Erection Work, Operating and Maintenance Instructions

Machine: **TwinFlo Refiner TF34**

Machine No.: 132135137
Year of manufacture:2012

Order code: Buckeye Florida L.P.
Order no.: PF 40022768

ORIGINAL LANGUAGE: GERMAN

Issued: PPF Fu Lei, 2012-06

Checked: PPF Huang Lingling, 2011-06

TABLE OF CONTENTS

1 INTRODUCTION

This manual is part of the ANDRITZ technical documentation for the machine. It is intended as a supplement to the training provided, to supply the basic knowledge required for proper, safe and economical use of the equipment supplied by ANDRITZ. Observing these instructions helps to avoid hazards and reduce repair and downtime costs, as well as increasing the reliability and useful life of the machine.

1.1 Use

Target group

This operating manual is intended for users with a knowledge of mechanical engineering and is for the exclusive use of the operator and his personnel.

Personnel entrusted with work on the machine must have read and understood these operating instructions and comply with them. This refers in particular to the following tasks:

- Erection work, installation and start-up
- Handling, starting and stopping
- Troubleshooting
- Maintenance and upkeep
- Transportation
- Maintenance and disposal of process materials, cleaning of machine and the area around the machine

In particular, the following must be considered:

- SAFETY Section of the present manual
- the safety instructions contained in various other sections of the manual

Supplementary instructions

The plant operator shall complete this manual by adding national regulations on occupational health and safety, and on environmental protection.

Instructions on any special operational conditions concerning work organization, sequence of work/operations and the personnel assigned to the job shall also be added. This includes instructions regarding obligatory supervision and notification requirements.

Safekeeping

Keep the entire operating manual near the place where the machine is installed and within easy reach.

1.2 Standards and guidelines

The machine/plant has been built in accordance with state-of-the-art standards and the recognized safety rules.

The declaration of incorporation confirms that the safety requirements according to Annex 1 of Machinery Directive 2006/42/EC mentioned in the declaration have been observed.

Electrical equipment supplied has a CE marking (if the equipment falls within the scope of a directive, for example the low-voltage or EMC directive).

1.3 Use of manual

Presentation

- Section and paragraph headings are printed in capitals in the body text:

  SAFETY Section

- Designations for display and operating elements are written in inverted commas in the body text:

  Operate switch "xxx"

- Lists without numbering do not require operations to be carried out in a certain order.

Pictograms

The following pictograms are used in the operating instructions:

Warning signs

Warning signs are shown with an explanation of the type of hazard.

The meanings of the different graduations of hazards are described in the SAFETY Section.

Marks an instruction on handling of the machine.

Marks a useful piece of information.

Marks a cross-reference to another Section with absolute path indication.

e.g.  /MACHINE/SAFETY

Work steps

Work steps are presented in tables. Work steps are numbered and must be carried out in the order specified.

Numbering of pages, tables and figures

Pages:	Consecutive numbering of Sections	2-1
Tables:	Tab.+ Consecutive numbering in Sections	Tab. 2-1
Figures:	Fig. + Consecutive numbering in Sections	Fig. 2-1

Abbreviations

Tab.	Table
Fig.	Figure

Illustrations and graphics

The illustrations and graphics show the basic design of the machine. This need not necessarily correspond exactly to the version supplied.

Detailed information on the equipment supplied

➨ .../PARTS BOOK

➨.../SUPPLIER DOCUMENTATION

1.4 Warranty and liability

The ANDRITZ general terms of delivery and sale shall apply.

Guarantee and liability claims towards ANDRITZ shall become void if personal injury or material damage is caused by one or several of the following:

- Use of the machine for any purpose other than its intended use.
- Non-conformity of erection work, start-up and handling of the machine
- Non-observance of the safety instructions in the manual
- Non-authorized structural changes to the machine
- Non-observance of the maintenance and upkeep instructions

In the event of a claim for repair under guarantee, ANDRITZ reserves the right to assess the damage to the machine.

1.5 Name and address of the manufacturer

Manufacturer

ANDRITZ Technologies Ltd.
9 Tianbao Road, West City Industry Zone, Chancheng District,
Chancheng District
Foshan 528000
China

Service

The following SERVICE DEPARTMENTS are at your disposal:

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1.6 Copyright

2 SAFETY

2.1 General safety regulations

The SAFETY Section contains general safety regulations which must be observed when working on the machine/plant.

Additional safety instructions for individual activities are provided as a supplement thereto in the relevant sections of the manual. These are highlighted in the text with special warning signs.

Safety instructions on components not supplied by ANDRITZ are contained in the descriptions of the components provided by sub-suppliers.

➡.../SUPPLIER DOCUMENTATION

The safety instructions supplement the ANDRITZ operating instructions.

All safety instructions must be observed. Non-observance of the safety instructions can lead to personal injury, damage to the environment, and/or material damage.

ANDRITZ requires the operator to provide the following:

- The machine/plant will be assembled by qualified plant engineers in accordance with United States OSHA (Occupational Safety and Health Administration) and NEC Regulations, as well as with all applicable federal, state and local legislation, and according to drafts relating to the site itself. These engineers have the necessary training in mechanical engineering, design engineering, electrical engineering, and other specialist areas.
- The operator has mounted suitable lockable service switches for shutting down the energy supply to the main drive of the refiner (shut-off devices and labeling), as required according to OSHA and NEC, and suitable process instructions have been compiled for shut-off devices and labeling, as is required of employers according to OSHA.
- The operator must compile a comprehensive general safety program. Anyone working at or in the vicinity of the machine must have received training for working on plants of this type and on the process running there, including where to mount barriers and markings.

2.2 Danger and warning signs

The entire SAFETY Section is extremely important and relevant to safety. Thus, the information in this Section is not marked with special danger symbols.

In the ERECTION WORK, START-UP, OPERATION, and MAINTENANCE Sections of the present manual, warnings are marked by a pictogram. The following warning signs are used:

DANGER

This symbol indicates that there may be a risk to life and limb.

Non-compliance with the warning signs may lead to serious health problems or even fatal injuries, and can cause extensive damage to property.

WARNING

This symbol indicates that there is an imminent health risk, as well as a risk of environmental pollution and of damage to property.

Non-compliance with the warning signs may cause moderate health problems and/or extensive environmental pollution and damage to property.

CAUTION

This symbol gives warning of a dangerous situation.

Non-observance of these signs may cause environmental pollution and damage to property.

Further symbols and pictograms used are described in the INTRODUCTION.

2.3 Intended use

The machine should only be used according to the specifications forming part of the purchase order.

Use of the machine/plant for any other purpose is considered contrary to its intended use.

Any modifications to the scope of supply made without the agreement of ANDRITZ are considered contrary to the intended use.

The term "intended use" also covers adherence to the operating instructions, compliance with the operating, inspection and maintenance conditions, and with the regulations on cleaning and upkeep.

The machine has been designed for installation in a non-explosive atmosphere. Intended use provides for operation outside a zone according to ATEX directive 1999/92/EC.

The machine is intended for installation in a plant covered over with a roof.

2.4 General remarks on machine/plant safety

The machine/plant has been built in accordance with state-of-the-art standards and recognised safety rules. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties, or cause damage to the machine/plant and to other material assets.

The machine/plant may only be operated when in perfect condition and with due consideration to safety and the risks involved. All protective devices and the EMERGENCY STOP equipment must be in place and fully functional.

Malfunctions and unforeseen changes to the machine/plant must be rectified immediately.

2.5 Hazardous applications

The machine was designed specially for the process specified in the sales contract. All changes to this process must be checked and approved because ANDRITZ does not know in detail the chemical and biological properties of the numerous materials that can be processed in this machine. The machine as-sold is not suitable for safe processing of hazardous materials unless additional precautions are taken.

Before processing materials that are already combustible, explosive, toxic, or hazardous in other ways or which can become hazardous in a reaction, the operator must conduct a thorough hazard analysis and risk evaluation of the entire process. This includes drawing up of contingency plans for handling process errors and faults.

In particular, the following must be observed:

1. If combustible or potentially explosive materials are to be processed, all electric motors, cabling and operating elements MUST be explosion-proof. Furthermore, maintenance work on the plant MUST be performed using non-sparking tools. Smoking is forbidden.
2. If the material processed is toxic, appropriate safety measures MUST be implemented.

2.6 Obligations of the operator

Intended use

The user of the machine is responsible for its intended use.

Work instructions

In addition to the operating instructions, the applicable legal regulations in the user countries and other rules governing safety at work, health and environmental protection must be observed and personnel instructed in these matters.

Qualification of personnel assigned

The machine/plant may only be operated, maintained and serviced by authorised, skilled personnel with hands-on training.

The minimum legal age must be taken into account.

Any person undergoing training or in apprenticeship or under instruction may only work on the machine/plant after receiving instruction on the theory and only under the supervision of an experienced person.

Instruction

The operating and maintenance personnel of the operator must be instructed by qualified persons after completion of the installation work.

The user undertakes to have new, additional operating and maintenance personnel instructed in machine/plant operation and maintenance to the same extent and applying the same care, and with due consideration to the safety instructions.

Workers entrusted with the transportation, erection work, start-up, operation, and maintenance of the machine/plant must have read and understood the operating instructions, especially the SAFETY Section, the safety instructions concerning a certain activity, as well as the safety instructions issued by sub-suppliers.

Definition of areas of responsibility

The operator is responsible for:

- definition of the machine operator's responsibility and his right to give instructions,
- definition of the required content of and of responsibility for keeping the records on functioning and any failure of the monitoring equipment (log book),
- personnel areas of responsibility relating to operating, tooling, maintenance and upkeep.

Inspections and tests

The operator must:

- check at regular intervals whether the safety instructions and regulations governing work on the machine/plant are observed,
- to carry out regular training to confirm the level of knowledge of the operating and maintenance personnel.

Attachment of safety features

The operator shall ensure that all safety-relevant instructions are observed and that all symbols and notices are attached in the production area in accordance with the local regulations.

- Safety devices and regulations (**see Chapter 2.8**)

In addition, ANDRITZ recommends mounting the following devices, symbols and signs, in as far as these are not already included in the local regulations.

- Markings on the floor for vehicle routes, protective fencing and danger areas (yellow)
- Barriers and covers
- Handrails (foot, centre and chest height)
- Emergency lighting
- Lockable service switch (shut-off device for power to the drive motor)
- Locking facility for the water and air supplies
- Information signs – fire prevention equipment
- Information signs – emergency phone number
- Direction signs – exits
- Direction signs – escape routes
- Information signs – first aid post
- Fire extinguishing equipment in accordance with national regulations

2.7 General obligations of personnel

To avoid personal injury and material damage, all persons working on the plant shall observe the following safety instructions:

- The safety instructions in the manual and attached to the machine must be observed.
- In the event of a safety-relevant functional disorder, stop and secure the part of the plant affected. Report disorders and have them repaired immediately.
- All safety-critical modes of operation are prohibited.
- Use only the machine accesses, paths and passages intended for this purpose.
- Do not touch moving and rotating parts and/or reach out beyond them.
- Keep the machine and the workplace clean. Do not place tools and other objects on the machine/plant.
- Do not wear any garments/jewellery that might get caught on moving machine/plant parts. This includes ties, scarves, rings and necklaces.
- Do not wear long hair loose.
- Familiarise yourself with the function and any failure of machine monitoring equipment (log book) before starting work.
- No smoking in the vicinity of the machine/plant.
- Wear personal protective apparel when working on the machine/plant.

2.8 Safety devices

The machine/plant must not be operated without effective safety equipment.

Safety equipment must not be circumvented, dismantled or made unserviceable during operations. The safety equipment is there to protect operating personnel.

Safety equipment and access thereto must be kept clear.

Safety devices

Fig. 2-1 shows the protective covers at the machine.

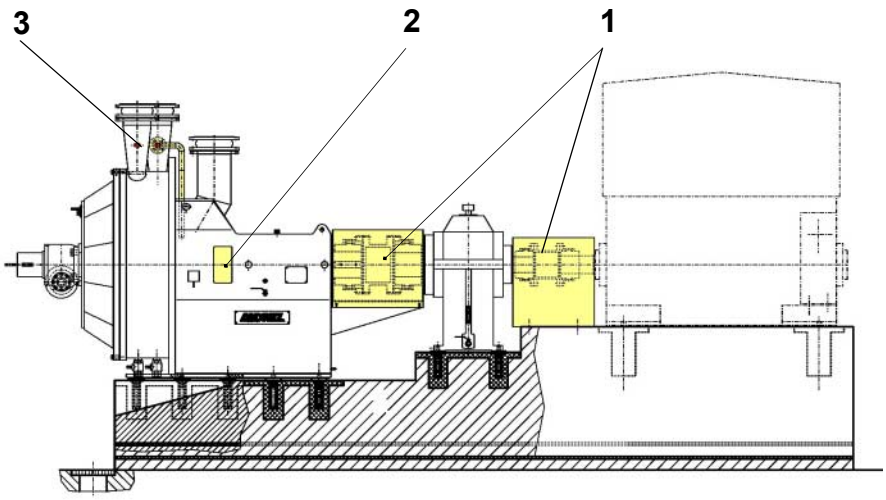


Fig. 2-1 Safety guards at the refiner

Item	Component
1	Coupling guard
2	Shaft protection
3	Temperature switch
4	Emergency-off switch (not shown)

Lockable Switches

At service and operating mode selector switches for local machine settings, the keys for these switches must be removed and retained by the operator to prevent third parties from changing the switch setting and thus creating a risk!

Emergency-off switch, emergency cut-out

The following EMERGENCY STOP switches are provided on the machine:

- EMERGENCY-OFF switch at the control box for the refiner

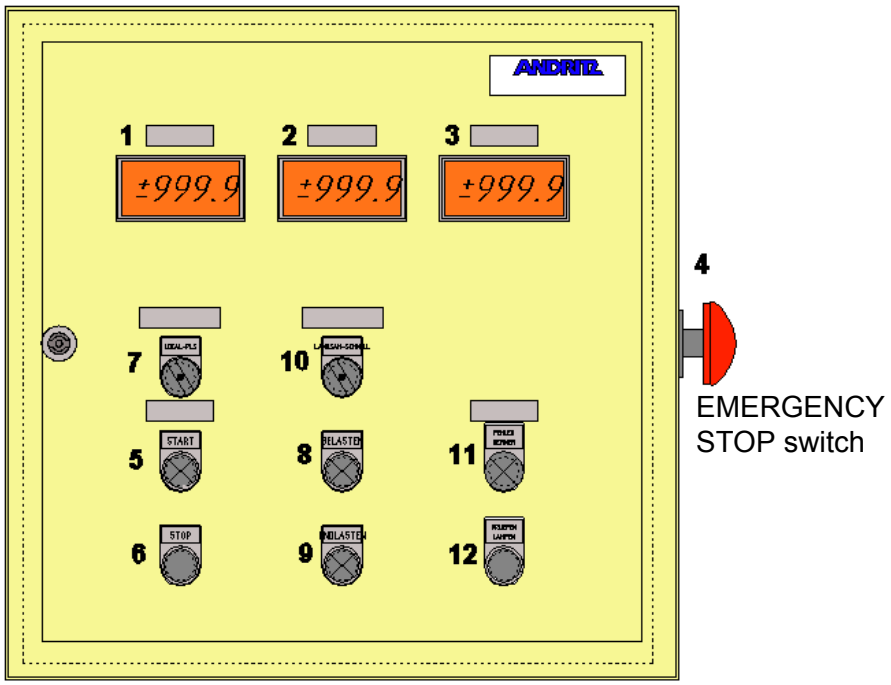


Fig. 2-2 Emergency-OFF switch at the control box

The operator must provide an EMERGENCY STOP switch in the immediate vicinity of the machine to guarantee that the it can be shut down by immediately cutting off the power supply to the drive elements.

If the supply includes an control box with an EMERGENCY STOP switch installed by ANDRITZ, the operator need only complete the wiring and integrate the EMERGENCY STOP switch into the EMERGENCY STOP chain.

The EMERGENCY STOP device must be installed not more than 15 meters away from the machine.

The EMERGENCY STOP switch and further units included in the EMERGENCY STOP safety equipment must be installed and implemented by the operator in accordance with the applicable standards, particularly EN ISO 13850 and EN 60204-1 (stop category 0)

Indicative, warning and prohibiting signs

Information, warning and prohibiting signs must be observed. They must be checked regularly for legibility and completeness and they must not be removed or obstructed.

The following indicative, warning and prohibiting signs are attached to the machine:

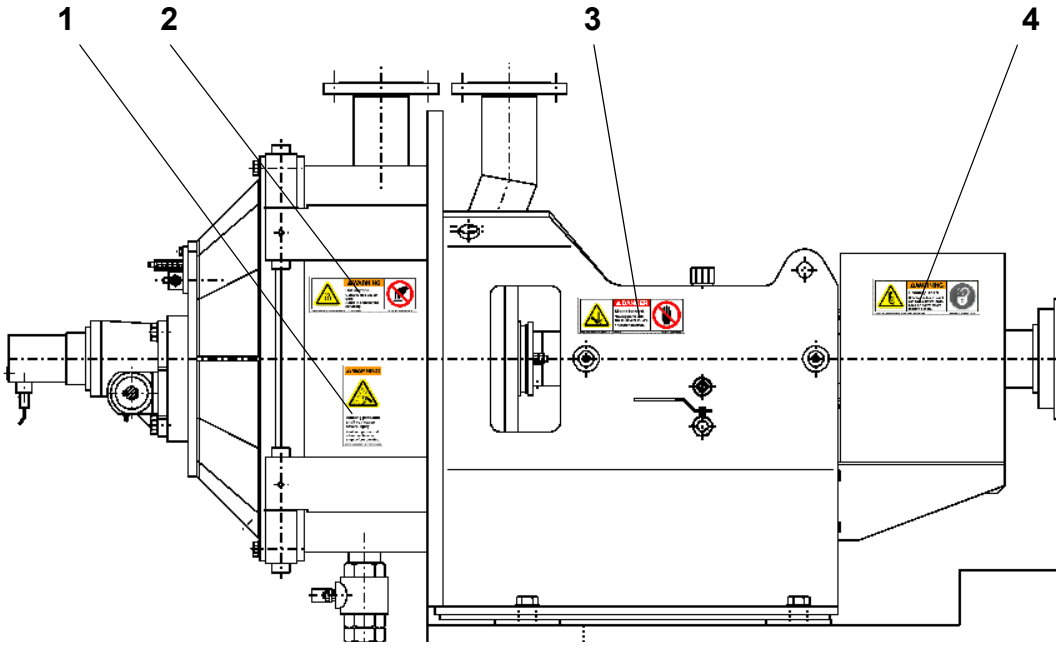


Fig. 2-3 Warning signs on the machine

Sign-1

Sign-2

Sign-3

Sign-4

2.9 Personal protective apparel

General protection equipment

Use and always carry personal protective equipment in accordance with local regulations or those of the plant operator.

