OPERATING INSTRUCTIONS

for FLOTTWEG Sedicanter® Z 4D with HYBRID DRIVE

TABLE OF CONTENTS

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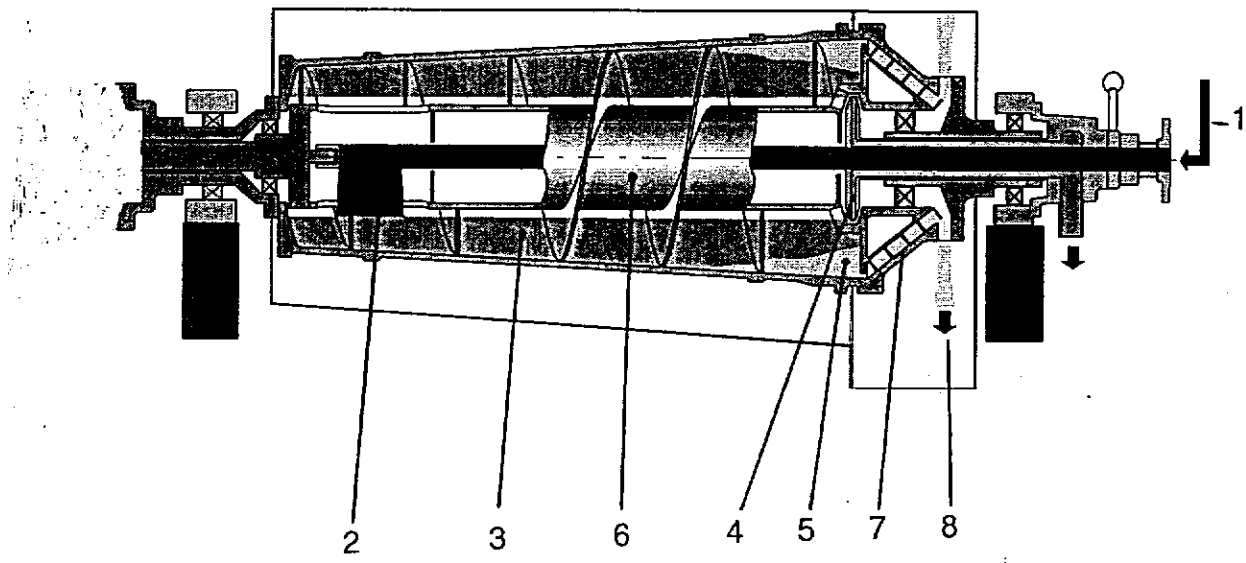
GENERAL

Description of your Sedicanter®



The medium to be separated is fed into the Sedicanter® through the central feed pipe (1). The denser solids settle against the bowl wall (2) under the influence of the centrifugal force.

The lighter liquid (3) is clarified, flows to the impeller chamber, where it is discharged by the impeller (4).

The solids deposited on the bowl wall (5) are transported towards the conical end of the bowl (7) by the conveyor scroll (6) to the discharge ports (8) and discharged into the solids housing.

The **moisture content** of the discharged solids and the **purity of the liquid** can be adapted:

a) by changing the **pool depth** by means of the variable impeller:

- less moisture in the solids by increasing the impeller diameter and thereby increasing the drainage zone

- less solids content in the centrate by Sedicanter® the impeller diameter and thereby increasing the pool depth

b) by changing the **bowl speed**:

- the finer the solids, the higher the bowl speed necessary for satisfactory separation results.

c) by changing the **scroll differential speed** (see speed diagram - section 5):

- the lower the desired moisture content of the discharged solids, the lower you set the differential speed.

- the higher the solids content, the higher the required differential speed.

Note:

The **optimum machine setting** can only be determined by **careful testing**.

Description of the hydraulic drive

(See 2.2/3 and hydraulic diagram / Appendix)

1. GENERAL

   The hydraulic scroll drive makes a stepfree adjustment of the scroll differential speed for optimum adaption to a varying product composition and for overload protection of the scroll possible.

2. CONSTRUCTION

   - Pump aggregate (E-motor with flanged adjustable pump); open fluid circulation.
   - Rotating hydraulic motor (radial piston type) at the Sedicanter®.
   - Connection between aggregate and hydraulic motor by hydraulic hoses.

3. FUNCTION

   Scroll drive through rotating hydraulic motor with rotary transmission.

   - Adjustment of the fluid flow via throttle valve and adjustable pump, thereby stepfree adjustment of the differential speed possible.
   - Load-controlled increase of the differential speed by the analog controller, preventing plugging of scroll.

4. DISPLAY AND SECURITY INSTALLATIONS

4.1 Digital indication of - bowl- and differential speed (EXTRA)	**at the switch board**
4.2 Analog indication of - fluid pressure scroll drive at pressure gauge	**at the aggregate**
4.3 Visual indication of - fluid level and fluid temperature	**at the aggregate**
4.4 Visual indication of contamination at the high pressure filter.	**at the aggregate**

4.5 Combined pressure switch manometer with 2 adjustable switch points.

p1 - switching off the infeed pump **green tab**

p2 - switching off the sedicanter® (E-)motor **red tab**

4.6 Pressure safety valve as overload safety device for the scroll drive. **at the aggregate**

4.7 Control of fluid temperature by thermostat and fluid-water heat exchanger. **at the aggregate**

4.8 N.T.C. sensor at sedicanter® motor (EXTRA)

5. Additional directions

If ambient temperature is below 15°C a fluid heating is necessary.
During transient operation at low temperature, do not switch off the hydraulic drive. Through almost pressureless operation the fluid is kept at operating temperature.

1. Installation and piping of your Sedicanter® according to instructions in the "Installation Manual".

2. Observe your operating instructions! They are made for your operating personnel to ensure safe operation of your Flottweg Sedicanter®. — OPERATING INSTRUCTIONS

   (We accept no responsibility for damage due to unauthorized repairs or non-observance of instructions).

3. Periodic safety inspections are to be performed according to national safety regulations in most countries:

   Every 3 years an inspection of the Sedicanter® in dismantled condition is absolutely essential for maintaining its operating safety. — PERIODIC INSPECTIONS

   In case of excessive unbalance, strong corrosion and/or abrasion more frequent checks are required.

   The inspection must be carried out by a qualified specialist. — SERVICE

4. Do not exceed bowl speed limit and density of wet solids. Refer to machine labe. — SPEED DENSITY

5. Wear ear protection during work near the Sedicanter®.

6. Do not remove covers or machine parts as long as bowl rotates!

7. In case of unusual noise or vibration check for cause, turn off if necessary.

8. For extremely abrasive media:

   Inspect discharge area of the bowl

   WEEKLY for WEAR — DANGER

   and exchange defective WEAR PROTECTION

DANGER!

If wear protection is worn or missing, the bowl may be severely damaged within a few hours.

9. A daily operating diary should be kept for routine maintenance and special incidents. An exemplary form is enclosed in the appendix. — Sedicanter® Control Sheet

Flottweg-Sedicanter® S 4D-3/409 machine-no.: 932556

1. Sedicanter® layout for --

2. Rotor

bowl:	max. speed	4600	min^{-1}
	max. solids density	1,3	g/cm^3
	bowl inside diameter	470	mm
	material bowl	1.4463	
	material sealings	NBR	
	max. operating temperature	50	°C
scroll:	wear protection helix	thungsten carbide	
	feed compartment	--	

3. Adjustment (on delivery)**:**

mode of operation	lagging	
bowl speed	4800	min^{-1}
scroll differential speed	-2...-25	min^{-1}

4. Drive:

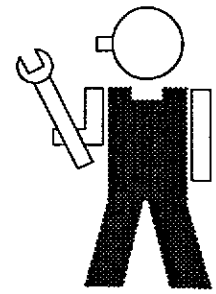
kind:	hybrid - drive	
bowl drive:		
electromotor: type	180	L
performance	30	kW
voltage / frequency	230;400 V / 50 Hz	
scroll drive:		
pump: type	P 20	
hydromotor: type	1070 S	
electromotor: type	132	M
performance	7,5	kW
voltage / frequency	400 V / 50 Hz	

5. Lubricants: see sect.3

OPERATION

Installation and start-up should be carried out by a **Flottweg specialist.**

SERVICE



He will s u p e r v i s e the procedure, c h e c k the machine and run t e s t s to determine the best machine setting for the respective medium:

- feed rate / pool depth
- bowl speed / scroll differential speed

He will i n s t r u c t your p e r s o n n e l.

NOTE:

Tools, nuts and washers are attached

Installation

Your Sedicanter® is shipped as a completely assembled unit with loose belt guard and V-belts.

A Flottweg specialist will proceed as follows:
(see installation plan)

1. Take off belt guard.
2. Place base onto foundation and fix.
3. Rotate bowl by hand to make sure it turns freely.
4. Install V-belts and tighten motor base.
5. Connect pipes and lines via vibration isolators.
6. Connect hydraulik aggregate (see 2.1/2)
7. Install belt guard.

Start-up

1. Note: Do not fill bearings with grease before starting They are provided with sufficient grease for the first start.
2. Check:
   - Sense of rotation according to arrows
   - electrical function / interlocking (wiring diagram)
   - alignment of belt sheaves.

1. Connection of the scroll drive

- Take off belt guard
- Take off protecting caps from the hydro motor scroll drive and the hydraulic hoses (collect fluid)
- Mount hydraulic lines at hydraulic motor
- Install belt guard

Note: With electrical bowl- and differential speed indication the adjustment of the initiators has to be checked according to the instructions for extras.

2. Connection of the fluid cooler (only with oil/water heat exchangers)

Install hoses for inlet and outlet of the cooling water at the aggregate: notice flow-direction of the thermostat valve!

1. Before switching on the Sedicanter®, check:
   - Infeed pump / flocculant pump must not start when the Sedicanter® is not in operation.
   - coolant for feed pipe bearing has to flow (ca. 10 - 12 l/h)

   Attention

   Make sure that flow is continuous !
   (we recommend a flowmeter with limit value switch)

2. Switch on Sedicanter®

3. After starting
   - during operation speed of the Sedicanter® switch on infeed pump.
   - If suspensions contain amorphous solids parts

     or very small solids parts (few µ),

     raise Sedicanter® slowly to full throughput capacity

     within 10-20 min.

4. During operation
   - check temperature of main bearings (max. 75°C) after one hour.

5. Stopping the Sedicanter®
   - Stop infeed / flocculant feed
   - Supply water until effluent is clear
   - Flush Sedicanter® carefully (see section "Cleaning")
   - Close centrate shut off valve if centrate is conveyed without pump to a rising pipe with the impeller disc
   - Switch off Sedicanter®

6. After standstill of the Sedicanter®
   - stop coolant flow (feed pipe bearing)
   - Main switch "OFF"

For operation of the drive see special instructions (page 2.2/2)

Operation of the hybrid drive

drawing:

2.2/3

1. **Before start:**
   - Check fluid level
   - Switch on fluid cooler: thermostat on reading 3 (ca. 40°C opening temperature)
   - Check sense of rotation of the E-motor according to arrows.

2. **Start:**
   - Set differential speed coarsely (see 2.2/4)
   - Switch on E-motor at the hydraulic unit
   - Switch on bowl drive

throttle valve

scale

3. **After starting the** Sedicanter® **to the preset speed:**
   - adjust scroll differential speed to the desired value (see 2.2/4)

   NOTE: do not start bowl if scroll is not in operation!

