



Kräutler
Electric Motors

Boat motor catalog

version V01.17

The future
needs new drive

For the provide of boat pictures we would like to thank the following companies.



Frauscher

Frauscher Bootswerft Ges.m.b.H. & Co KG
Betriebspark Ehrenfeld 3
4662 Steyrermühl | Austria



Markus Glas GmbH
Bootwerft und Fachgeschäft für Bootszubehör und Wassersportbedarf
Seeweg 1-3
82343 Pöcking-Possenhofen



Pehn Bootsbau
Attergaustraße 8
A 4880 St. Georgen



Formstaal GmbH & Co. KG
An der Werft 17
D 18439 Stralsund

This document has been written with utmost care. Kräutler Elektromaschinen GmbH assumes no responsibility for errors or omissions. This also applies to damages that may result from use of the information contained in this document.

COPYRIGHT

Copyright © 2018 Kräutler Elektromaschinen GmbH. All rights reserved.

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF KRÄUTLER ELEKTROMASCHINEN GmbH.

Index

Index	3
Introduction	5
The company Kräutler	6
Division industrial motors	7
Division boat motors	8
Division repair	9
The drive	11
For every application the right drive	12
Submersible motors	18
Delivery programme submersible flange motor	21
Submersible flange motor with fixed propeller.....	22
Submersible flange motor with folding propeller.....	23
Delivery programme submersible motor outboarder	24
Outboarder with grip (for hand steering).....	25
Outboarder with pin (for remote control).....	26
Submersible pod motor for mounting in a rudder gland	27
Outboarder for Electric boats (straight stern)	28
Outboarder with shaft-profile	29
Outboarder with different shaft lengths (not tiltable).....	30
Sail-Drive motors	31
Delivery programme Sail-Drive.....	34
Sail-Drive compact.....	35
Sail-Drive fixed	36
Sail-Drive mechanical rotatable – 2x45°	37
Rudderpropeller – 360°	38
Electric Drives for existing shafting.....	39
Delivery programme shaft drives	41
Direct - drives for shaft drives	42
Shaft drives with gearbox	43
Drive system for high speed	44
Hybrid Drives	45
Diesel-Electric Drives	46
Controls / energy supply	48
Infinitely variable Electric regulation system	51
Single lever control (EHS)	53
Battery monitor (BMV 700)	55
Kräutler Control Unit (KCU 5.0 P)	56
Batteries and charger	57
Spare - / Wear parts	58
Sacrificial anodes.....	59
Repair kits	62





Kräutler
Electric Motors

Introduction

**The future
needs new drive**

The company Kräutler



Every one of us needs his drive - his motivation!

For us the electric motor is the drive - it makes us every day more flexible for new challenges. We are a competent partner for special customer solutions - our technicians realize in the shortest time new solutions - flexibility belongs to the daily tool.

Company portrait

Our family company was established in 1971 by Oswald Kräutler. In the meantime, his sons Harald and Andreas Kräutler with about 20 employees are available for you. We complete electric drive units for motorboats and electric auxiliary drives for sailing boats, also special designs of asynchronous three-phase motors for the drive and machine-building industry. Every year, thousands of electric motors leave our factory in Lustenau, in the extreme West of Austria.

Industrial motors

In the division industrial motors, our company delivers the component electric motor to system providers in the drive industry. Besides, we also provide directly the machine-building industry or all companies that require demanding drive motor techniques. The Industrial Motor Division of us is skill in developing special mechanical and electrical solutions for the specific drive motor needs of the customer.

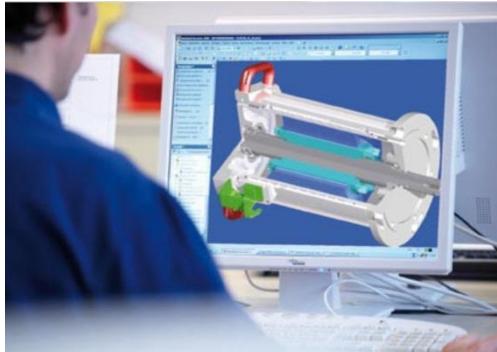
Boat motors

With a large amount of innovations, the division boat motors of our company has positioned as a complete provider with a wide, but individual standard range. Nowadays we deliver nearly exclusively drive units for motor and sailing boats ready for assembly. A solid distribution network takes charge of the sale.

Repair

Everything around the motor belongs to the action area of our company, and this does not end up with the repair and maintenance service. This also means to cover the specific customer needs with the suiting market products. Careless whether own or foreign motor, the optimum solution of the problem has priority.

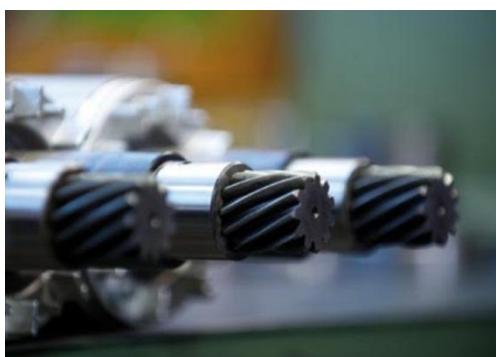
Division industrial motors



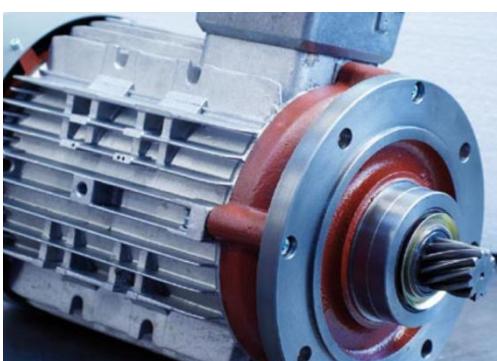
The division industrial motors include development, construction, production, and sales of mainly asynchronous three-phase motors. Emphasis is not made on the manufacture of standard motors and mass production; we rather try to solve together with our customer his individual drive needs. We construct independently of quantities - we mainly build single units and small series, and this in shortest delivery times.



Kräutler supplies asynchronous motors as special mechanical and electrical solutions, water-cooled motors, synchronous reluctance motors, torque and coiling motors, motors for hoisting gears and electric drives for the car industry.



The motor production of Kräutler has an individual character. Everything is tailor-made, what requires a good deal of flexibility. The large amount of special constructions from Kräutler proves our force, to respond to customer-specific requests. This diversity of variants induces us to improve our products day by day and to optimise permanently our production flow. The key-point is nevertheless a good working global system - from the first contact with the customer over construction and production, right up to the commissioning of the drive unit.



Division boat motors

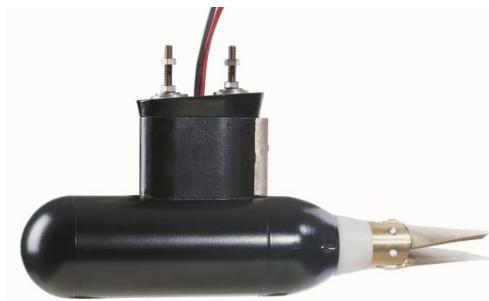
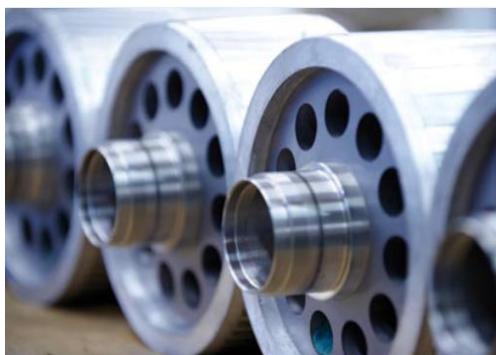


The construction of electric boat motors started in the 80's. First for own consumption and in reality only because no product on the market satisfied the high requirements of the company founder Oswald Kräutler. Nearly 40 years after the first boat motor from Kräutler, these motors gained in the meantime worldwide recognition. No wonder that sailing and motorboat fans link „Kräutler“ to commitment to quality and performance.



With our „groove“ in motor construction we show competence and quality. Especially in motors for boat drives, our range of electric motors for sailing and motorboats has practically no limit. This is our contribution to an environmental thinking focused on the future.

In the last years, the division Boat Motors, together with engineering and constructors and the know-how of the motor manufacturer Kräutler, a sample and prototype for the car and vehicle industry has furthermore been developed.



Division repair



The division repair includes the areas of preventive repairs servicing, reporting and the classic repair.

The failure of an electric motor during use can lead to significant failure costs. In order to avoid this failure costs, we offer our customers the option of preventive maintenance work. In this work, wear and tear parts such as seals, bearings are replaced and the winding is tested.



Through years of experience in the field of electric motors production and assembly, it is possible for us to identify development or production errors also from other manufacturers and to demonstrate as part of a reporting.

In the classic motor repair, we are able to repair through our extensive range of machinery almost all defective parts or to replace them with new ones.

Our service scope includes:

- o new winding
- o exchange of the ball bearings
- o repair or replace defective mechanical components
- o replace wear and tear parts (brake, brush, etc.)





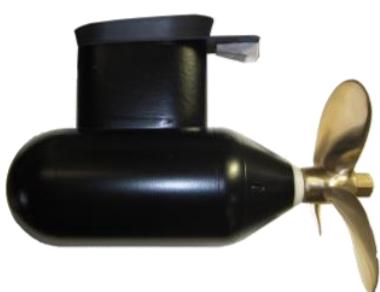


Kräutler
Electric Motors

The drive

**The future
needs new drive**

For every application the right drive



ACV with
fixed propeller

page 22



GPV with
folding propeller

page 23



GPAV with grip
for hand steering

page 25



GPAV with pin
for remote control



GPRV with
rudder gland



GPE with
straight stern



ACA with pin
for remote control

page 26

page 27

page 28

page 29



SDK with
folding propeller

page 35



SDKH with
fixed propeller

page 36



SDKH-D with
fixed propeller

page 37



KRP 25e

page 38



WAd 11,0 AC

page 42



WAz 15,0 AC

page 42



hybrid

page 45



WA 370/100
with fixed propeller

page 44

Submersible motors



In the last years there has been a significant improve and expand of diversity and power of electric propulsion submersible motors. Here you will find some explanations for a better distinguish of different motor variants and a description of the components which are included in the standard version.

For an application with low power requirements, we recommend the GP engine. The GP motor is a permanently excited DC motor.

For a power requirement of more than 2,4kW we recommend the AC engine. The AC motor is a brushless three-phase asynchronous motor.