It should be compulsory to wear hard-toed boots throughout the entire premises.

In addition to the regulations applying, we recommend using the following safety equipment for certain activities.

Activity	Safety equipment		
Time spent in the immediate vicinity of the machine while it is running			
Taking pulp samples			
Field installation and maintenance work for which parts of the machine have to be removed			

Tab. 2-1 Recommended safety equipment for certain activities

Key to symbols

	Protective clothing to prevent the pulp from coming into contact with the skin		Safety shoes as protection against foot injuries
	Gloves to prevent hand injuries		Ear protection to prevent damage to hearing
	Eye protection to prevent eye injuries		Standard hard hat as protection against head injuries

Tab. 2-2 Purpose of the safety equipment

2.10 Safety at the machine installation site

There is no permanent place of work at the machine. Working near the machine is only necessary during inspection and maintenance work. The equipment is operated from the DCS (process control system) located in a control room.

In order to check the limit switch setting at start-up and after changing a refiner plate, the refiner plates can also be adjusted from the control box at the machine, but only if the main drive is switched off.

A suitably large, clear, and unconfined working area must be created on all sides of the machine. Pipework, ducting, etc. must be laid such as not to impede access to the machine.

All operating and maintenance areas of the machine must have adequate lighting and ventilation (industrial lighting).

The foundation must be sized to withstand the loads caused by the machine.

The area around the machine and the marked escapes are to be kept clear. The area around the machine must be marked as a danger zone. It must be possible to enter and leave the operating area unimpeded.

Make sure that the machine and the surrounding area are kept clean. In particular, oil and grease on the floor and on machine elements may cause slipping. This is therefore a considerable source of injuries, as are tools that have not been put down in a safe place. The operating area must be clear of waste materials, tools and other extraneous objects.

The floor around the machine must be provided with a non-slip finish.

In order to prevent any falls from or damage to the machine, it is forbidden to climb onto machine elements or on the machine (except for the treading areas provided). Use ladders or similar equipment in accordance with recognized standards.

Ramps, platforms and lifts must be used to avoid injury or excessive physical effort.

2.11 Temperature

The machine is designed for a stock temperature of up to 60?. If the temperature in the discharge branch rises to 90°C, temperature controllers shut down the main drive. The operator shall be responsible for implementing the necessary safety measures (e.g. protective gloves, proper training, etc.).

No maintenance work should be carried out until the hot surface has cooled down.

2.12 Noise

Sound pressure level of the machine (including drive) within the specified operating range: 90 dB(A).

When the machine is in operation, the noise level of the motor is higher than the noise level of the machine itself. This can alter the overall noise level, depending on the type of motor.

The total noise emissions from all machines in the production room can restrict spoken communication and impair hearing.

The machine is designed such that no operators are required in the immediate vicinity of the machine during normal operation. Appropriate hearing protection should be worn throughout maintenance and adjusting work while the machine is running.

2.13 Electrical equipment

All work on the electrical equipment, without exception, must be carried out by skilled electricians.

Any form of contact with electrical equipment may cause fatal injuries.

Before beginning any maintenance or repair work, the operator must disconnect the electric power supply to all drives securely. This can be achieved with a lockable maintenance switch, lockable racks in the MCC, or with other suitable measures that comply with the safety regulations applying.

If any work is necessary on live parts, it is essential to proceed according to the applicable standards.

Users of medical electronic equipment, such as pacemakers, must not enter the electrical danger zone.

The machine must be grounded to avoid electrostatic loading or contact voltage. Machine, gears and motors must be connected to the earthing system.

2.14 Hydraulic and Pneumatic Equipment

Hydraulic and pneumatic systems operate at high pressure. Malfunctions in the hydraulic system may cause hazards to operating personnel, damage to property and environmental pollution.

The specified operating data and the prescribed revision and maintenance intervals of the hydraulic and pneumatic equipment items must be observed at all times.

Systems must be depressurised before carrying out maintenance work.

Work on hydraulic and pneumatic equipment must not be carried out other than by skilled erection personnel with special training and experience in handling hydraulic and pneumatic equipment.

In order to avoid injuries (e.g. caused by whiplash), all pressurised flexible hoses and pipes must be tied or held together.

2.15 Welding work

In general, welding work is only permitted after consulting ANDRITZ. Any welding work that is described in detail in the maintenance instructions is excluded from this ruling.
When performing welding work, always observe the relevant safety regulations, as well as the appropriate safety regulations for work performed in enclosed and confined spaces.

DANGER

HOT WORK PERMIT REQUIRED!

Danger of fire and explosions!
There is a considerable risk of fire or explosion during welding work. Always take the appropriate fire precautions before beginning work, e.g. keep fire extinguishers at the ready.

All motors should be disconnected before carrying out electric welding work.

During arc welding work the earth cable should never be allowed to run over the rolling bearings. An earth cable must be connected up in the immediate vicinity of the welding area.

2.16 Fluids (liquids, gases, vapour or smoke)

Unintended chemical reactions may take place in fibre pulps during a prolonged standstill and hazardous fumes may be produced.

The machine must be thoroughly cleaned after prolonged stoppages.

The area must be adequately ventilated.

Before beginning work on the machine, ensure that no liquids, gases, vapours or smoke can enter the working area from inlet pipes, discharge pipes or shafts.

If it is not possible to reliably exclude the risk of liquids, gases, vapours or smoke flowing in, all persons working in the danger zone must be equipped with a safety harness and a safety rope. Each worker must be monitored by a second person outside the danger zone.
It must always be possible to evacuate a worker from the danger zone without delay.

2.17 Oils and greases

The safety instructions for the products concerned must be observed when handling oil, grease and other chemical substances.

Suitable skin protection is required when handling aggressive media. See manufacturers' information for the type of skin protection required.

Also observe relevant requirements for disposal.

3 TECHNICAL DATA

3.1 Data

Operating data	**TwinFlo Refiner TF34**	
	Maximum operating pressure	5.9 bar
	Maximum operating temperature	85 °C
	Min. flow rate at 4%	1400l/min
	Max. flow rate at 4%	9000l/min
Sealing water	Flow rate	0.5 - 3 l/min
	Pressure	6 - 8 bar
	Temperature	20 - 40 °C
	Quality	75 microns (fresh water)
Weights	Complete machine, empty	approx. 3700 kg
	Refiner cover with adjusting device	720 kg
	Rotating unit (shaft, rotor, bearing assembly, shaft seal)	470 kg
	Rotor with refiner fillings	approx. 380 kg
	Shaft with bearings	approx. 270 kg
Flushing water	Pressure	2 - 4 bar
	Temperature	25 60 °C
Actuating drive	Nominal rating	0.37 kW
	System of protection	IP55
	Refiner plate adjustment - rapid movement	75 Hz
	Refiner plate adjustment - loading	15 Hz
Main drive	Motor	see project data sheet and/or supplier documentation
	Gearbox	see project data sheet and/or supplier documentation
	Coupling	see project data sheet and/or supplier documentation
Set	Refiner segments	see Parts Book
Medium	Pulp, specified in the sales contract.	
	Foreign objects, such as stones, wire, sand, other heavy rejects or the use of chemicals in contravention of the specifications can cause damage to the machine for which ANDRITZ does not accept liability.	

4 DESCRIPTION

4.1 Field of application

The TwinFlo Refiner TF34 is used to refine virgin and recycled fibre pulps.

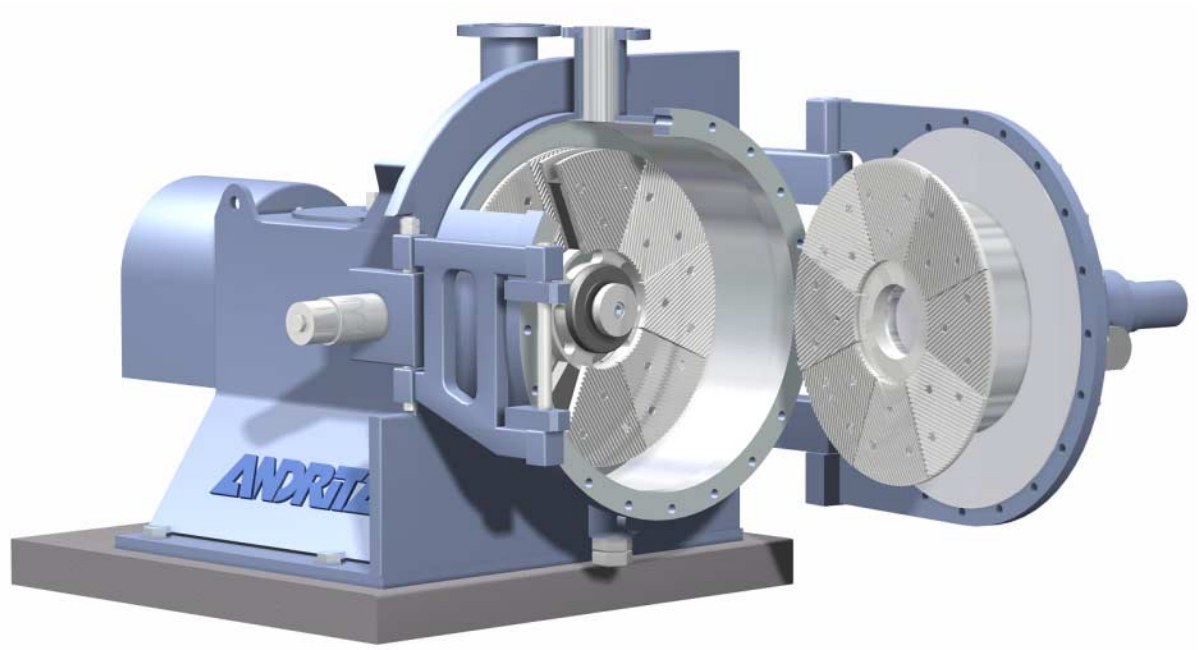


Fig. 4-1 TwinFlo Refiner TF34

4.2 Technological description

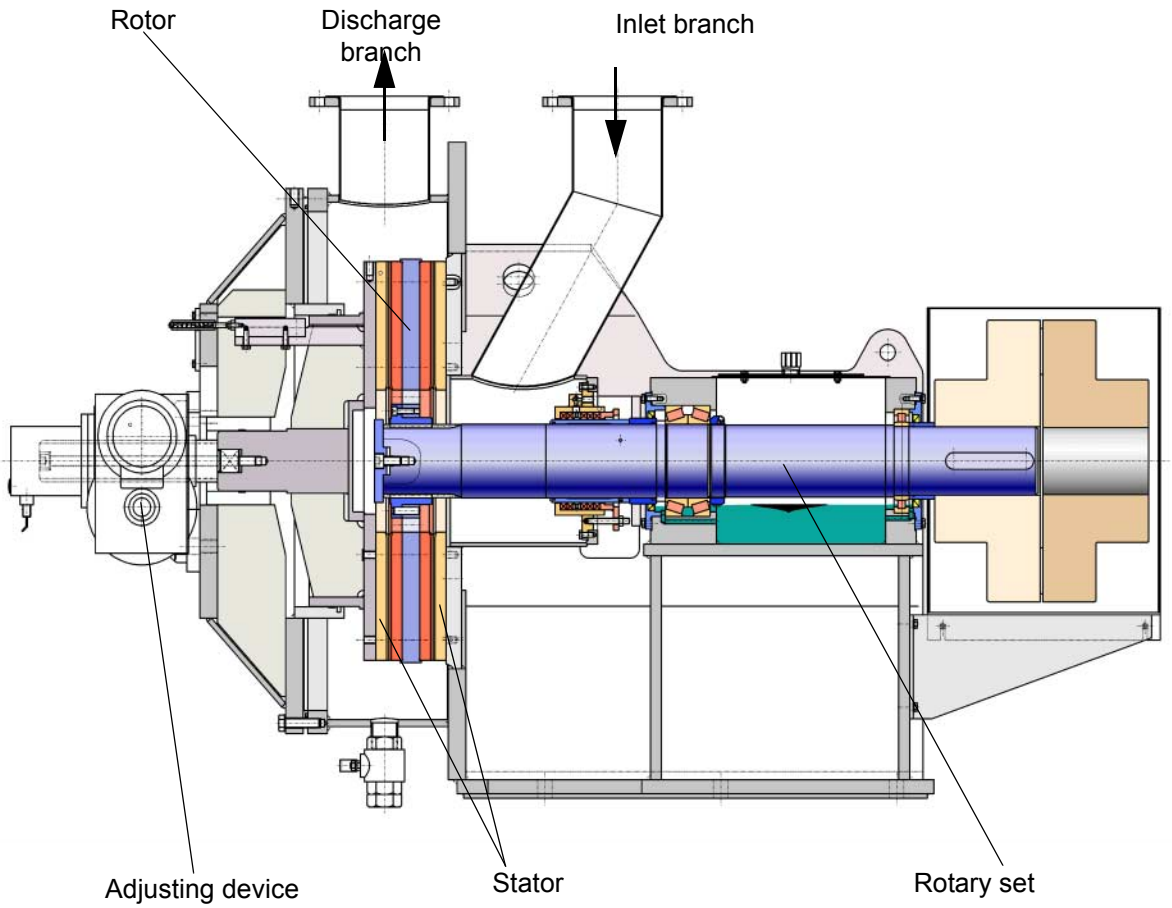


Fig. 4-2 TwinFlo Refiner TF34

The pulp enters the refiner housing through the inlet branch. The pulp is distributed evenly over the two refiner gaps and passes through the refiner gap from the inside to the outside. When this happens, the pulp is refined between one static and one rotating set of refiner fillings. The refined pulp leaves the housing through the discharge branch.

4.3 Main plant components

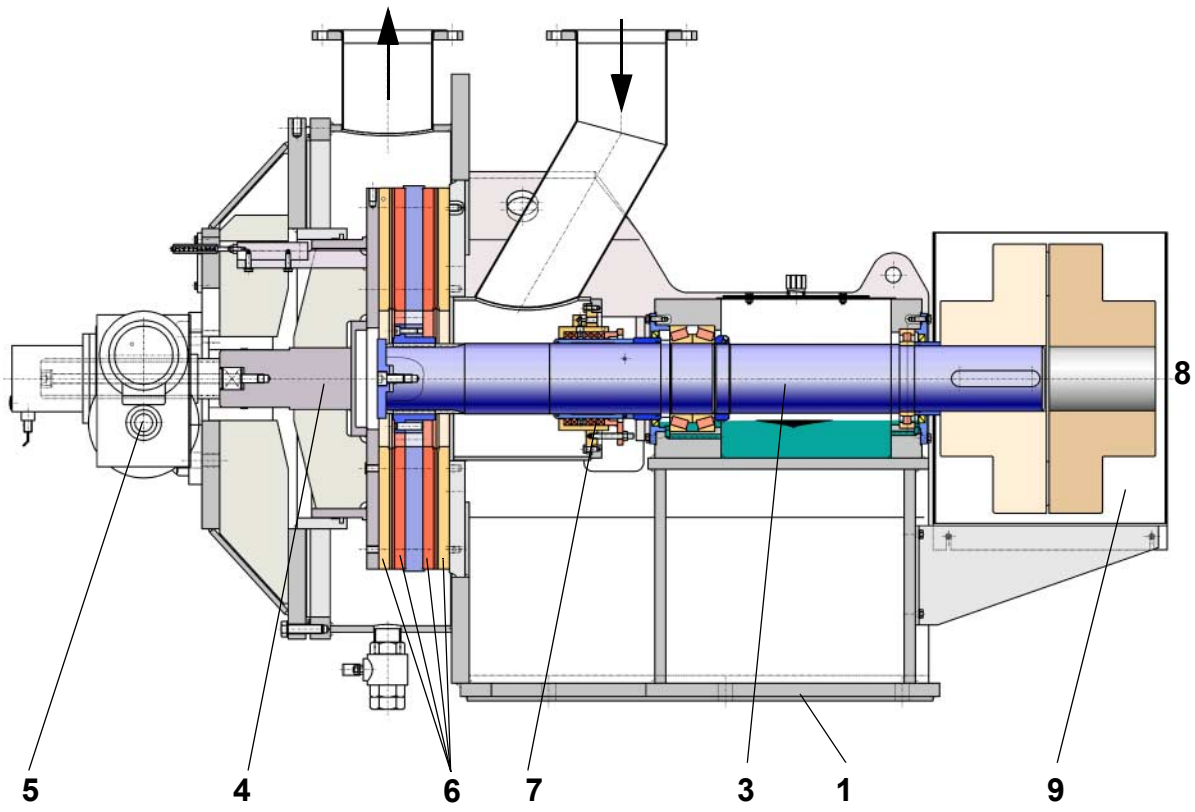


Fig. 4-3 TwinFlo Refiner TF34

Item	Component	Item	Component
1	Housing	6	Refiner filling
2	Rotor changing device (not shown)	7	Seal
3	Rotary set	8	Main drive (not shown)
4	Stator	9	Safety device
5	Refiner plate adjusting device	10	Operating panel (not shown)

Housing (1)

Function: The housing holds the bearing and the seal for the rotor.

Design: Welded structure made of steel. All parts coming into contact with the medium are made of acid-proof stainless steel. The inlet and discharge branches are welded onto the top side of the housing. A temperature monitor is screwed into the discharge branch. Tap holes are provided on the side of the housing for mounting a vibration monitoring unit. On the front side of the housing there is a cover that can be opened out to the side after removing the flange bolts. The stator with one set of refiner fillings (**6**) and the refiner plate adjustment device (**5**) are mounted on the cover.

