Part 2: Decanter Centrifuge

2.1 GN Industry Decanter Centrifuge

GN designs and manufactures different sizes of decanter centrifuges for industry separation. Solid bowl decanter centrifuges have been operating according to the same basic principle since the 19th Century. GN centrifuge production line is from 9inch (220mm) bowl to 30inch (760mm) bowl, with bowl length and diameter ratio up to 4.2, and the adjustable G force is up to 3000G to meet different industries' separation applications.

GN design specific centrifuges according to specific separation tasks and the use of resilient, high-quality materials have improved the performance of the centrifuges.

Moreover, GN owns a branch for design PLC and electrical control system; this gives GN advantages in electrical components for measuring and control technology. The performance and availability of the decanter centrifuges or three-phase centrifuges are significantly improved by the control system.

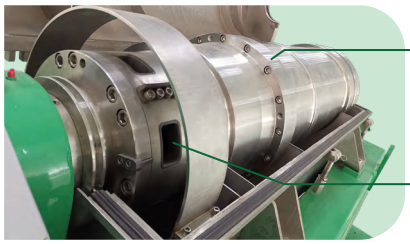
Main Function of GN Industry Centrifuges

- Dewatering sludge / mud and suspensions
- Thickening sludge or mud
- Clarifying different type liquids
- Separating 3-phase mixtures, i.e. two immiscible fluid phases and a solid phase
- Classifying solids in a wet suspension by grain size
- Separation of solids according to various densities

GN Centrifuge Main Application Industry

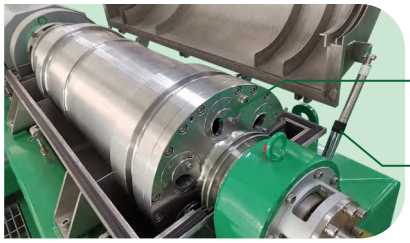
- Oil Gas Drilling Mud Solids Control
- Drilling Waste Management
- Oil Sludge Treatment
- HDD trenchless mud cleaning
- Bored Pile and TBM mud dewatering
- Waste water treatment
- Chemical and Pharmaceutical separation
- Mining industry separation
- Food and Beverage industry separation

2.1.1 GN Centrifuge Features



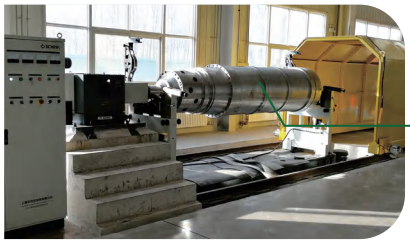
The bowl of GN centrifuge is made from Duplex Stainless Steel SS2205 or SS2304 by centrifugal casting which is better than SS304 or SS316.

The solids discharge port is made from Tungsten carbide inserts, the anti-abrasion will extend the life.

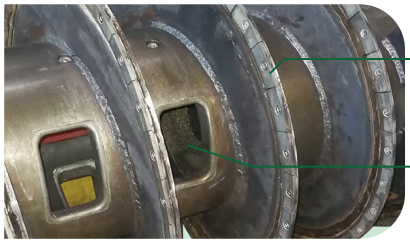


Flexible pond depth adjustment for different material separation.

The air-operated spring for assisting open of the cover with safety locking system.

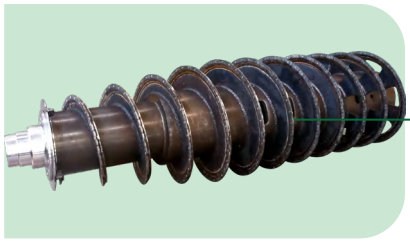


3 Stage balancing processes to maximize the balance of the centrifuge include 1800RPM low speed balancing and real operation high speed balancing as well as the assembly balancing.

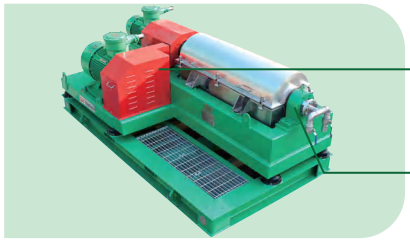


The Screw is protected by interchangeable Tungsten Carbide Tiles for longer life and easy maintenance.