All electric drives with Submersible motors consist of

- Motor with appropriate bracket
- Electric regulation system mounted on an aluminium base plate with fuse and cut-off relay
- Single lever control (throttle) for panel mounting in standard version with key switch, status LED, black front panel, black aluminium lever and mounting screws
 - Special designs at additional cost (see page 53)
- Cable set: controller-battery 3m, controller-motor 1,5m, controller-single lever control 5m,
 - Optional cable lengths at additional cost
- Battery master switcher and battery fuse
- Battery monitor BMV 700 with shunt and 10m connecting cable
- Fixed propeller 3 blade aluminium or bronze (depending on model)
- Alternative with 2 blade folding propeller
- Anode for fresh water
- Alternative anode for salt water



Direct current - models	
DC - model	brief description
*GPV	<p>Submersible flange motor for fixed mounting under the hull</p> <p>Technology: DC motor with permanent magnets, continuous control</p> <p>Advantages: small and light design</p> <p>Power range: 0,5 – 2,2kW</p> <p>Battery voltage: 24 – 36 Volt</p>
*GPRV	<p>Submersible motor for mounting in a rudder gland (mechanical rotatable / Pod)</p> <p>Technology: DC motor with permanent magnets, continuous control</p> <p>Advantages: small and light design</p> <p>Power range: 0,5 – 2,2kW</p> <p>Battery voltage: 24 – 36 Volt</p>
*GPH	*GPR with rudder gland
*GPAV	<p>Submersible outboarder with stainless steel tube and with outboarder-bracket</p> <p>Technology: DC motor with permanent magnets, continuous control</p> <p>Advantages: small and light design</p> <p>Power range: 0,5 – 2,2kW</p> <p>Battery voltage: 24 – 36 Volt</p>
*GPE	<p>Submersible outboarder for fixed mounting on the straight stern</p> <p>Technology: DC motor with permanent magnets, continuous control</p> <p>Advantages: small and light design</p> <p>Power range: 0,5 – 2,2kW</p> <p>Battery voltage: 24 – 36 Volt</p>
ATTENTION	<p>* The GP motors are only for short using in seawater – max. 4 weeks.</p> <p>After a maximum of four weeks at a time, you must check the housing against corrosion. If necessary, repair the painting.</p> <p>You must change the anode, if you are driving in brackish or seawater.</p>



alternating current - models	
AC - model	brief description
ACV / SCV	<p>Submersible flange motor for fixed mounting under the hull</p> <p>Technology ACV: brushless three phase asynchronous motor</p> <p>Technology SCV: brushless three phase synchronous motor</p> <p>Advantages: high performance and free of maintenance</p> <p>Power range: 2,4 – 17,0kW</p> <p>Battery voltage: 24 – 48 Volt</p>
ACR / SCR	<p>Submersible motor for mounting in a rudder gland (mechanical rotatable / Pod)</p> <p>Technology ACR: brushless three phase asynchronous motor</p> <p>Technology SCR: brushless three phase synchronous motor</p> <p>Advantages: high performance and free of maintenance</p> <p>Power range: 2,4 – 17,0kW</p> <p>Battery voltage: 24 – 48 Volt</p>
ACH	ACR with rudder gland
ACAV	<p>Submersible outboarder with stainless steel tube and with outboarder-bracket</p> <p>Technology: brushless three phase asynchronous motor</p> <p>Advantages: high performance and free of maintenance</p> <p>Power range: 2,4 – 5,0kW</p> <p>Battery voltage: 24 – 48 Volt</p>
ACE	<p>Submersible outboarder for fixed mounting on the straight stern</p> <p>Technology: brushless three phase asynchronous motor</p> <p>Advantages: high performance and free of maintenance</p> <p>Power range: 2,4 – 5,0kW</p> <p>Battery voltage: 24 – 48 Volt</p>
ACA	<p>Submersible outboarder with shaft-profile and outboarder-bracket</p> <p>Technology: brushless three phase asynchronous motor</p> <p>Advantages: high performance and free of maintenance</p> <p>Power range: 2,4 – 11,7kW</p> <p>Battery voltage: 24 – 48 Volt</p>
ACRE / SCRE	<p>Submersible outboarder with outboarder-bracket, for fixed mounting, not tiltable</p> <p>Technology ACRE: brushless three phase asynchronous motor</p> <p>Technology SCRE: brushless three phase synchronous motor</p> <p>Advantages: high performance and free of maintenance</p> <p>Power range: 2,4 – 17,0kW</p> <p>Battery voltage: 24 – 48 Volt</p>
ATTENTION	You must change the anode, if you are driving in brackish or seawater.

Delivery programme submersible flange motor

**your wish
our solution**



GPV folding propeller



fixed propeller



ACV fixed propeller



folding propeller

High performance

The efficiency of a ship propulsion system is dependent on the shaft speed and the proper selection of the propeller. By the superior torque curve of an electric motor to a gasoline engine two or three-blade propeller can be used at low shaft speed. Because of this principle, a very high thrust is developed even for small drives. Both, the AC and the GP engine are available with a fixed or folding propeller. Kräutler AC drives are also completely maintenance-free.

Low noise level

The luxury of being able to move almost silently is the most beautiful experience of navigating with an electrically powered vehicle. Whole chapter in the literature for shipbuilding are dedicated to noise reduction in powertrains. Kräutler submersible flange motors are slow rotating and therefore require no gearbox. The propeller is mounted directly on the motor shaft and runs very quietly and with low vibration.

Controllable

With the convenient single-lever-controller, an infinitely variable speed control in forward and reverse is possible. The high-quality electric controller operates almost without energy loss and protects your valuable battery pack against deep discharge. The modern power electronics will help you to optimally adjust the drive to your ship.

Environmentally friendly

Electric motors are totally emission free. They are the future in maritime applications, since they apply to all environmental protection requirements, today and in future.

Submersible flange motor with fixed propeller

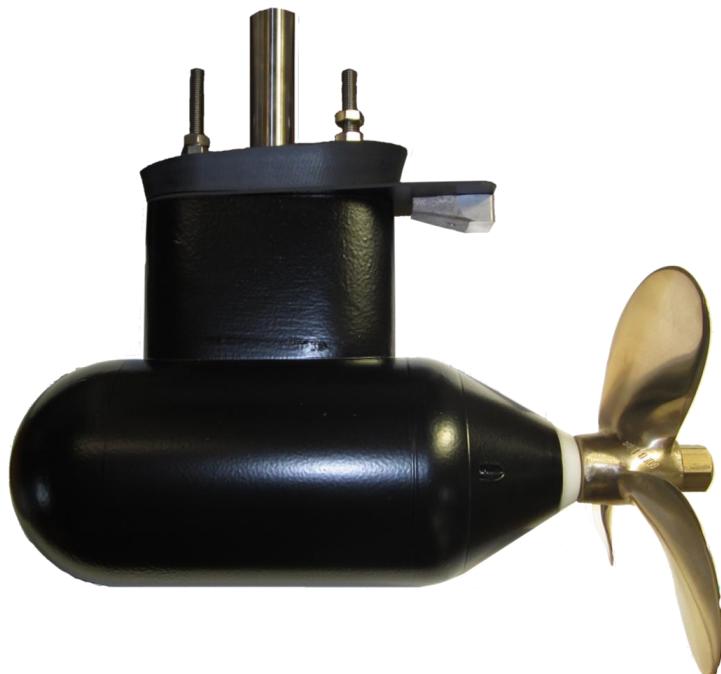


Figure: ACV - flange motor with fixed propeller

Type	Continuous power		Voltage	Current	Total efficiency	Weight	up to boat weight	
	Consumption	Output					Sailing-boat	Power-boat
GPV 0,5	0,5 kW	0,4 kW	24 V	21 A	85 %	14 kg	0,4 t	0,2
GPV 0,8	0,8 kW	0,7 kW	24 V	34 A	85 %	15 kg	0,7 t	0,3
GPV 1,6	1,6 kW	1,4 kW	24 V	67 A	85 %	20 kg	1,4 t	0,6
GPV 2,2	2,2 kW	1,9 kW	36 V	61 A	85 %	20 kg	1,9 t	0,8
ACV 1,8	2,4 kW	1,8 kW	24 V	100 A	75 %	23 kg	1,8 t	0,7
ACV 2,0	2,6 kW	2,0 kW	24 V	107 A	78 %	27 kg	2,0 t	1,0
ACV 2,1	2,8 kW	2,1 kW	48 V	58 A	75 %	23 kg	2,1 t	0,8
ACV 4,0	5,0 kW	4,0 kW	48 V	104 A	80 %	27 kg	4,0 t	1,6
ACV 8,0	9,7 kW	8,0 kW	48 V	202 A	82 %	48 kg	8,0 t	3,2
ACVS 11,0	13,2 kW	11,0 kW	48 V	275 A	83 %	61 kg	11,0 t	4,4
SCV 15,0	17,0 kW	15,0 kW	48 V	355 A	88 %	78 kg	15,0 t	6,0

possible options

GPV 0,5 and GPV 0,8 with two-stage switch for speed control

Special hull adjustments: GPV=8° - ACV 1,8-4,0=0° or 6,5° - ACV 8,0+ACVS 11,0=7,1°

Special bolts length and special tube lengths – e.g. For wooden boats

ACV and ACVS with Boost function (30% performance increase for 2 minutes)

Attention: The GPV motor is only for short term use in seawater.

Submersible flange motor with folding propeller



Figure: GPV - flange motor with folding propeller

Type	Continuous power Consumption		Voltage	Current	Total efficiency	Weight	up to boat weight	
	Output	Consumption					Sailing-boat	Power-boat
GPV 0,5	0,5 kW	0,4 kW	24 V	21 A	85 %	14 kg	0,4 t	-
GPV 0,8	0,8 kW	0,7 kW	24 V	34 A	85 %	15 kg	0,7 t	-
GPV 1,6	1,6 kW	1,4 kW	24 V	67 A	85 %	20 kg	1,4 t	-
GPV 2,2	2,2 kW	1,9 kW	36 V	61 A	85 %	20 kg	1,9 t	-
ACV 1,8	2,4 kW	1,8 kW	24 V	100 A	75 %	23 kg	1,8 t	-
ACV 2,0	2,6 kW	2,0 kW	24 V	107 A	78 %	27 kg	2,0 t	-
ACV 2,1	2,8 kW	2,1 kW	48 V	58 A	75 %	23 kg	2,1 t	-
ACV 4,0	5,0 kW	4,0 kW	48 V	104 A	80 %	27 kg	4,0 t	-
ACV 8,0	9,7 kW	8,0 kW	48 V	202 A	82 %	48 kg	8,0 t	-
ACVS 11,0	13,2 kW	11,0 kW	48 V	275 A	83 %	61 kg	11,0 t	-
SCV 15,0	17,0 kW	15,0 kW	48 V	355 A	88 %	78 kg	15,0 t	-

possible options

GPV 0,5 and GPV 0,8 with two-stage switch for speed control

Special hull adjustments: GPV=8° - ACV 1,8-4,0=0° or 6,5° - ACV 8,0+ACVS 11,0=7,1°

Special bolts length and special tube lengths – e.g. For wooden boats

ACV and ACVS with Boost function (30% performance increase for 2 minutes)

Attention: The GPV motor is only for short term use in seawater.

