

KTR-STOP® M-xxx-F B-xx

M-xxx-F B-xx is a spring-actuated brake in a floating caliper design serving to generate a brake force on a brake disk in order to decelerate a plant's movement or stop it, respectively, or keep it at standstill.



The KTR brake system was designed to operate as a service brake/emergency stop brake on rotating brake disks. For any other applications please consult with KTR.

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1 Technical data

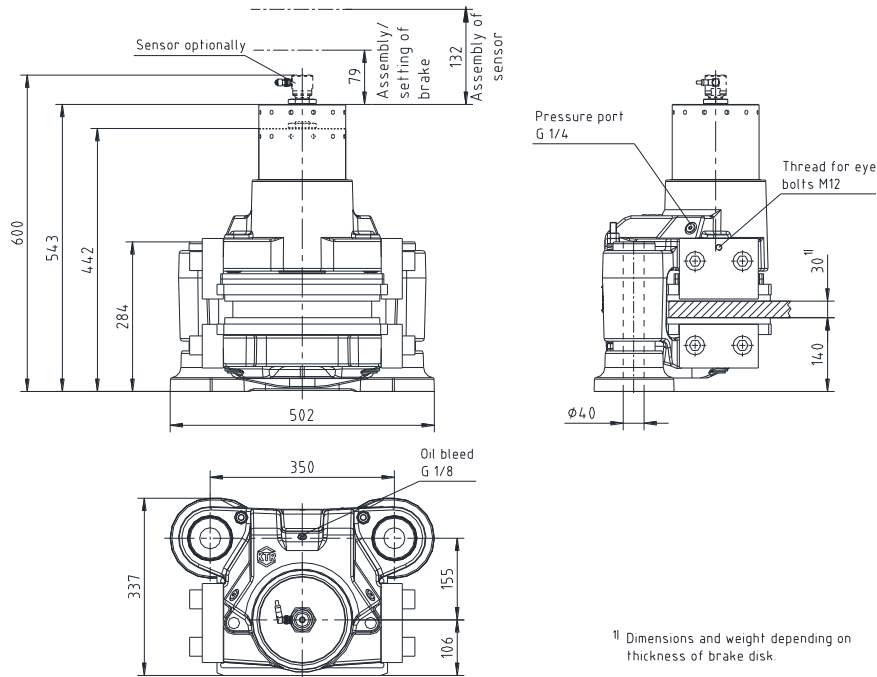


Illustration 1: Dimensional drawing

Table 1: Technical data

			M-xxx-F B-xx
Weight		[kg]	Approx. 215 - 230 ¹⁾
Width of brake pad		[mm]	200
Surface of each brake pad	organic	[mm ²]	57,900
	powder metal	[mm ²]	53,500
Max. wear of each brake pad		[mm]	8
Rated coefficient of friction ²⁾		[μ =]	0.4
Total brake piston surface - complete brake		[cm ²]	137.4
Volume for each brake caliper with 1 mm stroke		[cm ³]	13.74
Max. operating pressure		[bar]	200
Width of brake disk		[mm]	25 – 50
Pressure port			G 1/4
Oil bleed			G 1/8
Floating range on axles	towards mounting surface	[mm]	5
	away from mounting surface	[mm]	below 120 kN = 10 from 120 kN = 5
Min. diameter of brake disk ØD _A		[mm]	800
Operating temperature		[°C]	- 20 to + 50

1 Technical data

Table 2: Clamping force, loss of preload force, opening pressure and weight

Brake type ³⁾	Clamping force F _c [kN]	Loss of power ⁴⁾ [%]	Opening pressure [bar]	Braking torque [Nm] with brake disk Ø [mm]		
				800	1500	2000
KTR-STOP® M-100-F B-xx	100	7.0	110	24000	52000	72000
KTR-STOP® M-110-F B-xx	110	6.5	120	26400	57200	79200
KTR-STOP® M-120-F B-xx	120	8.5	130	28800	62400	86400
KTR-STOP® M-130-F B-xx	130	5.0	140	31200	67600	93600
KTR-STOP® M-140-F B-xx	140	4.5	150	33600	72800	100800
KTR-STOP® M-150-F B-xx	150	7.5	165	36000	78000	108000
KTR-STOP® M-160-F B-xx	160	7.0	180	38400	83200	115200
KTR-STOP® M-170-F B-xx	170	6.5	190	40800	88400	122400
KTR-STOP® M-180-F B-xx	180	6.0	190	43200	93600	129600

2) The friction coefficient each depends on the application or material of the brake pad; please consult with KTR.

3) Other brake types on request

4) With a stroke of 1 mm (0.5 mm wear of brake pad on each side)

$$F_b = F_c \cdot 2 \cdot \mu$$

$$M_b = z \cdot F_b \cdot \frac{D_{av}}{2}$$

- F_b = Brake power [kN]
- F_c = Clamping force [kN]
- M_b = Braking torque [kNm]
- z = Number of brakes
- D_{av} = Effective diameter of brake [m]

Calculation of brake disk:

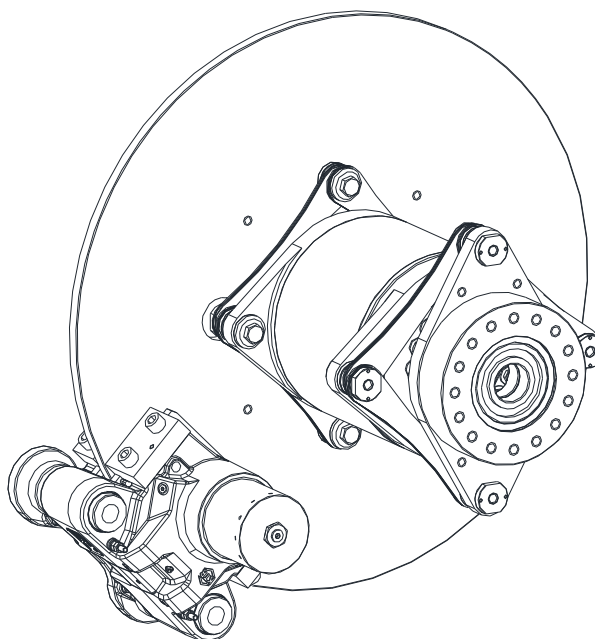


Illustration 2: Assembly of brake

Table 3: Calculation of brake disk

$D_{C \max.} = D_A - 420$
$D_{av} = D_A - 200$

1 Technical data

Connection dimensions of brake

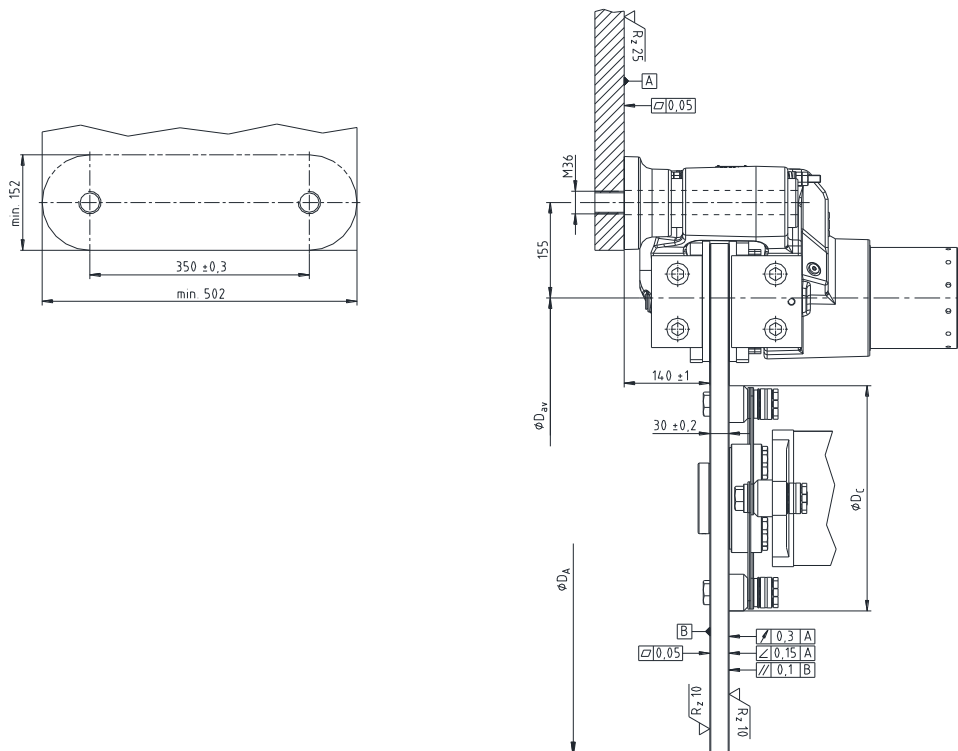


Illustration 3: Connection dimensions

2 Advice

2.1 General advice

Please read through these operating/assembly instructions carefully before you start up the brake.
 Please pay special attention to the safety instructions!
 The operating/assembly instructions are part of your product. Please store them carefully.
 The copyright for these operating/assembly instructions remains with KTR.

2.2 Safety and advice symbols



Warning of personal injury

This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death.



Warning of product damages

This symbol indicates notes which may contribute to preventing material or machine damage.



General advice

This symbol indicates notes which may contribute to preventing adverse results or conditions.

Please observe protection note ISO 16016.	Drawn: 2022-01-11 Ka/Wie	Replacing: KTR-N dated 2018-04-03
	Verified: 2022-01-26 Ka	Replaced by:

**2 Advice****2.3 General hazard warnings**

With assembly, operation and maintenance of the brake it has to be made sure that the entire drive train is secured against accidental switch-on. You may be seriously hurt by rotating parts. Please make absolutely sure to read through and observe the following safety indications.

- All operations on and with the brake have to be performed taking into account "safety first".
- Make sure to switch off the power pack before you perform your work on the brake.
- Secure the power pack against accidental switch-on, e. g. by providing warning signs at the place of switch-on or removing the fuse for current supply.
- Do not reach into the operating area of the brake as long as it is in operation.
- Please secure the brake against accidental contact. Please provide for the necessary protection devices.
- Please make sure that the overall brake/hydraulic system is depressurized during maintenance operations.

2.4 Intended use

You may only assemble, operate and maintain the brake if you

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

The brake may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the brake design are not admissible. We will not assume liability for any damage that may arise. In the interest of further development we reserve the right for technical modifications.

The **brake type M-xxx-F B-xx** described in here corresponds to the technical status at the time of printing of these operating/assembly instructions.

3 Storage, transport and packaging**3.1 Storage**

The brake is delivered in preserved condition and can be stored in a closed, dry place during 12 months.

With favourable storage conditions its properties remain unchanged up to 12 months.

If the brake is stored over a longer period exceeding 12 months as well as after each transport the corrosion protection needs to be renewed and the brake has to be activated over the full braking distance in order to prevent the gaskets from sticking together.



The storage rooms must not include any ozone-generating devices like e. g. fluorescent light sources, mercury-vapour lamps or electrical high-voltage appliances. Humid storage rooms are not suitable.

Please make sure that condensation is not generated. The best relative air humidity is less than 65 %.

3.2 Transport and packaging

In order to avoid any injuries and any kind of damage please always make use of proper transport and lifting equipment.

The brake is packed differently each depending on quantity and kind of transport. Unless otherwise contractually agreed, packaging will follow the in-house packaging specifications of KTR.



4 Assembly

The brake is supplied in pre-assembled condition. Before assembly the brake has to be inspected for completeness.



The brake is generally supplied with the transport lock mounted.
The screw pin (component 1.21) is attached to the brake in bulk.

4.1 Components of the brake

Components/component assemblies of brake – Type M-xxx-F B-xx

Component/ component assembly	Quantity	Description
1	1	Caliper with components
2	1 ¹⁾	Distance plate
3	1	Base plate with guide pin
4	2	Centering system
5	2	Pad retraction set of brake caliper
6	2	Brake pad
7	2	Pad retraction set
8	1 ²⁾	Sensor

- 1) Quantity depends on thickness of brake disk.
- 2) Optionally available

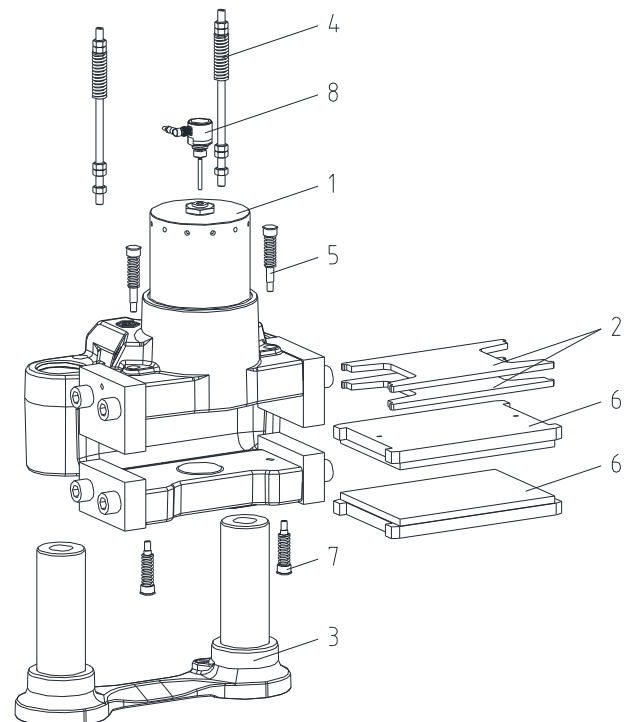


Illustration 4: Components/component assemblies of brake

4 Assembly

4.1 Components of the brake

Component assembly 1: Caliper with components

Component	Quantity	Description
1.1	1	Brake caliper
1.2	1	Brake piston
1.3	1	Scraper
1.4	1	Gasket
1.5	1	Gasket
1.6	1	Set of disk springs
1.7	1	Setting nut
1.8	1	Centering pin
1.9	1	O-ring
1.10	1	Scraper
1.11	1	Gasket
1.12	1	Gasket
1.13	4	Screw plug VSTI (acc. to DIN 908)
1.14	2	Pad retainer
1.15	2	Pad retainer
1.16	8	Cap screw DIN EN ISO 4762 - 10.9
1.17	1	Drain plug (nylon)
1.18	4	DU bushing
1.19	4	Scraper
1.20	1	Connection adapter
1.21	1	Screw plug VSTI (acc. to DIN 908)

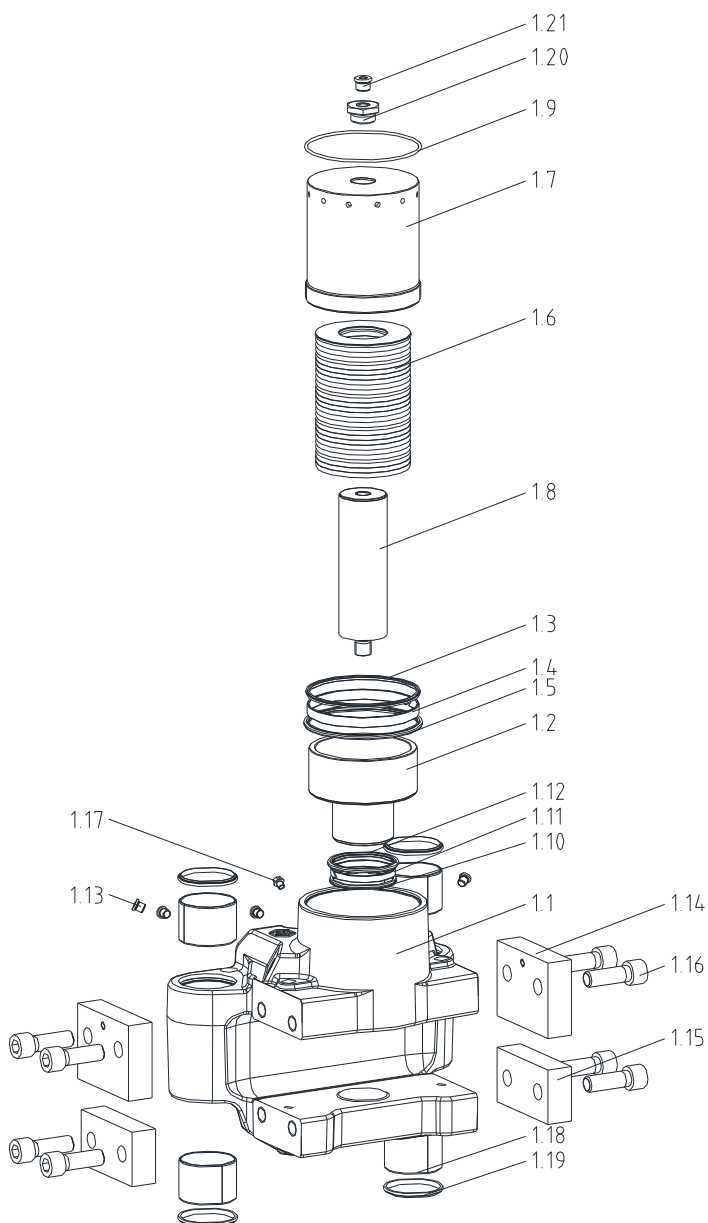


Illustration 5: Housing with single parts



4 Assembly

4.1 Components of the brake

Component assembly 3: Base plate with guide pin

Component	Quantity	Description
3.1	1	Base plate
3.2	2	Guide pin

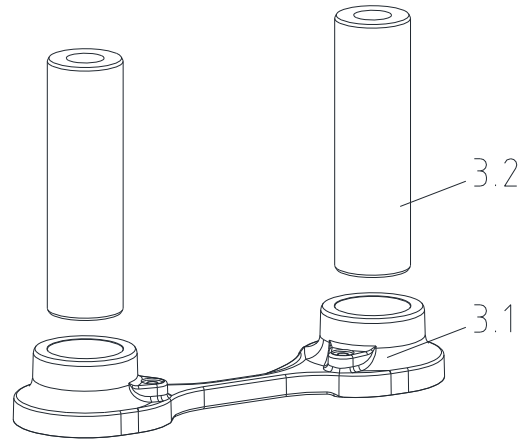


Illustration 6: Base plate with guide pin

Component assembly 4: Centering system

Component	Quantity	Description
4.1	1	Pin
4.2	1	Pressure spring
4.3	5	Hexagon nut DIN EN ISO 4032
4.4	1	Washer

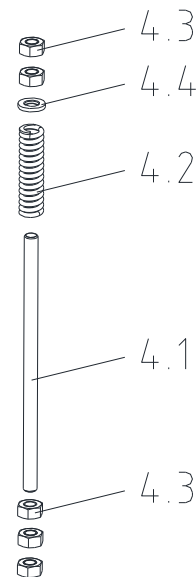


Illustration 7: Centering system

4 Assembly

4.1 Components of the brake

Component assembly 9: Pad retraction set of brake caliper

Component	Quantity	Description
5.1	1	Long pin
5.2	1	Pressure spring
5.3	1	Sealing plug

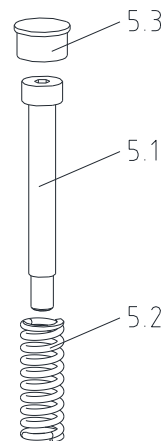


Illustration 8: Pad retraction set for housing

Component assembly 7: Pad retraction set

Component	Quantity	Description
7.1	1	Short pin
7.2	1	Pressure spring
7.3	1	Sealing plug

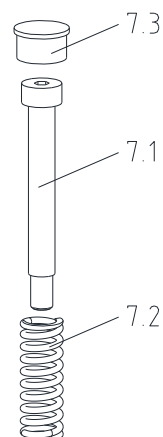


Illustration 9: Pad retraction set for housing

4.2 Preparation of assembly



To ensure the full braking power, the preparation for assembly needs to be performed carefully.

- The connection plate for the brake as well as the brake disk have to be inspected for dimensional accuracy. For that purpose please investigate the connection dimensions, connection surfaces and tolerances as specified in the drawing (see illustrations 1 to 3 and table 3).
- Clean and degrease the brake disk and mounting surfaces. Dirt can easily be removed by means of solvents.



The connection between connection surface and brake is defined to be frictionally engaged. Any residues of oil, dirt and corrosion protection reduce the coefficient of friction. As a result the operation of the brake and the full braking power are no longer ensured.



Please observe the manufacturer's instructions regarding the use of solvents.

Please observe protection note ISO 16016.	Drawn: 2022-01-11 Ka/Wie	Replacing: KTR-N dated 2018-04-03
	Verified: 2022-01-26 Ka	Replaced by:

**4 Assembly****4.3 Brake pads**

**KTR supplies brake pads free from asbestos and lead only.
If requested, we will provide you with the respective certificates.**

The brake pads are each adapted to the application and delivered accordingly.
They can be distinguished as follows:

- organic material
- powder metal



**Brake pads are highly sensitive to grease and oil which means that they cannot be cleaned.
Brake pads having such kind of dirt need to be replaced and disposed of.**



**We would recommend to store the brake pads in their package as long as possible to
protect them from any kind of dirt.**



**Brake pads which have worn off to the wear limit have to be replaced immediately. Make
sure to replace by original parts only.**

4.4 Assembly of the brake

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



**The brake is mainly selected for mounting on vertically aligned brake disks
(see illustration 3). With horizontally aligned brake disks (see illustration 1) the brake may
only be aligned upright.**

M12 threads are located on the back of the brake and in the pad retainer to fasten an eye bolt serving to use lifting tools. The eye bolt is to be dismantled after assembly of the brake and stored in a safe place.



**In order to avoid any damages on the brake, never twist a rope or another lifting tool around
damageable components.**



**Before you start with the assembly please check if a sensor has been mounted.
Please remove it before assembly in order to avoid any damages.**

- Inspect the position of the setting nut (component 1.7). If necessary, set it to the right dimension (see illustration 18).
- Insert the brake pads (component 6) fully into the brake caliper.



**If you want to use brake pads after having assembled the brake, it is necessary to
disassemble the pad holder (component 1.14 and 1.15) for that purpose (chapter 5.1).**

- Mount the pad retraction set (component 7) by shifting the pressure spring (component 7.2) onto the pin (component 7.1). Screw the pin with the pressure spring into the brake pad against a stop.
- Repeat this process with the pad retraction set of caliper (component 5).



**Secure the screw connection (component 5.1 and 7.1) at the brake pad additionally against
working loose, e. g. conglutinating with Loctite (average strength).**

4 Assembly

4.4 Assembly of the brake

- Insert the brake in the correct position towards the connection plate. Hand-tighten the brake via the screws for the time being.



To facilitate the assembly it is possible to fix the position of the brake by one screw only for the time being. Swing in the brake until the second screw can be assembled, too (see illustration 10).

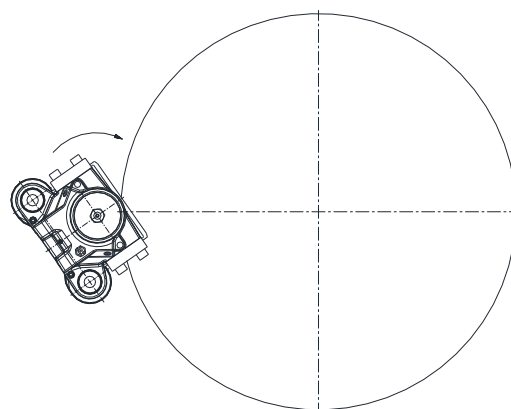


Illustration 10

- Screw the brake through the guide pins to the connection plate via 2 screws and tighten them evenly stepwise at the tightening torque specified (see table 4).

Table 4: Tightening torques

Screw size	Tightening torque T_A [Nm]			
	10.9		12.9	
	Untreated and oiled	Greased with MoS ₂	Untreated and oiled	Greased with MoS ₂
M36	3300	2450	3800	2800

- Align the brake in centre to the brake disk.
- Make sure that the brake disk can rotate freely while not touching the brake pads or the caliper.
- Re-assemble the sealing plugs (component 5.3 and 7.3).



In order to avoid any contact between the brake disk and the brake resulting from thermal expansion, the distance of the brake according to table 3 needs to be observed.



Please make sure that the tolerances of the brake disk do not exceed the figures specified in illustration 3.

**4 Assembly****4.5 Setting/resetting of the centering system**

The centering system needs to be reset with initial assembly or after having replaced brake pads or single parts, respectively. Only in this way it is ensured that the gap between the brake disk and the brake pad on the bottom side is set to the right value and the pad does not touch on any side.



The centering system has to be reset regularly with wear of the brake pads. For that purpose repeat the complete chapter *Setting/resetting of the centering system*.

- Measure the gap between the brake disk and the brake pad on the bottom side via a feeler gauge.
- Set the gap to 0.5 mm or the figure x requested (see illustration 11), respectively, by screwing the hexagon nut marked with 1 in illustration 12 either upwards or downwards.
- Counter the hexagon nut with the hexagon nut marked with 2 in illustration 12.

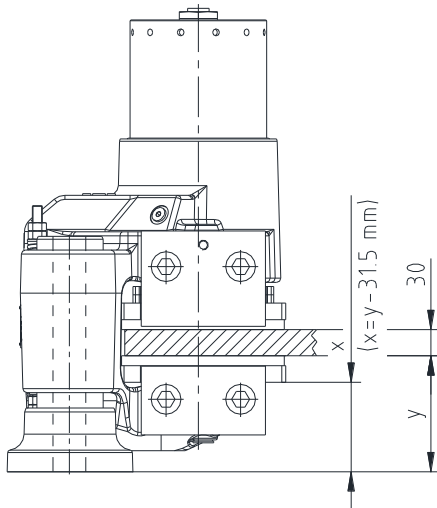


Illustration 11: Setting of gap

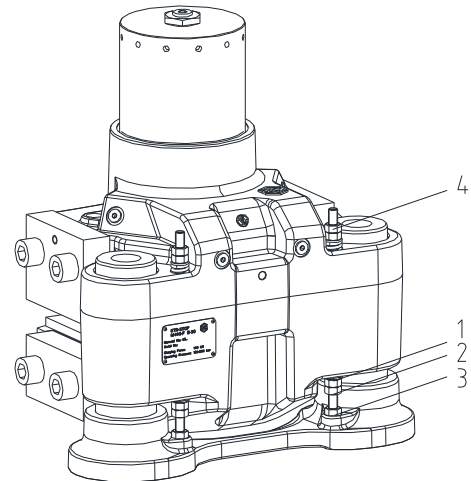


Illustration 12: Setting of centering system



The gap between brake disk and brake pad needs to be 0.5 mm on both sides to ensure the brake power.



4 Assembly

4.6 Pressure port of a brake

- Connect the pressure oil line to one of the pressure ports of the brake (see illustration 13 and 14). For that purpose remove the screw plug beforehand.



The hydraulic lines have to be rinsed before connecting to the brake to prevent any particles from getting into the brake. If the lines are not rinsed sufficiently, the gaskets may be damaged and the operation of the brake is no longer ensured.

- Mount a miniature measuring coupling with a miniature measuring hose to the venting hole (see illustration 13 and 14), for that purpose the screw plug needs to be removed beforehand. Discharge the end of the miniature measuring hose in a suitable collection container.



The pressure port on top serves for venting the brake. For a wash-up system please make use of the pressure port on top.



It is not recommended to use steel plugs for venting.

- Connect the drain line to the brake (see illustration 13 and 14). For that purpose remove the drain plug beforehand.



In order to locate a leakage immediately, it is recommended to use a transparent hose and collection container. Since higher pressures (5 bar at the maximum) are not generated, a pneumatic hose may be used, too. Please inspect the brake regularly for leakages.



Severe leakages have to be removed immediately. Oil which has escaped has to be removed completely, since oil remains may vaporize on hot components and ignite.

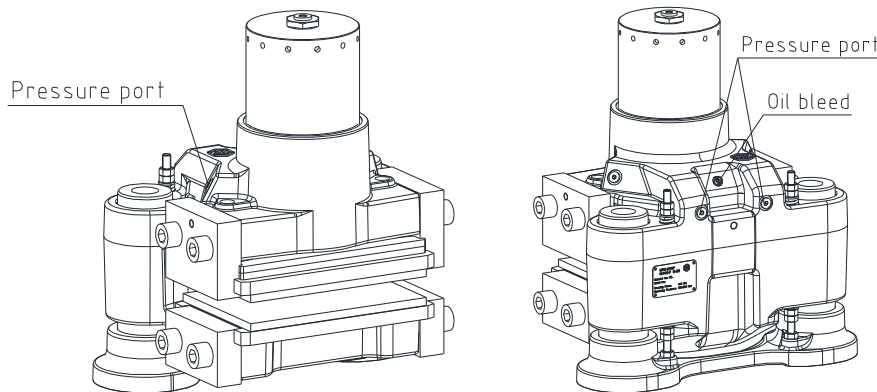


Illustration 13: Connections of the drain lines/pressure lines

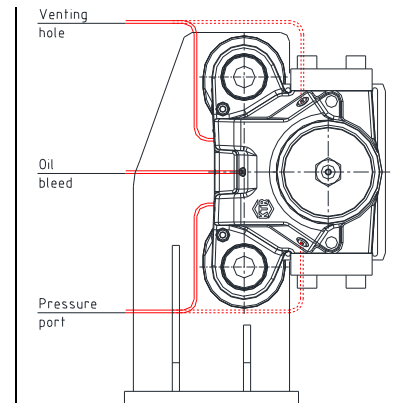


Illustration 14: Pressure port of a brake



Please make sure that the connections and hoses are adapted to the brakes with regard to pressure, flow rate, temperature and liquid. Moreover, you have to use flexible hydraulic hoses in order to not limit the motions of the brake. Any hoses which are located close to mobile components should be secured or coated accordingly.



4 Assembly

4.7 Pressure port of several brakes



If several brakes are assembled we recommend to connect the pressure port for each brake individually (in parallel) (see illustration 15).

Please note, if several brakes are connected in a series (see illustration 16), the braking effect of all following brakes may become effective slightly delayed.

- Connect the pressure oil line to one of the pressure ports of the brake (see illustration 13, 15 and 16). For that purpose remove the screw plug beforehand.



The hydraulic lines have to be rinsed before connecting to the brake to prevent any particles from getting into the brake. If the lines are not rinsed sufficiently, the gaskets may be damaged and the operation of the brake is no longer ensured.

- Mount a miniature measuring coupling with a miniature measuring hose to the venting hole (see illustration 13, 15 and 16), for that purpose the screw plug needs to be removed beforehand. Discharge the end of the miniature measuring hose in a suitable collection container.

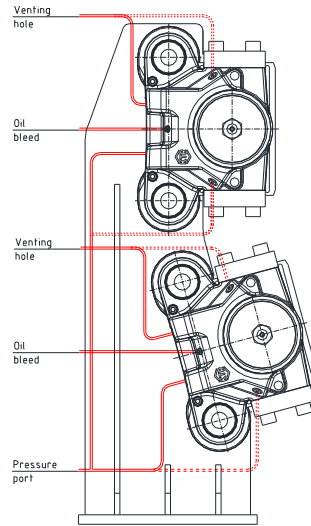


Illustration 15: Pressure port of several brakes (in parallel)

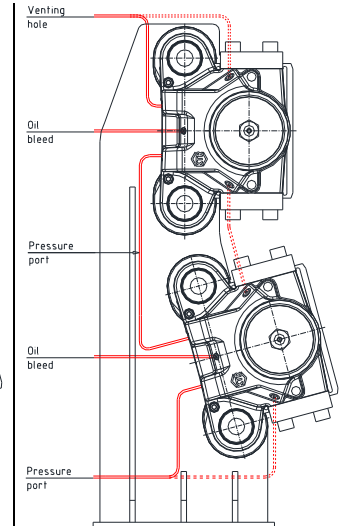


Illustration 16: Pressure port of several brakes (in a series)



The pressure port on top serves for venting the brake. For a wash-up system please make use of the pressure port on top.



With the parallel connection of brakes (see illustration 15) each brake needs to be vented individually.



It is not recommended to use steel plugs for venting.

- Connect the drain line to the brake (see illustration 13, 15 and 16). For that purpose remove the sealing plug beforehand.



In order to locate a leakage immediately, it is recommended to use a transparent hose and collection container. Since higher pressures (5 bar at the maximum) are not generated, a pneumatic hose may be used, too. Please inspect the brake regularly for leakages.



Severe leakages have to be removed immediately. Oil which has escaped has to be removed completely, since oil remains may vaporize on hot components and ignite.



Please make sure that the connections and hoses are adapted to the brakes with regard to pressure, flow rate, temperature and liquid. Moreover, you have to use flexible hydraulic hoses in order to not limit the motions of the brake. Any hoses which are located close to mobile components should be secured or coated accordingly.

4 Assembly

4.8 Start-up of the brake



Before start-up and after each operation on the brake the hydraulic system has to be generally vented. Repeat bleeding the brake several times a year, since any air in the hydraulic system may affect the operation of the brake and the plant.



Make sure that there is sufficient liquid in the hydraulic system during and after the venting process (recommendation of liquid, see chapter 4.10).

- Switch on the hydraulic system for a short while to make sure that the brake is flushed with hydraulic oil. Repeat this process until a stream of clean oil dissipates from the miniature measuring hose.
- Remove the miniature measuring hose.



If the miniature measuring coupling is removed as well, the screw plug (component 1.13) needs to be screwed in the venting hole (see illustrations 13 to 16).

- Dispose of the hydraulic oil of the collection container as per chapter 4.13.
- Put the opening pressure (see table 2) on the hydraulic system to relieve the assembly lock.



The hydraulic system must never be operated at a higher pressure than the figures specified in the type plate of the brake or table 1. If any figures or types/sizes are changed, please consult with KTR.



Never keep your fingers between brake disk and brake when locking the brake in order to prevent serious injuries of your hands. Before every maintenance operation please make sure that the brake is fully secured against activating.

- Remove the screw with the disk (assembly lock, see illustration 17) from the centering pin (component 1.8).



Afterwards store the assembly lock (screw with disk) in a safe place since it will be required again later.

- Screw the connection adapter (component 1.20) and the screw plug (component 1.21) into the setting nut (component 1.7)
- **Applying with the use of a sensor only:** Mount the sensor (component 8) according to chapter 6.2 instead of the screw plug (component 1.21).
- The brake pads have to be ground in on the surface of the brake disk to achieve the nominal coefficient of friction.

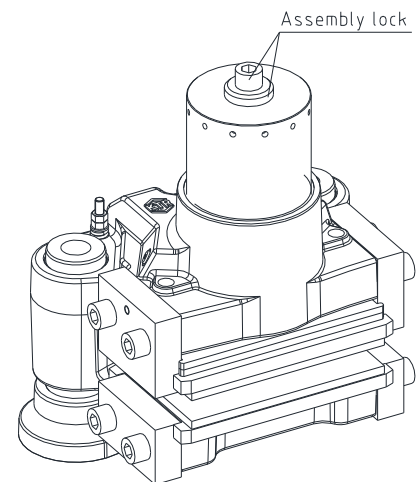


Bild 17: Assembly lock



Please observe the instructions for grinding-in according to KTR-N.

**4 Assembly****4.9 Setting/Resetting of the brake**

The brake needs to be set with the initial assembly or after having replaced the brake pads or single parts, respectively. Only in this way it is ensured that the brake has the clamping force specified.



In case of wear of the brake pads the brake needs to be regularly reset. Before you reset the brake, the centering system needs to be set first. For that purpose repeat the complete chapters *Setting/resetting of the centering system* and afterwards *Setting/resetting of the brake*.

- Remove the O-ring (component 1.9) and the screw plug (component 1.21).
- **Applying with the use of a sensor only:**
Remove the sensor (component 8).
- Put the opening pressure (see table 2) on the hydraulic system to make sure that the brake pads lift off the brake disk.



Please note chapter 4.8 *Start-up of brake*.

- Screw the screw with the disk (assembly lock, see illustration 17) into the center pin (component 1.8).
- Release the pressure from the hydraulic system.
- Measure the gap between the brake disk and the brake pad on the side of the housing via a feeler gauge.
- Set the gap to 0.5 mm by screwing the setting nut either upwards or downwards.
- **Applying for resetting of the brake only (wear of brake pad):**
With a wear of the brake pad (0.5 mm wear for each brake pad) of 1 mm the setting nut needs to be screwed in by 1/3 revolution.
- Insert the O-ring (component 1.9) between the housing and the setting nut.

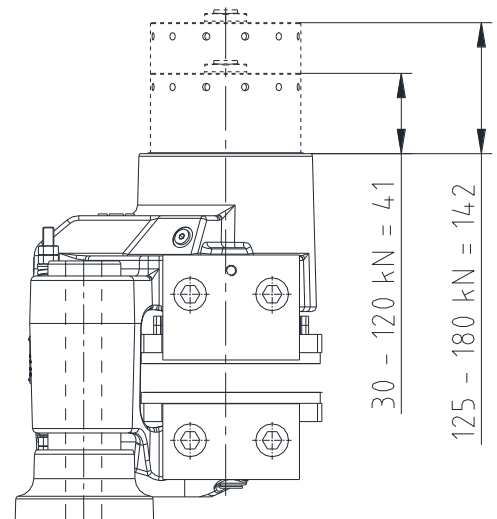


Illustration 18: Setting of setting nut



The gap between brake disk and brake pad needs to be 0.5 mm on both sides to ensure the brake power.

- **Applying with the use of a sensor only:**
Mount the sensor (component 8) according to chapter 6.2 instead of the screw plug (component 1.21).

**4 Assembly****4.10 Recommendation of fluids to be used**

You may only use mineral hydraulic fluids meeting the demands of DIN 51524. KTR recommends those fluids corresponding to DIN 51524-3.

KTR recommends the following fluids (other manufacturers may be selected):

Manufacturer	Standard		Special	
	- 20 °C to + 40 °C (- 4 °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)
<i>Mineral oil</i>				
Castrol	Hyspin HVI 32	Hyspin HVI 46	-	Hyspin HVI 68
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



The permissible operating temperatures of brake components from - 20 °C to + 60 °C (- 4 °F to + 140 °F) have to be observed. For deviating operating temperatures please consult with KTR.

Viscosity

We would recommend a viscosity range from 20 to 220 mm²/s (cSt) of the hydraulic fluid with operating temperature. The viscosity during starting should not exceed 500 mm²/s and the viscosity during operation should not fall below 12 mm²/s.

Filtration

When filling and re-filling the hydraulic system and replacing the hydraulic fluid, the oil needs to be filtered. For that purpose use an offline filter or a respective fill unit. In addition we would recommend to use an inline filter.



The service life of the brake system is extended depending on the degree of purity of the oil.

As a standard the KTR basic power packs are equipped with a 10-µm-inline filter.

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

- ISO 4406, class 20/17/12

Maintenance operations on the hydraulic system

In order to ensure a smooth operation of the overall system, the maintenance operations on the hydraulic system (inspection of level and degree of dirt, replacing the hydraulic fluid or filter elements, etc.) have to be performed as per the manufacturer's operating instructions.

The system has to be scavenged or vented after each replacement of the hydraulic fluid.



Adverse reactions may be generated by mixing different fluids or fluids of various manufacturers.



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



4 Assembly

4.11 Disassembly of the brake



In order to avoid any personal injuries, protect the brake by means of the assembly lock.

- Remove the screw plug (component 1.21) or the sensor (component 8) from the setting nut (component 1.7).
- Put the opening pressure (see table 2) onto the hydraulic system.
- Hand-tighten the screw with the disk (assembly lock, see illustration 17) into the setting nut (component 1.7).
- Release the pressure fully from the hydraulic system.



Please make sure that the entire brake/hydraulic system is depressurized.



Parts released or falling down may cause injury to persons or damage on the machine. Secure the components before disassembly.

- Remove the screw plug located at the highest point (component 1.13) from the venting hole (see illustrations 13 to 16).
- Drain the hydraulic oil completely from the brake.
- Dispose of the hydraulic oil as per chapter 4.13.
- Disconnect the drain and pressure oil line from the brake.
- Screw the screw plugs (component 1.13) in all pressure ports or venting holes (see illustrations 13 to 16).
- Remove the 2-off screws serving for fixing the brake to the connection plate.
- Take out the brake.

4.12 Spares inventory, customer service addresses

A basic requirement to ensure the readiness for use of the brake 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 at www.ktr.com.



KTR does not assume any liability or warranty for the use of spare parts and accessories which are not provided by KTR and for the damages which may incur as a result.

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4 Assembly**4.13 Disposal**

In respect of environmental protection we would ask you to dispose of the products on termination of their service life in accordance with the legal regulations and standards that apply, respectively.

- **Metal or brake pads, respectively**
Brake pads and any other metal parts have to be cleaned and disposed of by scrap metal.
- **Gaskets**
Gaskets can be disposed of by residual waste.
- **Sensors**
Electric components have to be treated as electric waste.
- **Hydraulic oil**
Hydraulic oils have to be collected in suitable tanks and disposed of by a waste disposal company.

5 Maintenance**5.1 Replacement of brake pads**

Brake pads having a balance of pad height of less than 2 mm have to be replaced by return.



Parts released or falling down may cause injury to persons or damage on the machine. Secure the components before disassembly.



Never keep your fingers between brake disk and brake when locking the brake in order to prevent serious injuries of your hands. Before every maintenance operation please make sure that the brake is fully secured against activating.

- Remove the screw plug (component 1.21) or the sensor (component 8) from the setting nut (component 1.7).
- Put the opening pressure (see table 2) onto the hydraulic system.
- Screw the screw with the disk (assembly lock, see illustration 17) hand-tight into the centre bolt (component 1.8).
- Release the pressure fully from the hydraulic system.
- Inspect the position of the setting nut (component 1.7). If necessary, set it to the right dimension (see illustration 18).
- Disassemble the pad holders on one side (component 1.14 and 1.15).
- Remove the pad retracting sets (component 5 and 7).
- Replace the brake pads that have worn off. Insert the brake pads (component 6) fully into the brake caliper or the distance plate, respectively.
- Hand-tighten the pad holders (component 1.14 and 1.15) by each 2-off cap screws (component 1.16) for the time being. Tighten the screws at the tightening torque $T_A = 890 \text{ Nm}$.



Please make sure that the pad holders of the housing have various heights.

**5 Maintenance****5.1 Replacement of brake pads**

- Mount the pad retraction set (component 7) by shifting the pressure spring (component 7.2) onto the pin (component 7.1). Screw the pin with the pressure spring into the brake pad against a stop.
- Repeat this process with the pad retraction set of caliper (component 5).



Secure the screw connection (component 5.1 and 7.1) at the brake pad additionally against working loose, e. g. conglutinating with Loctite (average strength).

- Repeat chapter 4.5 *Setting/re-adjustment of the centering system* and chapter 4.9 *Setting/re-adjustment of the brake*.
- Please make sure that the brake disk can rotate freely while not touching the brake pads or the brake caliper.



To facilitate the replacement of the brake pads you can unscrew the screws of the connection plate and remove 1 out of the 2 screws alternatively. Swing the brake out of its position.



Please note chapter 4.4 *Assembly of the brake*.

- Before you reactivate the brake, please observe chapter 4.8 *Start-up of the brake*.

5.2 Maintenance of the brake / replacement of single parts

To ensure the full braking power, both disassembly and assembly have to be performed at the highest level of purity.

- Disassemble the brake, please observe chapter 4.11 *Disassembly of the brake*.
- Remove the pad retracting sets (component 5 and 7).
- Take out the brake pads (component 6) and the distance plates (component 2).
- Untighten each the two hexagon nuts on top of the centering system (component 4) and remove them along with the disk and the pressure spring.
- Remove the brake caliper (component 1) from the guide pin (component 3).



Inspect the components/component assemblies 2, 3 and 4 for any kind of damage; it may be necessary to replace the components. Afterwards remove dirt, grease and corrosion from the components.

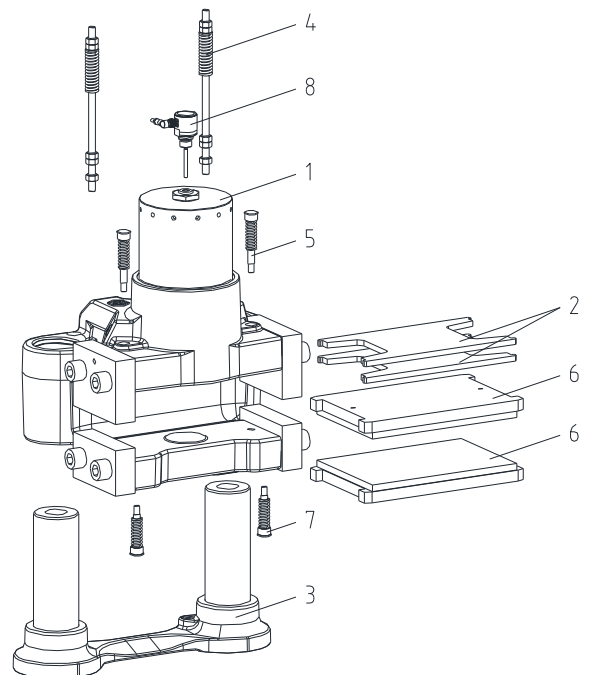


Illustration 19: KTR-STOP® XS-xx-F B-xx

**5 Maintenance****5.2 Maintenance of the brake / replacement of single parts**

- Remove the O-ring (component 1.9).
- Put the opening pressure (see table 2) onto the hydraulic system.
- Remove the screw with the disk (assembly lock, see illustration 17) from the center pin (component 1.8).
- Release the pressure from the hydraulic system.
- Unscrew the setting nut (component 1.7) from the housing.
- Remove the disk spring package (component 1.6).



Please make use of a support to ensure that you can provide for the same arrangement of disk springs, disk and adjustment washer(s) with re-assembly of the brake.

- Press the brake piston (component 1.2) carefully out of the brake caliper (if necessary, use some hydraulic oil).
- Remove the gaskets (component 1.4 and 1.5) and the scraper (component 1.3).



When removing the gaskets and scrapers please make sure that the keyways in the housing are not damaged.

- The components have to be cleaned from dirt, grease and corrosion protection. The components can easily be cleaned by means of solvents. Afterwards dry the components.



Please observe the manufacturer's instructions regarding the use of solvents.



Inspect the DU bushes (component 1.18), scrapers (component 1.19) and centering pins (component 1.8) for any kind of damage; if necessary, the components have to be replaced. Afterwards remove dirt, grease and corrosion from the components.

- Insert new gaskets (component 1.4 and 1.5) and scrapers (component 1.3 and 1.19) into the housing. For that purpose the components may be heart-shaped (see illustration 21).



The gasket and scraper have to be installed in the right direction (see illustration 22).



With a new assembly of the brake piston basically new gaskets and scrapers have to be used, since their operativeness is no longer ensured due to wear and damages.

- Grease the gaskets and the scraper with hydraulic oil (see illustration 22).

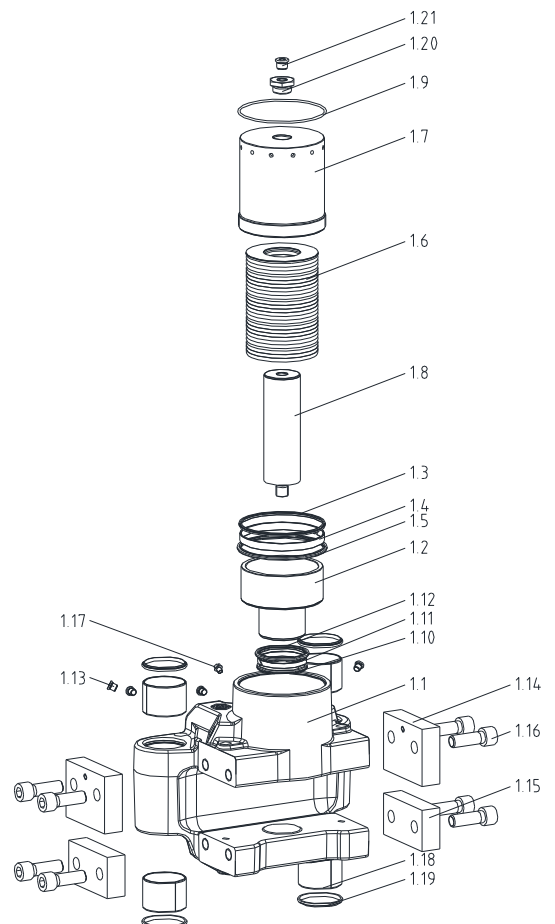


Illustration 20: Housing with single parts

5 Maintenance

5.2 Maintenance of the brake / replacement of single parts



Oils and greases containing molybdenum disulphite or zinc sulphite additives must not be used.

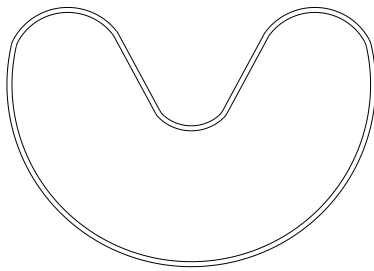


Illustration 21: Assembly of gasket and scraper

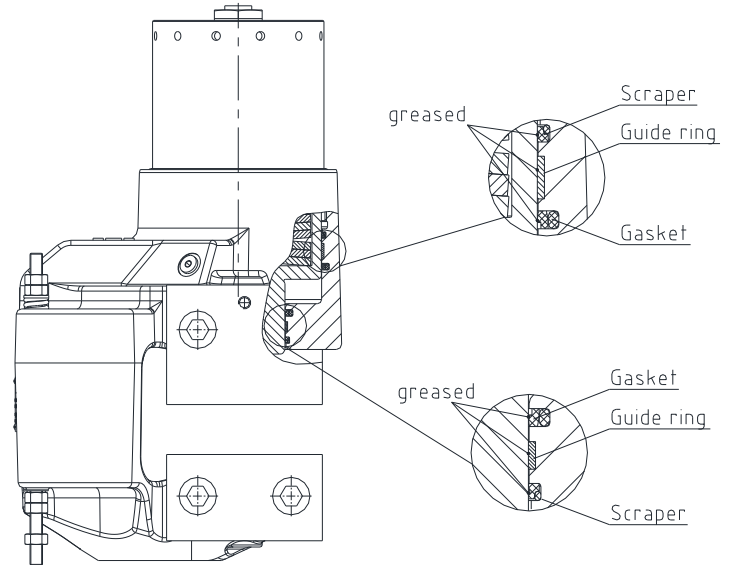


Illustration 22



Inspect the surfaces of the brake piston and the hole of the housing to make sure that they are neither scratched nor damaged, since the surfaces are either ground or polished. Such kind of damages may cause earlier wear on the gaskets and scrapers and generate leakages.

- Insert the brake piston (component 1.2) into the brake caliper and press it against a stop.
- Shift the set of disk springs (component 1.6) into the brake piston (component 1.2). Make sure that the disks are located on top.



Grease the disk springs properly with Molykote MoS₂. Please make sure that the set of disk springs is mounted in the same arrangement as it was supplied. If a new set of disk springs is used, the condition of supply needs to be observed in detail.

