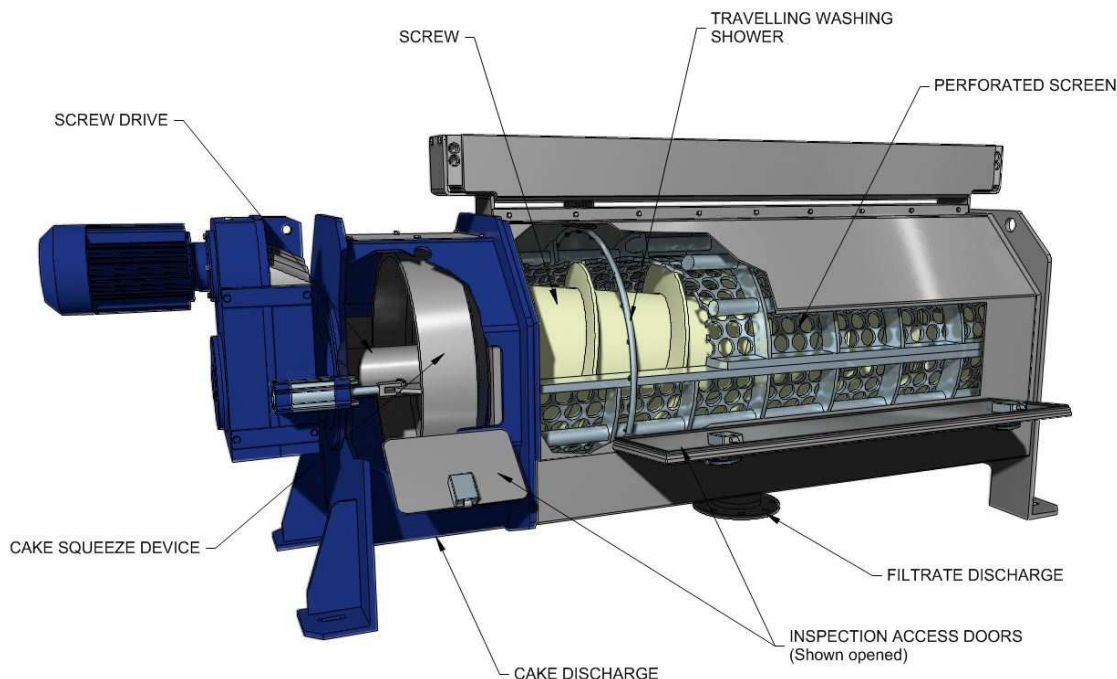


IEA SCREW PRESS

General description

The SP screw press is illustrated with its main components in the overview drawing. The sieve basket including the press screw is installed between the two bearing housings which are situated at the main frame. The sludge inlet happens on the right side between the center tube of the screw and the sieve basket. The solid matter is separated from the filtrate water inside the sieve basket. The filtrate water flows from the perforated mesh of the sieve basket and is collected at the filtrate tank. The sludge cake is discharged at the end of the press screw. At the discharge a press cone is situated which is pushed to the discharge with a constant power achieved by pneumatic cylinders. The drive of the press screw happens with a gear motor. Covers which are situated at the full length of the screw press avoid the discharge of filtrate and washwater and reduce the discharge of odour to a minimum. The washing device which includes several washing nozzles is cleaning the sieve basket during the dewatering process in cycles. The washing nozzles are installed on a circular tube which is moved axial over the full length of the sieve basket by means of a linear drive which is pneumatically actuated. During the washing of the sieve Basket the dewatering process is not interrupted. Technical clean water with a pressure of 3-5 bar is required for the washing process.



Components of the screw press

Base frame

For the installation of the screw and the sieve drum.
Fully enclosed design with access doors for direct view to the running process.

Dewatering unit

Consisting of the screen basket with the fine and coarse sieves and the dewatering screw.

Screw drive

The screw is driven with a directly flanged gear drive.
Speed control by means of a frequency inverter.