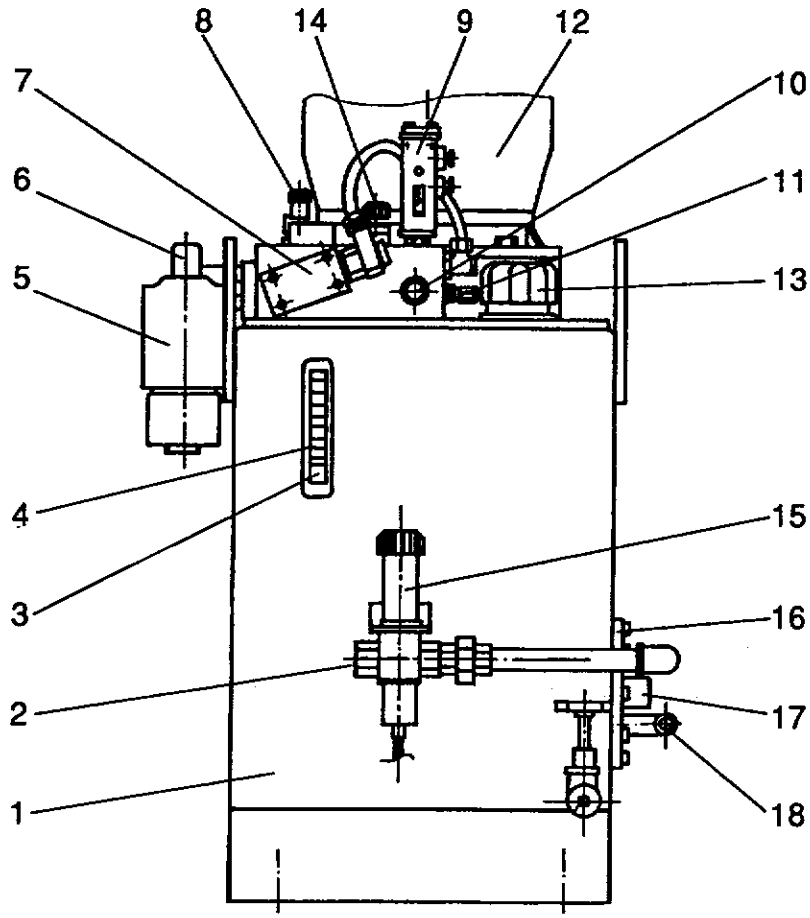
4. **During operation:**
   - Check fluid temperature (max. 60°C)
   - Check for leakiness
   - Control indication of contamination at high pressure filter

   ATTENTION: If contamination indicator shows red, exchange filter element

indication at high pressure filter

5. **Stop:**
   - Switch off bowl drive
   - Wait until bowl comes to a standstill
   - Switch off E-motor at the hydraulic unit
   - Switch off cooling

switch board



1	fluid tank
2	inlet cooling water
3	fluid level indication
4	thermometer
5	high pressure filter
6	optical contamination indication
7	analog controller
8	throttle valve scroll
9	manometer with pressure switch
10	pressure connection hydromotor
11	pressure gauge connection
12	E-motor
13	filling- and ventilation filter
*14	pressure safety valve
15	thermostat fluid cooling
16	fluid-water-heat exchanger
17	fluid-return
18	outlet cooling water

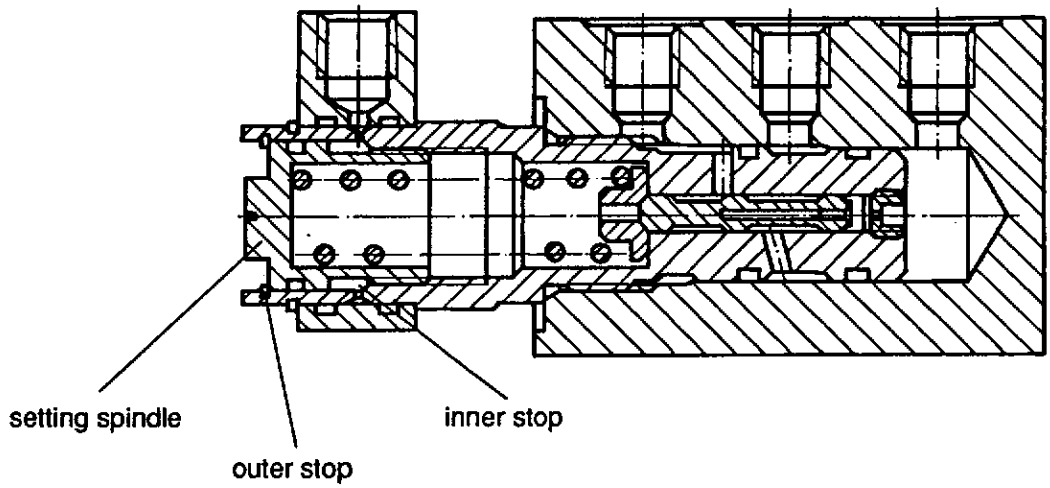
* fixed-adjusted at factory

See also sheet 2.2/3 and diagram 2.2/5

1. **Adjustment of the main differential speed** (see 2.2/5)
   - Before starting close throttle valve at the unit completely and after open about 4 turns (turning to the left = opening)
   - Switch on Sedicanter® and supply product, after adjust throttle valve until an optimum separation result is obtained.

2. **Adjustment of the analog controller - switch point** (see 2.2/5).

   During normal operation the scroll turns constantly with the main differential speed adjusted at the throttle valve. If the loading of the scroll is increased e.g. because of higher sediment density, also the pressure in the hydraulics is increased. Through the increased pressure the analog controller is releasing additional volume, the scroll turns faster and clogging is prevented.



   For adjustment of the analog controller the setting spindle has to be turned out until the outer stop, after the spindle is turned in for the number of rotations determined through the diagram (2.2/5). Usually the analog controller is adjusted at the normal operating pressure plus 10 - 20 bar. We suggest to adjust the switch on pressure not higher than 200 bar because otherwise the difference between switch on and maximum pressure becomes so low that there is practically no more control range.

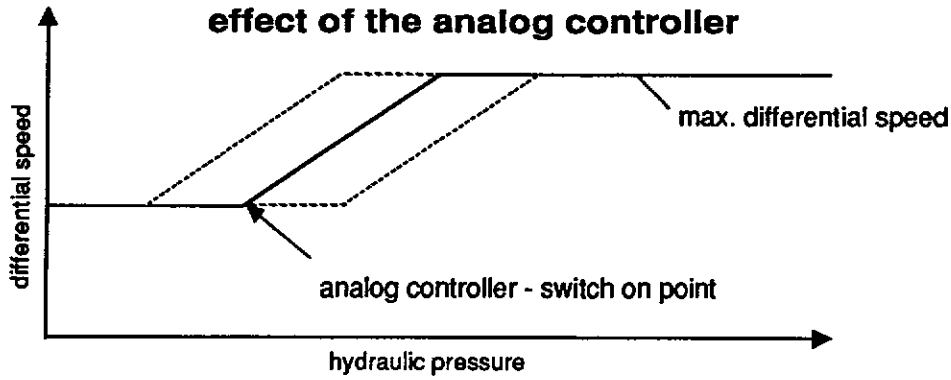
3. **Adjustment of the pressure switch manometer**

   The setting has to be made with regard to the adjusted main differential speed and the analog switch on point.

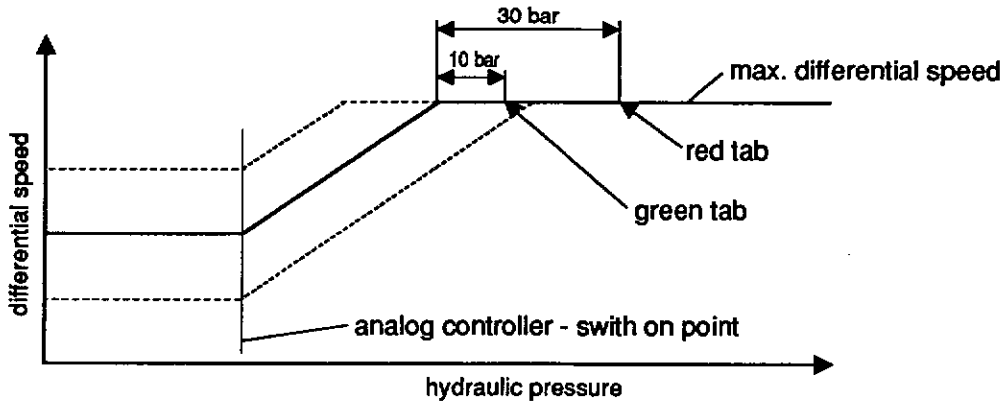
   Green tab = Stopping of the infeed pump about + 10 bar over the pressure at which the maximum differential speed is reached. (max.230 bar)

   Red tab = Stopping of the Sedicanter® main motor about + 30 bar over the pressure at which the maximum differential speed is obtained. (max.270 bar)

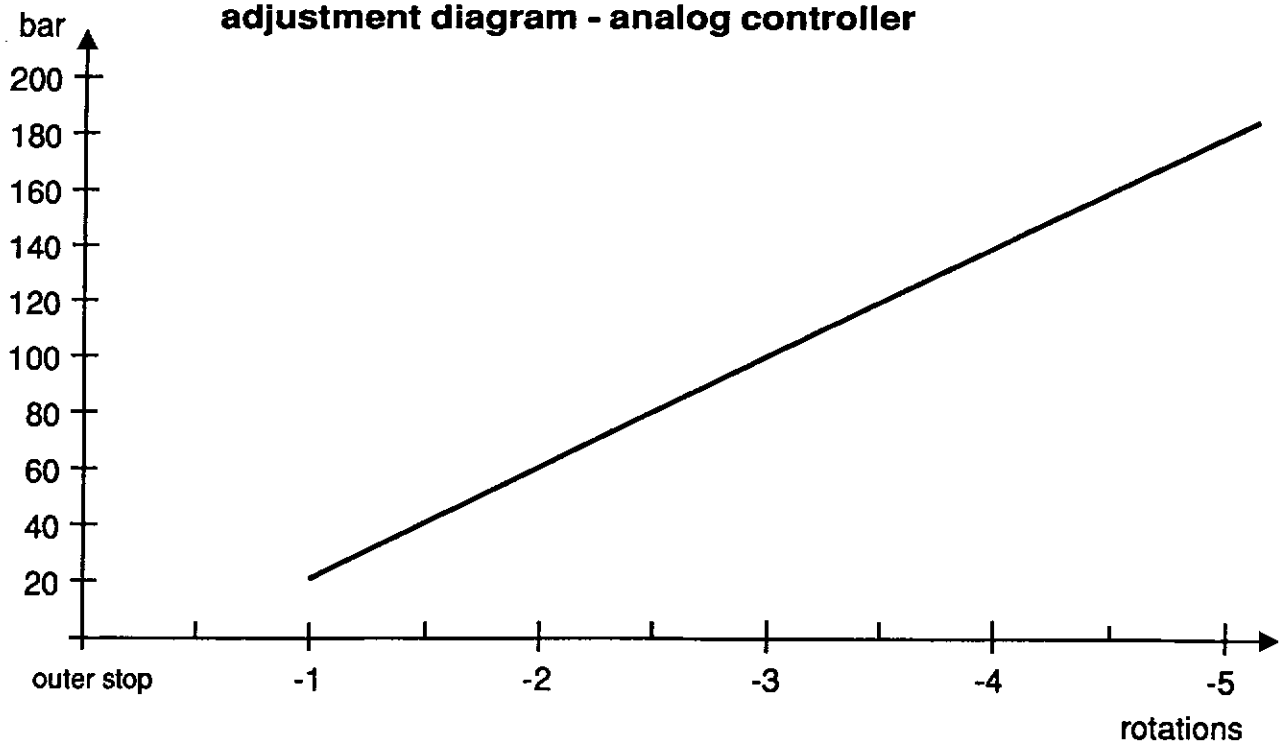
effect of the analog controller



effect of the throttle valve



adjustment diagram - analog controller



Rinsing liquids:

Lye solution:	NaOH / temperature max. 80 °C / concentration max. 1,5 %
Acid:	HNO_3 / temperature max. 60 °C / concentration max. 1,0 %
Water:	Temperature max. 80 °C

1. Pre-rinsing

1.1 Pre-rinsing with water at operating speed:

- Stop product feed
- Charge Sedicanter® with water (ca. 5 min.) over inlet pipe, scroll- and housing flushing device.
- As soon as clear water comes out from the outlet, stop supply (rinsing liquid is rejected)

1.2 Pre-rinsing with lye solution at operating speed:

- Charge Sedicanter® with lye solution (ca. 5 min.) over inlet pipe, scroll- and housing flushing device.
- Stop supply of lye solution (rinsing liquid is rejected)
- Adjust selector switch at switch board to position "flushing", Sedicanter® speed is regulated reduced to spin speed.

2. Main rinsing with lye solution (acid)

(rinsing liquid is transported in circulation)

2.1 Main rinsing over inlet pipe

- Charge Sedicanter® (ca. 10 min.) with lye solution (acid) over inlet pipe, housing- and scroll flushing device.

2.2 Back rinsing

- Charge Sedicanter® with lye solution (acid) over centrate outlet pipe (ca. 5 min.)
- Execute main flushing with acid 1 x per week

3. Additional rinsing with water

- Flush Sedicanter® with water (5-10 min.) acc. to 2.1 and 2.2 after back flushing and **without** turning off.

Attention: Never flush with rotor at standstill!
Bearing damage!

подшипник внутри 6221
снаружи 6022
№ 228 С

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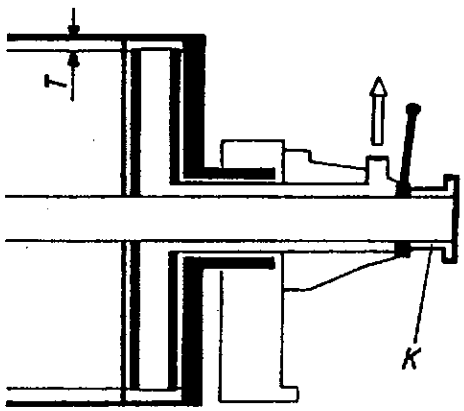
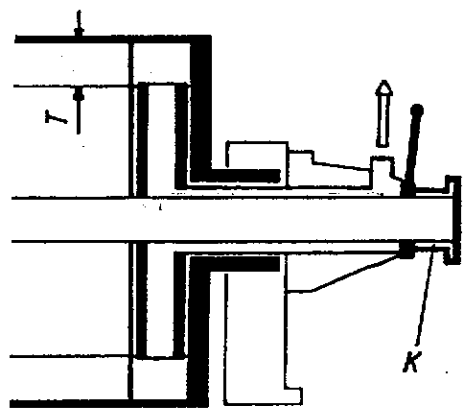
OPERATING VARIABLE IMPELLER 2.4

The variable impeller is used for infinitely variable pool depth adjusting during operation.
The optimum setting for the best separation result can therefore be chosen during operation or in the start-up testing phase (see section 1.1)
The pressure of the discharged centrate must not exceed 2 bar, otherwise danger of damage to the impeller device.



