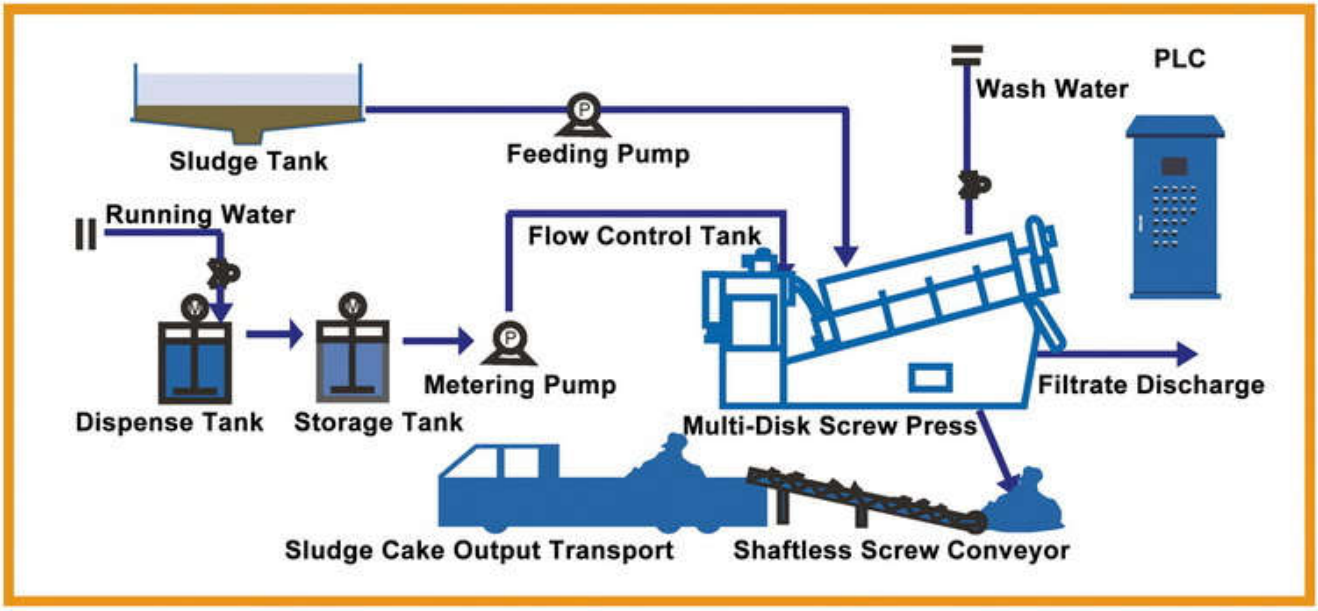
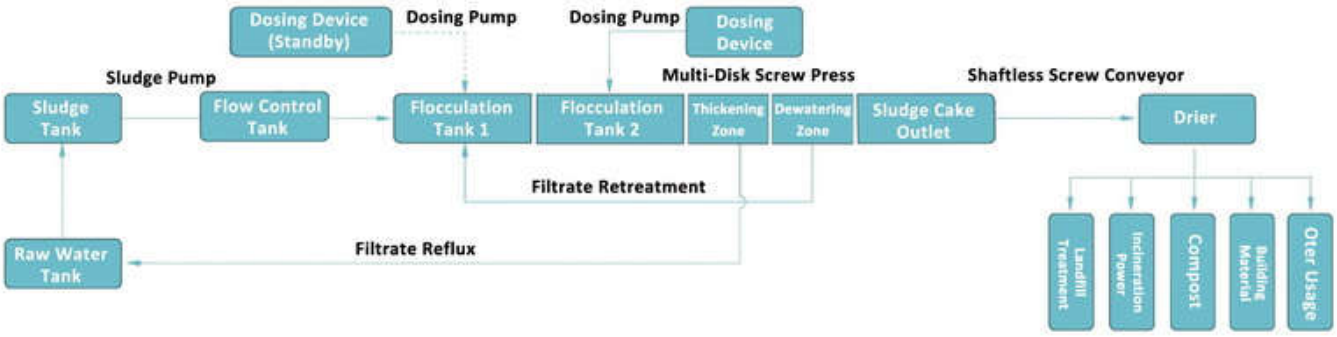
Sludge Treatment Process



