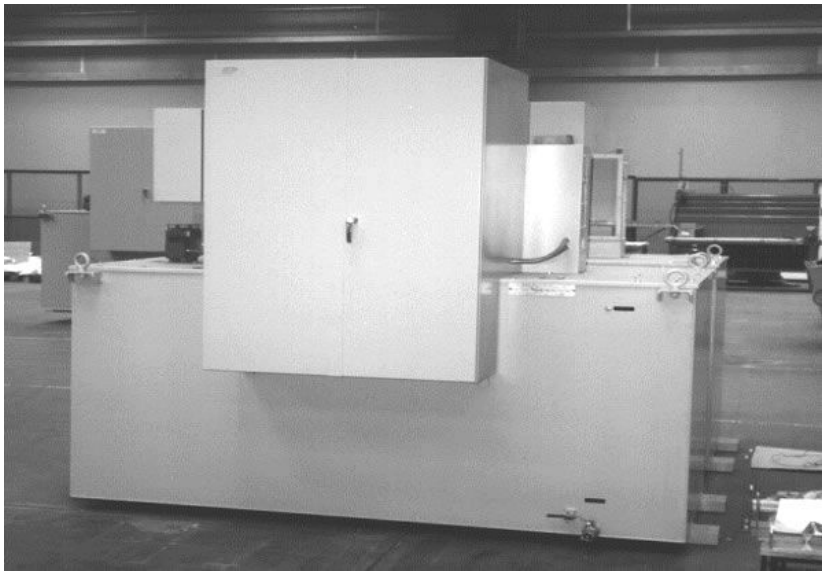


EPM

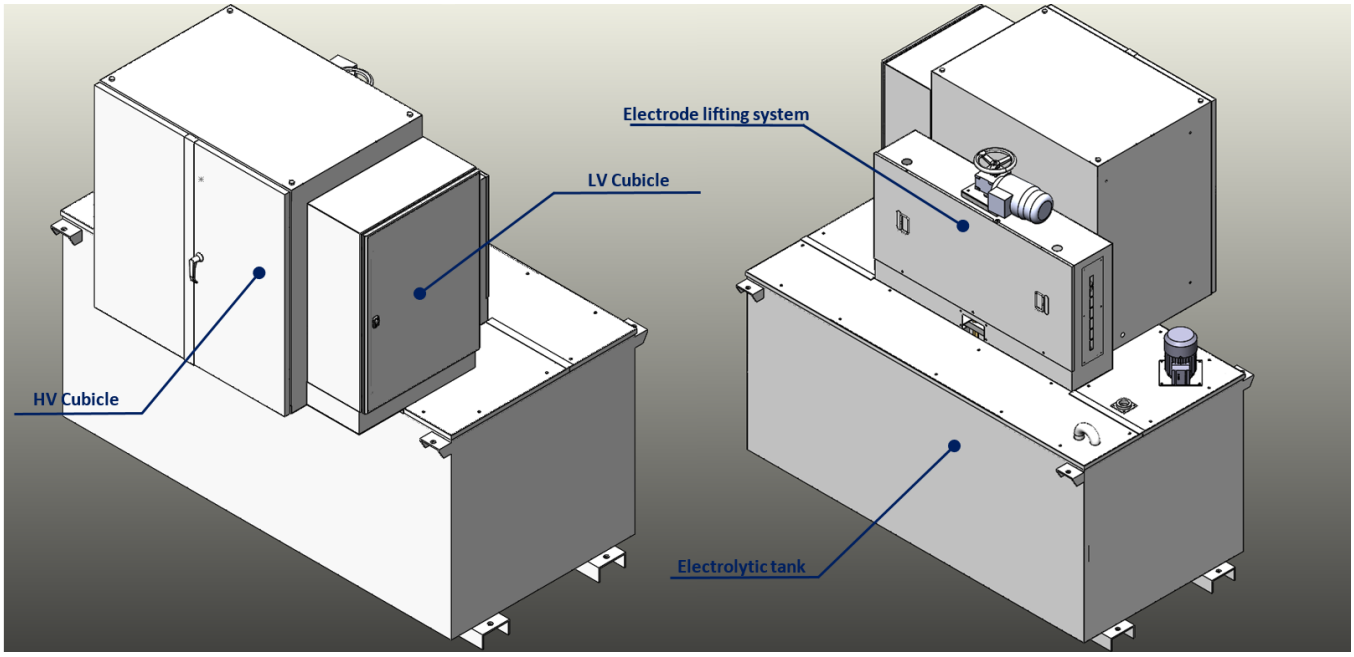
Electrolytic starter (LRS) for slip ring motors from 500 to 20,000 kW

The EPM electrolytic starter is AOIP's solution to start slip ring motors with heavy duty cycle and high power. Made in France and using premium materials, the EPM has proven to be reliable and sturdy, even in the most challenging environment.

