

Detailed Information Package

Hydro-Sludge[®] Screen

Durable Pressurized In-line Screening System



Improve the quality of your sludge, and increase process efficiency.

Wastewater Information Package - Introduction

The Hydro-Sludge® Screen was introduced by Hydro International to the UK market in 1998 as the “Sludge Screen”. Years of development and refinement in the UK market led Hydro to introduce and re-brand the technology for the US market in 2010 as the Hydro-Sludge® Screen. With hundreds of installations worldwide and an increasing installation base in the US, interest and momentum for this innovative technology is growing rapidly. Each improvement to the Hydro-Sludge® Screen was made with operations and maintenance in mind. Improvements to access and operator interface make the Hydro-Sludge® the easiest to use sludge screening technology available.

Hydro-Sludge® Screen Process Description

The Hydro-Sludge Screen is a horizontal in-line coarse solids separator that screens and dewateres in a single process unit. The main components of the Hydro-Sludge Screen are the inlet, screening zone, pressing zone and the screenings discharge area. Screening and pressing zones are installed in-line, in the horizontal longitudinal axis. The screw is encapsulated by perforated screen baskets with a backpressure cone at the discharge end of the pressing zone to regulate backpressure. A direct coupled gearbox and motor drives the screw.

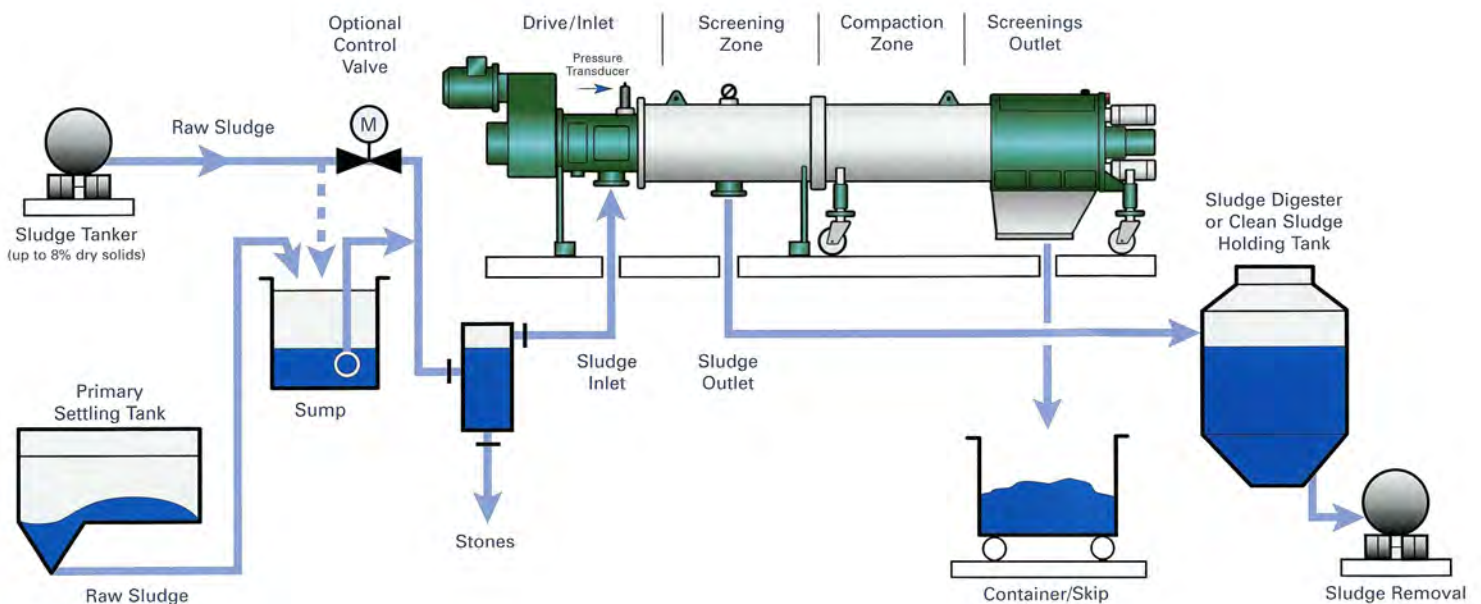
The unscreened sludge is pumped to the inlet and directed into the screening zone. Sludge flows through the perforated screen and exits via a flanged connection. Non-compressible solids larger than the 5 mm perforations are retained within the screen basket and transported to the dewatering zone by the rotating screw. The separated solids are further concentrated in the pressing zone, transported by the pressing screw, and compacted into a plug under gradually increasing compression. This is achieved by the regulation of the backpressure cone against the compacted screenings.