Delivery programme submersible motor outboarder



High performance

The Kräutler submersible outboarders are powerful, quiet and reliable. But every boat is different! We have developed a wide range of mounts and mounting options for the requirements on the boat. Whether mounting on the straight stern, in the engine slot or under your rudder gland system, Kräutler certainly has the right drive. The leading e-boat manufacturers in Europe have confidence in our technology, your benefit from our decades of experience. Both, the AC and the GP engine are available with a fixed or folding propeller.

Low noise level

The luxury of being able to move almost silently is the most beautiful experience of navigating with an electrically powered vehicle. Whole chapter in the literature for shipbuilding are dedicated to noise reduction in powertrains.

Kräutler submersible flange motors are slow rotating and therefore require no gearbox. The propeller is mounted directly on the motor shaft and runs very quietly and with low vibration.

Controllable

With the convenient single-lever-controller, an infinitely variable speed control in forward and reverse is possible. The high-quality electric controller operates almost without energy loss and protects your valuable battery pack against deep discharge. The modern power electronics will help you to optimally adjust the drive to your ship.

Environmentally friendly

Electric motors are totally emission free. They are the future in maritime applications, since they apply to all environmental protection requirements, today and in future.

Outboarder with grip (for hand steering)



Figure: Outboarder with grip (for hand steering)

Type	Continuous power Consumption	Output	Voltage	Current	Total efficiency	Weight	up to boat weight Sailing-boat	Power-boat
GPAV 0,5	0,5 kW	0,4 kW	24 V	21 A	85 %	18 kg	0,4 t	0,2 t
GPAV 0,8	0,8 kW	0,7 kW	24 V	34 A	85 %	19 kg	0,7 t	0,3 t
GPAV 1,6	1,6 kW	1,4 kW	24 V	67 A	85 %	24 kg	1,4 t	0,6 t
GPAV 2,2	2,2 kW	1,9 kW	36 V	61 A	85 %	24 kg	1,9 t	0,8 t
ACAV 1,8	2,4 kW	1,8 kW	24 V	100 A	75 %	27 kg	1,8 t	0,7 t
ACAV 2,0	2,6 kW	2,0 kW	24 V	107 A	78 %	31 kg	2,0 t	0,8 t
ACAV 2,1	2,8 kW	2,1 kW	48 V	58 A	75 %	27 kg	2,1 t	0,8 t
ACAV 4,0	5,0 kW	4,0 kW	48 V	104 A	80 %	31 kg	4,0 t	1,6 t

possible options

GPAV 0,5 and GPAV 0,8 with two-stage switch for speed control

Rudder for GPAV and ACAV

Special shaft length up to 1m

ACAV with Boost function (30% performance increase for 2 minutes)

Length of standard shaft 850mm

Attention: The GPAV motor is only for short term use in seawater.

Outboarder with pin (for remote control)



Figure: Outboarder with pin (for remote control)

Type	Continuous power Consumption	Output	Voltage	Current	Total efficiency	Weight	up to boat weight	
	Sailing-boat	Power-boat						
GPAV 0,5	0,5 kW	0,4 kW	24 V	21 A	85 %	18 kg	0,4 t	0,2 t
GPAV 0,8	0,8 kW	0,7 kW	24 V	34 A	85 %	19 kg	0,7 t	0,3 t
GPAV 1,6	1,6 kW	1,4 kW	24 V	67 A	85 %	24 kg	1,4 t	0,6 t
GPAV 2,2	2,2 kW	1,9 kW	36 V	61 A	85 %	24 kg	1,9 t	0,8 t
ACAV 1,8	2,4 kW	1,8 kW	24 V	100 A	75 %	27 kg	1,8 t	0,7 t
ACAV 2,0	2,6 kW	2,0 kW	24 V	107 A	78 %	31 kg	2,0 t	0,8 t
ACAV 2,1	2,8 kW	2,1 kW	48 V	58 A	75 %	27 kg	2,1 t	0,8 t
ACAV 4,0	5,0 kW	4,0 kW	48 V	104 A	80 %	31 kg	4,0 t	1,6 t

possible options

GPAV 0,5 and GPAV 0,8 with two-stage switch for speed control

Rudder for GPAV and ACAV

Special shaft length up to 1m

ACAV with Boost function (30% performance increase for 2 minutes)

Short shaft (650mm), Long shaft (750mm) and super long shaft (850mm)

Attention: The GPAV motor is only for short term use in seawater.

Submersible pod motor for mounting in a rudder gland



Figure: Submersible pod motor for mounting in a rudder gland

Type	Continuous power		Voltage	Current	Total efficiency	Weight	up to boat weight	
	Consumption	Output					Sailing-boat	Power-boat
GPRV 0,5	0,5 kW	0,4 kW	24 V	21 A	85 %	15 kg	0,4 t	0,2 t
GPRV 0,8	0,8 kW	0,7 kW	24 V	34 A	85 %	16 kg	0,7 t	0,3 t
GPRV 1,6	1,6 kW	1,4 kW	24 V	67 A	85 %	21 kg	1,4 t	0,6 t
GPRV 2,2	2,2 kW	1,9 kW	36 V	61 A	85 %	21 kg	1,9 t	0,8 t
ACR 1,8	2,4 kW	1,8 kW	24 V	100 A	75 %	25 kg	1,8 t	0,7 t
ACR 2,0	2,6 kW	2,0 kW	24 V	107 A	78 %	29 kg	2,0 t	0,8 t
ACR 2,1	2,8 kW	2,1 kW	48 V	58 A	75 %	25 kg	2,1 t	0,8 t
ACR 4,0	5,0 kW	4,0 kW	48 V	104 A	80 %	29 kg	4,0 t	1,6 t
ACR 8,0	9,7 kW	8,0 kW	48 V	202 A	82 %	50 kg	8,0 t	3,2 t
ACR 9,9	11,7 kW	9,9 kW	48 V	244 A	84 %	50 kg	-	0,5 t
ACRS 11,0	13,2 kW	11,0 kW	48 V	275 A	83 %	63 kg	11,0 t	4,4 t
SCR 15,0	17,0 kW	15,0 kW	48 V	355 A	88 %	79 kg	15,0 t	6,0 t

possible options

GPV 0,5 and GPV 0,8 with two-stage switch for speed control

Rudder for GPRV, ACR, ACRS and SCR

Special shaft length up to 1m

Rudder gland for GPRV and ACR 1,8 up to ACR 4,0 in 2 different lengths: 175mm and 275mm

Rudder gland for ACR 8,0 up to ACRS 11,0 in 2 different lengths: 205mm and 305mm

Rudder gland for SCR 15,0 with length 275mm

ACR and ACRS with Boost function (30% performance increase for 2 minutes)

Length of standard shaft 450mm

Attention: GPRV motors are only for short term use in seawater.

Outboarder for Electric boats (straight stern)



Figure: Outboarder for Electric boats (straight stern)

Type	Continuous power Consumption	Output	Voltage	Current	Total efficiency	Weight	up to boat weight Sailing-boat	Power-boat
GPE 0,5	0,5 kW	0,4 kW	24 V	21 A	85 %	17 kg	0,4 t	0,2 t
GPE 0,8	0,8 kW	0,7 kW	24 V	34 A	85 %	18 kg	0,7 t	0,3 t
GPE 1,6	1,6 kW	1,4 kW	24 V	67 A	85 %	23 kg	1,4 t	0,6 t
GPE 2,2	2,2 kW	1,9 kW	36 V	61 A	85 %	23 kg	1,9 t	0,8 t
ACE 1,8	2,4 kW	1,8 kW	24 V	100 A	75 %	27 kg	1,8 t	0,7 t
ACE 2,0	2,6 kW	2,0 kW	24 V	107 A	78 %	31 kg	2,0 t	0,8 t
ACE 2,1	2,8 kW	2,1 kW	48 V	58 A	75 %	27 kg	2,1 t	0,8 t
ACE 4,0	5,0 kW	4,0 kW	48 V	104 A	80 %	31 kg	4,0 t	1,6 t

possible options

GPE 0,5 and GPE 0,8 with two-stage switch for speed control

Rudder for GPE and ACE

ACE with Boost function (30% performance increase for 2 minutes)

Attention: GPE motors are only for short term use in seawater.

Outboarder with shaft-profile



Figure: Outboarder with shaft-profile

Type	Continuous power Consumption		Voltage	Current	Total efficiency	Weight	up to boat weight	
	Output	Consumption					Sailing-boat	Power-boat
ACA 1,8								
ACA 1,8 L	2,4 kW	1,8 kW	24 V	100 A	75 %	29 kg	1,8 t	0,7 t
ACA 1,8 SL								
ACA 2,0								
ACA 2,0 L	2,6 kW	2,0 kW	24 V	107 A	78 %	33 kg	2,0 t	0,8 t
ACA 2,0 SL								
ACA 2,1								
ACA 2,1 L	2,8 kW	2,1 kW	48 V	58 A	75 %	29 kg	2,1 t	0,8 t
ACA 2,1 SL								
ACA 4,0								
ACA 4,0 L	5,0 kW	4,0 kW	48 V	104 A	80 %	33 kg	4,0 t	1,6 t
ACA 4,0 SL								
ACA 8,0								
ACA 8,0 L	9,7 kW	8,0 kW	48 V	202 A	82 %	51 kg	8,0 t	3,2 t
ACA 8,0 SL								
ACA 9,9	11,7 kW	9,9 kW	48 V	244 A	84 %	51 kg	-	0,5 t

possible options

Rudder for ACA

With Boost function (30% performance increase for 2 minutes)

The drive can also be tilted with an electro-hydraulic motor mount (at extra cost).

