MI SWACO
A Schlumberger Company

MD-3 Triple-Deck Shale Shaker

More decks. More options. Less space.

MD-3 Triple-Deck Shale Shaker: Dual-motion, high capacity solids control in a compact footprint

The demands on solids control packages have never been greater than in today's fast-paced, highly scrutinized drilling environment. Ever-changing downhole drilling conditions, coupled with additional environmental restrictions, demand immediate and flexible solids control solutions. If your solids control package is unable to keep pace with changing drilling conditions and more stringent environmental regulations, costs from downtime and additional cuttings treatment can be severe.

The MD-3† triple-deck shale shaker from M-I SWACO, a Schlumberger company, is supported by the industry's largest global infrastructure that puts all required service, spare parts, screens, and solids-removal and waste-handling technologies within reach, wherever your operation is located.

When demands are high and space is tight, the MD-3 shale shaker is your only option

Features

- Dual motion: 7.2 G capacity mode or 6.3 G normal mode
- Three-deck configuration
- Pneumo-hydraulic controls on front of shaker provide deck adjustment
- Configured to all common power supply requirements
- Standard integral fume extraction hood
- Standard spray bar for scalping deck
- Pre-tension, lightweight composite screens (<15 lbs [6.8 kg])
- Modular bolting provisions
- Front-loaded screens
- Pneumatic screen clamping system with controls mounted on front of shaker
- Screen bed with sloped bottom
- Designed to HSE-driven standards

Benefits

- Increases fluid capacity and solids control
- Maximizes fluid recovery
- Maximizes screen life
- Decreases space requirements
- Reduces mud losses from screens
- Promotes flexible shaker configurations
- Recovers loss circulation, wellbore strengthening materials
- Replaces multiple shakers
- Allows for easy screen changes
- Provides safer, faster screen changes
- Decreases maintenance requirements
- Increases process capacity
- Delivers drier cuttings
- Reduces costs

With our MD-3 triple-deck shale shaker, M-I SWACO gives you the industry's most effective solids control solution in a compact and high performance package that adapts quickly to changing drilling conditions. As drilling rates and cuttings volumes change, a flip of a switch adjusts the MD-3 triple-deck shaker from capacity to normal motion.

The MD-3 delivers cuttings that meet the most stringent environmental criteria for discard dryness. What's more, not only can the compact three-deck shaker be installed seamlessly on the most constrained rig floor, the capacity of the MD-3 shale shaker to move fluid and cuttings over all three decks allows greater utilization of the overall screen area and delivers optimum flow capacity.

The modular, multi-deck MD-3 shale shaker is one more example of the M-I SWACO approach to providing solutions to your most daunting solids-control challenges. Going far beyond the capabilities of an equipment supplier, our specialists are dedicated to optimizing your productivity and environmental performance.

The ultimate in solids removal in a small footprint

The MD-3 shale shaker provides primary solids removal from both oil-based (OBM) and water-based mud (WBM) during drilling operations. The three decks of the MD-3 shale shaker can be adjusted to allow flexible control of fluid pool depth and beach length in a variety of drilling conditions. The normal mode is a progressive elliptical motion that maximizes cuttings retention time and screen life. The capacity mode is a balanced elliptical motion used during fluid surges and heavy solids loading.

During operation of a series mode MD-3 shaker, the inflow of the shaker passes through the feeder to the top scalping deck. Large scalped solids are discarded from the shaker front. The scalping effluent is redirected by a flow-back pan to rear fluid ducts and onto the middle deck. Solids are discarded off the middle deck and removed from the active system or transferred by a trough (in recovery applications) back into the active system. The middle deck effluent is processed by the bottom primary deck.

During wellbore fracture or stress cage applications, the use of Wellbore Strengthening Material (WSM) can plug the fracture and/or increase the stability of the wellbore. The MD-3 shale shaker recovery trough is designed to catch usable WSM particulate, allowing the WSM to be reused.