S 1: large impeller diameter for low pool (T)



S 2: small impeller diameter for high pool (T)

Adjusting the impeller with machine not in operation/ in operation

1. Hold tight impeller lever
   (The ball at the impeller lever is a safety device and must not be removed. In case the ball is missing the impeller must not be changed! Danger of injuries by the bare thread.)
2. Loosen wedge / threaded flange (K) ca. 1/4 - 1/2 turn.
3. Turn impeller lever slowly and choose diameter on scale.

   Attention: Release impeller lever only after wedge is tightened again. Through the immersion of the impeller disc into the liquid coat and the pressure on the impeller disc resulting from that, the impeller lever could be rotating.
4. Tighten wedge / threaded flange.

   Note: If diameter is raised after extended operation at small value, the machine should be in operation so that possible solids deposits in the impeller chamber are removed by the impeller. If the impeller cannot be adjusted because of incrustations at the eccentric after a long operating period at the same diameter or due to swelling up of an unsuitable sealing: open impeller chamber and repair (see maintenance manual)

If the Sedicanter® is equipped with an impeller disc for both senses of rotation (2 scales) pay attention to the following rule:

- with leading mode of operation (positive differential speed) the values indicated on the scale with "leading" can be adjusted
- with lagging mode of operation (negative differential speed) the values indicated on the scale with "lagging" can be adjusted.

LUBRICATION
AND
INSPECTION

Your Sedicanter® is equipped with a manually operated central grease lubrication system for both main bearings and depending on the type of the decanter it also lubricates the gear and gear reducer unit.

1. Function:

   Grease pump - piston distributor - grease lines - greasing points (see also appendix).

2. Lubricating:

   Operate pump at the end of a shift while the machine is running (see pos. 5).

   Number of strokes per shift: see 3.3 (lubricating diagram)

LUBRICATING DIAGRAM

3. If you wish to use an alternative type of grease, which is not recommended, please contact the factory.

4. Avoid excessive greasing:

   Overheating may cause bearing damage.

5. **Never** operate **grease pump** when decanter is **not in operation!**

   If temperatures are low, motor could be damaged due to excessive friction.

LUBRICANT:	
ex factory:	FLOTTWEG HG-Grease
alternative:	Fuchs Renolit HLT 2

Lubrication instructions for scroll bearing

1. A relubrication of the scroll thrust bearing (feed side) is not necessary.

   Only at new installation the bearings have to be filled with grease.

2. The scroll non locating bearing (drive side) is lubricated over a greasing nipple at the driving flange.

   Lubrication quantities and intervals acc. to sheet 3.3

LUBRICATING DIAGRAM

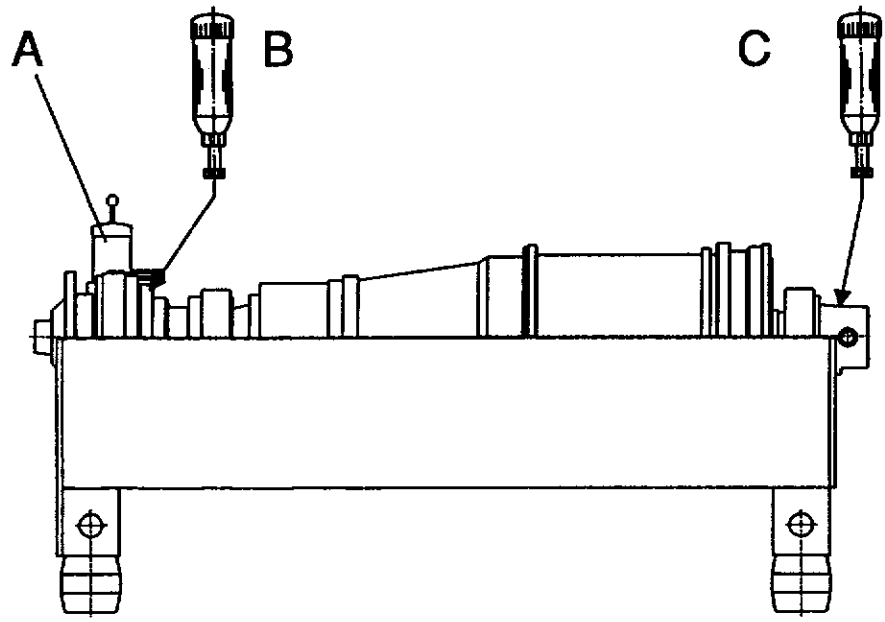
Attention:

Grease nipples rotate with high speed!

DANGER OF INJURY !

Lubricate only when rotor is at standstill.

LUBRICANT:	
normal operation:	FLOTTWEG HG-Grease
alternative:	Fuchs Renolit HLT 2
food operation:	Klüber Nontrop PLB EL



Greasing point	GREASING PERIOD / OPERATING CONDITIONS: Product **without** solvent and temperature **below** 80°C	Product with solvent **or** temperature above 80°C	Product with solvent **and** temperature above 80°C	Notes	Further directions
A	1 stroke/8h	2 strokes/8h	3 strokes/8h	Grease quantity per stroke = 3cm ^{3}	See sheet 3.1
B	1x2000h	1x500h	1x200h	With grease gun 20 strokes	
C	1x2000h	1x500h	1x200h	With grease gun 20 strokes	See sheet 3.2
Motor				Lubricate acc. to manufacturer specification	See appendix

For machines with automatic grease lubrication system:
point A is lubricated automatically

Hydraulic oil for FLOTTWEG Hybrid or Fully Hydraulic Drive

For Flottweg hydraulic plants pressure fluids from the group of HLP, according to DIN 51525 and VDM directions 24318, are used.

Only hydraulic oil with a kinematic viscosity of 65 to 75 cSt (mm^2/s) with 40° C (DIN 51562) is to be used.

Besides the following types of oil are suitable.

Manufacturer	Type
Addinol	HLP 68
Aral	Vitam GF 68
Avia	Avilub RSL 68
Castrol	Hyspin SP 68
DEA	Rando MDC 68
Shell	Tellus 68
Chevron	EP Hydraulic Oil 68
Esso	Nuto H - 68
Fuchs	Renolin MR 20
Mobil	DTE Heavy Medium
ÖMV	HTU 68

Because of transport reasons, it is not possible to deliver the hydraulic plant with oil filling.

Therefore we suggest to keep one barrel of the above mentioned hydraulic oil at disposal for start up.

The necessary quantity is stated in the installation plan for your hydraulic plant.

The same quantity is also needed for the periodical change of oil.

PROBLEM	CAUSE	ACTION
Periodic discharge	Insufficient solids layer between bowl bars after start-up (with bowls with bars)	Operate Sedicanter® at min. throughput rate for 1 hour and/or add medium with coarse or rapidly settling particles for building up a solids layer
Solids discharged too wet		- Reduce pool depth - Reduce differential speed - Reduce through put and scroll differential speed - Raise bowl speed
Unsatisfactory quality of centrate	Change of throughput/ solids content	- Reduce throughput - Raise differential speed - Raise bowl speed
	Increased content of fine particles (lab test!)	- Raise pool depth, if too much fine material settles - Reduce pool depth, if less fine material settles - Raise differential speed - Raise bowl speed
	Fluctuation of feed temperature	Find and adjust most favourable temperature (lab test!)
	Change of feed quality	Check quality (lab test): adapt throughput / pool depth / differential speed / bowl speed
	Change of viscosity	Change feed temperature or add water to dilute feed
	Feed compartment clogged	Clean via feed pipe
	Effect of flocculant is insufficient	Change flocculant
Gradual deterioration of centrate	Fine solids collect in clarifying zone of bowl	- Raise differential speed - Choose max. pool depth
	Scroll helix covered with greasy / sticky product	Flush Sedicanter® with acid / lye solution / hot water
	Scroll worn	Repair or exchange

PROBLEM	CAUSE	ACTION
Periodically changing solids content in centrate	Fluctuating feed rate, feed concentration or particle size distribution	- Raise pool depth - Raise differential speed - Install control device for differential speed
Discharge interrupted	Scroll plugged due to solids build-up - Excessive content of fine particles - Glutinous products - Incorrect machine setting	Adjust Sedicanter® (see above), if situation does not improve: - Stop feed pump, wait until discharge stops. - If discharge is not resumed, add liquid, until discharge starts. - If no improvement after 5 min: stop Sedicanter®. - If discharge starts during slowdown phase: start (half speed) stop until discharge finishes - If no discharge: stop Sedicanter®, remove and clean scroll
	Too high solids concentration	- Raise pool depth - Raise differential speed After cleaning problem adapt differential speed
	Scroll worn	Repair or exchange
	Loose or defective v-belts	Tighten belts or exchange
	Worn sheaves	Exchange

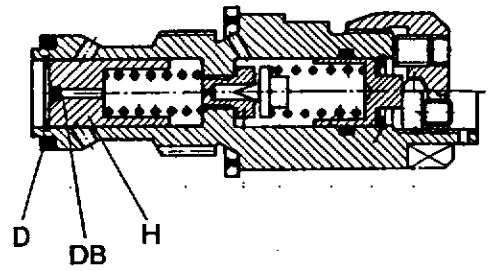
PROBLEM	CAUSE	ACTION
Excessive vibration or noise	Uneven solids deposits in the bowl (after long storage periods)	Start Sedicanter®, feed water / product: if no improvement, dismantle and clean Sedicanter®
	Wear (scroll or discharge bars)	- Repair or exchange scroll (by manufacturer) - Exchange bars (before screws will be attacked)
	Bearing damage	Repair by Flottweg specialist
	Bowl damage	Check: Repair if necessary by Flottweg specialist
	Feed pipe broken	Check: Repair if necessary by Flottweg specialist

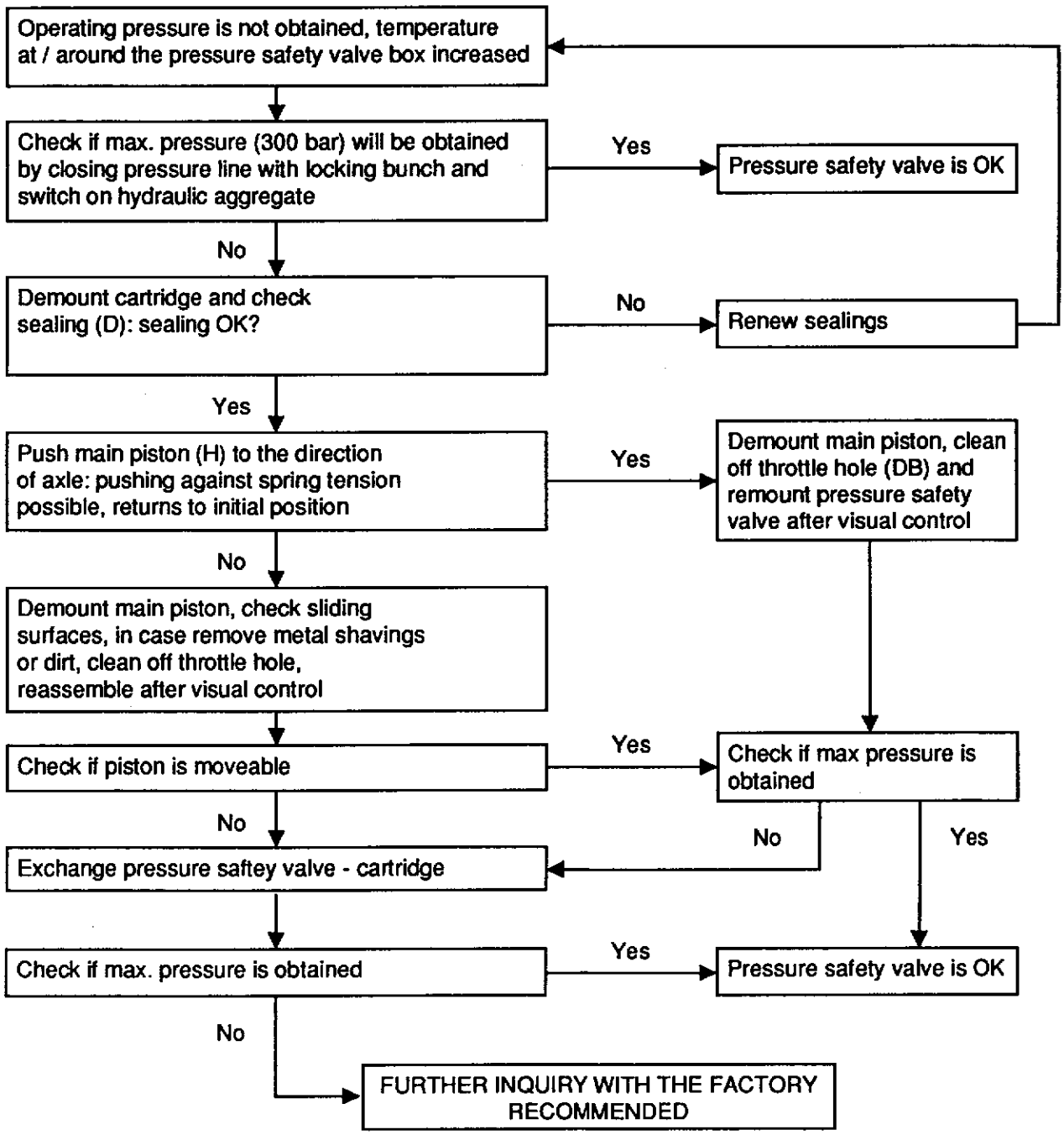
PROBLEM	CAUSE	ACTION
Differential speed increases too fast	Analog controller adjusted too low	Adjust for 1/4-1/2 turn higher
Differential speed is not increasing	Analog controller adjusted too high	Adjust for 1/2 and 1 turn lower
	Max. differential speed already adjusted at the throttle valve	Close throttle valve 1-2 turns
	Piston valve of analog controller stuck	Dismount analog controller, disassemble, clean, check for piston sliding well and remount
	Piston valve of fluid regulator (pump) stuck	Dismount, disassemble, clean, check for piston sliding well and mount
	Swing frame of hydro-pump defective	Exchange pump

