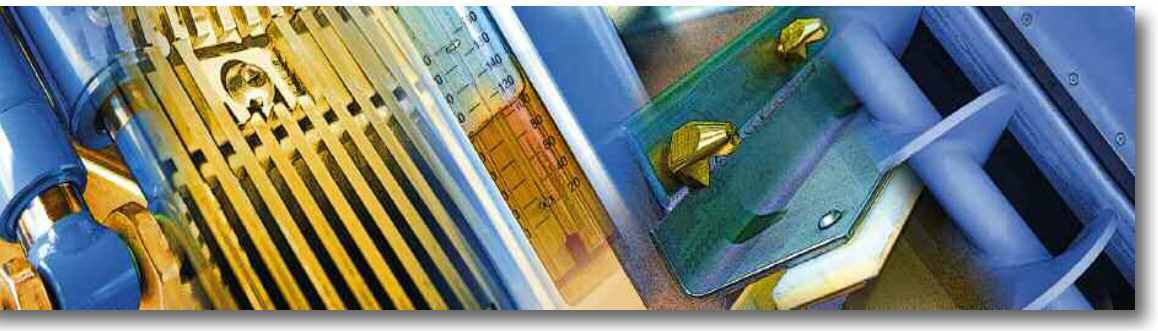
FLAT FINE SCREEN

The solution for a flexible and certain separation of solids



WERKSTOFF + FUNKTION
GRIMMEL WASSERTECHNIK GMBH
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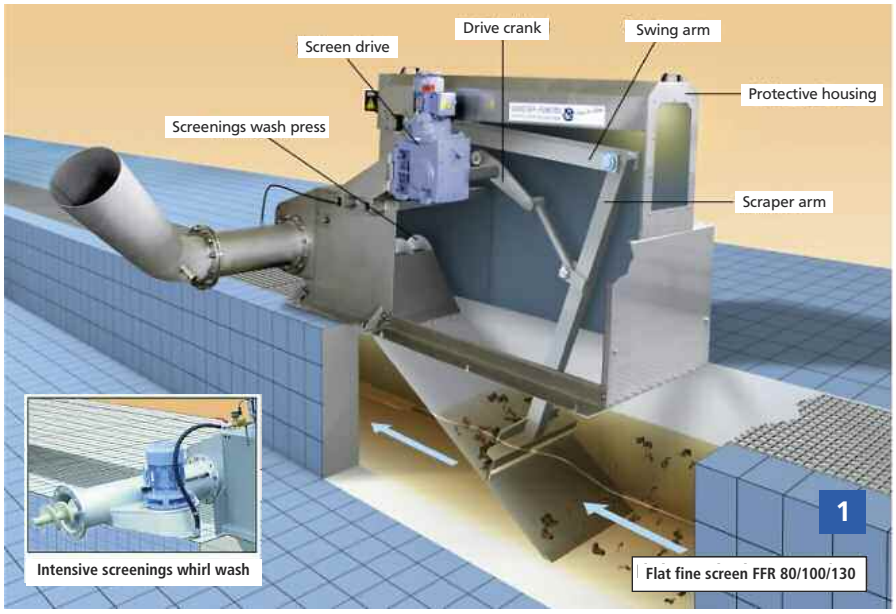
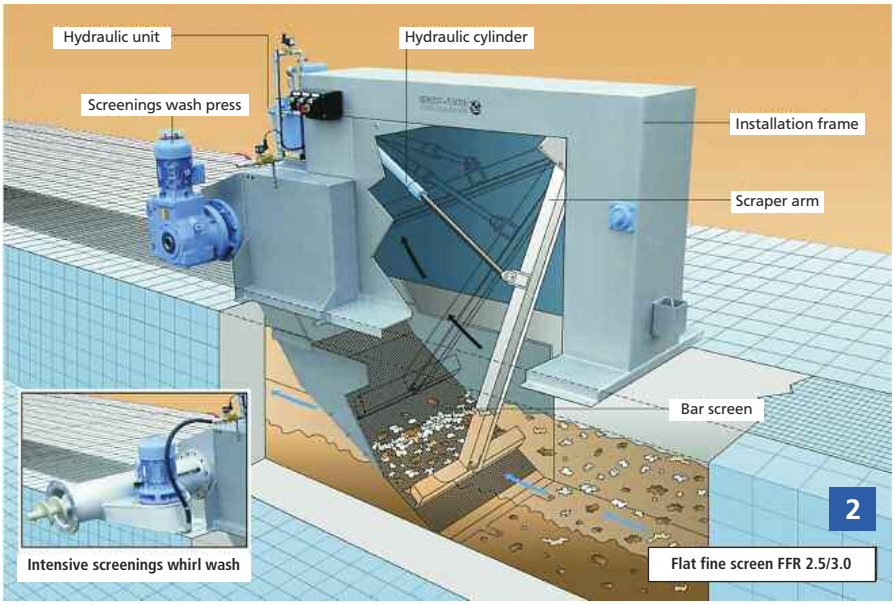
THE PROCESS