During operation of a parallel mode MD-3, the inflow of the shaker passes through the feeder to the top scalping deck. Large scalped solids are discarded from the shaker front. The scalping effluent is redirected by a flowback pan and split into two even streams in fluid ducts which are processed by both primary decks.

What's optional in others is standard with the MD-3 shaker

M-I SWACO considers shaker flexibility to be the key to reliability and productivity for your specific project needs. That's why we engineered the MD-3 triple-deck shaker with standard features that our competitors consider options.

Though we offer options that further enhance performance, our standard MD-3 shale shakers come standard with a number of unequaled enhancements, including:

- Dual modes of capacity and normal motion
- Normal operating mode for increased fluids recovery, discard dryness and screen life
- Capacity operating mode for increased capacity and conveyance rate
- Highest level certifications and multiple voltage/cycle configurations
- Screen-deck angle that can be adjusted while processing fluid to match changing drilling conditions
- Unique feeder assembly that presents fluid to the scalping screens as a uniform, low-impact curtain
- Screen bed with sloped bottom prevents solids buildup and cleans easily
- Latest lightweight composite screen design includes a latching mechanism to minimize time for full screen change-outs

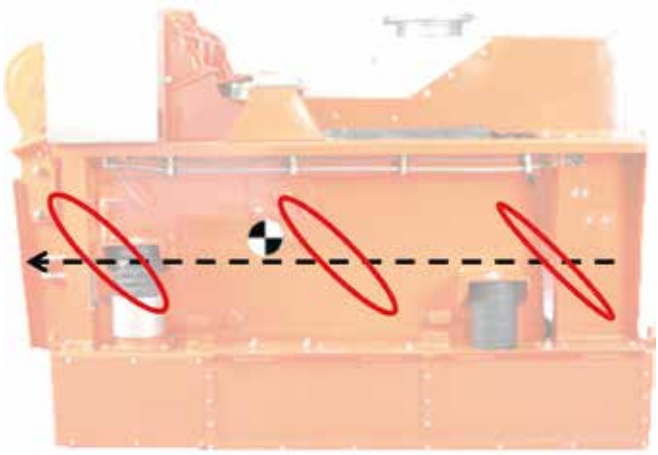
While the MD-3 comes standard with front mounted controls and a fume hood for high-spec applications, both can be removed to accommodate more basic shaker needs. The MD-3 shale shaker also can be configured easily to process high volumes of fluid or recover WSM.

The front controls are designed for operational ease and safety, while low operational noise levels and minimum maintenance requirements further increase worker safety.

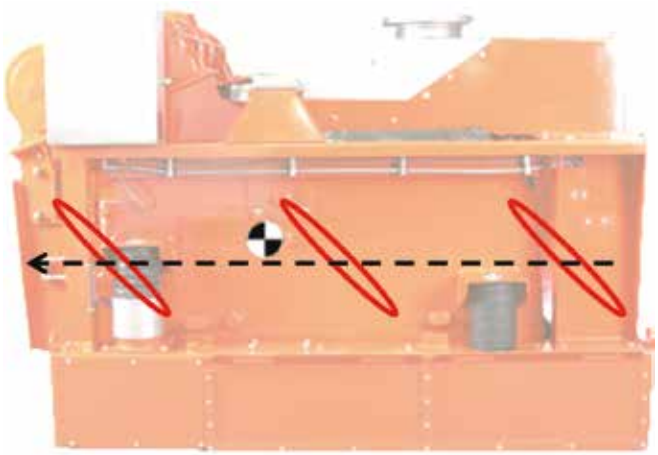
For unmatched adaptability, standard MD-3 shale shaker versions are available to operate with international power supplies (230, 400, 460, 575 and 690 volts) while meeting regional hazardous-area specifications (UL, CE, ATEX and NORSOK).