■ *Flow Diagram*



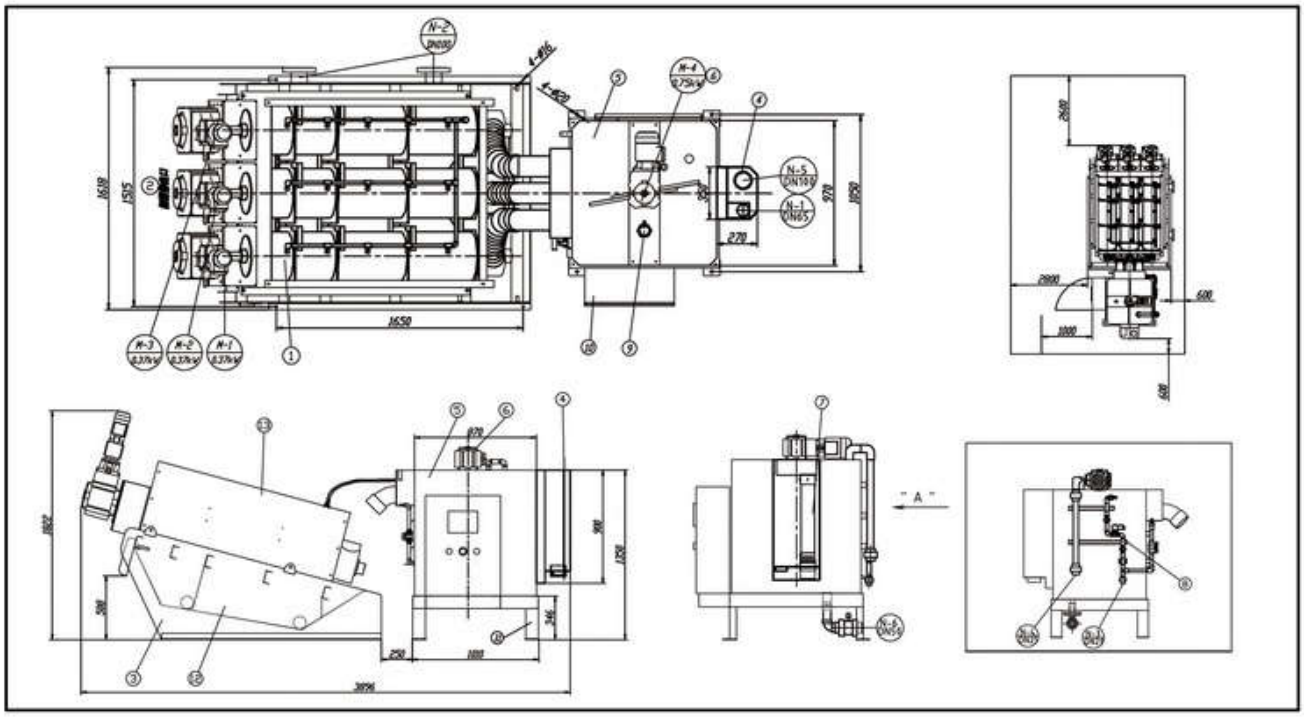
Process Introduction

1. Sludge is first fed into the Flow Control Tank and then flows down into the Flocculation Tank, where polymer coagulant is added.

2. From there, the flocculated sludge overflows into the dewatering drum where it is filtered and compressed. The entire operation sequence, including sludge feed control, polymer makeup, dosing and sludge cake discharge are controlled by the built-in timer and sensors of the PLC.

- Simple process, low system investment, highly efficient and energy-saving dewatering.
- System can be programmed to make the operation more convenient and accurate.
- Unique flocculating agent to make sludge dewatering easier.
- Uniform and accurate dispensing, saving running costs.

Layout of Multi-Disk Screw Press



Note： ***MDS 313 Layout Drawings***, this figure is only for reference , please ask for details while designing.

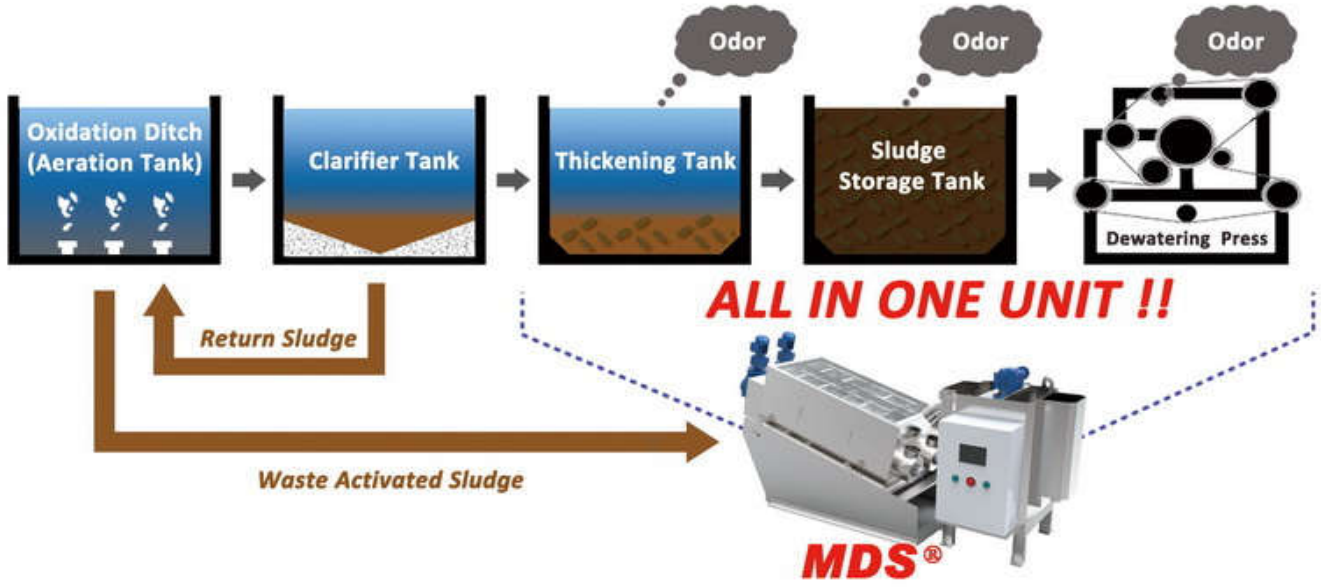
Cutting-edge Technology

■ Best Choice for Sludge Treatment

- Direct Dewatering from Oxidation Ditch -

In the past times, sludge was commonly thickened before dewatering, but when MDS Dewatering Press was introduced to the world, it's a cutting-edge technology, MDS is consisted of a filtering drum with both thickening and dewatering zone, changed this notion.

