

KTR-STOP RL

Size S and M

KTR-STOP RL (Rotor Lock) is a hydraulic mechanism serving to lock a rotor positively by inserting a pin into a locking disc. The locking serves for preventing a rotor standing still from starting.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



KTR-STOP RL (Rotor Lock) was designed to be used as a locking device for rotors of wind power stations. Being used properly a pin is pushed hydraulically into the bore to fit of a locking disc which prevents the rotor from turning. This process may take place at standstill only. For any other applications please consult with KTR Kupplungstechnik.

Table of Contents

1 Technical Data

2 Hints

- 2.1 General Hints
- 2.2 Safety and Advice Hints
- 2.3 General Hints to Danger
- 2.4 Proper Use

3 Storage

4 Assembly

- 4.1 Components of the KTR-STOP RL
- 4.2 Preparation of Assembly
- 4.3 Assembly of the KTR-STOP RL
- 4.4 Start-up of KTR-STOP RL
- 4.5 Securing the KTR-STOP RL
- 4.6 Recommendation of Fluids to be Used
- 4.7 Disassembly of the KTR-STOP RL
- 4.8 Spares Inventory, Customer Service Addresses

5 Maintenance of the KTR-STOP RL/Replacement of Single Parts

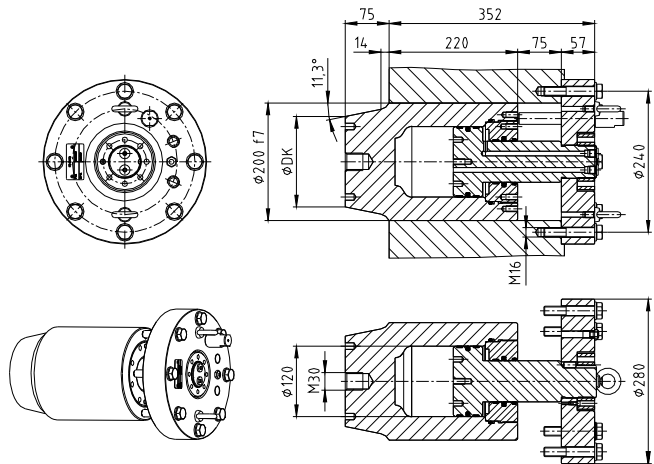
6 Accessories - Sensor

- 6.1 Technical Data
- 6.2 Assembly/Start-up

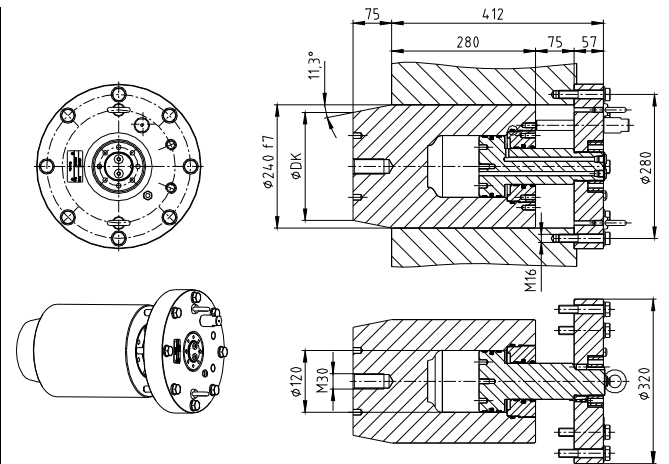
Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



1 Technical Data



picture 1: size S



picture 2: size M

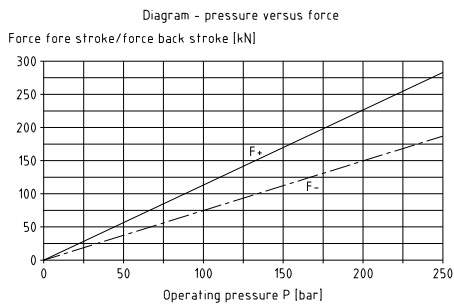
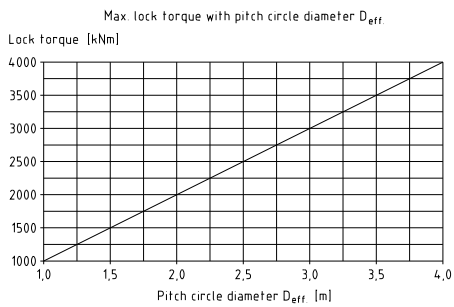
Table 1: technical data

		S	M
Approx. weight	[kg]	90	153
Max. stroke	[mm]	80	80
Max. lateral force F_L	[kN]	2000	4000
Max. operating pressure	[bar]	250	250
Max. force fore stroke (F+)	[kN]	283	283
Max. force back stroke (F-)	[kN]	187	187
Piston diameter	[mm]	120	120
Piston area fore stroke	[cm ²]	113,10	113,10
Piston area back stroke	[cm ²]	74,61	74,61
Oil volume per 1 mm stroke	[cm ³]	11,3	11,3
Oil volume with 75 mm stroke (full stroke)	[cm ³]	848,2	848,2
Pressure port		1/4" BSP	1/4" BSP