MD-3 Shale Shaker Specifications

Normal (Progressive Elliptical Motion) Mode



Capacity (Balanced Elliptical Motion) Mode



Dimensions (Parallel Mode)

- Length: 103.2 in. (2,621 mm)
- Width: 77.4 in. (1,967 mm)
- Height at 0°: 67.7 in. (1,720 mm)
- Weir height: 45.5 in (1,156 mm)
- Weight: 6,450 lb (2,926 kg)

Dimensions (Series Mode with Recovery Trough)

- Length: 113.5 in. (2,882 mm)
- Width: 77.4 in. (1,967 mm)
- Height at 0°: 67.7 in. (1,720 mm)
- Weir height: 45.5 in (1,156 mm)
- Weight: 6,780 lb (3,075 kg)

Screen Deck and Screens

- Gross screen area
  - Scalping deck: 25.4 ft^2 (2.4 m^2)
  - Primary decks: 50.8 ft^2 (4.7 m^2)
- Net (API) surface area
  - Scalping deck: 15.8 ft^2 (1.5 m^2)
  - Primary decks: 31.7 ft^2 (2.9 m^2)
- Deck-adjustment system
  - Scalping deck: +3° to –1°
  - Primary decks: +4° to +8°

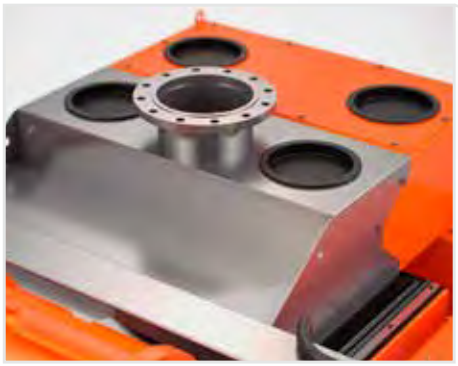
Vibratory Motion Type

- Normal mode: 6.3G
- Capacity mode: 7.2G

Motor Specifications

- Voltage: 220-690 VAC
- Speed: 1800RPM/60Hz; 1500RPM/50Hz
- Certifications: UL/cUL, CE, ATEX rated

Key features of the MD-3 Triple-Deck Shale Shaker



Fluid is split into four streams on top flowback pan and is directed to primary decks through four rear ducts

Deck angle can be adjusted while processing fluid.
Adjustment range:

- Scalping deck: -1° to +3°
- Primary decks: +4° to +8°

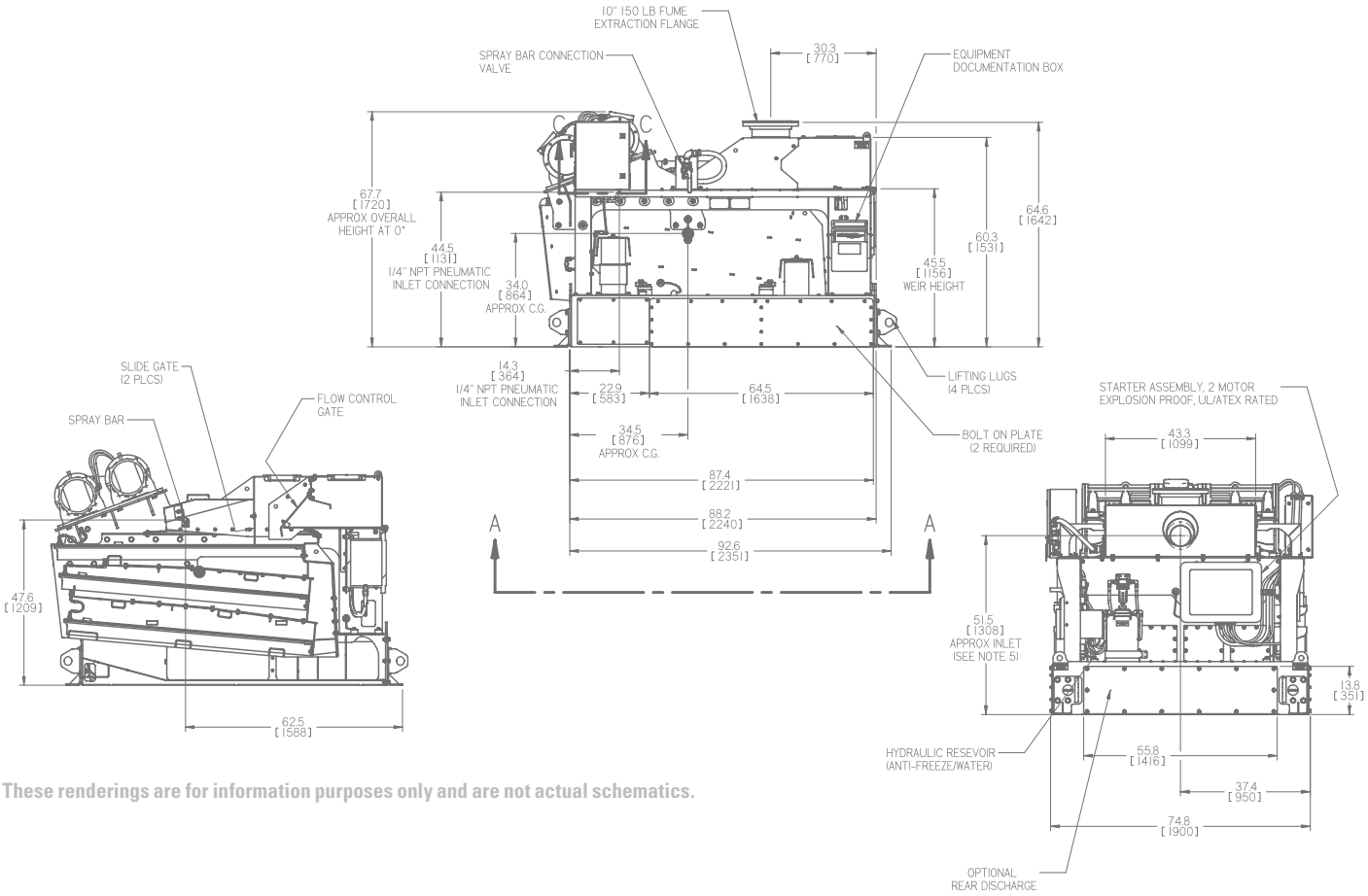
Two state-of-the-art, oilfield proven 3.7-HP motion generators with 1,800 rpm maximum speed

Screen-clamping actuators designed with continuous toggle to allow installation from discharge end of shaker

Standard configuration has one scalping deck and two primary decks. Pre-tensioned, composite scalping screens have the following gross screen areas:

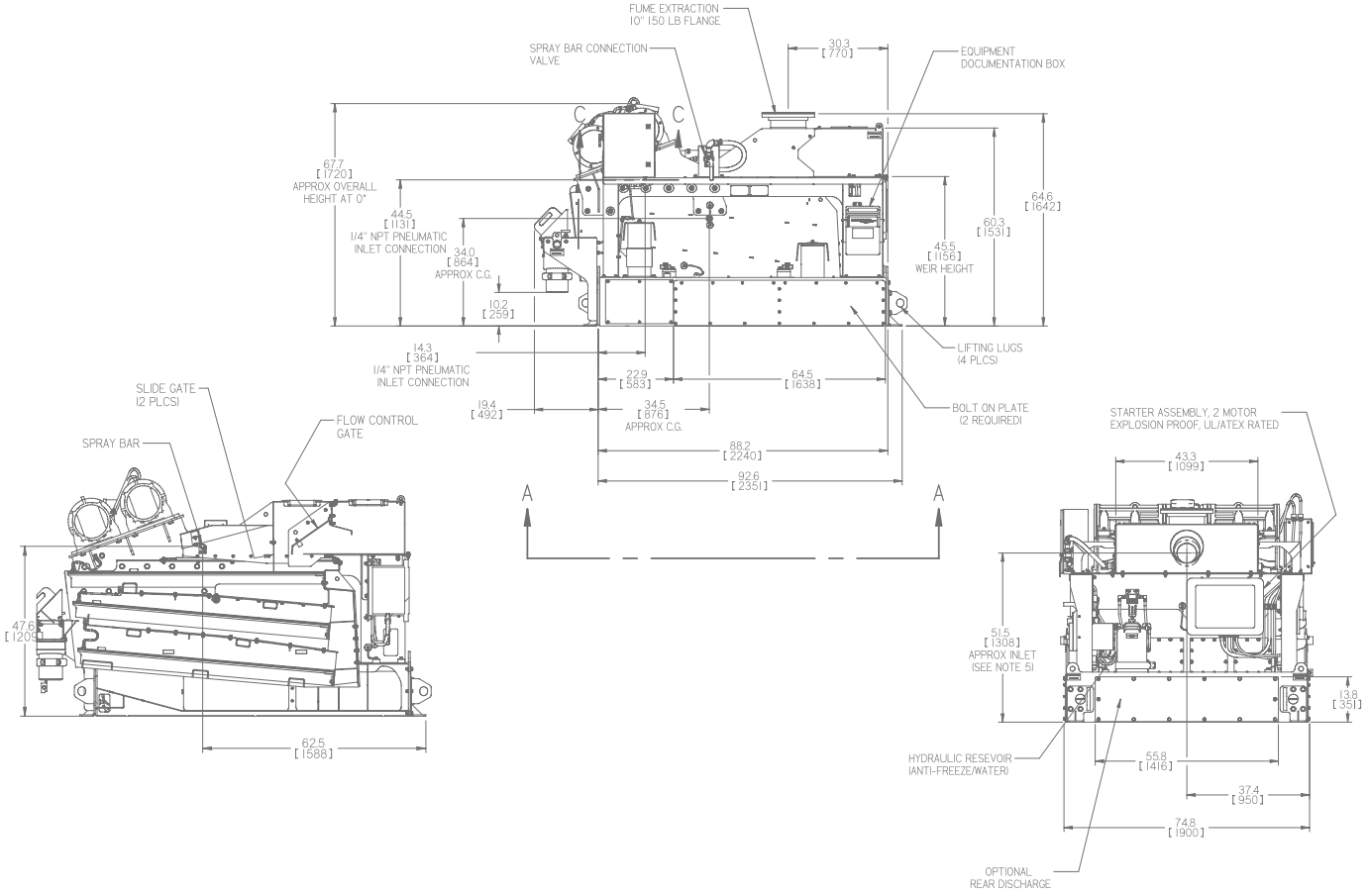
- Scalping deck: 25.4 ft² (2.4 m²)
- Primary decks: 50.8 ft² (4.7 m²)

MD-3 Shale Shaker - Parallel mode



These renderings are for information purposes only and are not actual schematics.

MD-3 Shale Shaker - Series mode



MD-3 Triple-Deck Shale Shaker proves itself in the field

Brazil: Three standard shakers no match for one MD-3 shale shaker

The Situation

To quantify the operational and economic advantages of the MD-3 shale shaker compared to conventional units, a field trial was arranged for an exploration well underway in the Campos Basin. Accordingly, one MD-3 shale shaker was installed on the Diamond Ocean Star semisubmersible, which typically employed four cascade shakers. The evaluation included a comparative analysis conducted during drilling of the 5,823-ft (1775 m) 12 ¼-in. section employing a 9.0 to 9.2 lb/gal (1.08 – 1.10 sg) PARADRIL† paraffin-base drilling fluid.