Due to the unique structure, MDS Dewatering Press can handle low concentrated sludge at 0.2% directly without any pre-thickening stage and is used in a great number of small-scale sewage treatment plants in China for dewatering sludge directly



- Advantages of Direct Dewatering from Oxidation Ditch -

* **Reduction of investment costs for thickening and storage equipment**
* **Reduction of running cost**
* **Removing odor by dewatering fresh aerobic sludge**
* **Reduction of the load of Phosphorus in the wastewater treatment**

Working Principle

Structure Principle

Layers of the spacers, which are Fixed and Moving Rings, are secured in place by a tie rod. The inner diameters of the Moving Rings are slightly smaller than the outer diameter of the screw and their rings. Mobilized by the screw, it continuously cleans the sludge out of the gaps, therefore, preventing clogging.

Force-water cocurrent

Force and water are in the same direction, making the free water comes out at the *Fastest Speed*

Moderate pressure

Maintain *Lowest energy Consumption and Mechanical wear* while ensuring the sludge dewatering effect

Thin-layer dewatering

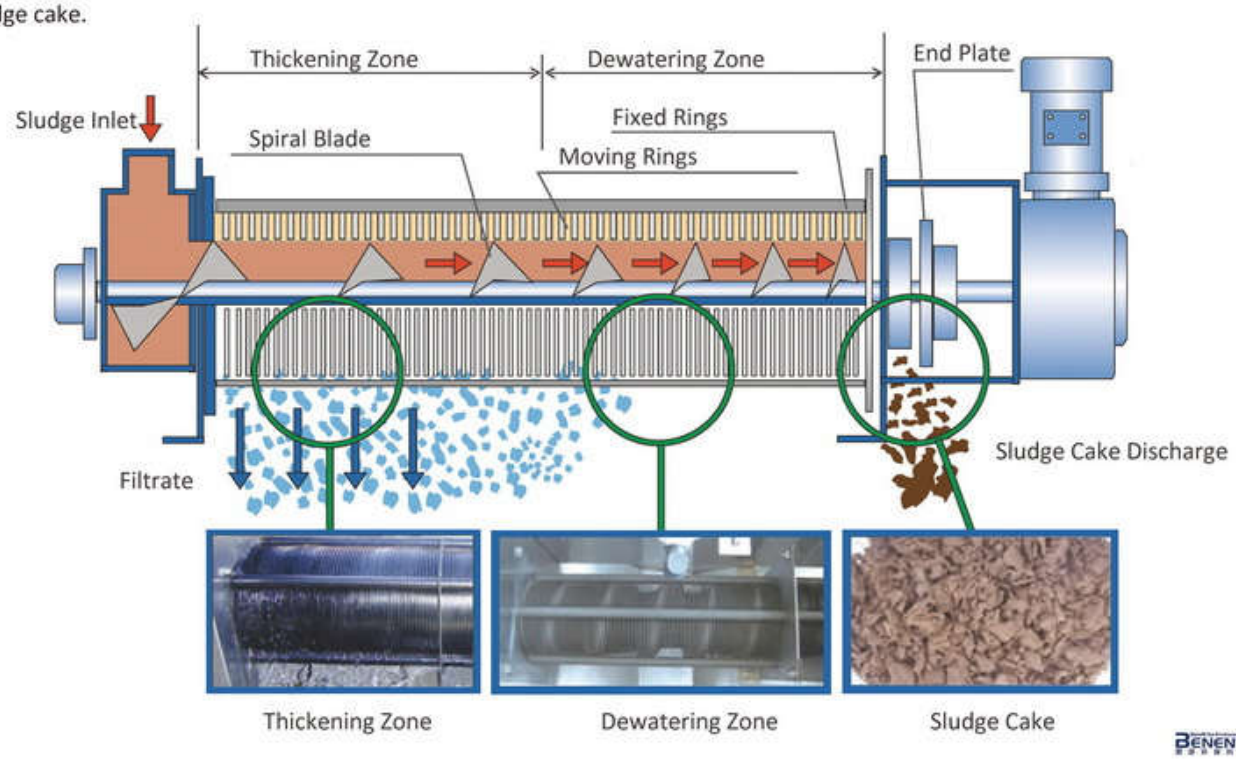
Thinning the sludge to make the free water come out by going a *Shortest Distance*

Extension of dewatering path

Not only ensuring the *Amount of Time* during the process of sludge dewatering, but also ensuring the *Continuous Operation*

Dewatering Principle

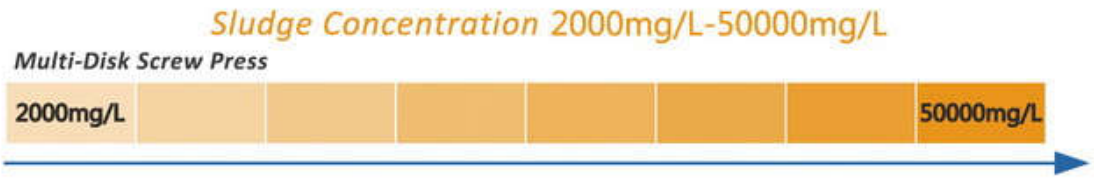
The initial section of dewatering drum is the Thickening Zone, where the solid-liquid separating process takes place and where the filtrate will also be discharged. The pitch of the screw and the gaps between the rings decrease at the end of dewatering drum, hence increasing its internal pressure. At the end, the End Plate further increases the pressure, so as to discharge dry sludge cake.



Technical Advantages

Widely Use

- Can be widely used in municipal sewage, food, slaughtering breeding, printing and dyeing, oil chemical industry, paper making, leather, pharmaceutical and other industries of sludge dewatering;
- Exclusive pre-concentration design, applicable sludge concentration of 200mg/L-50000mg/L;
- Due to the innovation of the structure design, it is highly suitable to various high and low concentration sludge, most especially the oily ones.