Our flat fine screen is variable like as the material that reaches a sewage treatment plant. Coarse and fine particles will be separated as required by the subsequent process. Our patented flat fine screen FFR has replaceable bar screens with openings from 1,0 - 6 mm to separate the screenings from the wastewater which flows in the inlet of the pretreatment area.

A special feature of the screen is the contoured bar screen profile, installed at a very flat angle of 30° in relation to the ground level of the channel. This ensures higher hydraulic throughput pretreatment with a screening system with sharply increased screen field angle. The installed bar screen gives 100% screen coverage of the channel width (no losses on the channel walls resulting from deflection systems, chain drives, structural frames, etc.). These two qualities give the flat fine screen an extra-large screening surface. A special frame, mounted on the channel bottom, allows for the easy replacement of the bar screen. The replacement is useable, to change the gap width of bar screen. All other parts of the flat fine screen are above the water line. In case of movement, the scraper arm touches down under the water line, to remove the solids and screenings from the bar screen into the integrated compactor.





The bar screen is cleaned by a scraper arm with an exchangeable scraping bar (material: PE) – nearly the only part that is subject to wear. Depending on the frame size, the scraper arm is driven either by a gear motor or by a hydraulic drive with a suitable hydraulic cylinder. The bar screen cleaning process starts directly on the channel bottom. The construction of the screen allows installation without a dip in the channel, avoiding sand and grit deposits. As the scraper arm moves upwards, all collected screenings on the bar screen will be picked up and will be removed by the scraper element in front of the scraper arm. When the scraper arm reaches its upper hold point, the screenings are passed to the subsequent screenings wash press via rinsing nozzles or, alternatively via a second mechanical waste scraper element. The scraper arm remains at its hold position above the water line until the next cleaning cycle starts.

The two bigger hydraulically powered screen types (FFR 2.5 and 3.0) (Pic. 2 and 4) also allow an optional pre-wash of the screenings at an earlier stage during the scraping process. This reduces the proportion of loose sludge and minerals in the screenings and lowers the consumption wear on parts in the subsequent screenings wash press. The models for low channel depths (FFR 80 until FFR130) (Pic. 1 and 3) do not require this pre-wash system. The flat fine screen system has already proven its suitability for everyday use in hundreds of applications and indeed particularly for sewage with a high proportion of mineral constituents. Its simple, reliable and low-maintenance stainless steel construction, together with a high level of hydraulic throughput are the main reasons why our customers decided for the flat fine screen system. Under usual conditions the flat fine screen is equipped with an integrated screenings wash press. The screenings that have been removed are flushed directly and without any mechanical touching into the wash press via the discharge edge of the bar screen. In the screenings

wash press any fecal content that stick on the screenings will treated in the wash water bath inside the press trough due to the movement of the press screw. The released fecal particles will be washed out with the added wash water (service water) and fed back into the swage flow together with the resulting press water.

The press water and any surplus wash water flows back into the channel via the discharge edge in front of the screen. Any material that is larger than the gap width remains on the grid and is conveyed into the wash press in the next clearance run. Once the screenings are removed, they are washed off and conveyed inside the subsequent friction and transport pipes, whereupon they are compacted and finally discharged into a container.

