



GKN Land Systems Aftermarkets & Services

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# Aquadrive Antivibration System

Edition 2012



## **Discover the peace** and quiet of boating.

No noise No vibration No maintenance





Grand Banks 58 classic, USA Aquadrive HDL



VDL Pilot 50, The Netherlands Aquadrive ModuLine



Norwegian Sea Rescue NSSR, Norway Aquadrive CV shafts





**Oyster 82**, UK Aquadrive HDL



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EXPECT>MORE





the following sectors:

- Driveline systems for the automotive industry
- Sinter metal components
- Systems and components for specialty vehicles
- Aircraft components

Within the group, GKN Aftermarkets & Services supplies not only original GKN parts for the worldwide passenger car and commercial vehicle aftermarket. Systems and components are also developed and manufactured in specialist service centres for specialty vehicles, industrial and marine applications.

driveline solutions.

## Introduction

GKN is an engineering group with operations in over 30 countries employing more than 35,000 people. Based on a long technological tradition GKN is a global leader in the development and production of world-class solutions within

GKN Aftermarktes & Services - Your partner for driveline parts and systems, repair and maintenance and the development and production of specialist

### EXPECT>MORE



by **GKN** 





## **Superior engineering**

The Aquadrive antivibration system will help you, and your crew, enjoy the peace and quiet of boating. By isolating the engine from the rest of your boat, noise and vibration are greatly reduced. Most installations result in a 50% or more reduction in cabin or cockpit noise and vibration. Aquadrive will also help to keep your driveline in good condition by minimising wear and tear on the transmission and cutlass bearings.

The propeller shaft is aligned to an Aquadrive thrust bearing, which absorbs the propeller thrust. A Constant Velocity (CV) shaft transmits engine power to the thrust bearing and propeller shaft. The CV shaft automatically adjusts to changes in the alignment between engine and thrust bearing and allows engine movements in every direction. Unlike standard installations, periodic realignment will not be required. The use of softer engine mounts, which isolate engine vibration from the hull, completes the system. Aquadrive antivibration system creates the necessary conditions for a smooth running, quiet boat.





## The Aquadrive system

#### CV shaft

The drive shaft of variable length includes two true plunging Constant Velocity joints that work independently at any angle, this eliminates the need for accurate engine alignment, either during initial installation or subsequent use. The rolling action of the balls within the CV-joints absorb all axial and radial loads, permitting the use of very soft engine mounts as well as reducing wear in connected bearings. A range of pre-machined gearbox coupling kits allows problem free coupling to almost every marine gearbox transmission.

#### Thrust bearing

Aquadrive thrust bearing assemblies with rubber mounts attach to a cross brace in the hull. Robust bearings transfer the thrust directly to the hull and not the engine. In addition, the propeller shaft is much better supported, leading to smoother running and less wear on the stern seal.

#### **Engine mounts**

Aquadrive's proven engine mounts are softer than almost any other and should be used to take full advantage of the system. These mounts are steel hooded to prevent diesel damage and fully captive so that the engine cannot leave its frame even if the vessel is turned over.



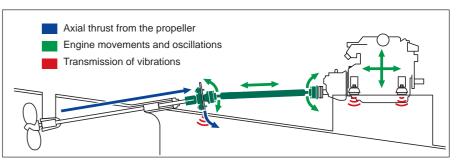


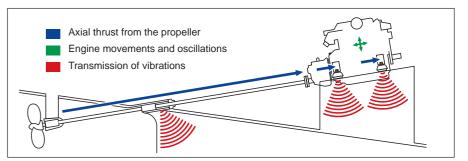
**Outstanding technology** 

the system that's right for your boat.

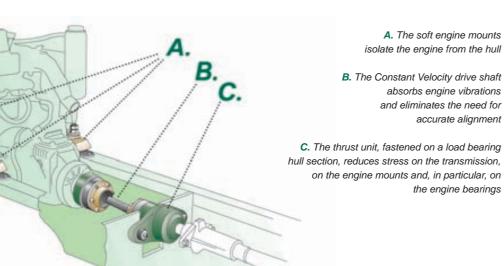
With Aquadrive

Without Aquadrive





even when perfectly aligned.



to improve boats worldwide

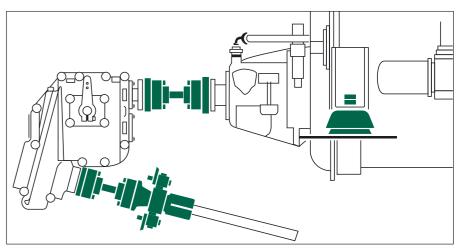
Aquadrive offers fourteen different models designed to match boats powered from

5 hp to 1500 hp, we have a system that's right for nearly any boat. Whether you are a

professional marine engine installer or an enlightened boat owner, we can help you find

absorbs engine vibrations and eliminates the need for accurate alignment

hull section, reduces stress on the transmission, on the engine mounts and, in particular, on the engine bearings Aquadrive for V-drives



Aquadrive for installations with V-drive.

