



Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Deutschland
www.pekrun.de

TECHNISCHE DOKUMENTATION

TECHNICAL DOCUMENTATION

ENGLISCH

ZUM AUFTRAG TO THE ORDER

<i>IHRE BESTELL NR.</i> YOUR ORDER NO.	4500494756 Pos. 20	
<i>WERKS NR.</i> WORKS NO.	2000064792 4001310647, 4001308822	
<i>KENNWORT</i> CODE WORD	GLAUCH TOOBA	
TAG-No	2.7.1.451	2.7.1.551
PEKRUN SERIAL NR.	10002292	10002293
PEKRUN KOM. NO.	19396-20	
<i>GETRIEBE TYP</i> GEAR UNIT TYPE	ASR 450-R-CCW	
<i>GEWICHT</i> WEIGHT	3363 kg	
<i>BAUJAHR</i> YEAR OF MANUFACTURE	2022	



Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany


Translation of the original Operating instructions

(including assembly instructions according to EU Machinery Directive 2006/42/EC,
Annex VI for partly completed machinery)

for
Pekrun gearboxes



Scope :	Worm gearboxes, Cylindrical gearboxes (except turbo gearboxes), Bevel gearboxes(except mill gearboxes), Planetary gearboxes, Combinations of these / special-purpose gearboxes
Type :	...ALG... / ..AGZ... / ..AG... / ..PG... / ..GV... / ..LG... / ..HS... ASR... / BSR... / CSR... / DSR... / ..SR... / ..SH... / ..VN... / ..VG... / ..VH... AKR... / BKR... / ..KR... / ..KS.. / ...PL... ...SO... / ..KZ... / ..MK... / ..SV... / ..VH... / ..VH... / ..VN... SN*.. / SNU*.. / SNO*.. / SNV*.. / SNC*.. / SNA*.. / SNAF*.. SW*.. / SHS*.. / SDA*.. / SVA*.. / SZA*.. / ZVA*.. / SEO*.. K*.. / KN*.. / KNV*.. / KNA*.. / KS*.. / KW*.. / KZV*.. / VKZ*.. / SKV*.. SSN *.. / SSNV*.. / SSW*.. / KSN*..

Document no.: OFF-035242	Rev.: C
created on: 19.01.2022	created by: B. Schröder
	COMPANY STANDARD N9100-EN

Observe protection notice (ISO 16016). Copyright © 2021 PEKRUN Getriebebau GmbH – All rights reserved.

1	Important background information	5
1.1	Scope of supply	5
1.2	Responsibilities	5
1.2.1	Responsibilities of the manufacturer	5
1.2.2	Responsibilities of the manufacturer of the completed machinery	5
1.2.3	Responsibilities of the operator	5
1.3	External interfaces	6
1.4	Legal information	6
1.5	Documentation	7
1.5.1	Background information about content and structure	7
1.5.2	Content and structure	7
1.5.3	Conventions	7
1.6	Service address	8
2	Safety	9
2.1	Conventions for safety instructions	9
2.1.1	Formatting	9
2.1.2	Symbols	9
2.1.3	Explanation of safety information provided	10
2.2	Emergency procedures	11
2.3	Intended use	11
2.3.1	Area of application	11
2.3.2	Requirements for personnel	11
2.3.3	Safety-relevant ambient conditions	12
2.3.4	Safety-relevant information for specific lifecycle phases	12
2.4	Possible misuse	14
2.5	Following the operating instructions	15
2.6	Residual risks and protective measures	15
2.6.1	Residual risks and protective measures for certain lifecycle phases	15
2.6.2	General protective measures	20
3	Technical data	24
4	Structure and function	25
4.1	Structure	25
4.1.1	Housing	25
4.1.2	Gearing and shafts	25
4.1.3	Shaft bearing	26
4.1.4	Lubrication	26
4.1.5	Sealing	27
4.2	Functional description	27
5	Inbound delivery, in-house transportation	28
5.1	Safety	28
5.2	Delivery	29
5.3	In-house transportation	29
6	Storage conditions	32
6.1	Safety	32

6.2	Condition as delivered	32
6.3	Gearbox storage.....	32
6.4	Anti-corrosion protection.....	33
6.4.1	Internal anti-corrosion protection with VCI concentrate	34
6.4.2	External anti-corrosion protection	36
6.5	Storage periods	37
6.5.1	Without additional packaging	37
6.5.2	With additional packaging	38
6.6	Flushing before commissioning	39
7	Set-up conditions	41
7.1	Safety.....	41
7.2	Installation plan	41
7.3	Total space requirements	41
7.4	Dimensions and weights.....	41
7.5	Foundations and floor.....	41
7.6	Ambient conditions	42
7.7	Supply connections	42
7.8	Safety precautions to be taken by the customer	43
7.9	Local requirements for the delivery	44
8	Assembly and installation, initial commissioning.....	45
8.1	Safety.....	45
8.2	Assembly and installation	47
8.2.1	Setting up the gearbox.....	48
8.2.2	Assembling couplings and other accessories.....	49
8.2.3	Installing piping.....	50
8.2.4	Final checklist	51
8.3	Initial commissioning	52
8.3.1	Measures before initial commissioning	52
8.3.2	Gearbox with attached backstop or flange-mounted oil pump.....	55
8.3.3	Gearbox with cooling coil/water-oil cooler	56
8.3.4	Gearboxes with ventilation using a cooling vane.....	57
8.3.5	Gearbox with oil heater	58
8.3.6	Gearbox with other add-on parts.....	59
8.3.7	Gearbox with switching mechanism	60
8.3.8	Advice for the starting phase of drive motors for gearboxes.....	62
8.3.9	First run for gearboxes with grease lubrication.....	63
8.3.10	First run for gearboxes with splash lubrication	64
8.3.11	First run for gearboxes with pressure lubrication.....	65
8.3.12	First run for gearboxes with oil supply system.....	67
8.3.13	Measures after the first run	69
8.4	Recommended lubricants for Pekrun gearboxes	70
8.4.1	Area of application	70
8.4.2	Recommended lubricants	70
8.4.3	Lubricating oil purity class.....	71
8.4.4	Lubricant table	71

8.4.5	Important usage information for the lubricant table	71
9	Operation.....	72
9.1	Safety.....	72
9.2	Operating modes.....	72
9.3	Special tools and operating materials	72
9.4	Commissioning.....	72
9.4.1	Commissioning after a planned shutdown	72
9.4.2	Commissioning after a planned shutdown	73
9.4.3	Recommissioning after an Emergency Stop	73
9.4.4	Recommissioning after a prolonged standstill (storage).....	74
9.5	Inspection and maintenance.....	74
9.6	Decommissioning	75
10	Troubleshooting	76
10.1	Safety.....	76
10.2	Fault identification	76
10.3	Initial steps to take when troubleshooting	77
11	Servicing and maintenance.....	80
11.1	Safety.....	80
11.2	Maintenance record.....	80
11.3	Control procedures and test jigs	81
11.4	Special tools and operating materials	81
11.5	Inspection and maintenance plan	82
11.6	Lubrication plan.....	83
11.6.1	Oil lubrication.....	83
11.6.2	Grease lubrication:.....	85
11.6.3	Grease lubrication of the bearings or seals:.....	86
11.7	Description of inspection and maintenance work	87
11.7.1	Cleaning the fan and gearbox.....	87
11.7.2	Checking the cooling coil (if present)	88
11.7.3	Checking the air/oil cooler (if present).....	88
11.7.4	Checking the water/oil cooler (if present)	88
11.7.5	Checking the line filter (if present).....	88
11.7.6	Check the fixing screws	88
11.7.7	Full inspection of gearbox	89
12	Dismantling and disposal	90
12.1	Safety.....	90
12.2	Dismantling	91
12.3	Disposal	91
13	Supplementary documents	92
13.1	Declaration of Incorporation	92
13.2	Drawings and order-specific documents.....	93

1 Important background information

1.1 Scope of supply

- Gearbox
(for delivery quantity and gearbox type, see confirmation of order and service spec/delivery agreement)
- Operating instructions incl. declaration of incorporation

1.2 Responsibilities

1.2.1 Responsibilities of the manufacturer

Pekrun Getriebebau GmbH completes assembly of the gearbox.

All instrumentation and all required monitoring devices are mounted on the gearbox. (If included in the scope of supply or provided by the customer.)

1.2.2 Responsibilities of the manufacturer of the completed machinery

The machine manufacturer or end customer is responsible for the execution of the foundation and its stability.

Further assembly of the machine is the responsibility of the machine manufacturer or end customer. The same applies to the electrical installation of the instruments and all required monitoring devices on the gearbox.


The assembly and provisioning of the required supply connections/lines is the responsibility of the machine manufacturer/operator.

The manufacturer of the completed machine must integrate all information relevant for operation (such as safety instructions, regulations and descriptions) from these operating instructions into the operating instructions for the completed machinery and keep these up to date over the entire lifetime of the gearbox.

1.2.3 Responsibilities of the operator

The operator or end customer is responsible for commissioning.

The operating instructions form part of the delivery. These instructions must be available at all times to persons tasked with carrying out assembly, operation, repairs, cleaning and maintenance.

NOTICE	
	<p>The operator must ensure that the abovementioned persons have read and understood the operating instructions. The owner must ensure these instructions are followed to the letter, in order to:</p> <ul style="list-style-type: none">– prevent hazards to the life and limb of users and third parties;– ensure the operational safety/reliability of the gearbox; and– rule out failures and environmental hazards resulting from incorrect handling.

1.3 External interfaces

For existing and/or relevant interfaces, please see the order-specific dimensional or section drawing and the technical data sheet in the appendix to these instructions.

Gearbox – machine:

The gearbox is connected to the rest of the machine by one or more drive shafts or by one or more gear output shafts.

Gearbox – energy supply:

The electrical energy supply for the instrumentation and monitoring devices (if included in the scope of supply or provided by the customer) is connected and provided by the operator or end customer.

The hydraulic energy supply for switching cylinders (if included in the scope of supply) is connected and provided by the operator or end customer.

Gearbox – process media supply:

When connected to an external oil supply system:

- the relevant oil inlet and outlet connections are connected and provided by the operator or machine manufacturer.

When connected to a coolant supply system (water/oil cooler or cooling coil):

- the relevant cooling water inlet and outlet connections are connected and provided by the operator or machine manufacturer.

Gearbox – housing:

The gearbox is connected with fixing screws to the foundation or the steel structure provided by the operator or end customer. End stops intended for levelling the gearbox precisely on the foundation are provided by the machine manufacturer, operator or end customer.

1.4 Legal information

The copyright to these operating instructions is retained by:

Pekrun Getriebebau GmbH

The present operating instructions are an integral part of the delivery and must always be kept close to the gearbox.

Pekrun Getriebebau GmbH accepts no liability for damage or operational disruption resulting from a failure to follow the operating instructions.

The gearbox must not be opened during the warranty period except by Pekrun employees. If this is not possible, obtain written approval from Pekrun before having the gearbox opened by other personnel – failure to do this will void the warranty! This does not include the opening of inspection covers or oil feed inlets.

1.5 Documentation

1.5.1 Background information about content and structure

These operating instructions provide you with important information about your gearbox. They are intended to help you to handle the gearbox safely.

1.5.2 Content and structure

These operating instructions provide you with important safety information for all of the gearbox's lifecycle phases.

The order-specific appendix includes the following documentation: handling instructions and technical data, as well as drawings and spare parts lists (as applicable).

User information provided by other suppliers (also included in the appendix) also forms an integral part of these operating instructions.

1.5.3 Conventions

General terms used

Dimensional drawing/data sheet: *

An assembly schematic for the gearbox, which includes the most important dimensions for installation into the overall plant as well as basic data for the intended use. These instructions use the term "dimensional drawing".

Section drawing/MRP drawing: *

Assembly schematic for the gearbox, which includes the gearbox structure and the positioning of all of the parts as a sectional view. These instructions use the term "section drawing".

Spare parts list/bill of materials: *

List of all parts in the gearbox that are required for repairs or when purchasing spare parts. These instructions use the term "spare parts list".

Technical data sheet (per order): *

Data sheet created for each order and which includes other important items of data (as needed) relevant for the intended use. This information must be followed in addition to the operating instructions and dimensional drawing.

* The documents supplied will vary according to the requirements and use case.

Abbreviations:

OI = Operating instructions

PPE = Personal protective equipment

EM = Electric motor

OSS = Oil supply system

Special technical terms:

Skilled personnel, qualified personnel:

A person whose appropriate training and experience enables them to detect risks, and to avoid possible hazards that can be caused by operating or servicing a product.

User:

A person or organisation capable of commissioning a product and/or using it to carry out a required function, including activities that range from cleaning to decommissioning at the end of the product's lifetime.

Guard:

A physical barrier that is designed to offer protection as an integral part of the machine.

1.6 Service address

If you have any technical queries, please contact our factory:

Pekrun Getriebebau GmbH

Köbbingser Mühle 14

58640 Iserlohn, Germany

Phone: +49 (0)2371 945-0

Fax: +49 (0)2371 945-299

Email: info@pekrun.de

Web: www.pekrun.de

24h Customer Service hotline: +49 (0)2371 945-116

2 Safety

2.1 Conventions for safety instructions

2.1.1 Formatting

Certain kinds of information are emphasised and highlighted by means of appropriate formatting:









Table 2-1

Convention	Type of information
Bold type	Especially important components, as well as headings
Red type	Important warning notices

2.1.2 Symbols



The following symbols are used throughout the operating instructions:



Table 2-2



Symbol	Description
	Risk of personal injury A failure to observe this safety instruction can lead to serious injury or death
	Warning, general
	Warning about a potential hazard Entanglement hazard
	Warning about a potential hazard (hot surfaces) Risk of burn injuries
	Warning about a potential hazard Suspended loads
	Operating instructions (general) Follow operating instructions and other relevant documents
	General mandatory sign Risk of damage
	Mandatory sign for lashing point/crane transportation Use the lashing points provided


2.1.3 Explanation of safety information provided


These operating instructions use the following signal words and symbols for warnings. If multiple hazards apply, the warning notice is used for the next-higher level in each case.


	<div data-bbox="432 398 1487 454"> DANGER</div> <div data-bbox="432 454 1487 539">Indicates an immediate hazard. A failure to follow this safety warning can lead to death or serious injury.</div>
---	---

	<div data-bbox="432 636 1487 692"> WARNING</div> <div data-bbox="432 692 1487 777">Indicates a potential hazard with a moderate risk. A failure to follow this safety warning can lead to death or serious injury.</div>
---	--



	<div data-bbox="432 875 1487 931"> CAUTION</div> <div data-bbox="432 931 1487 1016">Indicates a hazard with a low risk. A failure to follow this safety warning can lead to minor or moderate injury.</div>
---	---


	<div data-bbox="432 1115 1487 1171">TAKE CARE</div> <div data-bbox="432 1171 1487 1288">Provides important advice about avoiding damage to property. A failure to follow such safety instructions can lead to damage to the gearbox or the overall machine, and to the environment.</div>
---	--

	<div data-bbox="432 1384 1487 1440">NOTICE</div> <div data-bbox="432 1440 1487 1541">Used to provide information about general handling and operation. Should be followed at all times.</div>
---	--

	<div data-bbox="432 1639 1487 1695">NOTICE</div> <div data-bbox="432 1695 1487 1780">Provides important advice about the operating instructions and order-specific documents.</div>
---	--

2.2 Emergency procedures

	 DANGER
	<p>Danger to life from faulty gearbox or overall machine</p> <p>Switch off the drive unit immediately in an emergency!</p> <p>The drive unit must be taken out of service immediately if you identify any changes to the gearbox during operation, such as an elevated operating temperature or changes in the noises made by the gearbox.</p>

	TAKE CARE
	<p>Risk of damage</p> <p>A failure of the gearbox can cause consequential damage.</p> <p>Take appropriate action to avoid further damage to the gearbox.</p>


2.3 Intended use

2.3.1 Area of application

The gearbox is intended exclusively for use in an industrial environment.


The gearbox is intended for installation in a machine.

The gearbox must be deployed and operated within the operating conditions and performance limits specified by the service spec/delivery agreement.

	NOTICE
	<p>For important information about the intended use and the application area, also see the type plate and the dimensional drawing as well as the order-specific technical data sheet.</p>


2.3.2 Requirements for personnel

The operating instructions form part of the delivery. These instructions must be available at all times to persons tasked with carrying out assembly, operation and maintenance.



	NOTICE
	<p>Steps must be taken to ensure that all abovementioned persons have read and understood the operating instructions. It is advisable to assign the tasks listed above to people who have received appropriate professional training in these areas.</p> <p>(Skilled personnel/qualified personnel)</p>


The following persons are authorised to handle the product:

- Hauliers: personnel with basic training
- Fitters: Skilled personnel, qualified personnel
- Installers: Skilled personnel, qualified personnel
- Users: trained personnel
- Servicing personnel: Skilled personnel, qualified personnel

	NOTICE All work must be carried out with the greatest of care and due attention to safety . Observe the minimum requirements for safety and health protection when using work equipment, in accordance with the respective regulations of the country of use.
---	--

2.3.3 Safety-relevant ambient conditions

	 DANGER Danger to life when operated in a potentially explosive atmosphere! The gearbox must be deployed and operated within the ambient conditions specified by the service spec/delivery agreement.
---	--

	NOTICE For important safety-relevant information about ambient conditions, see the dimensional drawing and the order-specific technical data sheet.
---	---

2.3.4 Safety-relevant information for specific lifecycle phases

Set-up conditions:

Set up the gearbox on a foundation or steel structure that is as level, safe and inelastic as possible. The flatness tolerance of the set-up area is 0.1 mm per 1 m.

Connection conditions:



The connection to the drive unit and the working machine must be installed by the machine manufacturer/operator, using the respective gear shafts and with the help of a suitable coupling. This work also includes the guards to be installed in accordance with DIN EN ISO 12100-1 for all shafts and moving parts.

The connection from an external oil supply system to the gearbox must be provided and assembled by the machine manufacturer/operator by using suitable connections/lines. (If applicable.) To avoid overpressure or leaking oil lines, the machine manufacturer/operator should install a pressure monitoring system or pressure relief valve.

The connection from the hydraulic or pneumatic supply unit to the switching cylinders must be provided and appropriately assembled by the machine manufacturer/operator by using suitable connections/lines. (if applicable)

The electrical installation of the instrumentation and monitoring devices on the gearbox must be completed by the machine manufacturer/operator using qualified personnel (electricians). (if applicable)

Assembly

During set-up of the gearbox, there is a risk of injury to limbs due to crush and shear injuries. Damage to the musculoskeletal system can also occur, as can fatigue and discomfort as a result of incorrect posture.

If guards are not installed properly, this can lead to hazards from touching the machine accidentally.

During dismantling work, there is a risk of slip/fall injuries from pools of oil formed by leaking lines or flanged connections.

During installation work, there is a risk of injury during assembly on live parts. All live parts must be de-energised before carrying out assembly work.

Avoid placing the assembly personnel at any risk. Keep to safety clearance distances.

Operation



The rotation of the shafts presents a risk of entrapment injuries.

Due to the movement of external parts (such as switching cylinders for switching operations), there is a risk of crush/shear injuries to limbs.

Mount a guard that complies with DIN EN ISO 12100-1.



Depending on the operating conditions, the surface temperature of the gearbox can be very high. Contact with the housing can cause burn injuries to the skin.

Switch gearbox gears only when it is at a standstill and without any applied torque. (if applicable)

Maintenance and servicing

If guards are not installed properly, this can lead to hazards from touching the machine accidentally.

Maintenance and servicing must be performed when the gearbox is at a standstill.

During maintenance work, there is a risk of injury during assembly on live parts. All live parts must be de-energised before carrying out assembly work.

During servicing and maintenance work, there is a risk of slip/fall injuries from pools of oil formed by leaking lines or flanged connections.

When changing the oil, escaping hot oil can cause scald injuries on the skin.



Depending on the operating conditions, the surface temperature of the gearbox can be very high. Even after having been at a standstill for a while, contact with the housing can cause burn injuries to the skin.

Dismantling

Dismantle the gearbox only when it is at a standstill.



When draining the oil, escaping hot oil can cause scald injuries on the skin.

Depending on the operating conditions, the surface temperature of the gearbox can be very high. Even after having been at a standstill for a while, contact with the housing can cause burn injuries to the skin.

During dismantling work, there is a risk of slip/fall injuries from pools of oil formed by leaking lines or flanged connections.

During removal of the gearbox from the machine, there is a risk of crush, shear and amputation injuries to limbs.

Disposal

During disposal work, skin may come into contact with dirty oil. Use suitable personal protective equipment (PPE).

Always observe the environmental protection regulations in the country of use.

2.4 Possible misuse

Operation of the gearbox in a potentially explosive atmosphere

⇒ **Consequence: Explosion hazard.**

Operating the gearbox in the opposite direction of rotation or at too high a speed. This presents the risk of damage to the gearbox. Gearing parts and bearings may also be destroyed.

⇒ **Consequence: Risk of breakage during operation**

Operating the gearbox with the inspection cover open.

Dirt can enter the housing, and oil or other particles can be ejected out of the housing.

⇒ **Risk of injury resulting from ejected parts and fluids**

Personnel can reach into the housing during operation and their limbs can be caught between rotating shafts inside the gearbox.

⇒ **Risk of shear and crush injury**

Operating the gearbox without a functional oil supply or with the wrong grade or quantity of oil. This presents a risk of damage to the gearbox. Gearing parts and bearings may also be destroyed.

⇒ **Possible risk of breakage during operation**

Switching gearbox gears during operation. This presents a risk of damage to the gearbox. Gearing parts and bearings may also be destroyed.

⇒ **Possible risk of breakage during operation**

Performing welding work on the gearbox. Using the gearbox as a return during welding work. Gearing parts and bearings can be destroyed.

⇒ **Possible risk of breakage during operation**

Personnel who are **not** qualified are assigned assembly, commissioning and maintenance work. All personnel assigned assembly, commissioning and maintenance work must have read and understand the operating and maintenance instructions for the gearbox. It is advisable to assign the tasks listed above to people who have received appropriate professional training in these areas.

⇒ **Danger arising from incorrect assembly**

2.5 Following the operating instructions

These operating instructions are an integral part of the gearbox delivery.


Always keep these operating instructions close to the gearbox.


Retain the operating instructions for the entire lifetime of the gearbox.

If necessary, pass the operating instructions on to the next owner or user of the gearbox.


2.6 Residual risks and protective measures


2.6.1 Residual risks and protective measures for certain lifecycle phases


 Hazard area: Transportation (manufacturer, haulier, operator)	
Residual risks:	Protective measures:
<p>During transportation and loading/unloading of the gearbox, the gearbox may slip, fall or drop from a height onto personnel because loads have been secured and/or anchored incorrectly, or incorrect load handling gear has been used.</p> <p>There is a risk of injury to limbs due to crush and shear injuries if operators are trapped between obstacles and the load.</p>	<ul style="list-style-type: none"> - Inform all personnel entrusted with the transportation and setup of the gearbox about the existing residual risks, and especially about the selection of suitable load-handling equipment and proper securing of loads. - Always commission properly trained personnel with the transportation and loading/unloading of the gearbox. - Keep the speed of travel as low as possible. - Avoid rapid changes between moving and stopping the load, and the oscillations that this causes. - Avoid any endangerment to personnel. - Take care to ensure that personnel do not become trapped between obstacles and the load. - Keep to safety clearance distances. Wear PPE. - Transport the gearbox slowly and carefully, and especially when in a raised position. - Ensure the gearbox is anchored safely and correctly - Note the centre of gravity (which may be off-centre), weight and dimensions of the gearbox. Follow instructions about load distribution on the packaging or dimensional drawing. - Use suitable vehicles and loading platforms for transportation (load-bearing capacity, dimensions) - Secure the gearbox safely to the loading platform. - Choose ancillary equipment providing an adequate means to fix and lift the unit, with appropriate dimensions. <p>(See section 5.)</p>

 Hazard area: Assembly and installation (operator)	
Residual risks:	Protective measures:
General	<ul style="list-style-type: none"> - Only entrust the assembly and installation of the gearbox to properly qualified personnel, preferably those with relevant professional training. - Wear suitable PPE. - Inform all personnel entrusted with the assembly and installation of the gearbox about the existing residual risks. (See sections 5, 6, 7 and 8.)
<p>During setup of the gearbox on the base frame, the unit may slip, fall or drop from a height onto personnel because loads have been anchored incorrectly or incorrect load handling gear has been used.</p> <p>There is a risk of injury to limbs due to crush and shear injuries if operators are trapped between obstacles and the load.</p>	<ul style="list-style-type: none"> - Keep the speed of travel as low as possible. - Avoid rapid changes between moving and stopping the load, and the oscillations that this causes. - Avoid any endangerment to personnel. - Take care to ensure that personnel do not become trapped between obstacles and the load.
Damage to the musculoskeletal system can occur, as can fatigue and discomfort as a result of incorrect posture.	<ul style="list-style-type: none"> - Keep to safety clearance distances. Wear PPE. - Transport the gearbox slowly and carefully, and especially when in a raised position.
When assembling the couplings on the shaft or during assembly of the remaining machine, there is a risk of injury to limbs due to crush and shear injuries	<ul style="list-style-type: none"> - Ensure the gearbox is anchored safely and correctly - Note the centre of gravity (which may be off-centre), weight and dimensions of the gearbox. Follow instructions about load distribution on the packaging or dimensional drawing. - Ensure personnel have physical aptitude for the task
If guards are missing or not installed properly, this can lead to hazards from touching the machine accidentally.	<ul style="list-style-type: none"> - Instruct personnel entrusted with assembly and installation about the importance of machine guards
During installation work, there is a risk of injury during assembly on live parts.	<ul style="list-style-type: none"> - All live parts must be de-energised before carrying out assembly work.
When removing the anticorrosion protection with solvents or when opening the inspection cover, there is a risk of injury from escaping toxic or combustible gases.	<ul style="list-style-type: none"> - The handling of hazardous substances (solvents or spills of corrosion inhibitor oils) should be entrusted only to qualified personnel, ideally with appropriate professional training. - These regulations must be followed: the German Ordinance on Hazardous Substances, EU Regulation 1907/2006, and EU Directives 2010/75/EU and 89/656/EEC
When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.	<ul style="list-style-type: none"> - Observe the safety data sheet for the media being used. - Wear suitable PPE (safety goggles and gloves). - Have suitably-qualified personnel carry out the work.
When working on parts filled with oil, such as pipelines and the interior of the gearbox, skin can be exposed to contact with aggressive media.	<ul style="list-style-type: none"> - Remove any oil spills that occur immediately (e.g. with oil binder).

During assembly and installation work, personnel may slip or fall as a result of leaking oil or existing spills of oil.	<ul style="list-style-type: none"> - Clean up any oil spills or oil leaks with an oil binder. - Seal any leakage points as soon as possible.
---	--



 Hazard area: First use (operator)	
Residual risks:	Protective measures:
General	<ul style="list-style-type: none"> - Only entrust the first use to properly qualified personnel, preferably those with relevant professional training - Wear suitable PPE. - Inform all personnel entrusted with the first use of the gearbox about the existing residual risks. (See section 8 and 9.)
During the first use, leaky lines or flanged joints may spray out oil as a result of overpressure in the oil supply system or when pressurising the hydraulic lines in the switching unit. As a result, this oil may come into contact with personnel (e.g. get into eyes).	<ul style="list-style-type: none"> - Before the first use, check all oil supply lines and flanged joints to and on the gearbox, and check that these are connected/seated tightly. - Before the first use, check all hydraulic connecting lines and hoses for correct seating as well as any leaks - Use suitable PPE (eye protection)
During the first use, personnel may slip or fall as a result of leaking oil or existing spills of oil.	<ul style="list-style-type: none"> - Clean up any oil spills or oil leaks with an oil binder. - Seal any leakage points as soon as possible.
If guards are missing or not installed properly, this can lead to hazards from touching the machine accidentally.	<ul style="list-style-type: none"> - Inform all personnel entrusted with the first use of the gearbox about the existing residual risks
<p>During operation, foreign objects such as sand and dust can land on the rotating parts and then be ejected forcefully by these parts.</p> <p>When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.</p> <p>This creates a risk of eye injuries from objects being ejected with force from the unit, as well as sprays of pressurised oil escaping from the unit.</p>	<ul style="list-style-type: none"> - The operator/customer must set up guards to prevent access to the danger zone involving rotating machine shafts. - Before the first use, all oil supply lines and flanged joints to and on the gearbox should be checked for leaks and proper seating. (If applicable.) - All hydraulic connecting lines and hoses must be checked for leaks and correct seating. (If applicable.) - Observing correct maintenance intervals (checking for leaks at/on connection points/parts that are pressurised) - Ensure that all work on pipelines is carried out with due care and attention. - Wear appropriate protective clothing and suitable eye protection.

 Hazard area: troubleshooting, servicing, maintenance and cleaning (operator)	
Residual risks:	Protective measures:
General	<ul style="list-style-type: none"> - Only entrust troubleshooting, maintenance and cleaning work to properly qualified personnel, preferably those with relevant professional training - Wear PPE. - Only perform work on the gearbox when it is at a standstill. - Inform all personnel entrusted with troubleshooting, servicing, maintenance and cleaning work on the gearbox about the existing residual risks. <p>(See section 10 and 11.)</p>
There is a risk of crush injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers)	<ul style="list-style-type: none"> - Always wear PPE (gloves and shoes).
Personnel may come into contact with the hot surface of the gearbox housing (even after a while at a standstill) and can suffer burn injuries by then touching it.	<ul style="list-style-type: none"> - Check the temperatures at the gearbox and on the gearbox surface, and avoid starting any work before the surface has cooled down to a safe temperature.
When changing the oil, escaping hot oil can cause scald injuries on the skin.	
During troubleshooting work, leaky lines or flanged joints may spray out oil as a result of overpressure in the oil supply system or when pressurising the hydraulic lines in the switching unit. As a result, this oil may come into contact with personnel (e.g. get into eyes).	<ul style="list-style-type: none"> - Before the first use, check all oil supply lines and flanged joints to and on the gearbox, and check that these are connected/seated tightly. - Before the first use, check all hydraulic connecting lines and hoses for correct seating as well as any leaks
When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.	<ul style="list-style-type: none"> - Observe the safety data sheet for the media being used. - Wear suitable PPE (safety goggles and gloves).
When working on parts filled with oil, such as pipelines and the interior of the gearbox, skin can be exposed to contact with aggressive media.	<ul style="list-style-type: none"> - Have suitably-qualified personnel carry out the work. - Remove any oil spills that occur immediately (e.g. with oil binder).
Personnel may slip or fall as a result of leaking oil or existing spills of oil.	<ul style="list-style-type: none"> - Clean up any oil spills or oil leaks with an oil binder. - Seal any leakage points as soon as possible.
During this work, there is a risk of injury during assembly on live parts.	<ul style="list-style-type: none"> - All live parts must be de-energised before carrying out assembly work.




 Hazard area: decommissioning and dismantling (operator)	
Residual risks:	Protective measures:
General	<ul style="list-style-type: none"> - Only entrust decommissioning and dismantling work to properly qualified personnel, preferably those with relevant professional training - Wear PPE. - Only perform work on the gearbox when it is at a standstill. - Inform all personnel entrusted with the decommissioning and dismantling of the gearbox about the existing residual risks. (See section 12.)
There is a risk of crush injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers)	<ul style="list-style-type: none"> - Always wear PPE (gloves and shoes).
During removal of the gearbox from the machine or base frame, the unit may slip, fall or drop from a height onto personnel because loads have been anchored incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if operators are trapped between obstacles and the load.	<ul style="list-style-type: none"> - Keep the speed of travel as low as possible. - Avoid rapid changes between moving and stopping the load, and the oscillations that this causes. - Avoid any endangerment to personnel. - Take care to ensure that personnel do not become trapped between obstacles and the load.
Damage to the musculoskeletal system can occur, as can fatigue and discomfort as a result of incorrect posture.	<ul style="list-style-type: none"> - Keep to safety clearance distances. Wear PPE.
When removing the couplings from the shaft or other parts of the machine, there is a risk of injury to limbs due to crush and shear injuries	<ul style="list-style-type: none"> - Transport the gearbox slowly and carefully, and especially when in a raised position. - Ensure the gearbox is anchored safely and correctly - Note the centre of gravity (which may be off-centre), weight and dimensions of the gearbox. Follow instructions about load distribution on the packaging or dimensional drawing. - Ensure personnel have physical aptitude for the task
Personnel may come into contact with the hot surface of the gearbox housing (even after a while at a standstill) and can suffer burn injuries by then touching it.	<ul style="list-style-type: none"> - Check the temperatures at the gearbox and on the gearbox surface, and avoid starting any work before the surface has cooled down to a safe temperature.
When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.	<ul style="list-style-type: none"> - Observe the safety data sheet for the media being used. - Wear suitable PPE (safety goggles and gloves).
When working on parts filled with oil, such as pipelines and the interior of the gearbox, skin can be exposed to contact with aggressive media.	<ul style="list-style-type: none"> - Have suitably-qualified personnel carry out the work. - Remove any oil spills that occur immediately (e.g. with oil binder).
Personnel may slip or fall as a result of leaking oil or existing spills of oil.	<ul style="list-style-type: none"> - Clean up any oil spills or oil leaks with an oil binder.
During removal work, there is a risk of injury during assembly involving live parts.	<ul style="list-style-type: none"> - All live parts must be de-energised before carrying out assembly work.