SYSTEM COMPONENTS AND FUNCTION

Base frame

The base frame is a sturdy welded stainless steel structure which houses the drive unit of the screenings wash press and the covers, which can easily be taken off, one segment after another. When the covers are open, it is possible to work on the entire construction, as it is easily accessible (Pic. 6 and 7). The base frame is mounted on the upper edge of the channel and bolted together with the bar screen frame that is installed in the channel, so that both frames create a single unit. Upon request, types FFR 80, FFR 100 and FFR 130 can also be delivered with interior lighting. This unique option is a great benefit in poor lighting conditions, as it provides a perfect view of all movable parts and also of the channel and the bar screen (Pic. 5).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Bar Screen

The bar screen with a slope in the direction of the flow, is designed in a flow-efficient construction and rests on a mounting frame, attached directly to the channel sole (Pic. 8). Both components are fixed together in such a way that they can be detached again.This design permits the simple, fast and cost-effective replacement of the installed bar screen. The special shape and strength of the bars in the screen grid profile make it resistant against mineral materials (stones, grit, etc.), grit and other solids. The bar screen is sealed on both sides on the channel by means of robust stainless steel profiles (Pic. 9).


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All components can be specially adapted to suit specific operational requirements. This starts by the selection of the stainless steel material and continues with special requests concerning the positioning of the optional on-site controls

Arm-mounted scraper

The scraper arm carries a self-adjusting, non-serrated scraper bar (Pic. 10) which handles clearance of the bar screen grid in a straight line, without causing jams or blockages. When it carries out its scraping job, the scraper starts directly in the area of the channel sole and sweeps screenings over the bar screen upwards, out of the wastewater flow and into the subsequent screenings treatment section (Pic. 11). The scraper arm is moved back by a mechanical deflection device and will be lifted up from the bar screen and move backwards down to the channel sole.


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Drive unit

Up to a channel depth of 1300 mm, the scraper arm is driven by a geared motor (Pic. 13), in deeper channels, up to 2500 mm, the system will be driven by a hydraulic unit and hydraulic cylinders (Pic. 12). The basic functional concept of the design ensures that even fairly large solids (such as stones, squared timber, etc.) do not cause any blockages on the screen.


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Discharge of screenings

The removed screenings from bar screen are flushed (Pic. 15 and 16) by spray nozzles which are integrated in the scraper arm into the screeings wash press who is integrated in the flat fine screen system. Upon request, the movement of the screening from the scraper arm inside is also possible by a mechanical scraper arm which will be foreseen inside the screen structure. In such a case no service water supply is required for the screen, only for the integrated screenings wash press.


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Screenings wash press

As a rule, the screen described above is followed by the treatment of the screenings in the wash presh (RGWP), which is connected on the base frame of the flat fine screen and forms a constructional unit with the screen. A special development allowed that the RGWP works without holes or slots in the trough of the wash press. This eliminates the need for conventional components such as brushes attached on the press screw or the press water box which is foreseen underneath the press trough in classical wash press systems. Further equipment that may be added is the patented replaceable forefront of the press screw for the convenient and cost-effective replacement of part (Pic. 18 and 19). It is also possible to add an intensive whirl washer unit after the screenings wash press which allows a much higher removal of fecal content from the screenings (Pic. 17).


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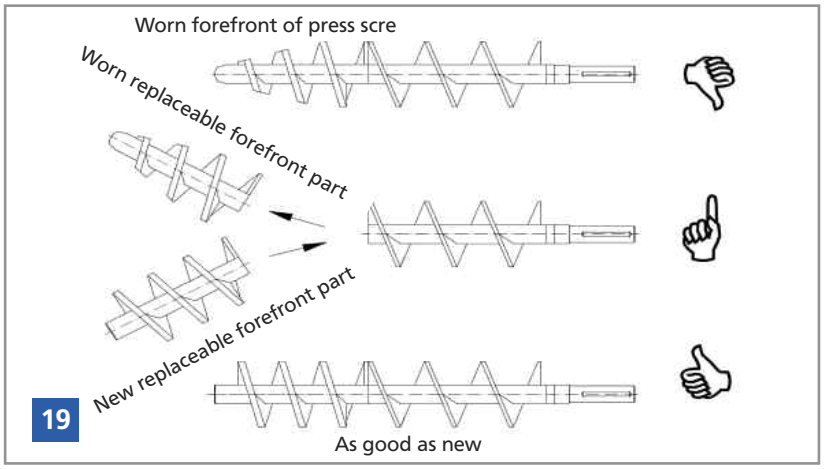

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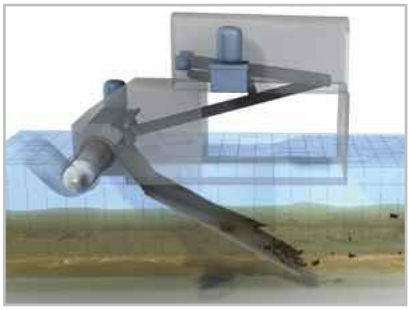
SEQUENCES OF MOVEMENTS IN THE CLEARANCE PROCESS