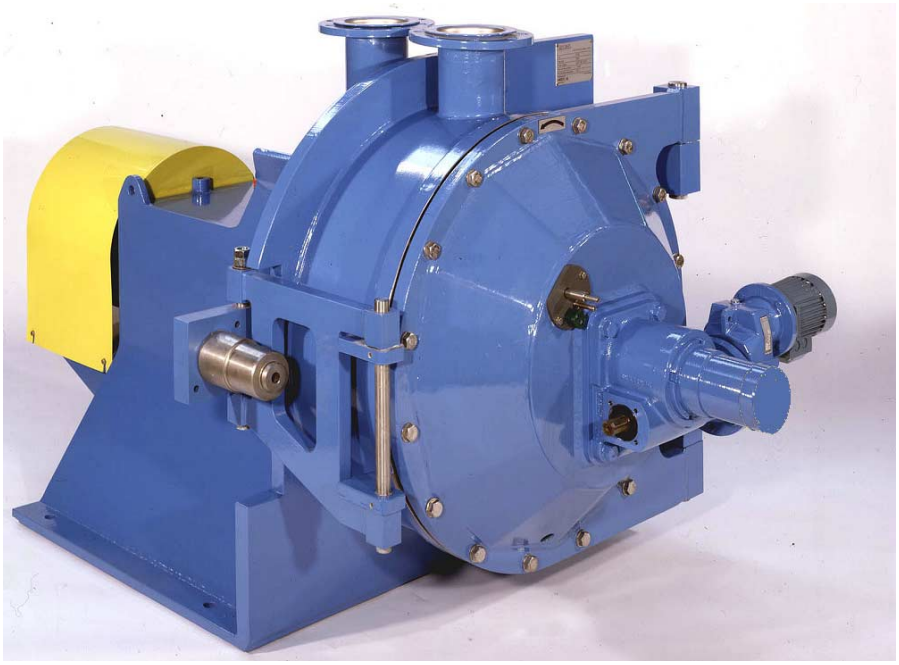


Fig. 4-4 Housing

Rotor changing device (2)

Function: The rotor changing device is used to remove the rotor and change the refiner fillings quickly and easily.

Design: Bi-partite, hinged lever with a mandrel for holding the rotor.

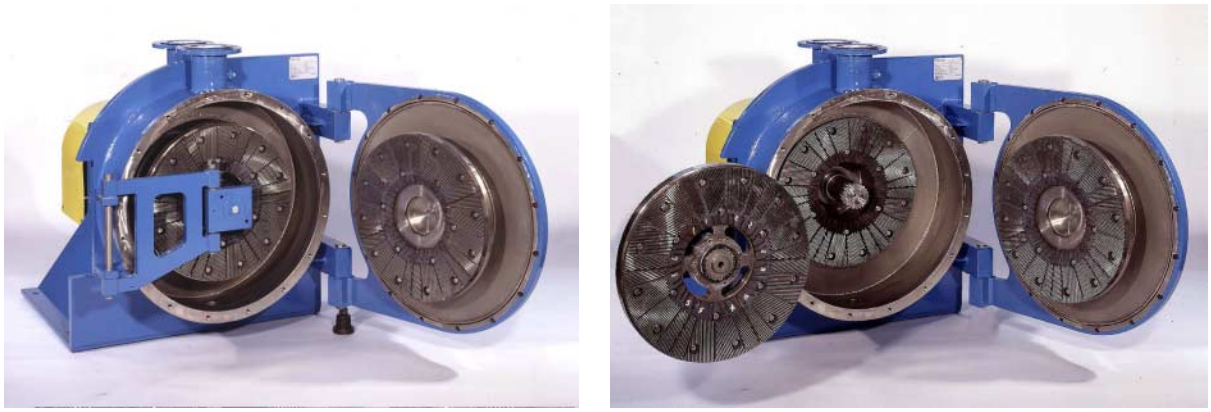


Fig. 4-5 Rotor changing device

Rotating unit (3)

Function: The shaft transmits the torque from the motor to the rotor. Sets of refiner fillings (I**6**) are mounted on both sides of the rotor.

Design: The rotary set comprises a shaft complete with bearing assembly and the rotor. One shaft end is splined. The rotor is screwed to the hub and is mounted such that it can slide on the shaft in axial direction.

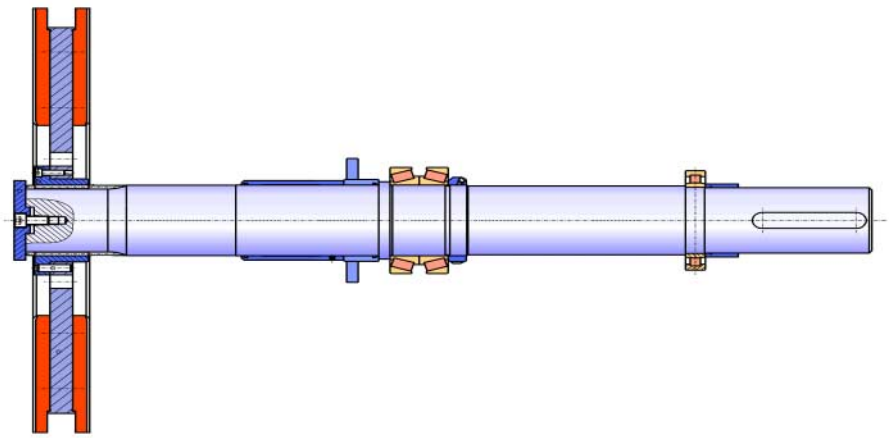


Fig. 4-6 Rotary set

Stator (4)

Function: A set of refiner fillings is mounted on the stator. The stator can slide back and forth in axial direction in order to set the refining gap.

Design: Welded structure made of steel. The stator has two guide points in the housing cover.

Refiner plate adjusting device (5)

Function: The electro-mechanical adjusting drive is used to slide the stator back and forth in axial direction in order to set the refining gap. If there is no supply of pulp or one of the monitoring devices is triggered, the adjusting drive disengages. If there is a power failure, the refiner plate adjusting device remains in the last position set.

Design: The electro-mechanical adjusting drive is mounted in the cover of the housing.

Set of refiner fillings (6)

Function: The pulp is refined between one static and one rotating set of refiner fillings. Since the refiner plates have profiles, the pulp is conveyed outwards radially.

Design: One set of refiner fillings comprises eight segments and is screwed to the rotor and the stator.

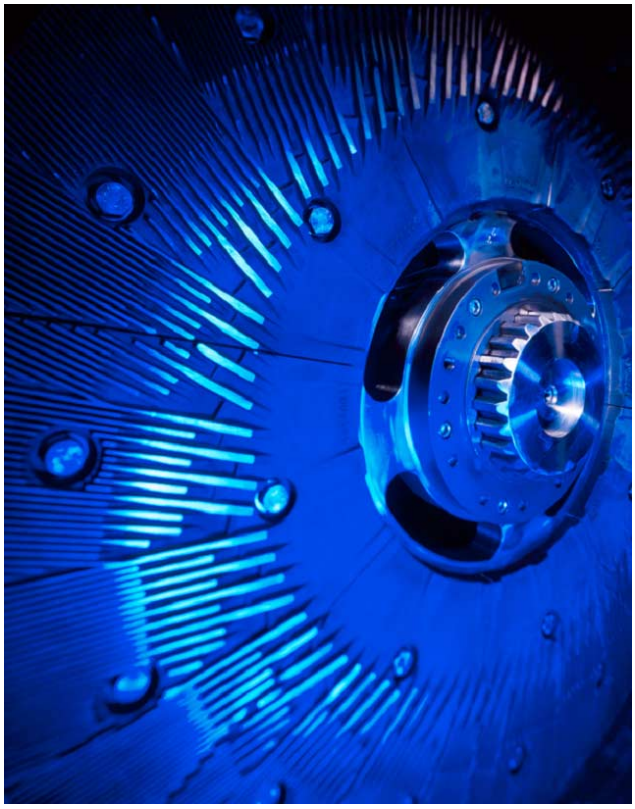


Fig. 4-7 Refiner filling

Seal (7)

Function: The seal prevents the pulp from escaping from the housing. The seal must have a continuous supply of sealing water. The connecting dimension and water requirement are indicated in the arrangement drawing.

Design: Stuffing box with five packing rings and one lantern ring.

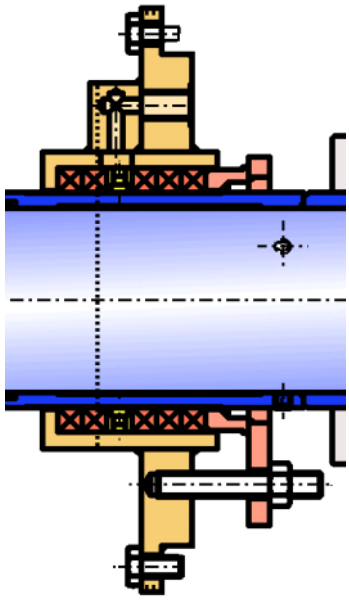


Fig. 4-8 Seal

Main drive (8)

Function: The motor drives the refiner rotor.

Design: The three-phase motor is connected to the rotor via a gear unit and two couplings.

Safety and protection devices (9)

Function: Safety cover for rotating parts.

Design:

- Sheet steel covers (**9**) over the couplings.

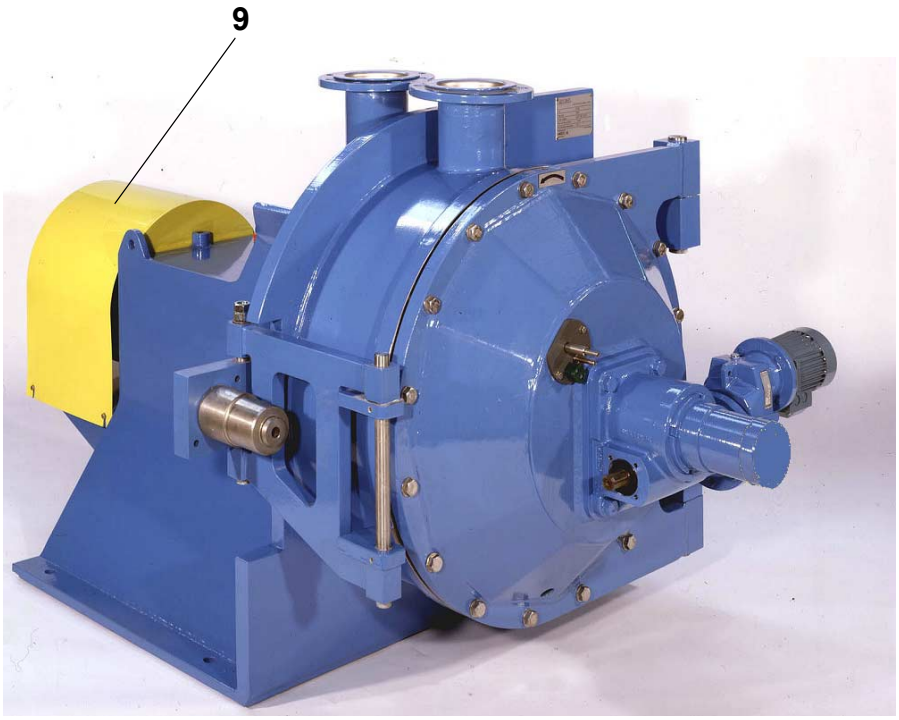


Fig. 4-9 Safety cover

4.4 Machine monitoring equipment

The refiner has the following monitoring equipment:

- Temperature monitor in the discharge branch of the refiner
- Proximity switch to monitor the maximum "open" position of the refiner plate adjusting device. When the inductive proximity switch is operated, the drive of the refiner plate adjusting device is switched off and the main drive released for switching on.
- Inductive proximity switch to monitor the "safety position" of the refiner plate adjusting device. When the inductive proximity switch is operated, the main drive and the drive of the refiner plate adjusting device are switched off.
- An electronic pressure transducer is installed in the inlet and discharge pipes immediately before and after the refiner.

5 ERECTION WORK and TRANSPORT

5.1 General

This chapter describes certain steps for transport, storage and installation of the refiner which may be the responsibility of the user.

Activities that are carried out by ANDRITZ, including works assembly, are not the subject of this description.

5.2 Safety instructions

DANGER

Do not disregard the safety regulations.
If the safety regulations are disregarded, this may cause a risk to life and limb and damage to the machine or its components.
All safety instructions in this section must be strictly observed!

CAUTION

Do not open the refiner until it has been anchored to the foundation!
The refiner tilts forward due to the uneven distribution of weight.

General safety instructions

All applicable accident prevention regulations must be observed.

Do not exceed permissible crane loads and weights on lifting gear and ropes/shackles. Secure loads to prevent them falling.

Do not step or walk below suspended loads! Standing below suspended loads can have fatal consequences and thus is strictly forbidden!

Jolts must be avoided. This applies especially to pre-assembled machines and discs.

Qualification of personnel assigned

Transport and unloading is to be carried out by personnel specially familiar with such work.

Workers entrusted with lifting and conveying equipment must have the national qualifications required.

Erection work may only be carried out by trained, skilled personnel.

Personal protective apparel

The following protective equipment must be worn when carrying out installation and transport work:

- Hard hat
- Protective gloves
- Safety shoes
- Eye protection

5.3 Transportation

DANGER

During transport or loading/unloading there is a risk to life and limb from falling machine components and also a danger that machine components may be damaged.

Do not lift machine and transport crates except at the points marked for lifting by crane or forklift!

If the entire machine is lifted and there are several different types of lifting lug available, personnel should only use suitable lugs (according to the transportation sketch) for the work in hand.

Do not step or walk below suspended loads!

Delivery

The refiner is supplied pre-assembled. Machine components and auxiliary materials are packed in transport crates.

Transport sizes and weights are stated in the shipping documents.

Largest supply weights:
➡ .../TECHNICAL DATA

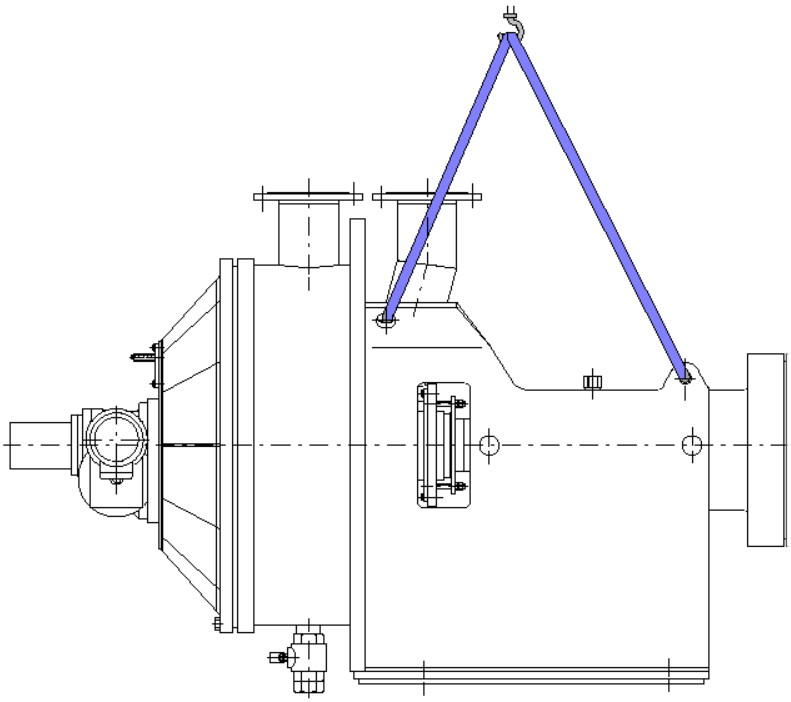


Fig. 5-1 Attaching the refiner

Acceptance

- Check whether scope of supply is complete (against shipping documents and packing lists) and in perfect condition.
- In the event of transport damage or short supply, do not accept goods, but notify forwarder and the ANDRITZ shipping department accordingly.
- If there is a hidden loss or defect, notify the forwarder and the ANDRITZ shipping department within two weeks of receiving the goods.

5.4 Bearing assembly

The following instructions must be observed if the system is not to be installed immediately:

- Please inform the ANDRITZ shipping department.
- Provide weather protection for stored machine components. In particular, avoid wide variations in temperature and ensure that the equipment is kept clean.
- Incidentals should be protected against damage and unauthorised withdrawal by storing in lockable rooms.
- Packaging should not be removed until field installation work begins.

5.5 Installation

General

 **WARNING**	**Disregarding the sequence plan and the installation instructions may result in hazardous situations causing a danger to life and limb, as well as machine damage.** **The sequence of erection work is important and must be strictly observed!**

Completion of the various steps must be documented in the certificate of completion of erection work.

The sequence of erection work is shown in step-by-step tables. The individual activities are numbered according to the sequence in which they are to be performed.

Preliminary requirements at installation site

The following supplementary documentation must be available before beginning installation work:

- Foundation and arrangement drawing
- Pipe connection diagram
- Documentation on electrical, measuring and control equipment
- Packing lists for each individual consignment

Preparations

Foundation

Foundation prepared according to the ANDRITZ foundation plan.

The following preparations have to be made prior to placing the refiner on the foundation:

- Mark axes and elevations on the foundation.
- Check the workmanship of the foundation before beginning erection work.

Preservation

Corrodible machine parts are protected with "Cortec VCI 369" preservative grease.

The preservative grease need not be removed.

CAUTION

Do not open the refiner until it has been anchored to the foundation!
The refiner tilts forward due to the uneven distribution of weight.

DANGER

Machines or machine components may fall during transport at installation site.
Do not lift machine and transport crates except at the points marked for lifting by crane or forklift!
Do not step or walk below suspended loads!

DANGER

Parts of the body may be trapped or crushed during installation work.
Do not place your hand below suspended loads.
Wear your personal protective apparel.

Machine installation

Prepare the foundation, then position and adjust the refiner according to the following table::

Step	Activity
1	Secure the foundation blocks (1) to the machine in a central position using hexagon head bolts (2).
2	Position shims (4).
3	Screw in the jacking screws (5) to the extent indicated.
4	Raise refiner and place on the shims (4).
5	Align refiner according to the foundation drawing.
6	Align refiner in horizontal direction using the jacking screws (5).
7	Grout in the foundation blocks (1) with non-shrink grouting compound (6) only and tighten the screws (2) a little.
8	Set up shuttering for base casting
9	Check machine alignment after the grouting compound at the foundation blocks has hardened. Then complete the base casting layer with non-shrink grouting compound (7).
10	When the grouting compound has hardened completely, tighten the fastening screws (2) according to the torque table provided in the Chapter on "Maintenance".