<p>When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.</p> <p>This creates a risk of eye injuries from objects being ejected with force from the unit, as well as sprays of pressurised oil escaping from the unit.</p>	<ul style="list-style-type: none"> - During dismantling work, oil supply lines and flanged joints to and on the gearbox should be checked. (If applicable.) - All hydraulic connecting lines and hoses must be checked for leaks. (If applicable.) - Ensure that dismantling work on pipelines is carried out with due care and attention. - Wear appropriate protective clothing and suitable eye protection.
---	--



2.6.2 General protective measures

	 DANGER
	<p>Danger to life when working on a switched-on machine</p> <p>As a general rule, always shut down the gearbox and all parts of an installed and connected oil supply system.</p> <p>Ensure that the entire machine is de-energised and depressurised.</p> <p>Secure the drive unit against accidental switch-on (e.g. by locking the key switch or removing the fuse from the power supply unit). Secure the gearbox's start-up console by posting up a sign indicating that work is in progress on the gearbox.</p>



Only perform work on the gearbox when it is at a standstill.

 	 DANGER
	<p>Danger to life from rotating and/or moving parts</p> <p>Risk of injury from being trapped and pulled in by rotating and/or moving parts!</p> <p>Secure all rotating drive parts such as couplings, gears/sprockets or belt drives so they cannot be touched.</p> <p>All external moving parts such as switching cylinders must be shielded so they cannot be touched.</p> <p>Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)</p>

Secure rotating and/or moving parts with guards so that they cannot be touched.



	 DANGER
	<p>Danger to life from dangerous electrical voltage</p> <p>During installation work on the gearbox, there is a risk of injury during assembly on live parts.</p> <p>Ensure that all work on electrical parts is carried out only by suitably qualified electricians.</p> <p>Always observe the 5 safety rules according to DIN EN 50110-1: Before starting work:</p> <ul style="list-style-type: none"> – Disconnect from the mains (isolate all power lines, including any ancillary circuits) – Secure against re-connection – Verify that the system is dead – Carry out earthing and short-circuiting – Provide protection from adjacent live parts


All live parts must be de-energised before carrying out work on the gearbox.


	 WARNING
	<p>Risk of eye injuries from objects being ejected with force from the unit, as well as escaping sprays of pressurised fluids!</p> <p>During operation, foreign objects such as sand and dust can land on the rotating parts and then be ejected forcefully by these parts.</p> <p>Wear appropriate eye protection.</p> <p>When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.</p> <p>Wear appropriate protective clothing and eye protection.</p>


For all work, always use suitable PPE. This includes hand protection (protective gloves), eye protection (safety goggles), head protection (hard hat), foot protection (safety boots) and hearing protection (ear muffs or ear plugs).


Only use PPE that complies with the safety requirements from the EU PPE Regulation 2016/425.



	 WARNING
	<p>Risk of burn injury from touching the gearbox!</p> <p>This may cause serious burn injuries.</p> <p>During operation and for a period of time after standstill, serious burn injuries can be caused by touching hot surfaces (>55 °C).</p> <ul style="list-style-type: none"> – Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.) – Let the gearbox cool down to a safe temperature before you touch it. – Wear suitable protective gloves and protective clothing.

	WARNING
	<p>Risk of burn injuries from escaping hot working fluid!</p> <p>This may cause serious scald injuries.</p> <p>During maintenance and repair work as well as oil changing work directly following operation – and for a period of time after standstill – there is a risk of serious injury from escaping hot working fluid (>55 °C).</p> <ul style="list-style-type: none"> – Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.) Keep protection in place while temperatures are not safe. – Let the working fluid cool down to a safe temperature before performing any work. – Wear suitable protective gloves and protective clothing.

	WARNING
	<p>Risk of injury from direct contact!</p> <p>Contact with cold surfaces carries a risk of serious injury.</p> <p>While the machine is at a standstill (if this has cooled down to the ambient temperature), potentially serious injuries can be caused by extreme cold (pain, numbness, frostbite) if cold surfaces (<0 °C) touch exposed skin.</p> <ul style="list-style-type: none"> – Check the temperatures of the gear unit and/or gearbox surface before touching it/them. - Wear suitable protective gloves and protective clothing.

	CAUTION
	<p>Risk of injury from incorrect posture!</p> <p>Incorrect or unhealthy bodily posture during assembly work can lead to ergonomic hazards in the form of disorders of the musculoskeletal system, fatigue and discomfort.</p> <ul style="list-style-type: none"> – All persons tasked with the installation must be informed of the residual risks associated with assembly work. – Entrust all assembly work to qualified personnel, ideally with appropriate professional training.

TAKE CARE	
	<p>Risk of damage</p> <p>Risk of damage from the ingress of moisture!</p> <p>Do not clean the gearbox with a pressure washer: this can cause moisture to penetrate inside the gearbox, where it can cause serious damage.</p>
	<p>Risk of damage to gearbox by switching during operation!</p> <p>Switch gearbox gears only when it is at a standstill.</p> <p>Also ensure that the gearbox is de-energised. The input and output sides must be able to rotate freely.</p> <p>It must not be possible to actuate the switching cylinders unless the shafts are not rotating at all and there is no torque acting on the shafts.</p> <p>An interlock must therefore be used.</p> <p>If necessary, alter the position of the gear selectors using jog mode on the drive unit, so as to make it easier for the gear selectors to engage.</p> <p>The drive unit must not be released for normal operation until the gear has been fully engaged in its final position on the gearbox.</p>
	<p>Risk of damage from changes affecting the gearbox!</p> <p>The drive unit must be taken out of service immediately if you identify any changes to the gearbox during operation, such as an elevated operating temperature or changes in the noises made by the gearbox.</p>
	<p>Risk of damage from welding work!</p> <p>Do not carry out any welding work on the gearbox. Do not use the gearbox as a grounding point for welding work.</p> <p>This could damage gearing parts and bearings.</p>

NOTICE	
	<p>Replace any bolts/screws rendered unusable by assembly or dismantling work. Always replace with bolts/screws of the same design and strength class (screw lock, tightening torque, etc.).</p>
	<p>Help to protect the environment!</p> <ul style="list-style-type: none"> – When changing the oil, collect used oil in appropriate containers – Clean up any oil spills immediately – Store corrosion inhibitors separately from used oil – Dispose of used oil, corrosion inhibitors, oil binders and cleaning rags soaked in oil according to the applicable local environmental regulations
	<p>Follow signs affixed to the gearbox, such as the type plate, arrow indicating the direction of rotation, etc. These must be free from dirt and paint. Replace any missing signs.</p>

3 Technical data

The technical data and the agreements specified in the contract between the ordering party and Pekrun set the limits within which the product is intended to be used. For the most important items of technical data, please see the type plate that is permanently affixed to each Pekrun gearbox.

Figure 3-1

[p e k r u n]			
Type type	1.	Leistung power	6. kW
Auftrags-Nr. order no.	2.	Übersetzung ratio	7.
Serial Nr. serial no.	3.	Antriebsdrehzahl input speed	8. min ⁻¹
Teil Nr. part no.	4.	Abtriebsdrehzahl output speed	9. min ⁻¹
Baujahr constr. year	5.	Ölviskosität oil viscosity	10. cSt/40°C
		Ölmenge oil quantity	11. l/min
		Ölfüllmenge oil filling quantity	12. l
		Gewicht weight	13. kg
Beschreibung description	Getriebe / Gearbox		
Pekrun Getriebebau GmbH - Köbblingser Mühle 14 - 58640 Iserlohn, Germany Fon. +49 (0)2371/945-0 - Fax. +49 (0)2371/945-299 www.pekrun.de - info@pekrun.de			

1. Type: Serial/type designation is made up of the model no. and size
2. Order no.: Pekrun order number, e.g. 12345
3. Serial no.: Sequential serial number, e.g. 10000123
4. Part no.: Material/article number, e.g. PART-012345
5. Year of construction: Year of production
6. Power rating: Nominal power rating in kW
7. Gear ratio: i, e.g. 1: 2.345
8. Input speed: n_1 in rpm
9. Output speed: n_2 in rpm
10. Oil viscosity: ISO VG XXX in c/St/40 °C
11. Oil quantity: Oil quantity for recirculating lubrication in l/min.
12. Oil fill quantity: For gearbox with minimum oil fill level, e.g. for splash lubrication
13. Weight: Total weight in kg

	NOTICE
	<p>For other technical specifications, please see the dimensional drawing and the technical data sheet, which is prepared according to the order. (See appendix.)</p> <p>Type plates or other information on the device must not be removed, made illegible or otherwise rendered unrecognisable. If this rule is not complied with, it will void all guarantees and manufacturer liability.</p> <p>Also observe all type plates on attachment parts.</p>


4 Structure and function

4.1 Structure

These operating instructions apply for Pekrun gearboxes comprising cylindrical gearboxes, bevel gearboxes, planetary gearboxes, worm gearboxes or combinations of these types. The gearboxes may incorporate 2-stage or multi-stage designs.

For the gearbox structure and layout, consult the supplied dimensional or section drawing.

Torque transmission parts (excepting the input/output shafts) are completely enclosed by the housing. The shaft ends protruding from the housing are intended for connection to the overall machine.

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of irreparable damage to the gearbox or parts from incorrect direction of rotation!</p> <p>For the direction of rotation, see the direction of rotation arrow on the gearbox, or the enclosed and authoritative dimensional drawing or order-specific technical data sheet.</p> <p>If no direction of rotation is specified in the supplied technical documents, then the gearbox can be operated in both directions.</p>

4.1.1 Housing

The gearbox housing is made from either cast iron or structural steel (welded housing designs). The design is torsion-resistant.

To check gearing, inspection windows are provided in the form of inspection covers or inspection holes.

Where applicable, oil fill levels can be checked by an oil level window located on the side, or an oil sight glass, oil dipstick or oil level indicator.

Options for oil filling include drilled holes (e.g. for the aeration filter) as well as other holes or inspection covers.

An oil drain plug (flange connection or attached ball valve with oil supply system) is provided to drain oil for an oil change.

The housing is equipped with appropriately sized transportation lugs or transportation eyes.

For the exact design, please see the order-specific dimensional or section drawing.

4.1.2 Gearing and shafts

Depending on requirements and use case, different types of gearings or combinations of gearings are provided in the gearbox. These may consist of cylindrical and bevel gear pairs or planetary and worm gear pairs.

For the exact design, please see the order-specific dimensional or section drawing.

The gearwheels are joined to the shafts (also including hollow shafts) with parallel key connections, interference fits, etc.

Parts that transmit torque are manufactured from steel (as well as non-ferrous metals for

worm gear pairs). The exact materials used are specified as part of the engineering design in accordance with the intended use.

The high quality of the gearing as well as the worm gear pairs guarantees reliable running and minimises noise levels.


4.1.3 Shaft bearing

Gearbox shafts are typically mounted in anti-friction bearings. Depending on requirements and use case, the bearing arrangement can also use slide bearings or bearing bushes.

For the exact design, please see the order-specific dimensional or section drawing.

4.1.4 Lubrication

The type of lubrication (oil or grease lubrication, splash or pressure lubrication), oil viscosity and oil volume are all determined as part of the engineering design.

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to the gearbox if operated without lubrication!</p> <p>Ensure that lubrication is performed regularly and correctly. Use appropriate lubricants. This approach achieves the highest levels of operational reliability for the gearbox and a long lifetime.</p> <ul style="list-style-type: none"> - Attach parts supplied separately or which were removed for transportation, such as pressure gauges, thermometers, piping, etc. - Always ensure the gearbox is filled with oil. (Exception: for gearboxes lubricated with grease, check the fill level.) - Proceed with commissioning as described in section 8.

Splash lubrication

If no particular kind of lubrication is described in the supplied technical documents, adequate lubrication of the gear pairs and bearings is ensured with the gearing and splash lubrication. This makes the gearboxes especially low-maintenance.

Pressure lubrication

Pressure lubrication using oil pumps is needed in the following cases:

- Providing lubrication to gearing and bearings at high circumferential speeds
- Cooling by an oil cooler
- Roller bearing lubrication for higher speeds of larger bearings
- Slide bearing lubrication
- Special installation setups and for gearboxes where splash lubrication is not possible.

Pressure lubrication is provided as follows:


- By a flange-mounted oil pump directly to a gear shaft
- or
- By a motor oil pump attached to the gearbox housing
- By a separate oil supply system
- By a centralised, customer oil supply system


The piping and connecting lines are laid onto/in the gearbox and fixed in place.

Monitoring of the lubrication system

Monitor the following operational states to ensure error-free operation of the oil circuit:

- a) Oil pressure => Pressure gauge/pressure switch, etc.
- b) Oil temperature => Dial-type thermometer/resistance thermometer, etc.
- c) Oil flow rate => Flow indicator/flow sensor, etc.

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to the gearbox if operated without lubrication!</p> <p>For gearboxes with an attached oil supply system, ensure that the instrumentation provided is properly functional before commissioning.</p>

	NOTICE
	<p>For operation and maintenance of the pump, filters and monitoring instruments, follow the operating instructions listed in the order-specific appendix as provided.</p>

4.1.5 Sealing

Depending on requirements, rotary shaft seals or labyrinth seals (depending on the use case) on the extended shaft ends prevent oil from leaking out of the gears as well as impurities from entering the gearbox.

4.2 Functional description

Pekrun gearboxes consist of one or more gear pairs (either interlocking pairs or worm gear pairs) that are completely enclosed by the housing. The housing does not enclose the shaft ends on the input and output shafts. These shaft ends extend out the housing and are intended for connection to the overall machine.


The gear or worm wheels are used for the direct transmission of the smallest to the largest forces and speeds between parallel, skewed or intersecting shafts.

5 Inbound delivery, in-house transportation

5.1 Safety


All work must be carried out with the greatest of care and attention to **safety!**

	NOTICE
Pay attention to the safety instructions in section 2: Safety	

	<div data-bbox="437 555 1481 600" data-label="Section-Header"> <h3> DANGER</h3> </div> <div data-bbox="437 600 1481 645" data-label="Text"> <p>Danger to life, risk of crush/shear injuries!</p> </div> <div data-bbox="437 651 1481 689" data-label="Text"> <p>Risk of serious injury from suspended loads!</p> </div> <div data-bbox="437 698 1481 869" data-label="Text"> <p>During transportation and loading/unloading of the gearbox, the gearbox may slip, fall or drop from a height onto personnel because loads have been lashed incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if users are trapped between obstacles and the load.</p> </div> <div data-bbox="437 884 1481 922" data-label="Text"> <p>Comply with the following protective measures:</p> </div> <div data-bbox="437 929 1481 1579" data-label="List-Group"> <ul style="list-style-type: none"> – Inform all personnel entrusted with the transportation and set-up of the gearbox about the existing residual risks, and especially about the selection of suitable load-handling equipment and proper load lashing. – Avoid any endangerment to personnel: Take care to ensure that personnel do not become trapped between obstacles and the load. Keep to safety clearance distances. Wear PPE. Transport the gearbox slowly and carefully, and especially when in a raised position. – Ensure the gearbox load is lashed safely and correctly: Do not exceed the load limits of the lifting gear Distribute the load evenly when using multiple slings for load lashing (take care: centre of gravity may be off-centre) Follow instructions about load distribution on the packaging or dimensional drawing. – Always commission properly trained personnel with the transportation and loading/unloading of the gearbox: Keep the speed of travel as low as possible. Avoid rapid changes between moving and stopping the load, and the oscillations that this causes. </div>
--	--

	<div data-bbox="437 1630 1481 1675" data-label="Section-Header"> <h3>TAKE CARE</h3> </div> <div data-bbox="437 1682 1481 1720" data-label="Text"> <p>Risk of damage</p> </div> <div data-bbox="437 1727 1481 1765" data-label="Text"> <p>Risk of damage to gearbox if incorrect lashing points are used!</p> </div> <div data-bbox="437 1771 1481 1848" data-label="Text"> <p>Never use the shaft journals to lift the gearbox. Do not lift by the threads on the end face!</p> </div> <div data-bbox="437 1854 1481 2004" data-label="Text"> <p>Do not use piping as a support during transportation. All load lashing must use only the transportation lugs or eyes provided on the housing. These are marked on the gearbox with the corresponding symbol.</p> </div>
--	--

5.2 Delivery

	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from corrosion!
	<p>Do not open the packaging at any time. This will reduce the durability of the gearbox anti-corrosion protection.</p> <p>If the packaging has been opened, please read section 6 of these operating instructions. <i>Please contact Pekrun in case of doubt.</i></p>

The contents of the delivery are listed in the shipping documents. On receipt, check whether the consignment has been damaged in transit and ensure that it is complete.

Immediately report to us in writing any deviations from the shipping documents and/or damage in transit.




The gearbox is supplied assembled and ready for operation but without its oil filling. Additional equipment (e.g. piping, oil cooler, valves and fittings, and monitoring instruments) may be delivered packed separately.


5.3 In-house transportation

The gearbox must be transported so that injuries to personnel and damage to the gearbox are avoided.

Transportation of the gear unit depends on the local conditions at the place of use.

When transporting on pallets using a forklift truck, pay particular attention to the load-bearing capacity of the forklift truck. For safe transportation, ensure the load is balanced on the forks.

	NOTICE
	<p>When transporting using a crane, always use the lashing points provided on the gearbox housing.</p> <p>These are marked on the gearbox with the corresponding symbol.</p>
	<p>The gearbox must be transported only with load-handling equipment and lifting gear according to EU directive 2006/42/EC.</p>
	<p>For the gearbox weight, refer to the technical data sheet in the appendix or the gearbox type plate.</p> <p>To ensure safe transportation, observe the centre of gravity (which may be off-centre) and gearbox dimensions. See the dimensional drawing in the appendix to these operating instructions.</p>

	NOTICE
	<p>When lashing the load, ensure that the lifting gear has adequate load-bearing capacity.</p>
	<p>Do not exceed the load-bearing capacity of the lifting gear being used.</p>
	<p>If load lashing uses several ropes, only 2 of these should be assumed to be load-bearing.</p>
	<p>In the case of ropes, chains and lifting slings, do not exceed an angle of inclination of $\beta=60^\circ$.</p>



Wrong –

The angle of inclination is $>60^\circ$



Correct –

The angle of inclination is $<60^\circ$

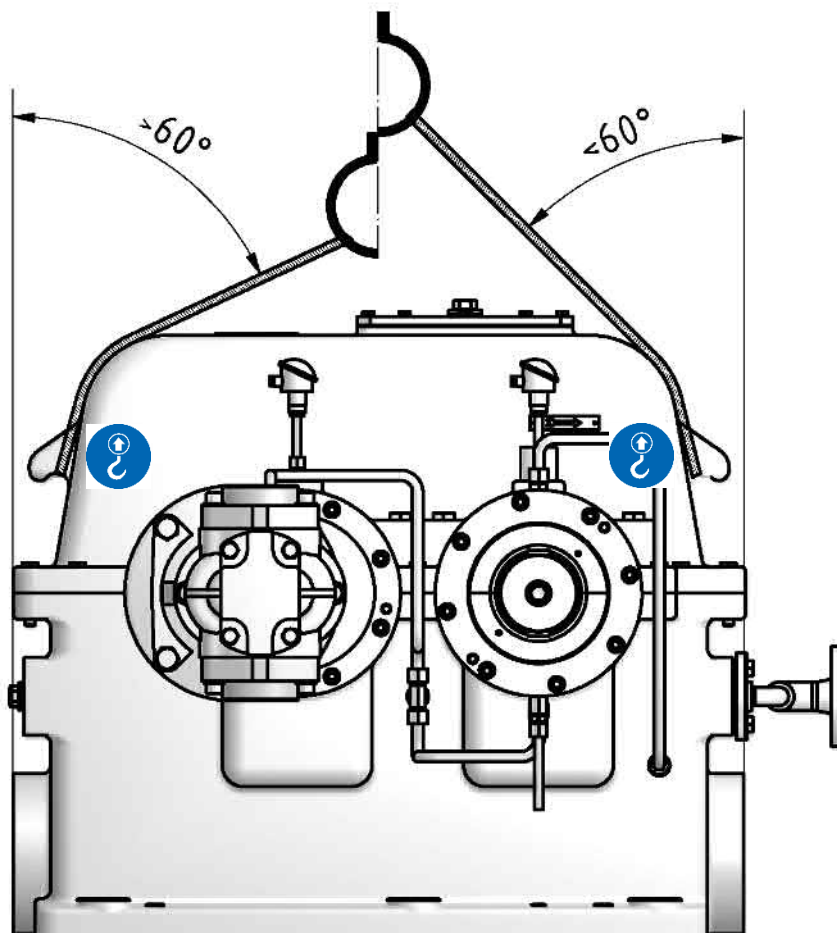






Figure 5-1

	TAKE CARE
	Risk of damage Risk of damage to gearbox from shocks/impact! Avoid exposing the gearbox to shocks when setting it down. This could damage component parts or bearings.
	Risk of damage to attached piping and/or instruments! When transporting the gearbox, take care not to damage the attached instruments and piping.
	Environmental damage The gearbox should not be transported when filled with oil.

6 Storage conditions

6.1 Safety

	 DANGER
	<p>Danger to life from tipping/falling gearbox!</p> <p>Risk of fatal injury from being struck or crushed by a tipping/falling gearbox! Risk of amputation injuries if persons become trapped between obstacles and the load.</p> <p>Do not stack gearboxes on top of one another.</p>

	NOTICE
	<p>Pay attention to the safety instructions in section 2: Safety</p>

6.2 Condition as delivered


Where possible, a test run is performed at our facilities before delivering the gearbox. This involves the use of running-in/corrosion protection oil.


The gearbox is supplied ready for operation:

Condition as delivered:

- Without oil filling (for safety reasons during transportation)
- Grease lubrication points are filled with grease (if applicable/check before commissioning)
- Shaft ends and hollow shaft holes are coated with anti-corrosion protection
- This outer coating is resistant to weak acids and alkalis, oils and solvents, and the effects of weathering. The coating is also resistant to seawater and tropical conditions, and thermally stable up to 120 °C (briefly up to 140 °C).

6.3 Gearbox storage

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to gearbox from vibration at storage location!</p> <p>Do not expose the gearbox to vibrations during storage.</p> <p>If this is not possible, all shafts should be occasionally (monthly) rotated in order to avoid marks due to shutdown. This procedure depends on the gearbox structure and the circumstances at the place of use.</p> <p>For gearboxes with labyrinth seals on the exposed shaft exits, close the gap to the housing immediately so it is air-tight.</p> <p><i>(Contact Pekrun for details.)</i></p>

	TAKE CARE
	Risk of damage
	<p>Risk of damage to gearbox from corrosion!</p> <p>Do not open the packaging at any time. This will reduce the durability of the gearbox anti-corrosion protection.</p> <p>The corrosion protection applied must be maintained during storage. To avoid a risk of corrosion, this protective coat must not be damaged.</p> <ul style="list-style-type: none"> – Take care to ensure that the coating is not damaged. Damage to the coating leads to corrosion and causes the external protection to fail. – The gearbox must remain sealed airtight during its storage period. This makes long periods of storage possible with internal anti-corrosion protection using a VCI concentrate without loss of this protection. – During longer periods of temporary storage, check the internal/external anti-corrosion protection and refresh it as necessary. (See section 6.4, “Anti-corrosion protection”.)

Store the gearbox level on a dry, soft substructure (e.g. wood). Use a suitable cover to protect the gearbox.

Do not stack gearboxes on top of one another.

When storing outdoors, take particular care to cover the gearbox well. When doing this, make sure that it is not possible for damp or foreign materials to settle on the gearbox. *(Seek advice from Pekrun.)*

The temperature in the immediate vicinity of the gearbox must not drop below 0 °C and must not exceed 20 °C. Consult Pekrun if this temperature range cannot be maintained due to the environmental circumstances on site.

6.4 Anti-corrosion protection


Gearboxes require special *internal anti-corrosion protection* when stored for prolonged periods or for export, including intermediate storage. In extreme conditions, it is not sufficient to *only apply external anti-corrosion protection* to especially corrosion-sensitive, unpainted outer areas such as shaft stubs, flanges or similar parts.


As a rule, internal anti-corrosion protection is provided for the gearbox as a result of the running-in or corrosion protection oil applied during the test run. A VCI concentrate is added to this oil.

The corrosion protection is provided by the inhibitor's vapour phase. This type of internal anti-corrosion protection offers the major advantage that, during the test run, oil can access and take effect in hard-to-reach cavities or otherwise inaccessible parts of the gearbox.


The high proportion of VCI concentrate in the remaining residual oil together with airtight packaging before shipping means that corrosion protection is ensured during normal freight conditions and typical haulage/storage periods. No cleaning/flushing is normally required before commissioning. (See also **section 6.4.1**.)


In special cases, where the main components are not completely enclosed by the housing – and therefore making airtight packaging inadvisable or impossible – a shorter period of storage applies (see **table 6-1**). If a longer period of storage is in fact required here, this must be specified in the delivery agreement and a solution found to the problem. *(Consult Pekrun for details.)*

	<div style="background-color: yellow; padding: 5px;">⚠ CAUTION</div> <p>The handling of corrosion inhibitors is subject to the provisions of the German Ordinance on Hazardous Substances, EU Regulation 1907/2006, and EU Directives 2010/75/EU and 89/656/EEC.</p> <ul style="list-style-type: none"> – Wear suitable PPE (safety goggles, protective gloves, respiratory protection) while working with anticorrosion agents. – Have experienced specialists carry out anticorrosion application work. – Clean up any oil spills that occur immediately (e.g. with oil binder).
---	--

	<div style="background-color: #cccccc; padding: 5px;">NOTICE</div> <p>If you have any questions about anticorrosion protection, contact us at the Customer Service address given in section 1.6 of these operating instructions.</p>
---	--

6.4.1 Internal anti-corrosion protection with VCI concentrate

	<div style="background-color: orange; padding: 5px;">⚠ WARNING</div> <p>Risk of injury, environmental hazard</p> <p>Risk of injury from escaping vapours</p> <p>Highly flammable vapours can escape when opening a gearbox protected with a corrosion inhibitor (VCI).</p> <ul style="list-style-type: none"> – Keep hot objects, open flames, fire and sparks away from the gearbox.
---	---

	<div style="background-color: #003366; color: white; padding: 5px;">TAKE CARE</div> <p>Risk of damage</p> <p>Risk of damage to gearbox from unsuitable lubricating oil!</p> <p>Avoid incompatibilities with the lubricating oil used later on:</p> <p>Use only mineral oils and oils based on PAOs or esters. This typically avoids any need for flushing before commissioning. (See section 6.6.)</p> <p>When using a polyglycol-based gear oil (if approved):</p> <p>The corrosion protection oil cannot be mixed with the lubricating oil!</p> <ul style="list-style-type: none"> – Drain off all of the corrosion protection oil. – Flush the gearbox thoroughly with the lubricating oil to be used later. (See section 6.6.) – Fill with the lubricating oil (see section 8) <p><i>(Contact Pekrun for details.)</i></p>
---	--

A test run is performed at our facilities before delivering the gearbox.


Unless otherwise agreed, this involves the use of a running-in/corrosion protection oil

ISO VG 220 or ISO VG 320 with a VCI concentrate additive.


For details of the durability of this anti-corrosion protection and storage periods, see **section 6.5**.

To extend the durability of the internal anti-corrosion protection, proceed as follows:

- The oil remaining in the gearbox does not need to be drained.
- Check the gearbox temperature: it should be ≥ 5 °C.
- Working outside the gearbox, mix the VCI concentrate with gear oil (later lubricating oil) at the recommended ratio. (As specified by the manufacturer.)

	NOTICE
	<p>Follow the manufacturer's usage instructions (see current data sheet) For a Pekrun recommendation for the correct concentrate selection, see the lubricant table enclosed with these operating instructions. (See section 8.4.)</p> <p>Depending on the manufacturer, the VCI concentrate can (but does not have to) be used mixed with gear oil (ideally, the later lubricating oil).</p> <p>For the mixing ratio, please see the data sheet for the VCI concentrate.</p> <p>You can use the gearbox dimensions (LxWxH) to achieve an approximation of the unit's available inner volume.</p>

- Clean the area around the oil filler neck, inspection cover, aeration filter and all other openings that will be used for filling.
- Ideally, you should open the gearbox at multiple places spread over the unit (e.g. at the oil filler neck, aeration filter, inspection cover).
- Check the interior of the gearbox for signs of moisture and corrosion. If signs of moisture can be identified, resolve the problem and ensure you discover the cause. Initial signs of corrosion must be removed before any corrosion inhibitor is re-applied. (*Consult Pekrun for details.*)
- Fill the VCI concentrate or the VCI concentrate/gear oil mixture at various points on the gearbox to achieve an even distribution throughout the interior.
- Close the oil filler neck and all other openings present and seal them off.
- Replace all aeration filters with screw plugs. (Store the original components safely for future use.)
- Seal off all air gaps (e.g. in labyrinth seals) with suitable materials (e.g. adhesive tape).

	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from corrosion!
	<p>Since corrosion protection is based on the agent in its vapour phase, it can only become fully effective when the gearbox is sealed airtight.</p> <p>The period of time between opening the gearbox and then sealing it airtight again should not exceed 1 hour.</p>


This has now extended the durability of the internal anti-corrosion protection in the gearbox.

This can be up to 24 months. (See **section 6.5**, “Storage periods”.)

This process can be repeated as often as required.

Before commissioning, the following points must also be observed:

- Install the aeration filters removed before adding the anti-corrosion protection at the required locations. (See cross-sectional/section drawing.)

	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from unsuitable lubricating oil!
	<p>Do not use the corrosion protection oil as a lubricating oil in the following circumstances:</p> <ul style="list-style-type: none"> – If the proportion of VCI concentrate in the oil is higher than 5% – If pumps, filters or electronic equipment is/are being used (<i>Check first with the component manufacturer.</i>) – If polyglycol-based lubricating oils are being used <p>In this case, the gearbox must be flushed before commissioning. (See section 6.6.)</p>

6.4.2 External anti-corrosion protection

If additional packaging work is not required or planned, apply external anti-corrosion protection to the gearbox as follows:

Unpainted external surfaces:

- Coat surfaces such as gearbox stub shafts, flange surfaces, shaft ends, etc. with a scuff-resistant wax coat, e.g. Tectyl 846, Tectyl 502 C or similar (for indoor storage, a soft film of corrosion inhibitor is sufficient).

If outdoor packaging is needed but was not planned or for longer storage periods, also complete the following steps:

- Also seal the gearbox from the outside (exposed shaft exits, oil ports, venting filters, and so on).


We also recommend the following precautions:

- Apply internal anti-corrosion protection with a VCI concentrate. (See **section 6.4.1.**)

6.5 Storage periods

6.5.1 Without additional packaging

Storage periods apply for outdoor storage and for roofed storage without additional packaging.

