Decanter Centrifuges

2015 – Revision F

Solids Control, Barite Recovery and Dewatering Centrifuges
Full-Service OEM
Engineering, Design, Manufacturing, Commissioning and Servicing.

Elgin Separation Solutions is able to tackle both the small and the big projects, regardless of location or well complexity.
Organizational Footprint
And Key Customers.
## Centrifuge Portfolio


<table>
<thead>
<tr>
<th></th>
<th>ESS-1450 HD2</th>
<th>ESS-1655 HD</th>
<th>ESS-1967 HD2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum G Forces</td>
<td>2,100</td>
<td>2,300</td>
<td>2,500</td>
</tr>
<tr>
<td>Maximum Speeds</td>
<td>3,250 rpm</td>
<td>3,400 rpm</td>
<td>3,100 rpm</td>
</tr>
<tr>
<td>Capacity</td>
<td>200 gpm (12 Lps)</td>
<td>265 gpm (17 Lps)</td>
<td>500 gpm (31 Lps)</td>
</tr>
<tr>
<td>Bowl Diameter</td>
<td>14” (356 mm)</td>
<td>16” (406 mm)</td>
<td>19” (470 mm)</td>
</tr>
<tr>
<td>Bowl Length</td>
<td>48” (1,219 mm)</td>
<td>55” (1,397 mm)</td>
<td>67” (1,702 mm)</td>
</tr>
<tr>
<td>Gearbox Ratio</td>
<td>52:1 or 125:1</td>
<td>56:1</td>
<td>80:1</td>
</tr>
</tbody>
</table>

Elgin’s decanter centrifuges can be fitted with a host of VFD, FHVD, MVD control options in both explosion proof and non-explosion proof configurations.
Centrifuge Controls Portfolio
Available options are dependent on the centrifuge and application

<table>
<thead>
<tr>
<th>NEMA 7X Cast Aluminum Enclosure (MVD)</th>
<th>NEMA 4X SS VFD Cabinet Enclosure with HMI</th>
<th>NEMA 4X SS VFD with HMI Air Conditioning and Purged Air</th>
<th>NEMA 7X Cast VFD Enclosure</th>
<th>Hydraulically Driven (FHVD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Stop/Start with Fluid Clutch Soft Start</td>
<td>Fully Variable Frequency Controlled</td>
<td>Fully Variable Frequency Controlled</td>
<td>Main Drive Variable Frequency Controlled</td>
<td>Fully Variable Speed Controlled</td>
</tr>
<tr>
<td>Push-Button Controls</td>
<td>HMI Touch-Screen</td>
<td>HMI Touch-Screen</td>
<td>Push-Button Controls</td>
<td>Push-Button Controls</td>
</tr>
<tr>
<td>Dual-Sheave Poly-chain</td>
<td>Poly-chain Sheave</td>
<td>Poly-chain Sheave</td>
<td>Standard Sheave</td>
<td>N/A</td>
</tr>
</tbody>
</table>
ESS-1450HD2
High Speed Decanter Centrifuge
ESS-1450 HD2
Key Features Overview

- Fitted with a 50HP NEMA Premium continuous duty main drive motor. Ensures “sweet spot” motor demand.
- Pond depth set by four, adjustable 304SS, epicentric liquid-end discharge ports. Easy to field manage & durable.
- 52:1 or 125:1 Gear Box (for dewatering) with an industry-leading 3.2 kN torque. Excellent for heavy drilling fluids.
- Standard Dual-Sheave Carbon-Fiber Poly-Chain Drive System provides for dual speeds without the use of a VFD.
- Standard Main Drive Bearing Thermal-Couple Protection Interlock System.