Tab. 5-1 Foundations for the refiner

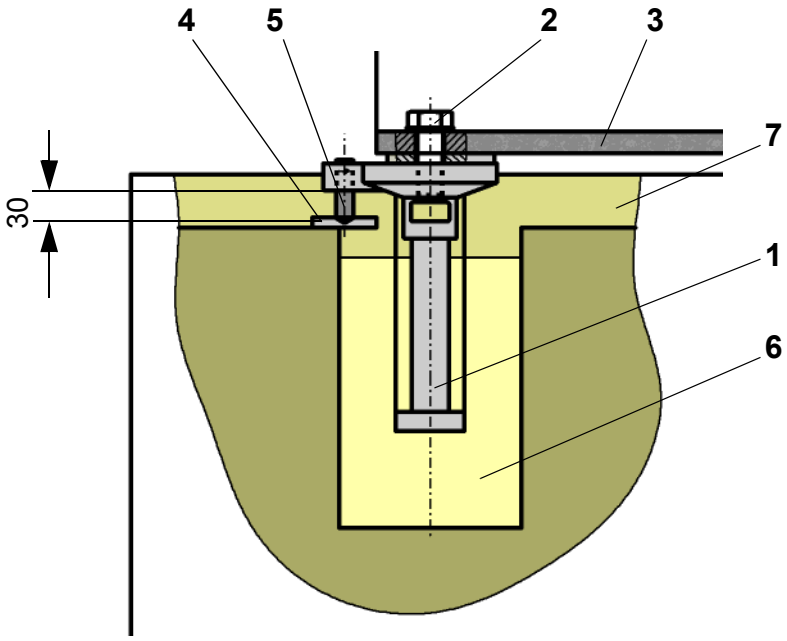


Fig. 5-2 Foundations for the refiner

Mounting the gearing

Prepare the foundation, position and adjust the gearing as follows:

Step	Activity
1	Insert the key into the shaft groove.
2	Pull the coupling halves onto the shaft end of the machine and gearing.
3	Insert 5 mm thick shims between the foundation blocks and each gearing leg. **The shims are inserted to compensate for the height tolerance during gear change!**
4	Secure the foundation blocks (1) at the gearing (3) in a central position using hexagon head bolts (2).
5	Position shims (4).
6	Screw in the jacking screws (5) to the extent indicated.
7	Raise gearing and place on the shims (4).
8	Align gearing according to the foundation drawing.
9	Align gearing in horizontal direction using the jacking screws (5).
10	Set the correct spacing between gear shaft and machine shaft. (see Fig. 5-7) The setting dimensions in Fig. 5-4 can be found in the arrangement drawing.
11	Align the coupling between the gearing and the refiner. (see Fig. 5-8) The permitted deviations according to Fig. 5-5 can be found in the documentation on the coupling used. (➡ .../SUPPLIER DOCUMENTATION)
12	Grout in the foundation blocks (1) with non-shrink grouting compound (6) only and tighten the screws (2) a little.
13	Check the coupling alignment.
14	Set up shuttering.
15	Make a non-shrink base casting layer (7).
16	When the grouting compound has hardened completely, tighten the fastening screws (2) according to the torque table provided in the Chapter on "Maintenance".

Tab. 5-2 Mounting the gearing

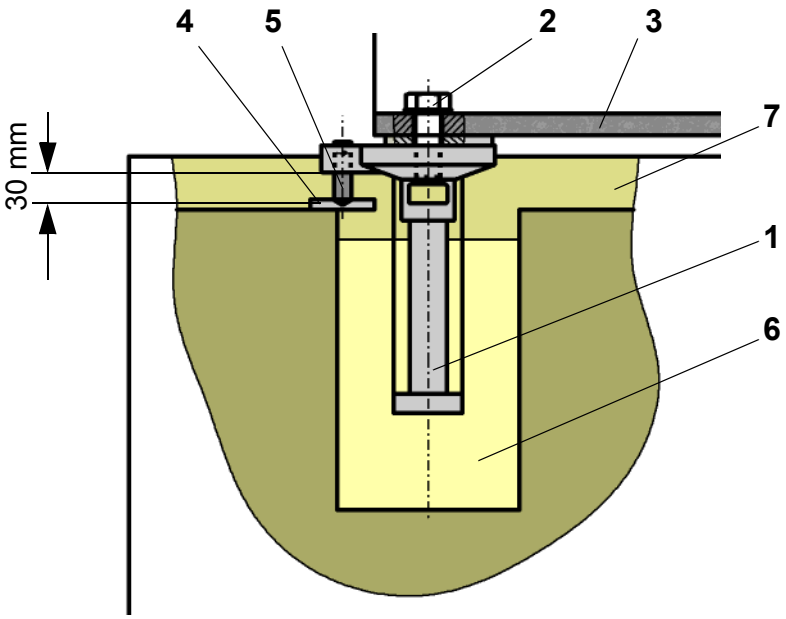


Fig. 5-3 Foundation for the gearing

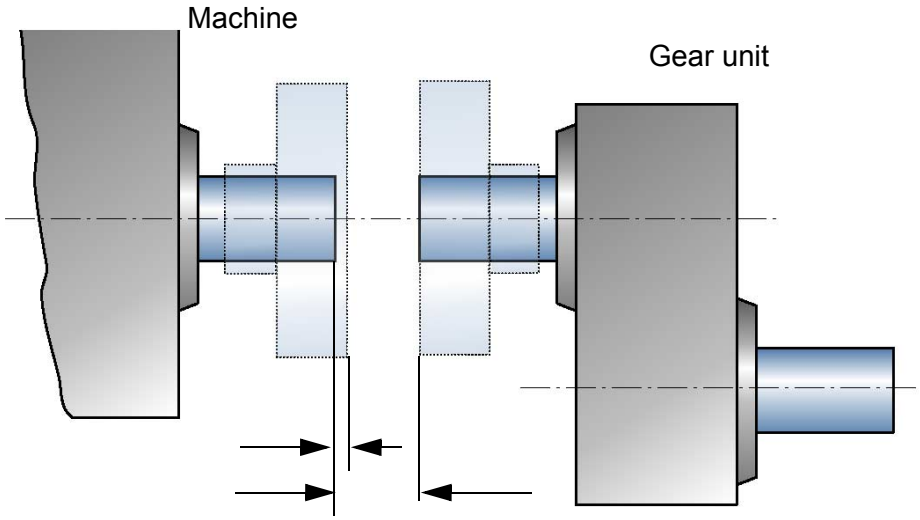


Fig. 5-4 Shaft spacing between machine and gearing

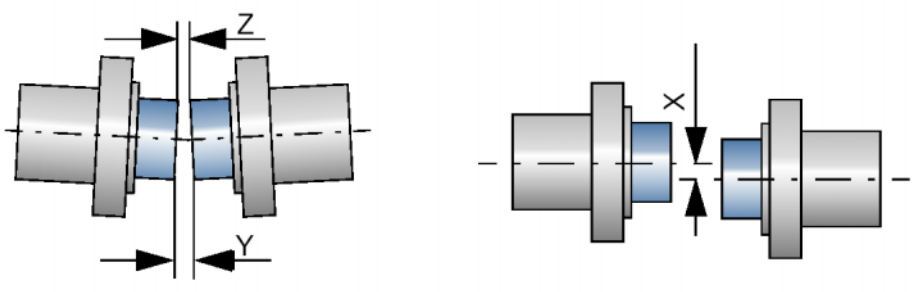


Fig. 5-5 Permitted deviations

Mounting the motor

Prepare the foundation, then position and adjust the motor as follows:.

Step	Activity
1	Insert the key into the shaft groove.
2	Pull the coupling halves onto the shaft end of the gear unit and motor.
3	Insert a 5 mm thick shim between the foundation blocks and each motor leg. **The shims are inserted to compensate for the height tolerance during motor change!**
4	Secure the foundation blocks (1) at the motor (3) in a central position using hexagon head bolts (2).
5	Position the shims (4).
6	Screw in the jacking screws (5) to the extent indicated.
7	Raise motor and place on the shims (4).
8	Align motor according to the foundation drawing.
9	Align motor in horizontal direction using the jacking screws (5).
10	Set the correct spacing between the motor shaft and the gear shaft. (see Fig. 5-7) The setting dimensions in Fig. 5-7 can be found in the arrangement drawing.
11	Align the coupling between the gearing and the motor. (see Fig. 5-8). The permitted deviations according to Fig. 5-8 can be found in the documentation on the coupling.
12	Grout in the foundation blocks (1) with non-shrink grouting compound (6) only and tighten the screws (2) a little.
13	Check the coupling alignment.
14	Set up shuttering.
15	Make a non-shrink base casting layer (7).
16	When the grouting compound has hardened completely, tighten the fastening screws (2) according to the torque table provided in the Chapter on "Maintenance".

Tab. 5-3 Mounting the motor

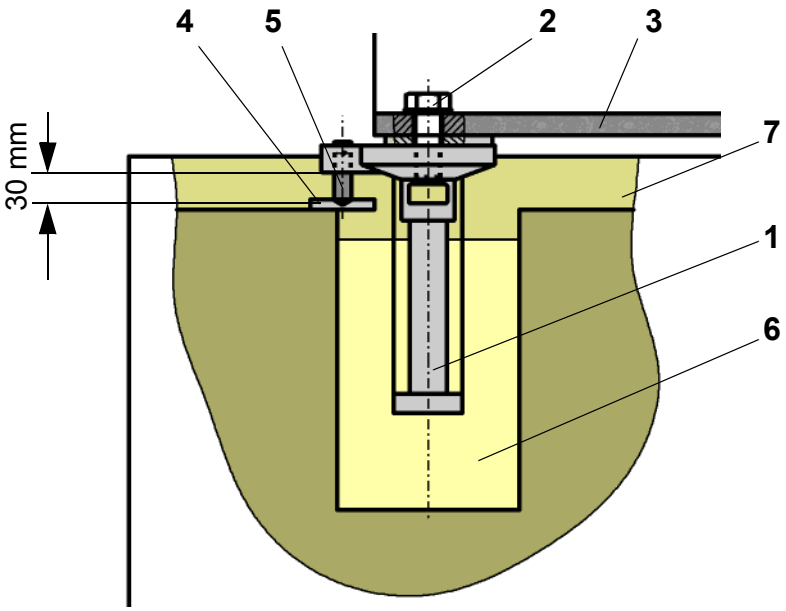


Fig. 5-6 Foundation for the motor

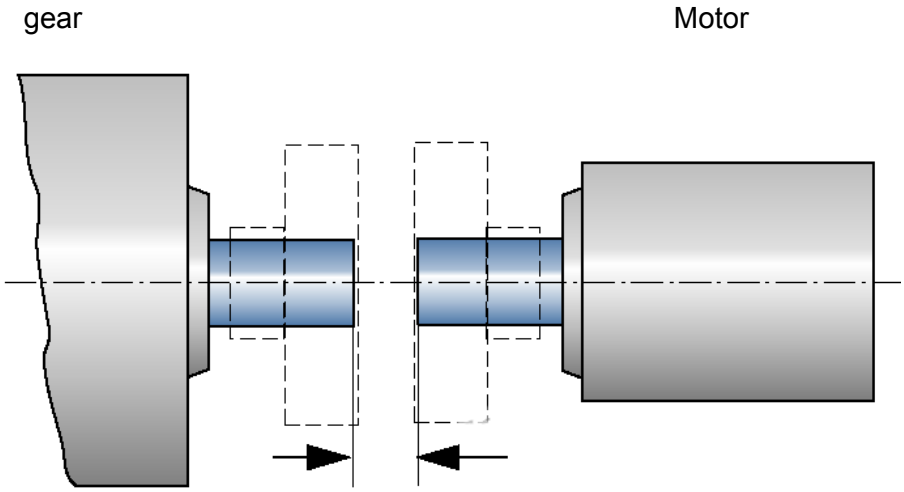


Fig. 5-7 Shaft clearance

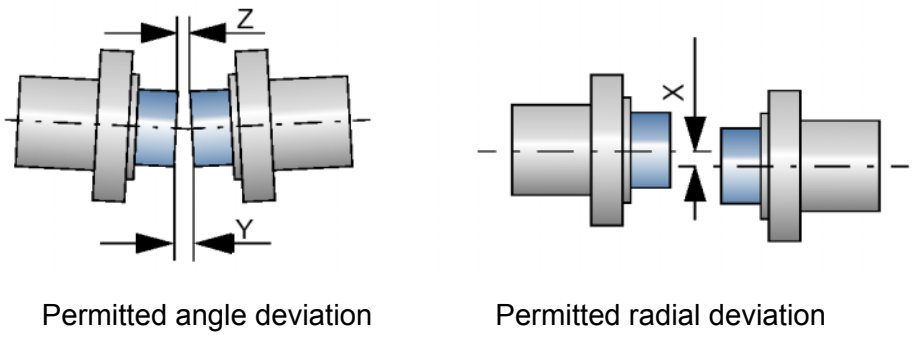


Fig. 5-8 Permitted deviations

5.6 Connections

Pipework

All connections and connecting dimensions at the refiner are shown in the arrangement drawing.

Drainage pipe

The drainage pipe must discharge reliably into the drain to prevent any hot liquid from spraying out and causing scalding injuries.

CAUTION

Errors in the installation of pipework and hoses may result in risks to life and limb and in damage to the machine.
Mount all pipes stress-free and free of vibration.
The pipework must be mounted such that it does not stress the machine during operation (e.g. by thermal expansion of the pipes).

Sampling

Sampling equipment

One sampling device each, suitable for taking samples from pressurized pipes, is to be provided before and after the refiner.

DANGER

When taking samples, hot liquids or vapors may escape or there may be a risk of chemical burns due to the chemicals added in the process!
Personal safety equipment, in particular eye protection and safety gloves, must be worn when taking samples.

Personal protective apparel

The following personal safety equipment must be worn when taking pulp or filtrate samples.

Safety equipment	
Protective clothing	
Protective gloves	
Eye protection	

Tab. 5-4 Safety equipment

WARNING

Contact with the pulp may cause skin damage and burning.
Persons handling the pulp should not suffer from an allergic condition to such substances.
Personal protective apparel must be worn!

	Examples of sampling devices
	Manually operated sampling fitting
	Sampling vessel

Tab. 5-5 Sampling equipment

Instruments

The instrumentation (instruments, actuators and control devices) of the refiner is to be installed according to the flow sheet and the applicable standards.

Temperature switch

A temperature switch is included in the scope of supply.

The temperature switch prevents steam from forming when the slide valve is closed and the main drive is running. The temperature switch switches the main drive off at a temperature of 90°C. The temperature switch has an emergency-off function and is to be integrated into the EMERGENCY STOP safety chain.

The temperature switch is installed in the discharge branch.

For information on installation and connections, see:

.../SUPPLIER DOCUMENTATION

/

DANGER

Danger of explosion due to formation of steam if the motor is left running with the discharge gate closed.
Ensure that the temperature switch will shut down the motor if it reaches 90°C.

Electrical equipment

The complete electrical installations are to be set up and operated according to the applicable standards.

5.7 Inspections and remaining work

Sense of rotation of the machine

Prerequisites:

- Shaft seals are set
- Sealing water pipe flushed out and sealing water available in the quality specified
- Motor for the main drive is connected up to the electricity supply.
- Coupling (machine / gear unit / motor) is mounted correctly
- Gear unit is filled with oil
- Refiner plates are open
- Refiner is empty (no medium)
- Transport safety devices have been removed
- Safety covers mounted correctly and EMERGENCY STOP devices checked and functioning.

Checking sense of rotation:

The direction of rotation of the machine should be checked according to the following table:

Step	Activity
1	Turn on sealing water supply.
2	Switch motor on briefly.
3	Sense of rotation according to Fig. 5-9: View of drive journal of the refiner: **"clockwise"**
4	Switch motor off again.
5	Turn off sealing water supply when the refiner has stopped rotating.

Tab. 5-6 Checking the sense of rotation of the machine

Fig. 5-9 Sense of rotation of the machine

Sense of rotation of the refiner plate adjusting device

Prerequisites:

- Motor for the refiner plate adjusting device is connected up to the electricity supply
- The couplings are mounted correctly
- Set operating mode switch to LOCAL at the control box
- Gear unit is filled with oil

Checking sense of rotation

The sense of rotation should be checked according to the following table:

Step	Activity
1	By operating the "relieve load" button, switch on the motor briefly towards "open refiner plates".
2	Direction at relieve load" (open refiner plates): **The scale (1) on the refiner plate wear display must move towards -40 mm.**
3	Switch motor off again.

Tab. 5-7 Checking the sense of rotation of the actuating drive

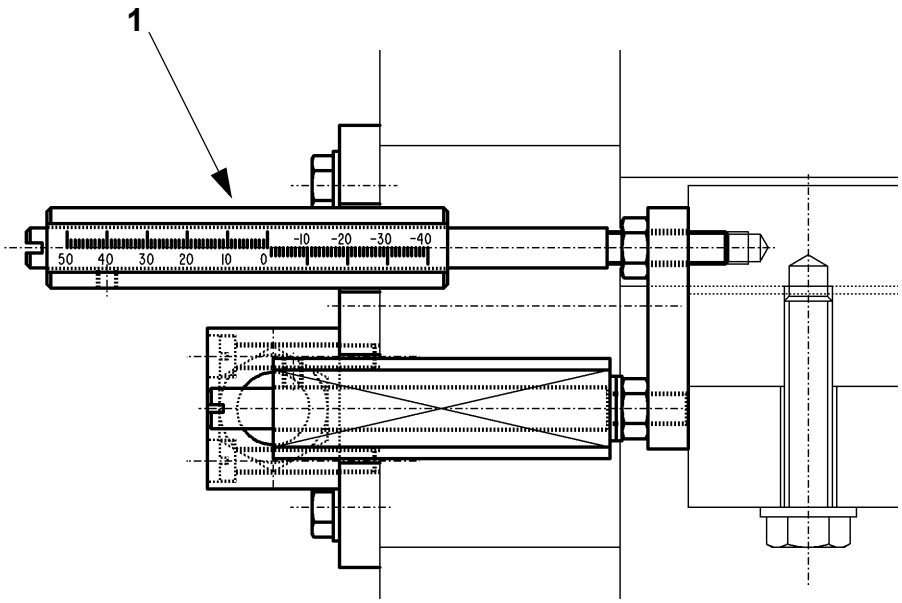


Fig. 5-10 Scale for refiner plate adjustment

Coupling

- Mount coupling for main drive according to data provided by coupling manufacturer.