NOTICE	
	Measures to ensure safe storage:
	Gearbox interior not sealed so it is airtight:
	During storage, gearbox vents and other openings/ports should always be covered to prevent the ingress of water into the gearbox interior due to weathering (rain, etc.).
	Gearbox interior sealed so it is airtight:
	– Seal off all openings on the gearbox. (This includes labyrinth seals at exposed shaft exits.)
	– Replace all air filters with threaded sealing plugs or tape these carefully to seal them. (The air filter must be put back into place before commissioning.)

Standard internal anti-corrosion protection with VCI concentrate

Table 6-1


Gearbox sealing	Time of anti-corrosion protection application	Storage period Indoors	Storage period Outdoors
Gearbox interior not sealed so it is airtight :	Delivery to commissioning:	4 months	2 months
Gearbox interior sealed so it is airtight :	Delivery to commissioning:	24 months	12 months
	Delivery to re-application:	20 months	8 months
	Re-application to re-application:	20 months	8 months
	Re-application to commissioning:	24 months	12 months

The storage period can be extended by the re-application of the VCI concentrate. (See **section 6.4.1.**)

6.5.2 With additional packaging

If storage periods longer than those given in the table are required, then the following kinds of measures should be taken:


- Seal off the gearbox with internal anti-corrosion protection at shaft grommets and other openings, so it is water vapour-tight.


	NOTICE
	Sealing off the gearbox is meant to imply that all shaft grommets and all other openings are sealed so they are tight against water vapour.

- Apply a sufficient quantity of desiccant (ideally with an indicator) outside the gearbox and then shrink-wrap the gearbox in a water vapour-tight film.


or

- Pack the gearbox with internal anti-corrosion protection as if for export (without desiccant).

	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from incorrect storage
	If packaging is hermetically sealed, temperature fluctuations will cause condensation to form. This presents a risk of rust formation.
	<ul style="list-style-type: none"> - Apply a desiccant inside the packaging space.
	Desiccants should be used to keep the relative humidity as low as possible. Indicators or moisture sensors used with desiccants can provide information about climatic conditions/moisture levels inside the packaging.
	For longer storage periods, suitable anti-corrosion protection and additional packaging is to be provided for unpainted parts as appropriate for the total storage period.
	Risk of damage to gearbox from excessively long storage periods!
	Long-term storage is also associated with other factors such as material deformation and similar kinds of outward changes. These can affect the total storage period possible. Appropriate measures should therefore be taken.
	<i>(Contact Pekrun for details.)</i>

	NOTICE
	Anti-corrosion protection and packaging work goes hand in hand. Sealing work should therefore also be seen as part of packaging activities.
	Consult with specialist firms or the Seaworthy Packaging Office in Hamburg (Germany), for example, about which additional packaging measures and packaging materials are suitable.


6.6 Flushing before commissioning

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to gearbox from unsuitable lubricating oil!</p> <p>Do not use the corrosion protection oil as a lubricating oil in the following circumstances:</p> <ul style="list-style-type: none"> – If the proportion of VCI concentrate in the oil is higher than 5% – If pumps, filters or electronic equipment is/are being used (<i>Check first with the manufacturer.</i>) – If polyglycol-based lubricating oils are being used <p>In this case, the gearbox must be flushed before commissioning.</p> <p>The oil grade used for normal operation is used here. For the correct choice of oil, see section 8.4 in these operating instructions.</p>


Before commissioning (as described in **section 8**), the gearbox must be flushed with oil to remove residues of the corrosion inhibitor. These could cause the formation of oil foam.

Proceed as follows:

- Fill the gear oil (75–100% of the normal oil quantity) into the gearbox via the inspection cover openings or oil feed inlet points.
- Clean up any oil spills with an oil binder.
- a) For gearboxes with splash lubrication or a directly attached oil pump:
Flush the gearbox by rotating the gearbox or operating it briefly
Duration of flush procedure: 15...30 minutes
- b) For gearboxes with oil lubrication recirculated by an oil pump:
Flush the gearbox by operating the oil pump
Duration of flush procedure: 1 hour (approx.)
- Drain the oil carefully from the gearbox **as soon as possible after the flush procedure.**


	NOTICE
	<p>Check to ensure complete drainage of the housing bottom part and all housing interiors, and the devices in the oil supply system (if present).</p>

- For commissioning, fill in **fresh, new** oil of the same grade and the same brand that was used for flushing the gearbox.
- Continue by completing the commissioning steps in **section 8**.


	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to gearbox from unsuitable lubricating oil!</p> <ul style="list-style-type: none"> – Use only unused oils that are free from all impurities. Use a filling filter when filling. (Filter grade max. 25 µm.) – Do not fill oil directly out of drums into the gearbox. Ensure that the proportion of water in the oil is not too high. This can lead to the oil foaming during operation. <p>Normal value for fresh oil: <250 ppm H₂O.</p> <p><i>In case of doubt, check with oil manufacturer/Pekrun.</i></p> <p>Risk of damage to gearbox from dirt in oil!</p> <p>Always use oil that meets the purity class recommended by Pekrun as a minimum requirement. (See section 8.4.)</p> <p>Do not re-use flushing oil as normal lubricating oil!</p>

7 Set-up conditions

7.1 Safety

	NOTICE
	Pay attention to the safety instructions in section 2: Safety

7.2 Installation plan


	NOTICE
	During setup, take into account the enclosed order-specific dimensional drawing, and the piping and hydraulic diagrams or junction box layout (if present and/or applicable).

7.3 Total space requirements


Ensure that there is enough space around the gearbox for assembly, and for carrying out future maintenance and cleaning work.

Ensure that the oil can be drained and that there is an adequate supply of air.

Keep all inspection windows easily accessible, to enable the inspection of internal parts.

	NOTICE
	If connecting pipes for an oil supply system are part of the Pekrun scope of supply, consult the piping plan included in these operating instructions.

7.4 Dimensions and weights

	NOTICE
	For information about weights and other technical data, refer to section 3 (or the order-specific technical data sheet as well as the enclosed dimensional drawing). (in the appendix)

7.5 Foundations and floor

Ensure that the set-up area is horizontal and level.

We recommend basing the maximum deviation of the flatness/evenness of the base plate (gearbox supporting surface) on tolerance class IT 7 (DIN EN ISO 286-1). The maximum deviation must not exceed 0.1 mm per 1 m.

When tightening the fixing screws, avoid placing any strain on the gearbox.

Complete the foundations so that no resonance vibrations can be generated. The machine

manufacturer or end customer is responsible for the stability of the foundations.

Ensure neighbouring foundations cannot transmit any shocks or vibrations.

If the gearbox is mounted on a steel structure, this structure must be torsion-resistant. The structure must be rated for the corresponding forces acting on the gearbox.

Tighten fixing screws and nuts using the prescribed amount of tightening torque. Use bolts with a minimum strength class of 8.8 or the specified strength class. The specifications for anchor bolts are the responsibility of the machine manufacturer.

7.6 Ambient conditions

When setting up the gearbox out of doors, protect it from the damaging effects of weathering.

Always maintain the ambient conditions as set out in the service spec and delivery agreement. Talk to us if these conditions change (including individual parameters such as setup height or ambient temperature). We will check and confirm that the supplied gearbox (or gear unit) can meet these conditions.


We offer no warranties for a gearbox that is operated in ambient conditions other than those explicitly specified.

7.7 Supply connections




The following supply connections must be provided:




(If applicable/included in the Pekrun scope of supply.)


- *For the lubricating oil supply:* supply lines to an external oil supply unit and connecting lines to the gearbox
- *For the gearbox cooling:* lines to the coolant supply system and connecting lines to the water/oil cooler
- *For the energy supply to the switching cylinders:* hydraulic supply lines to an external hydraulic unit and connections to the switching cylinders
- *For the energy supply to the electrical components:* provisioning of the energy supply parameters as specified in the service spec/delivery agreement and connections to the same.
- *For an oil supply system:* all supply lines and connections in accordance with the enclosed piping, junction box layout and hydraulic plan.

	NOTICE Observe the special operating instructions, plans, drawings and layouts for the various components and assemblies. These are enclosed in the appendix to these operating instructions (if included in scope of supply).
---	--

7.8 Safety precautions to be taken by the customer

 	 DANGER
	<p>Danger to life, risk of crush/shear injuries!</p> <p>Risk of serious injury from suspended loads!</p> <p>During transportation and loading/unloading of the gearbox, the gearbox may slip, fall or drop from a height onto personnel because loads have been lashed incorrectly or incorrect load handling gear has been used. There is a risk of injury to limbs due to crush and shear injuries if users are trapped between obstacles and the load.</p> <p>Comply with the following protective measures:</p> <ul style="list-style-type: none"> – Inform all personnel entrusted with the transportation and setup of the gearbox about the existing residual risks, and especially about the selection of suitable load-handling equipment and proper load lashing. – Avoid any endangerment to personnel: <ul style="list-style-type: none"> Take care to ensure that personnel do not become trapped between obstacles and the load. Keep to safety clearance distances. Wear PPE. Transport the gearbox slowly and carefully, and especially when in a raised position. – Ensure the gearbox load is lashed safely and correctly: <ul style="list-style-type: none"> Do not exceed the load limits of the lifting gear Distribute the load evenly when using multiple slings for load lashing (take care: centre of gravity may be off-centre) Follow instructions about load distribution on the packaging or dimensional drawing. – Always commission properly trained personnel with the transportation and loading/unloading of the gearbox: <ul style="list-style-type: none"> Keep the speed of travel as low as possible. Avoid rapid changes between moving and stopping the load, and the oscillations that this causes.


 	 DANGER
	<p>Danger to life from rotating and/or moving parts</p> <p>Risk of injury from being trapped and pulled in by rotating and/or moving parts!</p> <ul style="list-style-type: none"> – Secure all rotating drive parts such as couplings, gears/sprockets or belt drives so they cannot be touched. – All external moving parts such as switching cylinders must be shielded so they cannot be touched. – Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

	WARNING
	<p>Risk of burn injury from touching the gearbox!</p> <p>This may cause serious burn injuries.</p> <p>During operation and for a period of time after standstill, serious burn injuries can be caused by touching hot surfaces (>55 °C).</p> <ul style="list-style-type: none"> – Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.) – Let the gearbox cool down to a safe temperature before you touch it. – Wear suitable protective gloves and protective clothing.

7.9 Local requirements for the delivery

For transportation, provide a crane of adequate size with adequate load-handling equipment.

Have suitably-qualified personnel carry out the transportation work.

	NOTICE
	<p>Follow the instructions given in section 5: Delivery, in-house transport.</p>

8 Assembly and installation, initial commissioning



8.1 Safety



All work must be carried out with the greatest of care and attention to **safety!**

	NOTICE
	Pay attention to the safety instructions in section 2: Safety


	<div data-bbox="437 651 1471 701">WARNING</div> <p>Risk of injury during assembly, installation and initial commissioning</p> <p>There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers).</p> <p>Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts during assembly work.</p> <p>Personnel may slip or fall as a result of leaking oil or existing spills of oil.</p> <ul style="list-style-type: none"> – Clean up any oil spills or oil leaks with an oil binder. – Wear PPE. – Have assembly, installation and commissioning work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with assembly, installation and commissioning work about the existing residual risks (see section 2, “Safety”) <p>Keep to safety clearance distances!</p>
--	--

	<div data-bbox="437 1330 1471 1379">WARNING</div> <p>Risk of injury, environmental hazard</p> <p>Risk of injury from escaping vapours</p> <p>Highly flammable vapours can escape when opening a gearbox protected with a corrosion inhibitor (VCI).</p> <ul style="list-style-type: none"> – Keep hot objects, open flames, fire and sparks away from the gearbox.
--	--

	 CAUTION
	<p>Risk of injury from toxic vapours or fluids!</p> <p>When filling oil, there is a risk of injury from breathing in and/or coming into contact with lubricants or other process media.</p> <p>When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.</p> <p>When working on parts filled with oil, such as piping and the interior of the gearbox, skin can be exposed to contact with aggressive media.</p> <ul style="list-style-type: none"> – Observe the safety data sheet for the media being used. Wear suitable personal protective equipment (safety goggles, protective gloves) for oil-changing work. – Have suitably-qualified personnel carry out the work. – Clean up any oil spills that occur immediately (e.g. with oil binder).


	 CAUTION
	<p>Risk of injury from hazardous vapours or fluids!</p> <p>When removing external anti-corrosion protection, there is a risk of injury from breathing in and/or coming into contact with hazardous substances.</p> <p>The handling of solvents is subject to the provisions of the German Ordinance on Hazardous Substances, EU Regulation 1907/2006, and EU Directives 2010/75/EU and 89/656/EEC.</p> <ul style="list-style-type: none"> – Wear suitable PPE (safety goggles, protective gloves, respiratory protection) while working with solvents. – Have suitably-qualified personnel carry out the work. – Clean up any oil spills that occur immediately (e.g. with oil binder).

8.2 Assembly and installation


	NOTICE
	<p>At the start of assembly work, ensure enough load-handling equipment is available as well as lifting gear, etc. The load-bearing capacity of the load handling gear must at least match the weight of the gearbox.</p> <p>For information about transportation, please refer to section 5.</p>

Assembly must be carried out with the greatest of care and by skilled personnel.


1. Remove any packaging materials present (such as adhesive tape and protective caps) before installing the gearbox.
2. Remove the external anti-corrosion protection with a suitable solvent.

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to shaft ends when removing anti-corrosion protection!</p> <p>Never remove the anti-corrosion protection by sanding it off.</p> <p>Sanding off will irreparably damage the surface of the shaft ends, which can lead to connection problems in the overall machine.</p>


3. After prolonged storage of the gearbox before commissioning, remove the inspection covers and seals by undoing the fixing screws, and store these in a safe place for subsequent re-use.
4. Perform a visual inspection of the internal parts for corrosion.


	TAKE CARE
	<p>Risk of damage</p> <p>If corrosion damage is present, contact Pekrun at the Customer Service address (see section 1.6 in these operating instructions).</p> <p>To avoid further damage, do not operate the gearbox.</p>

5. Seal the inspection holes again with the available covers, seals and plugs. The seal surfaces must be clean and undamaged.
6. Remove the internal anti-corrosion protection (if present).

	NOTICE
	<p>In general, internal anti-corrosion protection is provided by the use of a corrosion protection oil with VCI concentrate during the test run at our factory.</p> <p>No cleaning/flushing is normally required before commissioning. (See section 6.4.1.)</p> <p>Check whether the gearbox must be flushed before commissioning:</p> <ul style="list-style-type: none"> – Which corrosion inhibitor was used? – Are residues of this corrosion inhibitor present inside the gearbox? <p>Also read and follow section 6.6.</p> <p><i>In case of doubt, please contact Pekrun.</i> (See section 1.6 for Customer Service address.)</p>

8.2.1 Setting up the gearbox


	NOTICE
	<p>Set up the gearbox on a foundation that is as level, safe and inelastic as possible.</p> <p>We recommend basing the maximum deviation of the flatness/evenness of the base plate (gearbox supporting surface) on tolerance class IT 7 (DIN EN ISO 286-1). The maximum deviation must not exceed 0.1 mm per 1 m. This prevents deformation in the shaft train.</p> <p>For secure mounting, ensure that bolts are only used if their number and size corresponds to the screw holes specified on the dimensional drawing.</p> <p>Observe the set-up conditions as set out in section 7.</p>

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage from inaccurate levelling work!</p> <p>Incorrect levelling can cause the following problems with the gearbox:</p> <ul style="list-style-type: none"> – Jamming of the bearings – Inadequate tooth flank contact – Reduced lifetime – High levels of vibration <p>Ensure that all the shafts on the gearbox and the working machine are exactly flush with one another under operating conditions.</p> <p>Even if elastic couplings are used, levelling and alignment is still necessary.</p> <p>With rigid gearbox mounting, mounting flanges must conform to true running and axial runout accuracy according to DIN SPEC 42955.</p> <p>Drive and output sides should be levelled to correct alignment problems, although transmission parts may be able to compensate to an extent.</p>

Proceed as follows:

- Before setting up the gearbox, clean the seating surfaces on the gearbox and on the foundation.
- Use metal shims to compensate for any unevenness of the foundation, so as to ensure that warping of the housing is not possible in any circumstances.
- After levelling the gearbox, fit the pins specified on the dimensional drawing.
- If necessary, fit side stops to prevent the gearbox from shifting about.


8.2.2 Assembling couplings and other accessories

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to the gearbox from shocks and impacts!</p> <p>Driving fixings on with heavy blows or impacts must be avoided: this would have the effect of damaging bearings, retaining rings, etc.</p> <ul style="list-style-type: none"> – When fitting couplings, washers, gearwheels, sprockets or similar, pull these on using the threaded centring at the shaft ends. – In the case of other types of fixings, comply with procedures agreed during ordering, e.g. joining together by heating the coupling, for example.

Coupling:

Clean the shaft ends and coupling components carefully before starting assembly.

Secure couplings so they cannot shift about axially.


	NOTICE
	<p>When assembling couplings, always follow the specific operating instructions from the manufacturer.</p>

Gearbox with hollow shaft design:

For *gearboxes with hollow shafts*, conditions for joining are the same as for the installation of couplings.

Drive unit or drive motor alignment:

Align the *drive unit* as accurately as possible along the centre line of the input shaft of the gearbox and then secure in place. The lifetime of the shafts, bearings and couplings depends on the accuracy of alignment between the shafts.


	NOTICE
	The maximum values allowed during alignment for axial, radial and angular displacement depend on the coupling dimensions, coupling type and the speed. These are given in the coupling manufacturer's operating instructions.
	For motor assembly, always follow the specific operating instructions from the manufacturer.
	If permissible lateral forces are shown on the dimensional drawing, forces must remain within these permissible limits.

8.2.3 Installing piping

For gearboxes designed for use with an external oil supply system, any piping removed earlier must be attached using the enclosed piping plan.

Proceed as follows:

- Remove all the plugs and blind flanges. (if present)
- Check the inside of the piping for cleanliness. If necessary, clean this thoroughly before assembly.
- Fit the piping in accordance with the enclosed piping plan.
- When setting up the gearbox, the flange bolts must be tightened with the appropriate torque.
- Use rubber expansion joints to compensate for minimal alignment errors in oil lines.
- **Piping must not be subjected to tension during installation.**
- If necessary, support piping using appropriate pipe supports.

	TAKE CARE
	Risk of damage
	Risk of damage from soiling present in piping.
	Bearings and gearing can become damaged as a result of dirt in piping. Acid clean all piping thoroughly that was modified by welding work on the construction site. Ensure that no dirt enters the gearbox when assembling the connection piping.




8.2.4 Final checklist

Proceed as follows:

- After setting up the gearbox, check that all threaded connections are firmly seated.
- Ensure that the alignment has not been disturbed by tightening the fasteners.
- Use the device list and drawings to check that all instruments removed for transportation have been fitted again.
- Check to confirm the correct and safe installation of external supply lines (e.g. hydraulic lines to the switching cylinder/water supply lines to the cooler/connecting lines to an oil supply system) (as applicable). (To be provided by operator.)
- Check the installation of all monitoring equipment. (Interlocks – if present.)
- Check that machine guards are correctly fitted and firmly seated.

8.3 Initial commissioning

8.3.1 Measures before initial commissioning


	<p>TAKE CARE</p> <p>Risk of damage to property/environment!</p> <p>Risk of damage from leaks of oil!</p> <p>In the case of non-standard installation positions where the oil filler neck is above the inspection opening, the cover and plug can be sealed with a single sealant.</p> <p>In this case, however, do not remove the inspection cover until the oil level has sunk below the inspection opening – otherwise oil will leak out.</p> <p>Each time the inspection cover is removed, it must be sealed with a new sealant. (This is not necessary when seals or O-rings are used.)</p>
	<p>Risk of damage</p> <p>Risk of damage to gearbox from unsuitable lubricating oil!</p> <p>For the oil viscosity, refer to the type plate or the enclosed dimensional drawing. A lubrication table is enclosed with these operating instructions, providing Pekrun's recommendations for the correct lubricant (see also section 8.4).</p> <ul style="list-style-type: none"> – Only use lubricants of proven equivalence for the lubrication of the gearboxes. – Use only unused oils that are free from all impurities. – Do not fill oil directly out of drums into the gearbox. – Ensure that the proportion of water in the oil is not too high. This can lead to the oil foaming during operation. <p>Normal value for fresh oil: <250 ppm H₂O.</p> <p><i>In case of doubt, check with oil manufacturer/Pekrun.</i></p> <p>Risk of damage to gearbox from dirt in oil!</p> <p>Always use oil that meets the purity class recommended by Pekrun as a minimum requirement. (See section 8.4.)</p> <p>Ensure that no dirt enters the gearbox when filling or when assembling the connection piping.</p> <p>Use a filling filter when filling. (Filter grade max. 25 µm.)</p>
	<p>Risk of damage</p> <p>Risk of damage to the gearbox from internal overpressure!</p> <p>If the gearbox is operated without a aeration filter fitted, this can lead to damage on the shaft sealing rings.</p> <p>Ensure the aeration filter is fitted correctly during commissioning.</p> <p>Also follow the supplied dimensional drawing.</p>


Proceed as follows:


1. Unscrew the oil drain plug or open the oil drain valve to drain residues of the running-in oil from the gearbox into a suitable vessel. Dispose of this used oil. (If applicable.)
2. Clean up any oil spills with an oil binder. Comply with applicable legal requirements regarding disposal.

For gearboxes with splash lubrication/integrated oil supply system:

3. a)
 - Undo and remove the aeration filter or drain plug on the oil feed inlet or the inspection cover opening (as applicable).
 - Lay the screws, cover and seals, etc. to one side in a safe place for re-use later.
 - Fill the gearbox with oil in accordance with the specified viscosity either through the inspection opening or oil filling holes on the gearbox and on the piping. When doing so, follow the details provided on the order-specific dimensional drawing (if applicable)

	NOTICE
	<p><i>If oil dipstick fitted:</i> The attached oil dipstick has 2 markings – the oil level must be between these at all times. Fill oil up to the upper marking.</p> <p><i>If oil sight glass or sight glass fitted:</i> Fill oil up to the middle of the sight glass.</p> <p>Wait awhile when filling the oil: the oil should have enough time to distribute itself evenly and the final oil level can then be read off.</p> <p>Take time to ensure that oil is distributed evenly – especially in the case of multi-stage gearboxes having interconnected oil chambers – otherwise not enough oil will be filled.</p>

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to oil pump by running dry</p> <p>During initial commissioning as well as during re-commissioning following a prolonged standstill, damage to the equipment may be caused by dry running if the oil pump is above the oil level in the gearbox or lubricating oil is not being applied in sufficient quantities.</p> <p>Fill the pump with lubricating oil. Monitor the oil pressure.</p> <p>Also follow the supplied operating instructions for the oil pump.</p> <p>Also fill all oil feed inlets in the piping. (if present) (see dimensional drawing)</p>

	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from incorrect oil level!
	<p>The oil level (if applicable) must be checked via the oil level monitoring function.</p>
	<p><i>If oil dipstick fitted:</i> The oil level should reach at least the lower marking on the dipstick or the oil sight glass.</p>
	<p><i>If oil sight glass or sight glass fitted:</i> The oil level should be visible at least at the bottom edge of the oil sight glass.</p>
	<p>The oil quantity on the type plate, the dimensional drawing, the technical data or in other printed materials is offered as a guide value.</p>
	<p>The quantity of oil to be filled is always determined only by the oil level marking on the oil sight glass or oil dipstick, or the oil overflow opening on the gearbox.</p>
	<p>When using an auxiliary oil tank, use the oil sight glass or oil dipstick in the tank to gauge the oil quantity.</p>
	<p>Check the oil level from time to time when the gearbox is at a standstill and the oil has cooled down.</p>
	<p>Never allow the oil level to fall below the lower marking on the oil dipstick or the bottom edge of the oil sight glass.</p>


Or

For gearboxes connected to an external oil supply system:

3. b)


- Undo and remove the blind flanges and seals and/or remove the blanking plugs attached for shipping from the gearbox piping connections.
 - Fit the connection piping to the external oil supply system and, before commissioning, ensure that the existing external oil supply system to be used is fully functional, connected and operational. (if applicable)
4. Clean up any oil spills that are present with an oil binder.


8.3.2 Gearbox with attached backstop or flange-mounted oil pump

	NOTICE Observe the special operating instructions, plans, drawings and layouts for the various components and assemblies. These are enclosed with these operating instructions (if included in scope of supply).
---	--


For backstops and oil pumps connected in the installation space, lubrication is via the gearbox.


For backstops whose installation space is separate from the gearbox, fill oil to the middle of the oil sight glass before commissioning. Follow the manufacturer's specifications about lubrication.


	TAKE CARE Risk of damage Risk of damage to gearbox from unsuitable lubricating oil or incorrect oil level! The backstop is lubricated with oil according to manufacturer specifications. Check the oil level from time to time when the gearbox is at a standstill and the oil has cooled down. Never allow the level to fall below the lower marking.
---	---

	TAKE CARE Risk of damage Risk of irreparable damage to the gearbox or parts from incorrect direction of rotation! Only a single direction of rotation is possible for the backstop and flange-mounted oil pumps (except universal pumps) fixed to the gearbox. These can suffer irreparable damage if the direction of rotation is wrong. When setting up the gearbox, check that directions of rotation match up before connecting up the motor and the backstop or oil pump. For the direction of rotation, consult the technical data in section 3 , the direction of rotation arrow on the gearbox or the enclosed (and authoritative) dimensional drawing. If no direction of rotation is specified in the supplied technical documents, then the gearbox can be operated in both directions. The direction of rotation arrow on the gearbox input shaft must match the direction of rotation of the motor.
---	--

8.3.3 Gearbox with cooling coil/water-oil cooler


	NOTICE
	Observe the special operating instructions, plans, drawings and layouts for the various components and assemblies. These are enclosed in the appendix to these operating instructions (if included in scope of supply).

	NOTICE
	<p>For gearboxes with an integrated cooling coil and with oil coolers, the operator must prepare and provide the required water supply connections.</p> <p>Ideally, you should use soft water; also check the specification for the respective order.</p> <p>Water can flow through the cooling coils in either direction.</p>


	TAKE CARE
	<p>Risk of damage</p> <p>Risk of breakage from overpressure!</p> <p>Excessively high water pressure in the lines can cause damage to the water cooler.</p> <p>Water overpressure must not exceed 10 bar (or as otherwise specified in the order documents).</p>


Proceed as follows:

- Remove the connecting sleeves of the cooling coil prior to connecting the coil.
- Flush out possible impurities.
- Install a cooling water intake and drain line.

	NOTICE
	Refer to the enclosed dimensional drawing and the piping plan for the location of the connections.




- The shut-off valves for the coolant supply and drain must be opened fully for commissioning.


	NOTICE
	The direction of water flow for separately installed oil coolers must be matched to the information on the coolers.

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage from frozen cooling water!</p> <p>Cooling water must be drained if there is a risk of frost or in the event of a prolonged gearbox shutdown; residual water must be blown out with compressed air.</p>


8.3.4 Gearboxes with ventilation using a cooling vane

Cooling vanes and a protective hood are fixed permanently to the gearbox. The protective hood prevents accidental contact with the cooling vane and also serves to guide the cooling air along the surface of the gearbox.

 	 DANGER
	<p>Danger to life from rotating and/or moving parts</p> <p>Risk of injury from being trapped and pulled in by rotating parts!</p> <ul style="list-style-type: none"> – Secure all rotating drive parts such as cooling vanes so they cannot be touched. – Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to gearbox from overheating!</p> <p>Care must be taken during operation that both the air intake openings and the outlet openings are always clear; cooling may otherwise be impaired.</p>

8.3.5 Gearbox with oil heater

	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from lubricating oil that is too cold!
	<p>For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold (= oil cooling in the shutdown period to temperatures close to the pour point).</p> <p>Accordingly, the gear oil and, if applicable, the oil in the auxiliary tank, must be heated to approx. +10 °C before commissioning.</p> <p>Preferably, you should heat the oil with an electric heater.</p>

Oil heater with electric heating element:



To keep the oil filling at a certain temperature, monitor the heating temperature as follows:


- Contact thermometer


The heater is activated or deactivated by the “min. and max.” contacts via a relay.


or

- Resistance thermometer (Pt100)
- Thermostats
- Heaters with direct thermostatic control function

	 DANGER
	Danger to life when operated in a potentially explosive atmosphere!
	The standard version of the devices is not suitable for use in machines exposed to explosion hazards.
	For use in a potentially explosive atmosphere, conversion work will be required – please talk to the manufacturer.


	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from overheating of the heater!
	During operation, ensure that the heating element is covered completely with oil, since overheating may otherwise result.
	Preferably, limit the max. temperature with a thermostat or resistance/contact thermometer:
	Heater must shut down at >40 °C

	NOTICE
	All electrical devices are rated as at least IP54 according to DIN EN 60529:2000-09




	NOTICE
	The electrical wiring of the heater and temperature monitoring device must be completed according to the operating instructions for these instruments. These are enclosed in the appendix to these operating instructions (if included in scope of supply).



8.3.6 Gearbox with other add-on parts


Refer to the order-specific device list/data sheets for the technical data for the add-on parts.

	NOTICE
	<p>Wire up the control and instrumentation devices according to the instructions as provided by the device suppliers.</p> <p>Please refer to the suppliers' enclosed operating instructions for the operation and maintenance of these components.</p>

8.3.7 Gearbox with switching mechanism

 	 DANGER
	<p>Danger to life from rotating and/or moving parts</p> <p>Risk of injury from being trapped and pulled in by moving parts!</p> <ul style="list-style-type: none"> – All external moving parts such as switching cylinders must be shielded so they cannot be touched. Connecting lines must be routed safely and not placed inside the machine's danger zone or near rotating and/or moving components. – Attach an appropriate guard (e.g. a guard complying with DIN EN ISO 12100) or make sure that these areas remain inaccessible to personnel at all times. (In areas without foot access, for example.)

	 WARNING
	<p>Risk of eye injuries from escaping sprays of pressurised fluids!</p> <p>When operating a gearbox with hydraulically operated switching mechanism, leaks can occur at connection points, resulting in oil being sprayed out into the air.</p> <ul style="list-style-type: none"> - Wear appropriate protective clothing and eye protection.

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to gearbox by switching during operation!</p> <p>Switch gearbox gears only when it is at a standstill.</p> <p>Also ensure that the gearbox is de-energised. The input and output sides must be able to rotate freely.</p> <p>It must not be possible to actuate the switching cylinders unless the shafts are not rotating at all and there is no torque acting on the shafts.</p> <p>An interlock must therefore be used.</p> <p>Cylinder pressure must remain constant during the entire switching procedure until the target switching position is reached.</p> <p>If necessary, alter the position of the gear selectors using jog mode on the drive unit, so as to make it easier for the gear selectors to engage.</p> <p>The drive unit must not be released for normal operation until the gear has been fully engaged in its final position on the gearbox.</p>

To ensure continuous trouble-free and reliable switching, complete the following measures before commissioning:

For all switchable Pekrun gearboxes:


- Ensure that an interlock is provided that stops the gearbox from starting up during the switching procedure.

For Pekrun gearboxes with manual switching:

Gearboxes with manual switching have a switching lever that is secured with a locking knob.

For a switching operation, proceed as follows:

- Release the locking knob
- Move the switching lever to the new position
- Slide the locking knob back into the hole provided until it locks into place


	TAKE CARE
	Risk of damage
	Risk of damage to gearbox if excessive force is used during switching!
	<p>When the gearbox comes at a standstill, the teeth may be exactly opposite and no switching operation may be possible.</p> <p>Do not exert excessive force on the switching lever under any circumstances: this can cause damage both to the switching mechanism and to the gearing.</p> <p>Change the tooth positions by rotating the drive shaft by hand. This will make it easier to switch into the next gear.</p>

For Pekrun manual gearboxes with switching cylinders:

- Fit the required hydraulic/pneumatic lines to the switching cylinders, and ensure that these lines are laid securely and safely. (Responsibility of the operator.)

End stop monitoring for the switching cylinders is generally provided by contactless limit switches. If included in the scope of supply, these are fitted to the gearbox by Pekrun.

- Connect the limit switches to the electrical supply and integrate them with the control system.

	NOTICE
	<p>Wire up the control and instrumentation devices according to the instructions as provided by the device suppliers.</p> <p>Please refer to the suppliers' enclosed operating instructions for the operation and maintenance of these components.</p>

8.3.8 Advice for the starting phase of drive motors for gearboxes

	NOTICE

Always follow the specific operating instructions from the motor manufacturer.