FFR 80 / FFR 100 / FFR 130 with electric drive



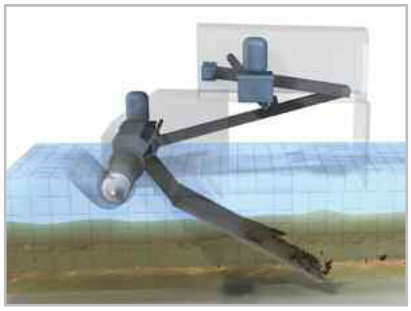
1. Idle position

2. Backwards movement

3. Beginning of clearance

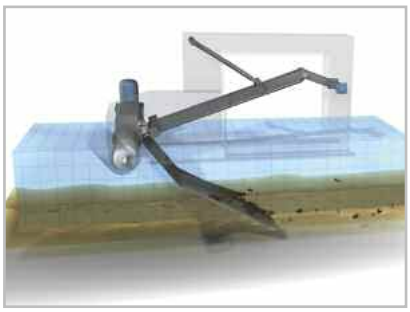
4. Clearance

5. Discharge point is reached

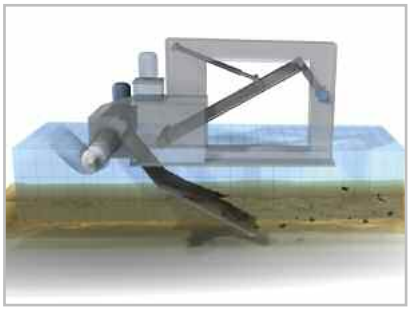


6. Screenings are washed out / discharged

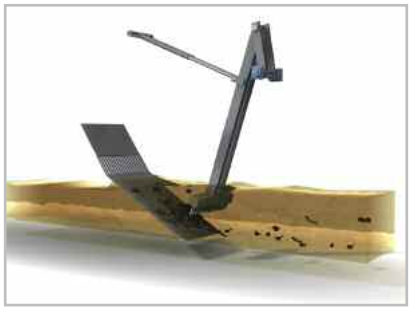
FFR 2.5 / FFR 3.0 with hydraulic drive



1. Idle position

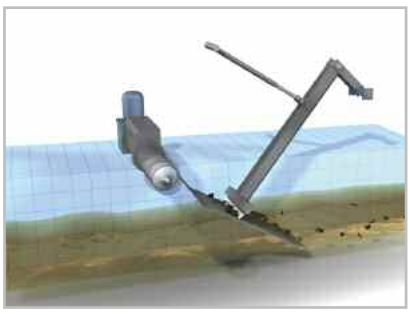


2. Backwards movement



3. Backwards movement

4. Beginning of clearance



5. Prewash on bar screen

6. Screenings are washed out / discharged

OPERATIONAL CHARACTERISTICS

- High hydraulic throughput and low hydraulic loss due 30° installation of the bar screen and use of total channel width
- No bearings, chains, brushes or deflection devices below the water level
- Easily detachable openings and hygienic containment
- Good visibility of the entire process
- Screening system with verifiable lowest malfunction and maintenance periods (German magazine Korrespondenz Abwasser, Abfall 2014 (61), issue 7, pp. 613ff.)
- Extremely low operating costs
- Machine requires no on-site readjustment
- Scraper is the only expendable item (any wear and tear of the bar will automatically compensate)
- Very little wear and tear as the machine contains few moving parts (maintenance costs, spare parts)
- No sand deposits in front of screen caused by scraping at ground level
- No jamming/blockage of screen caused by solids
- Simple to retrofit existing channels (no recess required in the channel bed)
- Completely made out of stainless steel (to suit your requirements)
- Low machine height, easily accessibly
- Very brief assembly time and therefore only short downtime for the sewage plant
- Gap widths can easily be changed at a later stage, by replacing the bar screen (a job which takes approximately 15 minutes), without the need to involve special assembly staff

Day-to-day experience

"... At long last: a screen that can cope with our stones and sand..."

"... The scraper is still working..."

"... It doesn't need any maintenance work..."

"... The principle is almost too simple..."

"... We quickly worked it out and solved the issue..."

"... No faults at all, even after decades..."