➡.../SUPPLIER DOCUMENTATION

The tolerances observed when aligning the coupling are to be recorded in the erection work report on the coupling.

Other work

Other work to be completed:

- Clean the machine.
- Mount safety covers (coupling guard, etc.).

5.8 Cold commissioning (preparation for initial start-up)

Sealing water

Before sealing water is fed to the shaft seal, the sealing water pipe must be closed off at the refiner and flushed out. The entire sealing water pipe from the main sealing water pipe to the refiner must be flushed out until all of the dirt has been removed from the pipe. After flushing out the pipe, connect it up to the refiner again.

Flushing and cleaning

Flushing out and cleaning the refiner and the refiner pipework system

Step	Activity
1	Clean the chest in front of the refiner and then rinse with water.
2	Empty the chest through the drainage valve and remove any dirt.
3	Fill chest with water.
4	Use the stock pump to clean the entire pipework system upstream and downstream of the refiner. **The refiner must not be in operation when doing so and the refiner plates must be in the "open" position.** The flushing water pipe must also be flushed out.
5	After flushing out, open the machine and remove any rejects that may have been caught up inside. **Before opening the machine, the energy supply to the main drive must be shut off at all poles and secured to prevent it being switched on again.**
6	Close the machine

Tab. 5-8 Flushing and cleaning

Stuffing box

The stuffing boxes must be set together with the ANDRITZ start-up engineer.

Pipework

All connections (flanges, screw fittings, etc.) must be checked to ensure they have been mounted correctly (screws tightened, seals mounted, welds complete, etc.).

Lubrication

Initial filling of lubricant according to lubricating schedule (bearings, etc.).

CAUTION

Damage to machine due to use of wrong oil grades.
Only use oil with the properties listed in the lubrication schedules!

Cold commissioning

The checks to be performed must be carried out according to the cold commissioning report and ticked off after completion.

5.9 Limit switches for "REFINER PLATES IN OPEN POSITION" and "REFINER START POSITION"

5.9.1 Functions

The 2 limit switches are mounted on the removable cover of the refiner door. Each limit switch has an LED function indicator. If the limit switch is actuated, the LED indicator lights up.

"OPEN POSITION"

The normally closed contact is open if the plates are in the "OPEN" position.

Function:

The plate adjustment drive is switched off in "RELEASE" direction.

Display when contact is open:

The process display and the "REFINER CONTROL" pop-up window display "PLATES IN OPEN POSITION".

"REFINER START POSITION"

The normally open contact is closed if the plates are in the "REFINER START POSITION".

Function:

Start release for the refiner

Display when contact is closed:

The "REFINER CONTROL" pop-up window displays "REFINER IN START POSITION".

Limit switch fault alarm

If both contacts of the limit switch transmit a normally open or normally closed signal at the same time, the alarm "OPEN POSITION LIMIT SWITCH FAULT" is triggered at the DCS.

If an alarm is triggered, stop the refiner and then check the function of the limit switches.

5.9.2 Adjusting and checking the limit switch for "PLATES IN OPEN POSITION"

DANGER

Before beginning any adjusting work, the power supply to all motors at the refiner must be switched off and locked out in the off position. This can be achieved with a service switch, lockable racks in the MCC, or with other suitable measures that comply with the safety regulations.

The limit switch is adjusted at start-up of the refiner and each time the refiner plates are changed.

Ensure that the refiner door is closed and secured with bolts.

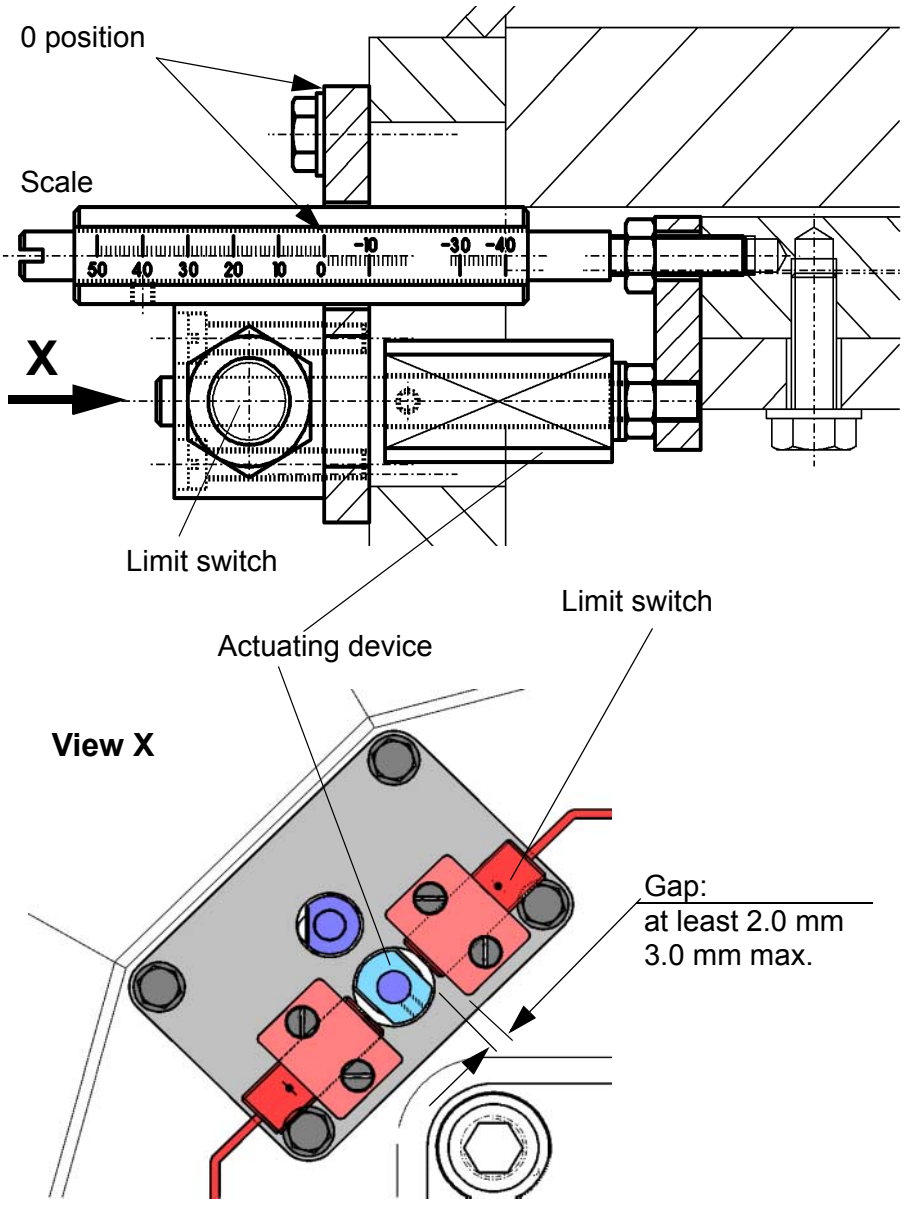


Fig. 5-11 Limit switch "REFINER PLATES IN OPEN POSITION"

Setting

The limit switch is adjusted by turning the external hexagon nut on the plate adjustment drive, which is located opposite the plate adjustment motor.

The direction of plate adjustment and the plate gap can be read off at the dial plate (Fig. 5-11).

The dial plate has a range of +50/0/-40 mm. If the reading is positive, this shows that there has been wear on the plates after a certain period in operation.

If the plates are closed (LOADED), the gap width indicated will rise (dial plate moves towards +50 mm) and if they are opened (RELEASED), the gap width indicated will drop.

Adjust the limit switch according to the following table:

Step	Activity
1	Turn the external hexagon nut to close the gap (LOAD) and keep turning until it will not turn any further, even if slight force is applied. Gap between stator and rotor = 0 mm With new refiner plates, the scale should indicate 0. If this is not the case, the scale must be adjusted accordingly.
2	Turn the external hexagon nut to "Open" (RELEASE) until the scale shows -8 mm. Gap between stator and rotor = 8 mm
3	Set the actuating device so that the limit switch is only just triggered. The actuating device is secured to the shaft with a headless pin. The integrated LED lights up when the limit switch is actuated.

Tab. 5-9 Adjusting the limit switch for "PLATES IN OPEN POSITION"

Checking

Check the limit switch in conjunction with the electrical plate adjustment motor according to the following table.

Repeat the function test using "FAST SPEED" plate adjustment.

Step	Activity
1	Set the mode switch at the local control box from"DCS" to "LOCAL".
2	Connect up energy supply to refiner plate adjustment drive.
3	Press the "LOAD" pushbutton towards "CLOSE" until the actuating device is approximately 2 mm away from the "OPEN" position.
4	Press the "RELEASE" pushbutton towards "OPEN". If the limit switch is actuated (LED lights up), the plate adjustment motor must be switched off automatically.
5	Fasten the actuating device with the headless pin and secure with LOCTITE.

Tab. 5-10 Checking the limit switch for "REFINER PLATES IN OPEN POSITION"

After successfully checking the limit switch function, leave the plates in the "OPEN" position (limit switch actuated) and move the switch at the local control box from "LOCAL" to "DCS".

5.9.3 Adjusting and checking the limit switch for "REFINER START POSITION"

Setting

The limit switch is set acccording to Section 5.9.2.

The limit switch for "REFINER START POSITION" must be set such that it is triggered a little before (approx. 0.5 mm) the limit switch for "REFINER PLATES IN OPEN POSITION".

Checking

Checking the starting conditions for the refiner:

- The refiner can only be started when the "REFINER START POSITION" limit switch has been triggered.

The "REFINER START POSITION" limit switch has no interlocking function when the refiner is in operation.

5.10 "SAFETY POSITION" limit switch

5.10.1 Functions

The "SAFETY POSITION" limit switch is only actuated if the "OPEN POSITION" limit switch is actuated and is used to switch off the refiner plate adjustment drive and the refiner in an emergency.

The limit switch is mounted on the door of the screw jack safety cover at the outer end of the screw jack and has an LED indicator to confirm its functioning. If the limit switch is actuated, the LED indicator lights up.

Normally closed contact

The normally closed contact is open if the plates are in the "SAFETY" position.

Function:

The refiner is switched off and the plate adjustment drive shut off towards "RELEASE".

Display when contact is open:

The "PLATES IN SAFETY POSITION" message is displayed in the "REFINER CONTROL" pop-up window.

Alarm displayed when contact is open

The process display issues the alarm message "PLATES IN SAFETY POSITION".

This alarm must be acknowledged by the operator to release the plate adjustment towards "RELEASE" and allow the refiner to be started up again. The alarm can only be acknowledged if the limit switch has not been actuated.

Normally open contact

The normally open contact is not used.

5.10.2 Adjusting and checking

DANGER

Before beginning any adjusting work, the power supply to all motors at the refiner must be switched off and locked out in the off position. This can be achieved with a service switch, lockable racks in the MCC, or with other suitable measures that comply with the safety regulations.

The limit switch is set during initial start-up and this need not be repeated.

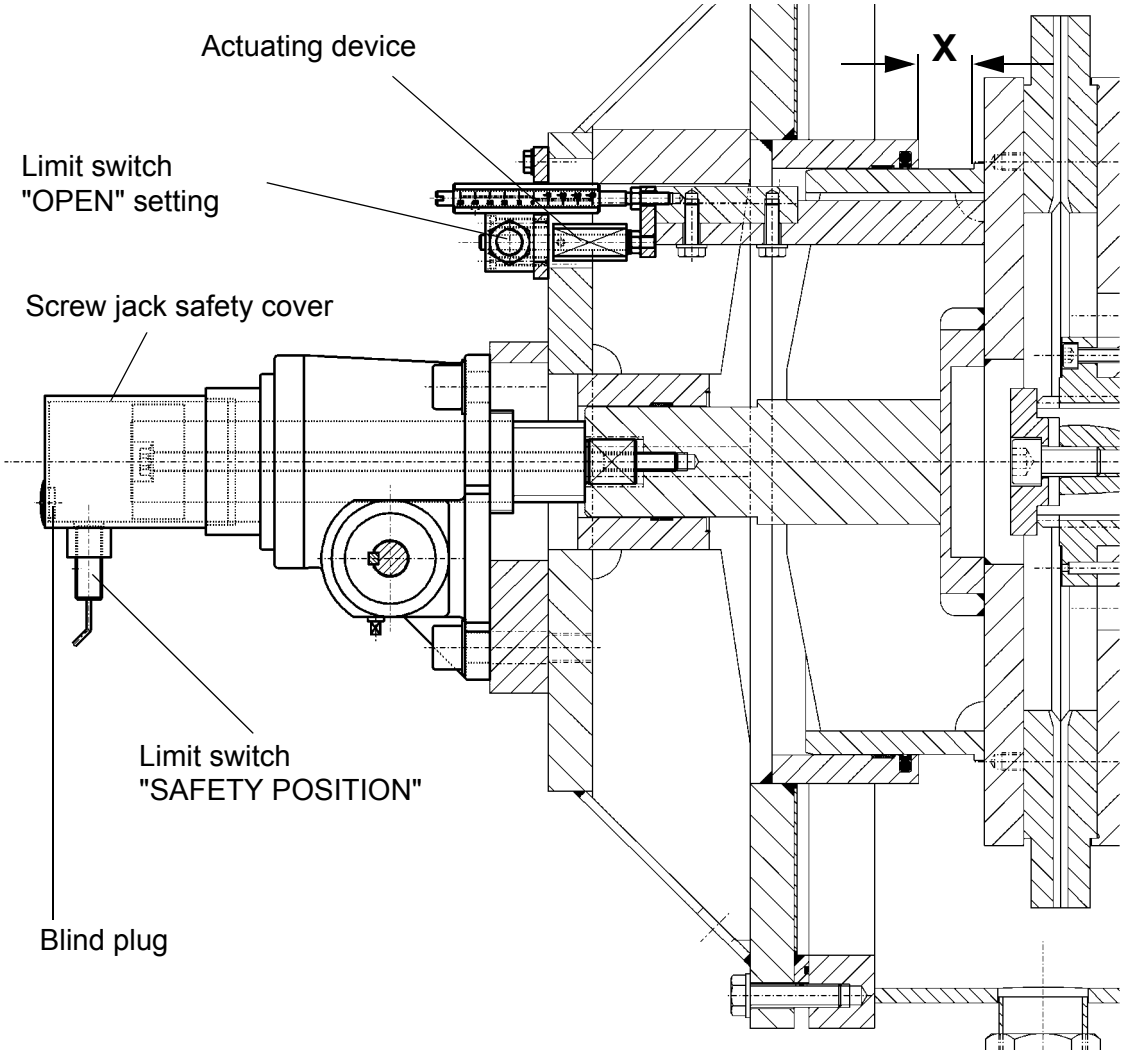


Fig. 5-12 Limit switch

Setting

The limit switch is adjusted by turning the external hexagon nut on the plate adjustment drive, which is located opposite the plate adjustment motor.

The direction of plate adjustment and the plate gap can be read off at the dial plate (Fig. 5-11).

Adjust the limit switch according to the following table:

Step	Activity
1	Open removable cover of the refiner.
2	In order to gain access to the actuating area of the limit switch, remove the blind plug on the screw jack housing cover.
3	Turn the external hexagon nut to "Open" (RELEASE) until the gap is "X" 2 - 3 mm. (see Fig. 5-12, dimension "X")
4	In this position the "SAFETY POSITION" limit switch must be actuated. The integrated LED lights up when the limit switch is actuated.
5	Close refiner door and secure with bolts.
6	Turn the external hexagon nut to "Close" (LOAD) until the "OPEN POSITION" limit switch is no longer actuated. The actuating device should be some 2 mm away from the "OPEN POSITION". Display on scale: approx. -6 mm

Tab. 5-11 Setting the "SAFETY POSITION" limit switch

Checking

Check the limit switch in conjunction with the electrical plate adjustment motor according to the following table.

Repeat the function test using "FAST SPEED" plate adjustment.

Step	Activity
1	Acknowledge the "REFINER PLATES IN SAFETY POSITION" alarm at the DCS.
2	Move the selector switch at the local control box from "DCS" to LOCAL".
3	Connect up energy supply to refiner plate adjustment drive.
4	Press the "RELEASE" pushbutton towards "OPEN" (RELEASE).
5	Actuate the "SAFETY POSITION" limit switch with a screw driver or other metallic device before the "OPEN POSITION" limit switch is actuated. If the "SAFETY POSITION" limit switch is actuated (LED lights up), the plate adjustment motor must be switched off automatically.

Tab. 5-12 Checking the "SAFETY POSITION" limit switch

When the limit switch has been successfully checked, acknowledge the "PLATES IN SAFETY POSITION" alarm at the DCS.

Then move the plates into the "OPEN" position and move the switch from "LOCAL" to "DCS" at the local control box.

5.11 Disassembly and disposal

DANGER

The machine must be disconnected from the power source and secured to prevent switching on again before disassembly!
The machine should only be disassembled by qualified and authorized personnel.

If the machine/plant is to be shut down, the following instructions must be observed for subsequent disposal:

Machine parts

- The machine components must be disassembled and separated according to the various materials, lubricant fillings, and various contaminating substances.
- The materials must be disposed of according to the waste disposal legislation applying.
- Proof must be brought of the properties and the disposal route of the various materials according to the applicable regulations on proof of recovery and disposal (e.g. statement and entry in register).
- Compile the necessary documents before disposal and dispose of the materials according to the regulations, taking account of the documents.

Plastic parts

WARNING

Synthetic components may be flammable!
Observe the local fire protection regulations. When separating the materials, do not work with welding devices or other equipment that generates sparks.

Additives

- Oil, utilities and cleaning agents must be disposed of according to the local provisions and in compliance with the appropriate manufacturer regulations.