PROBLEM	CAUSE	ACTION
Differential speed irregular, jerky, no diff.speed	Suction pipe leaky	Check hose and tightness of fittings and/or hose clips joints
	Differential speed too low (below 5 min^{-1})	Increase differential speed
+ Pressure peaks 150 - 180 bar:	Scroll partially or completely plugged	Set full differential speed, switch off Sedicanter®, eventually start again and repeat 2-3 times, flush Sedicanter®
After change of hydraulic motor - pump!	- Pressure pipes air filled - Pump not fluid filled - Wrong rotation direction of rotating hydraulic motor	- De-aerate - Fill up (via leakage pipe line) - Set right on hydraulic motor front side
	Feeding sieve plugged (no air transmission)	Exchange
Differential speed drops considerably under load	Pump defective: - Temperature too high (hand test) - Unnormal noise irregular pressure fluctuation (manometer)	Take off pressure hose between HP filter and hydromotor and close filter exit with locking bunches: Start hydraulic drive, pressure has to increase up to 160-180 bar and to remain, otherwise exchange pump
	Oil retainer ring of the pump drive shaft defective (fluid leakage out of pump bracket)	Exchange oil retainer ring
	Pressure safety valve defective: No noise from pump but increased temperature at/around the pressure safety valve box	Check pressure safety valve (see 3.4/7 adjust directions), repair / exchange

PROBLEM	CAUSE	ACTION
Cracking noise at the pump	Cavitation at the pump suction side. 1. Normally lasting up to 2 minutes after a long standstill or if the fluid temperature is below 10° C 2. If permanent state, problem e.g. - leaky suction pipe - clogged suction screen	 - Seal - Wash out
Working pressure too high during idling / at max. differential speed min. 40 bar over starting value	HP strainer clogged	Change; check reason (abrasion in pump or hydromotor)
	Pump internal analog controller out of adjustment (nominal pressure difference before / after the pump ca. 20 bar)	Adjust: Turning out the hexagon causes a smaller pressure difference (see appendix)
Differential speed is changing during operation	Counter nut was not tightened after setting / adjusting	Tighten counter nut
Hydraulic motor is not starting when aggregate is running, no pressure visible at manometer	1. Pressure safety valve leaky 2. Pump is not turning	Check pressure saftety valve (see 3.4/7 adjustment directions) Check flow volume with flowmeter, check if pump becomes warm, if yes, open pump bracket and repair /renew coupling

Faults location





INSPECTIONINTERVALS

for trouble-free operation

RUNNING TIME	6000h	3000h	1000h	500h	weekly	daily
Main bearing temperature: feel before greasing (not valid if extra "bearing temperature control" included)						X
V-belt tension				from 2nd month	1st month	
Hydraulic aggregate						
Hydraulic hoses — According to the safety rules of the employer's liability insurance association (ZH 1/74) the period of use of hose lines should not exceed six years.						
check hydraulic aggregate and pipes for leakage						X
check fluid temperature / level						X
note pressure and temperature in the control sheet						X
check HP filter contamination change HP filter (indication at filter)				X		
change fluid and clean tank	X		1.			
Scroll check for wear:						
repair if diameter Sedicanter® more than 20mm		X				
Control below 50°C Scroll bearing seals producttemp. and renew scroll bearing above 50°C grease completely	X	X				
Feed pipe: check outlet orifice for wear (potential cause for deposits inside scroll)		X				
Scroll interior: check for deposits;			X			
If deposits less than 10mm - flush and extend interval to		X				
Scroll bearings	In case of unusual noise (main bearing temperature not increased)					
Drive motor	according to instructions of motor manufacturer					

Hydraulic parts are extremely precise manufactured and therefore need special treatment and maintenance.

Principal rule for installation of component parts is cleanliness.

All parts have to be kept dust- and dirtfree during dismantling and have to be cleaned carefully before mounting because even very small dust particles can cause damage to the sealing faces and running surfaces.

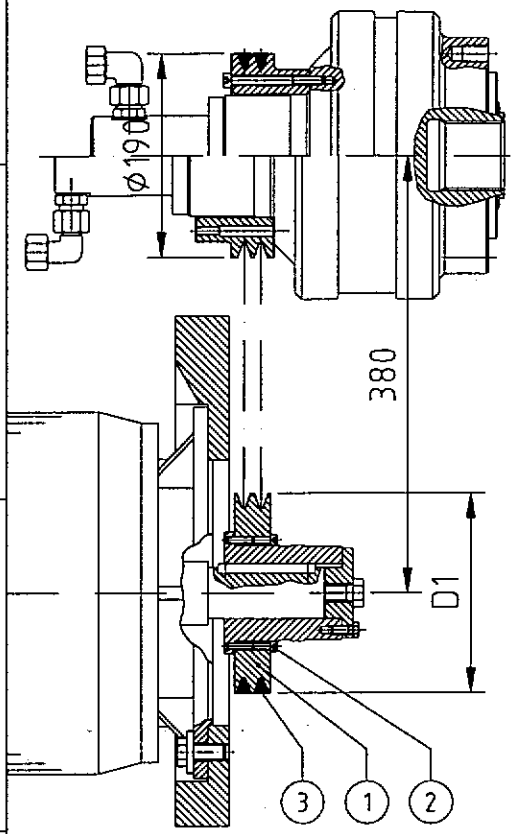
Special directions:

1. Clean with grease solvent liquids

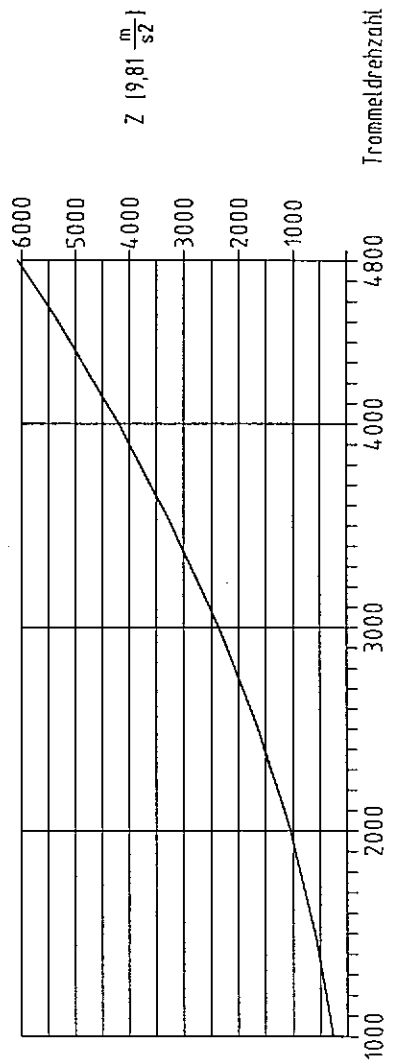
   ATTENTION: Take off sealings and o-rings before cleaning!
2. Close open end hose line with stoppers.
3. Fill only filtered hydraulic fluid into the tank (feeding sieve with double relief valve is installed in the tank cover).
4. Clean tank only if cold.
5. Do not clean tank with steam injector or splash water.
6. Adjust unions and pipe clamps regularly.
7. Mount couplings of the hydraulic pumps only with hoisting e.g. pulling apparatus, in order to avoid damage.

TABLES
AND
DIAGRAMS

Zentrifugalbeschleunigung	Motor	
Centrifugal acceleration	Motor	
Acceleration centrifuge	Moteur	
$z_{max} \approx \frac{n^2 \cdot d_{max}}{1800}$		
	160-200	



Riementrieb Trommel	Bowl belt drive	Commande a courroie de bol	① -- ③		2303.558.00	2303.559.00	2303.560.00	2303.561.00
Artikel - Nr.	Article - No.	Numero de comm.	③		0096.004.01	0096.003.01	0096.060.01	0096.061.01
Keilriemen	V-belts	Courroie	DIN 7753 SPAX LW [mm]		1432	1400	1360	1300
Artikel - Nr.	Article - No.	Numero de comm.	①		2607.006.00	2607.033.00	2607.028.00	2607.022.00
Keilriemen-Scheiben-ø	V-belts pulleys	Poulie a garge	D_1 [mm]		258	216	188	163
nominaler Achsabstand	Center distance	Entraxe des essieux	A [mm]		371,4	390,4	391,2	381,5
Drehzahl Trommel	Speed bowl	Vitesse de bol	n_2 [min^{-1}]		4800	4000	3500	3000
Drehzahl E-Motor	Speed motor	Vitesse n moteur	n_1 [min^{-1}]	3520				



Bemerkungen:

Die Drehzahlen sind Lastdrehzahlen. Sie unterscheiden sich von den Leerlaufdrehzahlen um den Faktor 1,02.

Mikraf.	Ausgabe	Änderung	Datum	Bearb.	Gepr. Name
	h				
	g				
	f				
	e				
	d				
	c				
	b				
	a				

	Datum	Name
Bearb.	04.05.94	Hie
Gepr.	5.05.1994	Jä.
Norm.		

Flottweg GmbH
Industriestraße 6-8
D-8313 Vilsbiburg

Schutzvermerk nach DIN34 beachten

Entst. aus.:

Drehzahltabelle Z4D / 60Hz

Speed diagramm
Table des vitesses

Zeichn.-Nr. F 325.5002.04

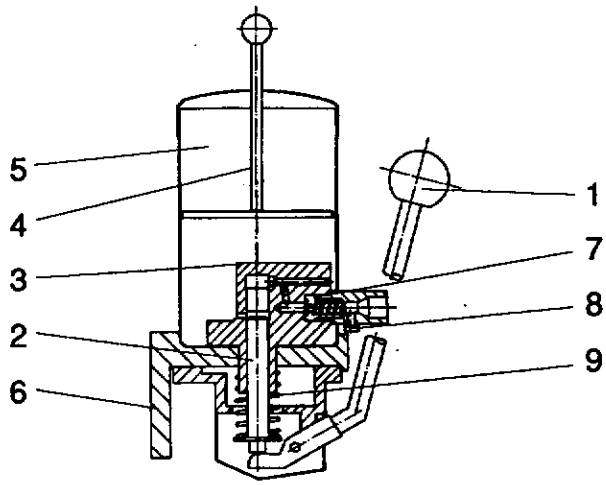
Maßstab -

Ersatz f.:

Ersetzt d.:

PRI 26.03.97

APPENDIX



Description of drawing

1 Hand lever
2 Delivery plunger
3 Pump body
4 Level gauge
5 Grease container
6 Mounting bracket
7 Non-return valve
8 Vent screw
9 Pressure spring

Technical Data	
Feeding volume:	3 cm^3 / stroke
Ambient temperature:	from -15 to +80°C
Container capacity:	either 0,6 l
Maximum back-pressure:	100 bar
Lubricant temperature:	from -15 to +80°C
Lubricant:	mineral lubricating grease
Penetration number:	= 265 Cst (mm^2)
Thread of outlet connection:	M 16 x 1,5

1. General

The grease pump of the central lubrication system ist operated according to individual lubricating instructions for main and scroll bearings of the decanter.

2. Pumping

- For lubricating press down the lever steadily.
- Lever ist automatically reset to its initial position.
- Repeat procedure according to number of strokes required.

3. Note before operating

- Grease lines must be undamaged (uniform diameter!)
- Grease container: check level (level gauge)

4. Refilling the grease container

- Refill before container is completely empty (level gauge!)
- Avoid air pockets: scoop in grease carefully
- Keep out impurities: danger of plugging

5. Cleaning

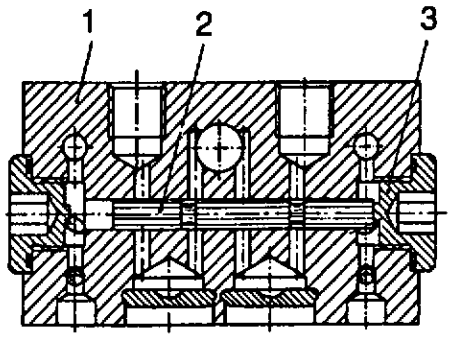
- Use clean, no fluffing cloth (no cotton waste!)
- Wash off deposits with brush and petroleum.

