Magnetic Pumping
SOLUTIONS

PERMANENT MAGNET PUMPING SYSTEMS

SECTION 6
SURFACE EQUIPMENT CATALOGUE

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INTRODUCTION

Magnetic Pumping Solutions offer a complete range of Surface Power Systems and associated accessories. This includes Well Head Junction Boxes, Direct On-Line Switchboards for Induction Motor systems, Variable Frequency Drives and Step-up / Step-down Power Transformers for both PM and Induction motor applications. In addition to the individual components, Magnetic Pumping Solutions also provides Surface power packages in skids and containers that are suitable for installation in remote or hostile environments.

The MPS range of Surface Power Systems is manufactured under strict quality control and conforms to all major electrical codes and specifications applicable to the industry.

1. Well Head Junction Boxes (Vented and Explosion Proof Designs),
2. Direct On-Line Switchboards for Induction Motor systems,
3. Variable Frequency Drives for PM and Induction Motor systems,
4. Step-Up and Step-Down Transformers
5. Surface Skids and Containers

JUNCTION BOXES

The Junction box is used on all ESP Installations to prevent the migration of gas to the switchboard or Variable Frequency Drive where the gas could be ignited by the sparks generated by the electric breaker or circuit and cause an explosion.

In a typical installation, the Junction Box is installed 15 feet or more from the wellhead and the switchboard / VSD is placed at 35 feet or more from the junction box; 50 feet or more from the wellhead. The Junction Box is mounted 3 to 4 feet above ground and cables from the Junction Box to the wellhead and the switchboard or Variable Frequency Drive are buried. The Junction Box must never be installed inside a building or a contained structure. The MPS High Voltage, Vented Junction Box meets NEMA-3R specifications and is available in both Stainless Steel and Powder Coated Carbon Steel construction. The MPS Junction Box provides easy access for installation of cables up to 2/0 AWG. Features for the grounding of the power conductor cable and adjustable interlocking of cable to fit all common ESP power cable in service are unique to these Junction Boxes. The Junction Box is rated to 5000V, using special heavy duty insulators and the special safety features like the terminal protective shield ensure that the unit meets all industry specific safety requirement. The surface junction boxes used in PM motor applications are provided with a circuit breaker arrangement to isolate the motor from the surface drive as the PM motor can generate a voltage if it turns in the well due to fluid flow back or by a kick from the well. The circuit breaker also allows the three phases to be shorted to ground to prevent rotation of the PM Motor.

In applications where the Junction Box is located close to the Well Head, an Explosion proof sealed junction box is used. The Cables are terminated at the Box using Explosion proof Cable Glands and the doors are sealed using neoprene gaskets / O-rings and steel bolts.

1	**Junction Boxes**
1.a	Vented, NEMA 3R, 5 KV, 100 A
1.b	Vented, NEMA 3R, 5 KV, 150 A
1.c	Explosion Proof, 5 KV, 200A

TRANSFORMERS

Magnetic Pumping Solutions offer a complete range of Transformers that are suitable for both Permanent Magnet motor applications and Fixed Speed operations / Variable Frequency induction motor applications. There are mainly two types of Transformers used in ESP applications.

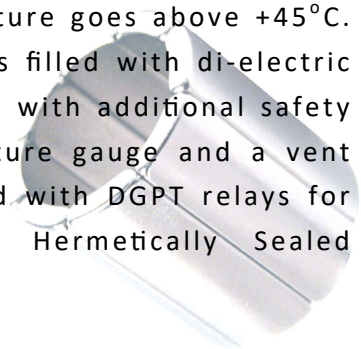
Step-down Transformers - The Step-down Transformers are used when the line voltage on the power line is higher than the operating voltage of the surface control system. These transformers are available in any voltage and power ratings as required by the application. Step-down transformers are usually single tap transformers that are specifically designed for a particular application.

Step-up Transformers - Most ESP systems operate at medium voltage ranges so as to keep the operating current and cable losses low. To facilitate this, once the electric power passes through the control system, the voltage is stepped up to ensure that the voltage at the motor is the same as the specified voltage for that motor at that frequency of operation. The Step-down Transformers have a multi-tap output which enables the changing of the output voltage within a specified range to suit the voltage of the selected motor at the specified frequency.