Other material groups to be separated are:

- Surface-treated sheet steel, such as powder-coated or wet-painted doors, covers, etc.
- Surface-coated construction steel, such as rotating parts, gratings, bolts, etc.
- Copper (electrical grade copper or silver-coated electrical grade copper), such as busbars, connecting straps, connections pieces, etc.
- Cables and wires
- Built-in units, electrical components and components generating radiation (radio-active probe), etc.

6 START-UP

6.1 General

This Chapter describes the preparations and steps required for initial start-up of the refiner.

6.2 Safety instructions

DANGER

Do not disregard the safety regulations.
If safety regulations are disregarded, this may cause a risk to life and limb and damage to the machine or its components.
All safety instructions in this section must be strictly observed!

General safety instructions

All applicable accident prevention regulations must be observed.

Qualification of personnel assigned

Start-up may only be carried out by skilled workers with the appropriate training.

Personal protective apparel

The following protective equipment must be worn when carrying out start-up and erection work:

- Hard hat
- Safety shoes
- Protective clothing
- Eye protection
- Protective gloves

6.3 Prerequisites for start-up

The following must be checked before start-up:

- Erection work completed.
- Cold commissioning completed.
- Installation site has been cleared and cleaned.
- Electricity, water and pulp are available.
- Supply of sealing water to shaft seal has been checked.
- All safety devices mounted.
- First filling of lubricants (gears, bearings, etc.) provided.
- The sense of rotation of the drives has been checked.
- Function and shift point of the limit switch for refiner plate adjustment have been checked.
- All electric interlocks and EMERGENCY STOP safety devices are functioning and have been checked.
- All control loops have been installed and tested.
- Process control system has been installed and tested.
- The stock chest ahead of the refiner and all pipes upstream and downstream of the refiner have been cleaned and flushed out.
- The refiner has been emptied after flushing out, cleaned carefully, and then closed again.

.

CAUTION

In order to avoid damage to the machine, the pulp must be free of any heavy matter (wires, bolts, and the like).

6.4 Start-up (initial start-up of the machine)

6.4.1 Manual start-up

For manual start-up, proceed according to the following table:

Step	Activity
1	Open the shut-off elements in the inlet pipe.
2	Open the shut-off elements in the discharge pipe.
3	Close the refiner bypass valve.
4	Open the shut-off elements in the flushing water pipe.
5	Turn on supply of sealing water.
6	Switch on locking water pump.
7	Turn on the cooling water supply (if gearbox is installed).
8	Switch on cooling water pump (if gearbox is installed).
9	Move the refiner plates apart until "Limit switch open" responds. Operation via the process control system (DCS), or set switch (Fig. 6-1, **7**) at the local control box to "LOCAL" and press the illuminated push button (Fig. 6-1, **9**, "Relieve pressure on refiner plate adjusting device").
10	Switch on main refiner drive. Operation via the process control system (DCS), or set switch (Fig. 6-1, **7**) at the local control box to "LOCAL" and press the illuminated push button (Fig. 6-1, **5**, "Start refiner").
11	Read off the idle running power at the process control system or at the power indicator in the local control box and make a record thereof.
12	Read off the idle running power at the process control system and make a record thereof.

Tab. 6-1 Manual start-up

6.4.2 Measuring the idle running power

The idle running power is measured under the following conditions:

- Run the refiner with water
- Refiner plates in the "OPEN" position

CAUTION

If the idle-running power deviates considerably (+/- 20%), check the power metering device.
The typical idle-running power is stated in the control description.

6.5 Certificates

The following certificates must be completed and signed after start-up:

- Start-up certificate
- Provisional acceptance certificate

6.6 Control box

Control box for operating the main drive locally and for refiner plate adjustment

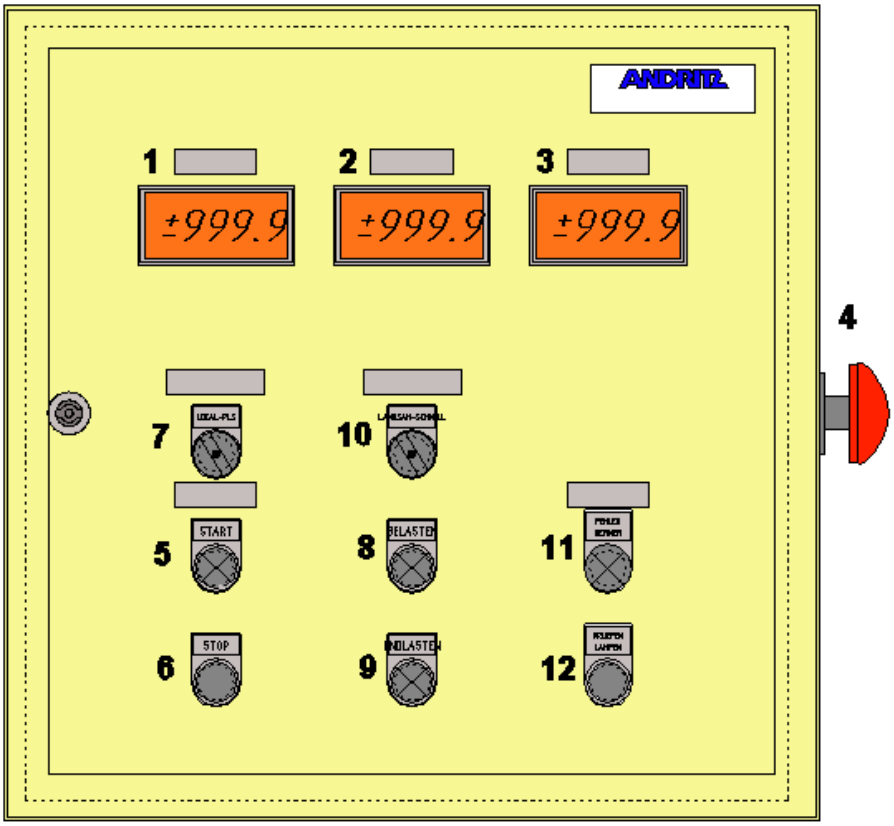


Fig. 6-1 Control box

Item	Function
1	PRESSURE READING - INLET
2	PRESSURE READING - OUTLET
3	POWER DISPLAY
4	REFINER – EMERGENCY STOP SWITCH
5	REFINER - START
6	REFINER - STOP
7	OPERATING MODE SELECTOR SWITCH - LOCAL/DCS
8	REFINER PLATE ADJUSTMENT - ENGAGE
9	REFINER PLATE ADJUSTMENT - DISENGAGE
10	REFINER PLATE ADJUSTMENT – SLOW / FAST
11	REFINER FAULTS
12	CHECK LAMPS

Functions: ➡ see Control description

7 OPERATION

7.1 General

This chapter describes the activities required for starting, operating and stopping the refiner. Possible malfunctions and troubleshooting methods are also presented.

CAUTION

In order to avoid damage to the machine, the pulp must be free of any heavy matter (wire, stones, glass, screws, and similar).

7.2 Safety instructions

DANGER

Do not disregard the safety regulations.
If safety regulations are disregarded, this may cause a risk to life and limb and damage to the machine or its components.
All safety instructions in this section must be strictly observed!

General safety instructions

All applicable accident prevention regulations must be observed.

Operating the refiner is not permitted without all the required safety devices.

Qualification of personnel assigned

The equipment may only be operated by trained and qualified personnel.

Operating personnel must know where the EMERGENCY STOP switches and the escape routes are located.

Operating personnel must be instructed in the function and possible failure of machine monitoring equipment and in carrying out maintenance and inspection work (shift log book, maintenance inspection records).

Personal protective apparel

The following personal protective equipment/apparel must be used when performing work on the machine (e.g. troubleshooting):

- Hard hat
- Protective gloves
- Safety shoes
- Eye protection
- Protective clothing

Safe operation

The refiner is operated under pressure. Thus it is important to ensure that housing cover, manholes, windows, etc. have been closed properly with fully functioning fixing elements.

Under no circumstances should the machine be operated at a higher pressure than the maximum permitted inlet or discharge pressure.

Reasons for increased pressure

Cause	Counter-measure
The necessary flow is not guaranteed	Open the inlet and discharge valves. Check stock pump Increase flow Check flow control loop
Surge pressure due to shut-off elements opening or closing too quickly	Always open and close shut-off elements slowly.

Tab. 7-1 Reasons for increased pressure

7.3 Control box

Control box

Control box for operating the main drive locally and for refiner plate adjustment

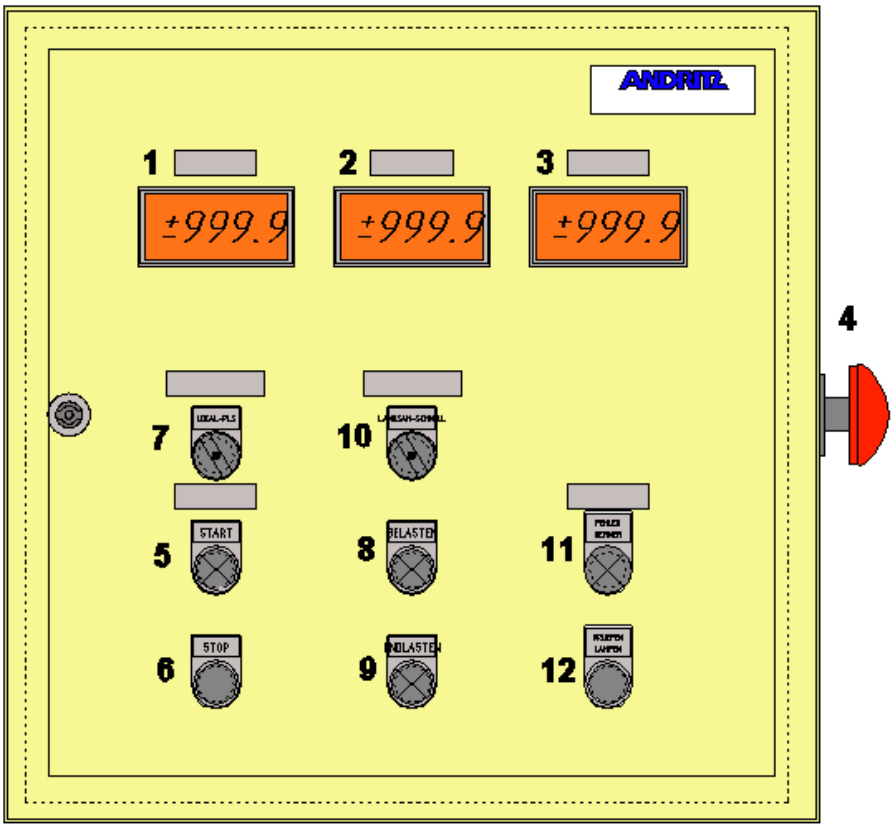


Fig. 7-1 Control box

Item	Function
1	PRESSURE READING - INLET
2	PRESSURE READING - OUTLET
3	POWER DISPLAY
4	REFINER – EMERGENCY STOP SWITCH
5	REFINER - START
6	REFINER - STOP
7	OPERATING MODE SELECTOR SWITCH - LOCAL/DCS
8	REFINER PLATE ADJUSTMENT - ENGAGE
9	REFINER PLATE ADJUSTMENT - DISENGAGE
10	REFINER PLATE ADJUSTMENT – SLOW / FAST
11	REFINER FAULTS
12	CHECK LAMPS

Functions: ➡ see Control description

7.4 Control via DCS

The refiner is started up and stopped entirely from the DCS. The refiner and all auxiliary units are started and stopped with the group start and stop function.

7.5 Start-up

Preliminary requirements

Before starting the machine, complete the following preparation work:

- Check whether the refiner plate adjusting device is in the "Refiner start" position.

Automatic starting

When using the group start, steps 7 to 16 are implemented automatically from the DCS.

Manual start-up

Start up the machine manually according to the table below. The machine is always operated by means of the DCS.

Step	Activity
1	Open the shut-off elements in the inlet pipe.
2	Open the shut-off elements in the discharge pipe.
3	Close the refiner bypass valve.
4	Set the operating mode selector switch (Fig. 7-1, **7**) to DCS.
5	Switch all controllers and the refiner plate adjusting drive to "automatic" mode.
6	Pre-set the reference values for production and power.
7	Switch on flushing water pump.
8	Switch on locking water pump.
9	Switch on consistency control water pump.
10	Switch on cooling water pump (if gearbox is installed).
11	Open sealing water valve.
12	Start refiner.
13	Open the stock valve ahead of the stock pump.
14	Switch on pulp pump to the refiner.
15	Check whether the following conditions have been fulfilled: Minimum flow rate, inlet pressure, and consistency When these conditions have been fulfilled, the refiner plates close automatically.

Tab. 7-2 Manual start-up

Step	Activity
16	**Running in the refiner filling sets at new start-up.** At initial start-up with new refiner filling sets, the refiner plates must be "run in", i.e. any dimension differences must be evened out. The refiner fillings are run in by increasing the refining power slowly over a certain period. First of all, the power reference value at the power controller is set to 5% more than the power limit value L1 (see control description). The refiner is operated with pulp for approximately 1 hour at this setting and the noises made by the refiner filling set are observed over this period. If the noises diminish after one hour in operation, beginning with the refiner plates coming into contact with one another, the power reference value can then be increased again in small stages. (Increase power by10% and run the refiner for 1 hour at this power rating). Remarks: When using refiner plates that have already been run in, the reference power value is increased automatically according to a time curve from the power limit value L1 (initial power reference value) to the required power reference value. For this purpose the power controller must be switched to external set value operation.
17	Observe the rise in power reference value and power actual value.

Tab. 7-2 Manual start-up

If the refiner does not start up, check the interlockings according to the control description.

7.6 Normal operation

DANGER

Do not operate without all safety devices on

During operation, operating personnel must make sure that data are recorded in the shift log book and data recording sheets, and also carry out the following work:

Daily jobs and checks

The following work has to be performed in normal operation:

Component or process value	Check and activity
Locking water consumption	Check flow indicator for function and cleanliness.
Discharge pressure	Outlet pressure should be less than 4.5 bar. At higher pressure, increase the flow rate or reduce the inlet pressure.
Rotor bearing	Maximum temperature 60°C.
Power input and output control	Compare the actual value with the pre-set value. If the deviations are too large, this should be reported to the automation engineer.

Tab. 7-3 Daily jobs and checks

In case of a malfunction, proceed according to section 7.10 (Operating faults and troubleshooting).

7.7 Shutdown

Preliminary requirements

Before shutting the machine down, the following preparations must be made:

- The refiner flushing water valve must be in automatic mode
- The flushing water pump must be in operation
- The refiner flushing time must be set to 20-40 secs

Automatic shutdown

When shutting down the machine with the group stop, the steps are carried out automatically by the DCS.

Manual shutdown

Shut down the machine manually according to the table below.

The machine is always operated by means of the DCS.

Always flush out the refiner before switching it off.

Step	Activity
1	Switch off pulp pump to the refiner.
2	The refiner plates open automatically when the stock pump is switched off.
3	If the power rating displayed is <L4 limit value (see control description) or the refiner plate adjusting devices is in the "open" position, the flushing valve is opened automatically and closed again at the end of the pre-set flushing time.
4	Switch off the refiner after it has been flushed out.
5	Close sealing water feed 5 minutes after the shutting down the refiner.
6	Switch off consistency control water pump.
7	Switch off cooling water pump (if gearbox is installed).
8	Switch off flushing water pump.

Tab. 7-4 Manual shutdown

CAUTION

In order to prevent the stuffing box packings from overheating, do not shut off the sealing water supply until 5 minutes after shutting down the refiner.

7.8 EMERGENCY STOP

If there is a danger to personnel or any other operating faults (excessive noise or vibrations), the emergency stop procedure should be implemented according to the following table:

Step	Activity
1	Press the EMERGENCY STOP button at the refiner. This shuts down the refiner and the feed system (stock pump) simultaneously. The refiner plate adjusting device opens (relieves pressure on) the refiner plates automatically.
2	Switch off service switch for the main refiner drive and lock out.
3	Determine the cause of the fault and repair (see Chapter on Troubleshooting 7.10).

Tab. 7-5 EMERGENCY STOP

7.9 Re-starting after an EMERGENCY STOP

Preliminary requirements for starting

Before starting up again after an EMERGENCY STOP, the reason for the stoppage must be found and eliminated.

Starting

The machine should be started up according to section 7.5.

CAUTION

Pulp may dry on inside the refiner after a longer shutdown period if the refiner has not been flushed out.
Empty the refiner manually and flush out before re-starting.

7.10 Operating malfunctions and troubleshooting

Malfunction	Cause	Remedy
Pulp flow is too low.	Stock pump is faulty.	Check functioning of the stock pump and replace any faulty components found. Check stock pump for clogging.
	Pulp consistency is too high.	Reduce consistency with consistency control device (4 - 5%). Check consistency control loop.
	The flow control valve is not open far enough.	Increase flow set value. Check flow control valve.
	Flow meter is faulty.	Check functioning of the flow meter and replace any faulty components found. Re-calibrate the flow meter.
	Flow set value is too low.	Increase flow set value. Check flow control loop
	Set of refiner fillings are clogged.	Switch refiner off. Clean and flush out refiner.
	Refiner fillings are worn down too far.	Switch refiner off. Replace refiner fillings. ➡ .../ MAINTENANCE
Pulp flow is too high.	The flow meter or the flow control valve is faulty.	Check flow meter and control valve. Check flow control loop
	Flow reference value is too high	Reduce reference flow value.
Stuffing box is overheating.	Sealing water pressure is too low.	Set sealing water flow.
	Sealing water supply is clogged.	Switch refiner off. Clean the locking water feed pipe.
	Stuffing box gland is too tight.	Loosen the screw fitting at the stuffing box gland. Set sealing water flow. ➡ .../ MAINTENANCE

Tab. 7-6 Operating malfunctions and troubleshooting

Malfunction	Cause	Remedy
Pulp escaping at the stuffing box seal.	Inadequate flow of sealing water.	Increase pressure until it is 0.5 bar above the pressure of the pulp.
	Stuffing box packing is worn.	Replace stuffing box packing. ➔ .../ MAINTENANCE
	Shaft protection sleeve is worn.	Switch off refiner and replace the shaft protection sleeve. ➔ .../ MAINTENANCE
Too much wear on the refiner fillings.	Too little pulp flow causes pieces to tear off the thin pulp layer that forms.	Increase the flow rate.
	Pulp is not cleaned adequately.	Check that the cleaning equipment ahead of the refiner is functioning properly.
	Heavy rejects present in pulp.	Switch refiner off. Flush out and clean refiner. Check that the cleaning equipment ahead of the refiner is functioning properly.
	Specific edge load is exceeded.	Reduce power.
Sheet strength is too low.	Specific edge load is exceeded.	Reduce power.
	Refiner fillings are worn.	Switch off refiner and replace the refiner filling set. ➔ .../ MAINTENANCE

Tab. 7-6 Operating malfunctions and troubleshooting

Malfunction	Cause	Remedy
Inlet pressure is too low (< 1 bar)	Pulp consistency is too high.	Reduce consistency with consistency control device (4 - 5%). Check consistency control loop.
	Stock pump is faulty.	Check functioning of the stock pump and replace any faulty components found. Check stock pump for clogging.
	Slide gate on the inlet side of the stock pump is not open far enough.	The gate must be opened fully.
	Slide gate on the delivery side of the stock pump is not open far enough.	Open the gate further until the required inlet pressure is obtained.
	Stock pump speed is too low.	Check stock pump. Increase speed if a frequency converter has been installed.
Discharge pressure is too high (> 4.5 bar)	Too little flow.	Increase flow set value. Check flow control loop
	The inlet pressure is too high.	Close the gate a little on the delivery side of the pump. Reduce the speed of the stock pump if a frequency converter has been installed. Check the sizing of the stock pump.
Substantial power fluctuations	The power transmitter is faulty.	Check the power transmitter and replace if necessary.
	Fluctuations in flow or consistency	Check flow and consistency control loop. Optimize control parameters.
	Power controller not functioning properly	Check and optimize setting of the control parameters and the actuating time. Optimize damping of the power measurement signal.