Four replaceable “wide-mouth”, Delchome 90™ discharge ports and plows for easy field maintenance.
ESS-1450 HD2
Hydraulic Performance Curve – Flow Loop Validated

Performance Curves
Relative to Bowl Speed (G-Force), Specific Gravity and Feed Rates*

Flow Rate (Gallons Per Minute)

17 PPG  15 PPG  13 PPG  11 PPG  9 PPG  8.34 PPG

*Actual feed rates are affected by plastic viscosity, particle size distribution, drilling fluid inhibition, and pond depth. The target flow rates highlighted by the above graph should be considered maximum capacities. The curves provided are provided as a guide only. Field conditions will ultimately dictate performance.
ESS-1450 HD2
Designed for Durability and Dependability

All surfaces fully sand-blasted and powder-coated for maximum wear protection under harsh conditions.

Skid and frame made from ASTM A36 ¼” tubular and plate steel to maximize equipment life.

Redesigned main-drive pillow block utilizing high-quality, premium ball bearings.

Stainless steel machined rotating assembly for maximum corrosion protection.

Heavy duty cast NEMA 7X control panel.
ESS-1450 HD2
Safety Interlocks and Equipment Protection Systems

Fluid clutch installed to protect motor during start-up and when “pack-off” conditions arise; fully disengages motor.

Main drive bearing thermal-couple sensor protection system to shut down centrifuge when bearings start to fail.

Centrifuge frame vibration sensor protection system to shut down centrifuge with heavy imbalances.

Back-drive high-torque protection system will protect the centrifuge during “pack-off”. Interlocked with controls.

Motor overload protection & centrally located E-Stop.
ESS-1450 HD2
Ergonomic Design and Improved Machine Guards

- DNV 2.7.1 compliant lifting eyes. Additional lifting points installed on the skid base to provide full installation flexibility.
- Full coverage main-drive belt guard to protect employees, the sheaves, and the belt.
- Lowered centrifuge center of gravity and direct access to motor, belts, and sheaves to improve maintenance.
- Stainless steel top cover, bottom cover and machine guards to ensure maximum equipment life.
- Full cage machine guard for the gear box and torque-arm assembly.
ESS-1655HD
High Speed Decanter Centrifuge
The ESS-1655HD utilizes four, large-mouth, hardened solids discharge wear inserts to maximize equipment life.

Pond depth is set by six, adjustable 304SS, epicentric liquid-end discharge ports. Easy to manage & durable.

Fitted with a 60HP NEMA-Premium continuous duty main drive motor. Ensures “sweet spot” motor demand.

56:1 premium gear box powered by a 20HP back-drive. Excellent for heavy drilling fluids.

Standard main drive bearing thermal-couple protection interlock system.
ESS-1655 HD2
Hydraulic Performance Curve

Performance Curves
Relative to Bowl Speed (G-Force), Specific Gravity and Feed Rates

Flow Rate (Gallons Per Minute)

- 1000 227 G's
- 1200 327 G's
- 1400 446 G's
- 1600 582 G's
- 1800 737 G's
- 2000 909 G's
- 2200 1100 G's
- 2400 1309 G's
- 2600 1537 G's
- 2800 1782 G's
- 3000 2046 G's

*Actual feed rates are affected by plastic viscosity, particle size distribution, drilling fluid inhibition, and pond depth. The target flow rates highlighted by the above graph should be considered maximum capacities. The curves provided are provided as a guide only. Field conditions will ultimately dictate performance.
ESS-1655 HD2
Designed for Durability and Dependability

All surfaces fully sand-blasted and powder-coated for maximum wear protection under harsh conditions.

304 stainless steel machined rotating assembly and cover for maximum corrosion protection.

Skid and frame made from ASTM A36 3/8” tubular and plate steel to maximize equipment life.

Sectioned plates on the inside cover direct fluid into discharge valve.

High-speed precision ball-bearings installed in both pillow blocks and conveyor bearings.
ESS-1655 HD2
Safety Interlocks and Equipment Protection Systems

- Main drive overload protection automatically built into HMI control interface.
- Main drive bearing thermal-couple sensor protection system.
- Centrifuge frame vibration sensor protection system.
- Front-mounted Emergency Stop and centrifuge cover sensor interlock.
- Back drive overload protection automatically built into HMI controls.
ESS-1655 HD2
Ergonomic Design and Improved Machine Guards

- DNV 2.7.1 compliant lifting eyes on the upper edge of centrifuge frame to support unobstructed lifts.
- OSHA compliant full coverage main-drive belt guard to protect employees, the sheaves, and the belt.
- Lift-assist spring hinges reduce operator strain when opening the top cover.
- Stainless steel top cover, bottom cover and machine guards to ensure maximum equipment life.
- Full cage machine guard for the gear box and motor coupling.
ESS-1967HD2
High Speed Decanter Centrifuge
ESS-1967 HD2
Key Features Overview

The ESS-1967HD2 utilizes a 360 degree discharge port arrangement that ensures smooth directed discharge of the solids.