- Smooth progressive acceleration
- Wide range of applications
- Sturdy and reliable
- Customised for each application
- Reduced maintenance

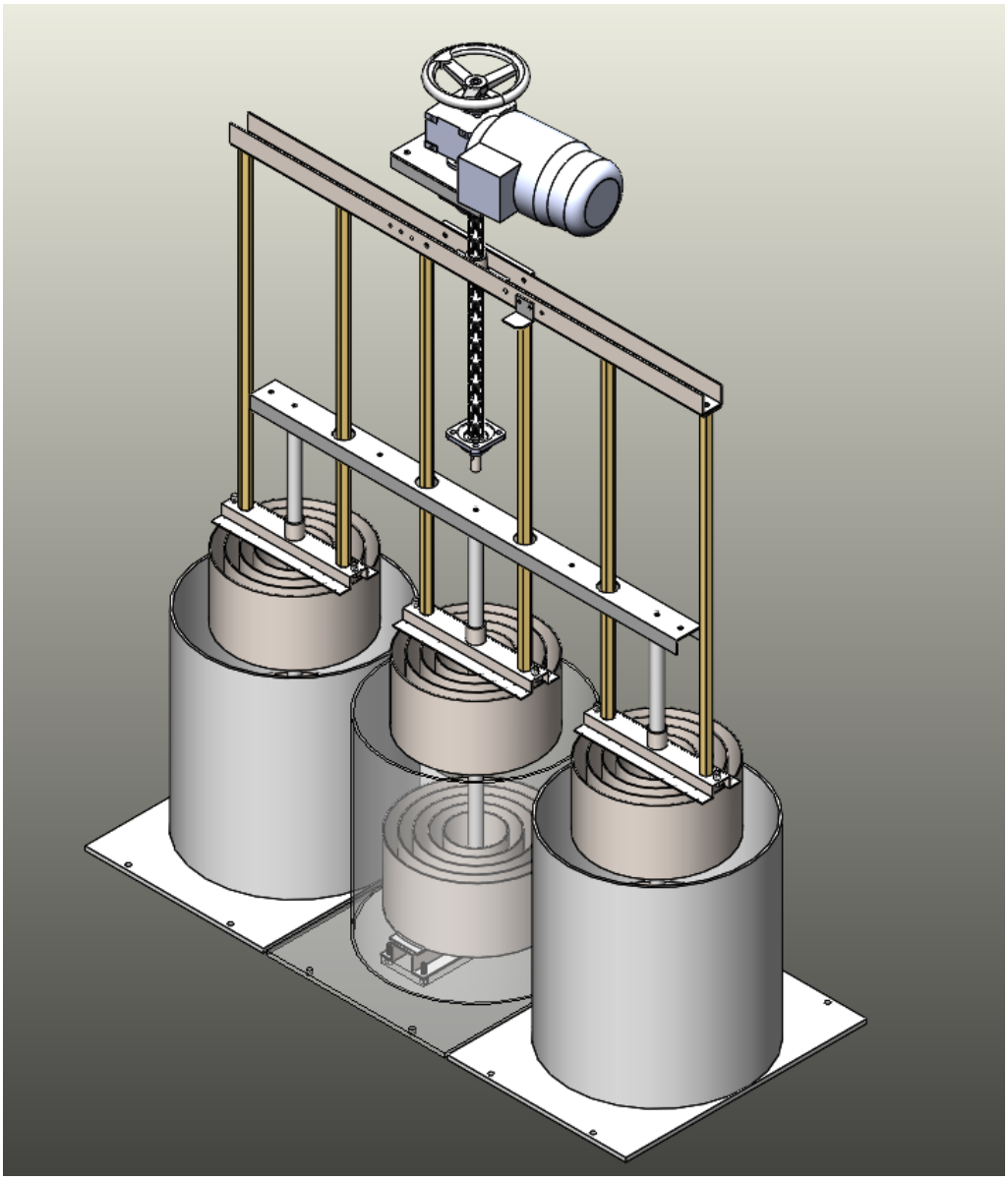
Description

Thanks to EPM (Mobile Plunge Electrode) technology, our starters ensure a smooth and linear start without any mechanical jerk for difficult and high-power applications (from 500 kW to 20,000 kW). The range is divided into 4 models with a large number of options available.
EPM starters consist of a control cubicle(LV), a short circuit cubicle (HV), an electrolytic tank and an electrode lifting system. (See diagram below)



Each starter is offered with an agitator system (propeller or pump) to ensure the thermal and chemical homogeneity of the electrolyte. Thermostats and a level sensor are installed to ensure the safety of the starter.