The mud distribution port is made from Tungsten carbide inserts, the anti-abrasion will extend the life for heavy mud.



The screw is made from stainless steel with heat treatment, and the opening impeller will improve the centrifuge capacity. Single Lead or double lead screw is optional.

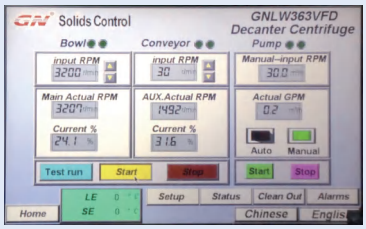


Two motors in one side to give more space for the operator to do maintenance.

The bearings are premium SKF bearings for reliable and longer operation. The automatically lubrication system is available for option.

2.2 GN Centrifuge VFD Control Panel

For the oil gas industry and mining industry, most of the time, the client need to use Explosion proof VFD control panel for hazardous area.GN developed the pressurized explosion proof VFD control panel to meet the IEC Ex, ATEX, and CNEX zone 1 and zone 2 applications.

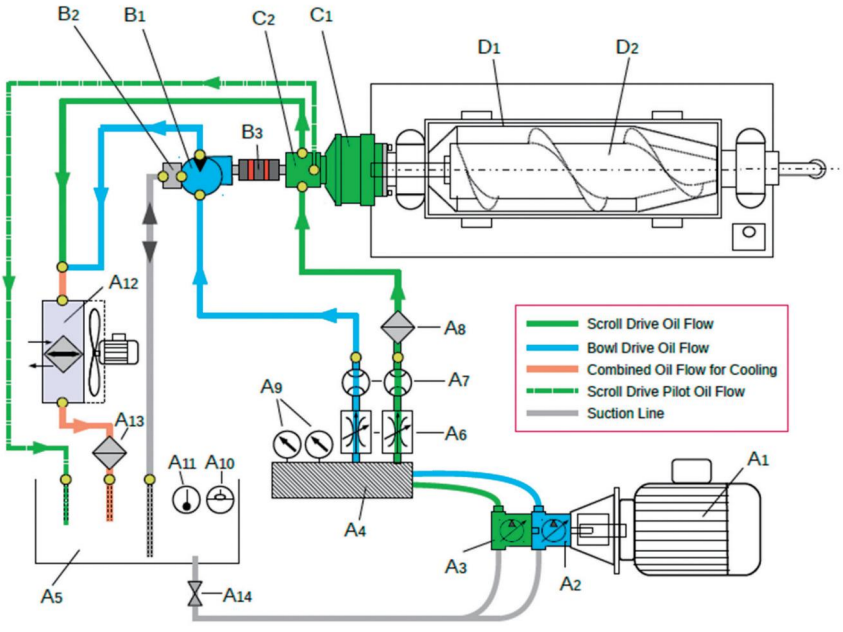
	• 3 VFD for bowl speed, differential speed, and pump capacity. • The VFD brand is ABB or YASKAWA
	• The positive pressurized VFD panel can be cooling by vertex tube or air conditioner to work for ambient Temp. up to +55 C degree. • The VFD panel is optional for IEC Ex or ATEX or CNEX zone 1 or Zone 2 application.
	• The HMI and PLC system for user-friendly operation and smart control and protection. • It's optional for client to choose bearing temperature protection, vibration switch.

2.3 Fully Hydraulic Drive Centrifuge

GN Solids Control is a leading decanter centrifuge manufacturer. And Viscotherm and ROTODIFF® from Switzerland are leading brand for centrifuge hydraulic driving system. GN and Viscotherm have been jointly working together to develop the Full hydraulic drive centrifuge for international clients to meet the highest standard.

The advantage of the FHD centrifuge is for using in high temperature ambient for heavy mud with flexible bowl and differential speed. The compact one skid design makes it easier to rig up.