With Aquadrive the engine can be installed in a horizontal position using soft and efficient mounts. Apart from easy installation and permanent alignment, this also leads to better space utilisation while dramatically reducing vibration and noise.

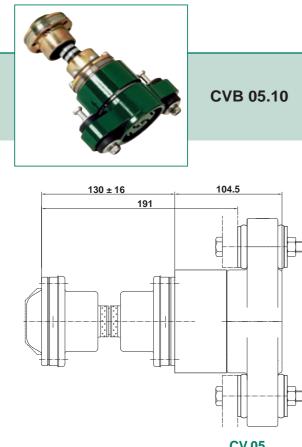
In traditional installations, the alignment of the propeller shaft to the engine has to be precise and subject to periodical maintenance. Stiff mounts transmit high levels of vibration to the hull,





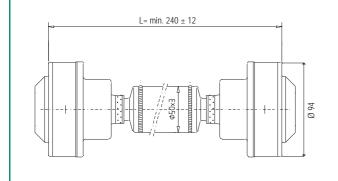
## Moduline B10

M 10

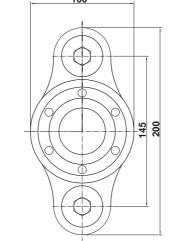


CV 05

Custom-length CV 05 driveshaft is available in lengths from 150 mm (from 240 mm with tubeshaft design). Maximum length depends on shaft rpm.



Max static torque (ØA=20 mm):	1034 Nm / 763 lbft
Max propeller shaft revolutions:	4000 rpm
Max continuous propeller thrust:	11 kN / 2475 lbf



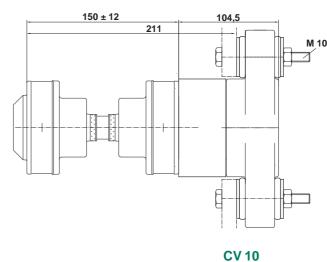
#### **Application examples**

	Rated power kW / HP	Crankshaft rpm	Gearbox ratio
Sailing boat	33 (45)	3800	2.6:1
Displacement motorboat	26 (35)	2600	3.0:1

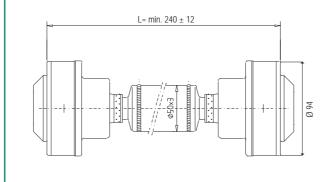
Note: Above rating examples are based on optimum conditions with 2° for each CV joints. In case a CV joint will run at an angle greater than 2°, the max permitted power must be reduced (normally by 8-9% for each degree over 2°).

The maximum allowable joint angle is 4-8° depending on shaft rpm.





Custom-length CV 10 driveshaft is available in lengths from 150 mm (from 240 mm with tubeshaft design). Maximum length depends on shaft rpm.



3/4"	20 mm	22 mm	7/8"	25 mm	1"	1 1/8"	30 mm	1 1/4"	32 mm	35 mm	1 1/2"	40 mm
						Oversize	e version w	ith externa	al clamp me	echanism s	suits shaft	diameters:

### B10 standard version accepts following propeller shaft ØA:

**Propeller shaft options** 

<sup>3</sup> /4" 20 mm 22 mm <sup>7</sup> /8" 25 mm 1" 1 <sup>1</sup> /8" 30 mm 1 <sup>1</sup> /4" 32 mm 35 mm 1 <sup>1</sup> /2"	40 mm
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Oversize version with external clamp mechanism suits shaft diameters:



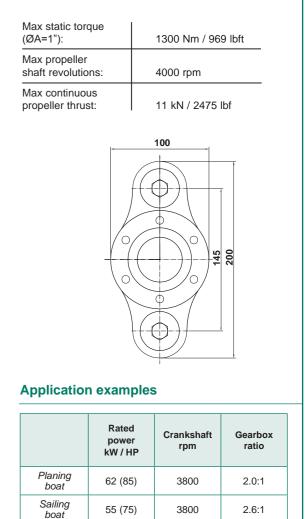
All B10 systems are also available with flange coupling to suit standard BW 5" propeller flange.

Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.



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Note: Above rating examples are based on optimum conditions with 2° for each CV joints. In case a CV joint will run at an angle greater than 2°, the max permitted power must be reduced (normally by 8-9% for each degree over 2°).

2600

40 (55)

Displacement

motorboat

The maximum allowable joint angle is 4-8° depending on shaft rpm.

#### **Propeller shaft options**

3.0:1

B10 standard version accepts following propeller shaft ØA:

1 <sup>3</sup> /4" 45 mm 50 mm 2"
-----------------------------------

All B10 systems are also available with flange coupling to suit standard BW 5" propeller flange. Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

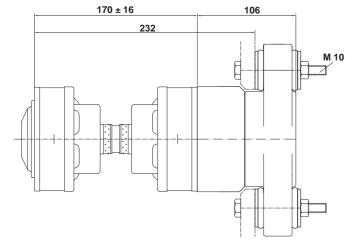


CVB 15.10

## **Moduline B10**

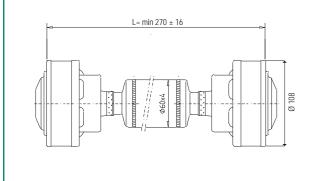


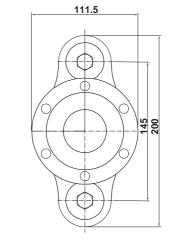
Max static torque $(\emptyset A=1^{1}/_{4})$ :	1625 Nm / 1200 lbft
Max propeller shaft revolutions:	4000 rpm
Max continuous propeller thrust:	11 kN / 2475 lbf



CV 15

Custom-length CV 15 driveshaft is available in lengths from 170 mm (from 270 mm with tubeshaft design). Maximum length depends on shaft rpm.