The piston distributor at the central grease pump is mounted ready for operation on delivery. During normal operation maintenance is not necessary. Occasional malfunction due to dirty lubricants can usually be easily eliminated by cleaning the device.

Cleaning (Illustr. 1)

- Remove grease lines
- Turn out stop screw (3) and press out piston (2)
- clean housing and pistons, using paraffin
- Introduce pistons and check function (do not confuse pistons)
- Install stop screws
- Fill in grease until grease emerges from all openings free of air
- Connect grease lines

Note: do not close outlet bores, as piston ditributor would be blocked.

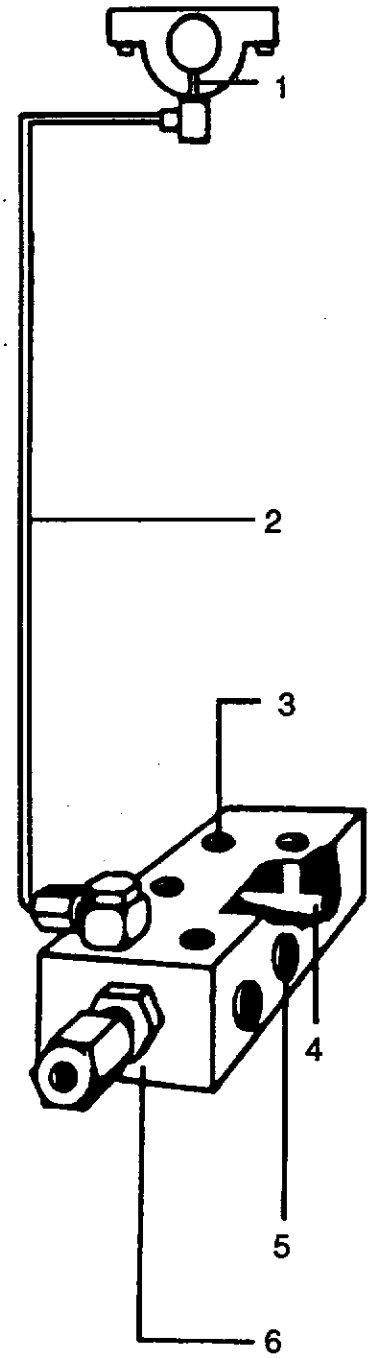


Illustr. 1: Design

1 Housing

2 Piston

3 Stop Screw



Illustr. 2 (Function)

1 Greasing points

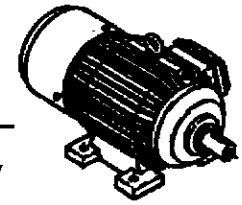
2 Grease lines

3 Outlets

4 Piston

5 Stop Screw

6 Housing



Operating Instructions for Three-Phase Squirrel Cage Motors up to 660V

1. Before Installation

- Inspect for transport damage
- Unlock bearing block (from size 250 - if installed)

2. Installation

- do not obstruct access of cooling air
- Avoid extreme temperatures
- For extended storage in damp environment measure insulation resistance: min. 0,6 MΩ; ø 1,5 MΩ
- Dry windings if lower values are obtained

3. Fitting belt pulleys / couplings

- Clean and grease shaft end
- Use pull-on device or heat hub (80°)
- Do not use mechanical force (bearing damage)

4. Connection

- Only by qualified specialists
- Mind data on motor plate
- Connect according to wiring diagram
- Check setting of motor protection switches

5. Direction or rotation

Start motor with belts removed:

Rotation of motor must be according to the arrow

6. Maintenance of the bearings

- From size 250: greasing via nipples during operation
- Greasing intervals / grease types: see special plate on motor

Note: Prolonging intervals and mixing different grease types may cause bearing damage

7. Spare parts

When ordering spare parts, state data on rating plate.

Y-103-106-10

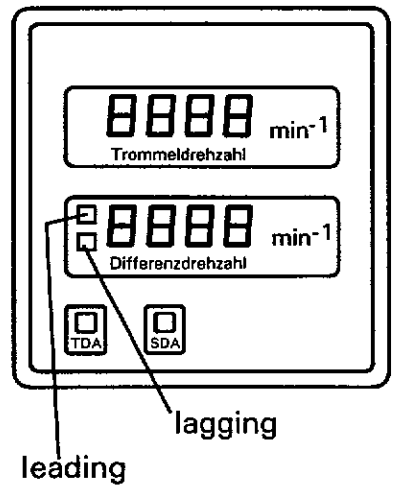
Decanter - Control sheet

in operation			control grease pump				conveyor bearing		bearing temperature				V-belts			cleaning				Only for hydraulic Drive								Occurrences, cause of interruption, etc
	hour		operated						feedside		driveside					flushing of decanter		flushing of conveyor interior										
date	from	till	hour	No. of pushes	date of de-aeration	grease container refilled (date)	greasing date	No. of pushes or quantity [cm3]	hour	°C	hour	°C	tension checked	retightened	exchanged	hour	time	hour	time	Pressure (bar) Scrolldrive	differential speed	Hydraulic fluid temperatur	Bowl speed	Pressure (bar) bowl drive	Fluid refilled	High pr. filter renewed	Suction filter cleaned	

ACCESSORIES

7.403 Differential and bowl speed measuring

1. Duty and function



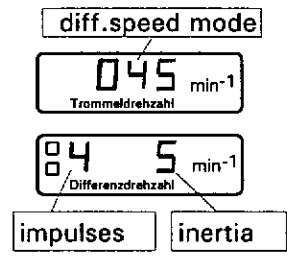
The speed measuring device indicates the differential- and bowl speed of the centrifuge.
The impulses are picked up according to Namur over two proximity switches, mounted at the centrifuge.
The bowl speed is indicated with a resolution of ± 1 min^{-1}, the differential speed with a resolution of $\pm$ 0,1 min^{-1}.
The both light emitting diodes to the left of the differential speed display show if the centrifuge is operated leading or lagging.
By the two light emitting diodes "TDA" and "SDA" at the frontside of the unit the function of the initiator can be controlled.
The unit is equipped with each one analog output for bowl- and differential speed. The analog output is switchable, optionally 0-20 mA or 4-20 mA.
The BCD-output is provided for the connection of a Flottweg limit value comparator.

2. Operation and adjustment

After starting, the actual adjustments are indicated for about 6 seconds, then the unit switches to the measurement.

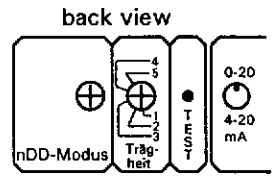
■ Adjustments
The unit has to be adjusted individually before commissioning.

- Inertia
  The inertia is a mean value which is taken arithmetically over 2 to 5 measuring cycles. The number of the desired measuring cycles can be adjusted at the rotary switch. (Inertia 5 gives the most quiet indication.)



- Differential speed mode
  The differential speed mode is the factor for the calculation of the differential speed. The adjustment is made with a screw driver at the backside of the unit.

Scroll drive	diff. speed mode	number of impulses
Test indication gear input speed	000	4
Hydromotor (type: 1060 or 1070)	001	4
Hydromotor (type: 1080 and larger)	001	3
Gear acc. to ratio e.g. gear 6A-**45**	045	4



- Number of impulses
  The number of impulses is coupled to the individual differential speed mode and cannot be adjusted separately.

- Analog output
  The analog output can be operated optionally with 0-20 mA or 4-20 mA.

- Adjustment of the initiators (see sect. 4)

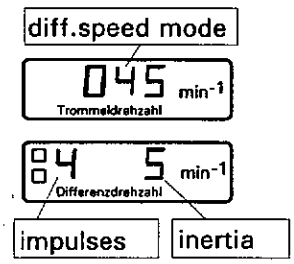
- Diagnostic function (button [TEST])
  The measuring device executes a self-test during operation in irregular intervals. An eventual, short flashing of single display segments is insignificant. The self-test function can also be executed continuously. For that purpose press the button TEST on the backside for ca. 3 seconds.
  Note:
  There is no speed measuring during the continuous TEST-function.

  1. step
  The figure 8 jumps in the indication from one point to the other in a seconds interval. After all points have been passed at least one time, call step 2 by pressing button [TEST] again.

  2. step
  The indication shows the operating parameters:

  above adjusted calculation factor (differential speed mode)

  below left necessary number of impulses/rotation for speed 1
  right adjusted inertia



  Continue by pressing button [TEST].

  3. step
  Checking of the analog output

indication	signal at adjustment 0-20 mA	signal at adjustment 4-20 mA
00	0 mA	4 mA
↓ continue by pressing button [TEST] ↓		
999	2 mA	5,6 mA
↓ continue by pressing buton [TEST] ↓		
9999	20 mA	20 mA

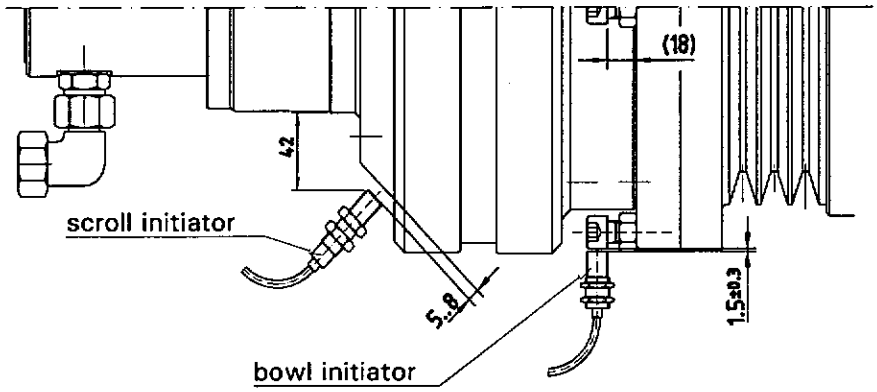
  By pressing the button [TEST] again the unit switches again to measuring activity.

3. Ex-execution
If the centrifuge is operated in a hazardous area, the initiator circuits have to be intrinsically safe. I.e. the connection boxes at the machine have to be intrinsically safe (blue) and the circuits have to be galvanically separated by circuit breakers.
The speed measuring device is not approved for operation in ex-area.

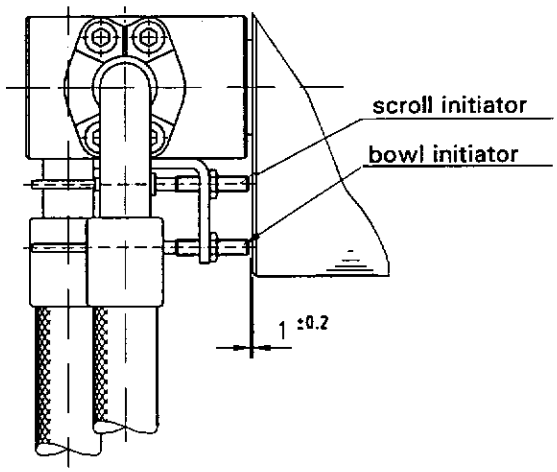
4. Adjustment of the initiators

For adjustment turn the initiators to the stated value at the impulse transmitter and fix. The stated tolerances have to be adhered to unconditionally, to guarantee the correct function of the initiators.

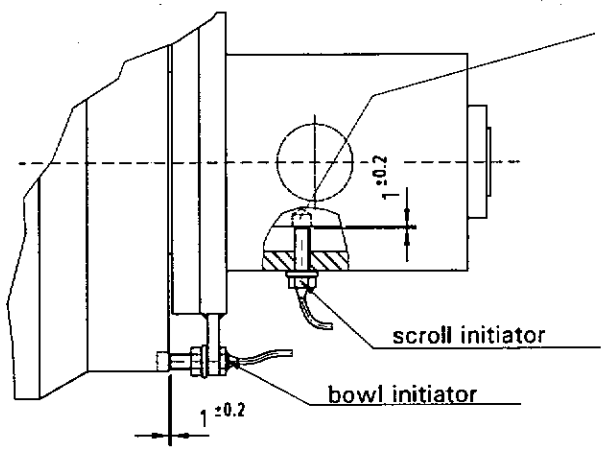
Hydromotors size 1060 and 1070



Hydromotors size 1080



Hydromotors size 1120



With this version
- screw in initiator up to stop
- turn back initiator for 1mm and fix with hexagonal nut

Attention:
Take care not to screw in the initiator into one of the 3 grooves.

In order to prevent excessive vibration of the feed pipe, it is equipped with an additional liquid-cooled bearing in the feed area (ceramic - sliding bearing).