Drive system using variable-speed motors:

	TAKE CARE

Risk of damage

Risk of damage to gearbox from uneven start-up or resonances!

A sudden increase in speed can result in steps being lost within the gearbox.

The speed control becomes involved in turn, with the result that entire frequency ranges can become critical (in terms of resonances). This can result in undesirable resonance effects from the system.

Accordingly, highly accurate adjustment of parameters – e.g. in the frequency inverter – to the process is needed.

Simultaneous drive system using 2 motors:

	TAKE CARE

Risk of damage

Risk of damage to gearbox from drive motors starting up asynchronously!

If a gearbox is being driven simultaneously by 2 or more motors, damage to the gearing can occur if the motors start up asynchronously.

Take appropriate precautions to ensure that drive motor start-up is synchronised.


8.3.9 First run for gearboxes with grease lubrication


Gearboxes are provided with grease lubrication for special operating conditions. The gearboxes are filled with grease at the acceptance test bench and are also delivered in this condition.

Commissioning such a gearbox can take place as soon as the grease filling has been confirmed by checking the filling level check bolt.

In special cases, the unit may also be supplied without a grease filling. In this case, the operator must complete the grease filling before the first run.


The drive unit can be started directly once all measures in section 8.3.1 have been completed and complied with (as applicable).

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to gearbox from unsuitable grease!</p> <p>The type of lubrication (oil or grease lubrication, splash or pressure lubrication), oil viscosity and oil volume are all determined early on at the design stage.</p> <p>If the gearbox is being used for a different use case, some modifications may be needed – e.g. changes in grease quality.</p> <p>Consult with the grease manufacturer or Pekrun if deviations from the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement) are seen during operation.</p> <p>The grease lubrication is intended to last for the gearbox's lifetime.</p> <p>Consult with the manufacturer before changing prior to this date</p>

	NOTICE
	<p>For important technical specifications, see the type plate, the dimensional drawing and the technical data sheet, which is prepared according to the order. (See appendix.)</p>


8.3.10 First run for gearboxes with splash lubrication


The drive unit can be started directly once all steps in section 8.3.1 have been completed and complied with.


TAKE CARE	
	Risk of damage
	Risk of damage to gearbox from lubricating oil that is too cold!
	Do not start the drive unit if the gearbox oil is too cold.
	For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold.
	The gear oil should normally have a minimum temperature of 10 °C (50 °F).
	Accordingly, the gear oil and, if applicable, the oil in the auxiliary tank, must be heated to approx. 10 °C (50 °F) before commissioning.
	For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).

8.3.11 First run for gearboxes with pressure lubrication

This applies both for gearboxes with an attached motor oil pump and for gearboxes that are connected to an external oil supply system (provided by the end customer).

	WARNING
	<p>Risk of eye injuries from pressurised fluids!</p> <p>When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.</p> <ul style="list-style-type: none"> – Follow the assembly instructions provided in section 8.2.3. – Wear appropriate protective clothing and eye protection.


	NOTICE
	<p>For required operating parameters (minimum lubricant pressure, required oil flow rate), please see section 3 of these operating instructions, the dimensional drawing or the order-specific technical data sheet (in the appendix).</p>


	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from lubricating oil that is too cold!
	<p>Do not start the drive unit if the gearbox oil is too cold.</p> <p>For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold.</p> <p>The gear oil must have a minimum temperature of 10 °C (50 °F).</p> <p>For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).</p>

Oil temperature ≥ 10 °C (50 °F)

Proceed as follows:



- Complete all steps from section 8.3.1 onwards.
 - Apply lubricating oil to the gearbox via the oil inlet connections from the external oil supply system.
- or*
- Start the motor oil pump. (Follow the operating instructions from the pump manufacturer in the appendix.)
- Check to confirm all necessary operating parameters are OK.
 - After a warm-up time of at least 10 minutes, then start the drive motor.


	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from inadequate lubrication!
	Do not start the drive unit until all specified operating parameters (lubricant pressure, oil feed quantity, oil temperature) are OK. This ensures an even supply of lubricant, especially during the start-up procedure.
	The minimum lubricant pressure, P min, is 0.5 bar. The pre-lubrication phase has the effect of safely supplying all the bearings and gearing with oil. For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the operating parameters agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).


	NOTICE
	For operation and maintenance of the pump, filters and monitoring instruments, follow the operating instructions listed in the order-specific appendix as provided.

8.3.12 First run for gearboxes with oil supply system


This applies to gearboxes with an oil supply system provided separately. If this oil supply system is also set up outdoors, this can expose it to extreme ambient temperatures.

	 WARNING
	<p>Risk of eye injuries from pressurised fluids!</p> <p>When operating a gearbox with pressure lubrication, leaks can occur at connection points, resulting in oil being sprayed out of the unit.</p> <ul style="list-style-type: none"> – Follow the assembly instructions provided in section 8.2.3. – Wear appropriate protective clothing and eye protection.

	NOTICE
	<p>For required operating parameters (minimum lubricant pressure, required oil flow rate), please see section 3 of these operating instructions, the dimensional drawing or the order-specific technical data sheet (in the appendix).</p>

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to gearbox from lubricating oil that is too cold!</p> <p>Do not start the drive unit if the gearbox oil is too cold.</p> <p>For the start-up procedure in particular, an even supply of lubrication will not be guaranteed if gear oil is too cold.</p> <p>The gear oil must have a minimum temperature of 15 °C (59 °F).</p> <p>For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the temperature ranges agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).</p>


– Oil temperature <5 °C (41 °F)

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to pump from lubricating oil that is too cold!</p> <p>Do not start the motor pump unit if the gear oil is too cold.</p> <p>The gear oil must have a minimum temperature of 5 °C (41 °F).</p> <p>At temperatures below 5 °C (<41 °F), ensure secondary heating equipment is in place before starting the oil pump: the pump cannot otherwise pump oil reliably in these temperature ranges and damage is therefore a possibility.</p> <p>An interlock must be provided that makes it impossible to switch on the oil pump until a temperature greater than 5 °C (>41 °F) has been reached.</p>

- Use secondary heating equipment (e.g. fan heaters) to ensure the uniform heating of the gearbox, parts used to feed oil and the oil reservoir tank (as needed).
- Check the oil temperatures at various places in the system.

Oil temperature $\geq 5\text{ }^{\circ}\text{C}$ (41 $^{\circ}\text{F}$) $< 15\text{ }^{\circ}\text{C}$ (59 $^{\circ}\text{F}$)


- Start the oil pump once the minimum temperature of $\geq 5\text{ }^{\circ}\text{C}$ ($\geq 41\text{ }^{\circ}\text{F}$) has been reached.
- Switch on the heater provided as described in section 8.3.5.

	NOTICE
	Oil circulation ensures heating is uniform.


Oil temperature $\geq 15\text{ }^{\circ}\text{C}$ (59 $^{\circ}\text{F}$)

Proceed as follows:

- First start the oil pump and let it run for at least 30 minutes before you start the drive motor.
- Check to confirm all necessary operating parameters are OK.
- After this, you can start the drive unit.

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to gearbox from inadequate lubrication!</p> <p>Do not start the drive unit until all specified operating parameters (lubricant pressure, oil feed quantity, oil temperature) are OK. This ensures an even supply of lubricant, especially during the start-up procedure.</p> <p>The minimum lubricant pressure, P min, is 0.5 bar.</p> <p>The pre-lubrication phase has the effect of safely supplying all the bearings and gearing with oil.</p> <p>For other use cases, some adjustments may need to be made – such as changing the oil viscosity. Operation must take place within the operating parameters agreed between the ordering party and Pekrun (as agreed in the service spec/delivery agreement).</p>

8.3.13 Measures after the first run

TAKE CARE	
	Risk of damage
	Risk of damage to the gearbox! Shut down the gearbox immediately if the bearing temperature rises above the permitted limit value and you notice excessive vibrations or abnormal noises – this will avoid any damage to the gearbox. During the first 12 h of operation under load, we recommend checking bearing temperatures once an hour. Bearing temperatures when idle should not exceed 75 °C and should not exceed 85 °C under load (or as otherwise specified in the service spec/delivery agreement).

In the start-up phase, the gearbox should ideally be run for 12 hours but **not** at full load. If this run produces no faults, the load can then be increased to full load. Continuous monitoring of the gearbox is required at all times.

Proceed as follows:

- 1. During the first 6 hours: 50% of load**
- 2. During next 6 to 12 hours: 75% of load**

After the first gearbox run of approx. 12 operating hours, perform some initial visual inspections:

- Check the oil level. (if applicable)
- Check the gearbox and the oil supply system (if present) for leak-tightness.
- Check all supply lines (hydraulics and water) and connections for leak-tightness.
- Check that the shaft seal is leak-tight.
- Check that rotating parts (shafts, couplings) do not come into contact with one another.
- Check that moving parts (e.g. switching cylinders) do not come into contact with one another.
- Check all machine guards to ensure they are functional.

- 3. After 12 hours and after performing inspections: 100%, full load**

8.4 Recommended lubricants for Pekrun gearboxes

8.4.1 Area of application

The recommendations in this lubricant table apply only to Pekrun gearboxes in the type series as listed below:

Cylindrical gearboxes (except turbo gearboxes)

Bevel gearboxes (except mill gearboxes)

Worm gearboxes

Planetary gearboxes or combinations of these


8.4.2 Recommended lubricants


The lubricant selection table lists a number of different lubricants corresponding to the recommendations of the oil companies.

The recommended oils traverse the 12th load stage in the back-to-back test rig according to DIN ISO 14635-1 without jumping to severe wear.


The listed oils are inhibited mineral oils with additives to increase resistance to aging and corrosion protection, and to improve the mixed friction response in accordance with CLP identification according to DIN 51502.

For Pekrun gearboxes, always use only the oils that fulfil the abovementioned quality criteria.

	NOTICE
	Always comply with the specifications about oil group and oil viscosity on type plates, the dimensional drawing and the order-specific technical data sheet.

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to gearbox from unsuitable lubricating oil!</p> <p>Always select oils based on the viscosity of the oil that is indicated on the gearbox type plate.</p> <ul style="list-style-type: none"> – Only use lubricants of proven equivalence for the lubrication of the gearboxes. Use only unused oils that are free from all impurities. – Do not fill oil directly out of drums into the gearbox. Ensure that the proportion of water in the oil is not too high. This can lead to the oil foaming during operation. <p>Normal value for fresh oil: <250 ppm H₂O.</p> <p><i>(In case of doubt, check with the lubricant manufacturer/supplier or Pekrun.)</i></p>

If oils other than the abovementioned oils are to be used, always obtain written approval from Pekrun Getriebebau GmbH. We do not offer any guarantees for the suitability of specific oil grades selected.


	NOTICE
	<p>Always check with Pekrun if you forget to mention when ordering that ambient temperatures below 10 °C (50 °F) or above 50 °C (122 °F) can occur, or if there are extreme temperature variations or external heating of the gearbox can occur.</p>
	<p>In these cases, you must use oil with a different viscosity or use special measures like providing oil heating or oil cooling.</p>
	<p>If the conditions of use change at a later date, always obtain written approval from Pekrun for the use of the lubricant in question.</p>

8.4.3 Lubricating oil purity class


We recommend purity classes of -/18/14 according to ISO 4406/1999 (equivalent to SAE-AS4059 purity class 9) for operating Pekrun gearboxes.

8.4.4 Lubricant table

The Pekrun lubricant table is provided to you along with these operating instructions.

	NOTICE
	<p>The latest version of the Pekrun lubricant table can be requested at any time by writing to the Customer Service address given in section 1.6.</p>


8.4.5 Important usage information for the lubricant table

	TAKE CARE
	<p>Risk of damage</p>
	<p>Risk of damage to gearbox from unsuitable lubricating oil!</p>
	<p>To ensure optimum reliability for lubrication, oils of the same type and viscosity should be used, but should not be mixed from different manufacturers.</p> <p><i>Check first with the lubricant manufacturer/supplier.</i></p>
	<p>The base oils used for the anti-friction bearing greases listed here are mineral oils. If polyglycol oils are used, then the grease must also be suitable for use with the polyglycol oil.</p> <p>Polyglycol-based oils must not be mixed with hydrocarbon-based oils, i.e. with mineral oils or polyalphaolefins (PAOs).</p>

9 Operation

9.1 Safety

All work must be carried out with the greatest of care and attention to **safety!**

	NOTICE
	Pay attention to the safety instructions in section 2: Safety

9.2 Operating modes

- Idling
For set-up and test runs.
- Production
Operation for the product's intended use.

9.3 Special tools and operating materials

For *transportation*, you will need load-handling equipment, e.g. chains, ropes or lifting slings, which have a minimum load-bearing capacity that at least matches the weight of the gearbox. All load handling gear must comply with Machinery Directive 2006/42/EC.

For *assembly*, you will need standard hand tools such as ring spanners, torque spanners, etc. that match the sizes of the bolts that are used in the product.

For *levelling and measuring*, you will need straight edges, a spirit level, a dial gauge and a thickness gauge.

For *gearbox lubrication*, you will need a suitable oil that corresponds to the enclosed Pekrun lubricant table. Refer to the type plate on the gearbox for the oil quantity.

You will need foundation/anchor bolts matching the size of the anchor holes in the gearbox foot.

9.4 Commissioning

9.4.1 Commissioning after a planned shutdown

Gearbox with splash lubrication:

If the gearbox was shut down only temporarily (**<1 week**), the drive unit can be started up again immediately.

Gearbox with oil supply system:

For a gearbox shut down only briefly (**<30 min**), proceed as follows:

- First start the oil pump, to lubricate all bearings and gearwheels.
- You can start the drive unit after the pump has been running for **about 10 minutes**.

9.4.2 Commissioning after a planned shutdown

TAKE CARE
<div data-bbox="316 539 411 633" data-label="Image"> </div> <p>Risk of damage</p> <p>Risk of gearbox damage from shutting down the oil supply system!</p> <p>For short stoppages, keep the oil supply system running.</p> <p>For a longer shutdown, also keep the oil supply system running for about 60 minutes at first. This avoids a heat build-up.</p> <p>Risk of damage to gearbox from corrosion!</p> <p>With longer stoppages (>1 week to <6 months), run the gearbox for a short time once a week to ensure all internal components are wetted with oil. This keeps the gearbox protected from corrosion for a short time.</p> <p>In the case of decommissioning for over 6 months, provide the gearbox with anti-corrosion protection as described in section 6, Storage conditions.</p>

Gearbox with splash lubrication:

After a planned shutdown (**>1 week to <6 months**) for the gearbox, proceed as follows:

- Run the gearbox for a short time once a week to ensure all internal components are wetted with oil.
- The drive unit can then be started again directly.

Gearbox with oil supply system:

After a planned shutdown (**>30 min to <6 months**) for the gearbox, proceed as follows:

- First start the oil pump, to lubricate all bearings and gearwheels.
- You can start the drive unit after the pump has been running for **about 10 minutes**.
- For a shutdown lasting **<6 months**, proceed as described in **section 9.6**.

9.4.3 Recommissioning after an Emergency Stop

TAKE CARE
<div data-bbox="316 1720 411 1814" data-label="Image"> </div> <p>Risk of damage</p> <p>You must ensure that there is no damage to the gearbox, the oil supply system or any other attached components.</p> <p>You must repair any damage before carrying out recommissioning.</p>


Before recommissioning, check the following:

- Levelling/alignment of gearbox and motor (see **section 8**)
- Condition of the couplings
- Oil level
- Tightness of the piping
- Tightness of shaft seals
- Firm seating of all machine guards
- Also follow the instructions in **section 8** (initial commissioning)

9.4.4 Recommissioning after a prolonged standstill (storage)

After a prolonged shutdown (storage) of **more than 6 months**, proceed with recommissioning as follows:

- Carry out the checks described in **section 9.4.3**.
- Remove the coat of corrosion inhibitor as described in **section 8**.
- For recommissioning, proceed as described in **section 8** (initial commissioning).

	NOTICE
	Pay attention to the storage conditions as stated in section 6 .


9.5 Inspection and maintenance

Performing regular inspection and maintenance on our Pekrun gearboxes ensures maximum operational reliability and safety.

Inspection and maintenance must be performed when the gearbox is at a standstill.

Proceed as follows:


- Keep a maintenance record or maintenance plan. This will help you to keep to the specified maintenance intervals.
- Have regular gearbox inspection and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with the inspection and maintenance of the gearbox about the existing residual risks (see **section 2, Safety**)

	NOTICE
	Keep to the inspection and maintenance plan given in section 11 .


9.6 Decommissioning

To decommission the gearbox, proceed as follows:

- Switch off the drive unit.
- Have decommissioning work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with the decommissioning of the gearbox about the existing residual risks (see **section 2: Safety**)
- Close the cooling water intake for gearboxes with water/oil coolers or cooling coils. If there is a risk of frost, drain the water from the cooler or the cooling coil. (See **section 8.3.3.**)


	TAKE CARE
	<p>Risk of damage</p> <p>Risk of gearbox damage from shutting down the oil supply system!</p> <p>For short stoppages, keep the oil supply system running.</p> <p>For a longer shutdown, also keep the oil supply system running for about 60 minutes at first. This avoids a heat build-up.</p> <p>With longer stoppages (>1 week to <6 months), run the gearbox for a short time once a week to ensure all internal components are wetted with oil. This keeps the gearbox protected from corrosion for a short time.</p> <p>In the case of decommissioning for over 6 months, provide the gearbox with anti-corrosion protection as described in section 6, Storage conditions.</p>



10 Troubleshooting

	NOTICE
	<p>If you have any technical queries, please contact our factory:</p> <p>Our Customer Service address is given in section 1.6 of these operating instructions.</p>


10.1 Safety

All work must be carried out with the greatest of care and attention to **safety!**

	NOTICE
	<p>Pay attention to the safety instructions in section 2, "Safety"</p>

	 WARNING
	<p>Risk of injury during troubleshooting!</p> <p>There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers).</p> <p>Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts during troubleshooting.</p> <p>Personnel may slip or fall as a result of leaking oil or existing spills of oil.</p> <ul style="list-style-type: none"> – Clean up any oil spills or oil leaks with an oil binder. – Wear PPE. – Have all troubleshooting work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with troubleshooting work about the existing residual risks (see section 2, "Safety") <p>Take especial care with troubleshooting when the unit is running!</p> <p>Keep to safety clearance distances!</p> <p>Always take the gearbox out of service before attempting to resolve faults or problems!</p>

10.2 Fault identification

	NOTICE
	<p>Also follow the instructions given in section 11, Servicing</p>

Always report problems that occur during the warranty period to our service address immediately.

Pekrun provides no warranty whatsoever if the gearbox is not used for its intended purpose. This also applies to any modifications made to the gearbox not agreed with Pekrun in advance as well as to the use of non-original Pekrun spare parts.

If faults occur and you cannot identify the cause, you are advised to contact our Customer Service at the service address.

Please note the following:

- Have all troubleshooting work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with troubleshooting work about the existing residual risks (see section 2: **Safety**)
- **Always take the gearbox out of service before attempting to resolve faults or problems!**
- Switch off the drive unit when working on the gearbox.
- Secure the drive unit so it cannot be accidentally started up again and post up a sign informing personnel of this on the start-up console.

10.3 Initial steps to take when troubleshooting


Table 10-1

Fault/error message	Possible cause(s)	Remedy
Change in gearbox noises	Damage to the gearing Defective bearings Increased bearing play	- Contact Customer Service. => Check gearing. Replace damaged parts as necessary. - Contact Customer Service. => Replace defective bearings - Contact Customer Service. => Adjust bearing play
Operating temperature too high	Oil level in gearbox too high Cooler defective Cooling water feed defective (cooling coils -> deposits/ sedimentation) Cooling air feed defective or contaminated Line filter dirty Oil is very dirty Oil is too old Oil line leaking	- Correct the oil level - Check the cooler => Replace if necessary (check cooler operating instructions) - Check cooling water supply => Clean the cooling coils and replace if necessary. Check cooler operating instructions. - Check cooling air supply => Clean. Check cooler operating instructions. - Clean the line filter. Check filter operating instructions. - Contact Customer Service. => Change oil - Contact Customer Service. => Change oil => Check oil-conducting lines. Seal if necessary. - Check oil pump

Fault/error message	Possible cause(s)	Remedy
	Oil pump is defective	=> Check oil pump operating instructions. Repair or replace oil pump.
Increased temperature on the bearing point	Defective bearing Oil pump is defective Oil line leaking Oil is too old Oil level in gearbox is too high or too low	- Contact Customer Service. => Replace defective bearings - Check oil pump => Replace if necessary. Check oil pump operating instructions. - Contact Customer Service. => Check oil-conducting lines. Seal if necessary. => Change oil - Correct the oil level - Contact Customer Service.
Oil leaking from gearbox	Seal faulty on housing cover or housing component joints Radial shaft seals are defective	=> Seal the housing cover or housing component joints => Replace the shaft seals
Oil is foaming in the oil sump Water in the oil	Unsuitable oil or contaminated oil (water in oil) Oil cooler or cooling coil defective Incorrect installation conditions (e.g. high humidity)	- Contact Customer Service. => Have oil condition checked - Contact Customer Service. => Check the oil cooler or cooling coil for leaks. Repair the leak if necessary. Replace the cooler or cooling coil. Check cooler operating instructions. - Contact Customer Service.
Pressure monitoring triggers an alarm	Oil pressure has dropped below minimum lubricating pressure (standard: 0.5 bar)	- Check oil level at room temperature => Correct oil level as necessary - Check oil filter => Clean or replace as necessary - Contact Customer Service. - Check oil pump => Check oil pump operating instructions. Repair or replace oil pump.
Oil filter's contamination display triggers an alarm	Line filter is dirty	=> With switchable line filters, perform switchover according to the operating instructions => Replace the dirty filter cartridge
Switching operation makes noises or does not work	Torque is acting on the shafts.	- Check all shafts involved to see if torque is acting on the shafts;


Fault/error message	Possible cause(s)	Remedy
	<p>The shafts are still rotating.</p> <p>Damage to gearing in switching gearwheels</p> <p>Monitoring instruments or end stops are faulty or incorrectly aligned</p> <p>Switching cylinders do not work. Switching cylinders are faulty</p>	<p>release loads on shafts as necessary.</p> <p>– Check to confirm all shafts are not moving; force shafts to a standstill if necessary.</p> <p>– Contact Customer Service.</p> <p>– Check gearing => Replace damaged parts as necessary</p> <p>– Contact Customer Service.</p> <p>– Check end stops and also check installation. => Repair or replace end stops. Check end stop operating instructions.</p> <p>– Check switching cylinder unit to confirm free to move/for any obstructing objects => Remove any obstacles to free movement if found.</p> <p>– Check the pressure being applied to the hydraulic/pneumatic cylinder. => If necessary, pressurise the lines or fix the leaks.</p> <p>– Check hydraulic/pneumatic lines for leaks. => Fix leak or replace lines.</p> <p>– Contact Customer Service.</p> <p>– Check the switching cylinders => Replace defective parts as necessary</p>



11 Servicing and maintenance

	NOTICE
	<p>If you have any technical queries, please contact our factory.</p> <p>Our Customer Service address is given in section 1.6 of these operating instructions.</p>

11.1 Safety

All work must be carried out with the greatest of care and attention to **safety!**

	NOTICE
	<p>Pay attention to the safety instructions in section 2, "Safety"</p>

	 WARNING
	<p>Risk of injury during servicing and maintenance</p> <p>There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers).</p> <p>Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts during troubleshooting.</p> <p>Personnel may slip or fall as a result of leaking oil or existing spills of oil.</p> <ul style="list-style-type: none"> – Clean up any oil spills or oil leaks with an oil binder. – Wear PPE. – Have servicing and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with servicing and maintenance work about the existing residual risks (see section 2, "Safety") <p>Take especial care with troubleshooting when the unit is running!</p> <p>Keep to safety clearance distances!</p> <p>Always take the gearbox out of service before attempting to resolve faults or problems!</p>

11.2 Maintenance record

Keep a maintenance record or maintenance plan. This will help you to keep to the specified maintenance intervals.

11.3 Control procedures and test jigs

Have regular gearbox inspection and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.

Regularly check all the operating data, e.g. the pressure, the temperature, the current consumption, the level of soiling on line filters and other visual checks. This helps to detect and eliminate faults at an early stage.

For preventive maintenance, it is advisable to use a machine diagnostics system that allows you to check machine states easily.

Using a vibration measurement system, you can generate a trend analysis by collecting measured data on a regular basis.

Other analysis tools let you determine and verify damage to bearings and gearing before a total failure of the system occurs.

Pekrun engineers can carry out vibration measurement and analysis.

If Pekrun engineers perform analysis, the results of comparable Pekrun gearboxes will also be included and taken into account.

11.4 Special tools and operating materials

Contact thermometer for measuring temperatures.

Endoscope for carrying out visual inspections of the inside of gearboxes.

Stethoscope for monitoring running noises in the gearbox.

Standard hand tools, e.g. open-ended spanners, ring spanners, Allen keys, etc.

11.5 Inspection and maintenance plan


	NOTICE
	The following details apply to operation with mineral oil.

Table 11-1

D = daily, W = weekly, M = monthly, A = annually, 1/2 = every six months



Work to be carried out	D	W	M	A
Check oil temperatures	X*	X*		
Check the gearbox for changes in noises		X		
Check the monitoring instruments on the gearbox and OSS			X	
Check the oil level			X	
Clean the oil filter as soon as the soiling indicator shows a warning			X	
Check that the gearbox is leak-proof			X	
Check that the piping is leak-proof			X	
Check that the oil supply system is leak-proof and functioning properly			X	
Check the condition of the air/oil cooler				X
Check the condition of the water/oil cooler				X
Check the water content of the oil				X
Check the machine guards				X
Clean the venting filter				1/2
Check fixing screws for firm seating				1/2
Check cooling coil for deposits	At same time as oil change			
Change oil filter	At same time as oil change			
Change oil	See table 11-2 + 11-3			
Re-apply grease lubrication to bearing points/seals	After 3000 operating hours or 6 months at the latest			
Full inspection of gearbox				X


* Depending on the use case, the oil temperature may also need checking daily.

11.6 Lubrication plan

11.6.1 Oil lubrication

Important information before changing oil:

	 CAUTION
	<p>Risk of injury from toxic vapours or fluids!</p> <p>When changing oil, there is a risk of injury from breathing in and/or coming into contact with lubricants or other process media.</p> <ul style="list-style-type: none"> – Observe the safety data sheet for the media being used. – Wear suitable personal protective equipment (safety goggles, protective gloves) for oil-changing work. – Have suitably-qualified personnel carry out the work. – Clean up any oil spills that occur immediately (e.g. with oil binder).

	TAKE CARE
	<p>Risk of damage</p> <p>Risk of damage to gearbox from unsuitable lubricating oil!</p> <p>Avoid incompatibilities with the lubricating oil used later on.</p> <p>To ensure optimum reliability for lubrication, oils of the same type and viscosity should be used, but should not be mixed from different manufacturers.</p> <p>Do not mix oils of different types or ones made by different manufacturers. In particular, do not mix synthetic oils with mineral oils or other synthetic oils.</p> <p>When switching from a mineral oil to a synthetic oil or vice versa, or when switching from synthetic oils with one base chemistry to synthetic oils with a different base chemistry:</p> <ul style="list-style-type: none"> – Drain off the old lubricating oil completely. – Flush the gearbox thoroughly with the lubricating oil to be used later. <p>(See section 6.6, “Flushing before commissioning”.)</p> <ul style="list-style-type: none"> – Fill with the new lubricating oil (see section 8) <p><i>Check first with the lubricant manufacturer/supplier.</i></p>

When changing the oil, always try to use the grade that you used before.

When changing the oil, flush the housing and clean it thoroughly.

Before filling with fresh oil, completely remove any and all oil sludge, abraded matter and used oil residue.

In special operating conditions, e.g. ambient air that is very damp, has a high dust content or contains chemical vapours, it may be necessary to change the oil more often. In the same way, favourable operating conditions can extend the useful life of the oil. In special cases, consult the technical customer service of the oil company for advice.

Oil change interval:

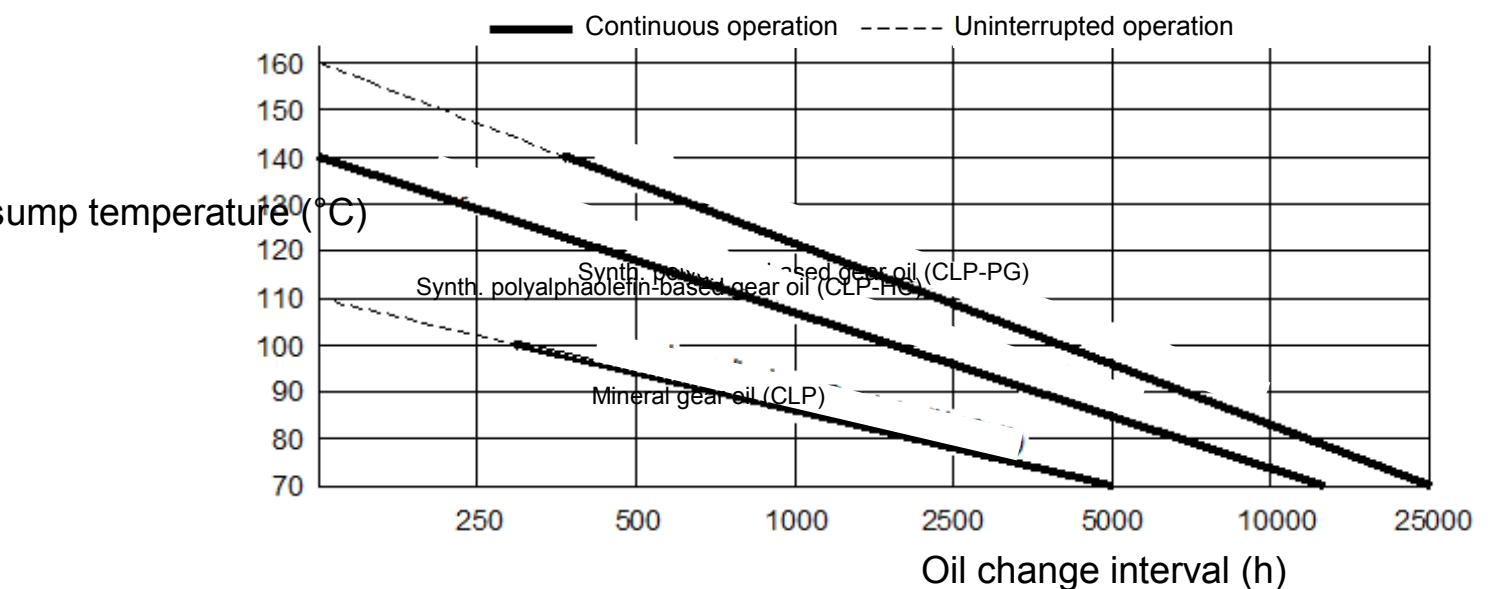
Reference values for oil change intervals can be found in table 11-2. These apply for normal operating conditions and for an oil sump temperature below 70 °C.

Table 11-2



		LUBRICANT TYPE			
		Mineral oil-based CLP	Synthetic polyalphaolefin-based CLP - HC	Synthetic polyglycol-based CLP - PG	Grease
1st oil change	Worm gearboxes	500 h	100 to 500 h	250 to 1000 h	
	Cylindrical gearbox Bevel gearbox	1000 h	2000 h	5000 h	
Next oil change	Worm gearboxes	3000 to 4000 h	5000 to 7500 h	8000 to 10000 h	5000 h
	Cylindrical gearbox Bevel gearbox	5000 h	12000 h	25000 h	8000 h
Regular intervals	Worm gearboxes	12 to 18 months	2 to 3 years	4 to 5 years	2 years
	Cylindrical gearbox Bevel gearbox				


At higher oil sump temperatures, oil change intervals can be determined by consulting diagram 11-3.