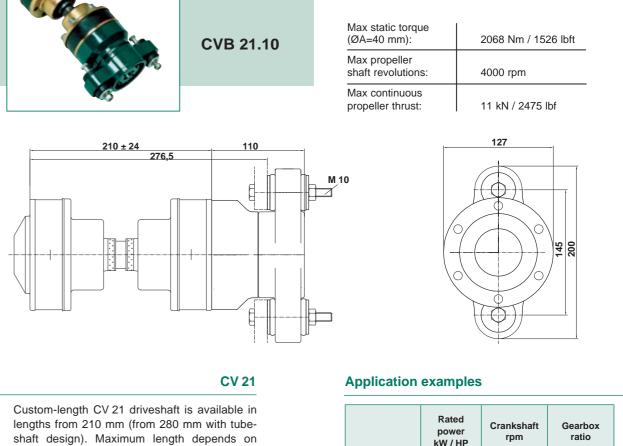
#### **Application examples**

	Rated power kW / HP	Crankshaft rpm	Gearbox ratio
Planing boat	114 (155)	3800	2.0:1
Semi-displacement motorboat	96 (130)	3300	2.2:1
Sailing boat	85 (115)	3300	2.6:1
Displacement motorboat	66 (90)	2600	3.0:1

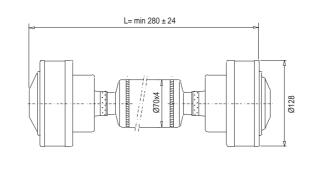
Note: Above rating examples are based on optimum conditions with 2° for each CV joints. In case a CV joint will run at an angle greater than 2°, the max permitted power must be reduced (normally by 8-9% for each degree over 2°).

The maximum allowable joint angle is 4-8° depending on shaft rpm.





shaft rpm.



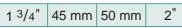
3/4"	20 mm	22 mm	7/8"	25 mm	1"	1 1/8"	30 mm	1 1/4"	32 mm	35 mm	1 1/2"	40 mm
						Oversize	e version w	ith externa	al clamp me	echanism s	suits shaft	diameters:

### **Propeller shaft options**

B10 standard version accepts following propeller shaft ØA:

3/4" 20	20 mm   2	22 mm	7/8"	25 mm	1"	1 1/8"	30 mm	1 1/4"	32 mm	35 mm	1 1/2"	40 mm
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Oversize version with external clamp mechanism suits shaft diameters:



All B10 systems are also available with flange coupling to suit standard BW 5" propeller flange.

Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

All B10 systems are also available with flange coupling to suit standard BW 5" propeller flange. Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.



	power kW / HP	rpm	ratio
Planing boat	173 (235)	3800	2.0:1
Semi-displacement motorboat	147 (200)	3300	2.2:1
Displacement motorboat	96 (130)	2500	3.1:1

Note: Above rating examples are based on optimum conditions with 2° for each CV joints. In case a CV joint will run at an angle greater than 2°, the max permitted power must be reduced (normally by 8-9% for each degree over 2°).

The maximum allowable joint angle is 4-8° depending on shaft rpm.

#### **Propeller shaft options**

B10 standard version accepts following propeller shaft ØA:

1 <sup>3</sup> /4" 45 mm 50 mm 2"
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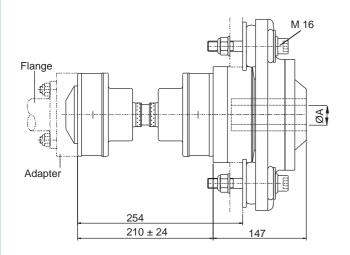
### No vibration

### Moduline B20



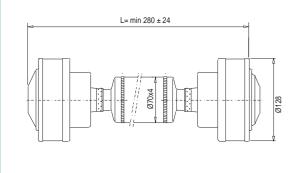
CVB 21.20

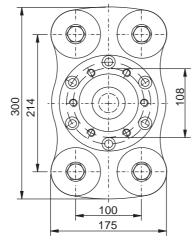
Max static torque (ØA=2"):	1400 Nm / 1034 lbft
Max propeller shaft revolutions:	2000 rpm
Max continuous propeller thrust:	14 kN / 3150 lbf



#### **CV 21**

Custom-length CV 21 driveshaft is available in lengths from 210 mm (from 280 mm with tubeshaft design). Maximum length depends on shaft rpm.