The full hydraulic system consists of A the Hydraulic Pump Unit, B the Bowl drive hydraulic motor, and C the Scroll drive (Rotodiff).The hydraulic pump unit A feeds hydraulic oil to the scroll drive C and the bowl drive B by means of two separate and individually independent operating circuitsAn electric motor A1 drives the combined pumps A2 and A3. Each operating circuit is equipped with its own hydraulic pump and its own controls. The pump unit contains all setting devices and safety valves, as well as pressure gauges. With this system, the bowl's rotational speed as well as the scroll's differential speed maybe manually adjusted independently from one another, continuously and infinitely variable during the centrifuge's operation.



A Hydraulic Pump Unit :
A1 EEx Electric Motor
A2 Variable Displacement Hydraulic Piston Pump, Bowl Drive
A3 Variable Displacement Hydraulic Piston Pump, Scroll Drive
A4 Controls A5 Oil Tank A7 Flow Meters
A6 Variable Scroll Speed, Variable Bowl Speed
A8 High Pressure Oil Filter
A9 Pressure Gauges
A10 Oil Level Gauge A11 Oil Temperature Gauge
A12 Oil-Air Cooler A13 Return Line Oil Filter
A14 Shut Off Valve

B Bowl Drive:
B1 High Speed Hydraulic Piston Motor
B2 Anti Cavitation Device
B3 Semi-Flexible Coupling

C Scroll Drive:
C1 Rotodiff Hydraulic Motor
C2 Connection Block

D Centrifuge:
D1 Centrifuge Bowl
D2 Centrifuge Scroll

2.4 9 inch (220mm) Decanter Centrifuge

The 9 Inch Decanter Centrifuge is a baby centrifuge which is the one of the world smallest industry decanters.The bowl of the centrifuge is 9 inch (220mm). As the compact design, it is popular for client to use in small capacity or limited space application for solids and liquid separation. It is also considered to be the best choice for experiment testing with decanter centrifuge. GN 9 inch decanter centrifuge is optional in three types includes: fixed gear box drive, fully hydraulic drive, and variable frequency drive.

Model	GNLW223D	GNLW224GT-VFD
Max Capacity	130 l/min	130 l/min
Effective Capacity	100 l/min	100 l/min
Bowl Diameter	9inch(220mm)	9inch(220mm)
Bowl Length	26.4inch(670mm)	36.4inch(924mm)
Max Bowl Speed	4500RPM	5099RPM
Typical Bowl Speed	3800RPM	0-4500RPM
Max G Force	2492G	3200G
Typical G Force	1777G	2492G
Main Motor	11KW(15HP)	11KW(15HP)
Pump Size	N/A	5.5KW(7.5HP)
Gearbox Torque (N · M)	500N · M	1400N · M

2.5 14inch (360mm) Decanter Centrifuge

GN 14inch (360mm) decanter centrifuge is the most popular centrifuge for oil gas industry, it is popular for drilling mud treatment, and also it can be used for industry waste water treatment, oil sludge treatment, mining water treatment, chemical industry separation.GN 14 inch decanter centrifuge is optional in three types includes: fixed gear box drive, fully hydraulic drive, and variable frequency drive.

Model	GNLW363D	GNLW363D-VFD	GNLW363D-FHD	GNLW364GT-VFD
Dive Mode	Fixed Speed	VFD	FHD	VFD
Bowl Diameter	14inch(360mm)	14inch(360mm)	14inch(360mm)	14inch(360mm)
Bowl Length	50inch(1271mm)	50inch(1271mm)	50inch(1271mm)	59.5inch(1512mm)
Designed Capacity	200GPM(45m^3/h)	200GPM(45m^3/h)	200GPM(45m^3/h)	242GPM(55m^3/h)
Typical Capacity	132GPM(30m^3/h)	132GPM(30m^3/h)	132GPM(30m^3/h)	154GPM(35m^3/h)
Max Bowl Speed	3900RPM	3900RPM	3600RPM	3986RPM
Typical Bowl Speed	3200RPM	0~3200RPM	0~3200RPM	0~3200RPM
Max G Force	3063G	3063G	3063G	3200G
Typical G Force	2062G	0~2062G	0~2062G	0~2062G
Cut Point	2~5μm	2~5μm	2~5μm	2~5μm
Differential Speed	38RPM	0~45RPM	0~65RPM	0~65RPM
Gearbox Torque	3500 N·M	3500 N·M	3717 N·M	3500 N·M
Gearbox Ratio	57:1	57:1	Hydraulic Gearbox	57:1
Main Motor	37KW(50HP)	37KW(50HP)	45KW(60HP)	37KW(50HP)
Back Drive Motor	11KW(15HP)	11KW(15HP)	N/A	11KW(15HP)
Recommend Pump Motor	7.5KW(11HP)	7.5KW(11HP)	7.5KW(11HP)	7.5KW(11HP)
Remarks	Above Max capacity is for water, the treating capacity would be various as per different material conditions and customer required treating results.			