NOTE:

1. Handle bearing with care during mounting!
   (shock sensitive!)

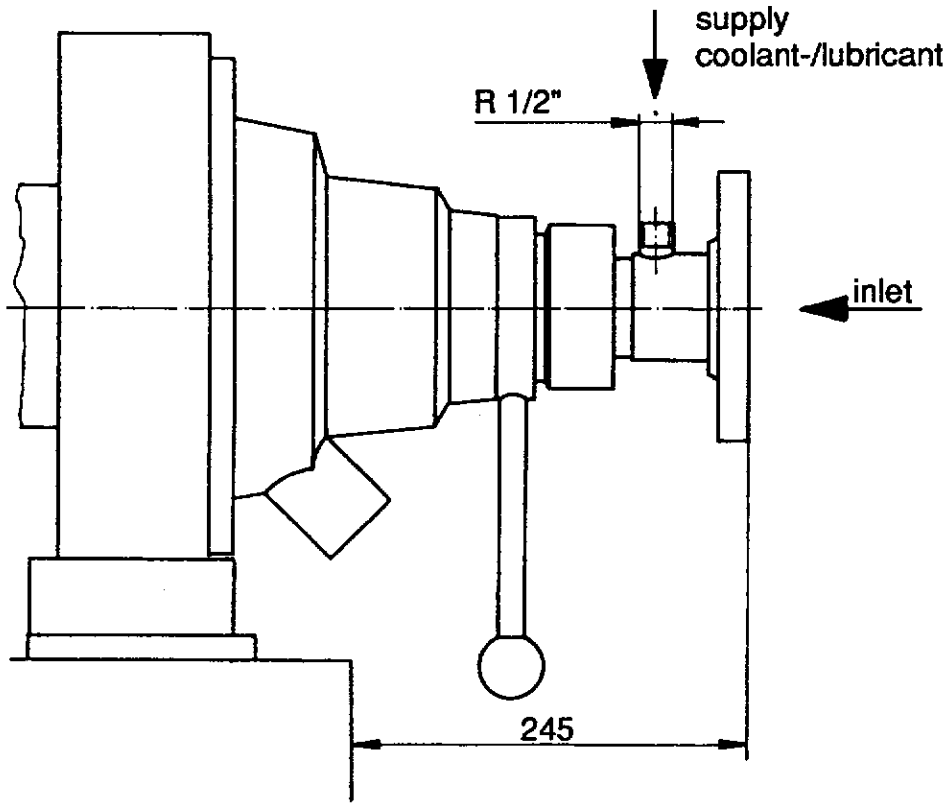
2. Make sure that the bearing is supplied with coolant/lubricant already before you start the decanter and that the flow is not stopped before the rotor is at rest:

   discontinuous flow of the coolant/lubricant or
   flow interruptions can cause bearing damage!

3. Coolant/lubricant: water/product-compatible liquid

   Dosage: 10-12 l/h
   (with extra flow meter adjust switch off limit value to 9 l/h))

   Connection: see installation plan

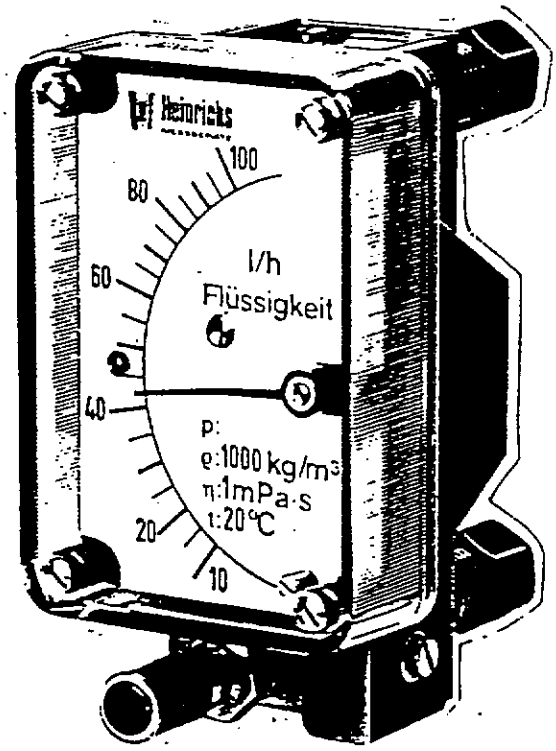


Heinrichs
MESSGERÄTE

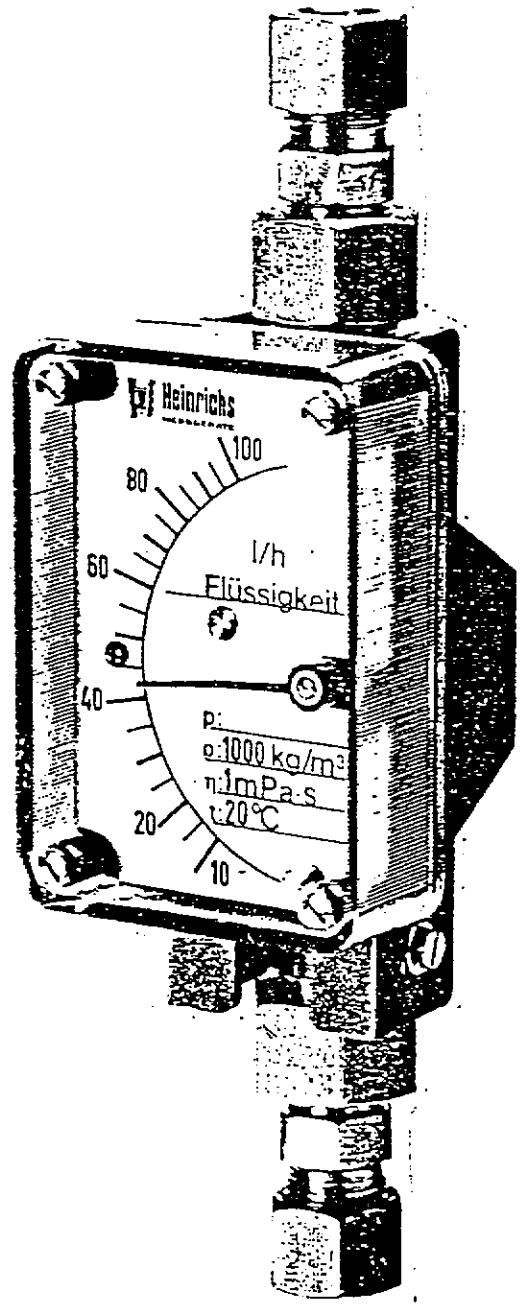
KDS

The smallest Heinrichs flowmeter with metal body
and balanced magnetic coupling system (patented)

Leaflet no. 2.100 E



KDS - 220



KDS - 120

Josef Heinrichs Meßgeräte GmbH & Co. KG
Stolberger Straße 393
5000 Köln 41

Telefon 0221/49708-0
Telex 8881873
Telegramm heinrichsmesser köln

Maß- und Konstruktionsänderungen vorbehalten.

Ne/Juli'86

Measuring Principle :

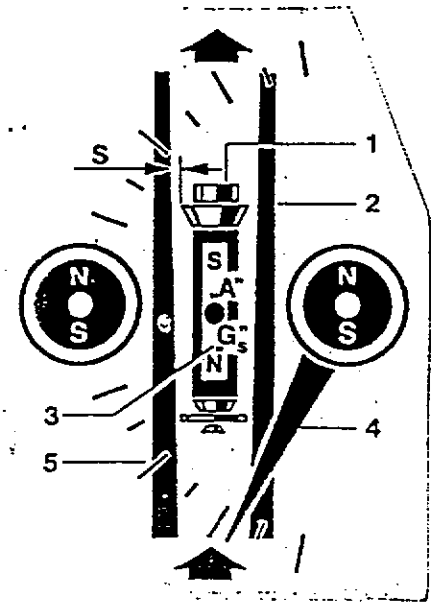
flowmeter according to the float principle (unguided float) with DUO-magnetic coupling

patented: DBP-P 1773798.3

This coupling system allows the measuring of smallest flow rates nearly free of hysteresis.

The medium enters the flowmeter at the bottom inlet. If there is a sufficient flow speed, the float is liftet until there is an equilibrium between lift and float weight.

The 2. magnet (balanced system) avoids one-sided retroaction of the magnetic coupling system



1 float
2 measuring cone
3 permanent magnet
4 follower magnet indication system
5 scale

Technical Data :

connection	: EO 6 and EO 8 outer diameter
accuracy	: ± 3% from scale end value
temperature	: max. 150°C
pressure	: max. 40 bar
measuring span	: 10 : 1

KDS - 120

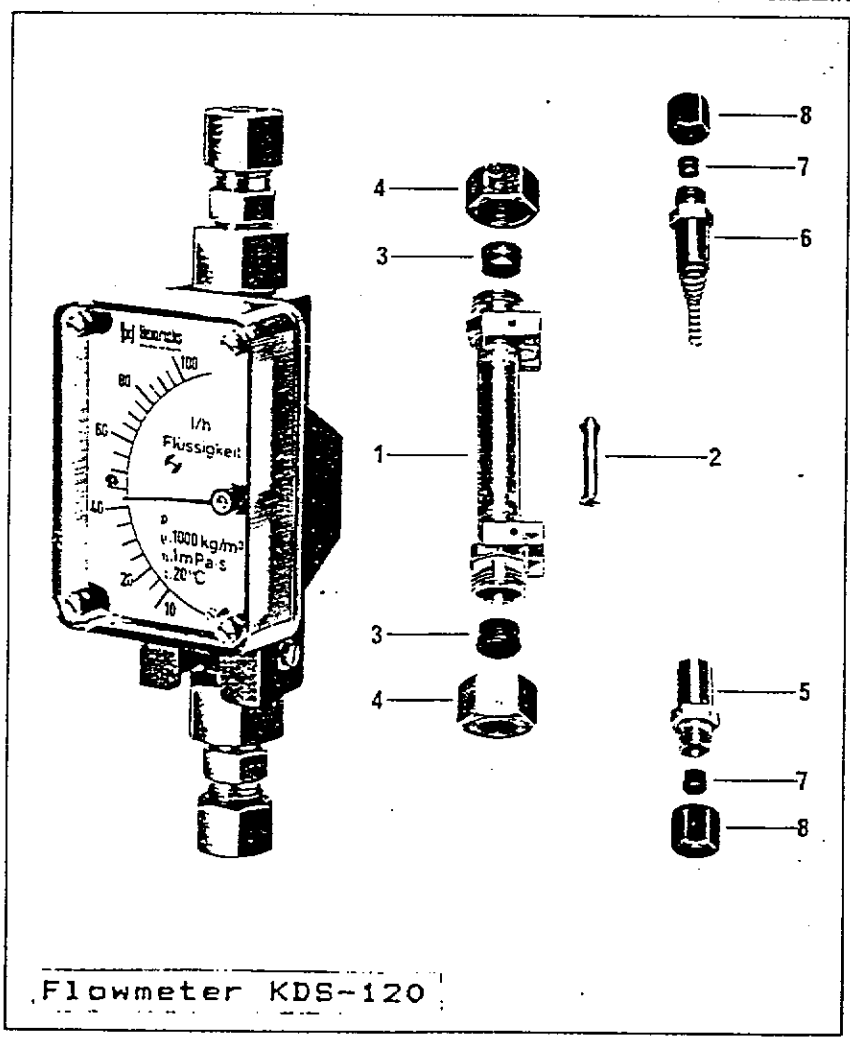
material	: media touched parts stainless (1.4571)
range	: min. 0,2 - 2,0 l/h ; max. 16 - 160 l/h water
length	: ca. 200 mm
installation	: vertical, bottom inlet

KDS - 220

material	: media touched parts stainless (1.4571)
range	: min. 0,2 - 2,0 l/h ; max. 10 - 100 l/h water
length	: 90 mm
installation	: horizontal, bottom inlet with fine adjustment valve

Flowmeter KDS-120

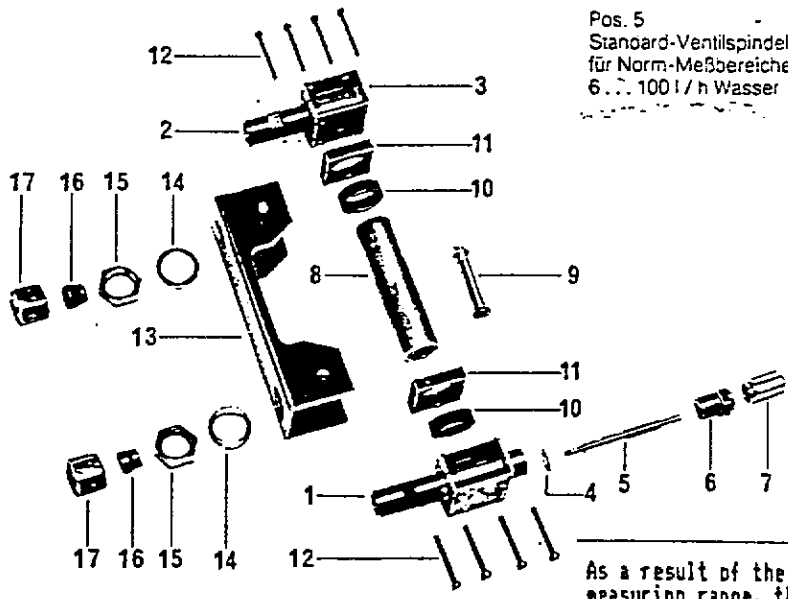
Item	Description	Material
1	Measuring cone with weld-on tubing fitting and support for indicator part	Mat.no.: 1.4571
2	Float "NU"	Mat.no.: 1.4571
3	Cutting- and compression ring	stainless steel
4	Union nut	stainless steel
5	Reducing adapter	Mat.no.: 1.4571
6	Reducing adapter with float-stop	Mat.no.: 1.4571
7	Cutting- and compression ring	stainless steel
8	Union nut	stainless steel