Clog-free

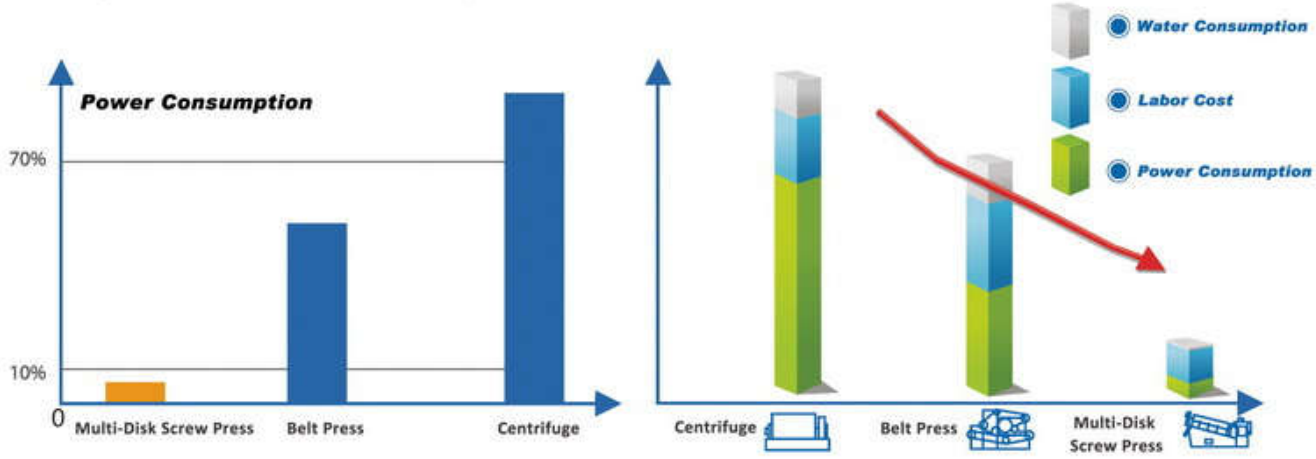
- Due to rotation of helical axis, the moving rings begin detaching from the fixed rings while continuously starting the self-cleaning process. As a result, the ubiquitous clogging is avoided. Therefore, it can handle oily sludge without any trouble while separating the water from the sludge easily. In addition, there is no need to add large quantity of flushing water and there is no odor and no secondary pollution during the dewatering process.

Fully Automatic Control

- There are no easily blocked pieces such as belt and filtration pore in Multi-Disk Screw Press. Combining with the auto control system, the machine runs very safely and simply and can be programmed according to the requirement of the users. It can operate automatically for 24 hours, unmanned.

Save Running Cost

- Multi-Disk Screw Press works by the machine's internal pressure and needs no large scale integrations like rollers. It saves energy and water and has very minimal noise because of low running speed (2-4 r/min). The average unit power consumption is only 0.1-0.01kwh/kg-DS (***1/8*** of ***Belt Press*** and ***1/20*** of ***Centrifuge***), and can greatly reduce the running cost of wastewater treatment system.



Contactless,Wear Free Structure Design

- Multi-Disk Screw Press uses the contactless wear free structure between the disks and spiral shafts, thus the service life of the Screw shafts and the rings will be greatly extended. The treatment capacity of equipment and processing effects can be improved in combination with other optimization design.

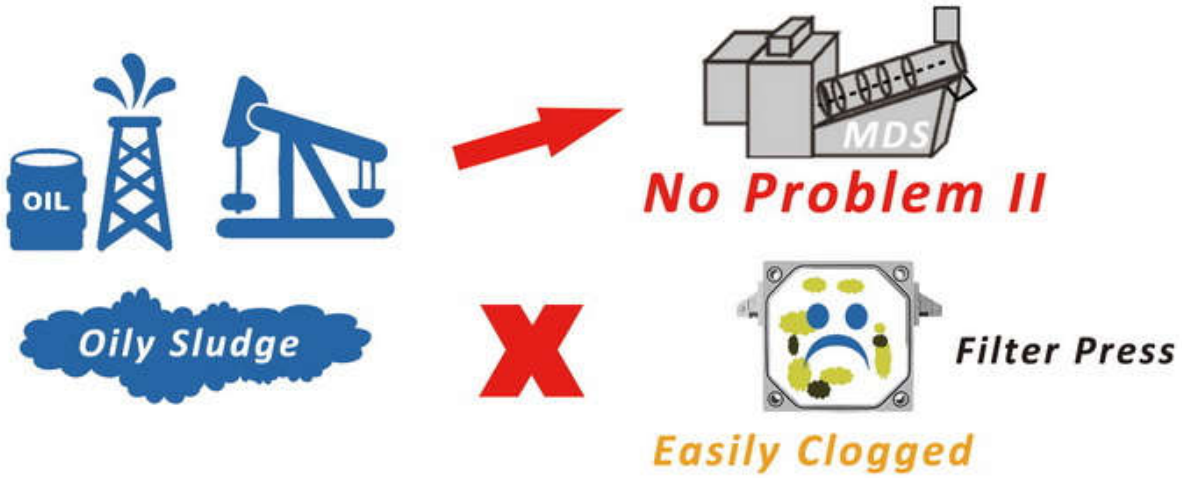
◎ The contactless, wear free design between the sludge-water separation devices and shafts in the dewatering part.

◎ Longer service life:shafts over 10 years and rings over 5 years.

◎ Wear free structural design to ensure a higher treatment capability and treatment effect.