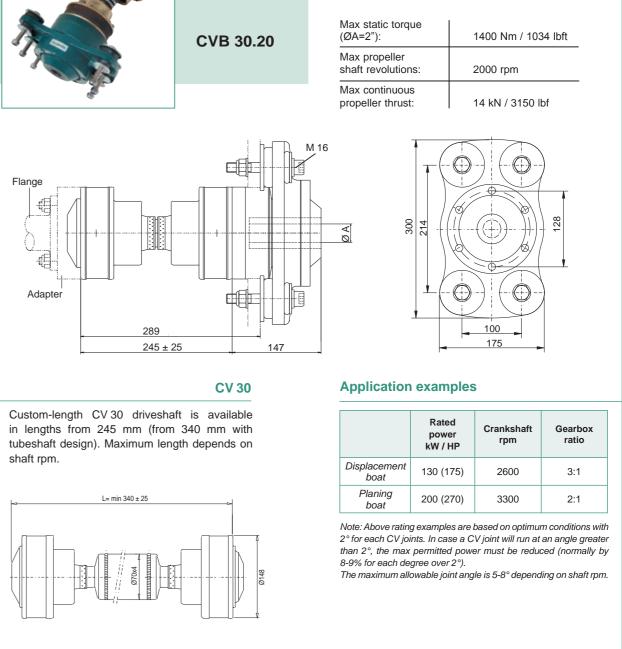
#### **Application examples**

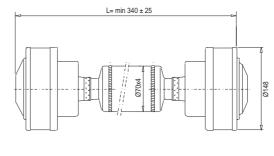
	Rated power kW / HP	Crankshaft rpm	Gearbox ratio
Displacement boat	100 (135)	2600	3:1
Planing boat	165 (225)	3900	2:1

Note: Above rating examples are based on optimum conditions with 2° for each CV joints. In case a CV joint will run at an angle greater than 2°, the max permitted power must be reduced (normally by 8-9% for each degree over 2°).

The maximum allowable joint angle is 4-8° depending on shaft rpm.

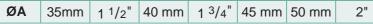






Propeller shaft options

B20 standard version accepts following propeller shaft diameters:



All B20 systems are also available with flange coupling.

Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

ØA 35m



#### **Propeller shaft options**

B20 standard version accepts following propeller shaft diameters:

m	1 1/2"	40 mm	1 <sup>3</sup> /4"	45 mm	50 mm	2"
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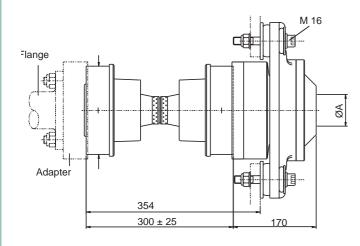
All B20 systems are also available with flange coupling. Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.



Moduline B30

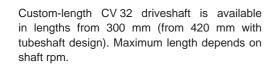


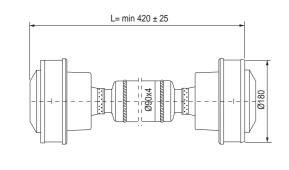
Max static torque (ØA=65 mm):	3000 Nm / 2215 lbft
Max propeller shaft revolutions:	1700 rpm
Max continuous propeller thrust:	21 kN / 4725 lbf

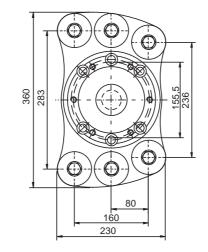


#### CV 32

CVB 32.30







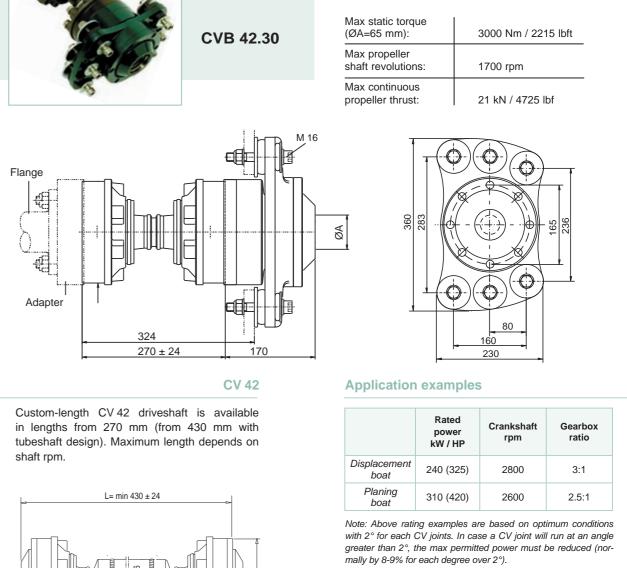
#### **Application examples**

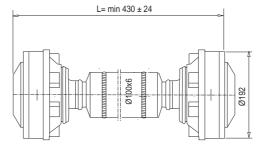
	Rated power kW / HP	Crankshaft rpm	Gearbox ratio
Displacement boat	195 (265)	2600	3:1
Planing boat	270 (365)	3000	2:1

Note: Above rating examples are based on optimum conditions with 2° for each CV joints. In case a CV joint will run at an angle greater than 2°, the max permitted power must be reduced (normally by 8-9% for each degree over 2°).