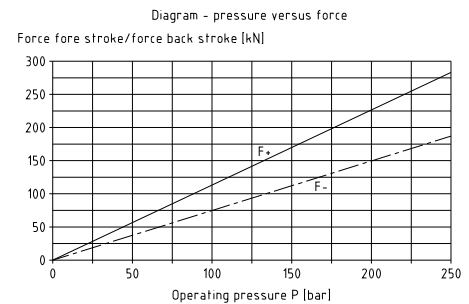
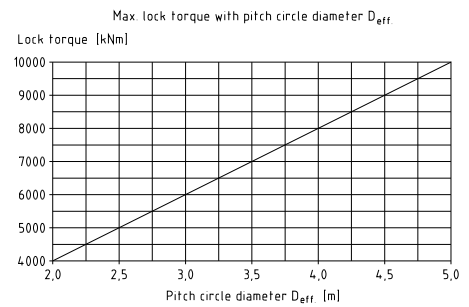


CAUTION!

Please note that the lateral force refers to the Rotor Lock only.



picture 3: diagram - size S



picture 4: diagram - size M

$$M_L = z \cdot F_L \cdot \frac{D_{eff.}}{2}$$

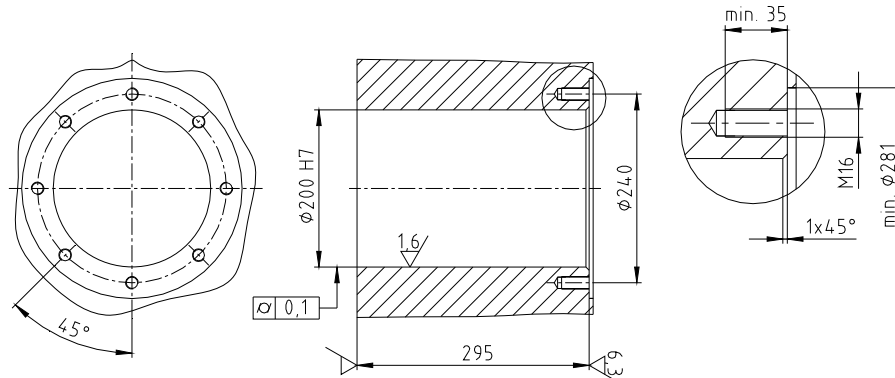
- F_L = Lateral force [kN]
- M_L = Lock torque [kNm]
- z = Number of KTR-STOP RL
- $D_{eff.}$ = Pitch circle diameter of locking disc [m]

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:

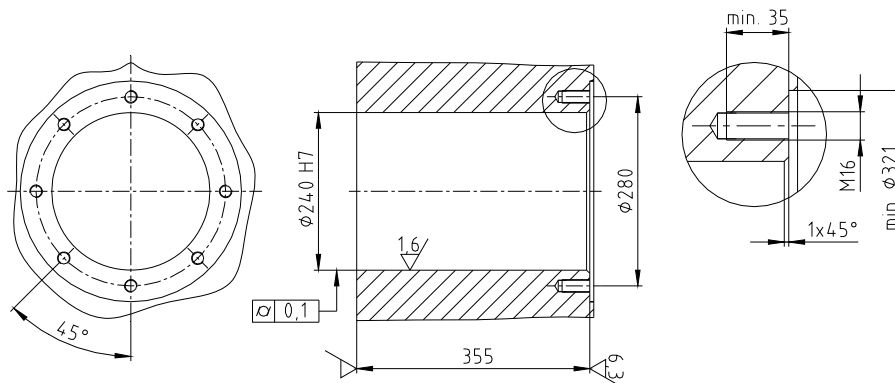


1 Technical Data

Connection dimensions of housing

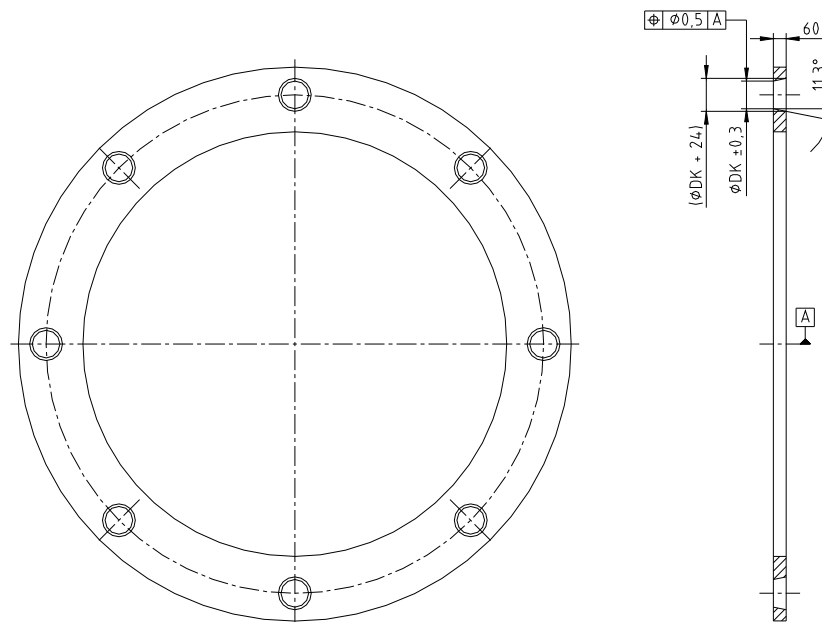


picture 5: housing diameter – size S



picture 6: housing diameter – size M

Connection dimensions of locking disc



picture 7: locking disc

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



2 Hints

2.1 General Hints

Please read through these operating-/mounting instructions carefully before you set the Rotor Lock into operation. Please pay special attention to the safety instructions!