Diagram 11-3



Description of oil change work:


	 WARNING
	<p>Risk of burn injuries from escaping hot working fluid!</p> <p>This may cause serious scald injuries.</p> <p>During oil changing work directly following operation – and for a period of time after standstill – there is a risk of serious injury from escaping hot working fluid (>55 °C).</p> <ul style="list-style-type: none"> – Have servicing work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field. – Inform all personnel entrusted with servicing work about the existing residual risks (see section 2, “Safety”). – When changing the oil, wear suitable PPE (protective gloves/goggles).

	NOTICE
	<p>Drain the oil immediately after the system comes to a standstill, when the oil is still warm and has a low viscosity.</p> <p>Collect the used oil in suitable containers.</p> <p>Clean up any oil spills that occur immediately.</p> <p>Dispose of the drained used oil, oil binders and cleaning rags soaked in oil according to applicable local environmental regulations.</p>

- When draining the oil, use a suitable collection container.
- Close the coolant supply to gearboxes with cooling coils or water/oil coolers.
- If you drain the oil through the oil drain hole, place a suitable container below it.
- While draining the oil, ensure that enough air can enter the housing via the aeration filter. If necessary, undo the screws on the aeration filter and remove.
- Use a suitable oil binder to mop up and dispose of any oil that escapes immediately.
- Screw the oil drain plug back in.
- Fill the gearbox with lubricant as described in **section 8.4**.

11.6.2 Grease lubrication:

Gearboxes are provided with grease lubrication for special operating conditions. The gearboxes are filled with grease at the acceptance test bench and are also delivered in this condition.

	NOTICE
	<p>The grease lubrication is intended to last for the gearbox's lifetime.</p> <p>Consult with the manufacturer before changing prior to this date.</p>

	NOTICE For gearbox grease recommendations, refer to the lubricant table for Pekrun gearboxes (details given in section 8.4).
--	--

11.6.3 Grease lubrication of the bearings or seals:

On some gearboxes, grease lubrication is provided for the bearings or the seals of extended shaft ends. Such points are equipped with pressure grease nipples and filled with grease on delivery of the gearboxes.

	TAKE CARE Risk of damage Risk of damage to gearbox from unsuitable grease! Do not mix greases with different soap bases. <i>Check first with the lubricant manufacturer/supplier.</i>
--	--

	NOTICE For reapplying or renewing the grease, use only compatible, branded anti-friction bearing greases. For details, see section 8.4 and the lubricant table for Pekrun gearboxes.
--	---

Re-lubrication of the bearing points is required after each **3000 operating hours** or an interval of **6 months**, whichever is the greater.

	NOTICE Seals on extended shaft ends may need to be re-lubricated more frequently, depending on the operating conditions.
--	--

When renewing the entire grease filling for a bearing, proceed as follows:

- Wash out the bearing thoroughly with white spirits (or similar).
- Brush the hollow spaces of the anti-friction bearing evenly with grease.
- Also fill 1/3 of the bearing housing cavity with grease, to prevent excessive heating.

	NOTICE For shafts running at low speeds ($n < 60$ rpm), we recommend filling the entire bearing housing space with grease.
--	---

11.7 Description of inspection and maintenance work

	NOTICE
	For the operation and maintenance of the components as listed below, also follow the operating instructions listed in the order-specific appendix as provided.

	NOTICE
	Replace any bolts/screws rendered unusable by assembly or dismantling work. Always replace with bolts/screws of the same design and strength class.

Please note the following:

- Have inspection and maintenance work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with inspection and maintenance work about the existing residual risks (see section 2: **Safety**)
- **Always take the gearbox out of service before attempting any work.**
- Switch off the drive unit when working on the gearbox.
- Secure the drive unit so it cannot be accidentally started up again and post up a sign informing personnel of this on the start-up console.


11.7.1 Cleaning the fan and gearbox

Heavy soiling on the fan or gearbox surface significantly reduces the cooling effects otherwise obtained. Regular cleaning of the fans and gearbox is therefore required.

Caution: Take the gearbox out of service before starting cleaning work.

- Remove any dirt deposits from the fan rotor, fan hood and the protective grille with a hard brush (for example).
- Carry out cleaning in the same way for the surface of the gearbox housing using a hand brush (for example).

	TAKE CARE
	Risk of damage
	Risk of damage from the ingress of moisture!
	Do not clean the gearbox with a pressure washer: this can cause moisture to penetrate inside the gearbox, where it can cause serious damage.

	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from incorrect assembly! When reinstalling the fan, ensure that the fan does not touch the fan hood.


11.7.2 Checking the cooling coil (if present)

Proceed as follows:

- Disconnect the cooling water intake and drain lines.
- Check the inner wall of the cooling coil for deposits/limescale.
- If soiled, clean the cooling coil with a suitable cleaning agent or replace the cooling coil with a new part.
- Then reconnect the cooling water intake and drain lines.

11.7.3 Checking the air/oil cooler (if present)

- Remove any dirt on the cooling assembly.
- Check the condition of the screw connections and replace them if necessary.

	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from incorrect assembly! Ensure that air can circulate freely around the cooler. If necessary, remove any objects in the way.

11.7.4 Checking the water/oil cooler (if present)

- Check that the pipes carrying water are leak-proof.
- Check the condition of the screw connections and replace them if necessary.

11.7.5 Checking the line filter (if present)

- Check the soiling indicator.
- If necessary, clean the line filter using a suitable cleaning agent.

11.7.6 Check the fixing screws


- Use a torque spanner to check that all fixing screws are seated firmly.
- Check the bolts for tightening torque according to table 11-4.
- Unusable bolts must be replaced with new ones of the same strength class.

Table 11-4 Tightening torques for headless steel screws

TIGHTENING TABLE FOR HEADLESS SCREWS				
	TIGHTENING TORQUE M_a [Nm] @ $\mu=0.14$			
	SIZE	8.8	10.9	12.9
COARSE-PITCH THREAD	M6	10	15	18
	M8	25	37	43
	M10	51	75	87
	M12	87	130	150
	M16	215	310	370
	M20	430	620	720
	M24	740	1060	1240
	M30	1500	2100	2500
	M36	2450	3450	4150
	M42	3950	5550	6650
FINE-PITCH THREAD	M48	5950	8400	10100
	M8x1	27	40	47
	M10x1.25	54	79	93
	M12x1.25	96	140	165
	M12x1.5	92	135	155
	M16x1.5	230	340	390
	M20x1.5	480	690	800
	M24x2	810	1160	1350
	M30x2	1670	2370	2780

The table values for M_a take into account:

- Friction value $\mu_{tot.} = 0.14$
- Utilisation of minimum yield point = 90%
- The torsional torque when tightening to the fiction value of $\mu_{tot.} = 0.14$ applies to nuts and bolts without coating and lightly oiled.

	TAKE CARE
	Risk of damage
	Risk of damage to gearbox from incorrect assembly! Additional lubrication of the thread considerably changes the coefficient of friction and results in unspecified tightening conditions.

11.7.7 Full inspection of gearbox

You should request a complete inspection of the gearbox from the Pekrun Customer Service department. Our engineers and supervisors are best placed for assessing whether gearbox components need to be replaced – and if so, which components.

12 Dismantling and disposal

12.1 Safety

All work must be carried out with the greatest of care and attention to **safety!**

Always observe the safety regulations that apply in the country of use. Environmental regulations for disposal.

	NOTICE
	Pay attention to the safety instructions in section 2, Safety

	<div data-bbox="438 689 1481 739">⚠ WARNING</div> <p>Risk of injury during dismantling work</p> <p>There is a risk of crush and shear injuries to limbs resulting from parts falling down or slipping away when wet with oil (e.g. inspection covers).</p> <p>Crush, shear and amputation injuries can occur when reaching into the inside of the gearbox or from contact with moving parts.</p> <p>Personnel may slip or fall as a result of leaking oil or existing spills of oil.</p> <ul style="list-style-type: none"> – Clean up any oil spills or oil leaks with an oil binder. – Wear PPE. <p>Have dismantling and disposal work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.</p> <ul style="list-style-type: none"> – Inform all personnel entrusted with dismantling and disposal work about the existing residual risks (see section 2, “Safety”) <p>Keep to safety clearance distances!</p>
--	--

	<div data-bbox="438 1408 1481 1458">⚠ CAUTION</div> <p>Risk of injury from toxic vapours or fluids!</p> <p>When draining and disposing of oil, there is a risk of injury from breathing in and/or coming into contact with lubricants or other process media.</p> <p>When opening the inspection cover or working on the oil supply system, there is a risk of injury from escaping harmful or combustible gases as well as leaks of lubricants.</p> <p>When working on parts filled with oil, such as piping and the interior of the gearbox, skin can be exposed to contact with aggressive media.</p> <ul style="list-style-type: none"> – Observe the safety data sheet for the media being used. <p>Wear suitable personal protective equipment (safety goggles, protective gloves) for oil-changing work.</p> <ul style="list-style-type: none"> – Have suitably-qualified personnel carry out the work. – Clean up any oil spills that occur immediately (e.g. with oil binder).
--	--

12.2 Dismantling

Description of dismantling work:

- Have dismantling work carried out by skilled and qualified personnel only, preferably with appropriate professional training in the field.
- Inform all personnel entrusted with dismantling work about the existing residual risks (see **section 2, Safety**)
- Take the gearbox out of service first. Follow the instructions in **section 9, Decommissioning**.
To take the gearbox out of service, switch the drive unit off.
- Switch off the power supply to the accessory units.
- Secure the drive unit so it cannot be accidentally started up again. Attach an informative sign to the start-up console.
- Next, drain the oil into a suitable container. To do this, follow the instructions in **section 11, Servicing**.
- Disconnect the drive shaft from the drive unit (e.g. motor). Follow the operating instructions from the plant manufacturer.
- Disconnect the output shaft(s) from the machine. Follow the operating instructions from the plant manufacturer.
- Dismantle and remove any piping that may be present. Use a suitable oil binder to mop up and dispose of any oil leaks in accordance with environmental protection regulations.
- Disconnect all connecting lines present.
- Unscrew and remove all fixing screws.
- Clean and degrease the gearbox before disposal.
- You can now remove the gearbox using suitable load-handling equipment. Follow the safety instructions and details about in-house transportation given in **section 5**.

12.3 Disposal

Description of disposal work:

If disposal is carried out correctly, the gearbox can be recycled.

Dispose of electronic components at a special facility in accordance with applicable regulations.

We recommend commissioning a local specialist firm with the disposal of used oil according to the environmental protection regulations in the country of use.

13 Supplementary documents

13.1 Declaration of Incorporation

Content and structure of the Declaration of Incorporation:

EU Declaration of Incorporation

According to EC- directive 2006/42/EC on machinery (Annex II B)

Name and address of manufacturer:

Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany

We hereby declare that the partly completed machinery described below

PRODUCT DENOMINATION:	GEARBOX
Model / Type:	ASR... / BSR... / CSR... / ALG... / AGZ... / *AG* / *CH* / *GV* / *HS* / *KR* / *KS* / *KZ* / *LG* / *MK* / *PG* / *PL* / *SH* / *SO* / *SV* / *VG* / *VH* / *VN* / SN*... / SNU*... / SNO*... / SNV*... / SNC*... / SNA*... / SNAF*... / SW*... / SHS*... / SDA*... / SVA*... / SZA*... / ZVA*... / SEO*... / K*... / KN*... / KNV*... / KNA*... / KS*... / KW*... / KZV*... / VKZ*... / SKV*... / SSN*... / SSNV*... / SSW*... / KSN
Machinery / Serial number:	1**** / 1000****
Year of manufacture:	20**

meets the following essential requirements of the Machinery Directive 006/42/EC - including the changes which applied at the time of the declaration.

Completely satisfied essential safety and health protection requirements:

1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.4, 1.4.2.1, 1.5.1, 1.5.13, 1.5.15, 1.5.2, 1.5.3, 1.5.4, 1.5.6, 1.5.7, 1.5.9, 1.6.1, 1.6.2, 1.7.1.1, 1.7.2, 1.7.3, 1.7.4

Partially satisfied essential safety and health protection requirements:

1.2.6, 1.3.2, 1.3.3, 1.3.7, 1.3.8.1, 1.3.9, 1.4.1, 1.5.5, 1.5.8, 1.6.3

The following legislation have been applied:

Machinery Directive 2006/42/EC


It is forbidden to put this product into service until the machine or system in which this product is to be installed or of which it represents a component corresponds to the provisions of all relevant complies with the legislation

The special technical documents have been compiled for the product according to Annex VII, part B; these documents can be forwarded to a national authority on the basis of a reasoned request.

The person authorised to compile the relevant technical documentation (must be established within EU): location: Iserlohn Wuppertal

Beate Schröder
Köbbingser Mühle 14
58640 Iserlohn
Germany

Annette Lindemann
Köbbingser Mühle 14
58640 Iserlohn
Germany

	NOTICE
	The original Declaration of Incorporation is supplied separately. You will receive this together with the delivery. This will (where possible) be affixed to the outside of the gearbox.

13.2 Drawings and order-specific documents

The documents supplied will vary according to the requirements and use case. These specify the intended use and point out order-specific peculiarities.

The following documents belong to this operating instructions:

- Technical data sheet (prepared per order)
- Pekrun recommended lubricants table (RLT)
- Original Declaration of Incorporation

The following additional documents are supplied in individual cases:

- Dimensional or section drawing
- Spare parts list
- Documentation for components
(Operating instructions / safety-relevant data sheets)

All supplied documents are part of these OI (see pt. 1.5.2)



Pekrun Getriebebau GmbH
Köbbingser Mühle 14
58640 Iserlohn, Germany

Technisches Datenblatt
Technical datasheet

zur Betriebsanleitung
to the Operating Instructions

DEUTSCH / ENGLISH

Geltungsbereich / Scope:			
Pekrun – Auftrags Nr. <i>Pekrun – order no.</i>		19396-20	
Kunden – Referenz <i>Customers - Reference</i>		4500494756; 2000064792 4001310647, 4001308822	
Getriebe / Typ <i>Gearbox / type</i>		ASR 450-R-CCW	
Pekrun - Teile Nr. / Serial Nr. <i>Pekrun - Part no. / serial no.</i>		PART-060562 / 10002292, 10002293	
Dokument-Nr. / <i>Document no:</i>		OFF-039793	Rev.: -
erstellt am / <i>created by:</i>		23.05.2022	erstellt von / <i>created by:</i> B. Schröder
Anhang zur <i>Annex to the</i>	WERKNORM N9100 COMPANY STANDARD N9100		

Inhalt / content

1.	Allgemeine technische Daten.....	3
	<i>General technical data</i>	3
2.	Umgebungsbedingungen	3
	<i>Environmental conditions</i>	3
3.	Schmierung.....	3
	<i>Lubrication</i>	3
4.	Grenz- und Einstellwerte zur Überwachung des Getriebes:.....	4
	<i>Limit and setting values for gearbox monitoring:</i>	4
5.	Wichtige zusätzliche Informationen:.....	4
	<i>Important additional information:</i>	4
6.	Montageanleitung Verschleißhülse (Innenring).....	5
	<i>Assembly instruction wear sleeve (inner ring)</i>	5

1. Allgemeine technische Daten *General technical data*

Maße:
dimensions: ca. L= 2207 mm. B=1490 mm, H=1148 mm

Gewicht:
weight: 3363 kg

Leistung:
rated power: P = 3600 kW

Antriebsdrehzahl:
input speed: $n_1 = 1493 \text{ min}^{-1}$

Antriebsdrehzahl:
input speed: $n_2 = 510,8 \text{ min}^{-1}$

Übersetzung:
transmission ratio: $i = 2,9231 : 1$

Service-Faktor:
Service factor: $K_a = 2$, DIN

2. Umgebungsbedingungen *Environmental conditions*

Umgebungstemperatur: -16...+45°C
ambient temperature:

3. Schmierung *Lubrication*

Typ:
type: Ölumlaufschmierung
Oil circulation lubrication

Schmierstoff:
lubricant: Ölviskosität: ISO VG 320
oil viscosity:

Schadenskraftstufe: 12 (FZG-Test DIN 51354)
Scuffing resistance:

Ölfüllmenge:
oil filling quantity: ca. 270 l

Ölbedarf:
oil demand: ca. 56 l/min.



Öldruck:
oil pressure: 2 bar(g)


Ölzulauftemperatur: +38...+47°C
oil inlet temperature:

4. Grenz- und Einstellwerte zur Überwachung des Getriebes:
Limit and setting values for gearbox monitoring:

	Warnung <i>warning</i>	Abschaltung <i>shutdown</i>	Normal <i>normal</i>
Gehäuseschwingungen <i>Housing vibration</i>	[mm/s]	[mm/s]	[mm/s]
- horizontal : - <i>Horizontal</i>	> 4,5	> 7,1	≤ 4,5
- vertikal : - <i>Vertical</i>	> 4,5	> 7,1	≤ 4,5
Temperaturen <i>Temperatures</i>	[°C]	[°C]	[°C]
- Ölzufluss : - <i>Oil inlet</i>	< 15... > 60	< 10... > 80	38 ... 47
Öldruck <i>Oil pressure</i>	[bar]	[bar]	[bar]
vor dem Getriebe : <i>in front of the gearbox</i>	< 1,4	< 1,2	1,6...6

5. Wichtige zusätzliche Informationen:
Important additional information:

ACHTUNG / CAUTION	
	Sachschaden
	Beschädigungen am Getriebe durch zu große Wellenverlagerung.
	Die kundenseitig zu montierende Kupplung an der Antriebswelle muss im Betrieb eine Wellenverlagerung von bis zu 2 mm ausgleichen können!
	Risk of property damage!
	Risk of damage to the gearbox due to large shaft misalignment.!
	<i>The coupling to be mounted on the drive shaft by the customer must be able to compensate a shaft misalignment of up to 2 mm during operation!</i>

HINWEIS / NOTE	
	Beachten Sie bei Montage von Kupplungen die speziellen Betriebsanleitungen des Herstellers.
	When installing couplings, always follow the specific instructions from the manufacturer.

6. Montageanleitung Verschleißhülse (Innenring) *Assembly instruction wear sleeve (inner ring)*

Abmaße / Dimensions:

- Wellendurchmesser / shaft diameter: $\varnothing 140\text{m6}$ (+0,040 / +0,015)
- Verschleißhülse / wear sleeve: $\varnothing 140$ (+0,00 / -0,025)

Vorbereitung / Preparation:

1. Reinigen Sie Welle und O-Ring- Nut mit geeigneten Mitteln von allen Rückständen.
Clean shaft and O-ring groove from all residues using suitable means.
2. Glätten Sie eventuell vorhandene Grate und Riefen.
Smooth out any burrs and grooves that may be present.

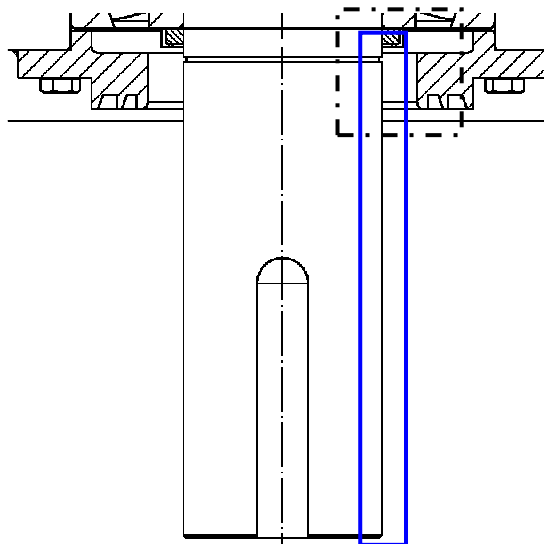
Hilfsmittel, Personal / Auxiliary means, personnel

3. Fett / grease (z.B./e.g. Klüber Staburags NBU 12 K)
4. Induktionserwärmung / induction heating
5. Thermometer / thermometer
6. Hitzebeständige Handschuhe / heat-resistant gloves
7. Innenring / inner ring IR140x160x50 EGS PART-001292
(drallfrei geschliffen / twist-free ground)
8. 2x Wellendichtring / shaft seal ring DIN 3760-160x190x15-BAUMX7-FKM
9. 2x Schonhammer / soft-face hammer
10. 2x Messingdorn / brass mandrel
11. 2 Monteure / 2 fitters

Montage / Assembly

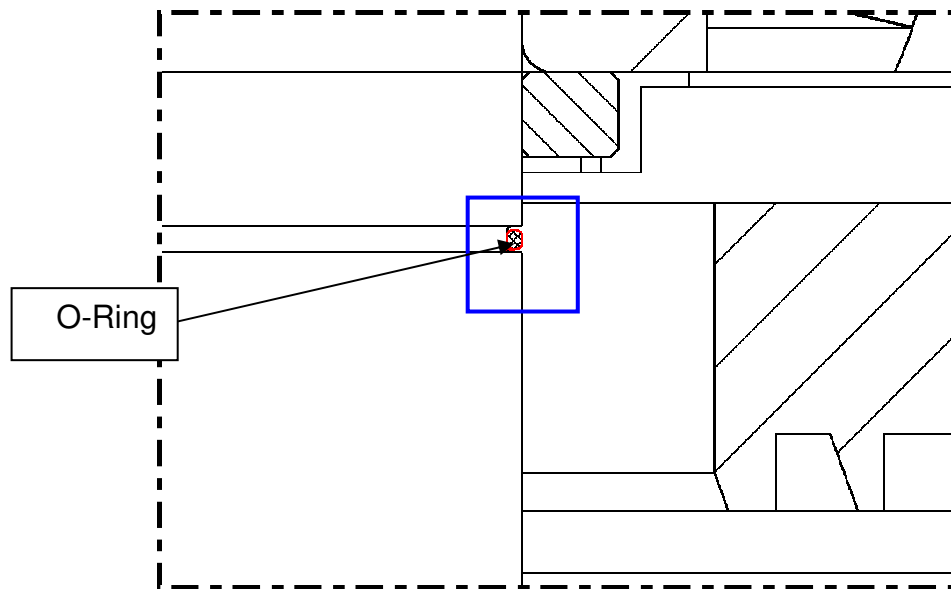
12. Die Temperatur der Welle muss kleiner 30°C sein.
Temperature of the shaft must be less than 30°C.
13. Fetten Sie das Wellenende leicht ein. (siehe blauer Bereich in Abbildung 1)
Lightly grease the shaft end. (see blue section in Figure 1)

Abbildung / Figure 1



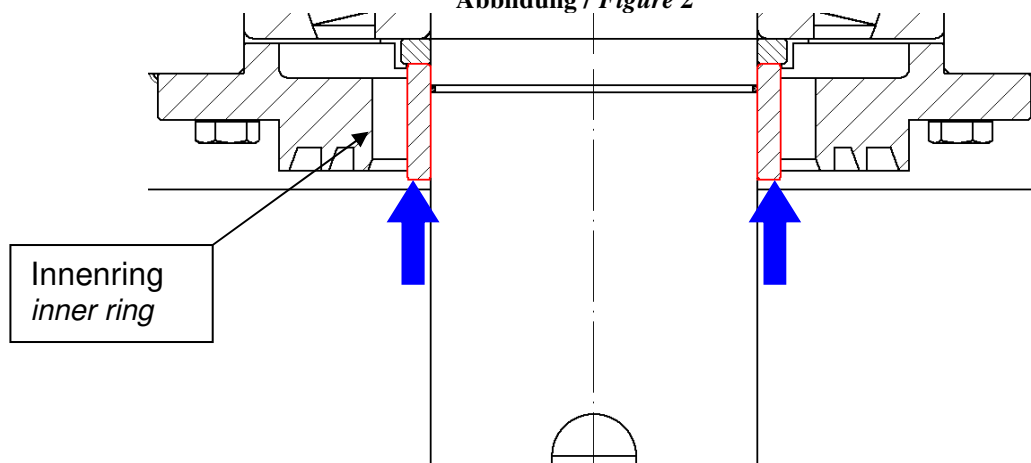
14. Fetten Sie den O-Ring ein.
Grease the O-ring
15. Schieben Sie den O-Ring vorsichtig über die Welle bis in die Nut.
Carefully push it over the shaft into the groove
16. Fetten Sie den O-Ring in der Nut noch einmal überall leicht ein.
Lightly grease the O-ring in the groove once again

Ausschnitt aus Abbildung / Detail from figure 1



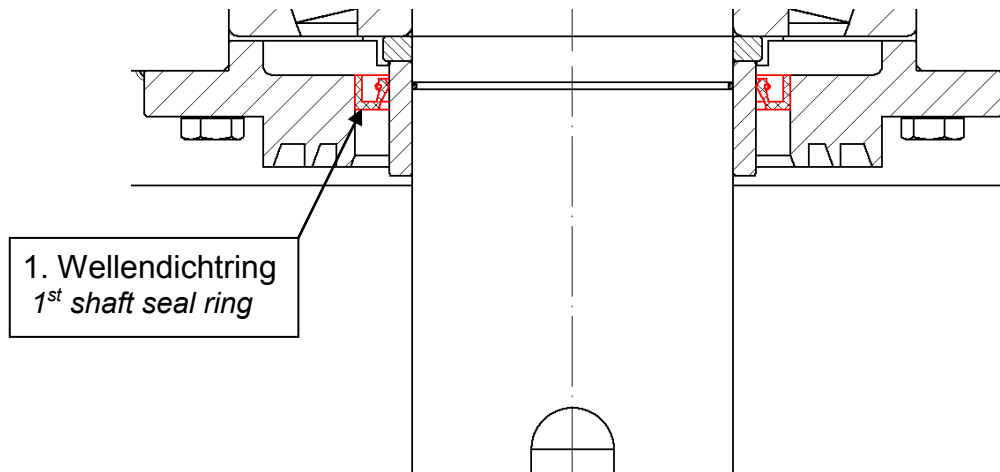
17. Erwärmen Sie den Innenring langsam auf 130°C.
Slowly heat the inner ring to 130°C.
18. Nehmen Sie nun sofort den Innenring vom Erwärmungsgerät und schieben ihn anschließend schnell über die Welle bis zum O-Ring.
Immediately remove the inner ring from the heating device and then quickly slide it over the shaft to the O-ring.
19. Treiben Sie nun innerhalb von 15 Sekunden den Innenring gleichzeitig (auf 2 Seiten um 180° versetzt) mit den Messingdornen und Schonhammer axial über den O-Ring bis dieser am Anlagebund anliegt.
Now, within 15 seconds, drive the inner ring simultaneously (offset by 180° on 2 sides) axially over the O-ring with the brass mandrels and soft-face hammer until the O-ring is in contact with the contact collar.

Abbildung / Figure 2



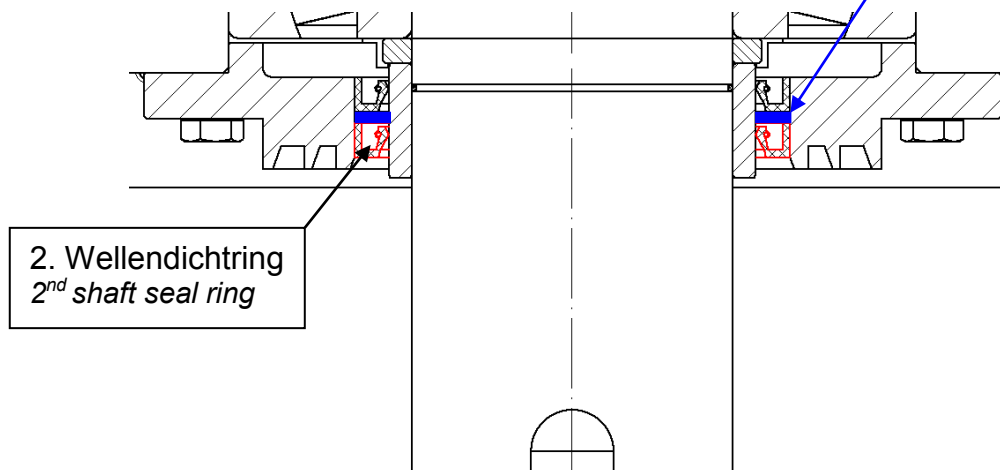
20. Lassen Sie den Innenring abkühlen und montieren anschließend den ersten Wellendichtring.
Allow the inner ring to cool down and subsequently install the first shaft seal ring.

Abbildung / Figure 3

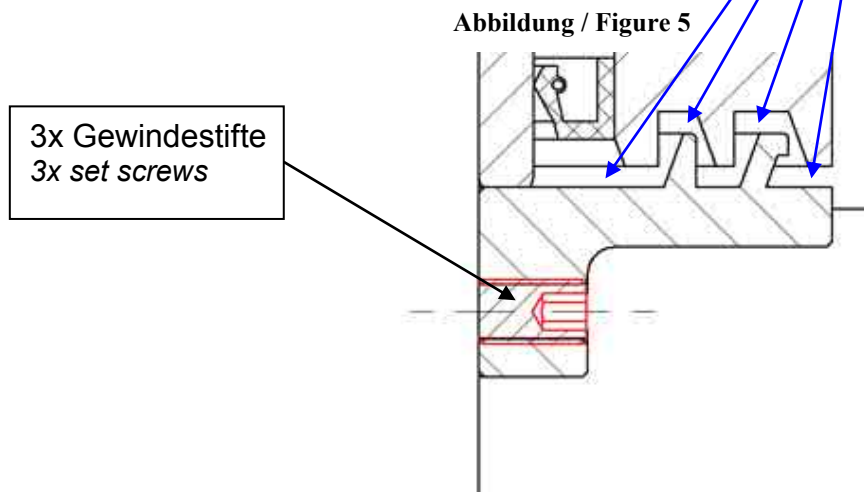


21. Füllen Sie den Raum zwischen den beiden Wellendichtringen zu 80% mit Fett.
Fill the space between the two shaft sealing rings up to 80% with grease.
22. Montieren Sie den zweiten Wellendichtring.
Mount the second shaft seal ring.

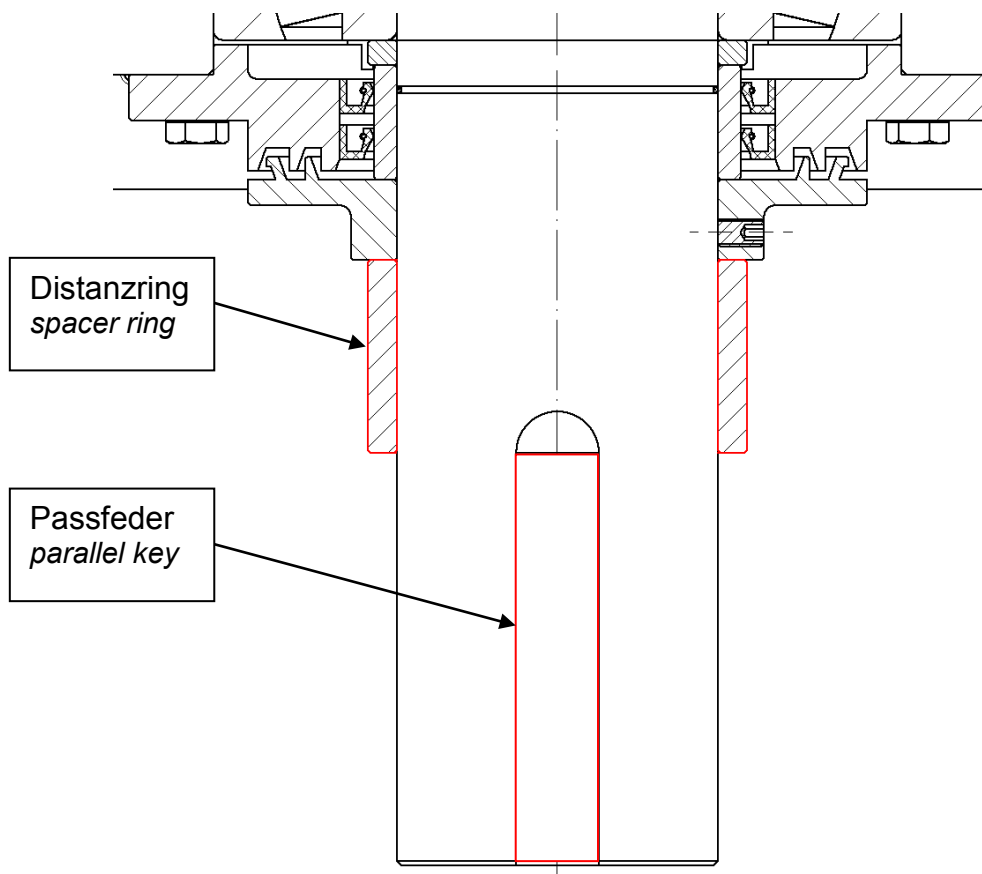
Abbildung / Figure 4



23. Montieren Sie den Labyrinthring.
Mount the labyrinth ring.
Verwenden Sie **kein Fett** zwischen Labyrinthdeckel und Labyrinthring.
Do not use grease between labyrinth cover and labyrinth ring.
24. Ziehen Sie die 3 Gewindestifte am Labyrinthring an.
Tighten the 3 set screws on labyrinth ring.



