Electrical Drives Systems (a.c. and/or d.c.) for offshore or onshore oil / gas drilling rigs

Cooperation between ICPE ACTEL (Research Institute for Electrical Engineering-Electric Drives) and ELECTROTEL S.A., based on 40 years experience of R&D, Engineering and Manufacturing

Granting full operation and control of drilling rigs

- Medium Voltage power supply (from Diesel generator or from the main power grid)
- Low Voltage distribution (400Vac, 230Vac, 24Vdc)
- Numerical control of the converters for the main drilling motors (2 to 11pcs) up to 850kW
- Power supply and control of the auxiliary equipment.

Constructional variants

Onshore variant I

Onshore variant II

Offshore variant

Legend: PCS = Power Control System; MCC = Motor Control Center; MT = Medium Voltage System; PT = Power Transformer; SCR = Semiconductor Control Rectifier

Systems for offshore application are assembled as partitioned electrical panels, placed in special rooms on offshore drilling rigs

Onshore Systems are manufactured as Mobile Stations (20" and 40" transportable containers mounted on a sledge) installed near the rigs
Standard systems
- Drilling location:
  - terrestrial (onshore): DEC, EC or EA-DEA; DEA, EA or EA-DEA type
  - maritime (offshore): DEA, DEC type
- Electrical supply:
  - from the main power grid, 3 x 660 (600)V~: EC, EA, EC-DEC, EA-DEA type or
  - Diesel-motor generator (for isolated areas): DEC, DEA type
- Motors on the drilling rigs: d.c. DEC, EC type or a.c. DEA, EA type

Structure of DEC (EC) and DEA (EA) type equipment
- System for Diesel-Generator power supply:
  - Command, protection, measuring, synchronization, coupling at the bus bars equipment with Diesel generator sets supply 3 x 690V, (660V) (600V); 50 Hz:
    - command and protection for Diesel – motors system;
    - measuring, command and protection for generators systems;
    - synchronization and coupling at the bus bars of generators systems;
    - load-sharing;
    - Power Management System, only start/stop remote command gensets
      - load dependent start/stop;
      - programmable start priority;
      - supervision of a bus coupler;
    - load sharing;
    - engine control and protection;
    - protections for generators syst.
- Coupling and protection equipment Medium Voltage switchgears;
- High power transformer system for SCR and MCC supply;
- SCR, resp. VFD equipment for 2…11 motors (850 kW) drive used for:
  - drawworks (drilling hoist);
  - rotary table;
  - mud pumps; jack-up pumps, only for offshore drilling rigs;
- MCC-type power supply for auxiliary tasks;
- Main Control Panel, explosion proof;
- Local control panels for mud pumps, explosion proof;

Main Control Panel (Chief Driller Board)
Interface between the operator (Chief Driller) and main drilling motors (drawworks, mud pumps, rotary table, jack-up pumps, top drive). Functions:
- Command and monitoring for auxiliary motors (boosters, overloading pumps, trip tank, mud agitators, automatic feed of bit, lubrication pumps)
- Monitoring electrical parameters of the drilling process;
- Electrical events diagnosis;
- Touch-screen commands: on / off, speed control, motor sense reverts, setting and configuration of motors converters;
- Display Control Panel;
- PROFIBUS type connections to the PLCs board of the SCR / VFD structure;
- 24 V d.c. power supply;
DEA (EA) Electrical Drive System – for offshore drilling rigs

DEC (EC) Electrical Drive System

DEA (EC) Electrical Drive System
Advantages

- **Motors converters** numerical control, digital display of motors electrical features (rotor current / excitation current, rotor voltage/supply voltage, etc) diagnosis software, events and defects storage;

- **Local and/or remote control** of drilling motors;

- **Multi-socket / plug Panel** for the Equipment’s external connection with the drilling platform units (various powers plugs; faster connection/disconnection; short time and easy installation).

- **Advanced Control and Protection System** for Diesel motors, with automatic microcontroller, WOODWARD type electronic controller;

- **MCC Modular Distribution Systems** - TTA (Type Tested Assembly) execution: Two variants: i) as independent fixed blocks or as ii) withdrawal drawers, (including starters and feeders); easy maintenance, immediate replacement in case of defects, and high safety;

- **Dual type DEC/EC or DEA/EA** is granting redundancy and enhanced reliability.

- **The A.C. drive solution advantages**
  - A.C. advantages compared to D.C. motors;
  - Numerical converters performing control;
  - High power factor (energy efficiency);
  - Power management systems.

- **Operating in various climate areas** (from Siberia to Africa) - operating temperature: -40...+55°C

- **High performance components & devices**: SIEMENS, SCHNEIDER, MOELLER

- **Optimum quality/price ratio; Customized turnkey solutions**;
  - Technical assistance for mounting, installation, commissioning, and maintenance;
  - Service during and after guarantee period; Personnel training.

References

**Domestic**: DAFORA - Medias; FOSERCO - Targu Ocna; FORAJ SONDE - Targu-Mures; GSP -Constanta; UPET - Targoviste; UPETROM 1 Mai - Ploiesti; Romanian Association of Drilling Contractors.

**Exports**: France, Indonesia, Iraq, Libya, Kazakhstan, Russia (Gazprom/Siberia), Ukraine, United Arab Emirates.

**Offshore drilling rigs**: Black Sea: Gloria, Atlas, Fortuna, Jupiter, Orizont, Prometeu, Saturn, platforms no. 3, 6 and 7; Inti Fajar Pratama Oil Jakarta – Indonesia.

**General Offer**

*Turn-key projects including the drilling equipment, could be offered in cooperation with specialized experienced well-known producers.*