The operating-/mounting instructions are part of your product. Please keep them carefully.

The copyright for these operating-/mounting instructions remains with **KTR Kupplungstechnik GmbH**.

2.2 Safety and Advice Hints



DANGER!

Danger of injury to persons.



CAUTION!

Damages on the machine possible.



ATTENTION!

Pointing to important items.

2.3 General Hints of Danger



DANGER!

With assembly, operation and maintenance of the Rotor Lock it has to be made sure that the entire drive train is protected against unintentional engagement. You can be seriously hurt by rotating parts. Please make absolutely sure to read through and observe the following safety instructions.

- All operations on and with the Rotor Lock have to be performed taking into account "safety first".
- Please make sure to disengage the power pack before you perform your work.
- Protect the power pack against unintentional engagement, e. g. by providing hints at the place of engagement or removing the fuse for current supply.
- Do not touch the operation area of the Rotor Lock as long as it is in operation.
- Please protect the Rotor Lock against unintentional operation. Please provide for the necessary protection devices.
- Please make sure that the entire hydraulic system is depressurized.

2.4 Proper Use

You may only assemble, operate and maintain the Rotor Lock if you

- have carefully read through the operating-/mounting instructions and understood them
- had technical training
- are authorized to do so by your company

The Rotor Lock may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the Rotor Lock design are not admissible. We do not take any warranty for resulting damages. To further develop the product we reserve the right for technical modifications.

The **KTR-STOP RL** described in here corresponds to the technical status at the time of printing of these operating-/mounting instructions.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



3 Storage

The Rotor Lock is supplied in preserved condition and can be stored in a dry and closed place for 12 months. With favourable storage conditions their properties remain unchanged up to 12 months. If the Rotor Lock is stored over a longer period exceeding 12 months and after every transport, the corrosion protection needs to be renewed and operated over the full distance to prevent the seals from sticking together.



CAUTION!

Humid storage rooms are not suitable.

Please make sure that there is no condensation. The best relative air humidity is less than 65%.

4 Assembly

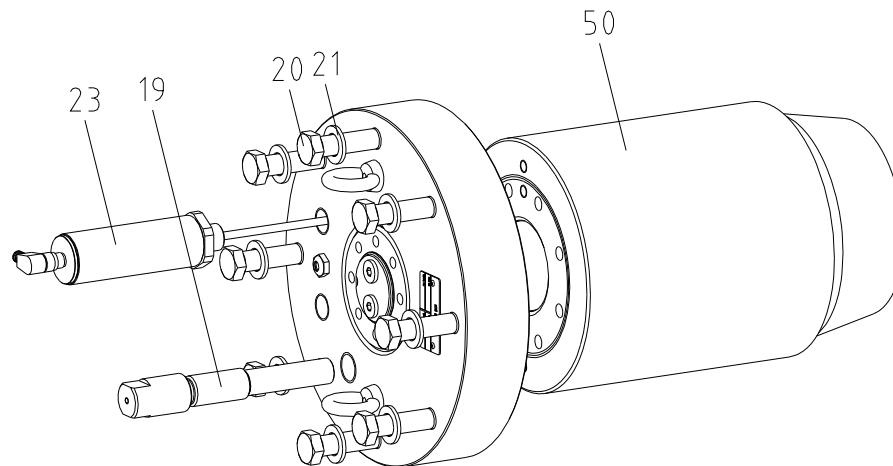
The Rotor Lock is supplied pre-assembled. Before assembly the Rotor Lock has to be inspected for completeness.

4.1 Components of the KTR-STOP RL

Components of the KTR-STOP RL

Component	Quantity	Designation
19	1	Fastening bolt
20	8	Hexagon head screw DIN EN ISO 4014 - 10.9
21	8	Washer DIN EN ISO 7089
23	1 ¹⁾	Sensor
50	1	KTR-STOP RL (pre-assembled)

