

AXIOM II

VARIABLE FREQUENCY DRIVE

Induction Motors and Permanent Magnet Motors with one VFD to optimize field operating expense

APPLICATIONS

- The Axiom II is designed to provide the maximum flexibility for enhanced reliability in a wide variety of challenging applications, including:
 - Unconventional wells
 - Cost sensitive wells
 - Unstable flow
 - High GOR
 - Hard to start pumps

ENHANCED SAFETY FEATURES

- TOUCHSAFE components in drive enclosure
- Disconnect switch inside input junction box
- Pre-wired controls junction box
- External grounding stud
- Door & circuit breaker locking provision

FEATURES & BENEFITS

- Adaptable universal drive for conventional induction motors or permanent magnet motors:
 - Optimizes VFD inventory
- Effectively and safely operates:
 - Conventional ESPs
 - High efficiency systems
 - Wide flow/wide range pumping systems
 - PMM driven PCP systems
- Advanced ESP software:
 - Gas lock detection and ride thru
 - “Pump Unfreeze” function for hard-to start or stuck pumps
 - Scale buildup prevention
 - Custom programming “DriveWorksEZ”:
 - Application-specific algorithms
- Integrated enhanced output filter:
 - Minimizes installation time
 - Reduces overall footprint
 - Reduces electrical stresses on downhole equipment
 - Increases reliability & drive efficiency
- External USB port:
 - Safe data download
- External 110 volts outlet:
 - Added convenience
- Advanced HMI:
 - Graphical touch screen display
 - Enhanced data logging
 - Ease of navigation
- HOA (hand-off auto) switch:
 - Selectable mode of operation
- Configurable Inputs/Outputs (digital & analog):
 - Wide ranging comm system

The Axiom II is the universal variable speed drive that efficiently and safely operates a variety of systems including conventional ESP induction motors, high efficiency permanent magnet motors (PMM), the wide range wear resistant (WR2) pumping system and the PMM - progressive cavity pumping system.

The Axiom II is equipped with the advanced software that targets challenging well conditions. The software features include but are not limited to gas lock detection, hard to start/stuck pumps and scale build up prevention. Also, custom programming is available for specific/challenging projects.

The AXIOM II has an integrated enhanced sine wave filter which reduces rig time and footprint. It also provides a near sinusoidal electrical waveform to the downhole equipment and delivers one of highest efficiency electrical VFD systems.

Safety is a prime focus; all internal parts are TOUCHSAFE (IP20 equivalent), the disconnect switch is mounted inside the input junction box, hence no power will be present in the drive cabinet when the switch is off. Also, an integral control box mounted to the side allows SCADA, Analog and Digital I/O interconnections easy access without having to open the drive cabinet door where high voltage is present.

Keeping in the AXIOM family the same AHMI is utilized for control with minor menu changes thus minimizing the learning curve for ease of use.

The AXIOM II is fully UL, CSA, and GOST certified VFD in a NEMA 3R cabinet.

Drive ratings range from 112 Amps to 937 Amps and will be offered initially in 6, 12, or 18 pulse for harmonic mitigation with 380 Vac or 480 Vac ratings.

DRIVE WORKSEZ SOFTWARE

DriveWorksEZ is powerful programming software that is built-in to the AXIOM II and provides “PLC” capabilities. It allows implementing complex and application tailored VFD functionality.

DriveWorksEZ allows the end user to customize and adapt the AXIOM II to their application needs in fast and intuitive manner.



SOFTWARE FEATURES:

1. PUMP UNFREEZE FUNCTION

The Pump Unfreeze is designed for hard to start or stuck pumps; it uses the latest software features and enhancement of the proven technology to free the majority of stuck pumps.

2. PUMP SHAKING ALGORITHM

The Pump Shaking algorithm alternates the motor speed with adjustable frequency limits, acceleration and deceleration to prevent or free scale deposits from the pump stages.