Flowmeter KDS-120

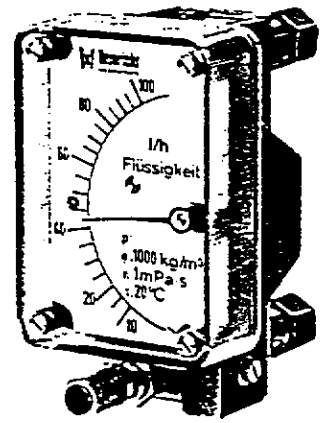
Flowmeter KDS-220

Item	Description	Material
1	Instrument-head assy. with valve seat	Mat.no.: 1.4305 Teflon/Graphite
2	Instrument-head assembly	Mat.no.: 1.4305
3	Instrument-head	Mat.no.: 1.4571
4	Valve stem seal	Teflon
5	Valve stem	Mat.no.: 1.4305
6	Pressure bushing	Mat.no.: 1.4305
7	Handle	Aluminium / plastic
8	Cone	Mat.no.: 1.4571
9	Float "NU"	Mat.no.: 1.4571
10	Packing	as ordered
11	Packing flange	Mat.no.: 1.4305
12	Srew	Mat.no.: 1.4571
13	Instrument base plate	Mat.no.: 1.4571
14	Washer	Brass, galvanized
15	Nut	Brass, galvanized
16	Cutting- and compression ring	Stainless steel
17	Union nut	Stainless steel



Armatur KDS-220

Pos. 5
Standard-Ventilspindel
für Norm-Meßbereiche von
6 ... 100 l / h Wasser



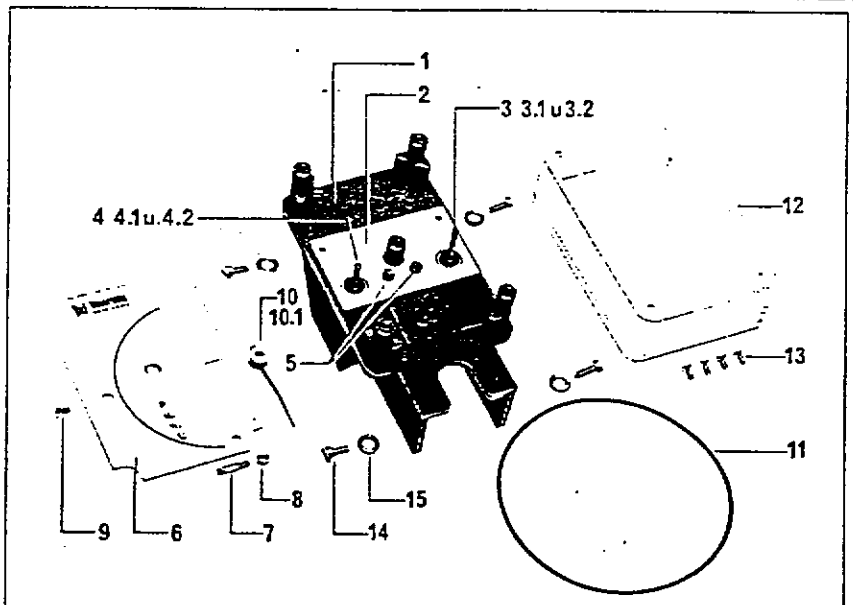
KDS-220

As a result of the large measuring range, the adjustment accuracy and reproducibility of the standard valve depends on the flow and the differential pressure.

Special valves are available for liquid flow under 6 l/h and for air flow under 150 l/h.

KDS Indicator

Item	Description	Material
1	Housing	Plastic
2	Mounting plate	Aluminium
3	Pointer axis	Mat.no.: 1.4301
3.1	Annular magnet	Derstit 260
3.2	Ball bearings	Mat.no.: 1.4571
4	Axis for opposite coupling	Mat.no.: 1.4301
4.1	Annular magnet	Derstit 260
4.2	Ball bearings	Mat.no.: 1.4571
5	Cap-screw	Brass, galvanized
6	Scale	Aluminium
7	Pointer - stop	Brass, galvanized
8	Hexagon nut	Brass, galvanized
9	Screw, countersunk	Brass, galvanized
10	Pointer	Aluminium
10.1	Set screw	Stainless steel
11	Housing seal	Rubber
12	Housing top	Plastic
13	Screw, countersunk	Brass, galvanized
14	Cap-screw	Brass, galvanized
15	Washer	Brass, galvanized



KDS Indicator

special design

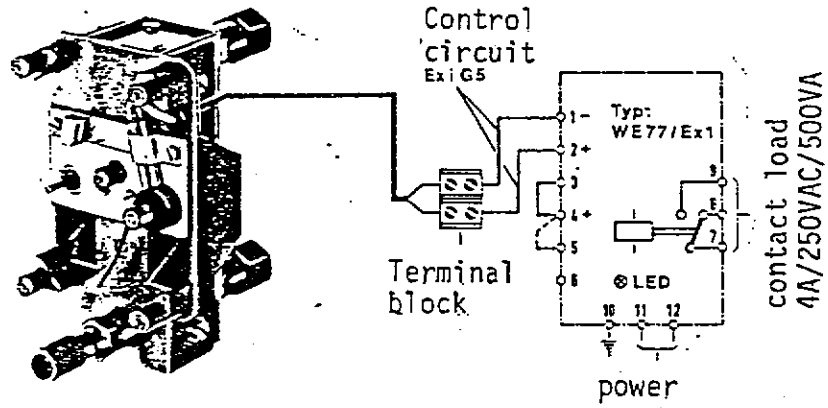
* connection EO 1o and EO 12 outer diameter for KDS-12o
* high pressure design (max. 4oo bar)
* flowmeter with cleaning plug
* KDS control unit for the purpose of keeping gas or fluid constant

local indication housing

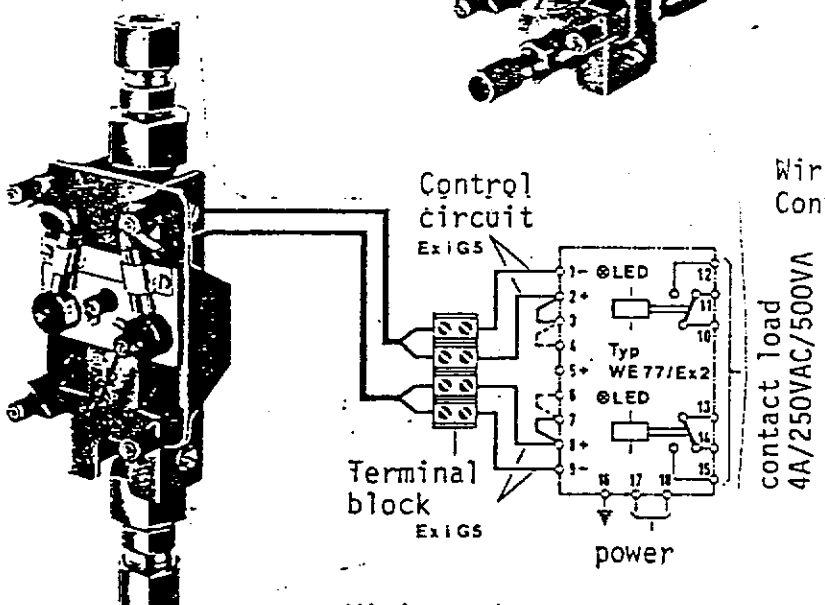
- housing made of ULTRAMID B
- transparent bonnet made of CELLIDOR CPM
- sheet metal anodized
- stainless bearing
- eddy current damping
- uncoupling-proof permanent magnet transmission system
- installation of max. 2 inductive contacts

Accessoires

1 or 2 inductive contact switches (relay necessary)

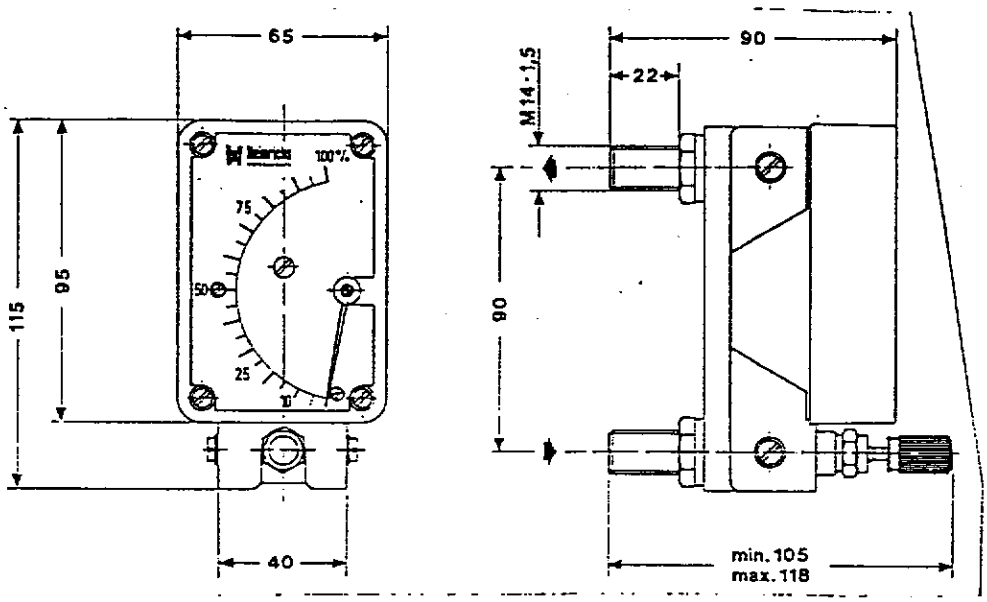


Wiring scheme
Contact making device type "KEI 1"

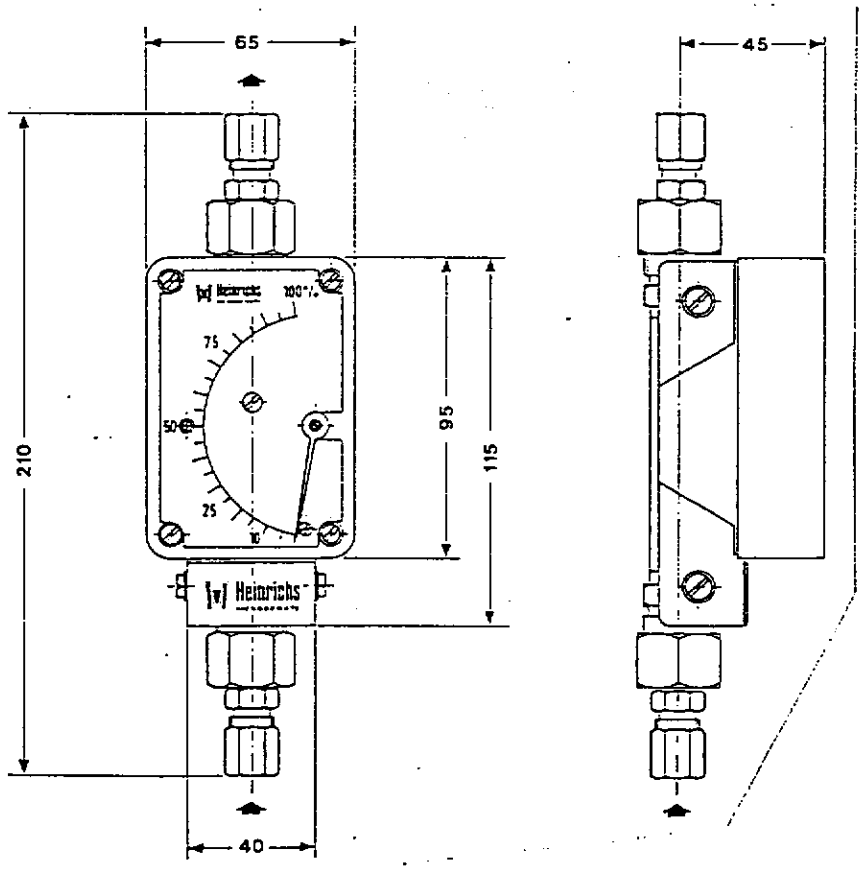


Wiring scheme
Contact making device type "KEI 2"

KDS - 220



KDS - I20



Due to continuous development we reserve the right to amend specifications without notification.

Flottweg

Temperature monitoring for feed pipe bearing

7.504

with electronic controller and PT-100-resistance thermometer

1. General

The temperature monitoring of the feed pipe bearing through an electronic controller with resistance thermometer permits the remote monitoring of the feed pipe bearing temperature.

At exceeding of the predetermined limit temperature the decanter motor ist switched off. By this means the equipment provides a fundamental safeguard to prevent bearing failure.

The installation allows the monitoring of the bearing temperature from the central control panel.

2. Construction

The temperature monitoring consists of:

Normal operation: PT-100-resistance thermometer - terminal box - electronic controller with digital actual value display.