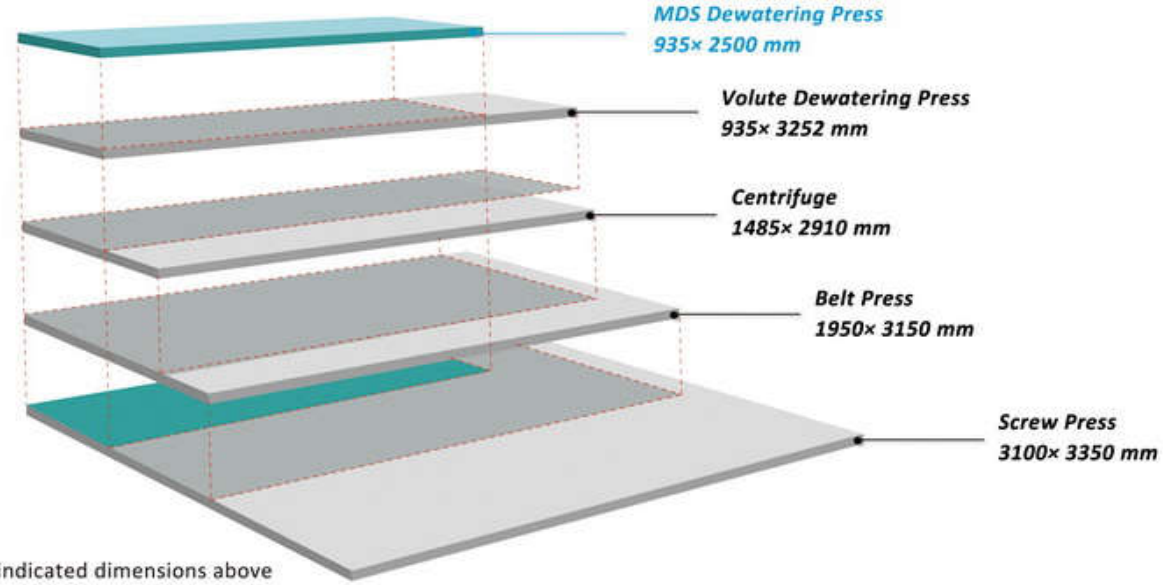
■ High Resistance to Oily Sludge

- The self-cleaning mechanism and stainless steel structure enables MDS to be ideal to dewater oily sludge, which easily causes clogging and is difficult to treat with other types of dewatering equipment.



■ Small Footprint

- MDS dewatering press can be installed in places where placement would not be possible with other technologies.This makes MDS suitable to customers who are considering the replacement of existing dewatering equip-

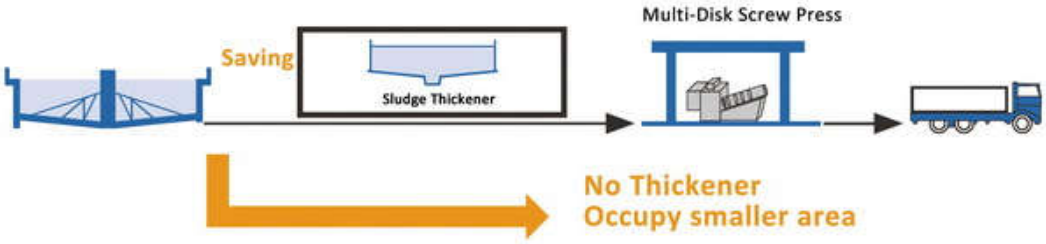


* The indicated dimensions above

The shown dimensions for the belt press and centrifuge are for the main bodies only. For other dewatering equipment, the dimensions of attachments, such as PLC control panels, flocculation tank, etc. are also included.

■ Decrease Capital Investment

- Multi-Disk Screw Press can treat sludge in aeration tank and secondary sedimentation tank without setting sludge thickeners. Therefore, this can decrease the total investment, avoid phosphorus release from the sludge thickeners and sludge storage tanks and enhance phosphorus removal effect of the wastewater treatment system.



◎ Save construction investments on sludge thickeners and costs on mixers, air compressors, flushing pumps and other auxiliary equipment.

◎ Occupy smaller area, reducing the construction investment on dewatering room.

■ Comparison Chart

Items	Multi-Disk Screw Press	Frame Filter Press	Belt Press	Centrifuge
Dewatering of Low Concentrated Sludge	✓	×	×	×
No need Thickener	✓	×	×	×
24-hour auto-matic operation	✓	×	×	×
Occupied Area	▲	▲▲▲	▲▲▲	▲▲
Energy Consumption	▲	▲▲▲	▲▲▲	▲▲▲▲
Labor Intensity	▲	▲▲▲	▲▲	▲
Noise	▲	▲▲▲	▲▲	▲▲▲▲
Maintenance	▲	▲▲	▲▲▲	▲▲▲
Running Cost	▲	▲▲▲	▲▲▲	▲▲▲▲