The Solution

As part of the trial protocol, three of the four existing cascade shakers on the rig were used in the comparative evaluation. The field trial was structured so the three standard shakers would be used concurrently with the MD-3 shale shaker, enabling the collection of aggressive comparison data. The primary objectives of the test included the following:

- Test the flow handling capacity of the MD-3 shale shaker compared to the cascade shakers.
- Prepare a qualitative assessment of the solids handling and conveyance capacity of the MD-3 shale shaker compared to the existing shakers.
- Evaluate the screen life of the MD-3 shale shaker compared directly with that of the cascade shakers as well as historical MD-3 shale shaker screen usage data.

The Results

The single MD-3 shale shaker surpassed the three cascade shakers in overall performance, screen life and QHSE perspectives. In a head-to-head comparison, the MD-3 shale shaker experienced none of the flow restrictions of the cascade shakers, even when fitted with higher API designation screens. The shaker adapted seamlessly to the high ROP encountered in both sections while handling the full flow rate.

At the conclusion of the test, the rig operations manager summed up the performance of the MD-3 shale shaker by saying it “exceeded our expectations in performance, reliability and screen life.” The overall performance prompted the contractor to replace the cascade shakers with a single MD-3 shale shaker.

Oman: Middle East debut of MD-3 shale shaker resounding success

The Situation

A field trial marking the debut of the MD-3 shale shaker onshore Middle East was structured to evaluate the performance of the MD-3 shale shaker under ever-changing drilling conditions. Accordingly, the MD-3 shale shaker was used throughout the 17 ½-, 12 ¼- and 8 ½-in. intervals of the 16,568-ft (5,050 m) exploration well. The well was drilled with a VERSACLEAN† oil-based drilling fluid with density ranging from 9.5 to 14.43 lb/gal (1.14 – 1.73 sg). The purpose of the comprehensive trial was to evaluate the operational and economic advantages of the new-generation shaker compared to conventional units.

The Solution

To fully quantify the solids control capabilities of the MD-3 shale shaker compared to the performance observed in the best available offset wells, two MD-3 shale shakers replaced three competitive units. The MD-3 shale shakers were fitted with DURAFLO† composite screens. Key objectives for the aggressive field trial included the following plans:

- Test the flow handling capacity of the MD-3 shale shaker compared to the shakers used previously on the rig.
- Prepare a qualitative and comparative assessment of the solids handling and conveyance capacity of the MD-3 shale shaker.
- Test and record oil-on-cuttings (OOC) rates and total surface losses.
- Measure the screen life of the MD-3 shale shaker compared to the per well screen usage of the conventional shakers and historical MD-3 shale shaker screen usage data.

The Results

The overall performance of the MD-3 shale shakers exceeded expectations, with the field trial effectively validating the technology's operational and economic advantages. In the intermediate 8,989-ft (2,740 m) 12¼-in. interval, a single MD-3 shale shaker capably handled the entire circulating volume with the same or higher API designation screen as those on the three conventional shakers. Of the 151 aggregate screens used on the two MD-3 shale shakers, only four were scrapped for excessive wear with 147 screens returned to inventory.

Moreover, once the MD-3 shale shakers were installed, the well was completed in less than 126 days, representing a time savings of 36.25 days, or 78%, compared to plan. A single MD-3 shale shaker fitted with API120 (200XR) DURAFLO screens was able to process the entire circulating volume, despite drilling rates from 50 to 197 ft/hr (15 – 60 m/hr) and flow rates of 872 – 925 gpm (3,300 – 3,500 lpm). In addition, the DURAFLO* screens used on the MD-3 shale shaker processed on average 287% more cuttings before being characterized as "consumed." Field personnel credited the ability to change the deck angle and motion selection of the MD-3 shale shaker as the keys to its comparatively higher efficiency and lower screen costs.

Put the MD-3 shale shaler to work for you

To find out more about how our MD-3 triple-deck shale shaker is working for our other customers worldwide, contact your local M-I SWACO representative.

ONLINE RESOURCES

Solids Control
www.miswaco.com/solidscontrol

Shakers
www.miswaco.com/shakers

MD-3 Triple-Deck Shale Shaker
www.miswaco.com/md3

DURAFLO Screens
www.miswaco.com/screens

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