Liquid from the pressing zone is drained through the fine perforations, and fed back with the drained sludge from the inlet screens. The slowly discharging plug of solids is held back by the retention nozzle and the backpressure cone which also seals the sludge inside of the unit.

As the screenings plug is formed, the motor / gearbox torque increases, pushing the screenings against the backpressure cone. This torque is monitored and converted to a pneumatic pressure, which adjusts the backpressure on the cone to release the screened solids. The dewatered solids fall through the screenings outlet and are collected in a solids receptacle for final disposal.

Unit operations are controlled by measuring the pressure at the feed and discharge ends. Therefore, it is possible to determine loss in the screen area and the inner pressure on the solids plug. The main load on the drive unit originates from the pressing operation. As the forces are very high, the motor is equipped with overload protection. A moisture sensor is incorporated in the solids discharge box to indicate a sludge break-through in the dewatering zone and interrupt the feed.

Hydro-Sludge® Screen Process Illustration



Maintenance Friendly Features

1. Controls

The standard Hydro control panel design utilizes a PLC (Programmable Logic Controller) and HMI (Human Machine Interface). The HMI unit is easy to use and operator friendly, providing 'real time' information to the operator and allows key operational parameters to be changed easily such as start pressure, run-off delay time, high pressure and drive load trip points. Access is password protected for security. The use of PLC based controls and pressure transducers facilitate the use of SCADA systems in conjunction with the Hydro-Sludge Screen system. The control panel allows the unit to operate automatically by detecting when the inlet pressure increases which starts the Hydro-Sludge® Screen. The controls are designed to operate for either continuous or intermittent screening of sludge.



Control Panel with HMI

2. Pressure Transducer

The Hydro-Sludge Screen utilizes a pressure transducer on the inlet (versus a mechanical pressure sensing gauge). The transducer enables pressure reading on the control panel HMI along with other parameters. This also allows the Hydro-Sludge Screen to provide real time pressure output from the panel for integration into the plant monitoring control system.



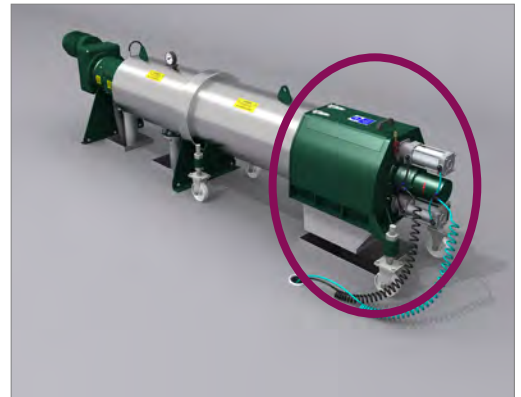
Pressure Transducer

3. Inlet Access Hatch

The Hydro design provides removable access covers as standard. The inlet point of the screen is the most likely place for a blockage to occur. Access to this area allows quick and easy removal of larger objects without dismantling the unit. The removable access covers ensure that the unit can be serviced and put back into operation much more quickly, minimizing downtime.