Tab. 7-6 Operating malfunctions and troubleshooting

8 MAINTENANCE

8.1 General

This chapter describes the maintenance and upkeep of the refiner, which are the responsibility of the machine operator.

All activities mentioned in this Section must be performed at the correct time.

The ANDRITZ service department is at your disposal for troubleshooting, as well as for extensive maintenance and repair work.

.../INTRODUCTION

Repair work on the plant components must be carried out at the manufacturer's works.

Workers trained and authorized by ANDRITZ may carry out repairs on site after obtaining permission to do so from ANDRITZ.

8.2 Safety regulations

DANGER

Do not disregard the safety regulations.
If the safety regulations are disregarded, this may cause a risk to life and limb and damage to the machine or its components.
All safety instructions in this section must be strictly observed!

General safety instructions

All applicable accident prevention regulations must be observed.

Sufficient space for maintenance work must be provided right away in the arrangement planning.

Service and maintenance work should not be performed until the **stock pump and the refiner have come to a standstill** and all supply and discharge lines have been closed off.

Do not exceed permissible crane loads and weights on lifting gear and ropes/shackles. Secure loads to prevent them falling.

Do not step or walk below suspended loads! Standing below suspended loads can have fatal consequences and thus is strictly forbidden!

The machine must be thoroughly cleaned before carrying out any maintenance work.

Use only original spare parts.

Safety devices

After completion of maintenance work, all required safety devices must be mounted again.

Power supply

Before beginning any maintenance or repair work the operator must disconnect the power supply to all drives securely. This can be achieved with a service switch, lockable racks in the MCC, or with other suitable measures that comply with the safety regulations.

Lighting

The operator shall ensure that adequate lighting is provided (with extra-low voltage bulbs) during service and repair work.

Qualification of personnel assigned

Maintenance and upkeep must be carried out by specially trained, skilled personnel only.

All work on the electrical equipment, without exception, must be carried out by skilled electricians.

Personal protective apparel

The following protective equipment must be worn when carrying out cleaning and maintenance work:

- Hard hat
- Protective gloves
- Safety shoes
- Eye protection
- Protective clothing

Welding work

In general, welding work is only permitted after consulting ANDRITZ.

When performing welding work, always observe the relevant safety rules and the appropriate safety regulations for work performed in enclosed and confined spaces.

DANGER

HOT WORK PERMIT REQUIRED!

Danger of fire and explosions!
There is a considerable risk of fire or explosion during welding work. Always take the appropriate fire precautions before beginning work, e.g. keep fire extinguishers at the ready.

All motors should be disconnected before carrying out electric welding work.

Gases, steam or smoke

Before beginning any service work, ensure that no gas, vapour or smoke can enter the working area from feed pipes, discharge pipes or shafts.

If it is not possible to reliably exclude the risk of gas, steam or smoke flowing in, all persons working in the danger zone must be equipped with a safety harness and a safety rope. Each worker must be monitored by a second person outside the danger zone. It must always be possible to evacuate a worker from the danger zone without delay.

8.3 Regular maintenance

For machines operating continuously (24 hours/day, 7 days/week), a prescheduled maintenance period is recommended every two weeks. During these periods the machine should be shut down, thoroughly cleaned, and checked for wear and tear.

Machines operating less than 24 hours a day should undergo these routine checks and be cleaned at each shutdown.

General machine checks

The following routine checks are to be conducted on the machine:

Component	Checks
Sealing water supply	Examine for leaks and check flow rate.
Gear unit	Examine for leaks and check oil level.
Bearing assembly	Check temperature and for noises.
Cooling water for gear	Check connections

Tab. 8-1 General machine checks

In the course of general machine checks, all additional units should also be checked to guarantee that the entire plant is functioning satisfactorily. For these checks, the attached maintenance and upkeep instructions provided by the manufacturer must be observed.

.../SUPPLIER DOCUMENTATION

Malfunctions and inadmissible changes found during these checks must be rectified immediately.

Flushing

Machine must be flushed out as follows before carrying out any maintenance work:

Step	Procedure
1	Shut down the pulp feed and secure against accidental start.
2	Shut down the refiner and secure against accidental start.
3	Close the inlet and discharge pipes.
4	Open drainage valve.
5	Open flushing water valve and flush out refiner thoroughly.
6	Close flushing water valve.
7	Wait until there is no more water coming from the drainage branch.

Tab. 8-2 Flushing

Clean

The machine should be thoroughly cleaned when shut down.

WARNING

Contact with the pulp may cause skin damage and burning.
Persons handling the pulp should not suffer from an allergic condition to such substances.
Personal protective apparel must be worn!

CAUTION

Do not use caustic agents for cleaning.
Make sure no water, steam or other cleaning medium enters electrical plant components.

8.4 Maintenance schedule

In addition to the work outlined below, maintenance has to be carried out in accordance with Section8.3 and normal operation work.

.../OPERATION

monthly

The following maintenance work is to be carried out at monthly intervals.

Component	Activity
Bearings	• Check temperature and for noises
Gear unit	• Check oil level • Check temperature • Check for leaks • Check for unusual noises
Seal	• Check leaking water rate

Tab. 8-3 monthly

6-monthly

The following maintenance work is to be carried out at 6-monthly intervals.

Component	Activity
Spline shaft – rotor hub	• Check for easy sliding and for any damage.
Coupling	• Check for wear and tear.
Screws/bolts	• Check that screws/bolts are firm and tighten if necessary.

Tab. 8-4 6-monthly

annually

The following maintenance work is to be carried out at annual intervals.

Component	Activity
Seal	• Check function and for wear and tear.
EMERGENCY switch	• Check function.
Earthing	• Check
Foundation bolt connection	• Check

Tab. 8-5 annually

8.5 Fasteners

Screw/bolt material

Pins and screws/bolts are manufactured in several classes of material. The heads of these screws and bolts are marked to show the strength class. Damaged or lost fasteners should only be replaced with fasteners of the same material.

CAUTION

The installation data apply to standard screwed/bolted connections at the machine and should only be used if no special installation data are stated in the assembly drawings or the operating manual!

The data in the following table apply to commercially available hexagon head bolts and cheese head screws with a metric ISO thread.

SET SCREWS													
	Pre-stressing forces for erection work (kN)						μ	Tightening torques (Nm)					
	5.6	8.8	A4-50	A4-70	A4-80	C3-80		5.6	8.8	A4-50	A4-70	A4-80	C3-80
M8	7	15	5	11	14	15	0.1	8	17	6	12	16	17
							0.125	10	21	7	15	19	21
							0.14	11	23	7	16	21	23
M10	11	24	8	17	23	24	0.1	16	34	11	24	32	34
							0.125	19	41	13	29	38	41
							0.14	21	45	15	32	42	45
M12	16	35	12	25	33	35	0.1	27	58	19	41	54	58
							0.125	33	70	23	49	66	70
							0.14	36	77	25	54	72	77
M16	31	65	21	46	61	65	0.1	66	140	46	99	132	140
							0.125	80	170	56	120	160	170
							0.14	88	188	62	133	177	188
M20	48	102	33	72	95	102	0.1	129	275	90	193	258	275
							0.125	156	334	110	235	313	334
							0.14	173	369	121	259	346	369
M24	69	147	48	103	137	147	0.1	222	474	156	333	444	474
							0.125	269	575	189	404	539	575
							0.14	298	635	209	447	596	635
M30	109	233	77	109	219	233	0.1	443	945	310	443	-	945
							0.125	538	1149	377	538	-	1149
							0.14	596	1271	417	596	-	1271
M36	159	340	111	159	319	340	0.1	767	1637	537	767	-	1637
							0.125	934	1992	654	934	-	1992
							0.14	1034	2205	724	1034	-	2205
M42	219	466	153	328	437	466	0.1	1223	2609	-	-	-	2609
							0.125	1490	3178	-	-	-	3178
							0.14	1650	3520	-	-	-	3520
M48	287	612	201	431	574	612	0.1	1841	3928	-	-	-	3928
							0.125	2245	4789	-	-	-	4789
							0.14	2487	5305	-	-	-	5305

Tab. 8-6 Installation data for set screws

Coefficients of friction and lubrication

The coefficient of friction, depending on the lubrication, can be found in the following table:

μ	Lubrication	
	5.6 / 8.8 / C3-80	**A4-50 / A4-70 / A4-80**
0.1	MoS2	Chlorinated paraffin or MoS2
0.125	dry or oiled	
0.14		Anti-seize compounds

Tab. 8-7 Recommended lubrication and friction coefficients

If special lubricants are used that are not mentioned here, please following the respective manufacturer's instructions.

For sub-supplied parts provided for the equipment, please observe the respective manufacturer's instructions.

CAUTION

Wrong torque tightening may cause machine damage and hazards leading to personal injury.

Please apply the tightening torques as shown in the drawings and table (Tab. 8-6).

8.6 Spare parts

A list of the spare parts required for the refiner can be found in the parts book.

➡ .../PARTS BOOK

Details on spare parts from sub-suppliers are also included in specifications from component suppliers.

➡.../SUPPLIER DOCUMENTATION

8.7 Lubrication

CAUTION

The refiner is supplied ex works without oil filling.
The refiner must be filled with oil before start-up.
The correct oil level can be read off at the oil level window.

Before start-up, check whether all lubrication points, in particular the bearings and gears, have been filled with the appropriate lubricants (see separate lubrication schedule).

Details on lubrication are also included in specifications from component suppliers.

➡.../SUPPLIER DOCUMENTATION

Please also observe maintenance instructions on the maintenance signs and rating plates attached to the machine and the components.

CAUTION

Incorrect disposal of waste oil causes an environmental risk!
Do not add foreign matter such as solvents, brake fluid or cooling liquid.
Collect leaking oil and dispose of properly without causing environmental pollution.
Oil containing plant-based raw materials should always be collected and disposed of separately.

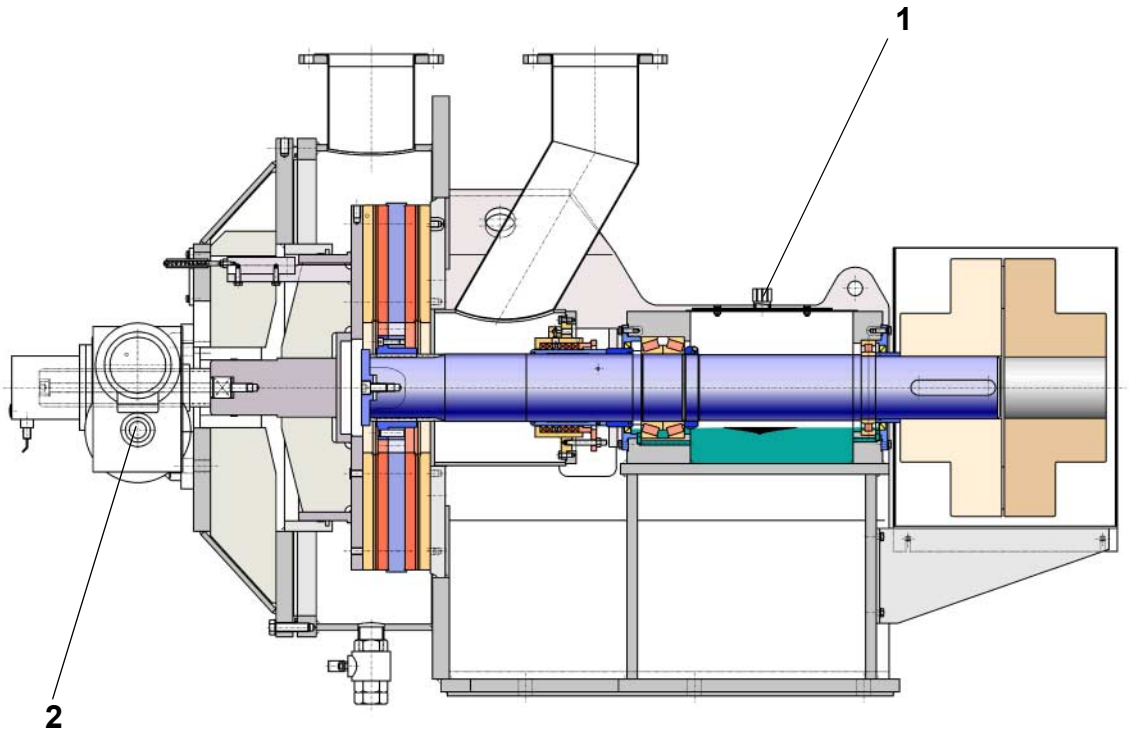
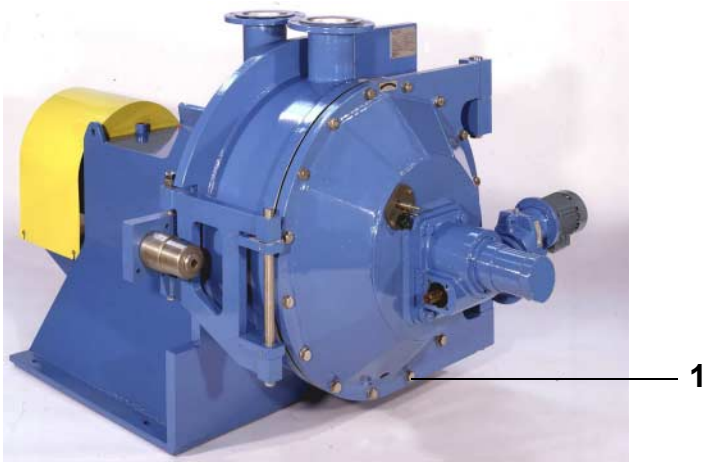
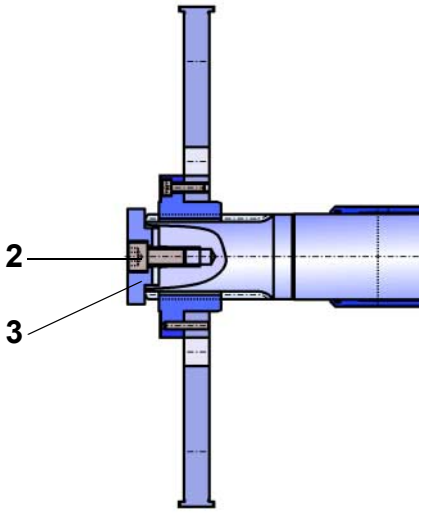


Fig. 8-1 TwinFlo Refiner TF34

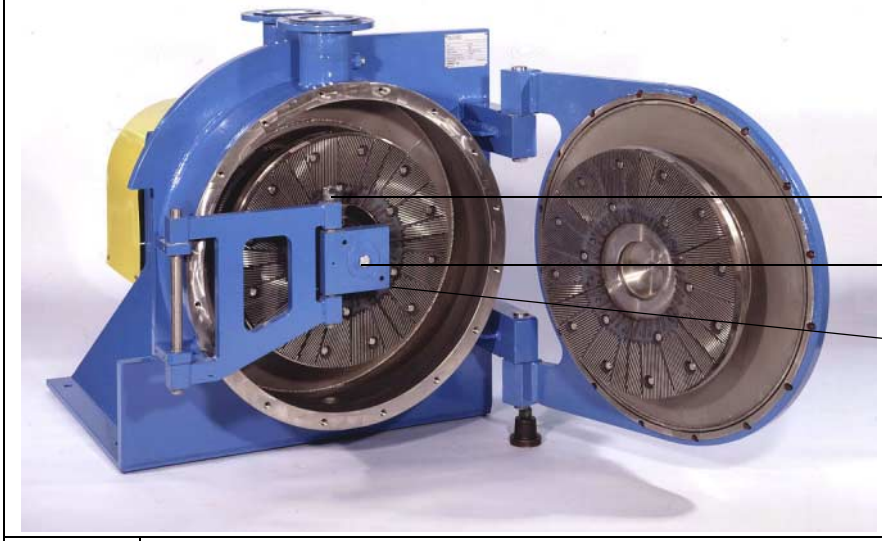
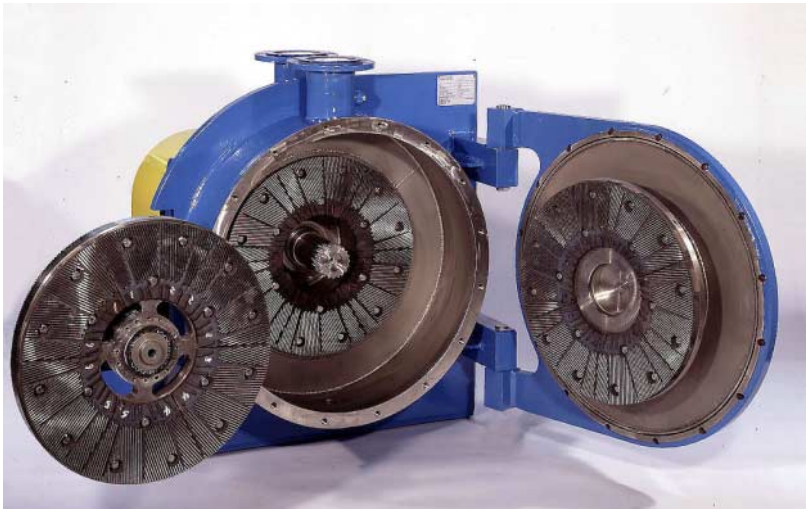
		Lubricating point			Quantity / Litres		Intervals / Operating hours	
Item	**Structural component**	**No.**	**Designation**	**Recommended lubricant**	**First filling**	**Refill**	**Refill**	**Oil/Grease change**
1	Bearing assembly	1	Lubricant filling cap	ISO VG150	18.5 l	Oil-level indicator	Check	8000
2	PFAFF actuator drive	1	Gearing (Lubricating nipple)	DEA Spectron FO 20 EP	1.3 kg		annually	Every 5 years
3		1	Spindle (Lubricating pipe at end of spindle)	DEA Spectron FO 20 EP	2-4 g		2 weeks	annually
4	Gear unit	see .../SUPPLIER DOCUMENTATION						

8.8 Dismounting the rotor

Dismounting the rotor

Step	Procedure
1	Clean the machine (see Section8.3).
2	Shut down all drives at all poles and secure against accidental start.
3	De-pressurize the casing and empty out the flushing water.
4	Detach hex. head bolts (**1**) and swing the cover aside.
	