Cake discharge

The discharge takes place continuously at the end of the screw into the hopper. It is equipped with a pneumatically driven pressure cone which closes the cake outlet with a certain force to ensure constant compression of the dewatering process.

Filtrate discharge

The filtrate is discharged at a collection tray which is situated beneath the sieve drum.

Washing device

For the cleaning of the sieve drum in cycles or at the end of the dewatering process.
It consists of a circular pipe with washing nozzles and the device for the movement over the sieve drum. It is designed for cleaning the mesh without interruption of the dewatering process.

Mixing vessel

Closed pressure tank designed for overpressure of max. 0,9 bar.
Including speed controlled agitator for realization of compact sludge flocs with optimized size for maximum dewatering results.
Shaft feedthrough by means of packing gland.

Operation of the SP

Introduction

The SP can run in four different operation modes:

START OF DEWATERING

Preselection : HAND or AUTOMATIC

1. Every drive can be started separately

2. Automatic operation

1.1. No electrical interlockings or securities

2.1. Start cycle

2.2. Operation cycle

2.3. Shutdown cycle

2.4. Washing cycle

The dewatering operation of the SP can be stopped and restarted at any time.
Description of the single operation modes following below.

Starting of the SP unit in automatic mode

Operating mode of the dewatering unit before starting

The dewatering unit is in the following status and if not must be brought to this status by manual access.

Mixing vessel

The mixing vessel is not under pressure. The filling degree with conditioned sludge is irrelevant.

Pressure cone

The pressure cone is in it's open position => no pressure to the sludge cake.

Press screw

The drive of the press screw is switched off. The filling degree of the screw press is irrelevant.

Agitator of mixing vessel

The agitator drive is switched off.

Sludge- and polymer pump

The pumps are switched off.

Washing device

The washing device is not in operation.

Description of the start cycle of the dewatering unit

With the start command the following actions are carried out in the described sequence:

Agitator of mixing vessel

The agitator drive is switched on. Adjustable lead time (0-1000 Seconds)

Comment: *The speed of the agitator drive is determined during the start up and should be marked in the startup log. The required speed depends on the sludge characteristics. The checking and adjustment of the agitator speed in case of changings of the sludge characteristics must be carried out by the plant operator.*

Sludge- and polymer dosing pump

Both pumps get the start impulse at the same time and start with the preadjusted speed. It is possible to delay the start of the sludge pump to ensure that no unconditioned sludge gets into the mixing vessel. Adjustable delay time (0-1000 Seconds). The target of the sludge pump is to reach and hold the specified operation pressure of the mixing vessel. The operation pressure normally between 0,1 and 0,4 bar.

Comment: *The operation pressure of the mixing vessel is determined during the start up and should be marked in the startup log. The required operation pressure depends on the sludge characteristics. The checking and adjustment of the operation pressure in case of changings of the sludge characteristics must be carried out by the plant operator.*

Press screw

The screw drive is started with the start speed as soon as a defined start pressure is reached in the mixing vessel. This start pressure is below the operation pressure. Normally the start pressure is between 0,03 and 0,5 bar. As soon as the operation pressure is reached the speed of the screw drive is raised to the defined operation speed.

Comment: *The optimum screw speed is determined during the start up and should be marked in the startup log. It is the same with the start pressure of the mixing vessel. The required screw speed for a certain sludge throughput depends on the sludge characteristics. The checking and adjustment of the screw speed which is responsible for the sludge throughput must be carried out by the plant operator in case of changings of the sludge characteristics.*

Pressure cone

At the start of the screw press (when the defined start pressure is reached) the pressure cone is driven to it's close position.

Comment: *The air pressure of the cone is determined during the start up and should be marked in the startup log. The required air pressure depends on the sludge characteristics. The checking and adjustment of the air pressure in case of changings of the sludge characteristics must be carried out by the plant operator.*

Dewatering of the SP unit under automatic mode

During dewatering under automatic mode the pressure in the mixing vessel (given operation value) is kept constant by means of the feeding system consisting of the sludge pump and the polymer dosing pump. The press screw rotates with the preset speed. The pressure cone is pushed against the sludge cake at the outlet with a constant preset air pressure.

