Low Starting Current Motors

ATB Laurence, Scott Ltd have designed and manufactured some of the largest motors with reduced starting current. Applications of the low starting current design have been installed on many offshore platforms and FPSO's where the power generation is limited or in onshore facilities fed from low capacity lines. Use of DOL low starting current design can provide a cost-effective solution removing the need for expensive electronic variable frequency starters or other forms of soft starters.

A typical cage induction motor having standard performance will achieve a starting current in the order of 6 times full load current. In conjunction with the system designer and the driven equipment designer, motors with starting currents down to 240% of full load current have been produced which minimise the impact on the line during starting of the motors but with sufficient torque to accelerate the driven equipment up to full speed.

Typically most applications are in the region of 300 to 350%, which provides an acceptable value of pull out torque allowing sufficient margin for the motor to ride through momentary voltage depression. Designs with starting current below 270% are generally not offered due to the low value of pull out torque.

At the time of writing there are over 350 motors with starting current of 450% or less, which have been commissioned for operation around the world.

4100kW (5500HP) PUMP DRIVE
2 Pole - 300% Starting Current

9500kW (12700HP) COMPRESSOR DRIVE
4 Pole - 290% Starting Current

The ratings range from 500kW to 15.3MW. One of the lowest starting current designs was a 10.6MW motor driving a gas compressor for a FPSO. The starting current of this motor was 270% of full load current.

Designs can either take into account system recovery such as starting off island generation or starting with a constant voltage depression such as starting using a unit transformer.

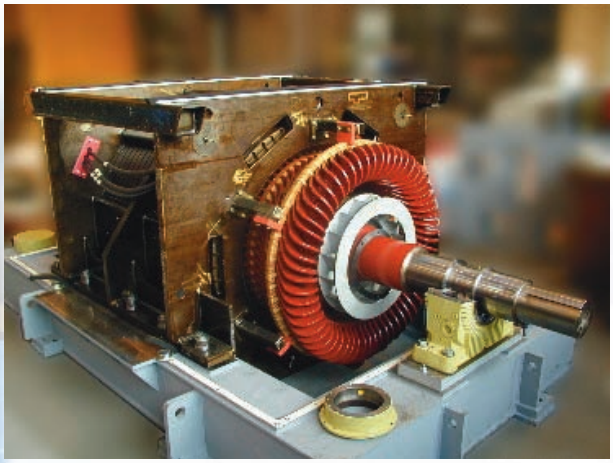
A reduced starting current induction motor has reduced transient air gap torque combined with the fact that an induction motor does not exhibit the oscillating torque that is produced during the starting of a synchronous motor. Low starting current designs can thereby help to reduce the mechanical stresses on coupled equipment seen during the starting sequence.

Our low starting current motors are custom designed utilising standard materials and manufacturing techniques, providing the traditional robustness and reliability associated with cage induction motors.

What is Needed for Starting

The table compares the requirement for the various options of starting method. A low starting current design removes the need for additional starters, control gear and switchgear, thereby keeping capital and maintenance costs to a minimum.

Type of Start	Switchgear	Control Gear
DOL - Low start current motor	1 contactor	None
Star-Delta (LV)	2 contactors	Timing only
Reactor	2 contactors	Reactor & timing
Auto Transformer	3 or 4 contactors	Auto-Transformer & timing
Soft starter	1 contactor	Soft starter (variable voltage)
Variable Speed Starter	1 contactor	Complex (Full variable voltage & frequency Drive)



The range includes box frame constructions or unit constructions on a base plate with pedestal-mounted bearings, all fabricated from carbon steel.

Typical construction includes Vacuum Pressure Impregnation Class F stator winding insulation system normally rated for Class B temperature rise.

The stator core is assembled from varnish insulated laminations produced at the same time as rotor laminations on an automated lamination punching & notching line, thus ensuring the best electrical and mechanical compatibility for rotor/stator packs.

Rotor construction utilises the sturdy and robust squirrel cage having copper or copper alloy bars brazed to joint less short-circuiting endrings. Various copper alloy and bar profiles are available with material properties appropriate to the electrical and mechanical requirements for the individual applications.

Rating:	250kW to 18,000kW 335HP to 24,000HP.
Specification:	BS/EN60034 – IEC 34. Other specifications are available on request such as, EEMUA 132 Shell DEP API541 CSA NEMA
Supply:	2750V to 13.8kV, 50/60Hz

Poles:	2 pole to in excess of 20 poles. Multiple-speed.	
Hazardous Area:	EEx n EEx p, Ex d	EN50021 EN50016 EN60079-1
Cooling:	TEFC, CACA (TEAAC), CACW (TEWAC) Open ventilated, NEMA I or II.	
Ingress Protection:	IP22 to IP56.	
Quality Assurance:	ISO9001.	

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