1) optionally available



picture 8: components of the KTR-STOP RL

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



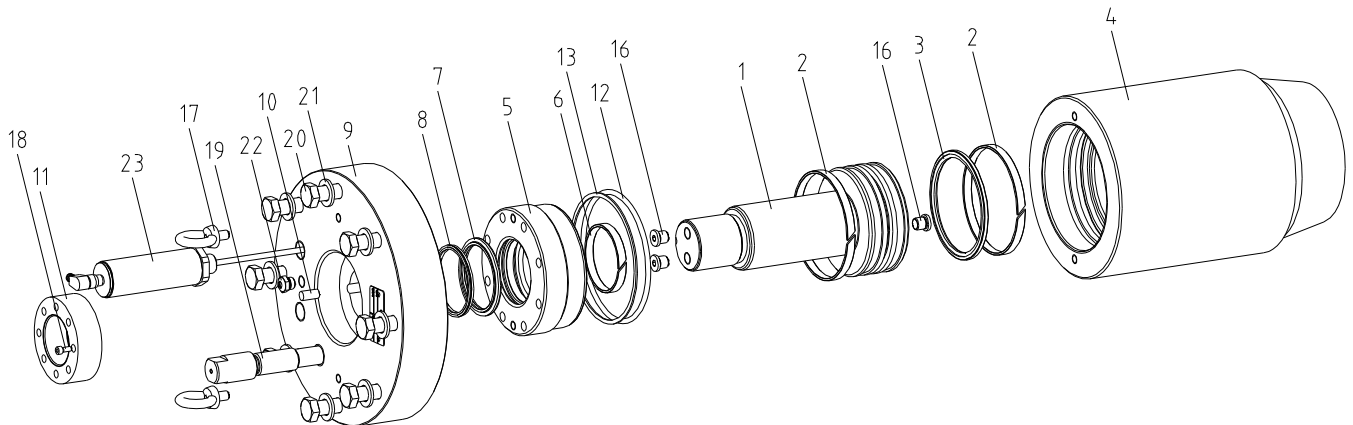
4 Assembly

4.1 Components of the KTR-STOP RL

Single parts of the KTR-STOP RL

Component	Quantity	Designation	Component	Quantity	Designation
1	1	Piston	13	1	Back-up ring (type BU)
2	2	Guide ring (piston)	16	3	Screw plug DIN 908
3	1	Piston seal	17	2	Ring bolt DIN 580
4	1	Lock bolt	18	1	Cap screw DIN EN ISO 4762 - 10.9
5	1	Piston cover	19	1	Fastening bolt
6	1	Guide ring (piston cover)	20	8	Hexagon head screw DIN EN ISO 4014 - 10.9
7	1	Columnar sealing ring	21	8	Washer DIN EN ISO 7089
8	1	Scraper	22	1	Air breather
9	1	Connection flange	23	1 ¹⁾	Sensor
10	1	Parallel pin			
11	1	Lock nut			
12	1	Seal ring			

1) optionally available



picture 9: single parts of the KTR-STOP RL

4.2 Preparation of Assembly



ATTENTION!

To ensure the full power of locking, the preparations for assembly have to be properly performed.

- The housing for the Rotor Lock as well as the locking disc have to be inspected for dimensional accuracy. For that purpose please investigate the connection dimensions, connection surfaces and tolerances as mentioned in the drawing (see pictures 5 to 7).
- Please clean the locking disc and mounting surfaces.

4.3 Assembly of the KTR-STOP RL



DANGER!

In order to avoid injuries please always make use of proper lifting equipment.

There are eye bolts on the face of the Rotor Lock serving to use lifting jacks.



CAUTION!

In order to prevent any kind of damage on the Rotor Lock, never cover components such as sensors etc. with a rope or another lifting equipment.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



4 Assembly

4.3 Assembly of the KTR-STOP RL



ATTENTION!

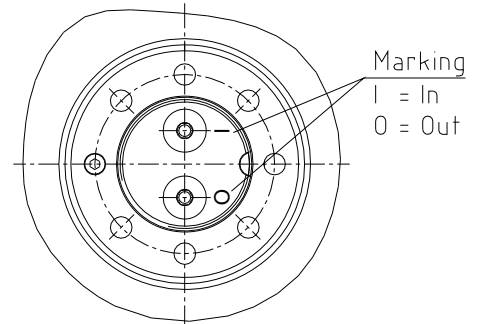
The ring bolts can be removed after the assembly of Rotor Lock. Please keep them in a safe place. Avoid any kind of dirt; for that purpose you should use drain plugs.



ATTENTION!

Before you start with the assembly of Rotor Lock, please make sure that the fastening bolt (component 19) has been disassembled (see picture 11).

- The piston (component 1) needs to be inserted into the lock bolt (component 4) as far as possible. For that purpose press the piston into the lock bolt manually or via hydraulic pressure on the pressure connection "I" as far as possible. Here the pressure connection "O" must not be closed or connected to a hydraulic system preventing a free pressure reduction on "O" (see picture 10).
- Please make sure that oil may overflow from pressure connection „O“.
- Please make sure that the surface of the connection flange (component 9) is in parallel with the locking disc.
- Lubricate the bore of the housing with Molykote MoS₂.
- Insert the Rotor Lock into the bore of the housing.
- Secure the Rotor Lock by means of the hexagon head screws M16 - DIN EN ISO 4014 - 10.9 (component 20) and the washers (component 21). Screw them hand-tight for the time being.
- Tighten the hexagon head screws crosswise at the tightening torque $T_A = 290 \text{ Nm}$.
- Assembly of sensor (sensor is available optionally).



picture 10: pressure parts



ATTENTION!