- Screw the setting nut (component 1.7) into the housing and set it to the right dimension (see illustration 18).
- Put the opening pressure (see table 2) onto the hydraulic system.
- Hand-tighten the screw with the disk (assembly lock, see illustration 17) into the setting nut (component 1.7).
- Release the pressure from the hydraulic system.
- Insert a new O-ring (component 1.9) between the brake caliper and the setting nut.
- After you have disassembled the pin of the centering system (component 4), screw each the 3-off hexagon nuts at the bottom onto the pin. Afterwards screw the pin into the base plate by 20 mm.
- Counter the pin with the hexagon nut marked with 3 in illustration 24.
- Fit the pre-assembled unit carefully onto the guide pins.



Please make sure that the centering system (component 4) is not damaged.

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**5 Maintenance****5.2 Maintenance of the brake / replacement of single parts**

- Set the gap between brake disk and brake pad to 0.5 mm or the requested value x (see illustration 23) by screwing the hexagon nut marked with 1 in illustration 24 upwards or downwards.
- Counter the hexagon nut with the hexagon nut marked with 2 in illustration 24.
- Push the pressure spring (component 4.2) and the disk (component 4.4) onto the pin of the centering system. Screw on the two hexagon nuts (component 4.3) until they fit the disk.
- The pressure spring needs to be pre-stressed by 13 mm. Counter the hexagon nut with the hexagon nut marked with 4 in illustration 24.
- Repeat chapters 4.2 to 4.9.

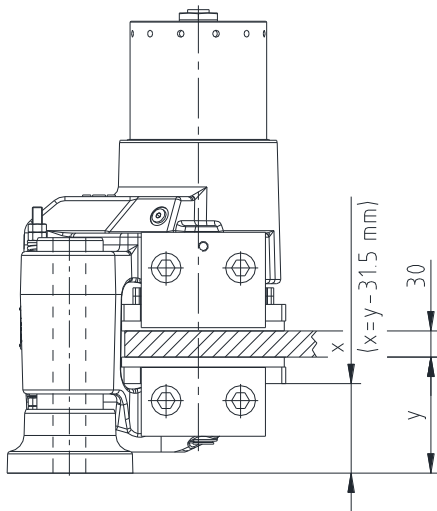


Illustration 23: Setting of gap

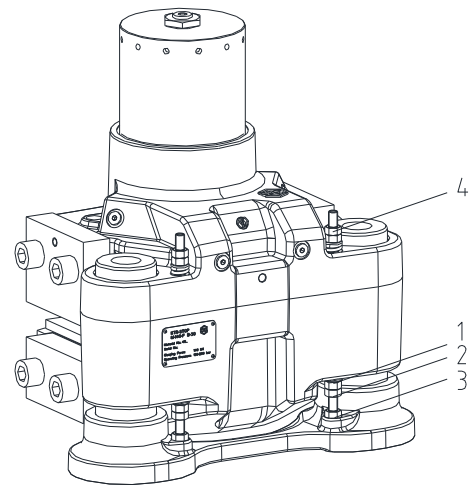


Illustration 24: Setting of centering system

5.3 Maintenance and service

KTR-STOP® M-xxx-F B-xx is a low-maintenance brake. We recommend to perform a visual inspection and an operational testing on the brake **at least once a year**. Here you should put special emphasis on leakages, corrosion, wear of brake pads and the condition of the screw connections.



If you realize any irregularities, please perform repairs accordingly.

6 Accessories - Sensor

6.1 Technical Data „State/wear sensor“

Operation of sensor

There are two micro switches in the housing of the sensor. The distance pin activates the switches in two different positions.

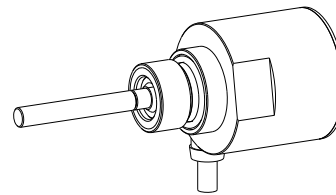


Illustration 25:
State/wear sensor

Table 5: Switching status of status (switch S1) and wear switch (switch S2) depending on the activating status of the brake.

Status of brake	Status of brake pad	Switch S1 (status signal on/off) ¹⁾	Switch S2 (wear signal) ¹⁾	
		1 - 4 ²⁾	2 - 3 ²⁾	2 - 5 ²⁾
Sensor not mounted	-	0	0	1
Brake not activated (unlocked)	-	1	1	0
Brake activated (locked)	No wear	0	1	0
	Resetting necessary	0	0	1

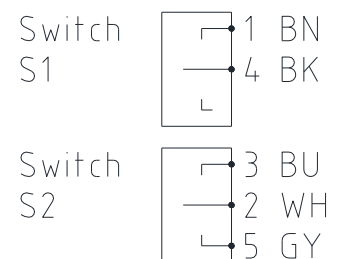


Illustration 26: Switch position

1) Status of brake
 on = brake unlocked
 off = brake locked

2) Switch position
 0 = unlocked
 1 = locked

Switch S2 only shows the wear status reliably when the brake is activated (locked). If the brake is not activated (unlocked), a statement about the condition of wear cannot be given.



The wear of the brake pad is only measured if the brake is activated. If the brake is not activated, there is no signal.



„Resetting necessary“ is displayed as soon as the brake pad has worn off in a way that resetting has become necessary.



**The brake pad has to be reset as soon as the signal status „resetting necessary“ is activated.
 Brake pads having a balance of pad height of less than 2 mm have to be replaced by return.
 Please note chapter 5.1 *Replacement of brake pads*.**

Fail-safe operation

A proper operation is only ensured if the state/wear sensor is wired properly. This provides a signal since a switch (NO) is locked which is normally unlocked.



In case of damages like, for example, faulty cables, bad connections, etc. the signals need to disappear.

**6 Accessories - Sensor****6.1 Technical Data „State/wear sensor“****Technical data:**

Operating temperature	- 40 °C to + 85 °C
Max. voltage	30 V DC/AC
Switching current	100 mA
Protection class	IP 65 (mounted)
Width across flats	24 mm
Max. tightening torque G 1/2	20 Nm
Max. tightening torque M12	hand-tight
Length of cable	5 m, 10 m or 15 m
Material of cable	PUR
Dimension of cable	5 * 0,34 mm ²

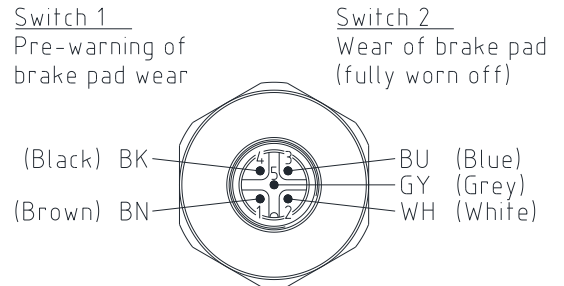


Illustration 27: Pin assignment of plug-in connection

6.2 Assembly / start-up

- Remove the screw plug (component 1.21) from the setting nut (component 1.7).
- Hand-tighten the sensor (component 8) into the setting nut first (see illustration 28).
- Tighten the sensor at the tightening torque
 $T_A = 20 \text{ Nm}$.
- Provide for the electric connection according to the plug-in connection (see illustration 27).

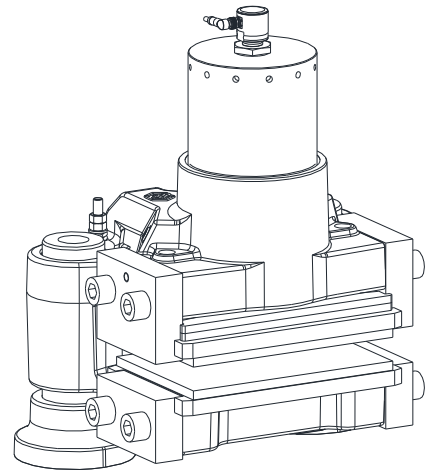


Illustration 28: Assembly of state/wear sensor