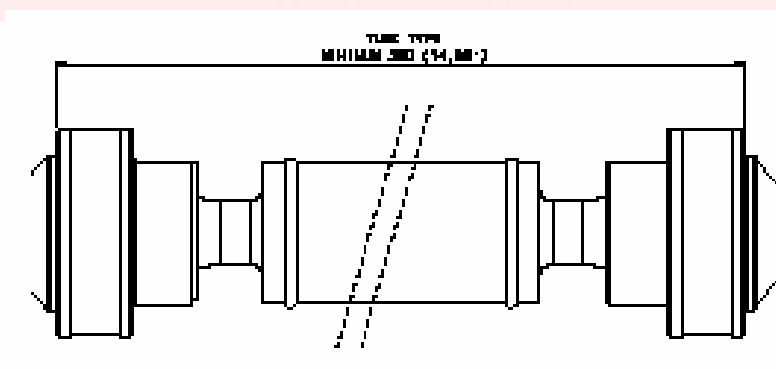
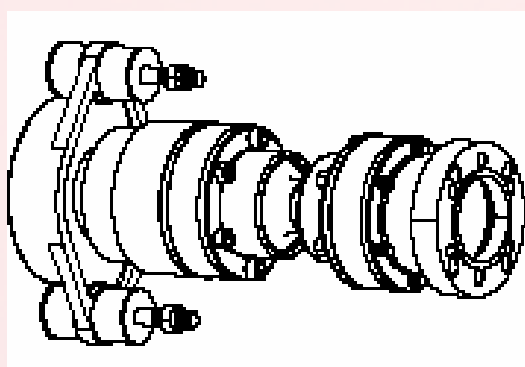
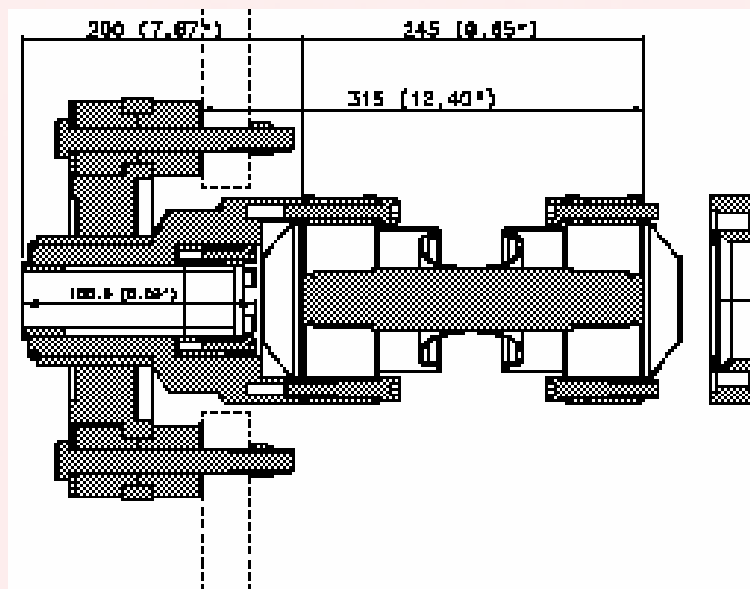
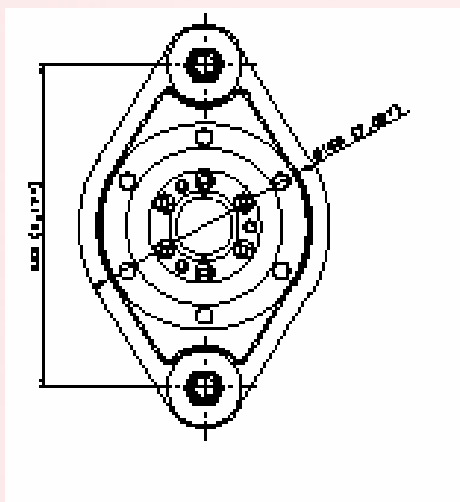




For practical purposes suitable for enginepower up to approx. 170 Hp.

For full planing vessels 225 Hp

Max continuous thrust:	18000 N
Shafts:	35/40/45/50mm 1,25"/1,375"/1,5"/1,75"/2"
Max continuous torque:	1080 Nm
Breakage torque:	4000 Nm
Max rpm:	5000
Max angular displacement pr joint	8°
Max Hp at 1000 rpm:	150 Hp



For practical purposes suitable for enginepower up to approx. 270 Hp.

For full planing vessels 320 Hp

Max continuous thrust:	25000 N
Shafts:	35/40/45/50/55mm 1,25"/1,375"/1,5"/1,75"/2"/2,25"
Max continuous torque:	1800 Nm
Breakage torque:	6000 Nm
Max rpm:	5000
Max angular displacement pr joint	8°
Max Hp at 1000 rpm:	240 Hp

Practical information about max angles on the CV-joints

A plunging constant velocity (CV) joint is producing heat if used with an angle.
The temperature must never be higher than 70 ° C. (USA : 160° Fahrenheit)

A USEFUL RULE OF THUMB IS: RPM (speed) x angle = less than 11000

Example 1: 5 ° x 1400 rpm = 7000 (Ok)

Example 2: 8 ° x 1600 rpm = 12800 (Not Ok)

Hydradrive of the Cardan type:

The two angles have to be as equal as possible. A difference of 1° is acceptable.

If the speed is less than 900 rpm the difference may be up to 2°.

The max angle on the cardan type is 5°. If a larger angle is needed we please ask you to contact customer service.

Thrust bearings:

All thrust bearings from 105 - 130 are equipped with a spherical type of bearing. The max angle must never be more than 4°. If a larger angle is wanted, please contact customer service.

All Thrust bearings from 142 - 200 do not have a spherical type of bearing. An alignment is therefore an important part of any installation of a Hydradrive. The alignment of a small bearing is a lot easier than the alignment of a complete Engine!

You will find installation manuals on www.powertrain.no

All drawings are available for download in several formats, or can be ordered as a CD-rom.

Spare parts: All parts are available from stock. Contact customer service

Adapters: All adapters for the different gearboxes (Transmissions) to be found in the pricelist. Most adapters have a length of 30mm (1,181")
Special lengths on request. Some adapters are made to avoid the hydraulic pump on the transmission (special shape). Drawings can be ordered at customer service.