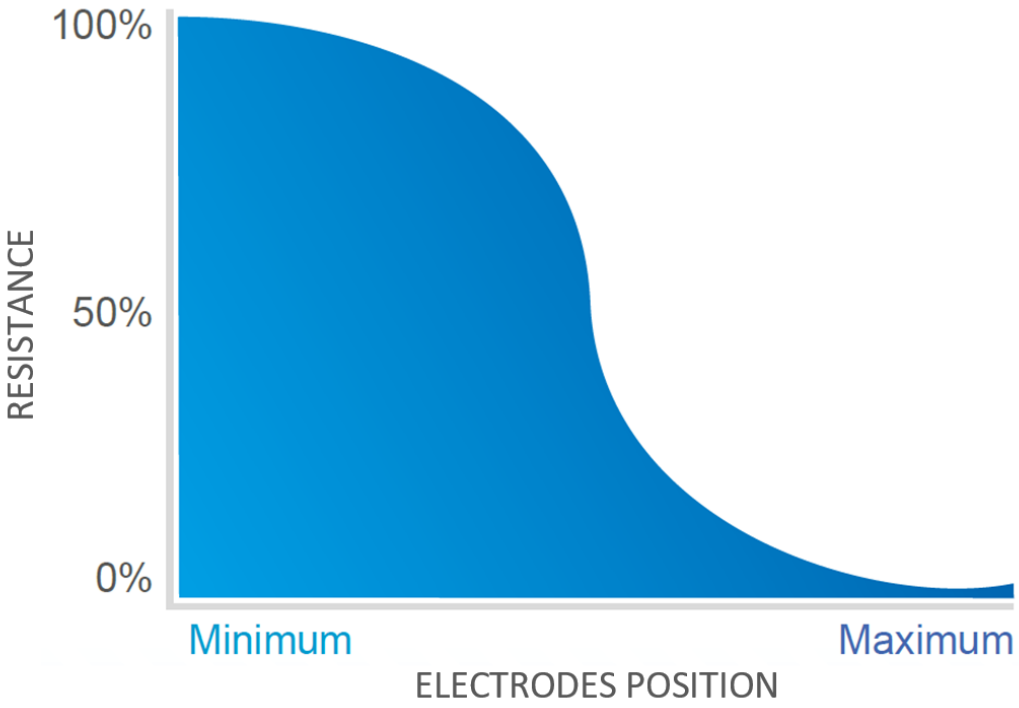
Principle :



Due to the very high starting torque, slip ring motors cannot start on their own. Adding resistance to the rotor makes it possible to change the torque and speed characteristics of the motor thus reducing the impact of starting torque.

The EPM starter uses this principle and inserts a variable resistor to start the slip ring motor at a set torque value depending on the application.

Thanks to its 3 movable plunge electrodes, the EPM starter has a variable resistance adjustable by the height of the electrodes and the concentration of the electrolyte solution.
The concentric shape of the electrodes ensures excellent current distribution and therefore reduced wear. All three phases are insulated using insulated tanks.



The materials and design of this assembly allow EPMs to withstand currents up to 4000A during the start-up phase.

The superiority of the EPM starter lies in the fact that it is self-variable resistance.
This type of starter ensures excellent starts with gradual and smooth speed increase, but it also meets certain needs such as speed variation (slippage) and counter-current braking.

Advantage:

- Seamless soft start
- Strong adaptability of starters to specific needs: slip, speed variation, ...
- Robust and reliable material: steel tank 30/10 to 50/10, stainless steel possible
- Reduced maintenance (electrolyte change every 10 years)
- Made of France, components of French or European origin

Applications :
EPM starters are used in many sectors: mining, quarrying, cement plants, water treatment, tertiary industries. They are also suitable for more specific applications such as car shredders, plastic mixers and sugar cane shredders. EPMs are most commonly found in the facilities of:

- Ventilation

- Grinding and crushing
- Conveyor belts
- Pumps...





Starter definition:

Do not hesitate to contact us and explain your need precisely, our teams will rate you the appropriate starter and the options to associate with it.
To get started, you can send us the information listed below. This will allow us to size the starter:

The installation:
the type of machine driven and its moment of inertia.