Recommended boat transom height:

Short shaft max. 50cm – long shaft (L) max. 63cm –super long shaft (SL) max. 74cm

Outboarder with different shaft lengths (not tilttable)



Figure: Outboarder with different shaft length – 7°

Type	Continuous power Consumption	Output	Voltage	Current	Total efficiency	Weight	up to boat weight	
							Sailing-boat	Power-boat
ACRE 1,8	2,4 kW	1,8 kW	24 V	100 A	75 %	36 kg	1,8 t	0,7 t
ACRE 2,0	2,6 kW	2,0 kW	24 V	107 A	78 %	40 kg	2,0 t	0,8 t
ACRE 2,1	2,8 kW	2,1 kW	48 V	58 A	75 %	36 kg	2,1 t	0,8 t
ACRE 4,0	5,0 kW	4,0 kW	48 V	104 A	80 %	40 kg	4,0 t	1,6 t
ACRE 8,0	9,7 kW	8,0 kW	48 V	202 A	82 %	61 kg	8,0 t	3,2 t
ACRE 9,9	11,7 kW	9,9 kW	48 V	244 A	84 %	61 kg	-	0,5 t
ACRE 11,0	13,2 kW	11,0 kW	48 V	275 A	83 %	74 kg	11,0 t	4,4 t
SCRE 15,0	17,0 kW	15,0 kW	48 V	355 A	88 %	89 kg	15,0 t	6,0 t

possible options

Rudder for ACRE and SCRE

Special shaft length up to 1m

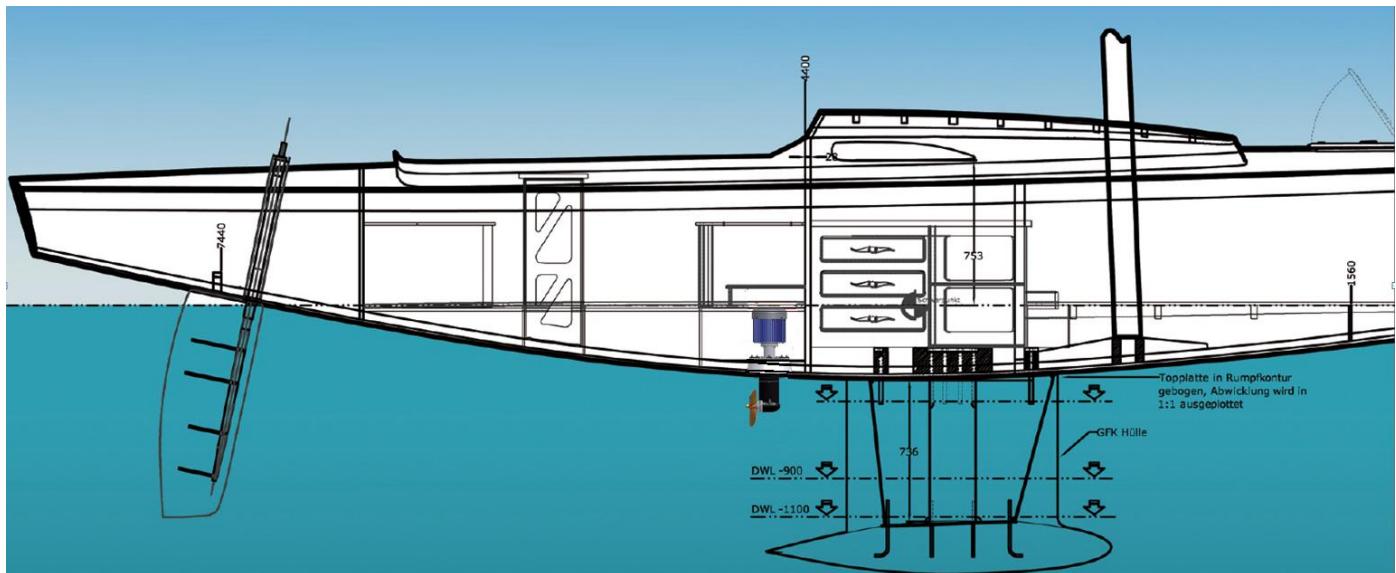
Different angels possible (e.g. 7°).

Special shaft length up to 1m

With Boost function (30% performance increase for 2 minutes)

The drive can also be tilted with an electro-hydraulic motor mount (at extra cost).

Sail-Drive motors



Sail-Drive is called a special drive design for motorboat or sailing yachts. This is a readily installable compact system.

The company Kräutler is the only electric motor manufacturer, that builds their Sail-Drive gearbox as an in-house production. As a result, you gain a perfectly matched electric drive and gearbox. The design, mechanically and electrically rotatable, is a special development and often it replaces the conventional steering system.

Kräutler Made in Austria!

All electric drives with Sail-Drive gear consist of:

- Motor with appropriate Sail-Drive gear
- base plate for lamination at the SDK and SDKS
 - at SDKH available for extra charge
 - Alternative with mounting plate for available mount for extra charge
- Electric regulation system mounted on an aluminium base plate with fuse and cut-off relay
- Single lever control (throttle) for panel mounting in standard version with key switch, status LED, black front panel, black aluminium lever and mounting screws
 - Special designs at additional cost (see page 53)
- Cable set: controller-battery 3m, controller-motor 1m, controller-single lever control 5m
 - Optional cable lengths at additional cost
- Battery master switcher and battery fuse
- Battery monitor BMV 700 or BMV 700H with shunt and 10m connecting cable
- Fixed or folding propeller is not included in the main price – see on the price list propeller
Alternative anode for salt water

Additionally for electric rotatable Sail-Drives

- Actuating drive with gearbox
- Electric regulation system for dynamic rotating actuating drive
- steering lever
 - Special design steering lever combination with EHS
- Kräutler Control Unit (KCU) incl. displaying the propeller position
 - Special design additional analog indication of the propeller position



Sail-Drive Model	
Model	brief description
*SDK compact or SDKS compact	<p>Electric Drive with Sail-Drive gear, motor without ventilaton</p> <p>SDK compact: only freshwater SDKS compact: fresh water and seawater Technology: brushless three phase asynchronous motor, continuous control Advantages: small, compact design and free of maintenance Power range: 2,5 – 4,7kW Battery voltage: 24 – 48 Volt</p>
*SDK or SDKS	<p>Electric Drive with Sail-Drive gear</p> <p>SDK: only freshwater SDKS: fresh water and seawater Technology: brushless three phase asynchronous motor, continuous control Advantages: higher power than the compact version, free of maintenance Power range: 3,1 – 7,1kW Battery voltage: 24 – 48 Volt</p>
*SDK-D or SDKS-D	<p>Electric Drive with Sail-Drive gear, Sail-Drive mechanical rotatable 2 x 45°</p> <p>SDK-D: only freshwater SDKS-D: fresh water and seawater Technology: brushless three phase asynchronous motor, continuous control Advantages: mechanical rotatable shuttle (active rudder), steered by Teleflex Power range: 3,1 – 7,1kW Battery voltage: 24 – 48 Volt</p>
ATTENTION	<p>* The Drives for fresh water are only for short using in seawater. After a maximum of four weeks at a time, you have to check the housing against corrosion. If necessary repair the painting.</p> <p>You have to change the anode, if you are driving in brackish or seawater. Water cooled drives are only useable in seawater with 2-circle water cooling.</p>

Sail-Drive Models	
Model	brief description
*SDK-ED or SDKS-ED	<p>Electric Drive with Sail-Drive gear, Sail-Drive electric rotatable 2 x 90°</p> <p>SDK-ED: only freshwater SDKS-ED: fresh water and seawater Technology: brushless three phase asynchronous motor, continuous control Advantages: electric rotatable shuttle (active rudder), steered by switcher or joystick and free of maintenance, Power range: 3,1 – 7,1kW Battery voltage: 24 – 48 Volt</p>
SDKH	<p>Electric Drive with Sail-Drive gear, heavy duty type, above 20kW water cooled</p> <p>Field of application: fresh water and seawater Technology: brushless three phase asynchronous motor, continuous control Advantages: Sail-Drive gear for high power, with big reduction free of maintenance Power range: 9,4 – 34,1kW Battery voltage: 48 – 144 Volt</p>
SDKH-D	<p>Electric Drive with Sail-Drive gear, heavy duty type, mechanical rotatable 2 x 45° above 20kW water cooled</p> <p>Field of application: fresh water and seawater Technology: brushless three phase asynchronous motor, continuous control Advantages: mechanical rotatable shuttle (active rudder), steered by Teleflex, free of maintenance, Power range: 9,4 – 34,1kW Battery voltage: 48 – 144 Volt</p>
SDKH-ED	<p>Electric Drive with Sail-Drive gear, heavy duty type, electric rotatable 2 x 90° above 20kW water cooled</p> <p>Field of application: fresh water and seawater Technology: brushless three phase asynchronous motor, continuous control Advantages: electric rotatable shuttle (active rudder), steered by switcher or joystick free of maintenance Power range: 9,4 – 34,1kW Battery voltage: 48 – 144 Volt</p>
ATTENTION	<p>* The Drives for fresh water are only for short using in seawater. After a maximum of four weeks at a time, you must check the housing against corrosion. If necessary, repair the painting.</p> <p>You have to change the anode, if you are driving in brackish or seawater. Water cooled drives are only useable in seawater with 2-circle water cooling.</p>

Delivery programme Sail-Drive



Variant

Depending on the version, the Sail-Drive is available as a fixed, electrical rotating or mechanical rotating drive. Details about each version can be found on the following pages.

Motor

The heart of the Sail-Drive is the electric motor. The Sail-Drive must work strong, reliable, quiet and maintenance-free. The Kräutler Sail-Drive motor is maintenance free AC-motor. This technology is characterized by a very long life and robustness against adverse environmental conditions.

Gearbox

The high standards of the company Kräutler haven't allowed using a gearbox "off the shelf". The company builds all Sail-Drive - gearboxes itself!

Why? The gearboxes must be quietly, because only a faint transmission has the best efficiency. The gearboxes unit must have spiral serrated, polished, and paired bevel gears. For the seawater the gearbox is made in bronze. That is also one special about a Kräutler Sail-Drive

Kräutler Sail-Drive, the best Sail-Drive for your boat.

Controllable

With the convenient single-lever-controller, an infinitely variable speed control in forward and reverse is possible. The high-quality electric controller operates almost without energy loss and protects your valuable battery pack against to deep discharge. The modern power electronics will help you to optimally adjust the drive to your ship.

Easy to install

The Sail-Drive (design SDK) is supplied with a fiberglass base plate. This fiberglass base plate can be laminated to the hull. Therefore, the installation cost is very low. For existing base plates like "Volvo" or "Yanmar", the Sail-Drive can be delivered with the right adapter plate. With the adapt plate, it's possible to mount the Kräutler Sail-Drive on the existing base plate.

Sail–Drive compact



Figure: Sail–Drive compact

Article no.	Type	Continuous power Consumption	power Output	Voltage	Current	Total efficiency	Weight	up to boat weight Sailing boat	weight Powerboat
105954	SDK 2,0 AC	2,5 kW	2,0 kW	24 V	104 A	80 %	42 kg	2,0 t	-
105620	SDK 3,0 AC	3,6 kW	3,0 kW	36 V	100 A	83 %	42 kg	3,0 t	-
105622	SDK 4,0 AC	4,7 kW	4,0 kW	48 V	99 A	84 %	42 kg	4,0 t	-
possible options									
	SDK unlimited for seawater = SDKS								
000279	Sail-Drive with recuperation								
139898	Control unit KCU 5.7 - 48V for passenger ships with the possibility to connect a camera								
	Boost function 30% performance increase for 2 minutes								

Attention: SDK motors are only for short term use in seawater.