The maximum allowable joint angle is 5-8° depending on shaft rpm.







### Propeller shaft options

B30 standard version accepts following propeller shaft sizes:

ØA	40 mm	1 <sup>3</sup> /4"	45 mm	50 mm	2"
	2 1/4"	60 mm	2 1/2"	65 mm	70mm

All B30 systems are also available with flange coupling.

Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

ØA





The maximum allowable joint angle is 5-8° depending on shaft rpm.

### **Propeller shaft options**

B30 standard version accepts following propeller shaft sizes:

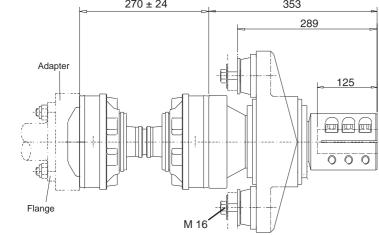
40 mm	1 3/4"	45 mm	50 mm	2"
2 1/4"	60 mm	2 1/2"	65 mm	70mm

All B30 systems are also available with flange coupling. Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application

**aquadrive** antivibration system by GKN

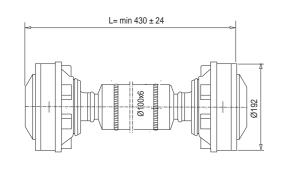
## Heavy Duty Line HDL

		Max static torque:	10500 Nm / 7750 lbft
	HDL 42.680	Max propeller shaft revolutions:	1700 rpm
		Max propeller thrust:	40 kN / 9000 lbf
270 ± 24	353		200



#### CV 42

Custom-length CV 42 driveshaft is available in lengths from 270 mm (from 430 mm with tubeshaft design). Maximum length depends on shaft rpm.



#### **Application examples**

AØ

	Rated power kW / HP	Crankshaft rpm	Gearbox ratio
Displacement boat	220 (300)	2100	3:1
Planing boat	420 (570)	2600	2:1

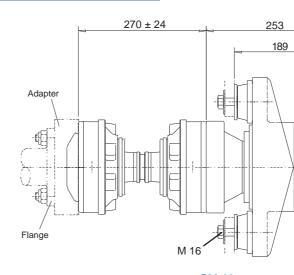
95

Note: Above rating examples are based on optimum conditions with 2° for each CV joints. In case a CV joint will run at an angle greater than 2°, the max permitted power must be reduced (normally by 8-9% for each degree over 2°).

The maximum allowable joint angle is 5-8° depending on shaft rpm.

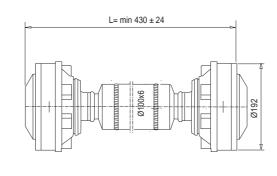


HDL 42.680 Flanged



### CV 42

Custom-length CV 42 driveshaft is available in lengths from 270 mm (from 430 mm with tubeshaft design). Maximum length depends on shaft rpm.



#### Propeller shaft options

HDL 680 standard version accepts following propeller shaft sizes:

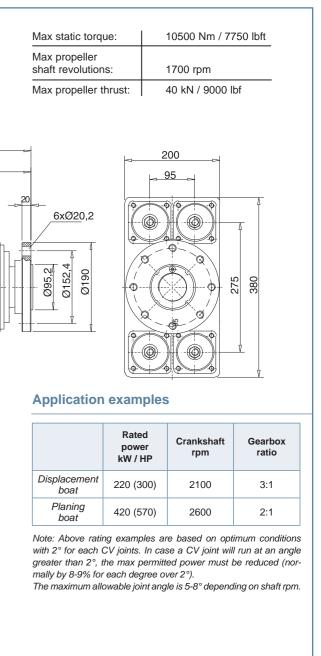
50 mm 2" 2 1/4" 60 mm 2 1/2" 65 mm 70 mn	50 mm	2"	2 1/4"	60 mm	2 1/2"	65 mm	70 mm
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Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

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### **Propeller shaft options**

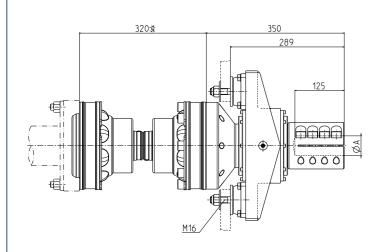
HDL 680 standard version accepts following propeller shaft sizes:

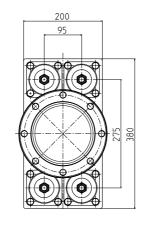
50 r	nm	2"	2 1/4"	60 mm	2 1/2"	65 mm	70 mm
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aquadrive antivibration system R by GKN

# Heavy Duty Line HDL

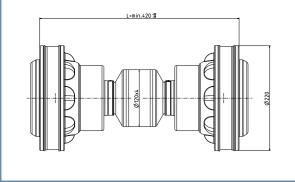
	Max static torque:	12240 Nm / 9060 lbft	
HDL 48.690	Max propeller shaft revolutions:	1700 rpm	
	Max propeller thrust:	40 kN / 9000 lbf	





#### CV 48

Custom-length CV 48 driveshaft is available in lengths from 320 mm (from 420 mm with tubeshaft design). Maximum length depends on shaft rpm.