5	Loosen the bolts (**2**) and remove with the washers (I**3**).
	
6	Place the rotor changing device on the rotor and secure with the bolt (**4**). The height of the rotor holder can be set using the adjusting nut (**5**).

Tab. 8-8 Dismounting the rotor

Step	Procedure
	
7	Push the two threaded rods (**6**) through the rotor holder and bolt to the rotor.
8	Screw the two hex. nuts onto the threaded rods. The rotor comes away from the splined shaft profile when the nuts are screwed in.
9	Pull the rotor right onto the rotor changing device.
10	Unscrew bolt (**4**) again.
11	Swing the rotor changing device away together with the rotor.
	

Tab. 8-8 Dismounting the rotor

Installing the rotor The rotor is installed in reverse order to the above.

8.9 Changing the refiner filling sets

Removing the refiner filling sets

Remove the refiner filling sets according to the following table:

Step	Procedure
1	Dismantle the rotor (see Section8.8).
2	Hold the refiner plate segment, loosen the bolts (**1**) and remove with the washers.
3	Remove refiner segment.

Tab. 8-9 Removing the refiner filling sets

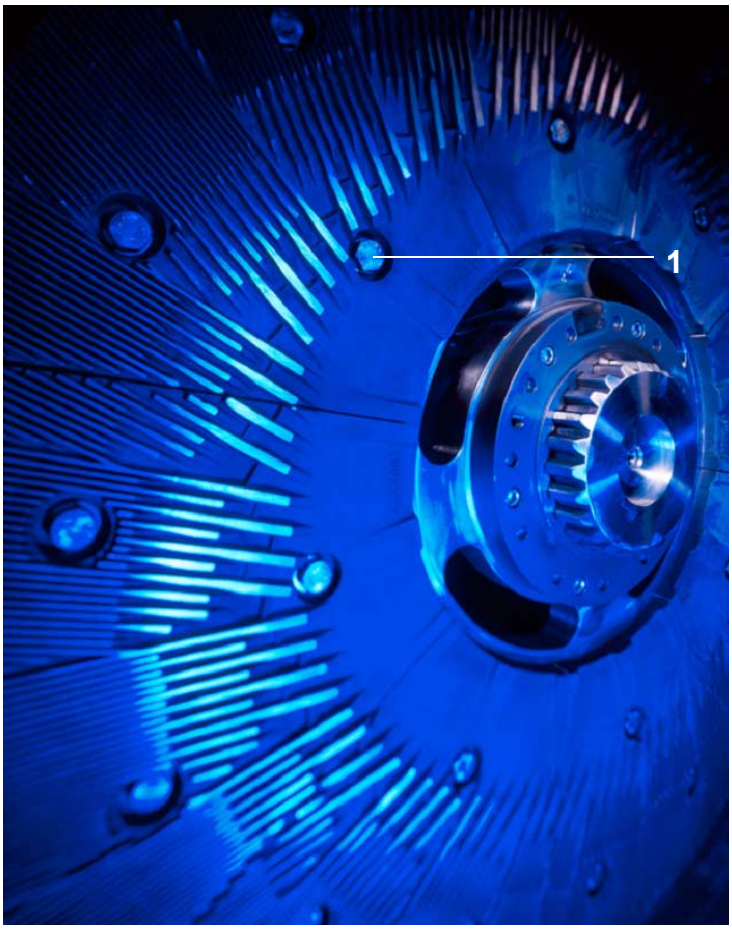
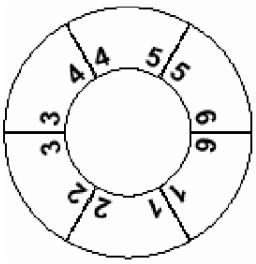


Fig. 8-2 Removing the refiner filling sets

Installing the refiner filling sets

Proceed according to the following table when installing the refiner fillings sets:

Step	Procedure
1	Measure the thickness of the refiner fillings and set the limit switch accordingly. ➡ .../INSTALLATION WORK/LIMIT SWITCH SETTING
2	Clean the supporting surfaces on the rotor and stator and check that they are even.
3	Check the tap holes for securing the refiner fillings. Repair any damaged threads with Helicoil threaded inserts.
4	Mount the segments in the arrangement shown. Only tighten the bolts (**1**) with washers slightly as the segments must be able to slide. Coat the thread and the head support of the screws with a suitable lubricant.
	The numbers are written by hand on the reverse side of the segments. The type designation of the set of refiner fillings is cast on the operator side.
5	Align the stator segments such that the spacing between the segments is the same everywhere. Tighten bolts (**1**). Required tightening torques according to section 8.5
6	Place the rotor segments on the guide ring and align such that the spacing between the segments is the same everywhere. Tighten bolts (**1**). Tightening torques according to section 8.5.
7	Mount the rotor according to section 8.8.

Tab. 8-10 Installing the refiner filling sets

For installation of the refiner fillings, please also refer to ➡ .../ SUPPLIER DOCUMENTATION/DURAMETAL

Caution!

The idle running power may change if new sets of refiner fillings are installed.
Measure the idle running power and enter the new value in the operating window of the control unit.

Measure the idle running capacity as described in the Chapter on "START-UP".

➡ .../START-UP

Running in the refiner filling sets

The refiner fillings should be run in as described in the "Operation" chapter.

Reduced refining performance must be expected during the run-in period for the refiner plates.

If two refiners are arranged in series, the times for changing the refiner plates should be coordinated where possible to ensure that the refiner filling sets do not have to be changed at both refiners at the same time. The advantage of this is that the second refiner will still be running at an optimum while the first refiner fillings are being run in. This means that the pulp quality produced will be better than if the refiner filling sets are changed at both refiners at the same time.

8.10 Changing the gland packing

Removing the gland packing

Proceed according to the following table when removing the gland packing:

Step	Procedure
1	Clean the machine (see Section8.3).
2	Shut down all drives at all poles and secure against accidental start.
3	Undo the nuts (**1**) and pull back the stuffing box gland (**2**).
4	Remove old stuffing box packings (**3**).
5	Take off the lantern ring (**4**).
6	Then remove the remaining gland packings (**3a**).
7	Clean the stuffing box gland, lantern ring and packing area thoroughly.
8	Check shaft protection sleeve (**5**)and replace if worn. **Notches or grooves on the surface of the shaft protection sleeve cause excessive wear on the gland packing!**

Tab. 8-11 Removing the gland packing

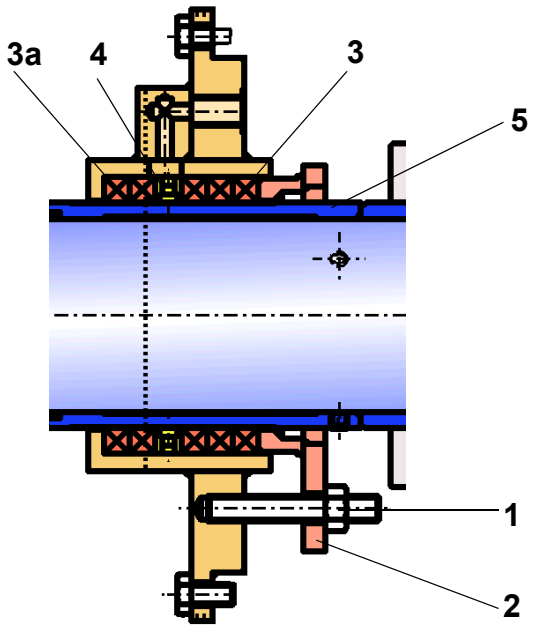


Fig. 8-3 Changing the gland packing

Installing the gland packing

Proceed according to the following table when installing the gland packing:

Step	Procedure
1	Mark gland packing and cut to the appropriate length. Keep stuffing box clean, do not stretch or squash stuffing box when measuring and cutting.
2	Wrap the packing round the shaft protection sleeve, then push the first packing ring into the stuffing box, starting at the butt joint. The ends of the ring must form a butt joint with no gap.
3	Push the first packing ring right in using a suitable tool. Mount the second packing ring with the butt joint offset by 120 degrees.
4	After inserting the second packing ring, mount the lantern ring.
5	Mount the remaining packing rings with the butt joints offset by 120 degrees.
6	When the stuffing box gland has been installed, tighten all nuts evenly according to the setting guidelines provided below.

Tab. 8-12 Installing the gland packing

Setting the stuffing box gland

DANGER

Thee is a considerable risk of crushing and being drawn into the machine when setting the stuffing box gland!
The stuffing box may only be set by trained and authorized personnel.

CAUTION

The stuffing box packing will be damaged if the stuffing box gland is screwed too tight.
If the stuffing box gland is too tight, this will cause burning on the seal surfaces.

Set the stuffing box gland according to the following table:

Step	Procedure
1	Tighten the screw fitting slightly at the stuffing box gland.
2	Turn on supply of sealing water.
3	Start up the machine.
4	Shut down the machine after a few minutes and check the temperature of the stuffing box seal. The temperature of the seal casing must not exceed 40°C.
5	Tighten the stuffing box gland further until there is less sealing water escaping.

Tab. 8-13 Setting the stuffing box gland

- The stuffing box should be checked at short intervals during the first few hours in operation.
- Set the stuffing box such that the shaft at the stuffing box gland is always moist.
- Loosen the screw fitting at the stuffing box gland if the stuffing box overheats.

New packings swell because they absorb water. This increases the surface pressure on the shaft and the large amount of sealing water that escapes at first is then reduced.

8.11 Changing the shaft protection sleeve

Removing the shaft protection sleeve

Remove the shaft protection sleeve according to the following table:

Step	Procedure
1	Clean the machine (see Section 8.3).
2	Shut down all drives at all poles and secure against accidental start.
3	Dismantle the gland packing (see Section8.10).
4	Dismantle the rotor (see Section8.8).
5	Detach the bolts (**1**) and remove the stuffing box cover (**2**) with the O-ring (**3**).
6	Undo the set screw (**4**) in the shaft protection sleeve (**5**).
7	Pull off the shaft protection sleeve with O-ring (**6**) forwards over the shaft.

Tab. 8-14 Removing the shaft protection sleeve

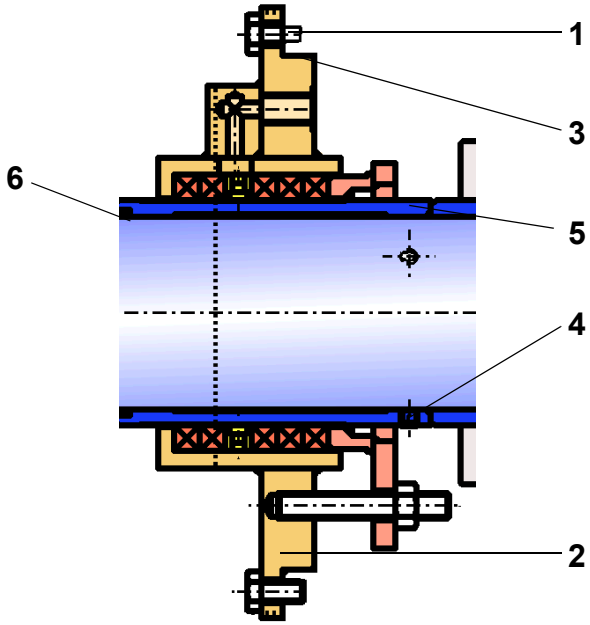


Fig. 8-4 Removing the shaft protection sleeve

Mounting the shaft protection sleeve

The shaft protection sleeve is installed in reverse order.
When the shaft protection sleeve is changed, the two O-rings (**3** and **6**6) must be replaced.

8.12 Changing the bearings

Preparations for dismounting the bearing

When dismounting the bearing, proceed according to the following table:

Step	Procedure
1	Clean the machine (see Section 8.3).
2	Shut down all drives at all poles and secure against accidental start.
3	Dismantle the coupling adjoining the motor according to the manufacturer's instructions and remove the feather key. ➡.../SUPPLIER DOCUMENTATION
4	Dismantle the rotor (see Section8.8).
5	Dismantle the gland housing (see section 8.11).
6	Drain off the oil for bearing lubrication.

Tab. 8-15 Dismounting the bearing

Dismounting the bearing

When dismounting the bearing, proceed according to the following table:

Step	Procedure
1	Remove the cover (**1**) on the top side of the oil container and suspend the shaft from a crane as support.
2	Detach bolts (**3**).
3	Undo the screws (**5**) and remove the bearing cover with the mechanical seal (**8**).
4	Pull the shaft to the left out of the machine.
5	Remove the shaft nut (**2**).
6	The bearings (**4**) should be removed according to the manufacturer's instructions (/ANNEX/ Maintenance, installation and removal of anti-friction bearings).
7	Remove bearing (**6**) according to the manufacturer's instructions . (/ANNEX/Anti-friction bearings, installation and removal of anti-friction bearings)

Tab. 8-16 Dismounting the bearing

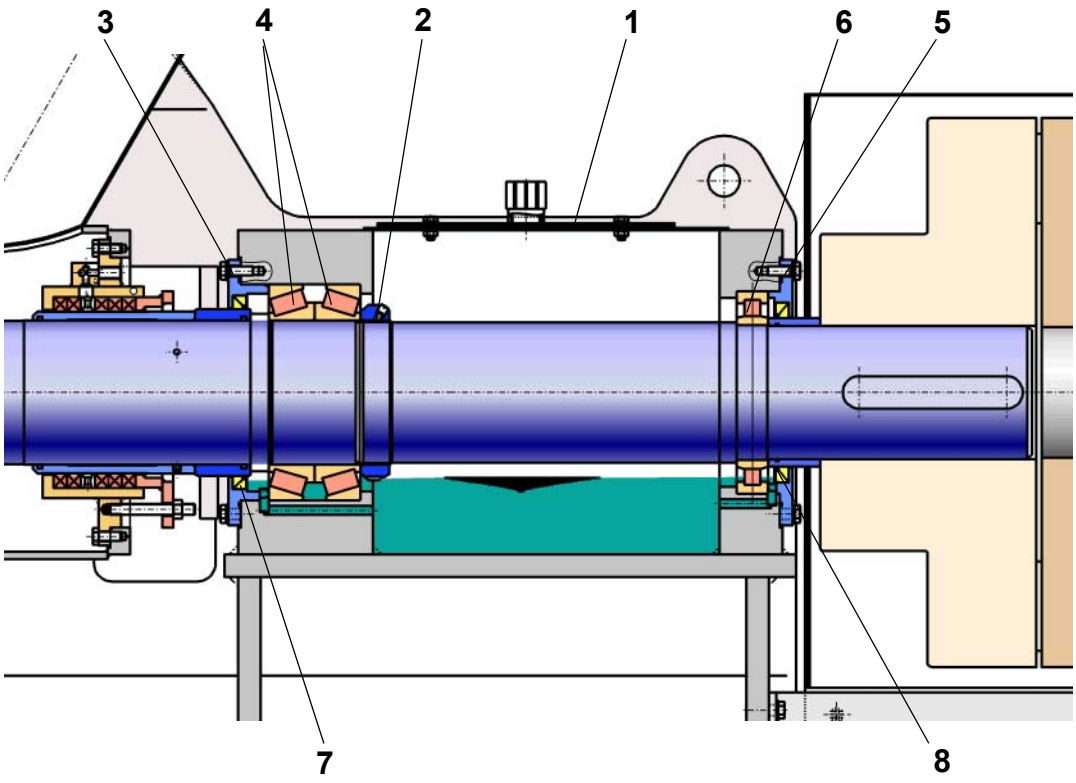


Fig. 8-5 Dismounting the bearing

Installation of bearing

The anti-friction bearings are installed in reverse order.

When the anti-friction bearings are changed, the two mechanical seals (**7** and **8**) have to be replaced.

9 SUPPLIER DOCUMENTATION

9.1 Housing

9.1.1 Ball Valve

Name of company VOLZ

Technical data Type . . . . . NKH-G 1.2

9.2 Refiner plate adjusting device

9.2.1 Worm gear screw jack

Name of company PFAFF-SILBERBLAU

Technical data

Type. . . . . SHE 25L

9.2.2 Worm gear motor

Name of company SEW

Technical data

Type. FF47 DRS71S4
Output:. . . . . 0.37 KW
Output speed . . . . . 11 rpm

9.3 Instruments

9.3.1 Proximity switches

Name of company PEPPERL+FUCHS

Technical data

Type. . . . . NBB 5-18GM60-WS-V12
Type. . . . . NBB 5-18GM60-WOE-V12

9.3.2 Temperature monitor

Name of company KOBOLD

Technical data

Type. . . . . TWR-3/4" NPT, NC, SS, 90C