Sail-Drive fixed



Figure: Sail-Drive fixed

Article no.	Type	Continuous power Consumption	power Output	Voltage	Current	Total efficiency	Weight	up to boat weight Sailing boat	boat weight Powerboat
130094	SDK 2,5 AC	3,1 kW	2,5 kW	24 V	130 A	80 %	45 kg	2,5 t	1,0 t
130099	SDK 3,5 AC	4,1 kW	3,5 kW	36 V	115 A	85 %	45 kg	3,5 t	1,4 t
105682	SDK 4,3 AC	5,0 kW	4,3 kW	48 V	104 A	85 %	45 kg	4,3 t	1,7 t
138050	SDK 5,0 AC	5,0 kW	6,0 kW	48 V	124 A	85 %	45 kg	5,0 t	2,0 t
141156	SDK 6,0 AC	7,1 kW	6,0 kW	48 V	148 A	85 %	45 kg	6,0 t	2,4 t
138981	SDKH 8,0 AC	9,4 kW	8,0 kW	48 V	196 A	85 %	80 kg	8,0 t	3,2 t
140393	SDKH 11,0 AC	13,0 kW	11,0 kW	48 V	270 A	85 %	91 kg	11,0 t	4,4 t
	SDKH 18,5 AC	21,0 kW	18,5 kW	96 V	219 A	88 %	91 kg	18,5 t	7,4 t
water cooled									
143970	SDKH 15,0 AC	17,4 kW	15,0 kW	48 V	370 A	85 %	91 kg	15,0 t	6,0 t
	SDKH 20,0 AC	23,0 kW	20,0 kW	48 V	480 A	88 %	101 kg	20,0 t	8,0 t
140380	SDKH 25,0 AC	28,4 kW	25,0 kW	96 V	296 A	88 %	101 kg	25,0 t	10,0 t
possible options									
SDK unlimited for seawater = SDKS									
103420	GfK-base plate for SDKH								
000279	Sail-Drive with recuperation								
	Control unit KCU 3,5								
	Control unit KCU 5.7 – 48 V and 96V for passenger ships with the possibility to connect a camera								
141590	Camera for KCU 5.7								
143350	Heat exchanger for 2-circle water cooling								
	Boost function 30% performance increase for 2 minutes								

Attention: SDK motors are only for short term use in seawater.

Attention: Water cooled drives are only useable in seawater with 2-circle water cooling.

Sail-Drive mechanical rotatable – 2x45°



Figure: Sail-Drive mechanical rotatable

Article no.	Type	Continuous power Consumption	power Output	Voltage	Current	Total efficiency	Weight	up to boat weight Sailing boat	weight Powerboat
130249	SDK-D 2,5 AC	3,1 kW	2,5 kW	24 V	130 A	80 %	52 kg	-	1,0 t
137258	SDK-D 3,5 AC	4,1 kW	3,5 kW	36 V	114 A	85 %	52 kg	-	1,6 t
105944	SDK-D 4,3 AC	5,0 kW	4,3 kW	48 V	104 A	85 %	52 kg	-	1,7 t
139199	SDK-D 6,0 AC	7,1 kW	6,0 kW	48 V	148 A	85 %	52 kg	-	2,4 t
138982	SDKH-D 8,0 AC	9,4 kW	8,0 kW	48 V	196 A	85 %	83 kg	-	3,2 t
140394	SDKH-D 11,0 AC	13,0 kW	11,0 kW	48 V	270 A	85 %	94 kg	-	4,0 t
	SDKH-D 18,5 AC	21,0 kW	18,5 kW	96 V	219 A	88 %	94 kg	-	7,4 t
water cooled									
143353	SDKH-D 15,0 AC	17,7 kW	15,0 kW	48 V	370 A	85 %	97 kg	-	6,0 t
	SDKH-D 20,0 AC	23,1 kW	20,0 kW	48 V	480 A	88 %	104 kg	-	8,0 t
140381	SDKH-D 25,0 AC	28,4 kW	25,0 kW	96 V	296 A	88 %	104 kg	-	10,0 t
possible options									
	SDK-D unlimited for seawater = SDKS-D								
103420	GfK-base plate for SDKH								
000279	Sail-Drive with recuperation								
	Control unit KCU 3.5 -								
	Control unit KCU 5.7 – 48V and 96V for passenger ships with the possibility to connect a camera								
141590	Camera for KCU 5.7								
102065	Fin for SDK-D								
143350	Heat exchanger for 2-circle water cooling Boost function 30% performance increase for 2 minutes								

Attention: **SDK-D motors are only for short term use in seawater.**

Attention: **Water cooled drives are only useable in seawater with 2-circle water cooling.**

Rudderpropeller electric rotatable – 360°



Figure: KRP 25e

Article no.	Type	Continuous	power	Voltage	Current	Total efficiency	Weight	up to boat weight	
		Consumption	Output					Sailing boat	Powerboat
	SDK-ED 2,5 AC	3,1 kW	2,5 kW	24 V	130 A	80 %	58 kg	2,5 t	1,0 t
	SDK-ED 3,5 AC	4,1 kW	3,5 kW	36 V	114 A	85 %	58 kg	3,5 t	1,4 t
141612	SDK-ED 4,3 AC	5,0 kW	4,3 kW	48 V	104 A	85 %	58 kg	4,3 t	1,7 t
142540	SDK-ED 6,0 AC	7,1 kW	6,0 kW	48 V	148 A	85 %	58 kg	6,0 t	2,4 t
139646	KRP 25e 8,0 AC	9,4 kW	8,0 kW	48 V	196 A	85 %	87 kg	8,0 t	3,2 t
141400	KRP 25e 11,0 AC	13,0 kW	11,0 kW	48 V	270 A	85 %	98 kg	11,0 t	4,4 t
	KRP 25e 18,5 AC	21,0 kW	18,5 kW	96 V	219 A	88 %	98 kg	18,5 t	7,4 t
	water cooled								
143672	KRP 25e 15,0 AC	17,7 kW	15,0 kW	48 V	370 A	85 %	98 kg	15,0 t	6,0 t
	KRP 25e 20,0 AC	23,1 kW	20,0 kW	48 V	480 A	88 %	108 kg	20,0 t	8,0 t
140382	KRP 25e 25,0 AC	28,4 kW	25,0 kW	96 V	296 A	88 %	108 kg	25,0 t	10,0 t
	possible options								
	SDK-ED unlimited for seawater = SDKS-ED								
103420	Gfk-base plate for SDKH								
000279	Sail-Drive with recuperation								
	Control unit KCU 3.5								
	Control unit KCU 5.7 - 96V for passenger ships with the possibility to connect a camera								
141590	Camera for KCU 5.7								
102065	Fin for SDK-ED								
143350	Heat exchanger for 2-circle water cooling								
142072	Analog display for rudder position 360°								
	Boost function 30% performance increase for 2 minutes								

Attention: SDK-ED motors are only for short term use in seawater.

Attention: Water cooled drives are only useable in seawater with 2-circle water cooling.

Electric Drives for existing shafting



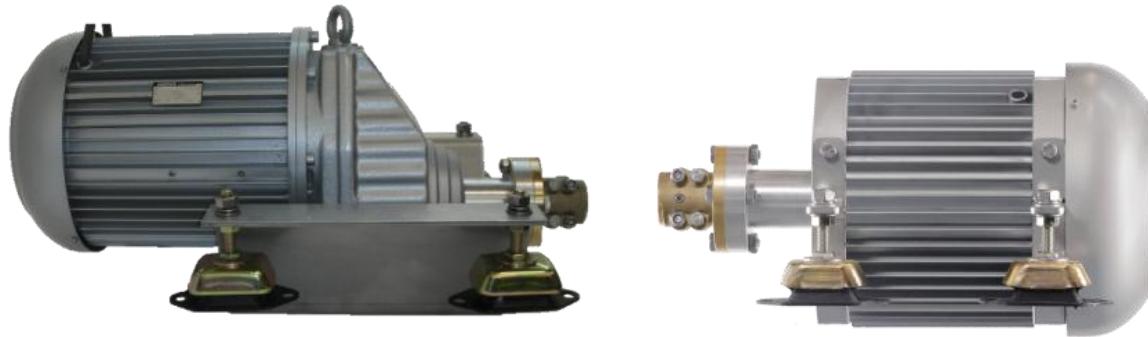
All electric drives for existing shafting (except for high speed) consist of:

- Motor with appropriate bracket or base plate with helical gear
- Clutch for shaft with Ø25mm
- Electric regulation system mounted on an aluminium base plate with fuse and cut-off relay
- Single lever control (throttle) for panel mounting in standard version with key switch, status LED, black front panel, black aluminium lever and mounting screws
 - Special designs at additional cost (see page 53)
- Cable set: controller-battery 3m, controller-motor 1m, controller-single lever control 5m
 - Optional cable lengths at additional cost
- Battery master switcher and battery fuse
- Battery monitor BMV 700 or BMV 700H with shunt and 10m connecting cable
- Fixed or folding propeller is not included in the main price – see price list propeller



Shaft drive	
Modell	brief description
WAd	<p>Direct-Drives for existing shafting</p> <p>Field of application: fresh water and seawater</p> <p>Technology: brushless three phase asynchronous motor, continuous control</p> <p>Advantages: small and light design, high total efficiency and free of maintenance</p> <p>Power range: 2,5 – 34,1kW</p> <p>Battery voltage: 24 – 96 Volt</p>
WAz	<p>Drives for existing shafting with gearbox,</p> <p>Field of application: fresh water and seawater</p> <p>Technology: brushless three phase asynchronous motor, continuous control</p> <p>Advantages: the drive can be adapted to the desired speed, very quiet and highly efficient transmission, many reductions are possible, free of maintenance.</p> <p>Power range: 7,2 – 42,0kW</p> <p>Battery voltage: 48 – 144 Volt</p>
WA 100/30 up to WA 500/100	<p>High performance shaft drives engines</p> <p>Field of application: fresh water and seawater only with Heat exchanger for 2-circle water cooling</p> <p>Technology: brushless three phase SYNCHRONUS motor, continuous control</p> <p>Advantages: high power in a small size, very high total efficiency</p> <p>Power range: 34,9 – 107,5kW</p> <p>Battery voltage: 100 – 525 Volt</p>
HyG-AC HyD-AC	<p>Hybrid-Drives for existing petrol- or diesel motor on shaft drives</p> <p>Field of application: Fresh water and seawater</p> <p>Technology: brushless three phase asynchronous motor, continuous control</p> <p>Advantages: existing systems can be used, simple to switch between motor- and generator mode,</p> <p>Power range: 2,5 – 13,0kW</p> <p>Battery voltage: 24 – 48 Volt</p>
ATTENTION	Water cooled drives are only useable in seawater with 2-circle water cooling.

Delivery programme shaft drives



Inspiration

Electrical shaft systems were the first electric drives with higher power on the market. A outdated system? Maybe for other suppliers. Kräutler pursue its own philosophy? For electric motors designed ships have in the rarest cases, a shaft system, since the drive trains require a lot of space and the installation of the shaft system is rather complicated. However, the remodeling of existing systems is always a challenge that can be implemented well with Kräutler motor shaft installations. Whether sail or motor boat or passenger ship the possibilities are diverse and the system requirements are high.

System

In a new building, the shaft system and propellers are dimensioned according to the electric drive, in this case Kräutler direct drives can be used (without additional gear).

For existing shaft systems and propellers, the drive must be adapted to the driveline of the old shaft system. If this is ignored, only a part of the performance is available, or worse, the drive is overloaded and overheats.