Pond depth Set by six, adjustable 304SS, epicentric liquid-end discharge ports. Easy to manage & durable.

Fitted with a 125HP NEMA-Premium continuous duty main drive motor. Ensures “sweet spot” motor demand.

80:1 premium gear box powered by a industry leading 40HP back-drive. excellent for heavy drilling fluids.

Standard carbon-fiber poly-chain drive system for maximum life. No belt re-tensioning required.

Standard main drive bearing thermal-couple protection interlock system.
ESS-1967 HD2
Hydraulic Performance Curve – Flow Loop Validated

Performance Curves
Relative to Bowl Speed (G-Force), Specific Gravity and Feed Rates

Flow Rate (Gallons Per Minute)

17 PPG  15 PPG  13 PPG  11 PPG  9 PPG  8.34 PPG

*Actual feed rates are affected by plastic viscosity, particle size distribution, drilling fluid inhibition, and pond depth. The target flow rates highlighted by the above graph should be considered maximum capacities. The curves provided are provided as a guide only. Field conditions will ultimately dictate performance.
ESS-1967 HD2
Designed for Durability and Dependability

All surfaces fully sandblasted and powder-coated for maximum wear protection under harsh conditions.

Skid and frame made from ASTM A36 3/8” tubular and plate steel to maximize equipment life.

304 stainless steel machined rotating assembly and cover for maximum corrosion protection.

Dual mated high-speed precision ball-bearings provide for double the L10 life and more stable bearing operation.

304 stainless steel solids-discharge wear ring.
ESS-1967 HD2
Safety Interlocks and Equipment Protection Systems

- Back drive overload protection automatically built into HMI control interface.
- Front-mounted Emergency Stop and centrifuge cover sensor interlock.
- Centrifuge frame vibration sensor protection system.
- Main drive bearing thermal-couple sensor protection system.
- Main drive overload protection automatically built into HMI control interface.
ESS-1967 HD2
Ergonomic Design and Improved Machine Guards

Full cage machine guard for the gear box and motor coupling.
DNV 2.7.1 compliant lifting eyes on the upper edge of centrifuge frame to support unobstructed lifts.
Lift-assist spring hinges reduce operator strain when opening the top cover.
Stainless steel top cover, bottom cover and machine guards to ensure maximum equipment life.
OSHA compliant full coverage main-drive belt guard.
### VFD HMI Centrifuge Controls

ESS-1967 HD2 Proprietary VFD Controls

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td><strong>NEMA 4X SS VFD Cabinet Enclosure with</strong></td>
<td><strong>NEMA 4X SS VFD Cabinet Enclosure with</strong></td>
</tr>
<tr>
<td>Integrated Touch-Screen Human/Machine Interface</td>
<td>Integrated Touch-Screen HMI, Nitrogen Purged</td>
</tr>
<tr>
<td></td>
<td>Cabinet and Air Conditioning</td>
</tr>
<tr>
<td>Class I – Division II Non-Explosion Proof</td>
<td>Class I – Division I Explosion Proof</td>
</tr>
<tr>
<td>Fully Variable Frequency Controlled</td>
<td>Fully Variable Frequency Controlled</td>
</tr>
<tr>
<td>Main Drive and Back Drive</td>
<td>Main Drive and Back Drive</td>
</tr>
<tr>
<td>High Contrast Weather-Resistant</td>
<td>High Contrast Weather-Resistant</td>
</tr>
<tr>
<td>HMI Touch-Screen</td>
<td>HMI Touch-Screen</td>
</tr>
</tbody>
</table>