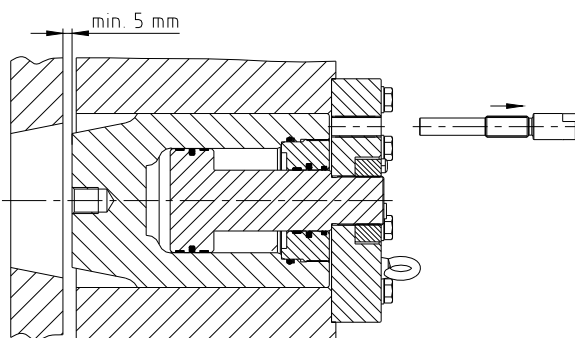
If using a sensor (component 23) please note chapter 6.

- Connect the pressure oil pipes to the pressure connections „I“ and „O“.

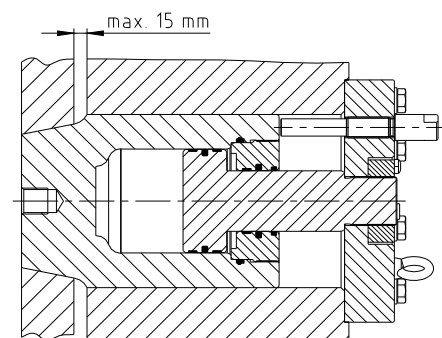


ATTENTION!

To avoid any contact between the locking disc and the Rotor Lock, a minimum distance of 5 mm needs to be adhered to in fully locked position (see picture 11). In fully unlocked position the maximum distance of 15 mm needs to be adhered to in every case (see picture 12).



picture 11



picture 12

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



4 Assembly

4.4 Start-up of KTR-STOP RL



ATTENTION!

Before the Rotor Lock is put into operation, the hydraulic system generally has to be deventilated and refilled with fluid.



CAUTION!

To prevent serious injuries of your hand, please never keep your fingers between locking disc and lock bolt while locking the Rotor Lock.

Before every maintenance operation please make sure that the Rotor Lock is entirely secured against being activated.

- Please refill the hydraulic system with sufficient fluid (recommendation of fluids to be used see chapter 4.6).
- Deventilate the Rotor Lock after each operation on the hydraulic system. By triggering the pressure connections reciprocally several times, you are allowed to vent the hydraulic system.



ATTENTION!

Repeat the deventilation several times a year, since any air in the hydraulic system may have an influence on the operativeness of the Rotor Lock.



CAUTION!

Please make sure that there is sufficient fluid in the hydraulic system after each deventilation.



CAUTION!

The hydraulic system must never be operated at a higher pressure than the figures mentioned in the type plate or table 1. In case that any figures or types/sizes are modified, please contact KTR Kupplungstechnik.

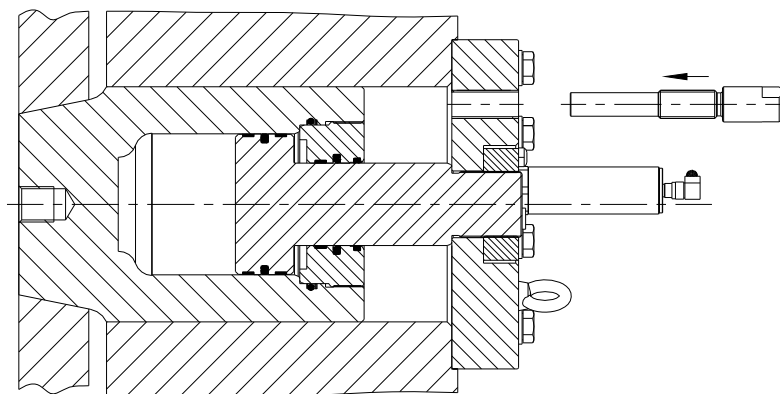
4.5 Securing of KTR-STOP RL



DANGER!

To prevent injuries and any kind of damage on the Rotor Lock or, as an example, your wind power station etc., the mechanical safety device of the Rotor Lock has to be mounted before the maintenance or service operations are started with.

- Screw the fastening bolt (component 19) into the connection flange (component 9) against a stop (see picture 13).



picture 13: securing of KTR-STOP RL

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



4 Assembly

4.6 Recommendation of Fluids to be Used



ATTENTION!

Only those hydraulic fluids corresponding to the following criteria may be used (other manufacturers may be chosen).

KTR Kupplungstechnik recommends the following fluids:

Manufacturer	Standard		Special	
	-20 °C to +40 °C (-14 °F to +104 °F)	+10 °C to +60 °C (+50 °F to +140 °F)	-30 °C to +20°C (-22 °F to +68 °F)	+30 °C to +70 °C (+86 °F to +158 °F)
Mineral oil				
Shell	Tellus TX32	Tellus TX46	Tellus Artic	Tellus TX68
Mobil	DTE 13M	DTE 15M	-	DTE 16M
Hydro Texaco	Rando HDZ32	Rando HDZ46	Rando Ashless 8401	Rando HDZ68
Valvoline	Ultramax HVLP32	Ultramax HVLP46	-	Ultramax HVLP68
Synthetic oil				
Mobil	SHC 524	SHC 525	-	SHC 526
Bio oil ¹⁾				
Shell	Naturelle HF-E15	Naturelle HF-E32	-	Naturelle HF-E46

1) Purity: <200PPM water components in oil.
In general: Mineral hydraulic fluid as per DIN 51524 part 3.



ATTENTION!