Specifications & Models

■ Models Reference

Model ①	Raw Wastewater Waste Activated Sludge Chemically Precipitated Sludge		Dissolved-air Flotation Sludge		Mixed Raw Sludge Aerobic Digested Sludge Sewage Sludge
Sludge Concentration (TS)	0.2%	1%	2%	5%	3%
MDS-051	~0.5kg-DS/h ② (~0.25m³/h)	~1kg-DS/h (~0.1m³/h)	~2kg-DS/h (~0.1m³/h)	~4kg-DS/h (~0.08m³/h)	~5kg-DS/h (~0.17m³/h)
MDS-101	~2kg-DS/h (~1.0m³/h)	~3kg-DS/h (~0.3m³/h)	~5kg-DS/h (~0.25m³/h)	~10kg-DS/h (~0.2m³/h)	~13kg-DS/h (~0.43m³/h)
MDS-131	~4kg-DS/h (~2.0m³/h)	~6kg-DS/h (~0.6m³/h)	~10kg-DS/h (~0.5m³/h)	~20kg-DS/h (~0.4m³/h)	~26kg-DS/h (~0.87m³/h)
MDS-132	~8kg-DS/h (~4.0m³/h)	~12kg-DS/h (~1.2m³/h)	~20kg-DS/h (~1.0m³/h)	~40kg-DS/h (~0.8m³/h)	~52kg-DS/h (~1.73m³/h)
MDS-201	~8kg-DS/h (~4.0m³/h)	~12kg-DS/h (~1.2m³/h)	~20kg-DS/h (~1.0m³/h)	~40kg-DS/h (~0.8m³/h)	~52kg-DS/h (~1.73m³/h)
MDS-202	~16kg-DS/h (~8.0m³/h)	~24kg-DS/h (~2.4m³/h)	~40kg-DS/h (~2.0m³/h)	~80kg-DS/h (~1.6m³/h)	~104kg-DS/h (~3.47m³/h)
MDS-311	~20kg-DS/h (~10m³/h)	~30kg-DS/h (~3.0m³/h)	~50kg-DS/h (~2.5m³/h)	~100kg-DS/h (~2.0m³/h)	~130kg-DS/h (~4.33m³/h)
MDS-312	~40kg-DS/h (~20m³/h)	~60kg-DS/h (~6.0m³/h)	~100kg-DS/h (~5.0m³/h)	~200kg-DS/h (~4.0m³/h)	~260kg-DS/h (~8.67m³/h)
MDS-313	~60kg-DS/h (~30m³/h)	~90kg-DS/h (~9.0m³/h)	~150kg-DS/h (~7.5m³/h)	~300kg-DS/h (~6.0m³/h)	~390kg-DS/h (~13m³/h)
MDS-412	~80kg-DS/h (~40m³/h)	~120kg-DS/h (~12m³/h)	~200kg-DS/h (~10m³/h)	~400kg-DS/h (~8.0m³/h)	~520kg-DS/h (~17.3m³/h)
MDS-413	~120kg-DS/h (~60m³/h)	~180kg-DS/h (~18m³/h)	~300kg-DS/h (~15m³/h)	~600kg-DS/h (~12m³/h)	~780kg-DS/h (~26m³/h)
MDS-453	~200kg-DS/h (~100m³/h)	~300kg-DS/h (~30m³/h)	~510kg-DS/h (~25.5m³/h)	~1020kg-DS/h (~20.4m³/h)	~1326kg-DS/h (~44.2m³/h)

① Use three letters and three digits to represent the Model. The letter MDS means machine type—Multi-Disk Screw. Two former digits means the MDS cylinder diameter, the last digit shows the number of the screw shafts, such as MDS 312, it means the MDS cylinder diameter is 310mm, the number of the screw shafts is two.

② Sludge Treatment Capacity=DS Standard Capacity÷Sludge Concentration (DS stands for Dried Sludge, 0% moisture.)

* Throughput of each model is based on sludge cake with 85% water content.

* There is no certain upper limitation on inlet sludge concentration, however, the target sludge must be flowable.

* Throughput of DAF Sludge is based on sludge containing much fat, oil, and grease such as meat processing applications etc.

* Throughput of Mixed Sludge (Primary Sludge and Waste Activated Sludge) and Aerobically Digested Sludge is based on sludge containing more than 30% fiber (200 mesh) against Total Solids.

Specifications

Model	Cylinder Specifications (mm)	Sludge Cake Outlet Distance (mm)	Machine Specifications (mm)			Net Weight (kg)	Running Weight (kg)	Power (kW)	Rinsing water (L/h)
			Length	Width	Height				
MDS 051	Φ 50 × 1	215	1105	656	980	100	120	0.2	12
MDS 101	Φ 100 × 1	215	1816	756	1040	200	290	0.2	24
MDS 131	Φ 130 × 1	250	1969	756	1040	220	315	0.2	24
MDS 132	Φ 130 × 2	250	2069	910	1040	305	450	0.3	48
MDS 202	Φ 200 × 2	350	2500	935	1270	520	730	0.8	64
MDS 311	Φ 300 × 1	495	3255	985	1600	910	1320	0.8	40
MDS 312	Φ 300 × 2	495	3455	1295	1600	1530	2230	1.2	80
MDS 313	Φ 300 × 3	495	3605	1690	1600	2090	3080	1.95	120
MDS 412	Φ 350 × 2	585	4140	1550	2250	2450	3400	3.75	144
MDS 413	Φ 350 × 3	585	4420	2100	2250	3350	4850	6.0	216
MDS 453	Φ 400 × 3	759	5037	2240	2400	4380	6800	6.7	300

Running Conditions

Model	Power (kW)			Rinsing ③ Water Pressure	Maintenance Frequency	Vulnerable Part Replacement Cycle ④ (h)	
	Screw	Mixer	Total			Screw Shaft	Moving Rings
MDS 051	0.1	0.1	0.2	0.1Mpa~ 0.2Mpa(No need High pressure washing device, tap water is fine.)	5min / day	10000	5000
MDS 101	0.1	0.1	0.2			10000	5000
MDS 131	0.1	0.1	0.2			10000	5000
MDS 132	0.2	0.1	0.3			10000	5000
MDS 202	0.4	0.4	0.8			15000	7500
MDS 311	0.4	0.4	0.8			30000	10000
MDS 312	0.8	0.4	1.2			30000	10000
MDS 313	1.2	0.75	1.95			30000	10000
MDS 412	3.0	0.75	3.75			30000	10000
MDS 413	4.5	1.5	6.0			30000	10000
MDS 453	4.5	2.2	6.7			30000	10000

③ Due to the dewatering body has self-cleaning function, it only needs to use atmospheric water (0.1 ~ 0.2 Mpa), rely on normally closed electromagnetic valve to spray regularly. ④ Replacement time of vulnerable part is an estimated time, in the actual operation process, the types of sludge, the means of processing, operation adjustment status and the running time of the day, will affect the replacement time. (Replacement cycle of vulnerable part is calculated as 365 days per year, 8 hours/day of running time.)