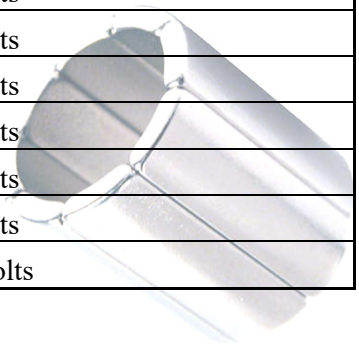
Magnetic Pumping Solutions offer two specific types of transformers in terms of build specifications to its clients.

Dry Type Transformers - The Dry Type Transformers is a good solution for low KVA applications that are in places with a maximum ambient temperature of +45°C. These are normally used for Switchboard applications but can also be used for low KVA Variable Frequency Drive applications. The Dry Type Transformers need to be installed in a housing based on the NEMA or IP ratings required for the application. The biggest advantage of the Dry Type Transformers is the lower cost compared to the Oil-Filled Transformers. The Dry Type Transformers are available with two types of materials for the windings, namely Copper and Aluminium.

Oil Filled Transformers - The Oil Filled Transformers are used in High KVA applications and in areas where the ambient temperature goes above +45°C. The Transformer is housed in an air tight tank that is filled with di-electric mineral oil. These types of Transformers are provided with additional safety protection systems like oil level gauge, oil temperature gauge and a vent valve. The higher specification Transformers are fitted with DGPT relays for monitoring and protection and in some cases, Hermetically Sealed Transformers are used.



1	**Dry Transformers (Copper or Aluminium Wound)**
1.a	Dry Type Transformer, 75 KVA 380/415/480; 700-1200 volts
1.b	Dry Type Transformer, 100 KVA 380/415/ 480; 700-1200 volts
1.c	Dry Type Transformer, 150 KVA 380/415/480; 750-1500 volts
1.d	Dry Type Transformer, 200 KVA MV 380/415/480; 750-1500 volts
1.e	Dry Type Transformer, 200 KVA HV 380/415/480; 1100-2400 volts
2	**OISC Transformers.**
2.a	Oil Filled Transformer, 50 KVA 415/480; 600-2480 volts
2.b	Oil Filled Transformer, 60 KVA 415/480; 600-2480 volts
2.c	Oil Filled Transformer, 80 KVA 415/480; 600-2480 volts
2.d	Oil Filled Transformer, 90 KVA 415/480; 600-2480 volts
2.e	Oil Filled Transformer, 100 KVA 415/480; 600-2480 volts
2.f	Oil Filled Transformer, 150 KVA 415/480; 1100-3800 volts
2.g	Oil Filled Transformer, 200 KVA 415/480; 1100-3800 volts
2.h	Oil Filled Transformer, 250 KVA 415/480; 1100-3800 volts
2.i	Oil Filled Transformer, 300 KVA 415/480; 1100-3800 volts
2.j	Oil Filled Transformer, 350 KVA 415/480; 1100-3800 volts
2.k	Oil Filled Transformer, 400 KVA 415/480; 1100-3800 volts
2.l	Oil Filled Transformer, 500 KVA 415/480; 1450-4800 volts
2.m	Oil Filled Transformer, 600 KVA 415/480; 1450-4800 volts
2.n	Oil Filled Transformer, 800 KVA 415/480; 1450-4800 volts
2.o	Oil Filled Transformer, 1000 KVA 415/480; 1450-4800 volts



SURFACE SKIDS

Magnetic Pumping Solutions specialize in the design, engineering and construction of dedicated, fit for purpose skidded systems. We manufacture NEMA 3R/4 certified control rooms for the following

- **Desert : -10°C to +60°C, Dry Environment with Blowing Sand**
- **Jungle: -10°C to +60°C, 100% Condensing Humidity, Heavy Rain and Flooding**
- **Offshore: -10°C to +50°C, Extreme Moisture, Corrosive Environment**
- **Arctic: -40°C to +40°C, Extreme Cold, Heavy Snow & Rain**
- **Open: -40°C to +60°C, All types of Environments**

All skids except the open skids contain an environmentally and thermally controlled, sealed room where the power system electronics are contained. The level of protection and the selection of the air conditioners depend on the application and its requirements. Transformers if required for the application are installed on the ends of the skids and pre-wired to the power and control system at the factory, tested and certified before the skids are shipped out.

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