2.6 18inch (450mm) Decanter Centrifuge

GN 18inch(450mm) decanter centrifuge is optional with 3 different bowl length.GNLW452 is an economic centrifuge, popular for drilling mud treatment. To meet different applications, the GNLW453 and GNLW454 is designed with longer bowl.

GN 18 inch decanter centrifuge is optional in three types includes: fixed gear box drive, fully hydraulic drive, and variable frequency drive.

Model	GNLW452D	GNLW453D-VFD	GNLW454GT-VFD
Bowl Diameter	18inch(450mm)	18inch(450mm)	18inch(450mm)
Bowl Length	43.5inch(1105mm)	61inch(1540mm)	74.5inch(1890mm)
Designed Capacity	250GPM(57M^3/h)	352GPM(80m^3/h)	400GPM(90m^3/h)
Typical Capacity	176GPM(40m3/h)	264GPM(60m3/h)	300GPM(68m3/h)
Max Bowl Speed	1800RPM	3200RPM	3452RPM
Typical Bowl Speed	1800RPM	0~2800RPM	0~3200RPM
Max G Force	815G	2578G	3000G
Typical G Force	815G	0~1973G	0~2578G
Cut Point	5~7μm	2~5μm	2~5μm
Differential Speed	32RPM	0~45RPM	0~45RPM
Gearbox Torque	3500 N·M	7500 N·M	7500 N·M
Gearbox Ratio	57:1	35:1	57:1
Main Motor	45KW(60HP)	55KW(75HP)	55KW(75HP)
Back Drive Motor	N/A	22KW(30HP)	22KW(30HP)
Recommend Pump Motor	11KW(15HP)	15KW(20HP)	15KW(30HP)
Remarks	Above Max capacity is for water, the treating capacity would be various as per different material conditions and customer required treating results.		

2.7 22inch(550mm) Decanter Centrifuge

GN 22inch (550mm) decanter centrifuge is widely used for different industries. It is the medium size centrifuge which has the normal capacity requirement for most of the applications. It is popular for drilling mud treatment, and also it can be used for industry waste water treatment, oil sludge treatment, mining water treatment, chemical industry and food industry separation.

Model	GNLW553D-VFD	GNLW554GT-VFD
Bowl Diameter	22inch(550mm)	22inch(550mm)
Bowl Length	71inch(1800mm)	91inch(2310mm)
Designed Capacity	500GPM(114m^3/h)	600GPM(136m^3/h)
Typical Capacity	400GPM(90m^3/h)	480GPM(108m^3/h)
Max Bowl Speed	3000RPM	3132RPM
Typical Bowl Speed	0-2500RPM	0~2800RPM
Max G Force	2719G	3000G
Typical G Force	0~1888G	0~2412G
Cut Point	2-5μm	2~5μm
Differential Speed	0~45RPM	0~45RPM
Gearbox Torque	12000 N·M	12000 N·M
Gearbox Ratio	35:1	35:1
Main Motor	90KW(120HP)	90KW(120HP)
Back Drive Motor	37KW(50HP)	45KW(60HP)
Remarks	Above Max capacity is for water, the treating capacity would be various as per different material conditions and customer required treating results.	