Integrated Sludge Treatment Solution

We supply integrated matching equipment based on our Multi-Disk Screw Press in the sludge dewatering system, to ensure automatic, stable and highly efficient operation.

■ Integrated System Composition

- Sludge Pumps　Submersible Sewage Pump, Screw Pump
- Chemicals Dosing Device　Dosing Barrel, Auto-dosing Unit
- Dosing Pumps　Plunger Metering Pump, Mechanical Diaphragm Pump
- Sludge Conveyor Device　Shaftless Screw Conveyor

Sludge Pumps :

Model Selection: The selected pump should continuously transfer quantificational sludge from sludge tank to the flocculation tank as per actual running request.

Flow = DS Reference Treatment Capacity per hour of configured dewatering machine/ sludge concentration.

- **Submersible Sewage Pump**

Description : The pump is concentrically connected with the motor and works in the sludge tank. It can realize long time continuous running without causing cavitation. Its flow can be adjusted by frequency converter to reduce sludge sedimentation during transferring sludge containing solid grains & long fiber.

Specifications

Model	Flow(m^3/h)	Lift(m)	Flow(m^3/h)	Lift(m)	Power(kW)
40DVSP5. 25A	1. 2	8. 7	5. 0	5. 4	0. 25
50DVSP5. 25A	2. 1	6. 6	12. 8	1. 8	0. 25
50DVSP5. 4A	2. 1	10. 2	15	3. 0	0. 4
50DVSP5. 75A	2. 1	14. 8	12	9. 0	0. 75
50DVSP51. 5A	2. 1	21. 4	13. 2	13. 5	1. 5
60DVSP5. 75A	8. 4	10. 9	24	3. 8	0. 75
60DVSP51. 5A	8. 4	15. 9	34	4. 2	1. 5
60DVSP52. 2A	8. 4	18. 3	46	6. 0	2. 2
60DVSP53. 7A	8. 4	23. 6	54	10. 4	3. 7
80DVSP5. 75A	8. 4	10. 9	24	3. 8	0. 75
80DVSP51. 5A	8. 4	15. 9	34	4. 2	1. 5
80DVSP52. 2A	8. 4	18. 3	46	6. 0	2. 2
80DVSP53. 7A	8. 4	23. 6	54	10. 4	3. 7

- **Screw Pump**

Description : The screw pump is a positive displacement pump that use one or several screws to move fluids or solids along the screw(s) axis. In its simplest form, a single screw rotates in a cylindrical cavity, thereby moving the material along the screw's spindle.

Specifications

Model	Flow(m^3/h)	Pressure(Mpa)	Power(kW)
G20-1	0.8	0.6	0.75
G20-2		1.2	1.5
G25-1	2	0.6	1.5
G25-2		1.2	2.2
G30-1	5	0.6	2.2
G30-2		1.2	3
G35-1	8	0.6	3
G35-2		1.2	4
G40-1	12	0.6	4
G40-2		1.2	5.5
G50-1	14	0.6	5.5
G50-2		1.2	7.5
G60-1	22	0.6	11
G60-2		1.2	15
G70-1	38	0.6	11
G70-2		1.2	18.5
G85-1	56	0.6	15
G85-2		1.2	30
G105-1	100	0.6	30
G105-2		1.2	55
G135-1	150	0.6	45
G135-2		1.2	90

Chemical Dosing Device :

Model Selection: The function of chemical dosing device is to dissolve powder flocculants or dilute liquid flocculants.

Volume = DS Reference Treatment Capacity per hour of configured dewatering machine x Flocculants addition rate x Dilution ratio x Retention time.

- **Dosing Barrel**

Description: It is composed of stirring motor, stirrer, feeding hole and clean hatch. It is used for small-scale projects and requires personnel supervision due to limited capacity.

Specifications

Model	Capacity(L)	Power(kW)
APT-500	500	0.75
APT-1000	1000	0.75

- **Auto-dosing Unit**

This equipment is automatic continuous allocation and dosing system. Dry powder enters into pre-mixe from screw propeller underneath the hopper. The moist material enters into the allocation tank to make the thinning mixing. It will be allocated as per the requirement of customer. The allocation solution enters into storage tank from allocation tank after the curing. When the storage tank is in high liquid position, the allocation process stops automatically.When the solution drops to low liquid position, the allocation process, then, starts automatically. Both the allocation tank and curing tank set the mixer and guarantee the dilution and curing for the flocculants.

Specifications

Model	Capacity(L/h)	Size(B×L×H)	Screw Pump Flow(m^3/h)
HTJY-500	500	900×1500×1650	1.0
HTJY-1000	1000	1000×1652×1750	1.0
HTJY-1500	1500	1000×2440×1800	1.5-2.0
HTJY-2000	2000	1220×2440×1800	1.5-2.0
HTJY-3000	3000	1220×3200×2000	3.0-5.0
HTJY-4000	4000	1450×3200×2000	3.0-5.0

Dosing Pumps :

Model Selection : Dosing pumps are used to deliver polymeric coagulant or inorganic flocculants to the flocculating tank. Due to the high viscosity of polymer coagulants, we should choose high viscosity resistance dosing pumps.

Flow = DS Capacity per hour of configured dewatering machine x Flocculants addition rate x Dilution ratio.

- **Plunger Metering Pump**

Description: The plunger metering pump is driven by a cam inside the in-line injection pump housing. Internally, a spring -loaded cam-follower converts the rotary motion of the camshaft into reciprocating motion. The reciprocating motion is transferred to a spring-loaded plunger, fitted with close tolerance in a cylindrical bore.