3. GAS LOCK RIDE THRU

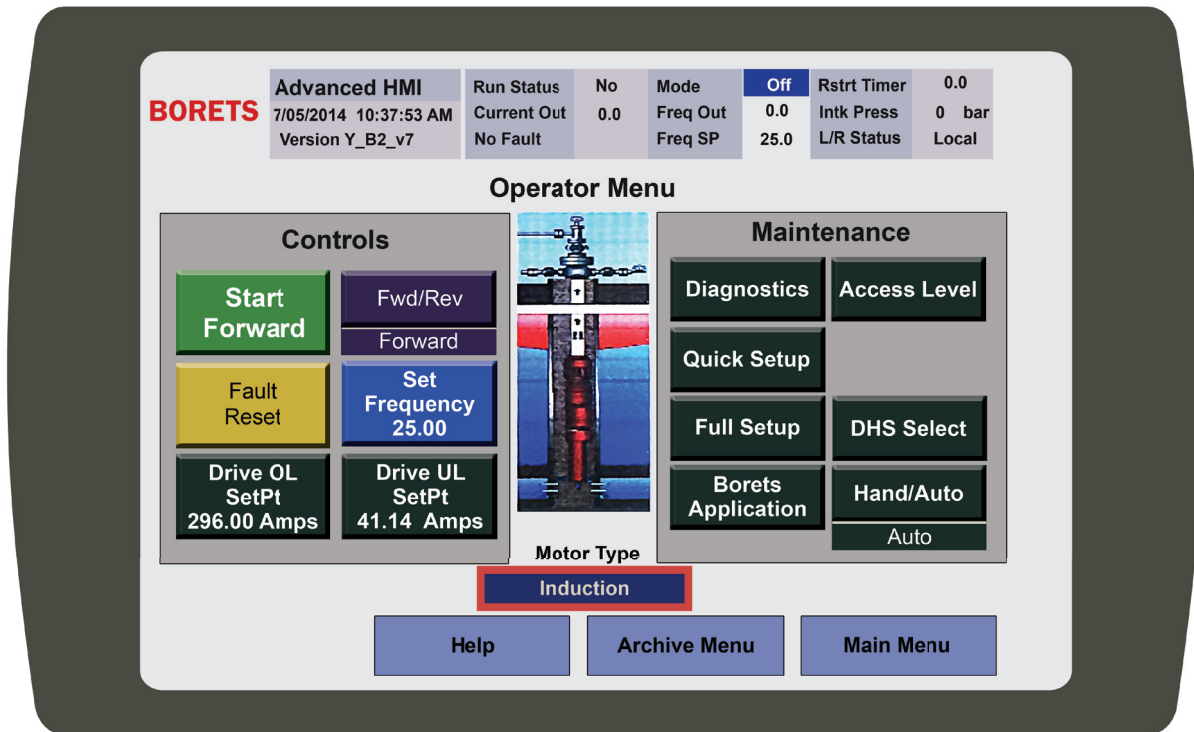
The Gas Lock Ride Thru is a custom control algorithm specific for breaking gas lock conditions.

When the Gas Lock condition is detected, the AXIOM II will follow the specific algorithm for several attempts, or until the Gas Lock condition is no longer present.

AXIOM II CONTROL ALGORITHMS:

- V/f Control for Induction motors
- V/f Control with PG Speed Feedback
- Open Loop Vector Control
- Closed Loop Vector Control
- Open Loop Vector Control for PMM
- Advanced Open Loop Vector Control for PMM
- Closed Loop Vector Control for PMM.

AXIOM II OPERATOR MENU



PARAMETERS	SPECIFICATIONS
Input voltage	480 Vac -25 % / +10 % 380 Vac -15 % / +15 %
Input frequency	47-63 Hz
Power factor	> 0.95 across all speeds
Output frequency	10-200 Hz (0.1Hz resolution)
Output distortion	<5 % after PWM filter
Intermittent overload	150 % for 1 minute
Maximum operating ambient temperature	55 °C / 131 °F
Minimum storage and operating temperature (has internal heaters)	-40 °C / -40 °F
Noise	<75 db at 1 meter
SCADA/ I/O built in (i.e. more options available with additional cards)	<ul style="list-style-type: none"> RS485 (115 kbps) MODBUS Slave SCADA interface for monitoring and control 5 Digital inputs (24 Vdc) 3 Analog inputs (0-10 Vdc/ 4-20 ma) 1 Fault relay (Form C) 3 Relay outputs (Form A) 2 Analog outputs (0-10 Vdc/ 4-20 ma)
Fault & event logging	Incorporated in the AHMI with SD card