4. Larger Discharge Area

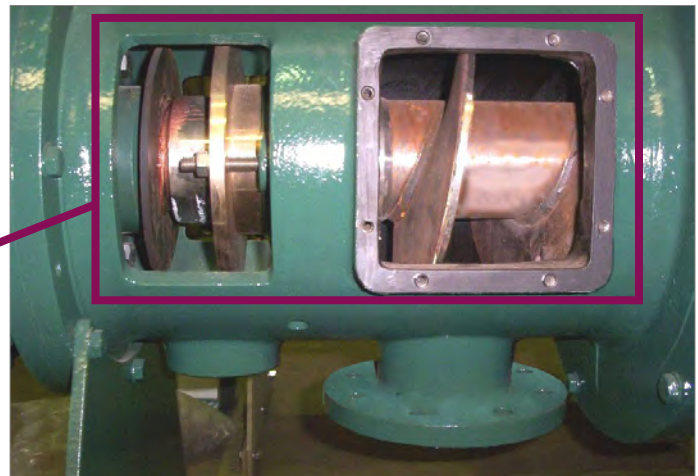
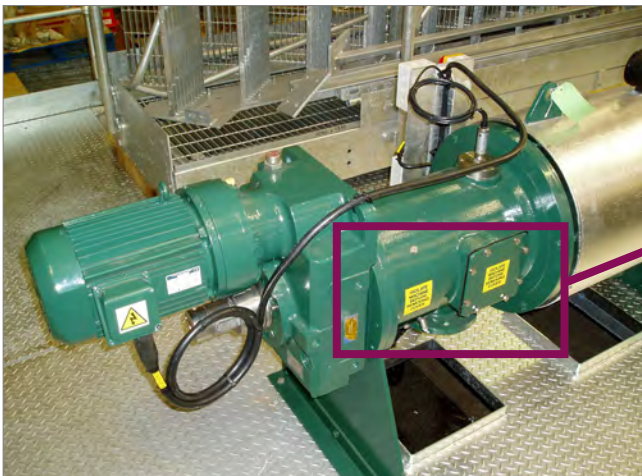
Standard Hydro-Sludge Screen design utilizes an extended discharge box that is 20% longer than conventional designs. This additional open discharge area reduces the potential for blockage and downtime.



The Hydro-Sludge Screen was lengthened in the discharge zone, increasing open area by over 20%

5. Direct Drive

Hydro introduced the direct drive system to reduce the number of mechanical components found on a chain drive system. Older chain and sprocket systems were more maintenance intensive; as chains stretch requiring tensioning and chain and sprockets wear requiring oiling and greasing.



Inlet Access Hatch (closed) on left. Close-up view of the Inlet Access Hatch (opened) on right.

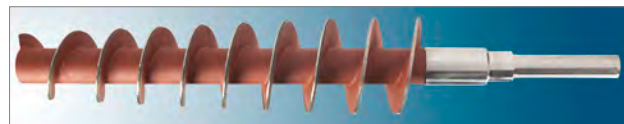
Materials of Construction

Housing & Support

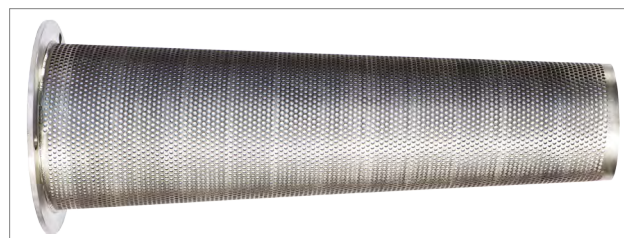
The Hydro-Sludge Screen inlet and discharge ends are constructed of heavy duty cast iron with a durable epoxy coating system. Cast iron provides the mechanical strength required to withstand the torsional forces developed within the unit. This gives the Hydro-Sludge Screen superior structural integrity. The Hydro unit weighs over 18% more than other units. Alternate coatings can be used for harsh environments where even stainless steel would suffer corrosion.