The permissible operating temperatures from -20 °C to +60 °C (-14 °F to +140 °F) of the Rotor Lock components have to be adhered to. For deviating operating temperatures please consult with KTR Kupplungstechnik.

Viscosity

A viscosity range from 20 to 200 cSt of the hydraulic fluid is recommended with operating temperature.

Filtration

The oil in the system and the oil to be refilled need to be filtered in general.
To refill the oil we would recommend to use an offline filter.



ATTENTION!

The service life of the Rotor Lock system is extended depending on the amount of purity of the oil.

The KTR hydraulic systems are provided with a 10-µm inline filter as a standard.

In order to ensure the reliability of the system, only oils originating from the following purity classes are permitted:

- NAS 1638, class 8
- ISO 4406, class 19/1 7/1 4.



ATTENTION!

We would recommend to replace the filters every 6 months, depending on the degree of dirt. After initial assembly trigger the pressure connections of Rotor Lock reciprocally several times (approx. 20 times) and replace the filter.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



4 Assembly

4.6 Recommendation of Fluids to be Used

Change of hydraulic fluid

Mineral oil: after 8.000 hours or once a year
Other fluids: after 2.000 hours or two times a year

The system has to be scavenged after each draining of the Rotor Lock system.



CAUTION!

Unwelcome reactions may be produced by mixing different fluids or fluids of various manufacturers.



ATTENTION!

Please contact the manufacturer of mineral oils if you intend to switch to another hydraulic fluid.

Material of seals

The Rotor Lock of KTR Kupplungstechnik are provided with seals from PUR (polyurethane) as a standard.



ATTENTION!

On request of the customer seals from PTFE (Teflon) or other alternative materials can be delivered for the Rotor Lock, too.

4.7 Disassembly of the KTR-STOP RL



CAUTION!

Please make sure that the entire hydraulic system is depressurized.



DANGER!

Parts falling down may cause injury of persons or damage to the machine. Secure the driving parts during assembly or disassembly.



ATTENTION!

If using a sensor (component 23), it needs to be removed before disassembly of the Rotor Lock.

- Disconnect the oil pressure pipe from the Rotor Lock.
- Remove the 8-off hexagon head screws (component 20) via the washers (component 21) serving to fix the Rotor Lock in the housing.
- Now you can take off the Rotor Lock.

4.8 Spares Inventory, Customer Service Addresses

A basic requirement to guarantee the operational readiness of the Rotor Lock is a stock of the most important spare parts on site.

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage under www.ktr.com.



ATTENTION!

KTR does not assume any liabilities or guarantees regarding the use of spare parts and accessories which are not provided by KTR and for the damages resulting herefrom.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf Geprüft: 18.01.11 Pz	Ersatz für: --- Ersetzt durch:
--------------------------------------	--	-----------------------------------



5 Maintenance of the KTR-STOP RL/Replacement of Single Parts



ATTENTION!

To ensure the full power of locking, please ensure the highest degree of cleanness with disassembly and assembly.

- Disassemble the Rotor Lock, see chapter 4.7 *disassembly of the KTR-STOP RL*.
- Remove the cap screw (component 18) and unscrew the lock nut (component 11) by means of a sickle spanner.
- Pull off the connection flange (component 9) and the parallel pin (component 10) from the piston (component 1).
- Unscrew the piston cover (component 5) by means of a sickle spanner and remove it from the piston.
- Remove the piston (component 1) from the lock bolt (component 4).



ATTENTION!

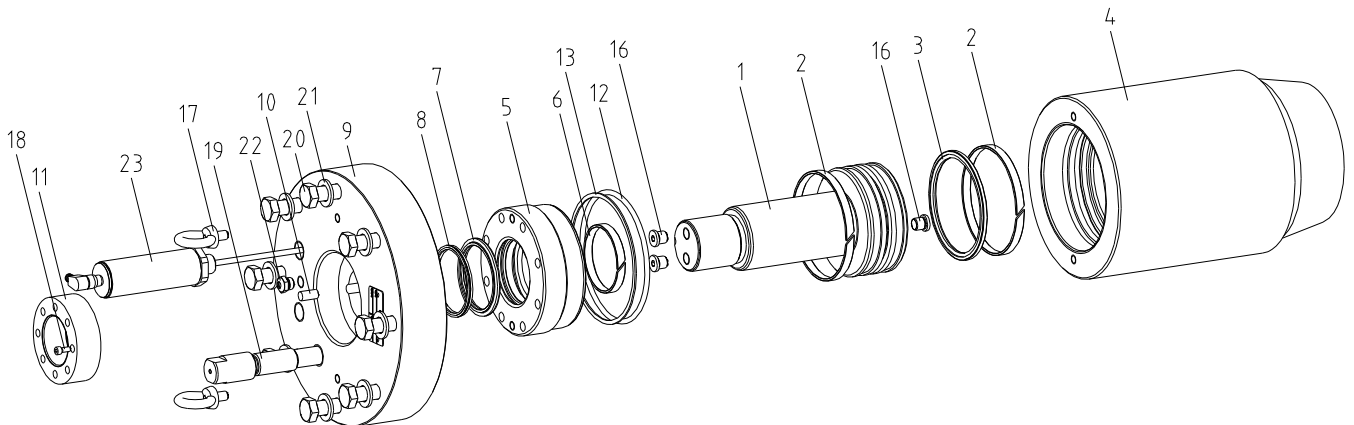
When removing the piston cover and the piston please make sure that the corresponding nuts are not damaged.