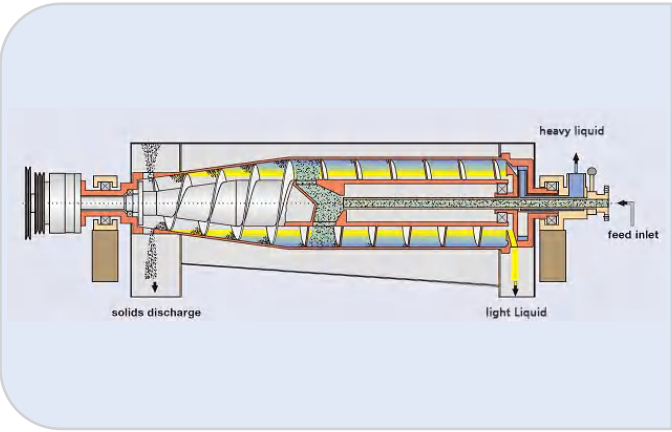
2.8 30inch(760mm) Decanter Centrifuge

The GN 30 inch (760mm) bowl diameter decanter centrifuge is a big bowl centrifuge. With the bowl length and diameter ratio at 4.4:1, GN 30inch centrifuge can handle big volume fluids with one single unit. GN 30 inch decanter centrifuge is designed for best performance in Tunnel Boring Project Mud Cleaning, Dredging Slurry Separation, and Municipal Sewage Sludge in Purification Plants, Industry Waste Water Treatment. The tungsten carbide protection in the slurry distribution port or solids discharge port as well as the screw conveyor inside the bowl guarantee the GN 30 inch decanter centrifuge last longer.

Model	GNLW764A-VFD
Bowl Diameter	760mm
Bowl Length	3328mm
Designed Capacity	528GPM/120m^3/h (Mud with 20% Solids Content)
Max Bowl Speed	2612RPM
Typical Bowl Speed	0-2200RPM
Max G Force	2900G
Typical G Force	0~2060G
Cut Point	2-5μm
Differential Speed	5~28RPM
Gearbox Torque	25000 N·M
Gearbox Ratio	38:1
Main Motor	160KW(217HP)
Back Drive Motor	90KW(120HP)
Remarks	Above Max capacity is for reference only, the treating capacity would be various as per different material conditions and customer required treating results.

2.9 3 Phase Decanter Centrifuge

The three-phase decanter centrifuge operation is based on the principle of sedimentation, that is, solid particles with specific liquid weight precipitate in a predetermined time. This principle can also be applied to two immiscible liquids with different specific gravities. When the material enters the high-speed rotating bowl, the material rotates synchronously with the bowl. Because of the different specific gravity, the centrifugal force is different. The solid particles with the larger specific gravity are subjected to the greatest centrifugal force, followed by the heavy phase liquid (such as water) and the light phase liquid (such as oil). So the centrifugal force is becoming less from outside to inside according to the magnitude of centrifugal force. A concentric solid layer and two liquid layers are formed. Solids are pushed out by the screw conveyor, and liquids are removed from their respective nozzles. Therefore, the application of three-phase decanter centrifuge can not only separate the solid in the material, but also separate the two-phase liquid with different specific gravity in the material, that is, Solid-liquid-liquid separation can be achieved.



3 Phase Decanter Centrifuge

Model	GNLWS-364	GNLWS-454	GNLWS-554
Type	Solids Liquid Liquid Separation		
Bowl Dia	360mm	450mm	550mm
Bowl Length	1567mm	1947mm	2347mm
Capacity	5 m^3/h	10 m^3/h	15m^3/h
Max Speed	3986 RPM	3452 RPM	3123 RPM
Max G Force	3200 G	3000 G	3000 G
Diff. Speed	0~30 RPM	0~30 RPM	0~30 RPM
Main Drive	30 KW/22KW	45KW/37 KW	75KW/55KW
Back Drive	7.5KW	15 KW/11KW	18.5KW/22KW
Lubrication	Grease type	Grease Type	Oil Lubrication
Oil Pump Size	N/A	N/A	0.37 KW
Feed Material	Solids Less 10% and Particle Size less than 2mm		