During dewatering under automatic mode a washing cycle is carried out according to the preset cycle time for a certain preset time.

Increasing of throughput

Screw press

To increase the throughput of the dewatering system the speed of the screw press must be increased in slowly and in steps.

Agitator of mixing vessel

Because of the increased screw speed more sludge flows through the mixing vessel. Possibly the speed of the agitator must be adjustet. It is recommended to increase the speed of the agitator at a higher throughput. Please note that the mixing vessel reacts slowly to these changes. Therefore the adjustment of speed should be carried out in small steps.

Pressure cone

Because of the increased screw speed more dewatered sludge is discharged which maybe makes it necessary to adjust the air pressure to the revised operation conditions. A reduction of the air pressure can result in a better filtrate quality. The increasing of the air pressure can result in a better dewatering result.

Increasing of the dewatering result

Screw press

To reach a higher dewatering result it is necessary to reduce the speed of the screw press slowly and in steps.

Agitator of mixing vessel

Because of the reduced screw speed less sludge flows through the mixing vessel. Possibly the speed of the agitator must be adjusted. It is recommended to reduce the speed of the agitator at a lower throughput. Please note that the mixing vessel reacts slowly to these changes. Therefore the adjustment of speed should be carried out in small steps.

Pressure cone

Because of the reduced screw speed less dewatered sludge is discharged which maybe makes it necessary to adjust the air pressure to the revised operation conditions. A reduction of the air pressure can result in a better filtrate quality. The increasing of the air pressure can result in a better dewatering result.

Control of the dewatering operation

The following items will be controlled automatically and a certain action is carried out if a limit value is exceeded.

Place of control	Control device	Functional description	Limit value	Action at exceeding of limit value
Sludge pump	Overpressure safety device	Continuous checking of the pressure in the system	Pressure	SDU is taken out of operation => Alarm
Sludge pump	Flow measurement	Continuous checking of the flow in the sludge pipe	Flow	SDU is taken out of operation => Alarm
Sludge pump	Dry run protection	Continuous checking of the stator temperature	Temperature	SDU is taken out of operation => Alarm
Polymer pump	Overpressure safety device	Continuous checking of the pressure in the system	Pressure	SDU is taken out of operation => Alarm
Polymer pump	Flow measurement	Continuous checking of the flow in the polymer pipe	Flow	SDU is taken out of operation => Alarm
Polymer pump	Dry run protection	Continuous checking of the stator temperature	Temperature	SDU is taken out of operation => Alarm
Mischbehälter	Overpressure safety device	Continuous checking of the pressure in the mixing vessel	Pressure	SDU is taken out of operation => Alarm

Washing cycles of the SP under automatic mode

Under automatic mode the following actions will be set in the described sequence

Pressure cone

Remains closed

Sludge- and polymer dosing pump

In operation

Screw Press

In operation

Washing

With the order for washing the solenoid valve for the washwater opens. At the same time the cycle for the movement of the linear drive for the washing ring starts. The movement happens by means of a pneumatic valve which opens and closes to control the movement of the washing ring between the two end positions. The washing is carried out for a certain time (1 – 10 minutes) which is depending on the type of sludge and the cycle time for washing.

Maintenance

The only wear part on the screw press is the screw sealing. The lifetime of this sealing depends on the amount of abrasive material in the sludge and is between 5.000 to 15.000 hours of operation.

The following signs indicate a wear of the screw sealing:

- Reduction of the throughput of the screw press
- Worsening of the dewatering result

Quick stop of the sludge dewatering unit

Because of the reason that the screw press must not be emptied during dewatering interruptions a quick stop can be carried out at any time. The restart of the system can be carried out at any time without a problem.