Specifications

Model	Flow(L/h)	Pressure(Mpa)	Power(kW)
J-D 25/50	25	50	4
J-D 70/40	70	40	4
J-D 100/28	100	28	2.2
J-D 125/26	125	26	4
J-D 180/10	180	10	4
J-D 300/15	300	15	4
J-D 450/10	450	10	4
J-D 650/4	650	4	4
J-D 1000/2	1000	2	2.2
J-D 1200/0.8	1200	0.8	2.2
J-D 2500/1.0	2500	1	4
J-D 3000/1.0	3000	1	4

- **Mechanical Diaphragm Pump**

Description: The diaphragm pump has two sections separated by a diaphragm. In one section a piston or plunger operates in a cylinder in which a non-corrosive fluid is displaced. The movement of the fluid is transmitted by means of flexible diaphragm to the liquid to be pumped. The only moving parts of the pump that are in contact with the liquid are the valves, and these can be specially designed to handle the material. In some cases, the movement of the diaphragm is produced by direct mechanical action, or the diaphragm may be air actuated.

Specifications

Model	Floww(L/h)	Pressure(Mpa)	Power(kW)
GM0050	50	1.0	0.25
GM0090	85	0.7	0.25
GM0120	115	0.7	0.25
GM0170	170	0.7	0.25
GM0240	235	0.7	0.25
GM0400	400	0.5	0.37
GM0500	500	0.5	0.37
GB0180	167	1.0	0.55
GB0240	237	1.0	0.55
GB0450	416	1.0	0.55
GB0500	464	0.7	0.55
GB1200	1200	0.35	0.75
GB1500	1500	0.3	0.75
GB1800	1800	0.3	0.75

Sludge Conveyor Device :

Model Selection: Sludge conveyor unit is used to convey the discharged sludge cake. The height from the bottom of sludge cake outlet to the ground must be put into consideration during selection, and the width of inlet of sludge conveyor should be slightly wider than the carrier plate.

Sludge cake throughput = DS Capacity per hour of configured dewatering machine / solid content of sludge cake.

- ***Shaftless Screw Conveyor***

Description: Shaftless screw conveyor is a kind of non-axis conveying equipment which conveys sludge along with screw rotating. It has advantages such as simple structure, sage and reliable operation, convenience usage and repair, continuum and level liquids discharging, stable pressure. It is totally enclosed for corrosive or hazardous requirements and will not cause secondary pollution.

Specifications

Model	Delivery Capacity(m^3/h)			Delivery Length(m)
	0°	15°	30°	
WLS-220	1	0.36	0.24(22°)	≤5
WLS-260	3	2.1	1.3	≤12
WLS-320	6	4.5	2.5	≤15
WLS-360	9.5	6.5	4.3	≤20
WLS-400	11	8.5	5.7	≤25

Installation Angle should be less than 20° , if request 20-30°, it's a custom-design.

Case Study

Multi-Disk Screw Press can be widely used for various wastewater treatment systems such as municipal, petrochemical, chemical fiber, paper making, pharmaceutical, leather and oythr industrial water treatment system. Also it can be used for ***Dairy Farm Manure Treatment***, ***Palm Oil Sludge, Septic Sludge,*** etc. The practical operation shows that Multi-Disk Screw Press can bring considerable economic and social benefits for users.

Project: *SAJ-WWTP TREATMENT PLANT*

Region: *Kota Bahru , Malaysia*

Model: *MDS 413*

Sludge Type: *Municipal / WAS Sludge*

Project: *GARNIER Slaughter House*

Region: *Nantes, France*

Model: *MDS 202*

Sludge Type: *Food Processing / DAF Sludge*

Project: *CP Thai Food Group (Vietnam)*

Region: *Ho Chi Minh City, Vietnam*

Model: *MDS 311*

Sludge Type: *Food Processing / Mixed WAS and DAF Sludge*

Project: *Surdeshan Chemical Group*

Region: *Dahod, India*

Model: *MDS 312*

Sludge Type: *Chemical Sludge / Chemical Precipitation*

Project: *Ganurn Chemical Products*

Region: *Belo Horizonte, Brazil*

Model: *MDS 131*

Sludge Type: *Chemical Sludge / Chemical Precipitation*

MDS dewatering screw press covers almost all industries. Please send us sewage sample for chemical determining, we will provide with the most detailed report and optimal solution.

Project: *ANSTEEL GROUP*

Region: *Liaoning, China*

Model: *MDS 413*

Sludge Type: *Mechanical / Precipitation Sludge*

Project: *YANGTZE RIVER PHARMACEUTICAL GROUP*

Region: *Jiangsu, China*

Model: *MDS 313*

Sludge Type: *Pharmaceutical / Precipitation+WAS sludge*

Project: *Oriental Petrochemical*

Region: *Taiwan*

Model: *MDS 412*

Sludge Type: *Petrochemical / DAF Sludge*

Project: *Fair Oaks Farm - Nutrient Recovery Project*

Region: *Indiana, USA*

Model: *MDS 413 / 3 sets*

Sludge Type: *Dairy Farm / DAF sludge (Manure)*

Project: *Palm Oil Treatment Plant in Kuala Lumpur*

Region: *Kuala Lumpur, Malaysia*

Model: *MDS 413*

Sludge Type: *Palm Oil / Precipitation sludge*

Project: *Shenzhen City Clean Co,.Ltd.*

Region: *Shenzhen, China*

Model: *MDS 312 / Integrated Sludge Treatment System*

Sludge Type: *Septic Sludge / River Desludging*