#### Application examples

	Rated power kW / HP	Crankshaft rpm	Gearbox ratio
Displacement boat	410 (550)	2100	3:1
Planing boat	670 (900)	2800	2:1

Note: Above rating examples are based on optimum conditions with 2° for each CV joints. In case a CV joint will run at an angle greater than 2°, the max permitted power must be reduced (normally by 8-9% for each degree over 2°). The maximum allowable joint angle is 5-8° depending on shaft

rpm.

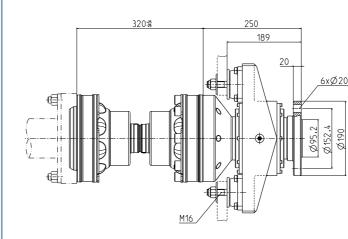
### Propeller shaft options

HDL 680 standard version accepts following propeller shaft sizes:

50 mm	2"	2 1/4"	60 mm	2 1/2"	65 mm	70 mm
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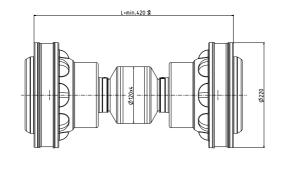


HDL 48.690 Flanged



#### CV 48

Custom-length CV 48 driveshaft is available in lengths from 320 mm (from 420 mm with tubeshaft design). Maximum length depends on shaft rpm.



50 mi

Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

18\_\_\_



	Max static torq	ue:	12240 Nm / 90	060 lbft
	Max propeller shaft revolution	IS:	1700 rpm	
	Max propeller t	hrust:	40 kN / 9000 l	bf
).2	Application		275 380	
		Rated power kW / HP	Crankshaft rpm	Gearbox ratio
	Displacement boat	410 (550)	2100	3:1
	Planing boat	670 (900)	2800	2:1
	Note: Above ratii with 2° for each ( greater than 2°, t mally by 8-9% for The maximum a rpm.	CV joints. In ca the max permit r each degree o	se a CV joint wil ted power must l over 2°).	l run at an angle be reduced (nor-
		Pr	opeller sh	aft options

### HDL 680 standard version accepts following propeller shaft sizes:

nm	2"	2 1/4"	60 mm	2 1/2"	65 mm	70 mm

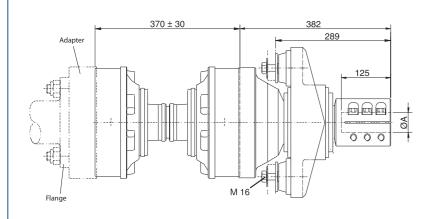
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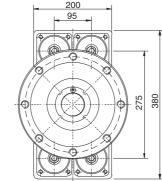
HDL

aquadrive antivibration system by **GKN** 

# Heavy Duty Line HDL

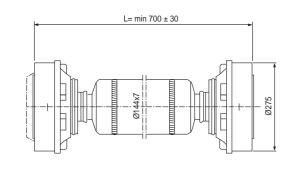
	Max static torque:	12240 Nm / 9060 lbft	
_ 60.700	Max propeller shaft revolutions:	1700 rpm	
	Max propeller thrust:	40 kN / 9000 lbf	





#### CV 60

Custom-length CV 60 driveshaft is available in lengths from 370 mm (from 700 mm with tubeshaft design). Maximum length depends on shaft rpm.



#### Application examples

	Rated power kW / HP	Crankshaft rpm	Gearbox ratio
Displacement boat	370 (500)	1900	2.7:1
Planing boat	660 (900)	2300	1.75:1

Note: Above rating examples are based on optimum conditions with 2° for each CV joints. In case a CV joint will run at an angle greater than 2°, the max permitted power must be reduced (normally by 8-9% for each degree over 2°).

The maximum allowable joint angle is 3° depending on shaft rpm. For higher benching angles please consult our technical department.

#### Propeller shaft options

HDL 700 standard version accepts following propeller shaft sizes:

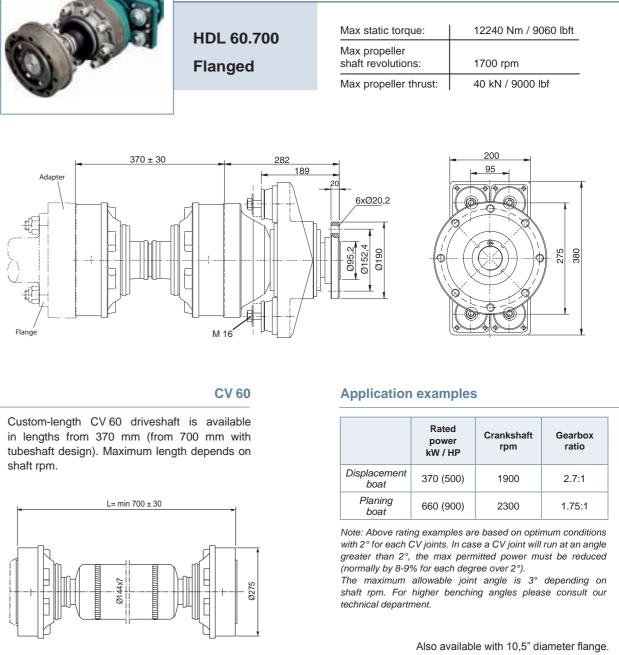


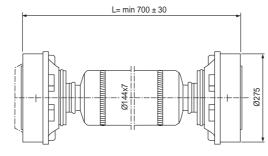
Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.





