Automation

Drives for Subsea Electrical Submersible Pumps (ESP)
DRIVES FOR SUBSEA ELECTRICAL SUBMERSIBLE PUMPS (ESP)

THE EFFICIENT AND SAFE CHOICE TO DRIVE SUBMERSIBLE PUMPS

State of the art in medium voltage frequency inverters, the MVW01 and MVW3000 models feature special functions, simplified programming and robust hardware. They are composed by multilevel inverting structure with medium voltage IGBTs (MVW01) or low voltage Cascaded H-Bridge (CHB) IGBT power cells - (MVW3000), plastic film capacitors and high-performance processors, which ensure fast responses, extremely high efficiency and reliability for driving submersible pumps.

The input stage is composed of a multi-pulse circuit with diodes fed by a phase-shifting transformer, in compliance with IEEE-519 standard.

Main Characteristics

- Ready to drive synchronous machines (PMSM)
- Fast and easy multilingual programming
- Network communication via main industrial protocols (Modbus, Profibus-DP, DeviceNet and Ethernet)
- Low noise level (below 75 dB)
- Free SuperDrive programming software, for downloads, uploads and monitoring of parameters
Main Benefits

- High efficiency
- Low operating cost
- Quick and simple maintenance
- Safe operation
- Flexibility for input voltage
- High input power factor
Special Functions for ESP

- Long cable compensation, programmable according to the length and characteristics of the cable
- Rocking Start function with programmable cycles
- Undercurrent protection with customizable curve, alarm and trip. The pump is thus protected against low flows and overheating
- Acceleration and deceleration ramps with three programmable slopes, ensuring starts and stops with maximum efficiency without operating damages
- Adjustable V/f curve
- Pumping direction setting (clockwise/ counterclockwise)

- Operation compatible with bottom-hole monitoring equipment
- Built-in sinusoidal output filter, eliminating occasional wave reflections and stress to the insulation of the pump motor coils and power cables
- Operation under short-circuit to the ground in one of the pump motor phases, allowing the production to continue under such conditions
  Note that, when in this condition, the motor must be repaired as soon as possible
- Event Data Logger
- Trace function for fast troubleshooting
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- Boost of Torque:
  - Voltage increasing causing boost of torque
  - u/f curve

- u/f curve:
  - Starting Ramp
  - Intermediate Ramp
  - Final Ramp
  - Steady state

- Rock Start Function:
  - Overcurrent indicates pump in a blocked condition
  - 3 attempts for each orientation

- Under Current Protection Curve:
  - Under Current curve defined by the operator
  - ESP current curve defined by the operator
  - Under current condition
The MVW01 enables the variation and control of the pump flow through the setting of the motor speed, using the signal of the sensors (pressure or flow) or by means of a process controller. For being a medium voltage topology, it allows the input transformer to be mounted outside the panel, enabling the optimization of the thermal load or arrangements that fit the space limits in the electric room. Combined with the high reliability of the topology, the MVW01 is easy to maintain, allowing the quick change of the power arms (one per phase) by means of an easy-to-operate device especially designed for the extraction.

Main Characteristics

- Voltage Source Inverter (VSI) with NPC topology
- Use of high voltage (4.5 / 6.5 kV) IGBTs with 30-year lifespan
- Low harmonic distortion upstream of the converter
- Power: 500 to 22,500 HP (400 to 16,000 kW)
- Output voltage: 2.3 kV to 5.1 kV
- Output frequency: up to 120 Hz
- Air or water cooling

Optimized number of semiconductors, resulting in the most efficient and robust design on the market

Mechanical and electrical interlock - power cannot be accessed with the inverter energized

Use of plastic film capacitors - high reliability and long service life

Flexibility in the selection of the input voltage
Change of the Power Arms

Power arm quick change procedure

NPC topology for the output bridge
Multilevel medium voltage inverters in CHB topology are composed of multiple low-voltage single-phase inverters connected in series, which allows reaching medium-voltage output levels.

With efficiency above 96% (phase-shifting/isolation transformer + inverter), the solution provides complete motor protection, easy maintenance and high availability, guaranteed by the modular topology that allows operation with cells in failure.

Main Characteristics

- High power factor (>0.95)
- High-efficiency air cooling
- Fully integrated solution, reducing the system commissioning and start-up time
- Use of plastic film capacitors - high reliability and long service life
- Voltage Source Inverter (VSI) with CHB topology
- Mechanical and electrical interlock – internal parts of power cabinet cannot be accessed with the inverter energized
- Motor current: up to 600 A (higher values on request)
- Voltage: 1.15 kV to 13.8 kV
- Output frequency: up to 120 Hz (higher values on request)
**Power Cells**
- Automatic cell bypass with small reduction in the drive operating voltage (optional)
- Operating voltage of each cell: 690 V

- The sinusoidal output voltage and current reduce the losses, vibration, torque pulsation and overheating of the motor
- Due to the transformer integrated to the panel and the topology, it produces very low levels of input and output harmonic distortion (36-pulse input configuration for the 6.9 kV voltage). It does not require the use of sinusoidal output filter for distances up to 500 meters

Power cells developed with WEG proven technology, with over thirty years of experience in frequency inverters.
In addition to the input phase-shifting transformer suitable for the voltage level available on the platform, WEG medium voltage frequency inverters can be equipped with step-up transformers in the output to compensate the losses in the umbilical and adjust the level of the pump operating voltage, when necessary.

**Main Characteristics**

- Resistant to the aggressive offshore environment, it can be manufactured in stainless steel and with protection rating IP54/55
- Electrostatic shield
- Tested and designed according to the standards: ABNT NBR 5356 / IEC 60076 / IEEE C57.12.00
- Custom design for each application (taps and pump operating frequency)
Global presence is essential, as much as understanding your needs.

Global Presence
With more than 30,000 employees worldwide, WEG is one of the largest electric motors, electronic equipments and systems manufacturers. We are constantly expanding our portfolio of products and services with expertise and market knowledge. We create integrated and customized solutions ranging from innovative products to complete after-sales service.

WEG’s know-how guarantees our Drives for Subsea Electrical Submersible Pumps (ESP) are the right choice for your application and business, assuring safety, efficiency and reliability.

Availability is to have a global support network
Partnership is to create solutions that suit your needs
Competitive edge is to unite technology and innovation

Know More
High performance and reliable products to improve your production process.

Excelence is to provide a whole solution in industrial automation that improves our customers productivity.

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