Exi-operation: PT-100-resistance thermometer - terminal box - 3 safety barriers-controller with digital actual value display.

PT-100-resistance thermometer and terminal box are installed in ex-area, safety barriers and controller outside.

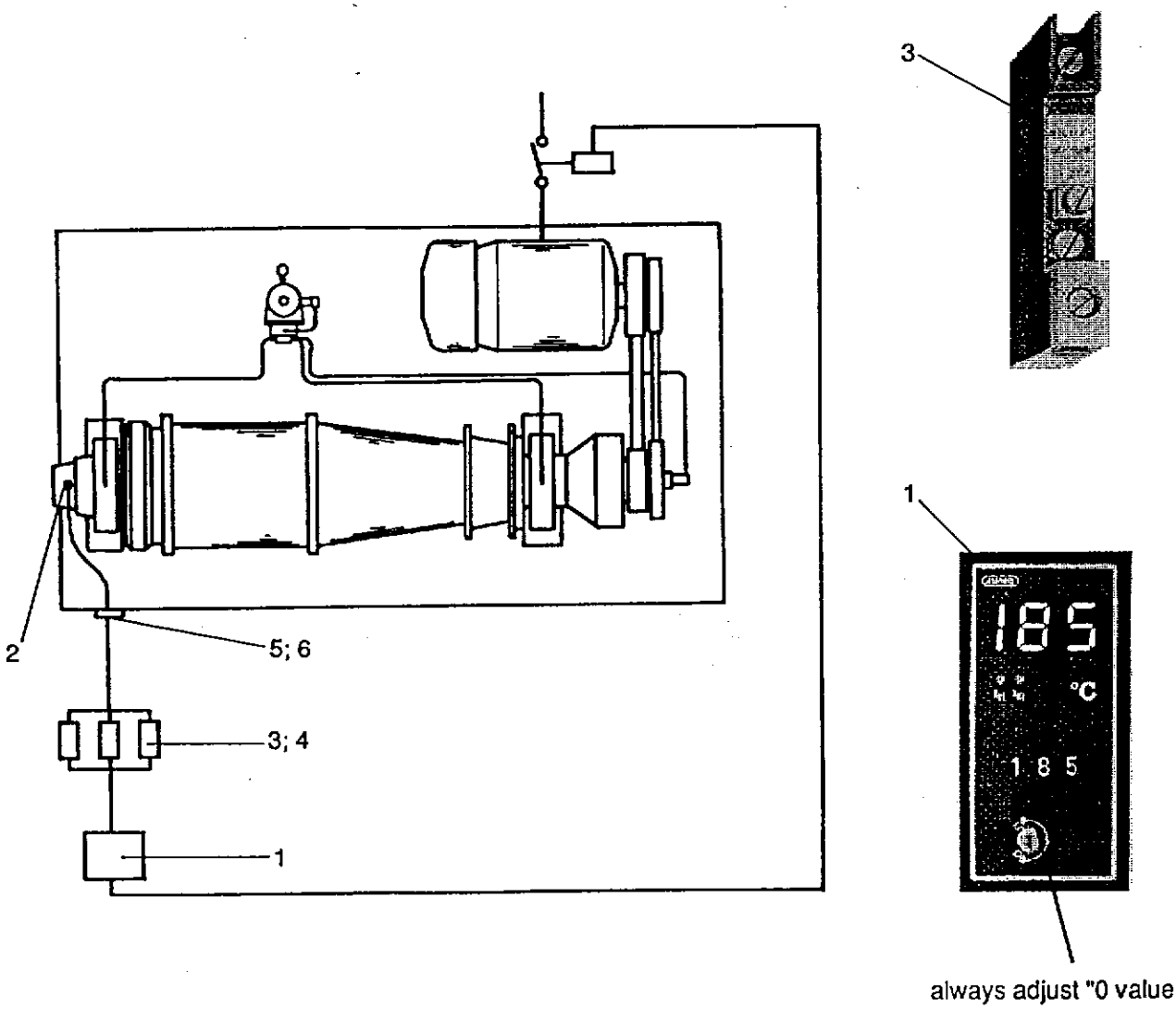
The above mentioned equipment is of the classification:

Ex-safety according to EEx iB II C (intrinsically safe).

It is confirmed by

CONFIRMATION CERTIFICATE PTB-Nr. Ex-78/2007x.

3. Assembly and scope of delivery



Pos.	name	type	pcs.	note:
1	electronic controller	HROw-48/di,d3,re4,lb	1	
2	PT100 resistance therm.		1	
3	Safety barrier		3	only at ex-operation
4	Mounting clamp		3	only at ex-operation
5	Terminal box		1	only at normal operation
6	Term.box intrinsically safe		1	only at ex-operation

4. Mode of operation and function

The sensing probe - installed in the feed pipe - a so called PT-100-resistance thermometer (PT-100 signifies 100 Ohm at 0°C), detects the bearing temperature by changing its electrical resistance and relays this to an analogous working electronic controller.

The nominal value (limit temperature for switching off the decanter) is adjustable by a digital switch.

When the temperature limit is reached, the decanter motor is switched off over an auxiliary relay.

5. Adjustment

Limit value for switching off: 50° C

6. Mounting

The essential information is shown on drawing, page 7.504/2 .

To fix the controller a cutout of 92x44 mm should be provided in the switch cabinet and to be mounted with the supplied clamps.

Electrical connections are according to circuit diagram 7.504/5. Only the PT-100-resistance thermometer and the terminal box for connecting the cable of the resistance thermometer with the connection line to the electronic controller may be installed in the Exi-area.

To mount the safety barriers special mounting clamps are deliverd, for the safe provision of the potential balance.

In case of Exi-construction, the lead connection between the safety barriers and the terminal box may only be with a cable with an outer insulating covering of light blue colour.
Cross section of conducting wire 1,5 mm^2.

Balancing of circuit

The electronic controller is connected with the resistance thermometer in a so called "triple lead switching". By this arrangement, the current resistance alteration which results from the temperature variation is equally distributed on each branch of the coil. Balancing of the circuit is not necessary.

Max. adm. length of the conducting lead ca. 50 m. With bigger leads (up to 150 m) with shielded cable 1 or 1,5 mm^2 cross section required.

7. Causes of too high bearing temperature and their remedy

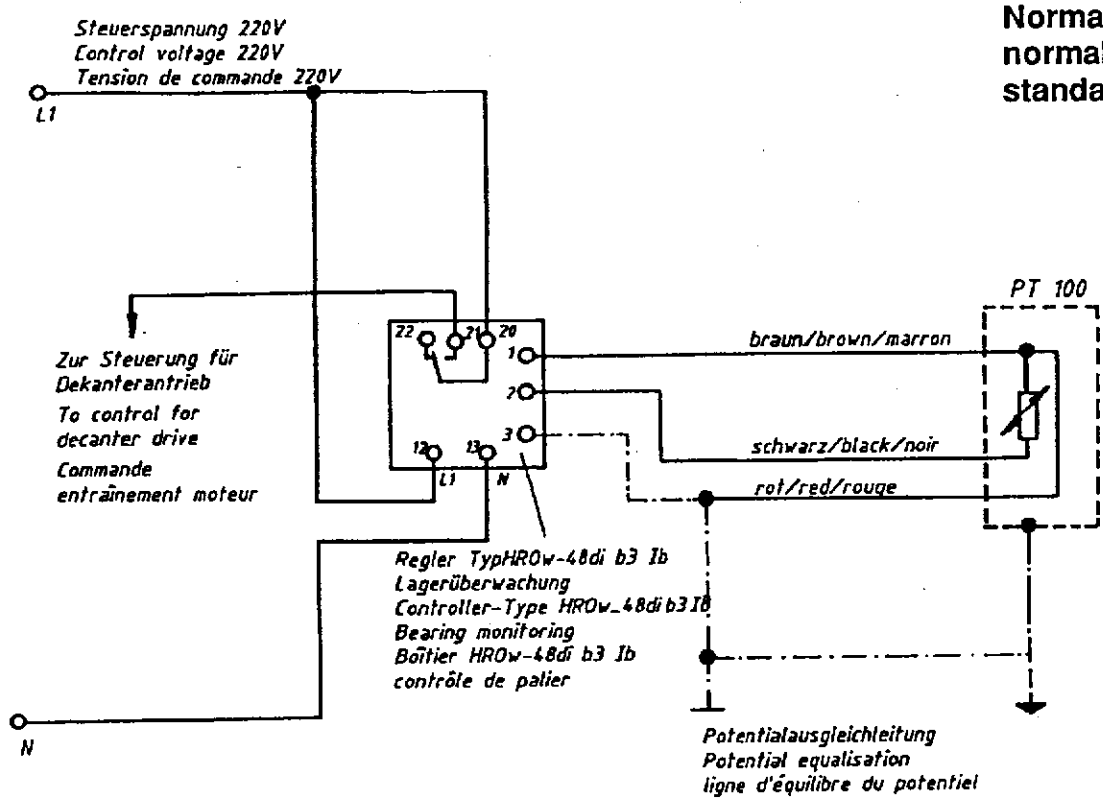
Cause	remedy
insufficient greasing	increase supply of coolant/lubricant
defective bearing	exchange the bearing immediately

8. Technical data of the electronic controller

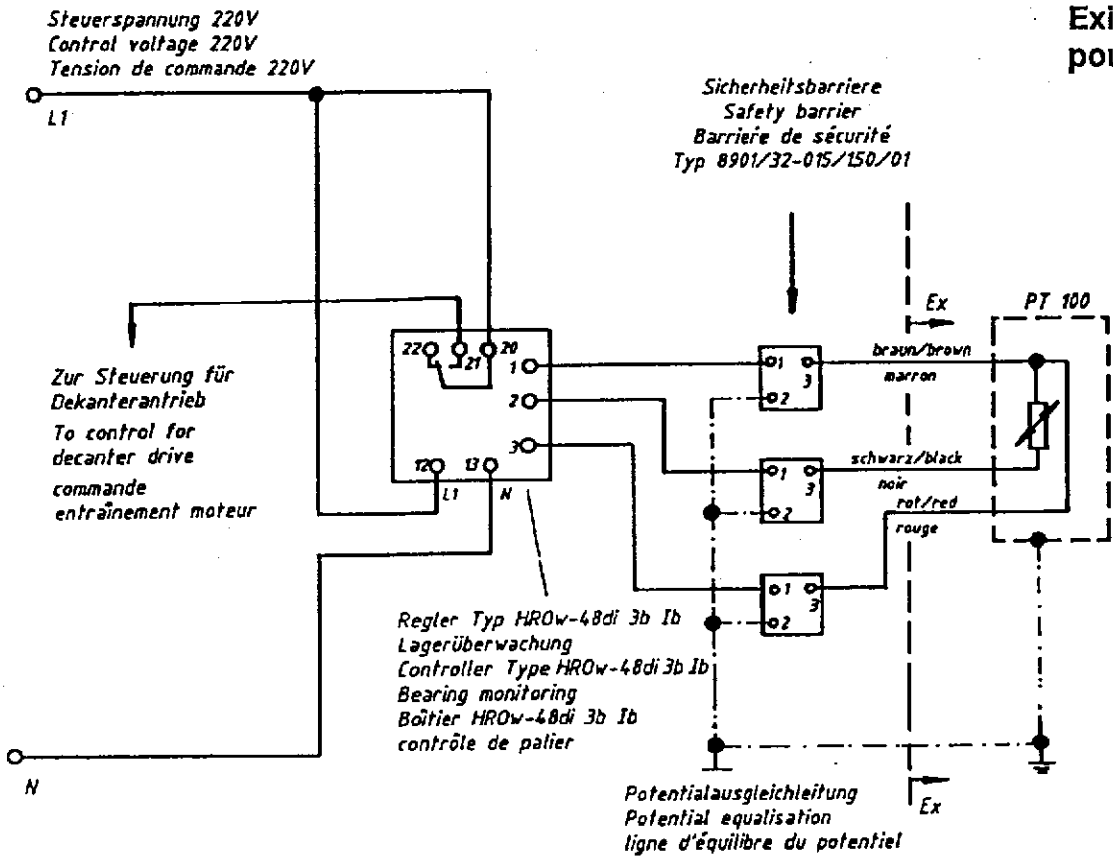
Type HROw-48 di, d3, re4, Ib (normal- and Exi-operation equal)

Measuring input:	Pt 100 in three-wire switching
Indicating range:	0... 199 °C
Control output:	1 relay with potential free change-over contact
Contact rating:	1100 W / 5A bei 220 V / 50 Hz, resistive load
Electronic connection:	flat plug DIN 46 244/A, 6,3 x 0,8 mm
Supply voltage:	110 / 220 V +10% / -15 %, bei 50 / 60 Hz, 5 VA
Protection class:	housing backside IP 00, front plate IP 50
Adm. ambient temperature:	0...60 °C
Switch position indication:	light diode indicates position "relay pulled up"
Switch difference:	1,5 K
Indication accuracy:	± 1% of range of regulation

Normalbetrieb
normal construction
standard



Exi-Betrieb
Exi-construction
pour type ADF



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Lagertemperaturüberwachung
Bearing temperature monitoring
Contrôle température de palier

Drawing-no. 7.504 / 5