HDL 60.700 Flanged





50 mi

### **Propeller shaft options**

HDL 700 standard version accepts following propeller shaft sizes:

1 2" 2 1/4" 60 mm 2 1/2" 65 mm 70 mm
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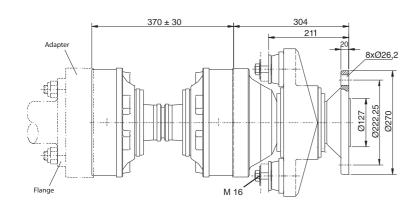
Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

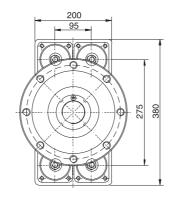
R

aquadrive antivibration system by GKN

## Heavy Duty Line HDL

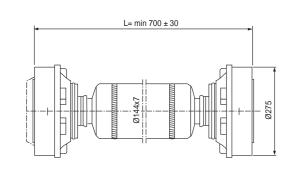
	HDL 60.700 HT* * HT - Higt tensile steel version	Max static torque:	22000 Nm / 16280 lbft
		Max propeller shaft revolutions:	1700 rpm
		Max propeller thrust:	40 kN / 9000 lbf





#### CV 60

Custom-length CV 60 driveshaft is available in lengths from 370 mm (from 700 mm for tubeshaft design). Maximum length depends on shaft rpm.



#### **Application examples**

	Rated power kW / HP	Crankshaft rpm	Gearbox ratio
Displacement boat	515 (700)	1900	3:1
Planing boat	735 (1000)	2300	2.5:1

Note: Above rating examples are based on optimum conditions with 2° for each CV joints. In case a CV joint will run at an angle greater than 2°, the max permitted power must be reduced (normally by 8-9% for each degree over 2°).

The maximum allowable joint angle is 3° depending on shaft rpm. For higher benching angles please consult our technical department.

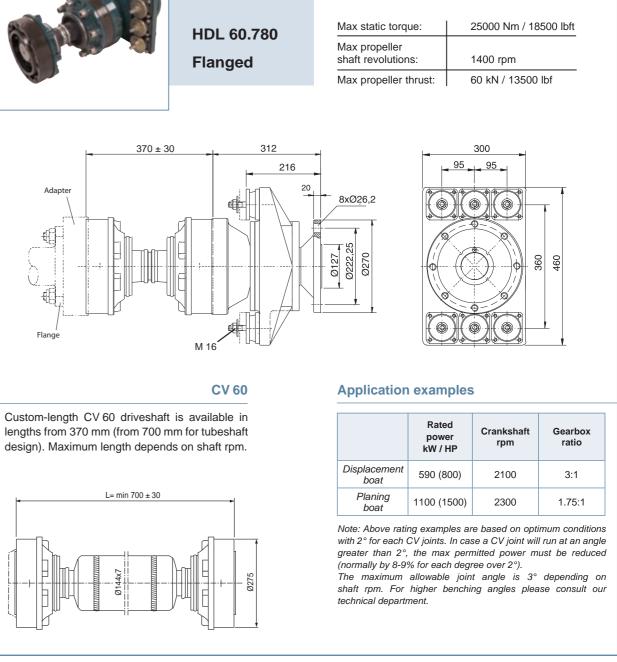
#### Propeller shaft options

HDL 700 standard version accepts following propeller shaft sizes:

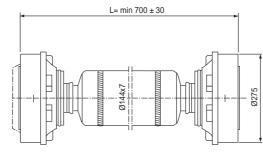




HDL 60.780 Flanged



Custom-length CV 60 driveshaft is available in lengths from 370 mm (from 700 mm for tubeshaft



50 mi

Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

Please contact our technical department to assist you in selecting a suitable Aquadrive system for your application.