The proven modular system and the strict quality criteria of Kräutler shaft systems with spur gear allow the torque and gear ratios that are unmatched. Likewise, they can be excellently adapted to existing systems. The design of the gear box, you just leave us, your partner with over 30 - years of experience.

Low noise level

The efficiency and smoothness are crucial in the selection of gear. This results in innovative drive solutions, specific to fit to your requirements.

Environmentally friendly

Electric motors are totally emission free. They are the future in maritime applications, since they apply to all environmental protection requirements, today and in future.

Direct - drives for shaft drives

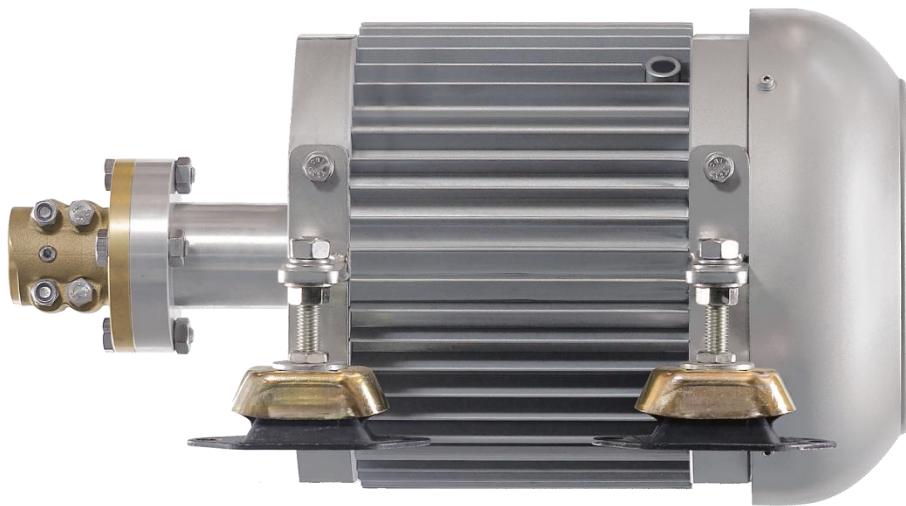


Figure: WAd 4,3 AC

Article no.	Type	Continuous power Consumption		Voltage	Current	Total efficiency	Weight	up to boat weight	
		Output	Consumption					Sailing boat	Powerboat
141011	WAd 2,0 AC	2,5 kW	2,0 kW	24 V	104 A	80 %	35 kg	2,0 t	0,8 t
140441	WAd 3,0 AC	3,6 kW	3,0 kW	36 V	100 A	83 %	35 kg	3,0 t	1,2 t
140447	WAd 4,3 AC	5,1 kW	4,3 kW	48 V	108 A	83 %	35 kg	4,3 t	1,7 t
143603	WAd 5,0 AC	6,0 kW	5,0 kW	48 V	124 A	83 %	35 kg	5,0 t	2,0 t
140490	WAd 6,0 AC	7,2 kW	6,0 kW	48 V	152 A	83 %	44 kg	6,0 t	2,4 t
140756	WAd 8,0 AC	9,4 kW	8,0 kW	48 V	193 A	86 %	69 kg	8,0 t	3,2 t
141281	WAd 11,0 AC	13,0 kW	11,0 kW	48 V	270 A	85 %	69 kg	11,0 t	4,4 t
	WAd 15,0 AC	17,0 kW	15,0 kW	96 V	178 A	88 %	69 kg	15,0 t	6,0 t
	WAd 18,5 AC	21,0 kW	18,5 kW	96 V	219 A	88 %	69 kg	18,5 t	7,4 t
water cooled									
144340	WAd 15,0 AC	17,7 kW	15,0 kW	48 V	370 A	85 %	76 kg	15,0 t	6,0 t
	WAd 20,0 AC	23,1 kW	20,0 kW	48 V	480 A	88 %	87 kg	20,0 t	8,0 t
	WAd 25,0 AC	28,4 kW	25,0 kW	96 V	296 A	88 %	107 kg	25,0 t	10,0 t
possible options									
139538	Shaft Ø=25mm up to 1,4m with stern tube 0,5m and rubber packing								
104446	Option mechanical seal for shaft Ø=25mm								
105322	Special base plate								
103247	Stern bearing to be screwed from outside								
101938	Shaft buck with rubber bearing Ø=25mm								
102659	Shaft buck with bearing and flange plate								
	Control unit KCU 5.7 - for passenger ships with the possibility to connect a camera								
141590	Camera for KCU 5.7								
Boost function 30% performance increase for 2 minutes									

Attention: Water cooled drives are only useable in seawater with 2-circle water cooling.

Shaft drives with gearbox



Figure: WAd 4,3 AC

Article no.	Type	Continuous power Consumption	Output	Voltage	Current	Total efficiency	Weight	up to boat weight Sailing boat	weight Powerboat
**	WAz 6,0 AC	7,2 kW	6,0 kW	48 V	152 A	83 %	44 kg	6,0 t	2,4 t
**	WAz 8,0 AC	9,4 kW	8,0 kW	48 V	196 A	85 %	74 kg	8,0 t	3,2 t
**	WAz 11,0 AC	13,0 kW	10,0 kW	48 V	249 A	84 %	74 kg	11,0 t	4,4 t
**	WAz 15,0 AC	17,0 kW	15,0 kW	96 V	178 A	88 %	97 kg	15,0 t	6,0 t
**	WAz 18,5 AC	21,0 kW	18,5 kW	96 V	219 A	88 %	97 kg	18,5 t	7,4 t
water cooled									
**	WAz 15,0 AC	17,7 kW	15,0 kW	48 V	370 A	85 %	97 kg	15,0 t	6,0 t
**	WAz 20,0 AC	23,1 kW	20,0 kW	96 V	237 A	88 %	107 kg	20,0 t	8,0 t
**	WAz 25,0 AC	28,4 kW	25,0 kW	96 V	296 A	88 %	107 kg	25,0 t	10,0 t
**	WAz 30,0 AC	34,1 kW	30,0 kW	96 V	355 A	88 %	168 kg	30,0 t	12,0 t
**	WAz 37,0 AC	42,0 kW	37,0 kW	96 V	438 A	88 %	168 kg	37,0 t	14,8 t
**	WAz 37,0 AC	42,0 kW	37,0 kW	144 V	292 A	88 %	168 kg	37,0 t	14,8 t
possible options									
139538	Shaft Ø=25mm up to 1,4m with stern tube 0,5m and rubber packing								
104446	Option mechanical seal for shaft Ø=25mm								
105322	Special base plate								
103247	Stern bearing to be screwed from outside								
101938	Shaft buck with rubber bearing Ø=25mm								
102659	Shaft buck with bearing and flange plate								
	Control unit KCU 5.7 - 48V for passenger ships with the possibility to connect a camera								
	Control unit KCU 5.7 - 96V for passenger ships with the possibility to connect a camera								
141590	Camera for KCU 5.7								
142435	Heat exchanger for 2-circle water cooling								
	Boost function 30% performance increase for 2 minutes								

Attention: Water cooled drives are only useable in seawater with 2-circle water cooling.

** The article number (articel no.) depends on the reduction of the gearbox.

Drive system for high speed



Figure: WA 157/40 with fix propeller

Powerful, quiet, reliable and environmentally friendly

These are the guidelines in the development and manufacture of Kräutler drive systems.

The drive systems for high speeds are optimized for leisure boats. To guarantee this, every system is optimally adapted to the boat's hull during commissioning.

Everything but not standard!

For a number of years, other manufacturers have been trying to convince the industry of "standard boat propulsion".

We have been building electric drives for 45 years and boat and ship drives for more than 30 years. From our experience and your wishes comes your drive system. These are small series and individual pieces for customers with high demands.

The battery system

There are many different lithium batteries for various applications and usage profiles. The weight is an important point when selecting the battery. However, not every application requires the high-tech execution, but a solution suitable for the owner. Please do not hesitate to contact us.

The efficiency

The overall efficiency is optimized by a generous dimensioning of the motor control. The values given in the data sheet correspond to the practice and are not laboratory values. As a system supplier, we attach great importance to the entire drive train. The power adjustment via the propeller is one of the most important tasks during project planning. No special drive propellers are used for our drives. We work together with well-known propeller suppliers, whose products have been used all over the world and have been used and developed over decades.

Article no.	Type	Motor type	Power consumption	Power output	Voltage	Current	Total efficiency	Weight
	WA 100/30	112M 30,0 4 W	34,9 kW	30 kW	105 V	349 A	86 %	76 kg
	WA 150/40	132M 40,0 4 W	45,5 kW	40 kW	150 V	303 A	88 %	87 kg
	WA 350/50	IPM 6.17.12	53,8 kW	50 kW	350 V	154 A	93 %	73 kg
	WA 350/60	IPM 6.17.18	64,0 kW	60 kW	350 V	183 A	93 %	102 kg
	WA 500/80	IPM 6.17.25	85,5 kW	80 kW	500 V	171 A	93 %	124 kg
	WA 500/100	IPM 6.17.25	107,5 kW	100 kW	500 V	215 A	93 %	124 kg

Hybrid Drives



The philosophy

In the last years the interest for hybrid drives is steadily increased. The combination of the huge range of a diesel engine and the possibility to move soundlessly and emission-free is very attractive for many shipowners. The benefit to combine both engines and get a higher benefit is one of the strengths of a Kräutler Hybrid drive.

The possibilities

The in-house production and attention to details of each employee of the company Kräutler, makes it possible to offer a hybrid solution for almost every drive. New construction or retrofit, house boat, sport boat or passenger ship, every owner has his personal idea and we support you with the implementation.

Some examples

House boat:

On a house boat the way is the goal. With these boats, it's not about to drive fast, but to enjoying the nature. Noiseless cruising through canals and lakes, without disturbing the nature and during driving with the diesel engine, the batteries will be recharged to supply the energy needs of an apartment on the water.

Sport boat:

In many sea or rivers, there are driving restrictions in certain areas or at certain seasons for conventional drives. In order to use your boat anyway, added a Kräutler hybrid drive is your existing drive concept.