25. Montieren Sie Distanzring und Passfeder.
Install the spacer ring and parallel key.



WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument-Nr.: OFF-036743– Rev.: -

1 / 8

Getriebeöle auf Mineralölbasis

Gear oil based on mineral oils

Huile à engrenages minérale

Óleos para engrenagens à base de óleos minerais

Aceite de base mineral

Tandwielolie op basis van minerale olie

Редукторные масла на минеральной основе

DIN 51502									
CLP 32	Degol BG 32	Alpha EP 32 Alpha VT 32 Optigear EP 32	Mobil DTE 24	RENOLIN ZAF B 32 HT	RENOLIN ZAF B 32 HT	–	Shell Tegula V 32	–	GST EP 32
CLP 46	–	Alpha SP 46 Optigear BM 46 Optigear EP 46	Mobil DTE 25	RENOLIN ZAF B 46 HT	RENOLIN ZAF B 46 HT	Klüberoil GEM 1-46 N	Shell Tellus S2 MA 46	–	GST EP 46
CLP 68	Degol BG 68	Alpha EP 68 Alpha SP 68 Optigear BM 68 Optigear EP 68	Mobilgear 600 XP 68	RENOLIN CLP 68 RENOLIN CLP 68 Plus	GEARMASTER CLP 68	Klüberoil GEM 1-68 N	Shell Omala S2 GX 68	Eco Gear 68 M	Meropa 68
CLP100	Degol BG 100	Alpha EP 100 Alpha SP 100 Optigear BM 100 Optigear EP 100	Mobilgear 600 XP 100	RENOLIN CLP 100 RENOLIN CLP 100 Plus	GEARMASTER CLP 100	Klüberoil GEM 1-100 N	Shell Omala S2 GX 100	Eco Gear 100 M Gear Oil 100 F	Meropa 100 Meropa XL 100 Meropa MG 100
CLP 150	Degol BG 150	Alpha EP 150 Alpha SP 150 Optigear BM 150 Optigear EP 150	Mobilgear 600 XP 150	RENOLIN CLP 150 RENOLIN CLP 150 Plus	GEARMASTER CLP 150	Klüberoil GEM 1-150 N	Shell Omala S2 GX 150	Eco Gear 150 M Gear Oil 150 F	Meropa 150 Meropa XL 150 Meropa MG 150
CLP 220	Degol BG 220	Alpha EP 220 Alpha SP 220 Optigear BM 220 Optigear EP 220	Mobilgear 600 XP 220	RENOLIN CLP 220 RENOLIN CLP 220 Plus RENOLIN CLP 220 VCI	GEARMASTER CLP 220	Klüberoil GEM 1-220 N	Shell Omala S2 GX 220	Eco Gear 220 M Gear Oil 220 F	Meropa 220 Meropa XL 220 Meropa MG 220
CLP 320	Degol BG 320	Alpha EP 320 Alpha SP 320 Optigear BM 320 Optigear EP 320	Mobilgear 600 XP 320	RENOLIN CLP 320 RENOLIN CLP 320 Plus RENOLIN CLP 320 VCI	GEARMASTER CLP 320	Klüberoil GEM 1-320 N	Shell Omala S2 GX 320	Eco Gear 320 M Gear Oil 320 F	Meropa 320 Meropa XL 320
CLP 460	–	Alpha EP 460 Alpha SP 460 Optigear BM 460 Optigear EP 460	Mobilgear 600 XP 460	RENOLIN CLP 460 RENOLIN CLP 460 Plus	GEARMASTER CLP 460	Klüberoil GEM 1-460 N	Shell Omala S2 GX 460	Eco Gear 460 M Gear Oil 460 F	Meropa 460 Meropa XL 460
CLP 680	–	Alpha EP 680 Alpha SP 680 Optigear BM 680	Mobilgear 600 XP 680	RENOLIN CLP 680 RENOLIN CLP 680 Plus	GEARMASTER CLP 680	Klüberoil GEM 1-680 N	Shell Omala S2 GX 680	Eco Gear 680 M Gear Oil 680 F	Meropa 680 Meropa XL 680
CLP 1000	–	Alpha SP 1000 Optigear BM 1000	–	–	–	Klüberoil GEM 1-1000 N	–	–	Meropa 1000

Beratung durch technischen Dienst / please consult technical service:

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -

2 / 8

Synthetisches Getriebeöl auf Polyalphaolefinbasis

Synthetic gear oil based on polyalphaolefines

Huile à engrenages sur base de Poly-Alpha-Oléfine

Óleo sintético de engranagens à base de polialfaolefin

Aceite sintético con base polialfaolefinica

Synthetische reductiekast olie op Polyalpha basis

Синтетические редукторные масла на основе полиальфаолефина

DIN 51502								
CLP HC 32	Alphasyn T 32 (CL HC)	Mobil SHC 624	RENOLIN Unisyn OL 32	RENOLIN Unisyn OL 32	Klübersynth GEM 4-32 N	–	Foodproof UNI 32 S	–
CLP HC 46	Alphasyn T 46 (CL HC)	Mobile SHC 625	RENOLIN Unisyn OL 46	RENOLIN Unisyn OL 46	Klübersynth GEM 4-46 N	–	Foodproof UNI 46 S	–
CLP HC 68	Alphasyn HTX 68 Optigear Synthetic PD 68 ES	Mobil SHC 626	RENOLIN Unisyn CLP 68	GEARMASTER SYN 68	Klübersynth GEM 4-68 N	–	Eco Gear 68 S-T	–
CLP HC 100	Alphasyn T 100 (HL HC) Optigear Synthetic PD 100 ES	Mobil SHC 627	RENOLIN Unisyn CLP 100	GEARMASTER SYN 100	Klübersynth GEM 4-100 N	–	Eco Gear 100 S	–
CLP HC 150	Alphasyn EP 150 Alphasyn HTX 150 Optigear Synthetic PD 150 ES	Mobil SHC 629 Mobil SHC Gear 150 Mobil SHC Elite 150	RENOLIN Unisyn CLP 150 RENOLIN UNISYN XT 150	GEARMASTER SYN 150	Klübersynth GEM 4-150 N	Shell Omala S4 GXV 150	Eco Gear 150 S	Meropa Synthetic EP 150
CLP HC 220	Alphasyn EP 220 Alphasyn HTX 220 Optigear Synthetic PD 220 ES	Mobil SHC 630 Mobil SHC Gear 220 Mobil SHC Elite 220	RENOLIN Unisyn CLP 220 RENOLIN UNISYN XT 220	GEARMASTER SYN 220	Klübersynth GEM 4-220 N	Shell Omala S4 GXV 220	Eco Gear 220 S	Meropa Synthetic EP 220
CLP HC 320	Alphasyn EP 320 Alphasyn HTX 320 Optigear Synthetic PD 320 ES	Mobil SHC 632 Mobil SHC Gear 320 Mobil SHC Elite 320	RENOLIN Unisyn CLP 320 RENOLIN UNISYN XT 320	GEARMASTER SYN 320	Klübersynth GEM 4-320 N	Shell Omala S4 GXV 320	Eco Gear 320 S	Meropa Synthetic EP 320 Meropa EliteSyn WL 320
CLP HC 460	Alphasyn EP 460 Alphasyn HTX 460 Optigear Synthetic PD 460 ES	Mobil SHC 634 Mobil SHC Gear 460	RENOLIN Unisyn CLP 460 RENOLIN UNISYN XT 460	GEARMASTER SYN 460	Klübersynth GEM 4-460 N	Shell Omala S4 GXV 460	Eco Gear 460 S	Meropa Synthetic EP 460
CLP HC 680	Alphasyn EP 680 Optigear Synthetic PD 680 ES	Mobil SHC 636 Mobil SHC Gear 680	RENOLIN Unisyn CLP 680 RENOLIN UNISYN XT 680	GEARMASTER SYN 680	Klübersynth GEM 4-680 N	–	Eco Gear 680 S	Meropa Synthetic EP 680 Meropa EliteSyn WL 680
CLP HC 1000	Alphasyn HTX 1000	Mobil SHC 639	RENOLIN UNISYN XT 1000	GEARMASTER SYN 1000	Klübersynth GEM 4-1000 N	–	–	–

Beratung durch technischen Dienst / please consult technical service:

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -

3 / 8

Biologisch abbaubare vollsynthetische Getriebeöle auf Esterbasis

Biological degradable fully synthetic gear oils based on ester

Huiles à engrenages synthétiques biodégradables base ester

Óleos de engrenagens totalmente sintéticos e biodegradáveis à base de éster

Aceite de reductores, sintético biológicamente desintegrable, con base de Ester

Biologisch afbreekbare volsynthetische reductiekastolie op Ester basis

Биологически расщепляемые синтетические редукторные масла на основе эфира

DIN 51502						
CLP E 32	-	-	PLANTOHYD 32 S PLANTOSYN 32 HVI	ECO-HYD 32 S	-	
CLP E 46	-	-	PLANTOHYD 46 S PLANTOSYN 46 HVI	ECO-HYD 46 S	-	
CLP E 68	-	Mobil SHC Aware 68	PLANTOSYN 68 HVI	GEARMASTER ECO 68	Klüberbio EG 2-68	
CLP E 100	-	Mobil SHC Aware 100	PLANTOGear 100 HVI	GEARMASTER ECO 100	Klüberbio EG 2-100	
CLP E 150	-	Mobil SHC Aware 150	PLANTOGear 150 HVI	GEARMASTER ECO 150	Klüberbio EG 2-150	
CLP E 220	Performance Bio GE 220 ESS	-	PLANTOGear 220 S	GEARMASTER ECO 220	Klübersynth GEM 2-220	
CLP E 320	Performance Bio GE 320 ESS	-	PLANTOGear 320 S	GEARMASTER ECO 320	Klüberbio EG 2-320	
CLP E 460	-	-	PLANTOGear 460 S	GEARMASTER ECO 460	Klüberbio CA 2-460	
CLP E 680	-	-	PLANTOGear 680 S	GEARMASTER ECO 680	-	
CLP E 1000	-	-	-	-	-	

Beratung durch technischen Dienst / please consult technical service:

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -

4 / 8

Synthetisches Getriebeöl auf Polyglykolbasis

Synthetic gear oil based on polyglycols



Huile à engrenages sur base de Poly-Glycolle

Óleo sintético de engrenagens à base de poliglicol

Aceite sintético con base poliglicol

Synthetische reductiekast olie op Polyglycol basis

Синтетические редукторные масла на основе полиальфаолефина

DIN 51502									
CLP PG 32	-	-	-	RENOLIN PG 32	GEARMASTER PGP 32	Klübersynth GH 6-32	-	-	-
CLP PG 46	-	-	-	RENOLIN PG 46	RENOLIN PG 46	Klübersynth GH 6-46	-	-	-
CLP PG 68	-	-	-	RENOLIN PG 68	GEARMASTER PGP 68	Klübersynth GH 6-80	-	-	-
CLP PG 100	-	Optigear Synthetic 800/100	-	RENOLIN PG 100	GEARMASTER PGP 100	Klübersynth GH 6-100	-	Poly Gear PG 100	-
CLP PG 150	Degol GS 150	Alphasyn PG 150 Optigear Synthetic 800/150	Mobil Glygoyle 150	RENOLIN PG 150	GEARMASTER PGP 150	Klübersynth GH 6-150	Shell Omala S4 WE 150	Poly Gear PG 150	Meropa Synlube WS 150 Meropa EliteSyn WS 150
CLP PG 220	Degol GS 220	Alphasyn GS 220 Alphasyn PG 220 Optigear Synthetic 800/220 Optigear Synthetic 1300/220	Mobil Glygoyle 220	RENOLIN PG 220	GEARMASTER PGP 220	Klübersynth GH 6-220	Shell Omala S4 WE 220	Poly Gear PG 220	Meropa Synlube WS 220 Meropa EliteSyn WS 220
CLP PG 320	Degol GS 320	Alphasyn GS 320 Alphasyn PG 320 Optigear Synthetic 800/320	Mobil Glygoyle 320	RENOLIN PG 320	GEARMASTER PGP 320	Klübersynth GH 6-320	Shell Omala S4 WE 320	Poly Gear PG 320	Meropa Synlube WS 320 Meropa EliteSyn WS 320
CLP PG 460	Degol GS 460	Alphasyn GS 460 Alphasyn PG 460 Optigear Synthetic 800/460 Optigear Synthetic 1300/460	Mobil Glygoyle 460	RENOLIN PG 460	GEARMASTER PGP 460	Klübersynth GH 6-460	Shell Omala S4 WE 460	Poly Gear PG 460	Meropa Synlube WS 460 Meropa EliteSyn WS 460
CLP PG 680	Degol GS 680	Alphasyn GS 680 Optigear Synthetic 800/680 Optigear Synthetic 1300/680	Mobil Glygoyle 680	RENOLIN PG 680	GEARMASTER PGP 680	Klübersynth GH 6-680	Shell Omala S4 WE 680	Poly Gear PG 680	Meropa Synlube WS 680 Meropa EliteSyn WS 680
CLP PG 1000	-	Optigear Synthetic 800/1000	Mobil Glygoyle 1000	RENOLIN PG 1000	GEARMASTER PGP 1000	Klübersynth GH 6-1000	-	-	-

Beratung durch technischen Dienst / please consult technical service:

WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -

5 / 8

Getriebeöle für die Nahrungsmittelindustrie

Gear oils for the food industry

Huiles à engrenages pour industrie alimentaire

Óleo de engrenagens para a indústria alimentar

Aceite de reductores para industria alimenticia

Reductiekastolie voor de levensmiddelen industrie

Редукторные масла для пищевой промышленности

DIN 51502						
CLP E 32	CASSIDA FLUID GL 150	-	Rivolta F.L. 50	CASSIDA FLUID HFS 32	-	Foodproof UNI 32 S
CLP E 46	Optileb HY 46 (HLP HC 46)	-	Rivolta F.L. 75	CASSIDA FLUID HFS 46	-	Foodproof UNI 46 S
CLP E 68	Optileb HY 68 (HLP HC 68)	-	Rivolta F.L. 100	CASSIDA FLUID HFS 68	Klüberoil 4 UH1-68 N	Foodproof UNI 68 S
CLP E 100	Optileb GT 100	Mobil SHC Cibus 100	Rivolta F.L. 125	CASSIDA FLUID HFS 100	Klüberoil 4 UH1-100 N Klübersynth UH1 6-100	Foodproof UNI 100 S
CLP E 150	Optileb GT 150	Mobil SHC Cibus150 Mobil Glygoyle 150	Rivolta F.L. 170	CASSIDA FLUID GL 150	Klüberoil 4 UH1-150 N Klübersynth UH1 6-150	Foodproof UNI 150 S
CLP E 220	Optileb GT 220 (HC) Optileb GT 1800/220 (PG)	Mobil SHC Cibus 220 Mobil Glygoyle 220	Rivolta F.L. 250	CASSIDA FLUID GL 220	Klüberoil 4 UH1-220 N Klübersynth UH1 6-220	Foodproof UNI 220 S (HC), Foodproof CLP 220 WX (min)
CLP E 320	Optileb GT 320 (HC)	Mobil SHC Cibus 320 Mobil Glygoyle 320	Rivolta F.L. 400	CASSIDA FLUID GL 320	Klüberoil 4 UH1-320 N Klübersynth UH1 6-320	Foodproof UNI 320 S (HC), Foodproof CLP 320 WX (min)
CLP E 460	Optileb GT 460 (HC) Optileb GT 1800/460 (PG)	Mobil SHC Cibus 460 Mobil Glygoyle 460	Rivolta F.L. 500	CASSIDA FLUID GL 460	Klüberoil 4 UH1-460 N Klübersynth UH1 6-460	Foodproof UNI 460 S
CLP E 680	Optileb GT 680 (HC) Optileb GT 1800/680 (PG)	Mobil Glygoyle 680	CASSIDA FLUID GL 680	CASSIDA FLUID GL 680	Klüberoil 4 UH1-680 N Klübersynth UH1 6-680	Foodproof UNI 680 S
CLP E 1000	-	Mobil Glygoyle 1000	-	-	Klübersynth UH1 6-1000	Foodproof UNI 1000 S

Beratung durch technischen Dienst / please consult technical service:

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -

6 / 8

Sonstige Schmierstoffe

Other lubricants

D'autres lubrifiants

Otros lubricantes

Outros lubrificantes

Andere smeermiddelen

Другие смазочные материалы

DIN 51502									
Lithiumverseifte Wälzlagerfette Lithiumgrease; Lithium saponifiés huiles pour roulements; Grasa de base lítica para rodamientos, Wentellagervetten verzeept met lithium; Massas de sabão de lítio para rolamentos de esferas de rolos; Литий мыльная основа смазки для подшипников									
KPSK-20	Aralub HLP 2	Spheerol EPL 2 Tribol GR 100-2 PD Optileb GR UF 1 (H1, NLGI 1)	Mobilux EP 2	RENOLIT LZR 2	LAGERMEISTER LP 2	CENTOPLEX 2 EP	Shell Gadus S2 V220 2	EP Mehrbereichsfett LM 2 EP	Multifak EP 2
Öl für Rücklaufsperrn Oils for return flow safety device; Huiles pour cliquets de retour; Aceite para antiretornos; Olie voor terugloop-blokkades; Óleo para bloqueios de retorno; Масла для предохранительного устройства обратный поток									
HLP 32	Vitam GF 32	Hyspin AWS 32 Hyspin ZZ 32 Optileb HY 32 (H1)	Mobil DTE 24	RENOLIN B 10 VG 32 RENOLIN ZAF B 32 HT RENOLIN ZAF D 32 HT RENOLIN MR 32 MC	RENOLIN B 10 VG 32 RENOLIN ZAF B 32 HT RENOLIN ZAF D 32 HT RENOLIN MR 32 MC	LAMORA HLP 32	Shell Tellus S2 MX 32 Shell Tellus S3 M 32	Hydrauliköl HLP 32	Rando HD 32 Clarity Hydraulic Oil AW 32 (ashless)
Fließfette für fettgeschmierte Getriebe Fluid grease for grease lubricated gear units; Graisses pour réducteurs graissés; Grasa fluida para reductores lubricados con grasa; Vloeibare vetten voor met vet gesmeerde tandwielkasten; Massas lubrificantes fluidas para engrenagens lubrificadas por massa lubrificante; Смазка Жидкость для консистентной смазкой редукторов									
GP00K-20	–	Spheerol EPL 00 Tribol GR 100-00 PD Optileb GR UF 00 (H1)	Mobil Chassis Grease LBZ	RENOLIT GFW 00	GEARMASTER LXG 00	MICROLUBE GB 00 Klübersynth BEM 44-4600	–	Fliessfett SGR 4-00-9 P	Multifak EP 00

Beratung durch technischen Dienst / please consult technical service:

PEKRUN GETRIEBEBAU GMBH, KÖBBINGSER MÜHLE 14, 58640 ISERLOHN
FON: +49 2371 945-0, FAX: +49 2371 945-299, EMAIL: INFO@PEKRUN.DE

WERKNORM N8053

[pekrun]

Schmierstoffempfehlung für Pekrun Getriebe
Recommended lubricants for Pekrun gearboxes

PEKRUN-SET Dokument Nr.:OFF-036743– Rev.: -

7 / 8

Korrosionsschutzinhibitor (VCI- Konzentrat)

Anti-corrosion inhibitor (VCI- concentrate)




Inhibiteur de corrosion (concentré de VCI)

Inhibidor de la corrosión (concentrado de VCI)

Inibidor anti-corrosão (concentrado de VCI)

Anti-corrosie remmer (VCI- concentraat)

антикоррозийный ингибитор (концентрат VCI)

			
	CORROSION INHIBITOR N 213	ANTICORID VCI UNI O 40	
	<p>Anwendung nach Pekrun- Vorschrift: Konservierung mit VCI- Konzentrat + Hersteller: Produkt Information Application according to Pekrun instruction : Preservation with VCI- concentrate + Manufacturer: Product Information Application: Selon la réglementation Pekrun: Conservation avec concentrado de VCI + Fabricant: Informations sur le produit Aplicación: Según normativa Pekrun: Conservación con concentrado de VCI + Fabricante: Información del producto Aplicação: De acordo com o regulamento Pekrun: Preservação com concentrado de VCI + Fabricante: Informações do produto Toepassing volgens Pekrun-regelgeving: conservering met VCI-concentraat + Fabrikant: Productinformatie Применение: Согласно правилам Pekrun: Консервация ингибитором с концентратом VCI + Производитель: Информация о продукте</p>		

Beratung durch technischen Dienst / please consult technical service:

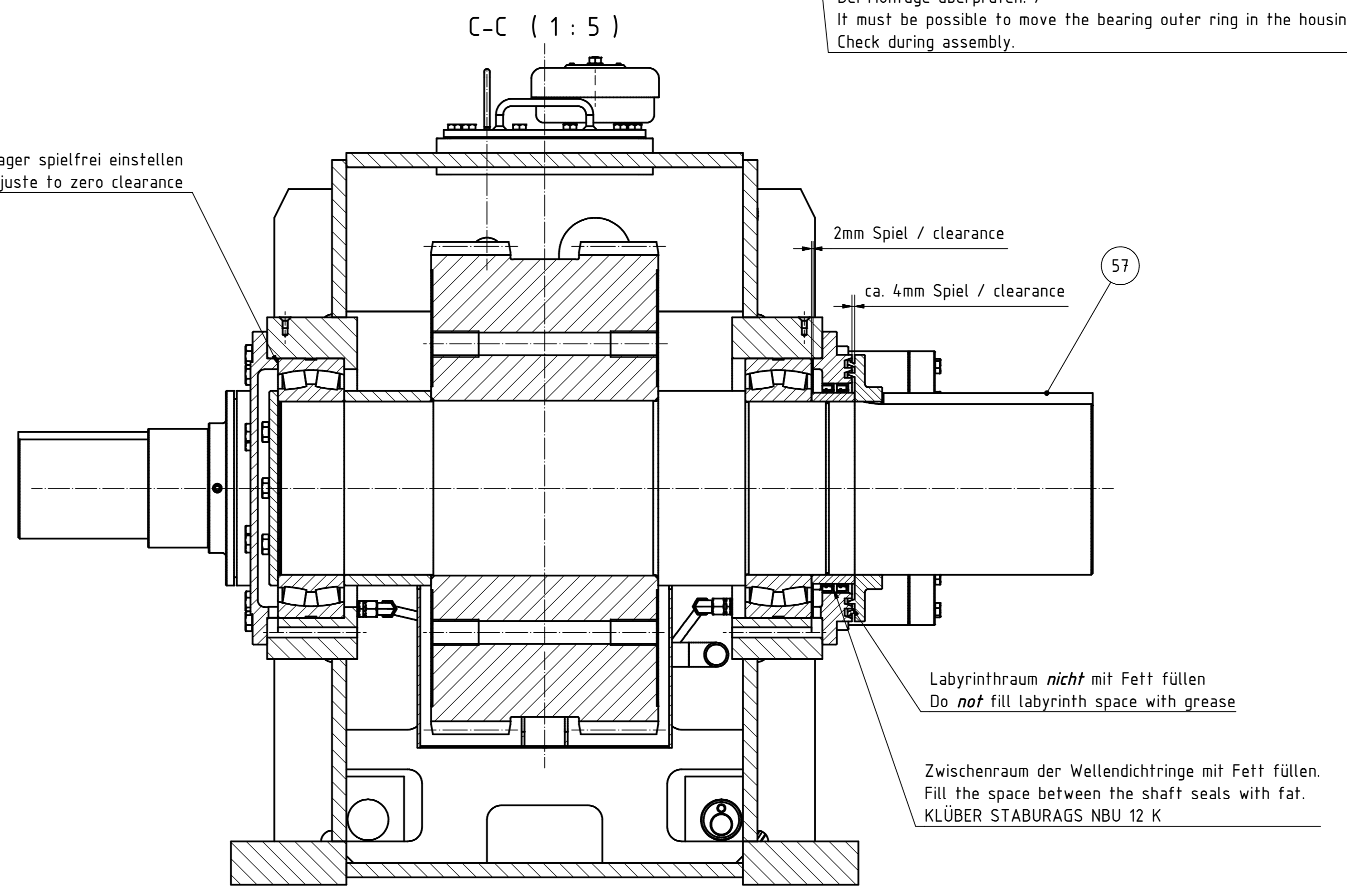
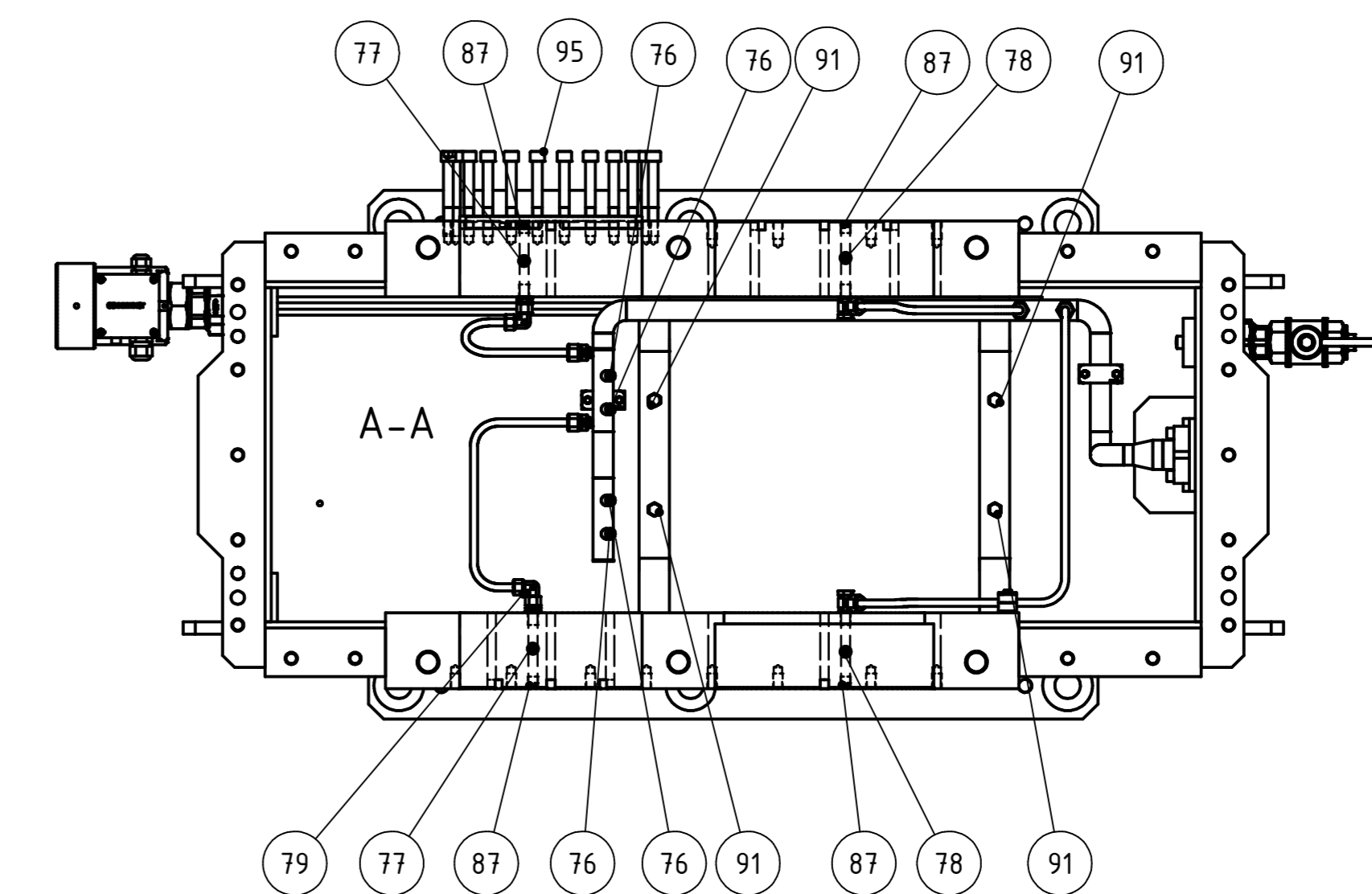
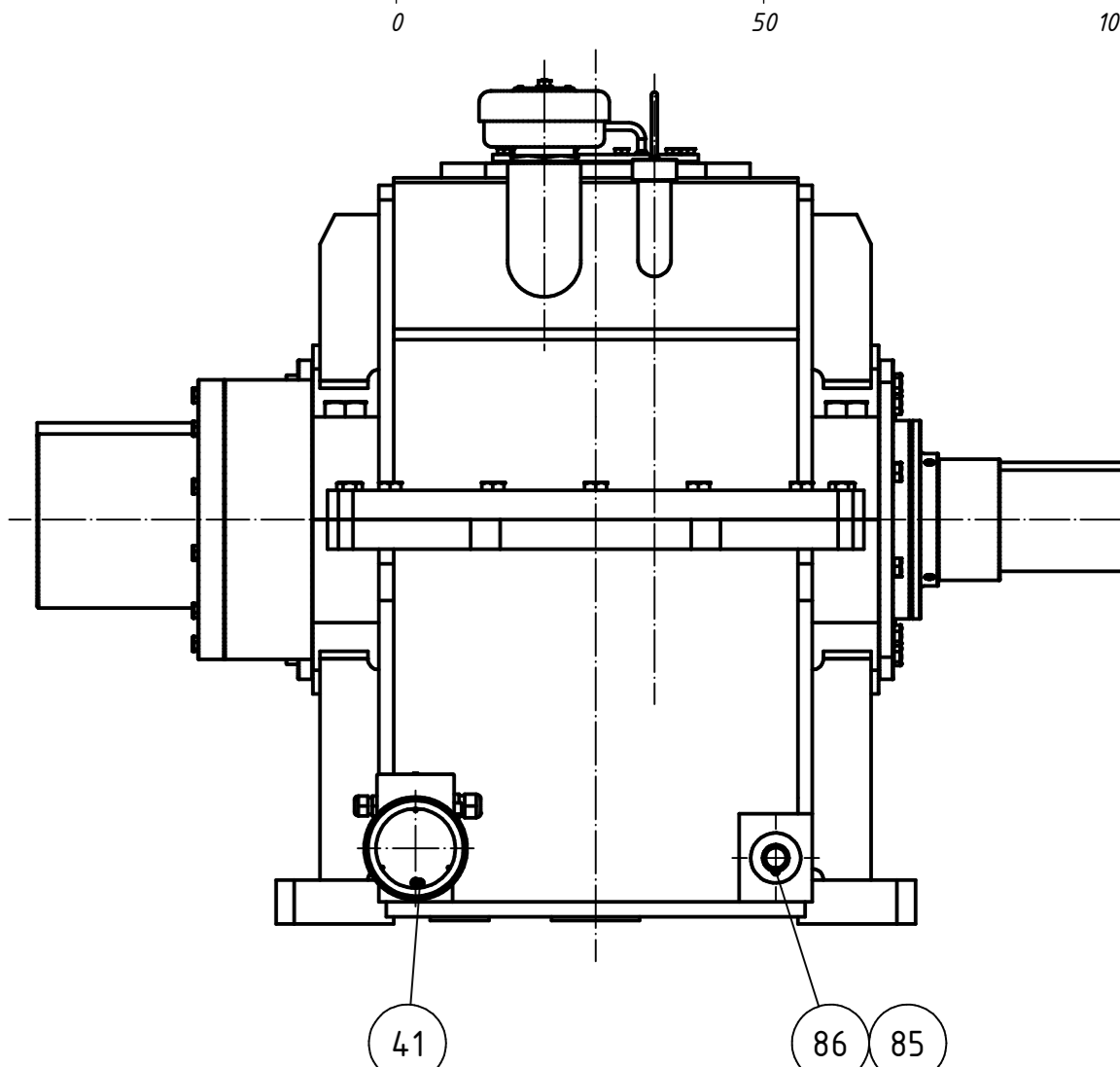
Mischbarkeit von Ölen / Miscibility of oils:

- DE** Öle auf Polyglykolbasis sind nicht mit Ölen auf Kohlenwasserstoffbasis - d.h. mit Mineralölen oder Polyalphaolefinen mischbar.
- EN** Oils based on polyglycols are not mixable with oils based on hydrocarbons, that means with mineral oils or polyalphaolefine oils!
- FR** Des huiles sur base de Poly-Glycolle ne peuvent pas être mélangées avec des huiles sur base de carbone, c.-à-d. des huiles minérales ou des huiles sur base de Poly-Alpha-Oléfine.
- ES** Los aceites con base poliglicol no se mezclan con aceites de base hidrocarburo, es decir aceites minerales o polialfaolefinicos
- NI** Olien op basis polyglycol kunnen niet worden vermengd met olie op basis van koolwaterstof - dat wil zeggen met minerale olie of olie op basis van polyalphaolefine!
- RU** Масла на основе полигликоля нельзя смешивать с маслами на основе углерода - т.е. с минеральными маслами или полиальфаолефинами
- PT** Óleos à base de poliglicol não são misturáveis com óleos à base de hidrocarboneto, isto é, com óleos minerais ou com óleos à base de polialfaolefin.