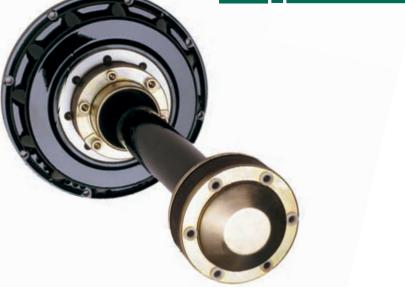


#### **Propeller shaft options**

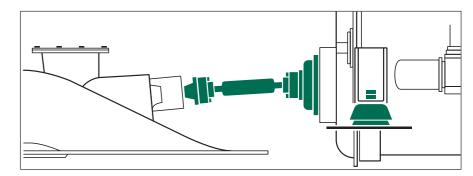
HDL 700 standard version accepts following propeller shaft sizes:

m 2" 2 1/4" 60 mm 2 1/2" 65 mm 70 mm
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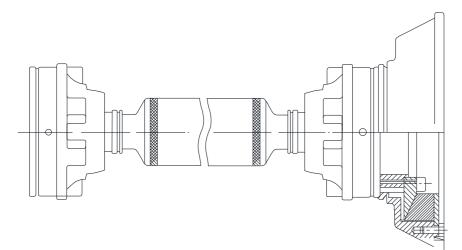
Aquadrive CVT for water-jet



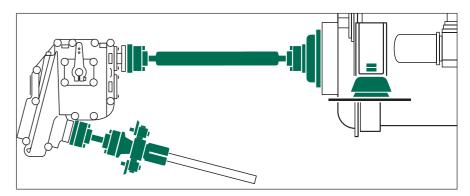
soft mounted engines.

# Aquadrive and torsional damping

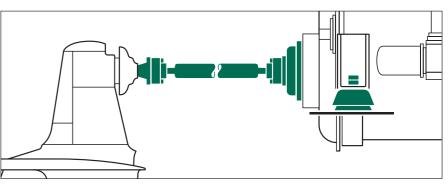
Soft, flexible rubber elements are normally installed between the engine flywheel and gearbox to avoid torsional vibration. Aquadrive CV shafts can be directly coupled to those gearboxes without additional rubber or flexible elements (CVT units). For flywheelmounted installations, Aquadrive is able to provide you with CV shafts combined with elastic torsional dampers as a customized solution in a full range of power applications involving remote mounted propulsion equipment, such as water-jets, stern-drives and remote v-drives.



Aquadrive for remote V-drives



Aquadrive CVT Jack-shaft



When splitting the engine and outboard stern drive, the best way to couple the flywheel to the stern drive is by means of a CVT unit. This surely offers a smoother and quieter solution, with considerably less wear on the bearings, than any other drive shaft systems available.

The CVT unit consists of a CV shaft of variable length and a rubber element torsional damper designed to bolt directly to the engine flywheel. This is the ultimate combination of excellent torsional damping and total absorption of misalignment and movement between water-jets and

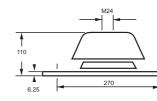
Demonstrably the best way to install a remote v-drive: The floating CVT unit with torsional damping between soft mounted engine and gearbox, then a CV shaft and thrust bearing that takes out the propeller thrust and allows soft mounted gearbox and free alignment. When required, "dual-rate couplings" are available to reduce "gear rattle".





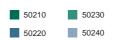
50230

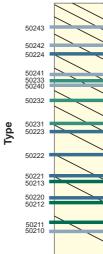
800kg per mount.



# deflection chart

Selecting the correct rubber grade and mount for a particular engine or generator is a skilled task and our expert staff will advise. For those who wish to study the science, the chart above shows how much deflection will occur on each mount and rubber hardness given a particular weight on the mount. In general you should aim for 3mm on the 50210, 4mm on the 50220, 5mm on the 50230 and 6mm on the 50240.





# **Engine mounts**

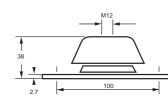
The Aquadrive system creates free movement between the engine and the propeller shaft. One result is the engine's mountings can be much softer then normal, partly because the engine can vibrate freely relative to the shaft, and partly because no propeller thrust reaches the mounts and strains them forwards. Aquadrive engine mounts can be used with almost any marine engine, and our expert staff will rapidly select the correct rubber stiffness for the machinery involved.

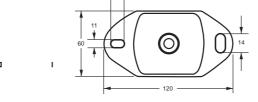


### 50210

50220

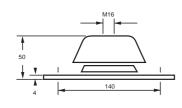
The smallest engine mount of the range are available in four rubber grades for weights up to 60kg per mount.

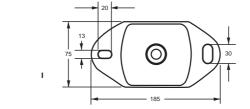






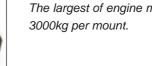
The most versatile mount, are available with five different rubber grades and takes weights up to 200kg per mount.





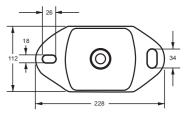
Engine mount

50240

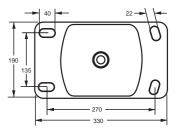


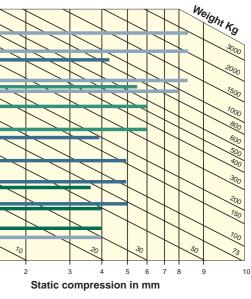
26

This engine mount are available in four different rubber grades and will take weights up to



The largest of engine mount of the range are available in four rubber grades taking up to











# **Aquadrive References**



**Green Line 33**, Slovenia Aquadrive Moduline



Gran Soleil 56, Italy Aquadrive Moduline



Hallberg Rassy 62, Sweden Aquadrive Moduline



Flemming 75, USA Aquadrive HDL