Screen Zone Screw

Hydro's standard material for the screening zone screw is carbon steel with stellite tipped flights welded to a stainless steel drive shaft. Because the leading edge of the screw flight cleans the internal surface of the screen, a tight interface between the two must be maintained. The leading edge of the screw will see the most wear and the stellite tipping maintains a sharp edge. Flights on the screening zone screw are made of 0.4" (10 mm) thick carbon steel which is seam welded to the drive shaft. The flights are tipped with stellite and ground to form an edge. Carbon steel is used for its superior strength and to reduce cost of this key replacement part. Stainless steel construction is available as an option.



Screen Zone Screw



Screen Zone Screen

Press Zone Screw

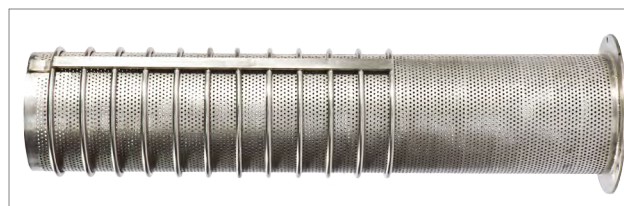
The press zone screw is manufactured of 304 stainless steel, with a mild steel stub shaft for inter-screw connection. The flight on the pressing screw is 0.31" (8 mm) thick. The press zone screw sees much less wear than the screen zone screw, tolerance between the screw and screen is not nearly as critical.



Press Zone Screw

Perforated Screens

All perforated screens are 304 stainless steel, 316 stainless steel is also available as an option. Screen material thickness is 3 mm and the screen zone screen is reinforced with external rings to provide additional strength. Conventional screens are not reinforced. Typical openings are 5 mm perforations in the screen zone and 3 mm in the press zones. Other openings are also available, to accommodate different sludge conditions. Screen perforations can be provided with 2,3,5,6,8, or 10 mm openings.



Press Zone Screen

System Design Considerations

- Hydro recommends the use of variable speed drive centrifugal solids handling pumps to feed the Hydro-Sludge® Screen.
- The Hydro-Sludge Screen requires the sludge to be pumped through the screen at a pressure not exceeding 17.4 psi.
- The standard electrical & pneumatic control panel enclosures are 304 stainless steel. Type 316 stainless steel enclosures are optional.
- The standard motor offered is suitable for use in a non-classified area.
- The pipe work associated with the Hydro-Sludge Screen is to be supported independently of the unit and heat traced if appropriate.
- Platform should utilize diamond plate rather than grating for ease of separating unit for maintenance.
- Normally the solids container will stand directly beneath the unit to allow the screenings to be deposited by gravity. The use of container guides is recommended to allow the container to be correctly positioned beneath the platform.
- No spare parts are expected within the first year of operation.
- If the feed sludge is pumped directly from tanker trucks a "Stone Trap" is necessary to protect the screen from stones. If requested, we can provide this as part of the scope of supply.

Technical Data

Application:	Sludge Screening
Type of Screen:	Pressurized in-line coarse material separator
Typical Flow rates*:	148 m ³ /hr @ 0–1% Dry Solids (DS) 111 m ³ /hr @ 2% DS 94 m ³ /hr @ 3% DS 83 m ³ /hr @ 4% DS 75.6 m ³ /hr @ 5% DS 68.4 m ³ /hr @ 7% DS
Discharge Screenings Concentration:	35-45% DS
Motor:	4 HP / 3ph / 380 V / 50Hz
Optimal working pressure (max):	14.5-17.4 psi
Pressure drop through unit:	7.25 psi (approx.) @ 5% DS
Screen Perforation (Screening Zone)	5 mm dia (typical) 2,3,6,8,10 mm dia options available
Screen Perforation (Pressing Zone)	3 mm dia (typical) 2mm option available
Weight Empty:	2,425 lbs. (1100 kg)
Inlet/Outlet Flanges:	Nominal 4" (10 cm) diameter
Trace Heating:	11W, 120V AC Self Regulating (if required)

* Values are based on 5 mm diameter Screening Zone screen and should only be used as a guide, as site specific factors influence performance.





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