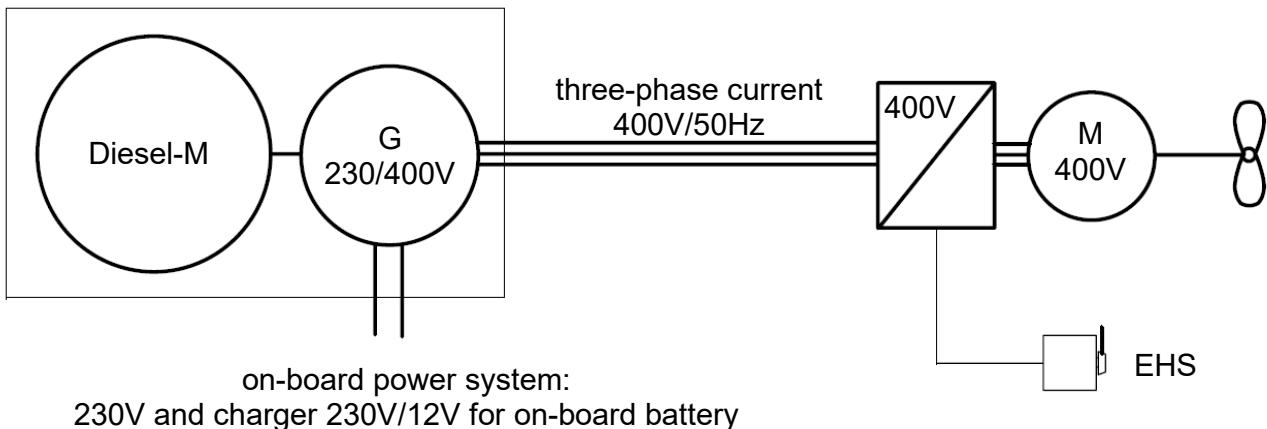
Passenger ship:

Many shipping companies use their passenger ships in the evening hours for events. Conventional drives with their noise and vibration often disturbing. For lectures, readings and theater performances on board convinced the quiet, electric motor and generator for driving under diesel engine.

For a quote, ask for our specification template.

Diesel-Electric Drives

Diesel-electric drive with three-phase AC motor and generator



All Kräutler motors based on low voltage have one thing in common; they need to feature a battery pack. Even with the additional supply of solar, wind, or diesel generators, you always need a battery pack.

But there is also the possibility to connect the Kräutler three-phase asynchronous motor with a power control (frequency converter) directly on a 400-volt generator. In this case the expensive and heavy battery pack is eliminated. The advantages are that the relatively light electric motor can be installed at the optimum position in the hull of the boat, the generator, however, completely independent of the center of gravity. Also, the supply from the electrical system is supplied by the generator.

The allocation of tasks is as follows, the electric motor takes over the speed control of the ship the rotational speed of the diesel generator is in this case completely independent of the boat speed and the diesel engine is always operated in its optimal working range. There is no reverse gear required; the clockwise/counterclockwise rotation is electrically controlled.

It is correct that in the conversion from diesel generator into electricity and then into drive energy losses, but the efficiency advantages of this system are much higher than a conventional diesel engine.

Please do not mix a diesel-electric drive with a hybrid drive, a hybrid drive always has two sources of energy.

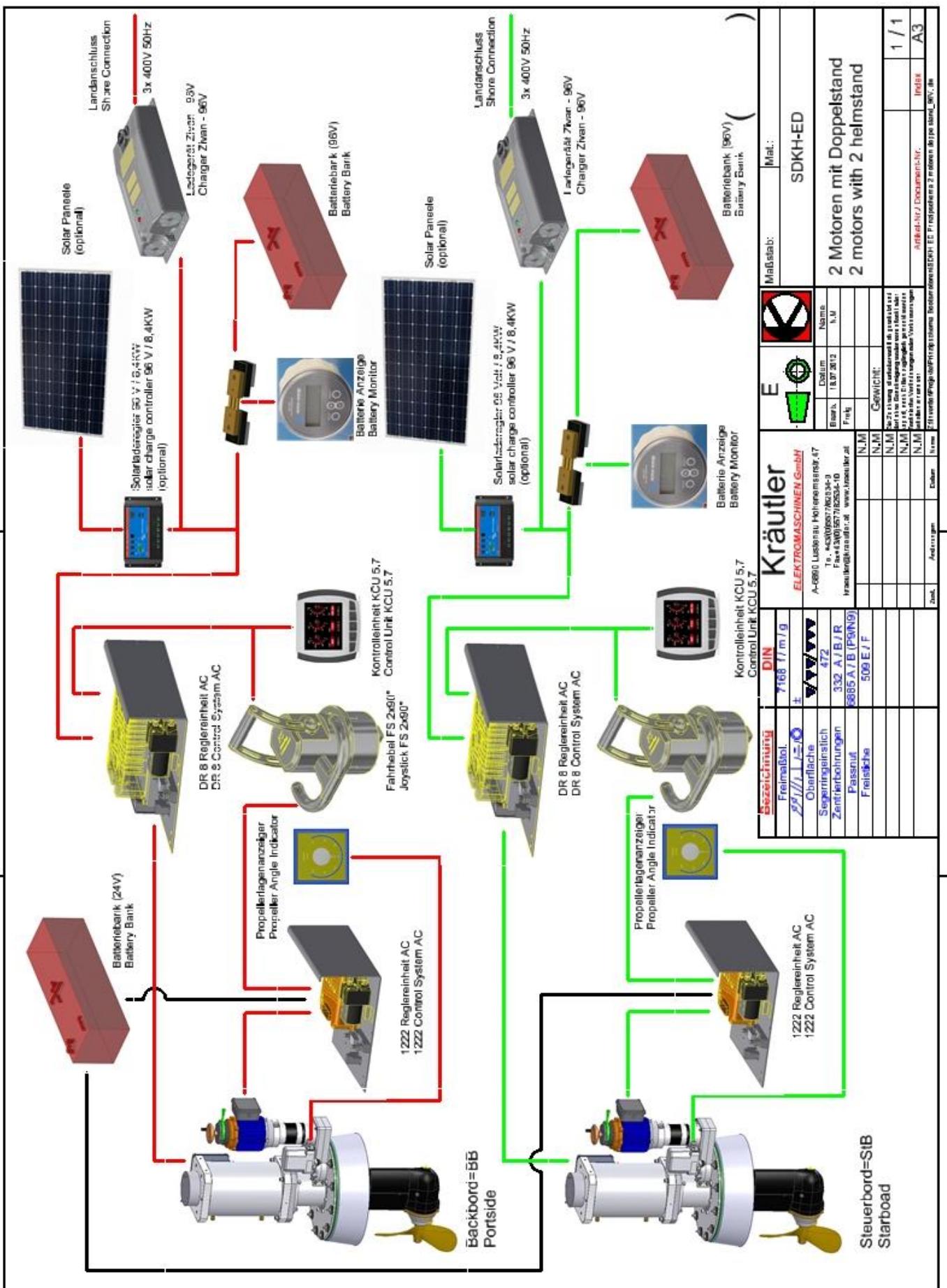




Kräutler
Electric Motors

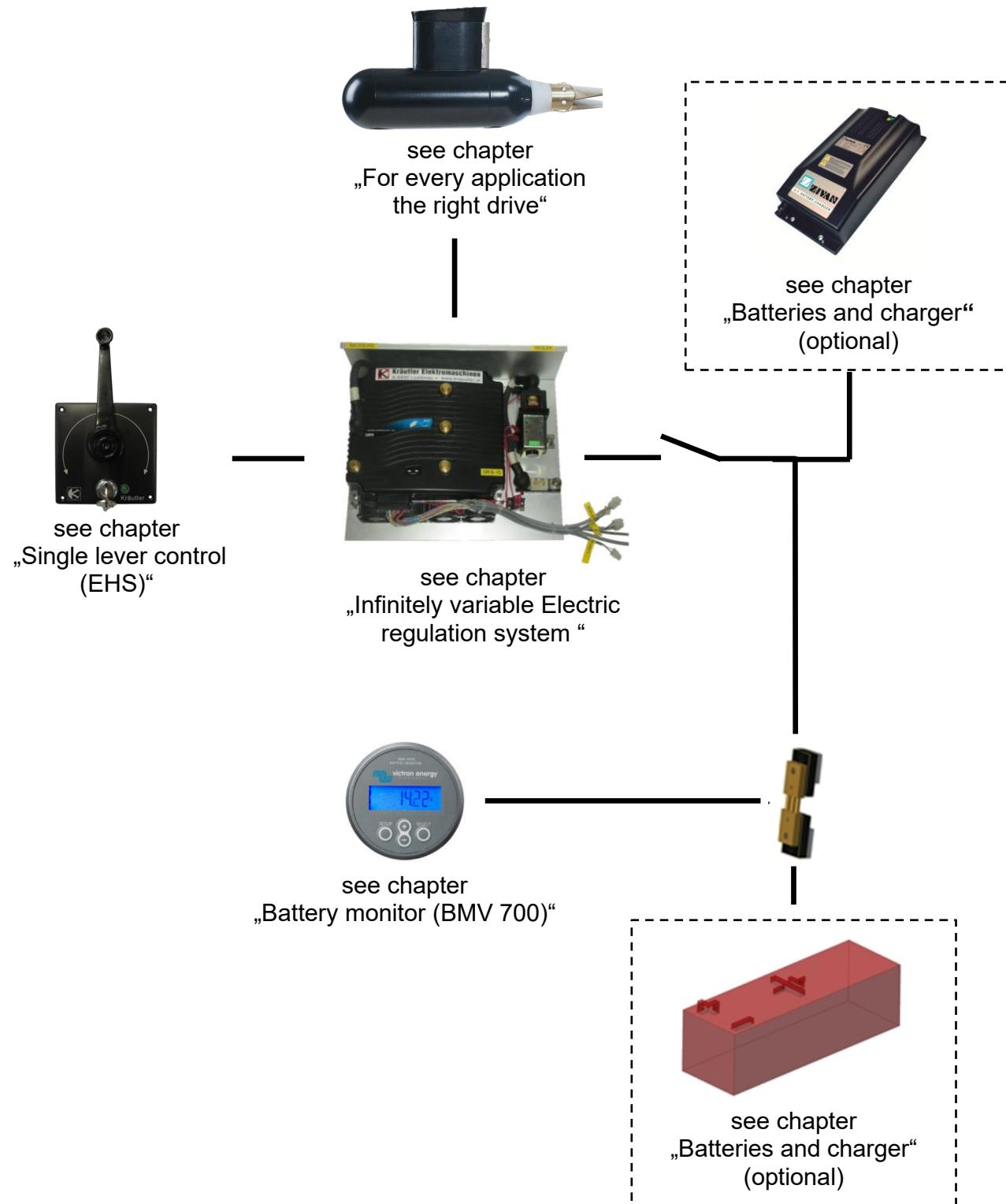
Controls / energy supply

The future
needs new drive



With each underwater boat drive you get in addition to the motor:

- an infinitely variable Electric regulation system
- a Single lever control (throttle)
- a Battery monitor BMV 700 or BMV 700H
- an anode for fresh water
- a Cable set
- a Battery master switcher and battery fuse
- a fixed or folding propeller depending on the ordered



Infinitely variable Electric regulation system



Depending on the required motor power, different control units are used. When we select the controller, we take ensure that the power output is possible at the optimum efficiency point of the controller. Only by this systematic implementation of energy efficiency, it is possible the overall efficiency of the system in all load points as high as possible and to keep the heat emission as low as possible.