- Take the guide rings, piston seal, columnar sealing ring, scraper, seal ring and back-up ring (components 2, 3, 6, 7, 8, 12 and 13) out of the piston and piston cover as well as the lock bolt.
- The components need to be made free from dirt, grease and corrosion protection. The components can easily be cleaned by means of solvents. Afterwards dry the components.



CAUTION!

Please pay attention to the manufacturer's instructions with regard to solvents.



picture 14: single parts of the KTR-STOP RL

- Mount the piston seal (component 3) and the guide rings (component 2) onto the piston.
- Insert the seal (component 12) and the back-up ring (component 13) in the lock bolt. For that purpose the seal may be shaped as a heart shape (see picture 15).
- Insert the guide ring (component 6), the columnar sealing ring (component 7) and the scraper (component 8) into the piston cover. For that purpose the columnar sealing ring and the scraper may be shaped as a heart shape (see picture 15).



CAUTION!

The columnar sealing ring (component 7) and scrapers (component 8) have to be installed in the right direction. For that purpose the sealing lips have to show in the opposite direction of the pressure room (see picture 16).

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



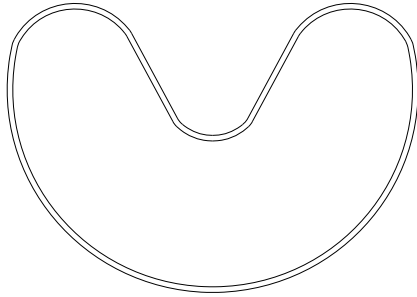
5 Maintenance of the KTR-STOP RL/Replacement of Single Parts



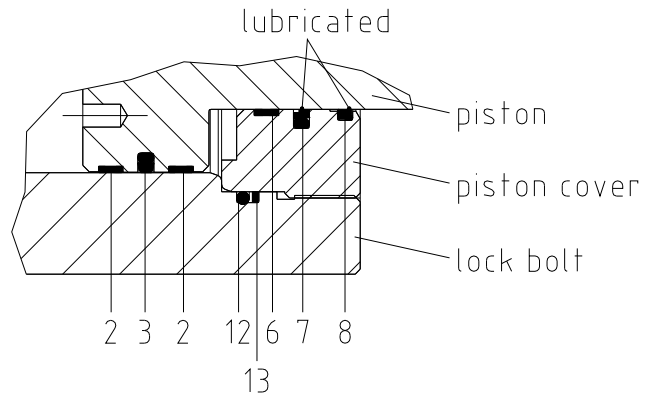
ATTENTION!

For a re-assembly basically new piston seals, guide rings, seals, back-up rings and scrapers have to be used, since their operativeness is no longer ensured subject to wear and failures.

- Grease the columnar sealing ring and scrapers with Molykote MoS₂ (see picture 16).



picture 15: assembly of seals, scrapers etc.



picture 16



CAUTION!

Inspect the surfaces of the piston and the holes of the lock bolt to make sure that they are neither scratched nor damaged. Such kind of damages may cause an earlier wear on the piston seals, guide rings, seals, back-up rings and scrapers and produce leakages.

- Lightly oil the piston and the bore of the lock bolt.
- Insert the piston (component 1) into the bore of the lock bolt (component 4) and press them against a stop.
- Push the piston cover (component 5) onto the piston and screw the piston cover in the lock bolt by means of a sickle spanner.
- Put the connection flange (component 9) onto the piston and align the two keyways against each other.
- Batter the parallel pin (component 10) into the keyway against a stop.
- Screw the lock nut (component 11) into the connection flange by means of a sickle spanner. Align a bore from the lock nut to the tapping of the connection flange.
- Secure the lock nut by means of the cap screw (component 18).
- Repeat chapters 4.2 to 4.6.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf Geprüft: 18.01.11 Pz	Ersatz für: --- Ersetzt durch:
--------------------------------------	--	-----------------------------------



6 Accessories - Sensor

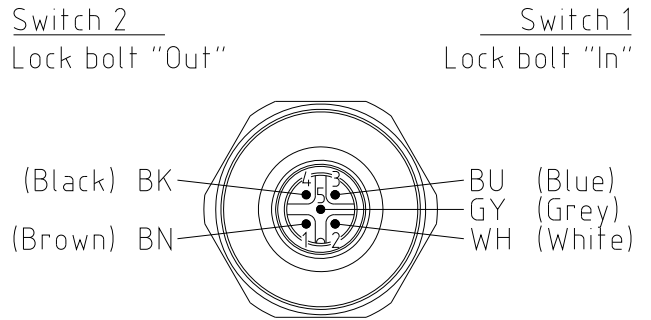
6.1 Technical Data

Funktion of sensors

There are two micro switches in the housing of the sensor. By extending and retracting the Rotor Lock fully the sensor pin triggers the switches in two different positions. In this way the electronic signal Rotor Lock "In" or Rotor Lock "Out" is passed on.