Schmiersicherheit / Lubrication safety:

- DE** Um optimale Schmiersicherheit zu gewährleisten, sollen Öle gleicher Art und Viskosität jedoch von unterschiedlichen Herstellern nicht gemischt werden. Gegebenenfalls ist mit den Lieferanten Rücksprache zu halten.
Bei Grundölen der hier aufgeführten Wälzlagerfette handelt es sich um Mineralöle. Werden Polyglykolöle verwendet, muss auch das Fett auf das Polyglykolöl abgestimmt sein.
- EN** In order to guarantee an optimal performance, oils of the same kind and viscosity, but of different manufacturers should not be mixed. When necessary please consult the supplier.
The base oils of the mentioned rolling bearing greases are mineral oils. If polyglycol oils are used, the grease has to correspond with the polyglycol oil.
- FR** Pour garantir une sécurité de graissage optimale on ne doit pas mélanger les huiles de la même sorte et de la même viscosité, mais de fabricants différents. Le cas échéant il faut consulter le fournisseur.
Les huiles de base des graisses de roulement ici mentionnées sont des huiles minérales. Quand on emploie des huiles sur base de Poly-Glycolle, l'huile de base de la graisse doit être accordée à l'huile sur base de Poly-Glycolle.
- ES** Con el fin de garantizar una correcta lubricación, se utilizarán siempre aceites del mismo tipo y viscosidad, no mezclando nunca aceites de distintos fabricantes. En caso de duda, consultar con el proveedor.
La grasa para rodamientos tiene un aceite de base mineral. Si se utiliza aceite poliglicol, la grasa deberá ser compatible con el aceite.
- NI** Om optimale smeerveiligheid te kunnen garanderen mogen oliën van het gelijke type en met een gelijke viscositeit, die echter van verschillende producenten stammen, niet worden gemengd. Zo nodig dient contact op te worden genomen met de leverancier.
Bij de basisoliën van de hier genoemde wentellagervetten gaat het om minerale oliën. Wanneer oliën op basis van polyglycol worden gebruikt, moet ook het vet zijn afgestemd op olie op basis van polyglycol.
- RU** Для обеспечения оптимальной надежности смазки следует не мешать масла одного и того же типа и вязкости разных производителей. При необходимости, следует проконсультироваться с поставщиками. Масляными основами приведенных здесь смазок для подшипников качения являются минеральные масла. Если будут использоваться масла на полигликольной основе, то необходимо будет подобрать консистентную смазку, подходящую к таким маслам.
- PT** De modo a garantir a maior segurança de lubrificação, os óleos do mesmo tipo e viscosidade mas de fabricantes diferentes não devem ser misturados. Eventualmente deverá consultar o fornecedor. Os óleos base para as massas dos rolamentos de esferas de rolos aqui mencionados são óleos minerais. Se forem utilizados óleos à base de poliglicol, a massa lubrificante deverá ser igualmente compatível com o óleo à base de poliglicol.

[illegible]

[pekrun]			Commission:	2.0.19396-20.1	partlist-no.:	PART-060562	GEARBOX ASR 450-R-CCW		page	1
			Gearbox Type:	ASR 450 -R-CCW	dimension drawing-no.:	PN-00096635.001.01				
			Ratio:	2,9231:1	sectional drawing-no.:	PN-00096635.010.01		translated (Name/Date)	of:	4
			Name/Date:	Appel/04.11.2021				A	B.Schröder/19.05.2022	
Pos.	Qty.		Designation	Article no.						
			Specification	Document no.						
1	1		HOUSING	PART-057677						
				PN-00077526.005.01 -						
2	1		INSPECTION COVER WITH HANDLE	PART-054719						
				PN-00074215.005.01 -						
3	1		OIL PAN	PART-057700						
				PN-00077580.000.01 -						
4	1		OIL DIPSTICK COMPLETE	PART-057347						
				PN-00076785.005.01 -						
5	1		COVER 290	PART-057243						
				PN-00076539.000.01 -						
6	1		COVER 360	PART-057228						
				PN-00076520.000.01 -						
7	1		LABYRINTH COVER 300	PART-057239						
				PN-00076533.000.01 -						
8	1		LABYRINTH COVER 360	PART-057234						
				PN-00076524.000.01 -						
9	1		LABYRINTH RING	PART-057235						
				PN-00076526.000.01 -						
10	1		LABYRINTH RING	PART-057238						
				PN-00076532.000.01 -						
20	1		PINION SHAFT 26	PART-057699						
				PN-00077578.000.01 -						
				PN-00077579.009.01 -						
21	1		SPUR GEAR 76	PART-057696						
				PN-00077575.000.01 -						
22	1		WHEEL SHAFT	PART-057585						
				PN-00077353.000.01 -						
30	1		SPACER RING	PART-057236						
				PN-00076528.000.01 -						
31	1		SPACER RING	PART-057237						
				PN-00076529.000.01 -						
32	1		SPACER RING	PART-057240						
				PN-00076535.000.01 -						

[pekrun]			Commission:	2.0.19396-20.1	partlist-no.:	PART-060562	GEARBOX ASR 450-R-CCW		page	2
			Gearbox Type:	ASR 450 -R-CCW	dimension drawing-no.:	PN-00096635.001.01				
			Ratio:	2,9231:1	sectional drawing-no.:	PN-00096635.010.01		translated (Name/Date)	of:	4
			Name/Date:	Appel/04.11.2021				A	B.Schröder/19.05.2022	
Pos.	Qty.		Designation	Article no.						
			Specification	Document no.						
33	1		SPACER RING	PART-057586						
				PN-00077354.000.01 -						
34	1		SPACER RING	PART-057352						
				PN-00076799.000.01 -						
36	1		END PLATE	PART-051274						
				PN-00068494.000.01 -						
37	1		END PLATE	PART-057227						
				PN-00076519.000.01 -						
40	1		ONE-WAY CLUTCH E-FC5045	PART-057433						
				SC-00076947.009.01 -						
41	1		HEATING CARTRIDGE-CSN EX R2"-EL=1400	PART-057342						
42	1		PIPE FITTING	PART-057346						
50	2		ROLLING BEARING DIN635	PART-057211						
51	2		ROLLING BEARING DIN635	PART-057212						
52	1		INNER RING	PART-001292						
53	1		INNER RING	PART-001300						
54	2		ROTARY SHAFT LIP TYPE SEAL	PART-019776						
55	2		ROTARY SHAFT LIP TYPE SEAL	PART-014878						
57	1		PARALLEL KEY	PART-057337						
58	1		PARALLEL KEY	PART-057336						
59	2		PARALLEL KEY	PART-057590						
63	1		SPRING-TYPE STRAIGHT PIN	PART-028305						

[pekrun]			Commission:	2.0.19396-20.1	partlist-no.:	PART-060562	GEARBOX ASR 450-R-CCW		page	3
			Gearbox Type:	ASR 450 -R-CCW	dimension drawing-no.:	PN-00096635.001.01				
			Ratio:	2,9231:1	sectional drawing-no.:	PN-00096635.010.01		translated (Name/Date)	of:	4
			Name/Date:	Appel/04.11.2021				A	B.Schröder/19.05.2022	
Pos.	Qty.		Designation		Article no.					
			Specification		Document no.					
74	1		O-RING		PART-057513					
75	1		O-RING		PART-018892					
76	4		ORIFICE PLATE		PART-016279					
					PN-00034550.000.01 -					
77	2		ORIFICE PLATE		PART-015292					
					PN-00033574.000.01 -					
78	2		ORIFICE PLATE		PART-016489					
					PN-00034788.000.01 -					
79	1		PIPING INSIDE COMPLETE		PART-057686					
					PN-00077549.005.01 -					
80	1		AERATION FILTER		PART-033181					
81	1		OIL LEVEL INDICATOR		PART-013240					
82	1		OIL DRAIN		PART-057341					
					PN-00076762.005.01 -					
85	2		SEALING RING		PART-001230					
86	1		SCREW PLUG		PART-013869					
87	4		SCREW PLUG		PART-001366					
90	6		SET SCREW		PART-013278					
91	4		SCREW		PART-013986					
92	12		SCREW		PART-011927					
93	26		SCREW		PART-003989					

[pekrun]			<i>Commission:</i>	2.0.19396-20.1	<i>partlist-no.:</i>	PART-060562	GEARBOX ASR 450-R-CCW		<i>page</i>	4
			<i>Gearbox Type:</i>	ASR 450 -R-CCW	<i>dimension drawing-no.:</i>	PN-00096635.001.01				
			<i>Ratio:</i>	2,9231:1	<i>sectional drawing-no.:</i>	PN-00096635.010.01		<i>translated (Name/Date)</i>	<i>of:</i>	4
			<i>Name/Date:</i>	Appel/04.11.2021				A	B.Schröder/19.05.2022	
Pos.	Qty.		Designation	Article no.						
			Specification	Document no.						
94	8		SCREW	PART-003973						
95	24		SCREW	PART-010868						
200	2		DIRECTION OF ROTATION INDICATOR	PART-002302						
			BIG SIZE	PN-00020759.000.01 -						
201	1		PEKRUN STANDARD TYPE PLATE	PART-028768						
			BIG SIZE	PE-00045948.000.01 C						

Translation
Created for the applicable standards in Germany

Only for use in a commercial environment!

Instruction manual

Article-Number: 2119931402134040605

Ex-Heater

Type		: 95F/HC-Exdet1,3T3/T200°C/RBE
Power	(KW)	: 1.3
Tolerance of power	(%)	: +5/-10
Voltage		: 400 V, 2~

SCHNIEWINDT GMBH & CO. KG

Schöntaler Weg 46

58809 Neuenrade, Germany

Phone: +49 2392 692-0

Fax: +49 2392 692-11



info@schniewindt.de

www.schniewindt.de

Table of Content

1	Product information.....	3
2	Intended use	3
3	Safety.....	4
4	Connection and performance data.....	5
5	Mounting notes	7
6	Mounting instructions	10
7	Electric Installation	11
8	Commissioning	12
9	Repair of malfunctions	13
10	Repairs	13
11	Maintenance and servicing	14
12	Dismantling	14
13	Storage	15
14	Disposal	15
15	Standards	15

1 Product information

Name	: Ex-Heater
Type	: 95F/HC-Exdet1,3T3/T200°C/RBE
EC type approval certificate	: BVS 15 ATEX E 143 X
	: IECEx BVS 15.0117X
Marking	:  II 2G Ex db eb IIC T3
	 II 2D Ex tb IIIC T200°C
	Flameproof enclosure (d)
	Increased safety (e)
	Protection by enclosure (t)
Temperature class	: T3
Mounting position	: horizontal, sensor protection tube, above
Design / approval	: ...
Fields of application	: zone 1 und zone 21
Environment temperature at the header	: - 40°C ... +50°C
Protection category	: IP 65
Drawing number	: hand sketch

2 Intended use

Ex-device, type 95F/...- Ex det. T., according to EC-Type Examination Certificate

BVS 15 ATEX E 143 X. Operating range: Zone 1 or Zone 21.

The Ex-device is used for heating the liquid specified under the operating data within the prescribed limits stated there. **Deviations from this are not allowed.**

For this purpose, the heating elements of the Ex-device are introduced into pipelines, containers or the like.

3 Safety

Observe the basic instructions in this Operation Manual for installation and operation.
The Operation Manual must be read and understood by the installation engineer and operating company responsible prior to assembly and commissioning.

Keep the Instruction Manual for later use.

Pass on the Instruction Manual to all subsequent owners and operating companies.



Surface temperatures of **up to 200°C** may occur on the ex-device in the area of the flange/cooling line due to the high media temperatures. There is a risk of burns. Suitable measures must be taken on site for protection against burns.

Do not make any modifications to the product.

Modifications can disable safety devices and cause personal injury and property damage.

Modifications lead to invalidation of conformity.

Respect any specified installation position and the flow direction of the medium to be heated.

The attention of operators is hereby drawn to the statutory requirements valid in every country for the operating of pressure vessel appliances.

Carry out periodic inspections in compliance with the national provisions.

Inspect safety-relevant components for proper function prior to commissioning.

Carry out an annual function inspection of the safety devices.

At shorter intervals depending on the level of use and ambient conditions.

4 Connection and performance data



A direct connection of aluminium conductors to the connection terminals is not allowed.

The site connection cable must have a minimum cross-section of 1.5 mm².

The cable must be suitable for high temperatures, insulation temperature min. 85°C.

Electrical data³

Power	(kW)	: 1.3
Tolerance of power	(%)	: +5/-10
Steps		: 1
Voltage		: 400 V, 2~
Connection		: triangle
Cable gland		: 2x M20x1,5, -55...+160°C, IP66, stainless steel
		5...9mm (sealing insert with Inlet)
		9...14mm (sealing insert without Inlet)
		..1x for connection Ex-device
		1x for limiter and controller

Heating element

Type		: High performance cartridge compacted
Diameter tube	(mm)	: 32
Material tube		: 1.4571
Immersion length of heat. elem.	(mm)	: 1.400
Unheated length	(mm)	: 50
Cooling line	(mm)	: without
Diameter tube bundle	(mm)	: 50

Process Data

Medium		: gear-oil, resting
Installation location		: vessel
Operating temperature	(°C)	: 40
Min. permissible Temperature	(°C)	: 0
Max. permissible Temperature	(°C)	: 80
Max permissible Pressure	(bar g)	: 0.5
Operating pressure	(bar g)	: ...
Max. permissible pressure	(bar g)	: ...

Flange

DIN : ISO228, G2" .1.4571

Sealing : Vovapress universal

Temperature Monitoring

Controller : 0-100°C, 230V, 16A

Temperature Limiter : 0-150°C, 230V ~, 16A,

The limiter is set to 80° C and sealed.**The manufacturer sets the limiter and it is not allowed to change.****The limiter and controller are directly interconnected.**

Connection head : GGG40.3, coated



A level monitor and an electrical controller are necessary for operation. These safety devices are not included in the delivery of the Ex-device. They have to be installed and adjusted by the constructor. Please note "mounting instructions" for safety devices in this operation manual.

5 Mounting notes

1. Installation location / installation conditions

The Ex-device must be installed in a suitable container / vessel in such a way that the heating elements and the heat can be dissipated unimpeded. The unheated length of the Ex-device and the installation conditions must be compatible. The heated length of the Ex device must be at least 50 mm in the medium. Heating within the container nozzle is not permitted. Deviations from this could lead to heat accumulation causing overheating/rendering the temperature limit ineffective.

The Ex unit must be installed in the vessel in such a way that the sensor protection tubes for regulator and limiter are above the cartridge tube in the medium.



A level monitor and an electrical controller are necessary for operation. These safety devices are not included in the delivery of the Ex device. They have to be installed and adjusted by the constructor. Please note "mounting instructions" for safety devices in this operation manual.

2. Temperature limiter

The temperature limiter has already been installed by the manufacturer. The trigger temperature has already been set and can not be changed.

3. Level monitor

The level monitor must be installed in such a way that minimum monitoring of the device with the heated medium of 50 mm is ensured. Triggering of the level monitor must result in switching off the device.

This measure must ensure that the device cannot run dry and/or a filling level that is too low offsets the reliable switch-on function of the limiter, e.g. due to the limiter sensor running dry.

4. Electrical controller

The Ex-device must be operated with an electrical controller. When shutting down a safety device (temperature limiter, flow monitor or level monitor), the Ex-device must be disconnected from the mains supply by means of a separate shut-down method (contactor) of the controller. This separate shut-down method must work independently of operationally necessary measuring and/or control devices.

5. Requirements for the safety devices

Monitoring devices (temperature limiters, level monitoring) must be functionally and reliably tested in accordance with the relevant regulations. Within the scope of Directive RL2014/34/EU they must either:

- Be certified according to RL2014 / 34 / EU (Examination Basis DIN EN 50495 SIL 1)
- In the framework of the assessment of the protection concept for the installation by the installer / operator, be assessed separately in accordance with RL2014 / 34 / EU.

6. Arrangement connection head

The connection head of the Ex-device must not be arranged in the immediate vicinity (<2m) of charged flowing particles (e.g. high-voltage electrode, ionizer, product stream that is not conducted within a closed metallic tube).

7. Ambient temperature range

During operation, the minimum or maximum ambient temperatures at the connection head specified in these instructions must not be exceeded or fallen short of. In the event of deviating ambient temperatures, the Ex-device must be switched off.

8. Unimpeded heat dissipation connection head

The connection head must not be provided with thermal insulation, as this would cause the connection area to overheat.

9. An overpressure safety valve must be provided on-site.

10. Subsequent painting

A subsequent coat of paint or powder coating of the Ex-device is forbidden.

11. Requirements for the medium

No contamination or foreign objects may enter the device / system. The medium must be free from impurities. Deposits, abrasive wear or similar are not permitted. Install appropriate measures, e.g. Filter, etc.

12. Emptying

Provide suitable facilities for emptying the container.

13. Exchange cable entry

If the cable glands mounted by the manufacturer should be replaced, suitable cable glands with an additional gasket or sealant must be used.

6 Mounting instructions

Before using the Ex-device, a visual inspection for transport damage must be carried out. It is not permitted to use a damaged Ex-device.

The Ex-device must be permanently installed and operated according to the specified installation position.

The transportation equipment and lifting gear must be selected in such a way that the heating elements cannot be bent or damaged during transportation and installation.

The Ex-device may only be attached to suitable structures designed to bear the weight of the Ex-device. For lifting and for the installation of the Ex-device only means of transport and tools, which are suitable for the load, may be used. For lifting may be used only lifting attachment which are sufficiently dimensioned and exhibit no damages.

Enough space must be allowed to ensure that any subsequent expansion of the Ex device is possible. Linear expansion during heating must be taken into account. The Ex-device must be brought to the final installation position slowly and while simultaneously aligning it.

Installation note:

- Use a suitable wrench.
- Put it only on the hexagon of the threaded flange on the wrench.

In any case, the force may be introduced via the connection head.

- The thread must be in perfect condition.
- Screw the threaded flange firmly.
- Tightening after the first heating (if necessary).

The Ex-device is to be screwed on firmly.

7 Electric Installation

An electrical engineer with the respective training may only execute the work described below.

The directive EN 60079-14 (VDE 0165/1) must be observed for the installation of the device. It must only be executed by persons who are familiar with **explosion protection**, i.e. by engineers with the respective training. The erecting engineer must write a respective installation certificate.

TT- and TN systems: A fault current protection device with a calculation value of the fault current of any more than 100 mA must be installed. Fault current protection device with a calculation value of the fault current of 30 mA are preferred.

IT system: An isolation control device has to be used, which interrupts the supply whenever the insulation resistance amounts to no more than 50 Ohm/V, related to the calculation tension.

- The supply voltage must be checked for compliance with the voltage indicated on the type plate.
- The temperature class required for the installation location must be checked for compliance with the temperature class indicated on the type plate.
- When choosing the cross sections for connection, the loads, fuse protection etc., the relevant regulations must be observed. (See a.o. VDE 0100, VDE 0298-4).

Electrical installation

A direct connection of aluminium conductors to the connection terminals is not allowed.

The site connection cable must have a minimum cross-section of 1.5 mm².

The cable must be suitable for high temperatures, insulation temperature min. 85°C.

1. Unscrew the 4 cover screws.
2. Take of the connection box.
3. Insert the cables through the cable glands into the connection box.
4. The nut of the cable gland must be drawn up to guarantee strain relief and protection category. (Cables and cable glands must be matched, so that the required protection category is guaranteed.)
5. Connect cable to the Ex conductor terminals according to the connection diagram
6. Connect the earth terminals.
7. Make earth conductor connection.
8. Generate external equipotential connection.
9. Check connections for tight fit.
10. Replace the cover of the connector box again.
11. Tighten the 4 cover screws. (About 2 Nm)

8 Commissioning**Important instructions:**

The temperature class is defined by the manufacturer. The local and operating conditions are specified.

Commissioning is only permissible if the Ex-device has been installed according to the specifications stated in the chapter MOUNTING INSTRUCTIONS.

1. Guarantee before switching on, that the temperature monitoring is connected
2. Before use check the correct closeness of the connection hood.
3. Guarantee before switching on, that the device is filled with the medium, which can be warmed up, and/or that it's sufficiently flowed through by the medium.

9 Repair of malfunctions

Exclusively electrical engineers who are familiar with explosion protection must execute the work described below.

- Check fusing outside the Ex-area.
- An official confirmation, that no fire hazard exists must be asked for, whenever the terminal box must be opened for measurement purposes.

Malfunction: Ex-device does not heat up

Repair: Check fusing
Control the supply voltage
Check the control unit
The on-site temperature control is set to a low temperature.
→ Set temperature control to the correct temperature.
Ex-temperature-limiter switched off circuit.
→ Check reason, remove fault, reset temperature limiter.

- Run the initial start-up procedure after each repair of malfunctions/ failures.

10 Repairs

Repairs may only be carried out after written approval by the Schniewindt GmbH & Co. KG.

Only spare parts approved by the manufacturer (Schniewindt GmbH & Co. KG) may be used.



A repair on the flameproof gaps may only be carried out by the manufacturer. The repair of flameproof gaps according to the values of table 3 of the IEC 60079-1:2014 is not permitted.

11 Maintenance and servicing

Inspect the safety device (temperature limiter, level monitor) to make sure that they function properly in compliance with the relevant provisions. **An annual inspection is recommended. At shorter intervals depending on the level of use and ambient conditions.** To satisfy the requirements of the EX-protection, the device must remain sealed.

- To fulfil the Ex-protection requirements, the Device must remain closed.

For perfect operation of the device the following aspects must be checked:

- ✓ measure the insulation values
- ✓ measure the resistance values (Ω)
- ✓ measure and check the thermostat and / or limiter function
- ✓ Visual inspection for damage
- ✓ Visual inspection for deposits or incrustations on the heating elements
- ✓ Visual inspection for leaks
- ✓ Visual inspection of the electrical connection compartment (Moisture, rust, .. reduce the insulation value and must be removed.)

Deposits or incrustations on the heating element can destroy the device and must be removed.

The cleaning must be do carefully, so that the surface is not damaged.

Carry out an annual functional test of the safety devices.

Depending on the application and environment in a shorter interval.

12 Dismantling

- Only dismantle the system if there is no danger of explosion. (fire permit)
- Switch off the system and secure to prevent unintentional restart.
- Allow the Ex-device to cool to room temperature.
- Uninstall and remove the connecting cable.

13 Storage

The store room must be dry and free of dust.

Make sure that the storing temperatures are between -40°C and +40°C.

Before storing, be sure that there is no humidity penetrated inside the terminal box during transport or interim storing.

All openings must be closely locked, in order to prevent a penetration from dust/moisture.

The terminal box shall be tightly closed if necessary the cable entries must be equipped with blinds.

Place a drying agent in the terminal box to absorb existing humidity.

Use only chemically indifferent drying agents (e.g., silica gel).

Change the drying agent at the specified intervals. Observe the instructions of the drying agent manufacturer.

During storage over a longer periods (several months), it is to be expected that the system-related insulation resistance reduces.

The device may be put into operation only when it is ensured that the insulation resistance is greater, in accordance with the standard DIN 44874, part 1, paragraph 5.3

$$R_{iso} = \frac{2 \text{ M}\Omega}{\text{Number of installed tubular heating elements}}$$

Measured in the cold state with a voltage of 500V DC.

14 Disposal

- Remove any problematic deposits in accordance with local regulations.
- Dispose of the Ex-device in accordance with local regulations.
- Give metals and plastics sorted for recycling or scrapping.

15 Standards

The applied standards can be found in the enclosed EC declaration of conformity. The device is manufactured in compliance with the following international standards:

⇒	EN 60079-0	General requirements
⇒	EN 60079-1	Flameproof enclosure „d“
⇒	EN 60079-7	Increased safety „e“
⇒	EN 60079-31	Protection by Enclosure „t“



EU-Konformitätserklärung / EU declaration of conformity

Wir/ We

Schniewindt GmbH & Co. KG
Schöntaler Weg 46, 58809 Neuenrade

erklären in alleiniger Verantwortung, dass das Produkt /
hereby declare in sole responsibility that the product

CSN® Ex Heizkörper / CSN® Ex Heater **95**/**-Exde* ***T*/T***°C**

Kennzeichnung/ marking:



II 2G Ex db eb IIC T. und / and optional
II 2D Ex tb IIIC T...°C

auf das sich diese Erklärung bezieht, den Bestimmungen der folgenden Richtlinie entspricht /
to which this declaration relates is in accordance with the provisions of the following directive

2014/34/EU
2014/30/EU

„ATEX- Richtlinie“ / „ATEX- Directive“
„EMV- Richtlinie“ / „EMC- Directive“

Angewandte harmonisierte Normen / Applied harmonised standards:

EN60079-0:2012+A11:2013
EN60079-7:2015
EN61000-6-2:2005/AC:2005

EN60079-1:2014
und / and optional EN60079-31:2014
EN61000-6-4:2007+A1:2011

EU-Baumusterprüfbescheinigung nach Anh. III/EC type examination certificate according to Ann. III

BVS 15 ATEX E 143 X der / from

DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Kennnummer / identification number: 0158

Produktionsüberwachung nach Anhang VII/Production surveillance according to Annex VII:

BVS 15 ATEX ZQS/E401 der / from

DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Kennnummer / identification number: 0158

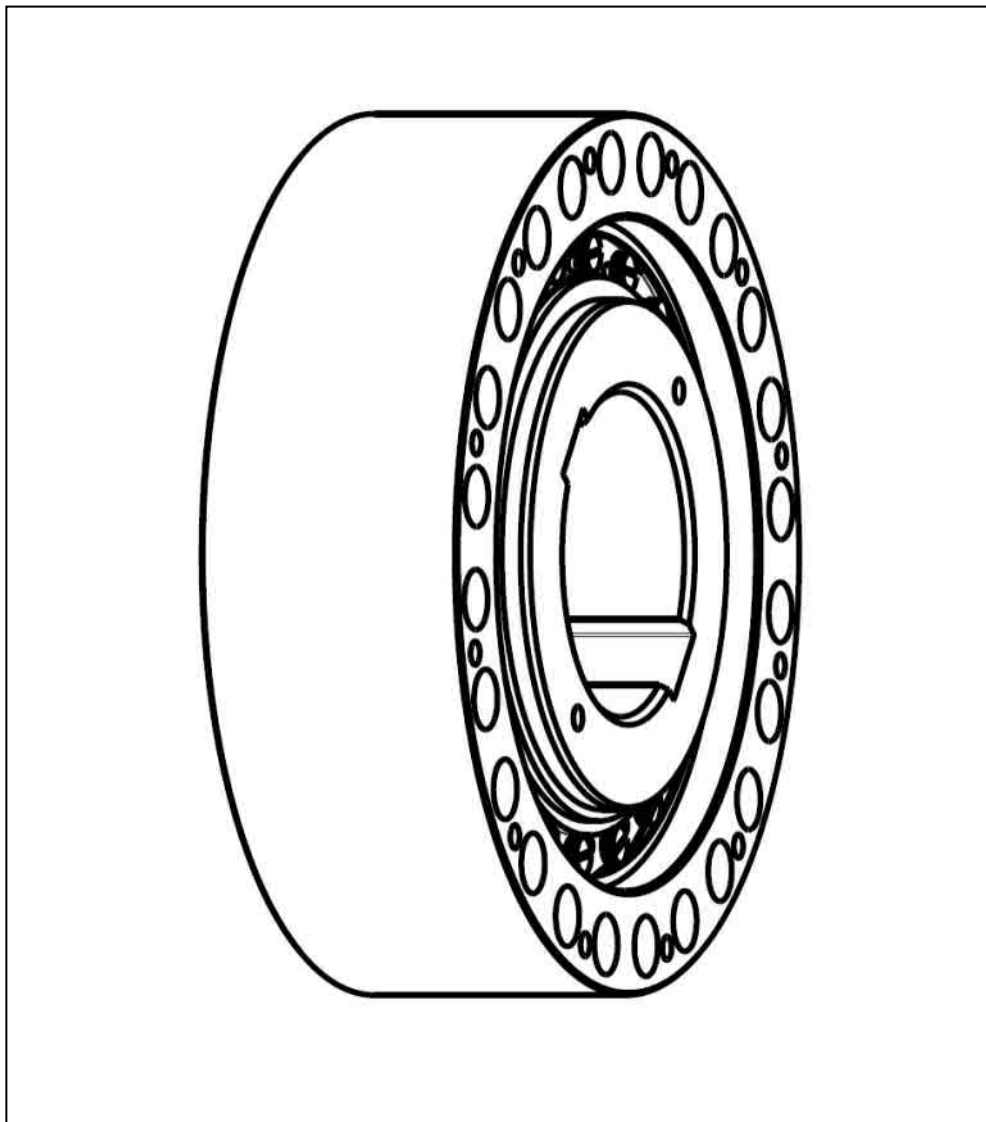
Neuenrade, den 12.11.2018

Dr. Karl Kaluza

Leiter des Qualitätsmanagements/
Head of Quality Management

Assembly and maintenance manual

Type FC5045



Hatschekstr.36
69126 Heidelberg
Germany
Phone +49(0)6221 30470
Fax +49(0)6221 304731
info@stieber.de
www.stieber.de



Date 30.4.2019 GB
Revision: 0

U:\EngUsers\I\ProduktDoku\1AAA_Einbauerklaerung_Wartungsanleitung_Konformitaetserklaerung\1AAA_Wartungsanleitungen\Orginal_Worddatei\M1260E_0_FC5045.docx

General safety instructions





	WARNING!	Risk of injury due to moving components! Rotating driven components can cause the most severe injuries. Therefore, during operation: <ul style="list-style-type: none"> ➤ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➤ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: <ul style="list-style-type: none"> ➤ Switch off the power supply and secure it against being switched on again ➤ Wait for lagging components to come to a standstill
	DANGER!	Danger due to improper operation! <ul style="list-style-type: none"> ➤ Modifications to the one-way clutch are not permitted and may impair safety ➤ All tasks may only be performed by personnel with the requisite training and expertise ➤ Repairs and maintenance tasks may only be performed when the machine is at a standstill. To this end, the machine is to be secured against a restart
	WARNING!	Risk of injury due to incorrect assembly! Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.
	WARNING!	Risk of injury for insufficiently qualified personnel! Improper handling can cause significant personal injury and property damage. Therefore: Only ever have tasks performed by those persons to whom the tasks have been assigned.