"... Amazing, all the stuff that's taken out by a surge flush ..."

"... We've got almost twice as much screened material now..."

"... Except for a daily visual check, we haven't done anything on the screen for years..."

"... I'd rather have a bit more screened material than the return flow from the press onto the grid and all that mess with clogged-up holes and slots in the old washer compactor..."

"... The interior lighting is great. We can keep the panelling completely shut."

FLAT FINE SCREEN FFR 80 IN A STAINLESS STEEL TANK

Besides the intended use in concrete channels the smaller types of the FFR screens - especially FFR 80 – can be installed in a stainless steel box or channel.

The use of these FFRs ranges from inlet screens, installed within free-standing steel channels, to integrated inlet tanks in compact grit trap systems (Pic. 21) with different throughput volumes. However, as the gap width can be adjusted to suit different requirements, implementation is also perfectly feasible for applications such as septic acceptance stations, return sludge screens and relief facilities for the replacement of primary clarifiers.

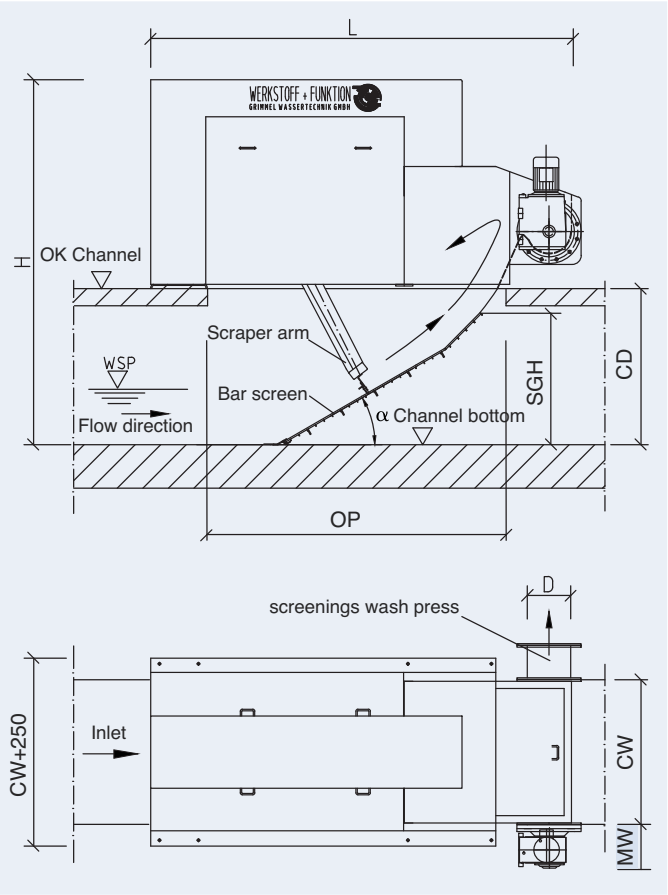
It is even conceivable to use the FFR 80 to operate a screen without a washer compactor – something which is otherwise uncommon in the FFR series. As usual, it is also possible to add optional extras as customised options to the steel tank, such as an integrated emergency bypass pipe, operating platforms, measuring equipment, on-site controls and also inspection holes in the tank.

Dimensions

Name	FFR 80 within container
Drive	Geared motor
Depth of the box	800 mm
Max. Width of the screen	1.500 mm
Length depends of the width	2.500 mm
Height over ground level	1.750 mm
Dimension of the press screw	200/250 mm

DIMENSIONS

Abbreviation	Meaning	Unit	FFR 80	FFR 100	FFR 130	FFR 2.5	FFR 3.0
	Drive (motor/hydraulic)		motor	motor	motor	hydraulic	hydraulic
CD	max. channel depth	mm	800	1.000	1.300	1.700	2.500
CW	max. channel width	mm	1.500	1.500	1.500	2.500	2.500
L	length of the unit	mm	1.800	2.100	2.600	3.600	4.400
H	height from ground level	mm	1.750	2.100	2.700	3.100	3.900
SGH	height of screen	mm	590	700	900	1.150	1.800
α	angle of screen	Degrees	30	30	30	30	40
D	dimension of press screw	mm	200/250	200/250	200-300	250/300	250-350
OP	min. opening at top	mm	1.500	1.800	2.100-2.280	2.400	3.000
MW	width of drive	mm	360	360	360	420	420



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