Technical data:

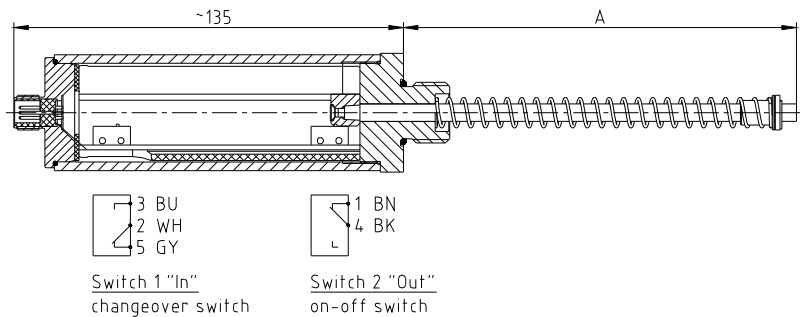
Operating temperature	-40 °C to +85 °C
Max. Voltage	30 V DC/AC
Switching current	1 to 100 mA
Switching tolerance	± 0,4 mm
Max. stroke	85 mm
Protection class	IP 65 (mounted)
Wrench size	41 mm
Max. tightening torque G 1/2"	20 Nm
Max. tightening torque M12	Hand-tight
Cable length [m]	5, 10 or 15
Material of the cable	PUR
Diameter of the cable	5 * 0,34 mm ²



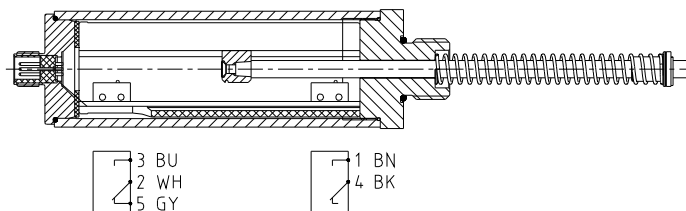
picture 17: plug-in connection

Position of switching:

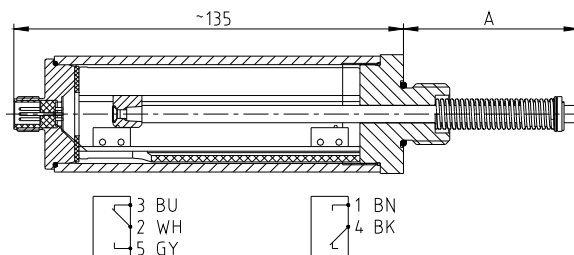
Rotor Lock is locked fully.



Rotor Lock between locked and unlocked fully.



Rotor Lock is unlocked fully.



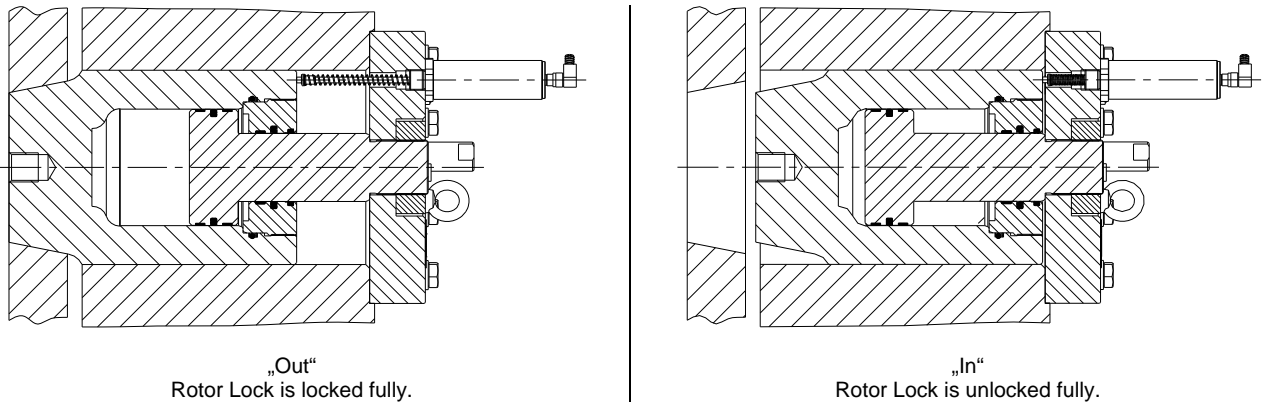
picture 18: position of switching

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch:



6 Accessories- Sensor

6.1 Technical Data



picture 19

6.2 Assembly/Start-up

- Remove the drain plug from the Rotor Lock.
- Screw the sensor hand-tight into the Rotor Lock for the time being.
- Tighten the sensor at the tightening torque $T_A = 20 \text{ Nm}$.
- Prepare the electric connection according to the plug-in connection (see picture 17).



ATTENTION!

The sensor measures the position of the lock bolt. The sensor indicates the signal Rotor Lock In or Out approximately 5 mm before the final position has been reached.



CAUTION!

In case of damages such as faulty cables, poor connections etc., the signals for the position Rotor Lock In or Out will disappear.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 12.01.11 Pz/Sf	Ersatz für: ---
	Geprüft: 18.01.11 Pz	Ersetzt durch: