

**KNOLL**

# Operating Instructions

Rotating Vacuum Filter  
Type VRF

GB



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# **1 Description of product and functions**

## **Scope**

Cleaning of cooling lubricants

## **Field of application**

- Primarily used in conjunction with machine tools for both single machines and machine groups.

## **Function**

- Liquid flows through the inflow chamber into the rotating vacuum filter from a lifting pump. A sieve drum is arranged such that it is completely immersed and forms a vacuum chamber.
- A vacuum pump sucks the liquid from the inside of the drum and conveys it to the clean water tank. The resulting vacuum causes liquid to flow into the drum; dirt particles are retained by the sieve drum mesh.
- Vacuum pressure increases due to dirt particles (filter cake) deposited on the fine filter mesh.
- A preset vacuum pressure value activates drum rotation by means of drive motor and chain.
- The sludge cake is scraped off and the filter is rinsed by reversed flow.
- Simultaneously, the sludge is discharged into a sludge container by means of a scraper chain.
- The liquid in the clean water tank is conveyed to the processing machine by means of the pure water pump.
- Multiple cleaning (circulation) by internal flow-off of the liquid (10-20 litre/min. approx.) from the clean water tank (deep tank) to the dirty water tank.

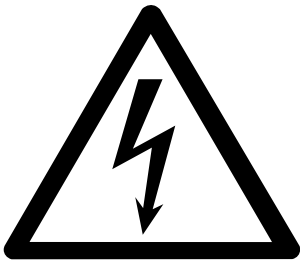
**Noise level:** < 70 dB(A)

## 2 Danger and safety instructions

### 2.1 General instructions



- Always observe all statements and instructions in the operating instructions delivered with the equipment!
- It is forbidden for unqualified persons to work at the plant!
- Ensure correct fastening if components were installed by customers!
- Never bypass safety contrivances (e.g. safety clutch)!
- The operation of safety contrivances must always be guaranteed!

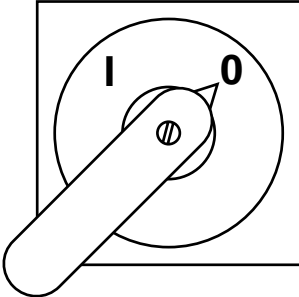


- Work on the electrical equipment may be carried out by qualified personnel only.
- Observe the relevant VDE requirements and connection requirements of the responsible Electricity Board!

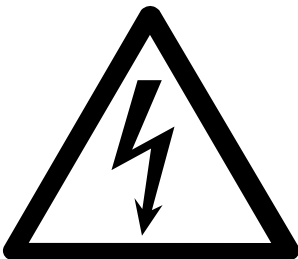


- Do not remove covers while the equipment is in operation.

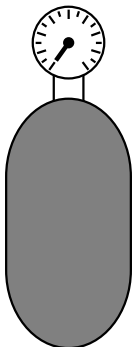
## 2.2 Instructions for repair and maintenance work and malfunctions



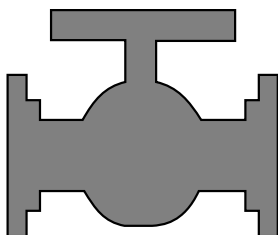
- Switch off the main switch!
- Secure the equipment against accidental start-up!



- Ensure that the equipment is dead!



- Depressurize the plant!



- Close pipe valves!
- Remove all noxious materials!
- Coolants must not enter the environment!



- When handling chips, wear protective clothing, safety boots and protective gloves!

## 3 Installation and location



- **Ensure secure positioning and installation!**
- **Secure equipment against accidental start-up!**

- Install equipment on a level surface.
- Connect supply/return lines and reverse flow rinsing pump, if applicable.



Check retrofitted piping for leaks.

- Install sludge container etc.
- Connect power supply for motor(s) and pump(s)

## 4 Start-up and operation

### 4.1 Prior to initial operation

- Connect electrical equipment (ensure proper voltage, frequency, current strength and sense of rotation).
- The rotating vacuum filter must always be connected via a lifting system (dirty water tank) because there may be an overflow of liquid during operation.
- The rotating vacuum filter may be filled directly from above or by means of a lifting pump. In both cases the equipment is filled up until the liquid flows back to the dirty water tank through the lateral overflow pipe.



The dirty water tank should be dimensioned to be able to hold the liquid coming from the rotating vacuum filter without flooding!

- The vacuum pump must be deaerated before initial operation; this applies also when the pump has aspirated air. For this purpose, open the air bleed screw at the pump (below the delivery-side flange) until water is forced through the opening. To this end, the equipment must be filled sufficiently.
- The entire equipment must be free of loose hardware (such as tools, accessories, etc.).



## 4.2 Filling the equipment

The coolant tank consists of:

Rotating vacuum filter, clean water tank, dirty water tank

- Fill the rotating vacuum filter and the clean water tank.
- Remove the cover plates from the rotating vacuum filter and the clean water tank.
- Fill the equipment with **clean liquid**, until the float switch in the rotating vacuum filter or the dirty water tank closes at the maximum level.



By means of an installed overflow pipe, the dirty water tank will be filled automatically.

- Switch on the equipment for a short time, until the lifting pump starts to convey.
- Switch off the equipment und refill the cooling lubricant if necessary.
- Mount the cover plates again.

## 4.3 Setting various modes of operation

**Only for RVF with switch box and control elements by Knoll:**

### **"Manual" mode**

- Switch main switch to "ON"
- Set selector switch to "Manual"

Now each consumer may be switched on individually.

### **"Automatic" mode**

- Switch main switch to "ON"
- Set all consumer switches to "Automatic"
- Set selector switch to "Automatic mode on"

Now the equipment is set for automatic operation



**RVF, controlled by the processing machine :**  
see operating instructions of the processing machine

**RVF with MT control:**  
see operating instructions RVF-MT

## 5 Maintenance

### 5.1 Removal/installation of the sieve drum



The sieve drum is installed accordingly in the reverse sequence.

- Switch equipment off and secure against accidental start-up (switch main switch off). Remove upper tank lids.
- Drain liquid from equipment



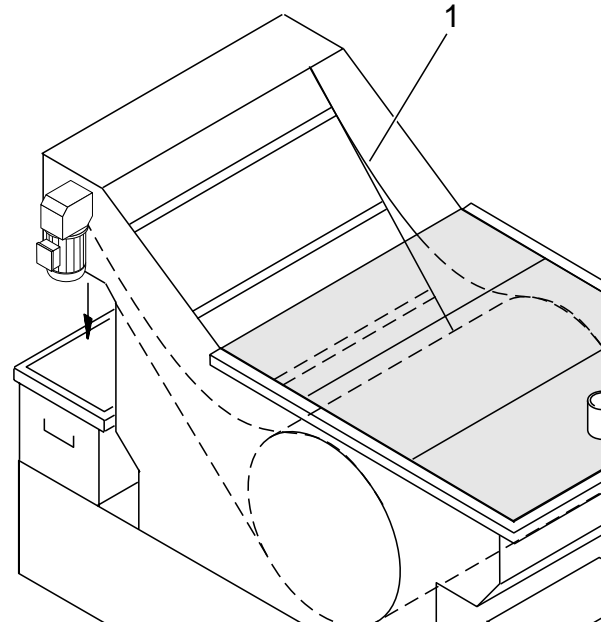
- **Risk of injury!**
- **Do not reach into the equipment when parts are moving or when the main switch is switched on.**

- Unscrew and remove the driver blades mounted at the drum circumference (index the drum in the manual mode until all driver blades have been removed - do not forget to set the main switch to "off" position).
- Switch equipment to manual operation; switch scraper belt drive on, until the chain joints of the bush chain are visible and accessible at the top (1).
- Switch equipment off and secure against accidental start-up (switch main switch off)
- Fold stripper bar away from drum.
- Open chain joints and remove scraper belt chain from the sieve drum (the chain does not have to be removed from the tank)
- Loosen the locking screw (5) on the bearing
- Remove the hexagon nuts (2) and pull the bearing lid (3) straight from the sieve drum.

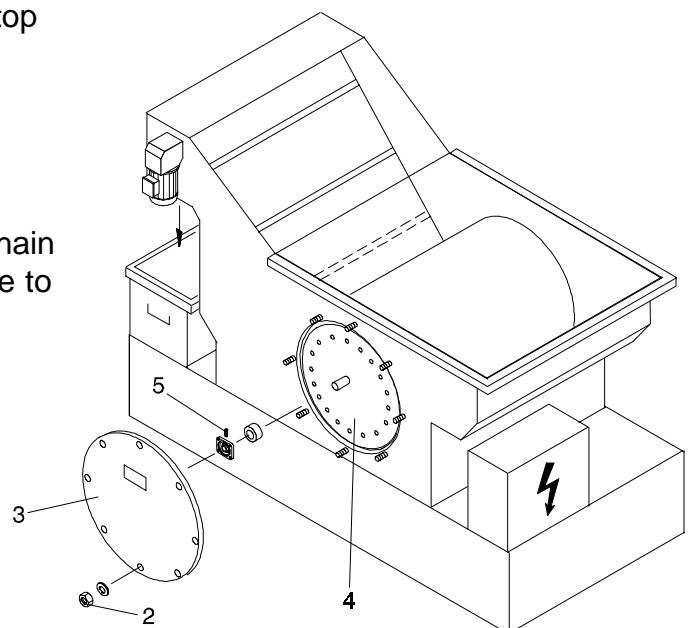


Check bearing lid seal for damage, replace if required.

- Unscrew and remove the sieve drum lid (4).



Symbolic figure



Symbolic figure

- Dismantle the rinsing pipe in the drum at the screwed connection and remove the pipe.
- Check the holes of the rinsing pipe for soiling and clean them if required.
- Remove the complete drum assembly from the housing without damaging the filter fabric..
- Clean and check seals and bearings inside the sieve drum, replace if damaged.

## 5.2 Adjusting the flow volume



Set flow only at the maximum liquid requirement of the processing machine(s)

### Supply flow (dirty water flow)

- The amount of dirty water must not be higher than the amount of clean water (there must be **no overflow** in the dirty water tank or lifting tank (2) respectively).
- Increase the clean water flow at the adjusting sleeve (1) or reduce the dirty water flow (3) as required.

### Flow rate (clean water flow)

- The adjusting sleeve / the gate valve for adjusting the flow rate is located in the pipe of the vacuum pump at which the pressure is applied (1).
- The flow rate is set correctly, if the filling level in the RVF slowly recedes.

### Adjusting sleeve (installed only up to size RVF 500 )

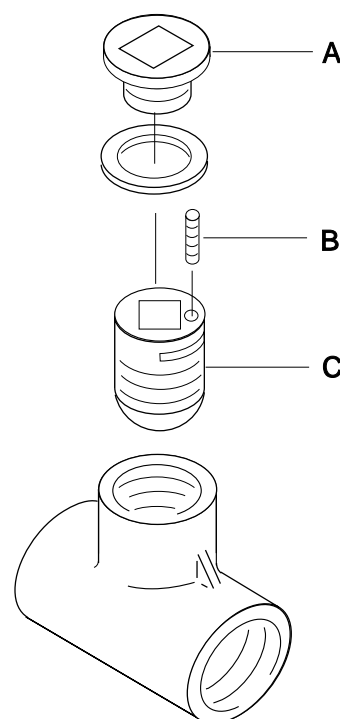
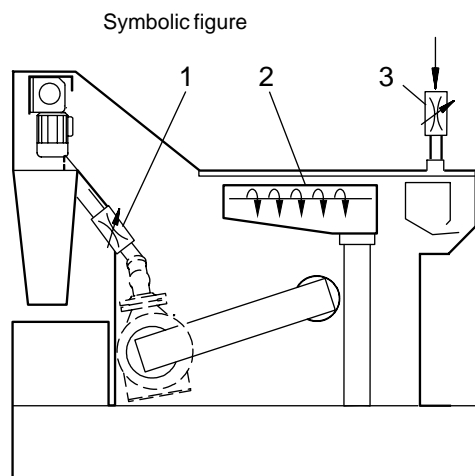
- Unscrew screw plug (A) and seal.
- Loosen the locking screw (B).



To decrease flow: Turn adjusting nipple (C) in clockwise direction.

Do not unscrew the adjusting nipple completely -liquid will be forced out under pressure.

- Tighten locking screw and screw in screw plug; replace seal if required.



## 5.3 Cleaning the sieve drum

### 5.3.1 Cleaning by suction



The level of liquid in the rotating vacuum filter must be lowered until the surface of the sieve drum may be cleaned with a suitable vacuum cleaning device.

- Switch off entire equipment
- Remove covers
- Drain the rotating vacuum filter by switching the vacuum pump on until the sieve drum rises above the liquid and may be cleaned.

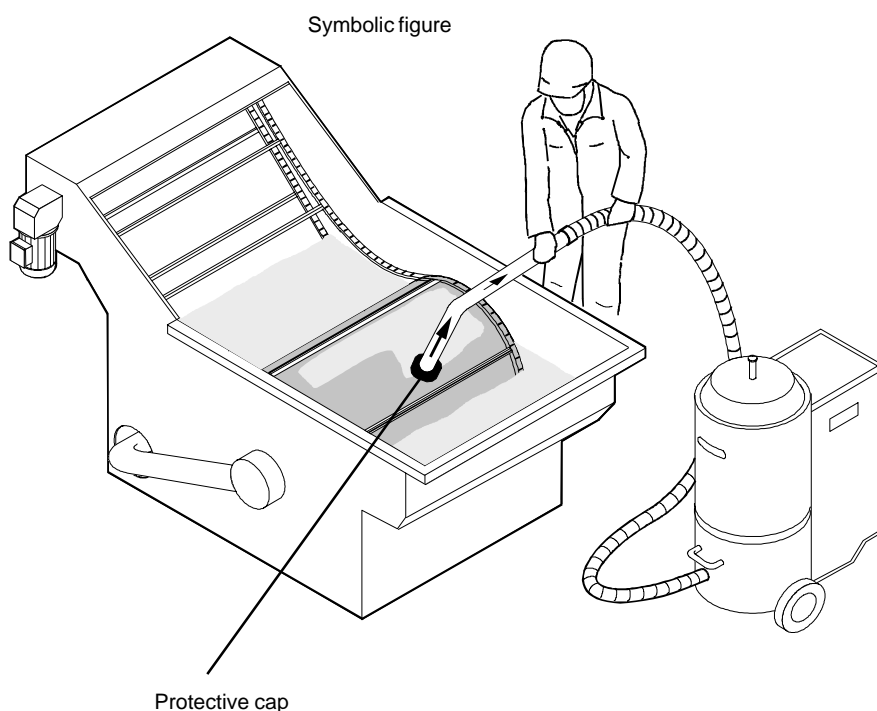


Use an extractor with a protective cap in order not to damage the filter material.

Under no circumstances may a wire brush or sharp and pointed objects be used .



- **During the cleaning process the equipment must remain switched off and secured against accidental start-up!**



## **5.4 Important directions for the vacuum drum**



After the initial operation the vacuum drum must be continuously immersed in liquid - if this cannot be guaranteed, clean the filter material (e.g. by means of sucking off) and preserve with anticorrosive agent.

Do not let the vacuum drum dry if contaminated!

Dried dirt might "clot" the sieve meshes of the filter material or cause corrosion. The vacuum drum becomes impermeable and thus useless. In most cases, later attempts at cleaning tend to be futile.

## **6 Information on coolants / tanks**

- Circulate the coolant permanently (circulation on weekends is recommended)
- Prevent organic substances from entering
- Avoid external oil input
- For an emulsion, the temperature should not exceed 25° C
- The pH-value should be within the neutral range
- The degree of hardness of the water for the preparation should not exceed 15° dH
- The degree of hardness due to upgrading must not exceed 20° dH

### **Cleaning of the coolant tanks**

- The cleaning intervals depend above all on the type of processing, material, type of coolant, and the number of working hours; for this reason, no generally valid interval may be stated. As a guideline, a cleaning interval of 4 through 8 weeks is recommended.

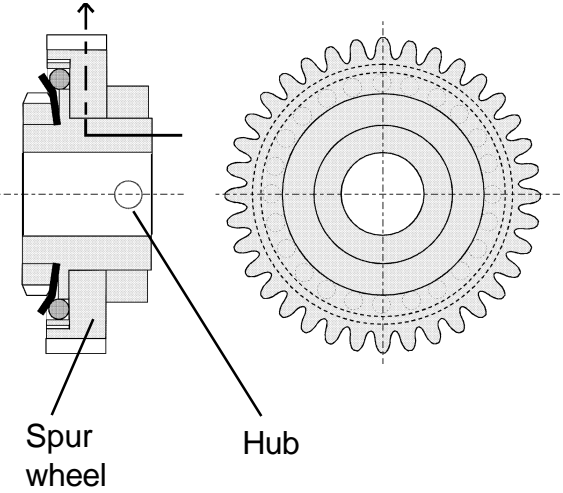
## 7 Maintenance table

Assembly/ component	Interval	Maintenance work	Safety instructions/ note
<b>Sludge container</b>	1 day	Drain accumulated liquid	
<b>Pumps</b>	---	See manufacturer's operating instructions	
<b>Electrical equipment</b> - Motor(s)  - Wiring  - Filling level switch  - Safety equipment	---	See manufacturer's operating instructions	
	3 months	Check for breakage and damage	Replace defective wiring
	3 months	Check function	Cross both switching positions in manual operation
	3 months	Check function	
<b>Tanks and piping</b>	6 months	Check for leakage, corrosion, and damage	Hazardous materials must not escape under any circumstances
<b>Scraper strips</b>	6 months	Check plastic insert for wear	Replace worn inserts
<b>Sieve drum</b>	1 month	Check for wear and damages, clean	Disassemble drum in case of wear or damages (see chapter 5) and return it to the manufacturer for replacement
	1 year	Change sieve drum if necessary	
	---	Clean tissue (clean tissue with vacuum cleaner or from the inside using a high pressure cleaner)	Cleaning interval depends on type of swarf/chips and coolant (see chapter 5.3) Outside influences may damage the filter material

Assembly/ component	Interval	Maintenance work	Safety instructions/ note
<b>Piping</b>	1 year	Disassemble, clean, and check (for wear) the return /shut-off traps and valves  Clean sludge filter of the hose assembly and strainer basket	Switch equipment off Relieve piping from pressure Cooling lubricant off Lower piping Operate shut-off valve if necessary Replace defective parts
<b>Coolant tanks/ float switch</b>	500 working hours	Check for contamination (sludge deposits) and clean if required	Depending on the tooling method, the interval may be significantly shortened  Coolant tanks are extras and thus not installed in every equipment.
<b>Manometer</b>	---	Open the stop valve <u>only</u> for the measuring procedure	Useful life of the manometer is increased



## 8 Eliminating malfunctions

Disturbance	Possible causes	Remedy
<b>No or insufficient reverse flow rinsing</b>	Vacuum contact-making pressure gauge / pressure sensor defective	Replace gauge/ sensor
	Filling level in the clean water tank too low	Refill liquid
	Holes in the rinsing nozzle of the sieve drum obstructed	Open and clean sieve drum (refer also to chapter 5.1) <b>Manual reverse flow rinsing max. 20 sec.</b>
	Filling level in the slush pump tank too low	Refill liquid
<b>Safety clutch slips</b> (loud rattling noise) Power transmission between clutch hub and running wheel interrupted 	Coarse parts block the equipment	Remove parts
	Safety clutch defective	Replace clutch
	Amount of chips/swarf too high	Clean equipment, reduce discharge cycle time

Disturbance	Possible causes	Remedy
<b>No chip/swarf discharge</b>	Amount of chips/swarf too high	Reduce discharge cycle time
<b>Insufficient cleaning performance or very short reverse flow rinsing cycle (&lt; 2min)</b>	Filter tissue clogged or clotted	<p>Clean tissue surface with vacuum cleaning device or from the inside using a high pressure cleaner</p> <p>The normal reverse flow rinsing cycle ranges from 2-5 minutes. Reverse flow rinsing cycles &lt; 2 minutes may cause damages at the slush pump</p>

## 9 R VF basic settings

In the hose assembly from the lifting pump to the R VF, there is an adjusting sleeve (2). By means of this sleeve, the amount of dirty water which is admitted to the R VF may be adjusted.

### R VF with level switch

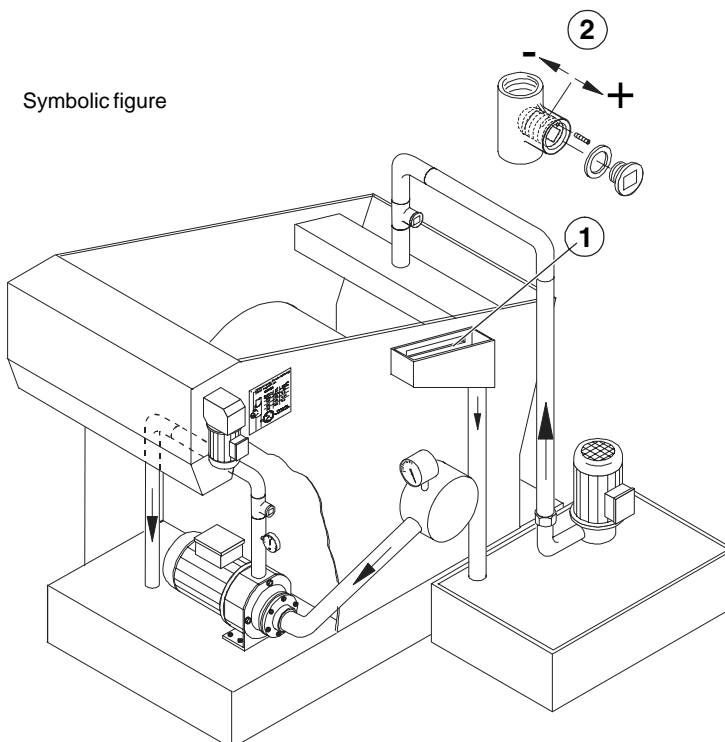
For the operation of the equipment, no overflow pipe for the liquid from the R VF to the dirty water tank is required.

Setting: Close the adjustment sleeve, until the liquid level for the normal operation of the equipment levels out immediately below the lateral overflow pipe (1), or **slowly** starts to recede.



Overflowing during the reverse flow rinsing procedure is quite normal.

In case the efficiency of the vacuum drum deteriorates due to solings, the amount of overflow increases and thus dirt will be discharged. In this case, the vacuum drum has to be rinsed by reverse flow several times, or to be disassembled and cleaned.



## Cycle times and settings

### Procedure for equipment START:

1. Lifting pump ON
2. Vacuum pump ON
3. Machine supply pump(s) ON

now the RVF cycle times start:

the cycle times may or **must** be changed **individually**

- RVF de-sludger: dead time 30 sec., pulse time 6 sec
- Vacuum: - 0,15 bar
- when the contact gauge responds (at - 0,15 bar): vacuum pump OFF, de-sludger ON, slush pump ON (6 sec. approx.)

For some types of processing (e.g. aluminium), it may be necessary to employ an interval reverse flow.



### **Interval reverse flow (induced reverse flow)**

In order to guarantee an effective reverse flow and a constant cleaning performance, the reverse flow process should be activated every 10 minutes for 6 seconds approx. In case the contact gauge responds less often, the interval reverse flow is necessary.

Responding of the float switch in the RVF for MIN: vacuum pump off



The swarf conveyor should run in continuous operation, in case of a high water discharge, short standstill intervals are, however, possible. Nevertheless, the standstill intervals must not be so long that the chips/swarf starts to accumulate, and consequently, the conveyor will be blocked.

## 10 Accessories

### 10.1 Setting instructions for scrapers

#### Risk of injuries!



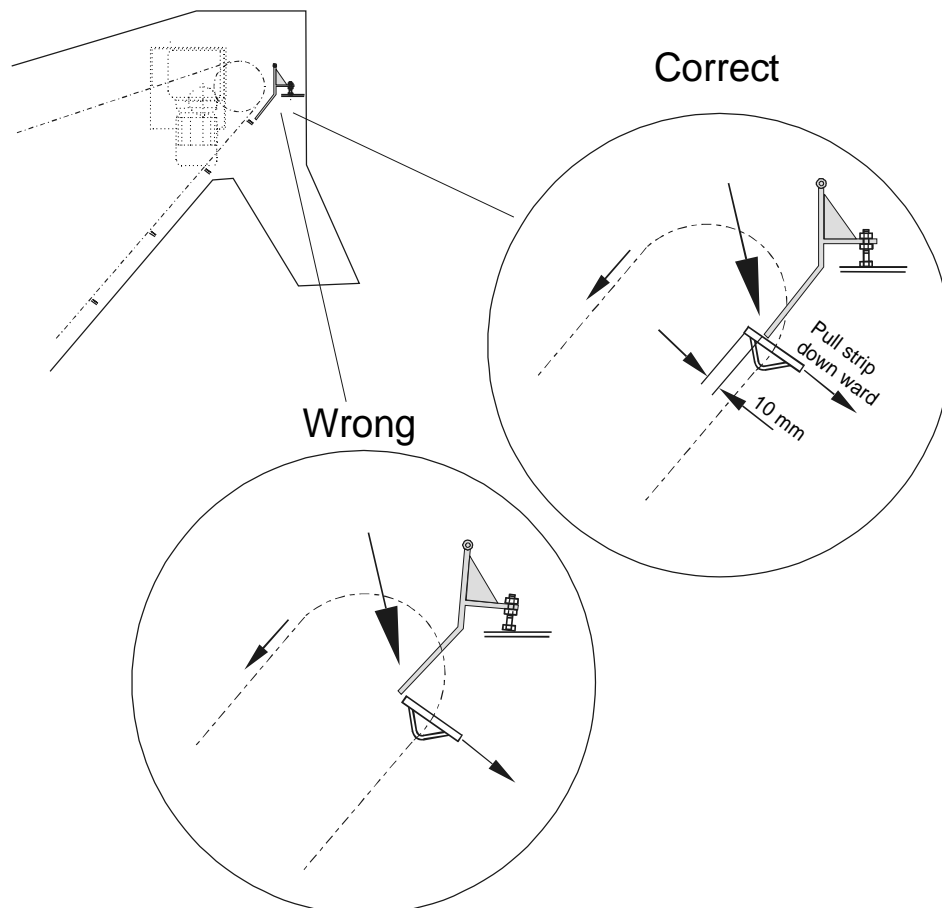
For all work carried out at the rotating vacuum filter:

- Do not stand or reach into the rotating vacuum filter while being in operation!
- Switch main switch off
- Secure rotating vacuum filter against accidental start-up!

- Switch equipment on, until the conveying strip is located 20 mm before the scraper
- Switch equipment off and secure against accidental start-up
- Dismantle sheet metal sheathing at the sludge ejector
- Set scraper at the adjusting screw, loosen lock nut beforehand
- Set scraper at a distance of 10 mm from the edge of the strip!
- Mount sheet metal sheathing at the sludge ejector again



- Incorrect settings will cause damages to the scraper and to the equipment!
- The equipment may be blocked!



**KNOLL**

Coolant cleaning systems  
Swarf conveying systems  
Low lift and jetting pumps

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