

KTR-STOP® M-A-F B-xx

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

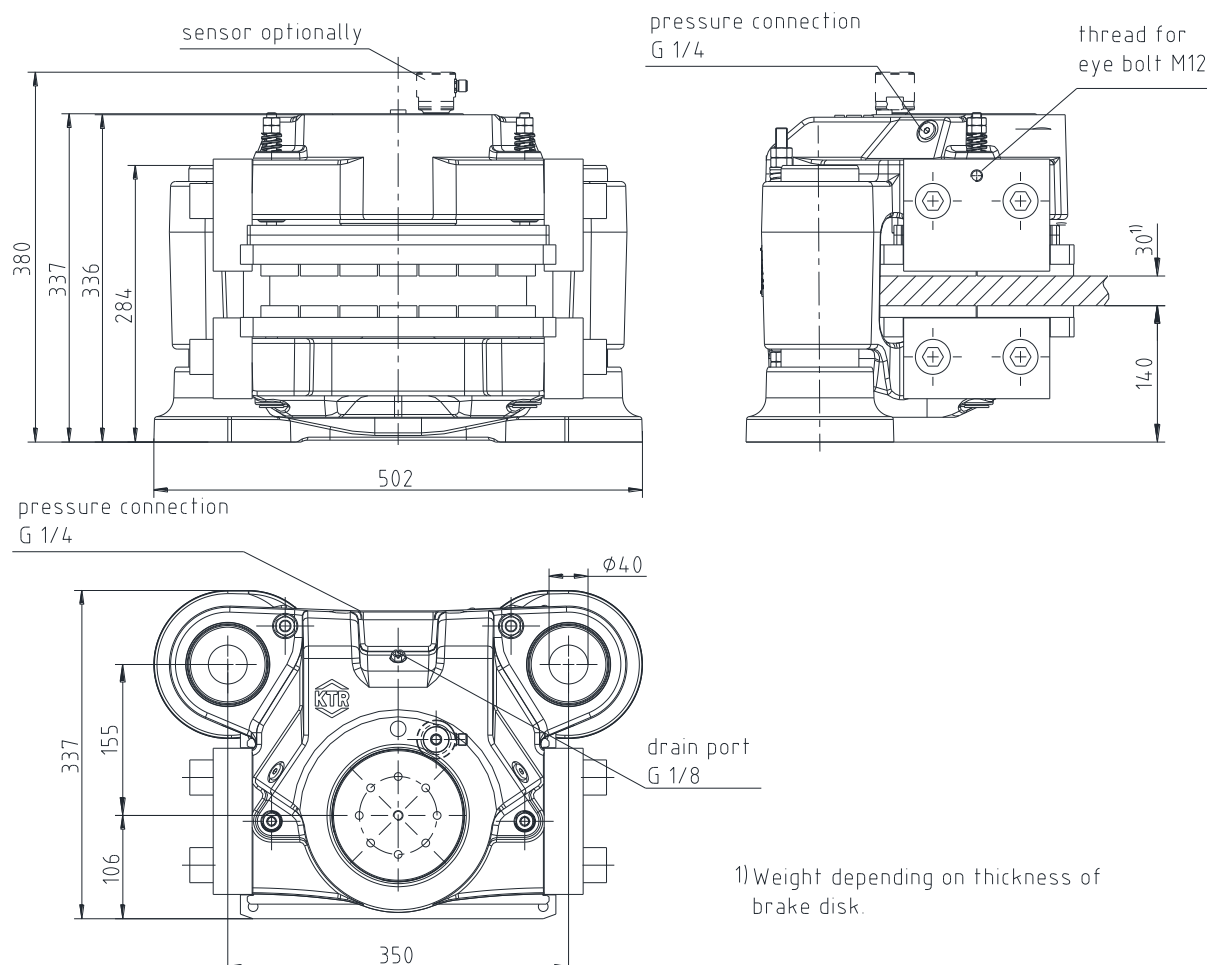
 KTR-Group	KTR-STOP® M-A-F B-xx Operating/Assembly instructions	KTR-N 445145 EN Sheet: 2 of 23 Edition: 1
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The KTR brake system was designed to operate as a service brake/emergency stop brake on rotating brake disks. For any other applications please consult with KTR.

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Please observe protection note ISO 16016.	Drawn: 2022-12-20 Ka/Wie	Replacing:
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1 Technical data


1) Weight depending on thickness of brake disk.

Illustration
1: Dimensional drawing

Table 1: Technical data

			M-A-F B-xx
Weight ¹⁾	in kg		Approx. 235 ¹⁾
Width of brake pad	in mm		200
Surface of each brake pad	organic	in mm ²	57,900
	sinter metal	in mm ²	53,500
Max. wear of each brake pad	in mm		8
Rated coefficient of friction ²⁾	$\mu =$		0.4
Total brake piston surface - complete brake	in cm ²		113
Volume for each brake caliper with 1 mm stroke	in cm ³		11.3
Max. operating pressure	in bar		115
Thickness of brake disk ³⁾	in mm		30, 40, 50
Pressure connection			G 1/4
Drain port			G 1/8
Floating range on axles	towards mounting surface	in mm	5
	off the mounting surface	in mm	10
Min. diameter of brake disk $\varnothing D_A$	in mm		800
Operating temperature	in °C		-20 to +50

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

3) Other thickness of brake disk available on request.

Table 2: Braking torque in Nm with brake disk \varnothing in mm

Brake disk \varnothing in mm	800	1500	2000
Braking torque in Nm	31200	67600	93600

**1 Technical data****Calculation of braking force/braking torque:**

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

$$M_b = z \cdot F_b \cdot \frac{D_A - 0,2}{2}$$

F_b = Braking power in kN
 F_c = Clamping force in kN
 M_b = Braking torque in kNm
 z = Number of brakes
 D_A = Outside diameter of brake disk in m
0.2 = Width of brake pad in m

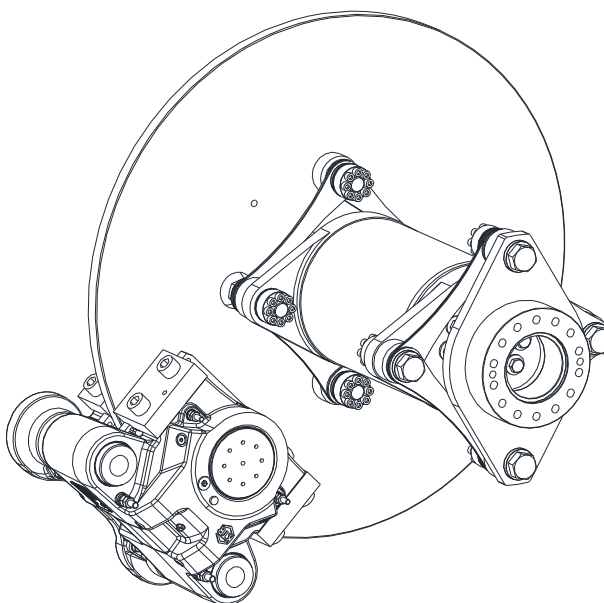
Calculation of brake disk:

Illustration 2: Assembly of brake

Table 2: Calculation of brake disk

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

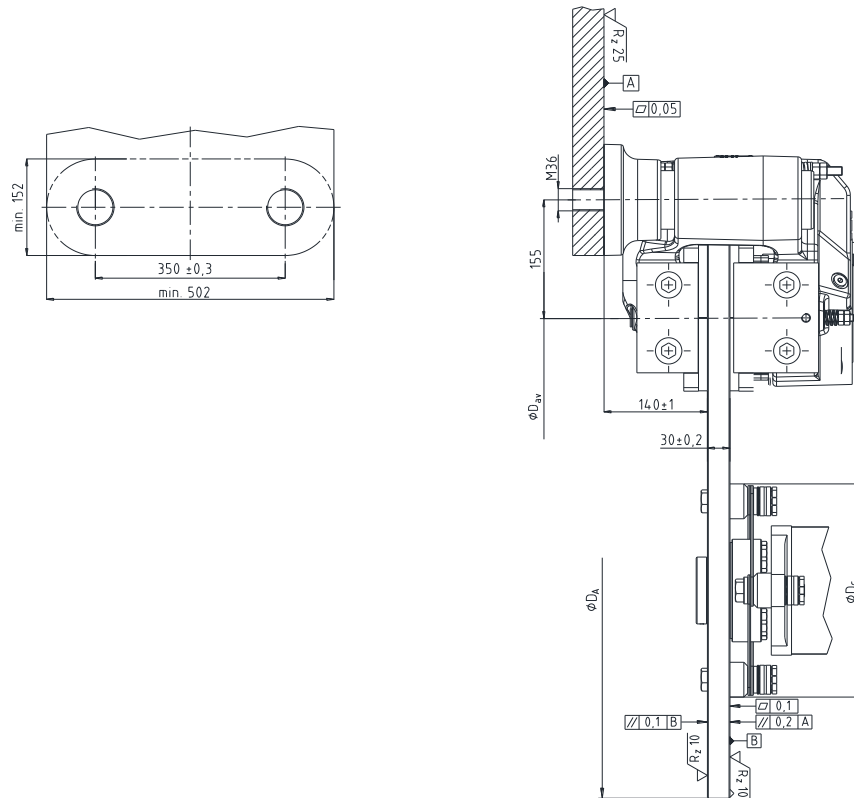
**1 Technical data****Connection dimensions of brake**

Illustration 3: Connection dimensions

2 Advice**2.1 General advice**

Read carefully through these operating/assembly instructions 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.



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. 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.
- Secure the brake against accidental contact. Provide for the necessary protection devices.
- Make sure that the overall brake and 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-A-F B-xx** described in here corresponds to the state of the art 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 for 12 months.

With favourable storage conditions its properties remain unchanged for 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 avoid sticking together of the gaskets.



**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.**

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 always make use of proper transport and lifting equipment.

The brake is packed differently each depending on number 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.

4.1 Components of the brake**Components/subassemblies of brake – Type M-A-F B-xx**

Component/sub-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 movable side
6	2	Brake pad
7	2	Pad retraction set on fixed side
8	1 ²⁾	Sensor

1) Number depends on thickness of brake disk.

2) Optionally available

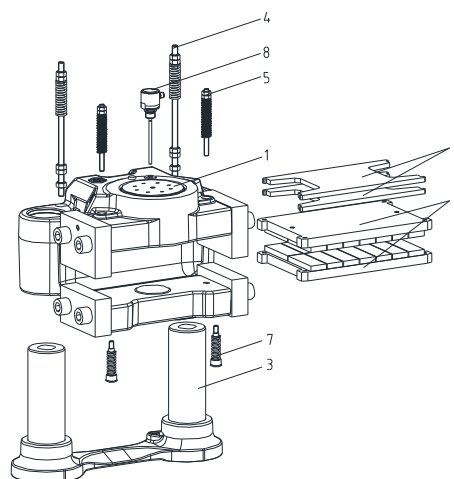


Illustration 4: Components/subassemblies of brake

Component 2: Number of the spacer plate

Thickness of brake disk	Number of spacer plates
30	2
40	1
50	-

Subassembly 1: Caliper with components

Component	Quantity	Description
1.1	1	Brake caliper (incl. piston cover)
1.2	4	DU sleeve
1.3	2	Pad retainer
1.4	2	Pad retainer
1.5	8	Cap screw DIN EN ISO 4762 - 10.9
1.6	4	Screw plug VSTI (acc. to DIN 908)
1.7	1	Sealing plug
1.8	1	Brake piston
1.9	1	Scraper
1.10	1	Gasket
1.11	1	Screw plug VSTI (acc. to DIN 908)
1.12	1	Sealing plug
1.13	4	Scraper

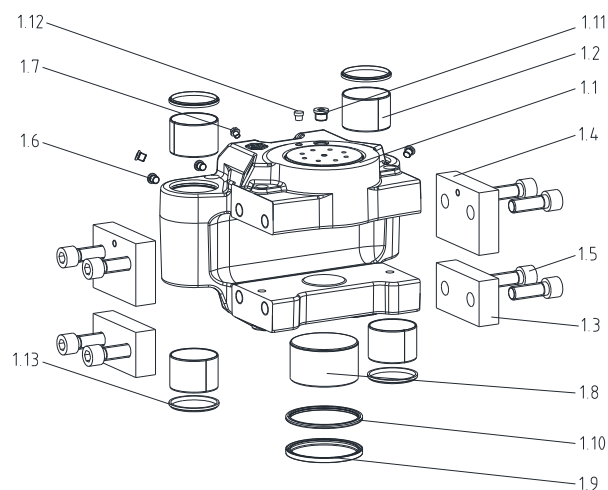


Illustration 5: Caliper with components

**4 Assembly****4.1 Components of the brake****Subassembly 3: Base plate with guide pin**

Component	Quantity	Description
3.1	1	Base plate
3.2	2	Guide pin

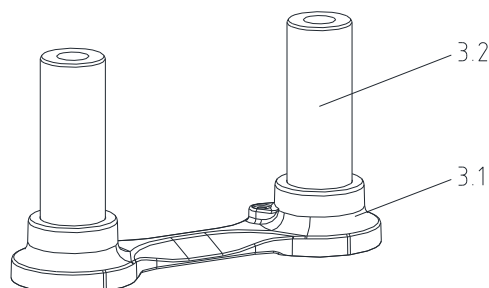


Illustration 6: Base plate with guide pin

Subassembly 4: Centering system

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

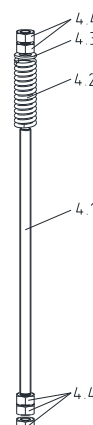


Illustration 7: Centering system

Subassembly 5: Pad retraction set movable side

Component	Quantity	Description
5.1	1	Pin
5.2	1	Pressure spring
5.3	2	Hexagon nut DIN EN ISO 4032

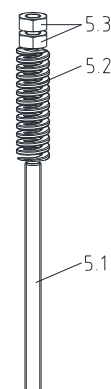


Illustration 8: Pad retraction set movable side

**4 Assembly****4.1 Components of the brake****Subassembly 7: Pad retraction set fixed side**

Component	Quantity	Description
7.1	1	Cap screw DIN EN ISO 7379 - 10.9
7.2	1	Pressure spring
7.3	1	Sealing plug

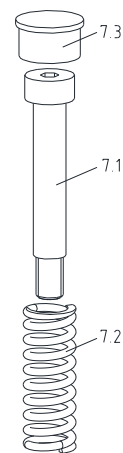


Illustration 9: Pad retraction set on fixed side

4.2 Preparation of assembly

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

- The connection plate for the brake as well as the brake disk have to be inspected for dimensional accuracy. For that purpose 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 as friction fit. 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.



Observe the manufacturer's instructions regarding the use of solvents.

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
- sinter 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 components only.

4.4 Assembly of the brake



In order to avoid any injuries 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.

There are M12 threads 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 check if a sensor has been mounted.
Remove it before assembly in order to avoid any damages.

- Insert the brake pads (component 6) fully into the brake caliper.
- Applying for the moveable side only:
Push back the brake pad and brake piston manually.



Please make sure that at least one screw plug (component 1.6) is removed when moving back the brake piston. Afterwards re-assemble the screw plug.

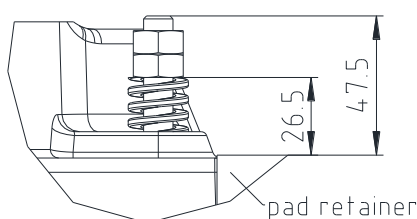


If you want to use brake pads after having assembled the brake, it is necessary to disassemble the pad retainer (component 1.3 and 1.4) for that purpose (chapter 5.1).

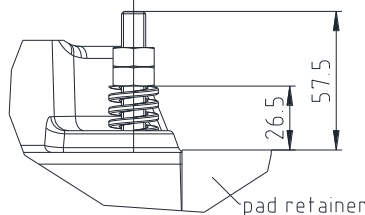
**4 Assembly****4.4 Assembly of the brake**

- Mount the pad retraction set on the movable side (component 7) by shifting the pressure spring (component 7.2) onto the pin (component 7.1). Screw the hexagon screw with the pressure spring into the brake pad against a stop.
- Seal the bore via the sealing plug (component 7.3).
- Mount the pad retraction set (component 5) by screwing the pin (component 5.1) into the brake pad against a stop. Set the pressure spring (component 5.2) on the pin (component 5.1). Pre-stress the pressure spring (component 5.2) with a hexagon nut (component 5.3) by adjusting the hexagon nut (component 5.3) to the dimension specified in illustration 10. Counter the hexagon nut with the second hexagon nut (component 5.3).

Thickness of brake disk 30 mm



Thickness of brake disk 40 mm



Thickness of brake disk 50 mm

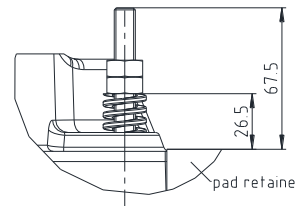


Illustration 10: Setting of pad retraction set movable side

- Repeat this process with the pad retraction set on the moveable side of caliper (component 5).



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

- Insert the brake in the correct position towards the connection plate. Hand-tighten the brake via the screws first.



To facilitate the assembly it is possible to fix the position of the brake by one screw only first. Swing in the brake until the second screw can be assembled, too (see illustration 11).

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

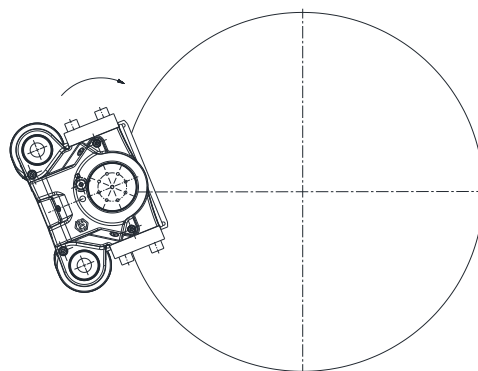


Illustration 11

Table 4: Tightening torques

Screw size	Tightening torque T_A in 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 7.3).

**4 Assembly****4.4 Assembly of the brake**

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



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

- Optional component:
Assemble the sensor (component 8) according to chapter 6.2.

4.5 Setting/resetting of the centering system

The centering systems need to be reset with initial assembly or after having replaced brake pads or single parts, respectively. This is the only way to ensure 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 systems need to be regularly reset 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 the value specified by screwing the hexagon nut marked with 1 in illustration 12 in the direction upwards or downwards.
- Counter the hexagon nut with the hexagon nut marked with 2 in illustration 12.

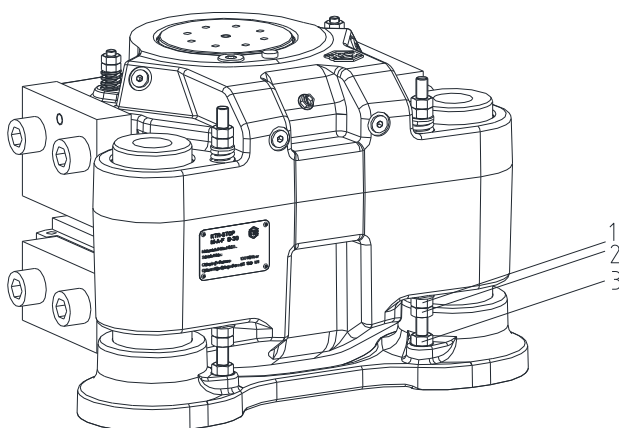


Illustration 12: Setting of centering system

**4 Assembly****4.6 Pressure connection of a brake**

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



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

- Mount a Minimesse coupling with a Minimesse 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 Minimesse hose in a suitable collection container.



The pressure connection on top serves for venting the brake. For a flushing system make use of the pressure connection on top.



It is not recommended to use steel plugs for venting.

- Connect the leakage oil line to the brake (see illustration 13 and 14). 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 bars at the maximum) are not generated, a pneumatic hose may be used, too. Inspect the brake for leakages regularly.



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

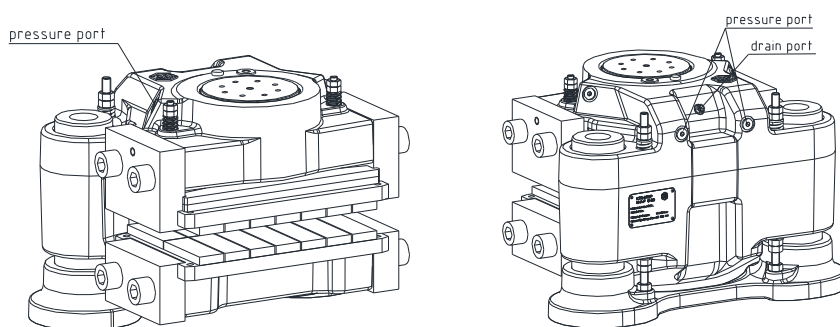


Illustration 13: Connections of the leakage oil lines/pressure lines

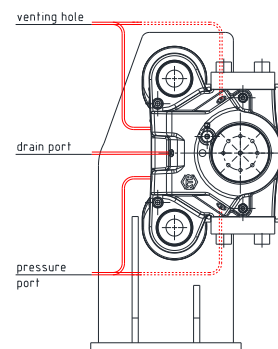


Illustration 14: Pressure connection of a brake



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 connection of several brakes**

If several brakes are assembled we recommend to connect the pressure connection 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 connections of the brake (see illustration 14, 15 and 16). For that purpose remove the screw plug beforehand.



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

- Mount a Minimesse coupling with a Minimesse 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 Minimesse hose in a suitable collection container.

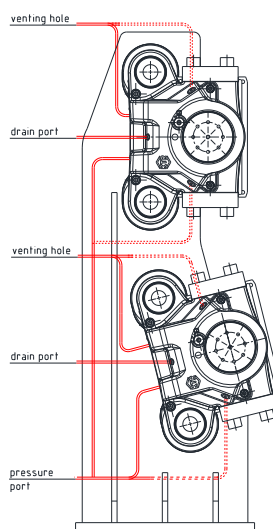


Illustration 15: Pressure connection of several brakes (in parallel)

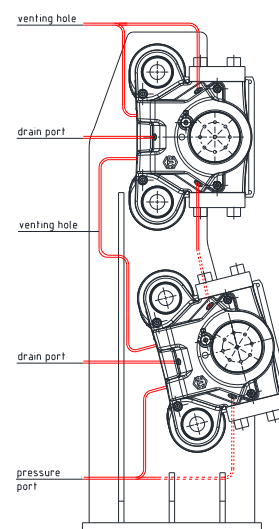


Illustration 16: Pressure connection of several brakes (in a series)



The pressure connection on top serves for venting the brake. For a flushing system make use of the pressure connection 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 leakage oil 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 bars at the maximum) are not generated, a pneumatic hose may be used, too. Inspect the brake for leakages regularly.



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



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 venting 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).

- Put some pressure on the hydraulic system. This will allow the brake pads to fit on the brake disk.



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, consult with KTR.



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

- Applying with the use of a sensor only:**
Mount the sensor (component 8) according to chapter 6.2 instead of the screw plug (component 1.11).
- The brake pads have to be run in on the surface of the brake disk to achieve the nominal coefficient of friction.



Observe the instructions for run-in according to KTR-N.

4.9 Recommendation of fluids to be used

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

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

Manufacturer	Standard		Special	
<i>Mineral oil</i>	-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)
Castrol	Hyspin HVI 32	Hyspin HVI 46	-	Hyspin HVI 68
Shell	Tellus S2 VX32	Tellus S2 VX46	Tellus S4 VX32	Tellus S2 VX68
Mobil	DTE 10 Excel 32	DTE 10 Excel 46	-	DTE 10 Excel 68



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 consult with KTR.

**4 Assembly****4.9 Recommendation of fluids to be used****Viscosity**

We would recommend a viscosity range from 20 to 220 mm²/s (cSt) of the hydraulic liquid 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 liquid, 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 18/16/13

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 liquid resp. filter elements, etc.) have to be performed as per the manufacturer's operating instructions.

The system has to be flushed resp. vented after each replacement of the hydraulic liquid.



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



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

4.10 Disassembly of the brake

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.



If a sensor is used (component 8) it has to be removed before the brake is disassembled.

- Drain the hydraulic oil completely from the brake.
- Dispose of the hydraulic oil as per chapter 4.12.
- Disconnect the leakage oil and pressure oil line from the brake.
- Remove the 2-off screws serving for fixing the brake to the connection plate.
- Take out the brake.

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4 Assembly

4.11 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.

4.12 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 resp. standards that apply.

- **Metal resp. brake pads**
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.



Make sure that the entire brake system is depressurized.



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 applying the brake in order to prevent serious injuries of your hands. Before every maintenance operation make sure that the brake is fully secured against activating.

- Disassemble the pad holders on one side (component 1.3 and 1.4).
- Remove the pad retraction 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.
- **Applying for the moveable side only:**
Push back the brake pad and brake piston manually.

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5 Maintenance

5.1 Replacement of brake pads



Please make sure that at least one screw plug (component 1.6) is removed when moving back the brake piston. Afterwards re-assemble the screw plug.

- Hand-tighten the pad holders (component 1.3 and 1.4) by each 2-off cap screws (component 1.5) 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 brake have various heights.

- Mount the pad retraction set on the movable side (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 on the moveable side of caliper (component 5).



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

- Repeat chapter 4.5 *Setting/resetting of the centering system*.
- 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 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, observe chapter 4.8 *Start-up of the brakes*.*

Please observe protection note ISO 16016.	Drawn: 2022-12-20 Ka/Wie	Replacing:
	Verified: 2022-12-21 Ka	Replaced by:

**5 Maintenance****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 4.10 *Disassembly of brakes*.
- Remove the pad retraction sets (component 5 and 7).



Disassemble the pad retraction sets carefully since the springs are prestressed.

- Take out the brake pads (component 6) and the distance plates (component 2).
- Each untighten the bottom 3-off hexagon nuts of the centering system (component 4) and unscrew the pins (component 4.1) from the base plate (component 3.1).



The two hexagon nuts on top of the centering system (component 4) must not be disassembled.

- Remove the brake caliper (component 1) from the guide pin (component 3.2).



Inspect the components/subassemblies 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.

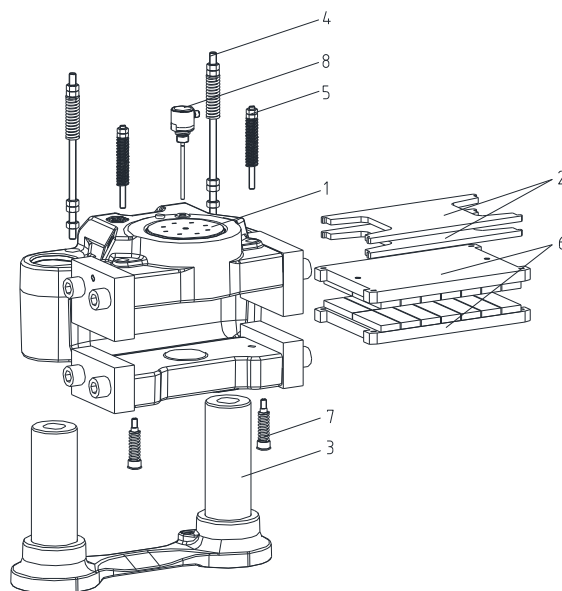


Illustration 17: KTR-STOP® M-A-F B-xx

- Connect the hydraulics to a pressure port (see illustration 13) of the caliper and make sure that all other pressure ports are locked by screw plugs.
- Press the brake piston (component 1.8) carefully out of the brake caliper by using some hydraulic oil.
- Remove the gasket (component 1.10) and the scraper (component 1.9).



When removing the gaskets and scrapers make sure that the keyways in the caliper 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.

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

Observe the manufacturer's instructions regarding the use of solvents.



Inspect the DU bushes (component 1.2) and scrapers (component 1.13) 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 1.10) and scrapers (component 1.9) into the caliper. For that purpose the components may be heart-shaped (see illustration 19).



The gasket and scraper have to be installed in the right direction (see illustration 20).



With reassembly 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 scrapers with hydraulic oil (see illustration 20).

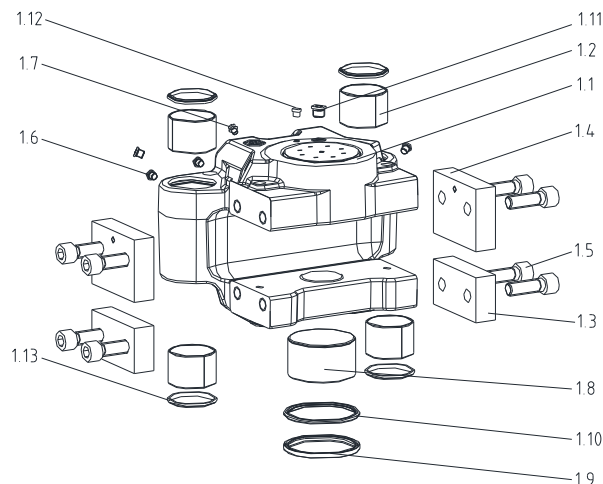


Illustration 18: Caliper with components



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

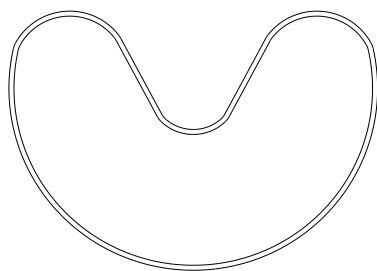


Illustration 19: Assembly of gasket and scraper

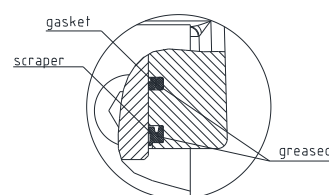
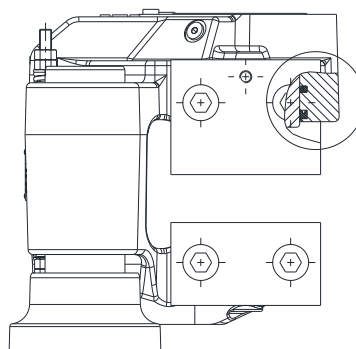


Illustration 20



Inspect the surfaces of the brake piston and the hole of the brake caliper 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 1.8) into the caliper and press it against a stop.
- Depending on the thickness of brake disk:**
Fit the spacer plate (component 2). Number of distance plates are shown of in the table in chapter 4.1 *Components of the brake*.
- After having disassembled the pin of the centering system (component 4), push the pin (component 4.1) with the pressure springs into the brake caliper. Afterwards screw the hexagon nuts onto the pin.

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

- Fit the pre-assembled unit carefully on the guide pins.



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

- Screw the bolt (component 4.1) into the base plate (component 3.1).
- Measure the gap between the brake disk and the brake pad on the bottom side via a feeler gauge.
- Set the gap to the value specified by screwing the hexagon nut marked with 1 in illustration 21 in the direction upwards or downwards.
- Counter the hexagon nut with the hexagon nut marked with 2 in illustration 21.
- Repeat chapters 4.2 to 4.8.

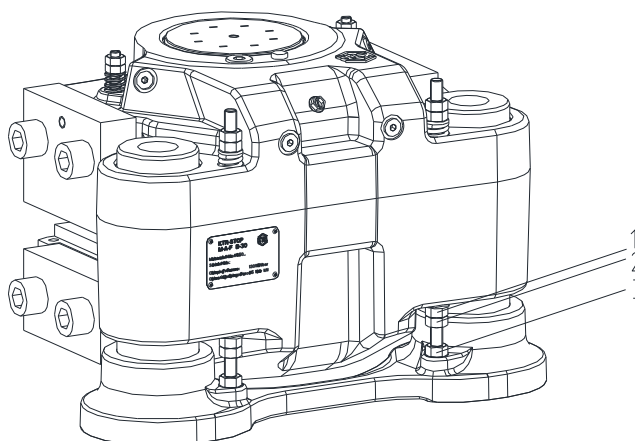


Illustration 21: Setting of centering system

5.3 Maintenance and service

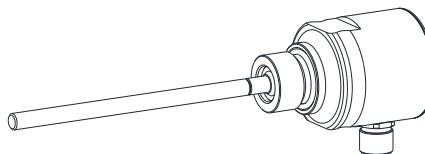
KTR-STOP® M-A-F B-xx is a low-maintenance brake. We recommend to perform a visual inspection and an operational testing on the brake **at least once a year**. Here you should put special emphasis on leakages, corrosion, wear of brake pads and the condition of the screw connections.



If you realize any irregularities, 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 spacer pin activates the switches in two different positions.

Illustration 22:
State/wear sensor**Table 4: Switching status of pre- (switch S1) and end wear switch (switch S2) depending on the activating status of the brake.**

Status of brake	Condition of brake pad	Switch S1	Switch S2	
		1 - 4 ¹⁾	2 - 3 ²⁾	2 - 5 ²⁾
Sensor not mounted	-	0	0	1
Brake not activated (unlocked)	-	1	1	0
Brake activated (locked)	No wear	1	1	0
	Pre-wear	0	1	0
	End wear	0	0	1

1) Condition of brake
on = no wear
off = pre-wear

2) Switch position
0 = unlocked
1 = locked

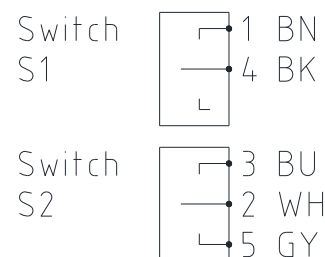


Illustration 23: Switch position

The sensor 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 when the brake is activated. When the brake is not activated, there is no signal.



"Pre-wear" is indicated as soon as the brake pad has worn off so that the brake pads need to be replaced.



The brake pad needs to be replaced immediately if the signal indicating the status „end wear“ is displayed. Please note chapter 5.1 *Replacement of brake pads*.

Fail-safe operation

A proper operating condition 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

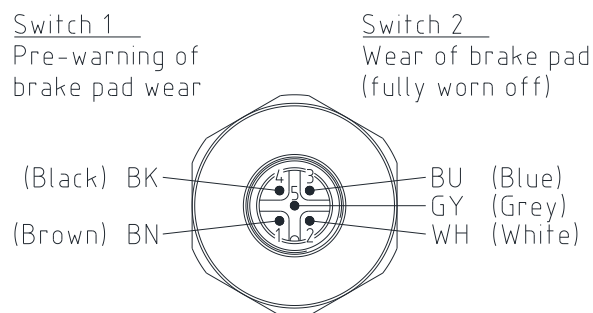


Illustration 24: Pin assignment of plug-in connection

6.2 Assembly / start-up

- Remove the screw plug (component 1.11) from the brake caliper with piston cover (component 1.1).
- Screw the sensor (component 8) hand-tight into the brake for the time being (see illustration 25).
- 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 24).

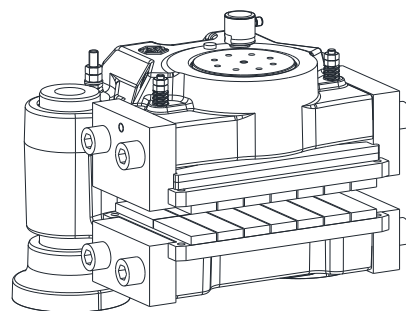


Illustration 25: Assembly of state/wear sensor