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[Image of VFD HMI Centrifuge Controls]

- **ELGIN**
  - Separation Solutions
ESS-1967 HD2
A Myriad of Available Options

Centrifuge Electrical Standards Options
• Class I – Division I Centrifuge
• Class I – Division II Centrifuge
• CE / ATEX / GOST R / Australian

Coating Options
• Custom Paint
• Custom Branding
• Marine Offshore Coating

Electrical Ratings
• 460V / 60Hz – 3 Phase
• 415V / 50Hz – 3 Phase
• 380V / 50Hz – 3 Phase
• 600V / 60Hz – 3 Phase

Support Systems
• Progressive Cavity Feed Pump
• Telescoping Stand
• Screw Conveyors
• Discharge Chutes
• Integrated Dewatering Systems

VFD Controls Options
• Class I – Division II Non-Explosion Proof VFD with HMI
• Class I – Division I Explosion Proof Purge Air VFD with HMI
XP Polishers
Mobile Centrifuge Packages
HDD Centrifuge Integration
Centrifuge Technology Targets Near Colloidal and Ultra Fine Solids

Tango 600 XPT or XPS Integrated ESS-1448 HD2 Centrifuge System
Build seamlessly into the primary mud system, the XPT and XPS Polishing Systems provide maximize drilling fluid life. Fully integrated centrifuge, dilution tank, PC pump, screw conveyor and centrate pump.

Independent ESS-1967 HD2 XP Polisher Mobile Centrifuge Packages
Built into a 36K triple-axel when using a single ESS-1967HD2 centrifuge or a 56’ dual-axel rock-over trailer, when using two ESS-1967HD2 centrifuges, these systems are designed to handle large volumes of drilling fluids without slowing down drilling operations.

Independent ESS-1448 HD2 XP Polisher Mobile Centrifuge Package
Utilizing a 30K triple-axel trailer, the ESS-1448 XP Polisher integrates with existing solids control assets (i.e. Tango 400, Tango 600, Tango 800, etc.). On board power and chemical injection (Select Floc LP3) systems are available for 100% removal of suspended solids.

Each XP Polisher system can be integrated with a number of customer-specified customizations.
Packaged mud reclamation systems are designed to integrate a number of processes into one platform and may include generator packages and trailers.
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ESS-1967HD2 XP Polishing System

Mobile Systems are Designed to Provide a Series of Integrated Processes:

- **On-Board Generator Power**: Powered by a 300KW prime on-board generator package with remote controls.
- **Maximum Control**: Integrated proprietary HMI touch-screen VFD control system.
- **High Volume Treatment**: Uses dual ESS-1967 HD2 centrifuges with variable drives.
- **Fluid Management**: Integrated centrate tanks and self-priming centrate pump.
- **Centrifuge Feed System**: Performed via dual on-board self-priming solids-handling feed pumps.

Packaged mud reclamation systems are designed to integrate a number of processes into one platform and may include generator packages and trailers.
Closing the WBM & OBM Loop
Integrated Solids Control and Waste Management Products.

Elgin’s product portfolio provides a “one-stop” shop for any solids control management or waste management challenge.
Elgin Value
Definitive Value Proposition in Utilizing Elgin Centrifuges

Unsurpassed Experience
Elgin has shipped more than 500 newly manufactured decanter centrifuges, 200 remanufactured centrifuges, 800 newly manufactured VCD’s and over 100 remanufactured VCDs’ to over 40 different countries.

Unsurpassed Durability
With more than 25 years of experience building centrifuges for the oil and gas industry, Elgin has developed a reputation for the most durable systems in the market. The average asset life exceeds 10 years with proper preventative maintenance.

Full-Scale Engineering Support
Elgin’s dedicated Engineering team evaluates system hydraulics, frictional losses, predictive reliability, and failure mode evaluation analysis (“FMEA”) for each centrifuge designed. Months of product validation testing is performed prior to the release of any Elgin centrifuge.

Elgin manufactures its own spare parts and consumables ensuring 100% integrated accountability for the entire centrifuge.