Table of contents

Page

General safety instructions	2
1 General.....	4
1.1 Information relating to the assembly and maintenance manual	4
1.2 Explanation of symbols	4

1.3	Manufacturer	5
1.4	Labeling	5
1.5	Environmental protection.....	5
2	Safety	5
2.1	Intended use	5
2.2	Responsibility of the operator	6
2.3	Assembly and maintenance personnel.....	6
2.4	Personal protective equipment.....	7
2.5	Limitations of use	7
3	Structure and function	8
3.1	Structure	8
3.2	Function	9
4	Transport and packaging.....	10
5	Storage.....	11
5.1	Short-term storage	11
5.2	Long-term storage.....	12
6	Installation	12
6.1	Checking the direction of rotation	12
6.2	Lubrication	14
6.2.1	Operation with oil lubrication	14
6.2.2	Operation with grease lubrication	14
6.2.3	Protection against corrosion damage	15
6.3	Assembly	15
6.4	Mounting example.....	17
7	Maintenance	17
7.1	Disassembly in case of maintenance	18
7.2	Test criteria in case of maintenance.....	18
7.3	Assembly in case of maintenance when using grease lubrication.....	19
8	Disassembly	20
9	Disposal	21
10	Faults	22
11	Spare parts	22
12	Appendix.....	22
12.1	Drawing FC5045	23

1 General

1.1 Information relating to the assembly and maintenance manual

This assembly and maintenance manual provides important information regarding the installation and commissioning of the one-way clutch.






Prerequisite for safe operation is compliance with all of the stated safety and handling instructions.

Moreover, the relevant local accident protection guidelines and general safety provisions for the field of application of the one-way clutch are to be complied with.

Read the assembly and maintenance manual carefully prior to installation and commissioning. It is a product component and must be kept in the immediate vicinity of the installation site and be accessible to personnel at all times. Furthermore, all safety instructions stated in the assembly and maintenance manual are to be observed.

1.2 Explanation of symbols

Warnings are marked throughout this assembly and maintenance manual by symbols. These warning symbols are introduced by signal words which indicate the extent of the danger. Comply with these warning symbols under all circumstances and act with due care and attention to avoid accidents, personal injury and property damage.

	DANGER!	...indicates an imminently dangerous situation which can be fatal or cause severe injuries if it is not averted.
	WARNING	...indicates a potentially dangerous situation which can be fatal or cause severe injuries if it is not averted.
	ATTENTION	...indicates a potentially dangerous situation which can cause minor or light injuries if it is not averted.
	CAUTION	...indicates a potentially dangerous situation which can cause property damage if it is not averted.
	NOTE	... highlights helpful tips and recommendations as well as information for efficient and fault-free operation.

1.3 Manufacturer

STIEBER GmbH, D-69126 Heidelberg, Hatschekstr. 36, Germany
Phone +49 (0) 6221 3047-0, Fax -31

1.4 Labeling

Front face of the outer race

- Manufacturer's name
- Type designation
- Date of manufacture (coded)

1.5 Environmental protection

Energy: The one-way clutch does not use any electrical energy.

Materials: Steel

Recycling: Steel parts are up to 100% recyclable.

2 Safety

2.1 Intended use

One-way clutches of type FC5045 are directional clutches, engaged and disengaged automatically, depending on the relative direction of rotation.

The torque is transmitted by a force-locking connection. They can be used as overrunning clutches or backstops in machinery and equipment.

Driving operation of an overrunning clutch:

When operating in torque transmission mode the driving machine element and the driven member are connected in a force-locking manner. In this operating state, a torque will be transferred.

Overrunning operation of an overrunning clutch:

The overrunning clutch disengages automatically when the driven member rotates faster than the driving member.

The contact-free operation will be ensured, when the driven member connected with the inner race runs above a defined speed. From this speed up the wear-free operation of all function-relevant components is guaranteed.

Lockout mode of a one-way clutch:

When operating in the locking direction of the one-way clutch, the machine shaft and the torque bracing to the machine element are connected in a force-locking manner.

In this operating state, a torque will be transferred.

Overrunning mode of a one-way clutch:

The one-way clutch disengages automatically the force-locked connection between the machine shaft and the torque bracing to the machine element, when the machine shaft runs in freewheeling direction. The contact-free operation will be ensured, when the machine shaft is rotating above a defined speed. From this speed up the wear-free operation of all function-relevant components is guaranteed.


2.2 Responsibility of the operator

The operator of the machine, in which the one-way clutch is installed, is subject to the legal obligations concerning occupational safety.

The valid provisions for the site of operation as well as the safety and accident prevention regulations of the trade associations are to be observed. This, in particular, means that the operator:

- is aware of the valid occupational safety provisions
- implements the necessary behavioral requirements for operation of the machine, in which the one-way clutch is installed, at the site of operation
- clearly defines responsibilities for installation, operation, maintenance and cleaning of the machine in which the one-way clutch is installed
- ensures that all staff members, who work at or with the machine in which the one-way clutch is installed, are employed and have read and understood the operating manual. Moreover, he must, at regular intervals, provide training for personnel on how to handle the machine, in which the one-way clutch is installed, and inform them of the potential dangers. In addition, the operator is responsible for ensuring that the machine in which the one-way clutch is installed:
 - is always in perfect technical condition
 - is maintained in accordance with the specified maintenance intervals
 - has all its safety equipment checked regularly for completeness and functionality

2.3 Assembly and maintenance personnel

	WARNING	Risk of injury for insufficiently qualified personnel! Improper handling can cause significant personal injury and property damage. Therefore: <ul style="list-style-type: none"> ➤ Only ever have tasks performed by those persons to whom the tasks have been assigned
---	----------------	---

Qualified personnel are those persons who, owing to their training, experience and instruction as well as their knowledge of relevant standards, provisions, accident prevention regulations and operating conditions, have been authorized by the person responsible for the safety of the plant to perform the requisite tasks and are able to recognize and avoid potential dangers in

doing so. Knowledge of first-aid measures and on-site emergency equipment must also be included.

2.4 Personal protective equipment

It is necessary to wear personal protective equipment when handling the machine, in which the one-way clutch is installed, to minimize health risks.

The necessary protective equipment such as work shoes, gloves, safety goggles etc. is to be put on prior to all tasks and kept on during the task.

2.5 Limitations of use

Typ FC5045	bore dia. [mm]	maximum torque [Nm]	Overrunning speeds [rpm]		admissible runout (T.I.R.) outer race to shaft [mm]	admissible axial run-out outer race to shaft [mm]	Number/ size fixing screws
			min.	max.			
	140	76000	330	1600	0,6	0,15	24xM16

*Torque limited by keyway, key

- Limits for ambient temperature: from –20°C to +80°C
- Maximum operating temperature: 90°C
- Overrunning: Machine shaft (inner race)
- Required machine shaft tolerance: d = h6 or j6
- Required tolerance outer race centering (inner diameter) :
d = h7 or g7
- Oil lubrication: approved oils according Stieber catalogue / WN900
- Grease lubrication: approved greases according Stieber catalogue / WN900

3 Structure and function

3.1 Structure

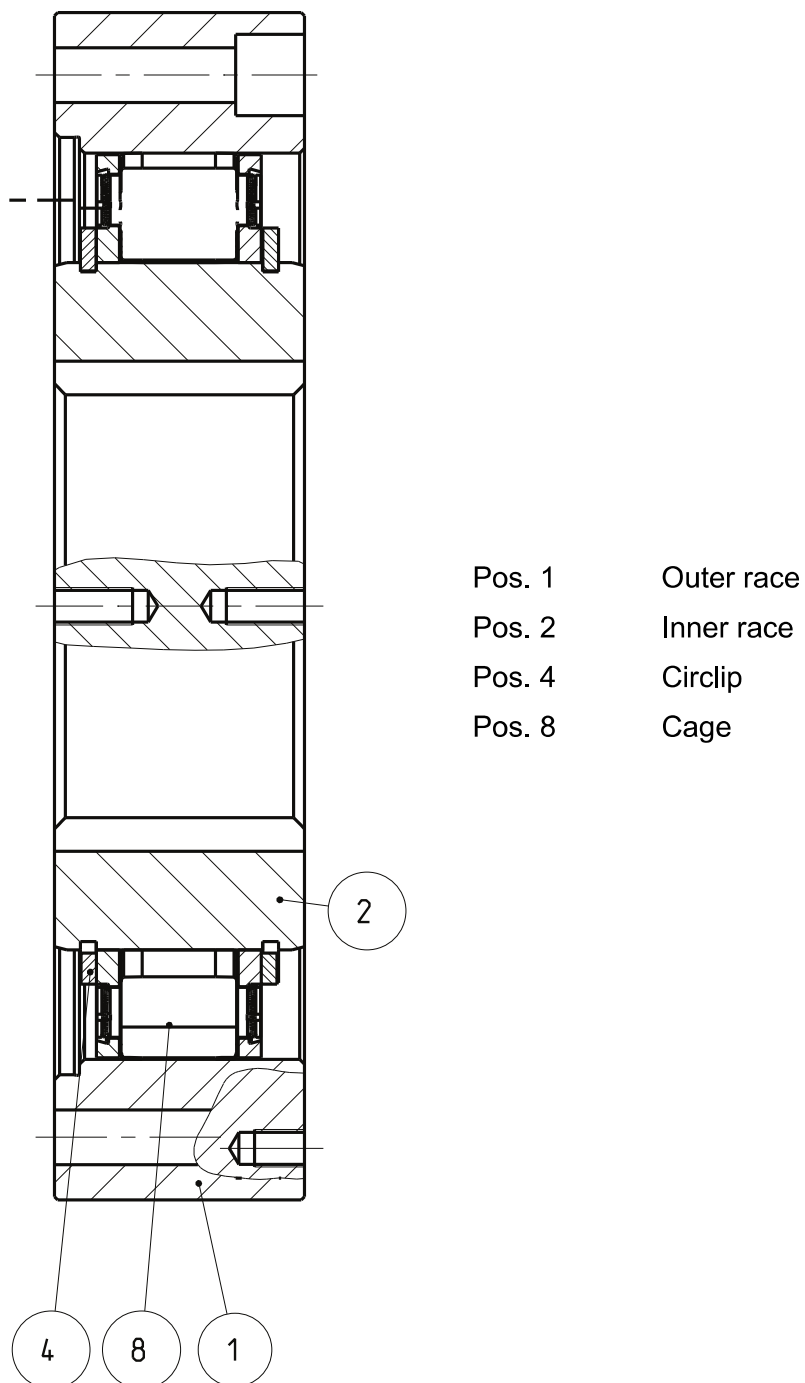


Fig. 1a Structure

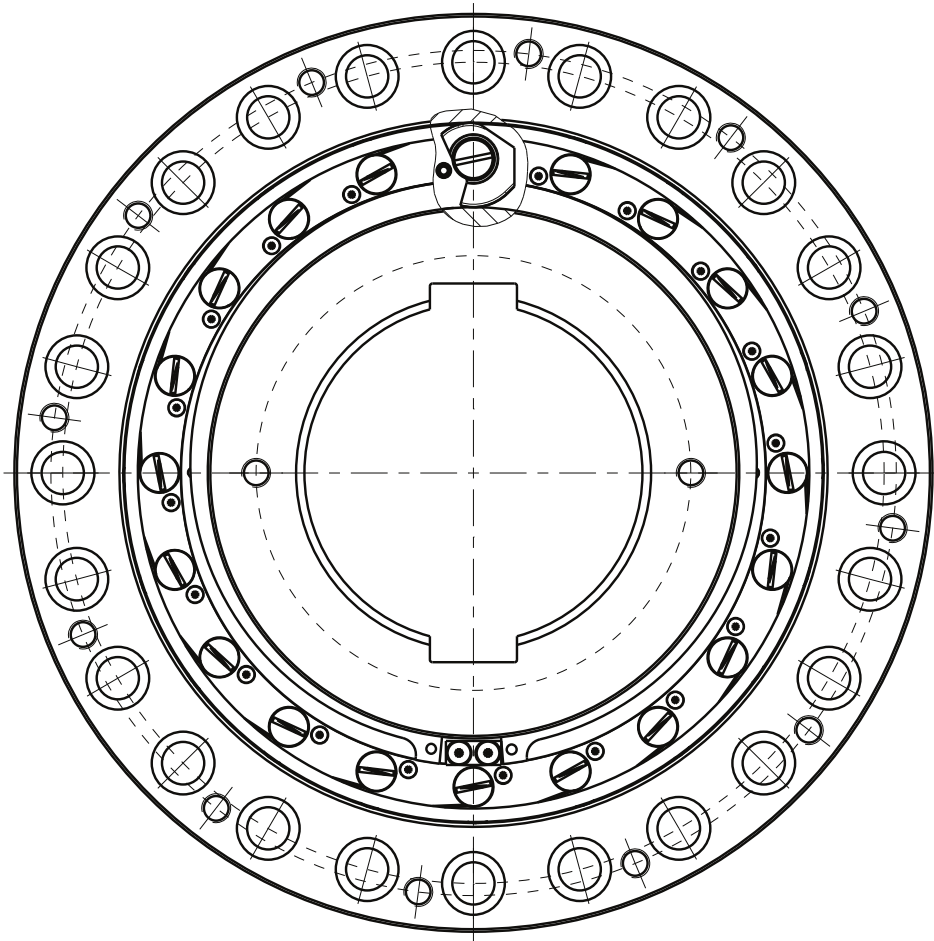


Fig. 1b Structure

3.2 Function

When the torque is transmitted through the one-way clutch, the outer race (1) and the inner race (2) are coupled in a force-locked manner (see Fig. 2). For this purpose, clamping elements are used, the outer contours of which generates the force-locked coupling. The clamping elements are integrated into a cage (8) and are energized by springs into contact with the outer and inner race. The springs ensure rapid responding behavior of the one-way clutch at the start of torque transmission.

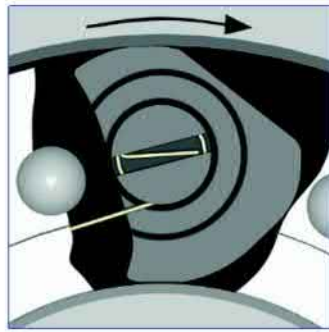


Fig.2 Torque transmission

In overrun operation, above the minimum permissible overrunning speed, the centrifugal force, in connection with the geometry of the clamping elements, generates a force which turns the clamping elements against the spring force (see Fig. 3). A contact-free position is brought about in this way so that wear-free operation of the one-way clutch can be achieved. The minimum permissible overrunning speed may only be lower for a short period during the start-up or shut-down stage otherwise the damage to the contact partner caused by wear and tear may lead to the failure of the one-way clutch.

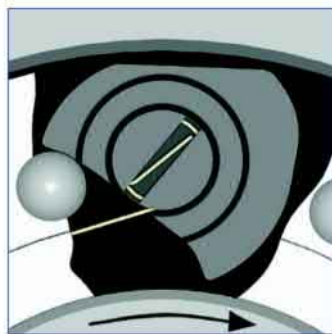



Fig.3 Contact-free position

4 Transport and packaging

	WARNING	<p>Risk of injury due to the one-way clutch falling down or tipping over! The weight of the one-way clutch can injure people and cause severe crushing. Therefore:</p> <ul style="list-style-type: none"> ➤ Use a pallet on which the one-way clutch can be moved with a forklift ➤ Use suitable lifting gear for lifting (slings, etc.) which is able to support the weight of the one-way clutch
---	----------------	---

**NOTE**

The local provisions regarding the disposal of transport and packaging materials are to be observed.

One-way clutches of Type FC5045 are packed in air cushion foils.

All components are sent in a box on a pallet.

To prevent the component from breaking or falling apart it is secured by a transportation lock (see Figure 4).

Transport damage to the packaging and / or the one-way clutch is to be reported to the respective transit company!

The one-way clutch must be unpacked in a clean and dry environment!

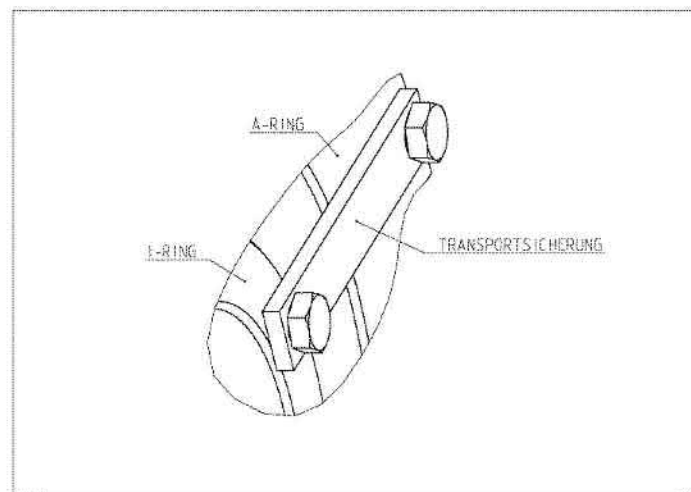


Fig. 4 Transportation lock

5 Storage

5.1 Short-term storage

The type FC5045 is packed in VCI bubble wrap. The VCI bubble wrap is to be checked at regular intervals. The frequency of these intervals is dependent on the environmental conditions (temperature, moisture, salt content of the air, etc.) at the storage site.

The maximum storage period (short-term storage) is 6 months. Moreover, the backstop must have long-term storage corrosion protection applied to it.

Store packages under the following conditions:

- Do not keep outdoors
- Keep dry and free from dust
- Do not expose to aggressive media

- Keep away from direct sunlight
- Avoid mechanical shocks and vibrations
- Storage temperature: -10 to +60°C
- Relative humidity: max. 95%, non-condensing

5.2 Long-term storage


For long-term storage, the one-way clutch must be shrink-wrapped with a desiccant and provided with a hygroscope. The corrosion protection must be checked after a period not exceeding one year or else depending on the environmental conditions (temperature, moisture, salt content of the air, etc.) at the storage site.


Store packages under the following conditions:


- Do not keep outdoors
- Keep dry and free from dust
- Do not expose to aggressive media
- Keep away from direct sunlight
- Avoid mechanical shocks and vibrations
- Storage temperature: -10 to +60°C
- Relative humidity: max. 95%, non-condensing

6 Installation

6.1 Checking the direction of rotation

	WARNING	Risk of injury due to incorrect assembly! Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.
---	----------------	--

	WARNING	Risk of injury due to moving components! Rotating driven components can cause the most severe injuries. Therefore, during operation: <ul style="list-style-type: none"> ➤ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➤ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: <ul style="list-style-type: none"> ➤ Switch off the power supply and secure it against being switched on again ➤ Wait for lagging components to come to a standstill
---	----------------	--

	CAUTION	Risk of injury due to falling components! The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.
---	----------------	---

The direction of rotation at idle speed is marked as FREE on the cage (8). The direction of rotation can be changed by turning the inner race (2) including cage (8).

Procedural steps:

- Place the one-way clutch facing upward the label "FREE" on an assembly table
- Remove the transportation lock
- Lift the inner race (2) including the cage (8) out of the outer race (1). Use appropriate lifting gear at the threaded hole of the inner race for this
- Place the inner race (2) including the cage (8) facing downwards the label "FREE" on an assembly table
- Secure (see Fig. 5 and 6) the clamp bodies in lift-off position (against the spring force) using an O-ring / cable connector as an assembly aid

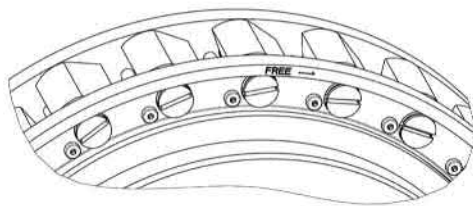


Figure 5: Clamp bodies "neutral position"

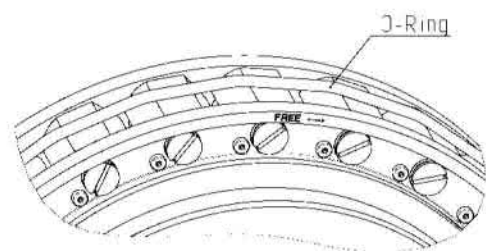



Figure 6: Clamp bodies "after lift-off"

- Insert the inner race (2) with cage (8) into the outer race (1) until half of the clamp body is covered

	NOTE	The assembly aid (O-ring / cable connector) must be completely removed. Non-observance of this note can cause functional impairment and even failure.
---	-------------	---

- Remove the assembly aid (O-ring / cable connector) completely and lower the inner race and cage completely
- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation
- Install the transportation lock

6.2 Lubrication

One-way clutches of Type FC5045 do not require any lubrication in overrun operation above the lift-off speed as they operate without contact.

Similarly, no lubrication is required in lockout operation as only a minimal degree of rolling motion in the clamp bodies occurs.

Additional lubrication is required if the one-way clutch runs with frequently repeated or permanent working cycles below the lift-off speed. To this end, a lubricating film, which coats the clamp bodies and tracks of the outer race, is mandatory. The lifetime is limited under these operating conditions!

6.2.1 Operation with oil lubrication


An oil mist is sufficient for mounting inside a gear box.


If the one-way clutch runs with frequently repeated or permanent working cycles below the lift-off speed, splash lubrication or oil supply between the cage and the outer track is necessary. The lifetime is limited under these operating conditions!

The oil volume which is necessary for splash lubrication depends on the surrounding construction.

The level should be up to a maximum of 10 mm to an inside diameter of the outer race.

6.2.2 Operation with grease lubrication

	NOTE	Excessive lubrication may negatively affect the one-way clutch functionality! Note the required grease quantities!
---	-------------	--

	NOTE	Unsuitable lubricants can negatively affect the one-way clutch functionality! Only use greases approved by Stieber!
---	-------------	---

Select only lubricating greases complying with product catalogue/ Stieber WN900.

Procedural steps for greasing:

- Place the one-way clutch facing upward the label "FREE" on an assembly table
- Remove the transportation lock
- Lift the inner race (2) including the cage (8) out of the outer race (1). Use appropriate lifting gear at the threaded hole of the inner race for this
- Grease the outer track with a layer thickness of approx. 1 mm
 - Use grease of NLGI class 000 to 2 with a maximum base oil viscosity of 42 mm²/s

- Evenly spread the remaining grease quantity (see chapter 2.5) over the inner race surface and cage
- Secure (see Fig. 5 and 6) the clamp bodies in lift-off position (against the spring force) using an O-ring / cable connector as an assembly aid
- Insert the inner race (2) with cage (8) into the outer race (1) until half of the clamp body is covered
- Remove the assembly aid (O-ring / cable connector) completely and lower the inner race and cage completely.

**NOTE**

The assembly aid (O-ring / cable connector) must be completely removed. Non-observance of this note can cause functional impairment and even failure.

- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation.
- Install the transportation lock

6.2.3 Protection against corrosion damage

One-way clutches must be protected against corrosion damage.

**Note**

Treat unpainted surfaces with suitable anticorrosive agents. As a corrosion inhibitor use grease of NLGI class 000 to 2 with a maximum base oil viscosity of 42 mm²/s !

6.3 Assembly

**WARNING****Risk of injury due to incorrect assembly!**

Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.

**WARNING****Risk of injury due to moving components!**

Rotating driven components can cause the most severe injuries. Therefore, during operation:

- It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity
- Do not disable, render unusable or circumvent safety equipment and / or safety functions

Prior to entering the danger zone:

- Switch off the power supply and secure it against being switched on again
- Wait for lagging components to come to a standstill

**CAUTION****Risk of injury due to falling components!**

The outer race or inner race can fall down if the transportation lock has been removed.

Fasten the outer / inner race axially.

Procedural steps :

- Lift up the one-way clutch using suitable lifting gear and push it onto the oiled machine shaft
- Remove the transportation lock
- Fasten the one-way clutch axially on the machine shaft
- Center the outer race in the torque-supporting machine element

**NOTE**

Screw qualities 12.9 must not be used!

- Secure the outer race in the torque-supporting machine element with the appropriate fixing screws (e.g. as per standard DIN EN ISO 4762) and with screw quality 10.9 or 8.8; tightening torque (see Table Tightening torque)

Tightening torque [Nm]		
Size	8.8	10.9
M16	206	290

Table: Tightening torque (according VDI 2230 Sheet1, $\mu=0.12$ metric standard thread)

- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation

6.4 Mounting example

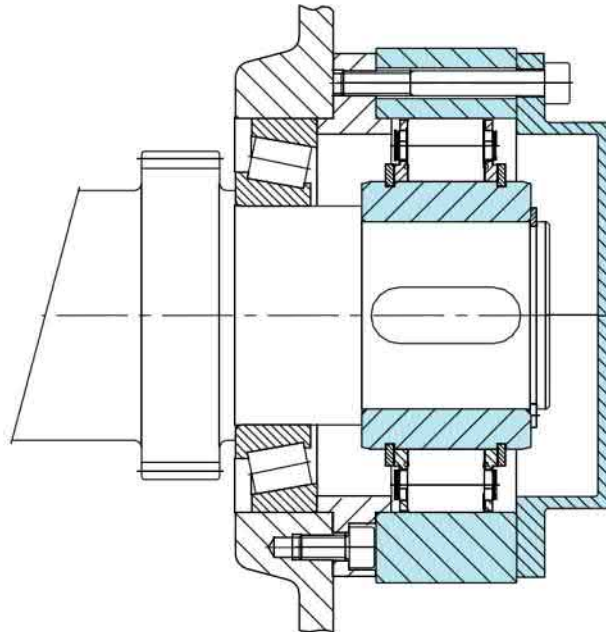





Figure 7: Mounting at the end of the shaft

7 Maintenance

	WARNING	Risk of injury due to incorrect assembly! Faulty installation and maintenance can cause severe property damage and personal injury. Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.
	WARNING	Risk of injury due to moving components! Rotating driven components can cause the most severe injuries. Therefore, during operation: <ul style="list-style-type: none"> ➤ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➤ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: <ul style="list-style-type: none"> ➤ Switch off the power supply and secure it against being switched on again ➤ Wait for lagging components to come to a standstill


	CAUTION	Risk of injury due to falling components! The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.
---	----------------	---

One-way clutches of Type FC5045 must be checked for damage and serviced after an operating period not exceeding 5 years.

7.1 Disassembly in case of maintenance

Procedural steps:

- Loosen the fastening screws of the outer race (1)
- Remove the axial retention of the inner race
- Install the transportation lock

	CAUTION	Risk of injury due to falling components! The outer race or inner race can fall down if the transportation lock has been removed. Therefore: ➤ Install the transportation lock!
--	----------------	--

- Pull the one-way clutch from the machine shaft. Use suitable lifting gear for this
- Place the one-way clutch facing upward the label "FREE" on an assembly table
- Remove the transportation lock
- Lift the inner race (2) including the cage (8) out of the outer race (1). Use appropriate lifting gear at the pull holes of the inner race for this
- Remove the circlip (4) of the inner race (2) and pull the cage (8) off the inner race (2)

7.2 Test criteria in case of maintenance

Procedural steps:

- Pre-clean the outer race (1) and cage (8) with a petroleum-based industrial cleaning agent and degrease with an acetone-based cleaning agent
- Check for damage, wear and cracks (see the testing criteria):
 - The outer race track must not exhibit any signs of damage / ruptures
 - Increased diameter due to wear in the outer race track maximum 0.1 mm compared to the area free from wear
 - Traces of deformation / indentations to the track diameters of the inner and outer race maximum 0.1 mm deep
 - Completeness of all spring elements (2 per clamp body)
 - Spring elements free of damage / deformation

- Smooth rotation of the clamp bodies from stop to stop
- Maximum width of the wear facet on the clamp bodies (see Figure 8)

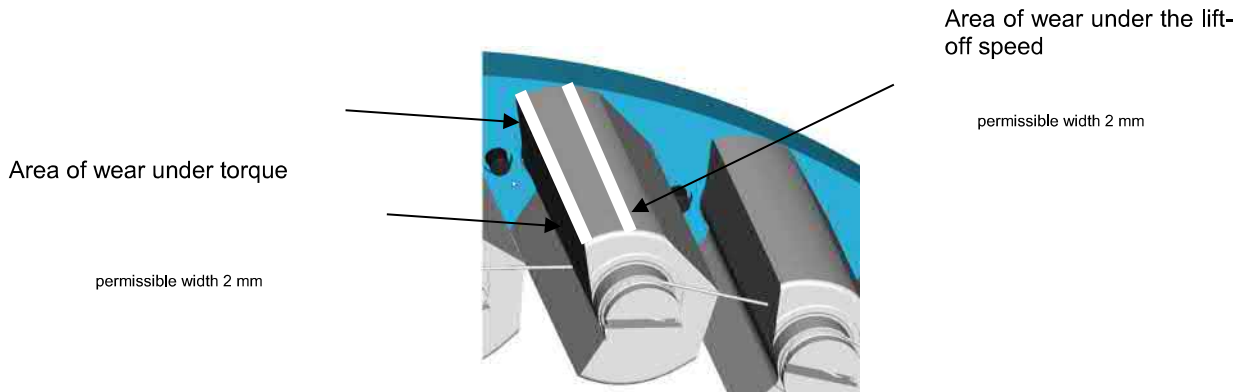


Figure 8: wear zones

- The one-way clutch can continue to be used only if all of the test criteria are met

7.3 Assembly in case of maintenance when using grease lubrication

Procedural steps:

- Mount the cage (8) on the inner race (2) and secure it axially using circlips (4)
- Grease the outer track with a layer thickness of approx. 1 mm
 - Use grease of NLGI class 000 to 2 with a maximum base oil viscosity of 42 mm²/s
- Evenly spread the remaining grease quantity (see chapter 2.5) over the inner race surface and cage
- Secure (see Fig. 5 and 6) the clamp bodies in lift-off position (against the spring force) using an O-ring / cable connector as an assembly aid
- Insert the inner race (2) with cage (8) into the outer race (1) until half of the clamp body is covered
- Remove the assembly aid (O-ring / cable connector) completely and lower the inner race and cage completely



NOTE

The assembly aid (O-ring / cable connector) must be completely removed. Non-observance of this note can cause functional impairment and even failure.

- Install the transportation lock

- Lift up the one-way clutch using suitable lifting gear and push it onto the oiled machine shaft observing the overrun direction of rotation in the process
- Remove the transportation lock
- Fasten the one-way clutch axially on the machine shaft
- Center the outer race in the torque-supporting machine element

**NOTE**

Screw qualities 12.9 must not be used!

- Secure the outer race in the torque-supporting machine element with the appropriate fixing screws (e.g. as per standard DIN EN ISO 4762) and with screw quality 10.9 or 8.8; tightening torque (see Table Tightening torque)

Tightening torque [Nm]		
Size	8.8	10.9
M16	206	290

Table: Tightening torque (according VDI 2230 Sheet1, $\mu=0.12$ metric standard thread)


- Check overrunning. The one-way clutch must be able to be turned easily in the overrun direction of rotation


8 Disassembly

**WARNING****Risk of injury due to incorrect assembly!**

Faulty installation and maintenance can cause severe property damage and personal injury.

Installation, maintenance and repair work may only be performed by personnel with the requisite training and expertise.


	WARNING	Risk of injury due to moving components! Rotating driven components can cause the most severe injuries. Therefore, during operation: <ul style="list-style-type: none"> ➤ It is strictly forbidden for persons to loiter in the danger zone or in its immediate vicinity ➤ Do not disable, render unusable or circumvent safety equipment and / or safety functions Prior to entering the danger zone: <ul style="list-style-type: none"> ➤ Switch off the power supply and secure it against being switched on again ➤ Wait for lagging components to come to a standstill
---	----------------	--

	CAUTION	Risk of injury due to falling components! The outer race or inner race can fall down if the transportation lock has been removed. Fasten the outer / inner race axially.
---	----------------	---

Procedural steps:

- Loosen the fastening screws of the outer race (1)
- Remove the axial retention of the inner race
- Install the transportation lock
- Pull the one-way clutch from the machine shaft. Use suitable lifting gear for this

9 Disposal

	NOTE	The local provisions regarding the disposal of metallic components and any lubricants present are to be observed.
---	-------------	---

The one-way clutch is comprised of metallic materials which are coated with grease or oil. Metallic materials are fully recyclable. Lubricants and anticorrosive agents are to be disposed of separately. The local disposal provisions are to be observed in this regard.

10 Faults

The manufacturer is to be contacted immediately should any faults arise.

STIEBER GMBH, D-69126 Heidelberg, Hatschekstr. 36, Germany
Phone +49 (0) 6221 3047-0, Fax -31

11 Spare parts



WARNING

Risk of injury due to incorrect spare parts!

Incorrect or faulty spare parts can cause damage, malfunctions or total failure as well as impair safety. Therefore:

- Only use original spare parts from the manufacturer

Procure spare parts only from authorized dealers or from the manufacturer directly.

12 Appendix

12.1 Drawing FC5045