The controller fulfills with its rugged, sealed housing and its connector, IP65 protection for use in harsh environments.

picture	technical data
A photograph of the Control unit GP 0,5/0,8/1,6/2,2. It is a black, rectangular unit with various connectors and a small display screen. The brand name 'Kräutler' is visible on the front panel.	Control unit GP 0,5/0,8/1,6/2,2 Power range: 0,5kW up to 2,2kW Voltage: 24V and 36V Cooling: air cooling
A photograph of the Control unit 24V/AC. It is a black, rectangular unit with four circular terminals for power input and a small display screen. The brand name 'Kräutler' is visible on the front panel.	Control unit 24V/AC Power range: 1,8kW and 2,0kW Voltage: 24V Cooling: air cooling
A photograph of the Control unit 48V/AC. It is a black, rectangular unit with four circular terminals for power input and a small display screen. The brand name 'Kräutler' is visible on the front panel.	Control unit 48V/AC Power range: 2,1kW up to 8,0kW Voltage: 48V Cooling: air cooling

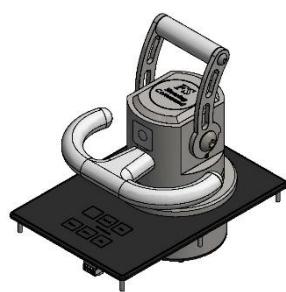
picture	technical data
	<p>Control unit 48V/AC11 and 48V/SC15</p> <p>Power range: 11,0kW and 15,0kW Voltage: 48V Cooling: air cooling</p>
	<p>Control unit 96V/AC15</p> <p>Power range: 15,0kW and 18,5kW Voltage: 96V Cooling: air cooling</p>
	<p>Control unit 48V/AC15W and 48V/AC20W</p> <p>Power range: 15,0kW and 20,0kW Voltage: 48V Cooling: water cooling</p>
	<p>Control unit 96V/AC water cooled</p> <p>Power range: 25,0kW up to 40,0kW Voltage: 96V Cooling: water cooling</p>

Control unit for voltage from 96V to 144V must be installed contact safe.
 Optionally all control units can be supplied with housing at extra cost.

Single lever control (EHS)



picture	description	picture	description
A black rectangular panel with a central circular dial and a black lever extending from the top. A key switch is located at the bottom. The brand name 'Kräutler' is printed at the bottom right.	black front panel black aluminium lever key switch (standard)	A silver rectangular panel with a central circular dial and a black lever extending from the top. A key switch is located at the bottom. The brand name 'Kräutler' is printed at the bottom right.	front panel silver black aluminium lever key switch
A black rectangular panel with a central circular dial and a stainless steel lever extending from the top. A key switch is located at the bottom. The brand name 'Kräutler' is printed at the bottom right.	black front panel stainless steel lever with key switch	A silver rectangular panel with a central circular dial and a stainless steel lever extending from the top. A key switch is located at the bottom. The brand name 'Kräutler' is printed at the bottom right.	front panel silver stainless steel lever with key switch
A black rectangular panel with a central circular dial and a black lever extending from the top. The dial has markings for 0°, 15°, 30°, and 45°. The brand name 'Kräutler' is printed at the bottom right.	steering lever		

picture	description	picture	description
	black front panel black aluminium lever push button		front panel silver black aluminium lever push button
	black front panel stainless steel lever push button		front panel silver stainless steel lever push button
	Top mounting - single		Top mounting - dual
	Top mounting – single (vandal safety)		Top mounting – dual (vandal safety)
	Throttle for steering the motor speed and steering the turning of the SDKH-ED		Joystick

Battery monitor (BMV 700)



The BMV 700 is a precision battery monitor. The main task of the battery monitor is to determine the charge status of the batteries and display the ampere hours consumed. The device also provides you with precise information about the current charge status in percent and the remaining driving time in hours and minutes

Standard information and alarms:

- Battery voltage (V).
- Battery charge / discharge current (A).
- Consumption in ampere-hours (Ah).
- Consumption in Watt (W)
- State of charge (%).
- Remaining time for momentary consumption.
- Optical and audible alarm: over and under voltage, and/or flat batteries.
- Alarm or generator-start relay programmable.



Kräutler Control Unit (KCU 5.0 P)

The Kraeutler Control Unit (KCU) is more than just a battery monitor.

The large 5.0" color/LCD display can be used to read engine-specific data such as the engine temperature and engine speed. The second connection is for an external loudspeaker (buzzer) which also reproduces the error messages acoustically.

The KCU 5.0 P meets the requirements of the "Central Ship Inspection Commission / Ship Calibration Office (ZSUK)" and is therefore indispensable for commercial shipping.

Technical Data:

- 5,0" color / LCD- touch display
- Resolution 800x480px
- Waterproof IP55
- Operating temperature -20 bis +55°C



Display – main page

- Power in kW
- Battery capacity in %
- Battery voltage in V
- Battery current in A
- Motor temperature in °C
- Date and time
- Direction indicator F / N / R – G
(Forward / Neutral / Reverse – Generator)



Display – second page

- Motor speed
- Battery capacity in %
- Battery voltage in V
- Battery current in A
- Motor temperature in °C
- Date and time
- Direction indicator F / N / R – G
(Forward / Neutral / Reverse – Generator)

Display – third page

- Aenton batteries

Optional page

- Motor speed
- Direction indicator of the rudder propeller

The error message display can be accessed from all pages.

There are also separate pages for diagnosis, setting and setup.

Batteries and charger



To ensure safe function of your electrical drive, you need a high-quality battery system.

Kräutler recommends batteries of the company Hoppecke and Aenton.

The company Hoppecke with headquarter in Germany, is a leader in the manufacture of traction batteries and a longtime business partner of Kräutler.

The batteries of Hoppecke are characterized in particular by:

- Long lifetime and high load cycle stability
- Maintenance free
- High operational reliability
- Simple assembly and installation

From the company Aenton with headquarters and production in Germany purchase Kräutler Lithium Ion batteries (Li-NMC).

The batteries of the company Aenton are characterized in particular by:

- 125% weight reduction with comparable performance to a standard lead acid battery.
- faster loading times
- much less or a multiple of the capacity of the same size as a standard lead-acid batteries
- longer lifetime and low self-discharge rate
- build in an alu-housing – protection IP 66

According to your requirement, we provide you a suitable battery system. A battery pack is just as good as its charging technology, so we gladly provide you the right charger for your batteries.

Through a well-coordinated drive system you can enjoy the beautiful carefree hours on your boat. Based on your needs, we will create a suitable battery system for you.



Kräutler
Electric Motors

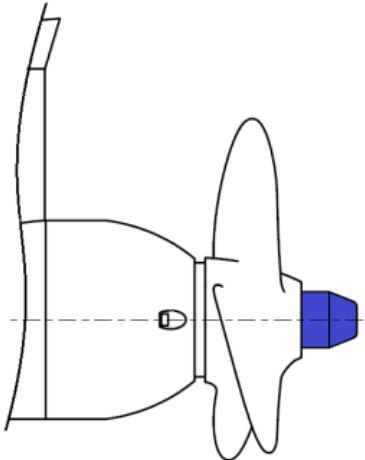
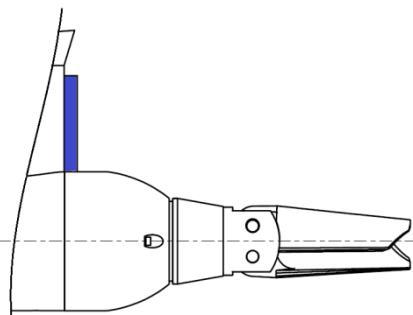
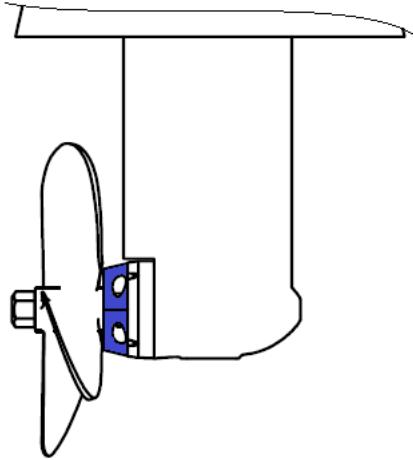
Spare - / Wear parts

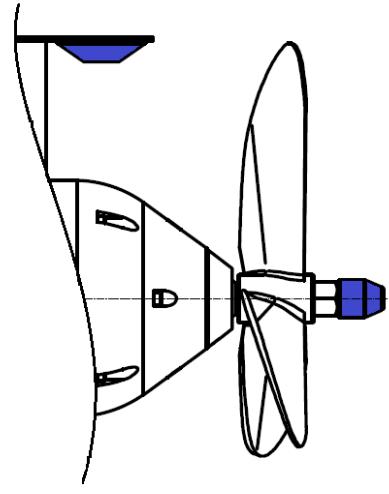
**The future
needs new drive**

Sacrificial anodes



installation position	picture	Article no.	description
		101362	sacrificial anode for GP 3fl. sailboat propellers freshwater
		101363	sacrificial anode for GP 3fl. sailboat propellers salt water
		101660	sacrificial anode for GP 3fl. sailboat propellers freshwater
		101661	sacrificial anode for GP 3fl. sailboat propellers salt water

installation position	picture	Article no.	description
		101360	sacrificial anode for GP fixed propeller freshwater
		101361	sacrificial anode for GP fixed propeller salt water
		101364	sacrificial anode for GPV 2fl. folding propeller freshwater
		101365	sacrificial anode for GPV 2fl. folding propeller salt water
		101398	sacrificial anode for Sail-Drive SDK freshwater
		101399	sacrificial anode for Sail-Drive SDK/SDKS salt water

installation position	picture	Article no.	description
		144362	sacrificial anode for AC-U freshwater
		137873	sacrificial anode for AC-U salt water
		141289	sacrificial anode for ACA freshwater
		140235	sacrificial anode for ACA salt water

Repair kits

There is also a repair kit available for the GP series.

Between 500 and 1,000 hours or 10 years, or irregularities during operation, we recommend sending the drive for a reversion to Kräutler directly or to a business partner of the company Kräutler.

Failure to properly repair irreparable damage or consequential damage to the engine or the boat may arise.

You will find the contact address of contractual partners on our homepage www.kraeutler.at or you call us +43 5577 82534 0.

Depending on engine size, there are three different repair kits:

- Repair kits for GP 0,5
- Repair kits for GP 0,8/1,6
- Repair kits for GP 2,2/2,8

A repair kit consists of:

- Deep groove ball bearings
- Radial shaft seals
- O-rings
- Brush
- div. small parts
- Installation instructions





Kräutler
Elektromotoren



Service rund um den Motor



Elektromotoren für Segelboote



Elektromotoren für Motorboote



Industriemotoren



Kräutler Elektromaschinen GmbH, Hohenemser Str. 47, A-6890 Lustenau, Austria
Telefon ++43 / 55 77 / 82 534-0, Fax ++43 / 55 77 / 82 534-10
www.kraeutler.at, E-mail: kraeutler@kraeutler.at