The characteristics of the ring motor:
Power, rotor voltage, rotor current, speed (rpm)

Environmental conditions:
ambient temperature (max/min), humidity, altitude.

Conditions of use:
Start rates (consecutive, per hour, per day), start-up time, start-up torque.

Specifications

Electrical features:

Reference	Maximum power			
	Tstarter / Tnominal = 0.7	**Tstarter / Tnominal = 1**	**Tstarter / Tnominal = 1.4**	**Tstarter / Tnominal = 2**
EPM1/1	1,600 kW	1,100 kW	790 kW	550 kW
EPM2/1	2,600 kW	1,800 kW	1,300 kW	900 kW
EPM3/1	5,200 kW	3,700 kW	2,600 kW	1,850 kW
EPM3/2	6,400 kW	4,500 kW	3,200 kW	2,250 kW
EPM4/1	7,800 kW	5,500 kW	3,900 kW	2,750 kW
EPM4/2	13,000 kW	9,100 kW	6,500 kW	4,550 kW
EPM1/1 DUO	2 x 1,600 kW	2 x 1,100 kW	2 x 790 kW	2 x 550 kW
EPM2/1 DUO	2 x 2,600 kW	2 x 1,800 kW	2 x 1,300 kW	2 x 900 kW
EPM3/1 DUO	2 x 5,200 kW	2 x 3,700 kW	2 x 2,600 kW	2 x 1,850 kW
EPM3/2 DUO	2 x 6,400 kW	2 x 4,500 kW	2 x 3,200 kW	2 x 2,250 kW
EPM3/1 DUO	2 x 7,800 kW	2 x 5,500 kW	2 x 3,900 kW	2 x 2,750 kW
EPM4/2 DUO		2 x 9,100 kW	2 x 6,500 kW	2 x 4550 kW

Maximum power of engine given for 1 start/hour and 3 consecutive starts from cold state.
Different models exist to suit the power of the starter(s) and the inertia of the driven machine.
The ranges of EPM starters given above are theoretical only, as ranges will depend on many further non negligible parameters such as starting conditions, starting time and cadenza, torque, type and load of the driven machine, ambient temperature...
Rotor voltage between rings: 3,500 V max
Standard starting times: 20, 30, 40, 60, 80, 130 s factory preset
Level of electrolyte monitored by magnetic floating system
Electrolyte temperature monitored by thermostats
Electrolyte cooling down by natural convection and agitator mixing
Low current density of electrodes: about 1 A/cm².

Further features

Démarreur EPM DUO	When starting machines of large powers, or in order to reduce mechanical stress, it is sometimes preferable to use two starters totaling the rated power rather than a single one. An EPM DUO starter is then used, to ensure identical acceleration of both motors. The EPM DUO consists in two resistances whose ohmic values are equalized between the two tanks. The electrode drive assemblies are mechanically coupled, so as to ensure complete

	synchronization of the movement of the two electrode assemblies, which are driven by a common geared motor. The two resistances are finally shorted out by a single four or six pole shorting contactor, at the end of the run-up period.
EPM starter with heat exchanger	An EPM starter equipped with a heat exchanger is suitable for applications requiring: - high starting cadenza - speed variation or permanent sliding of the engine An exchanging system can be mounted on any EPM started, with the addition of a regulation servo-motor and a heat exchanger. Heat dissipation and capacity are increased significantly. This option requires an onsite supply of cool water.
Electrolyte	Composition: In powder or crystal form for mixing with drinking water and anti-evaporation oil Electrolyte temperature is controlled by thermostat 16 A/400 V. Electrolyte level: level is visible through transparency of tanks.
Antigel (option)	Protection down to -20°C It has to be inserted into the electrolyte before commissioning since it alters its resistivity. Il can be used throughout the year.

General specifications

Reference	Tank capacity	Size (H x L x w)	Weight (empty tank)
EPM1/1	1,000 l	2000 x 1700 x 1230 mm	720 kg
EPM2/1	1,500 l	2000 x 2120 x 1360 mm	850 kg
EPM3/1	3,000 l	2290 x 2510 x 1660 mm	1,230 kg
EPM4/1	5,000 l	2500 x 2950 x 1860 mm	1,650 kg
EPM1/1 DUO	2 x 1,000 l	2000 x 2760 x 1520 mm	1,500 kg
EPM2/1 DUO	2 x 1,500 l	2000 x 2945 x 2030 mm	1,800 kg
EPM3/1 DUO	2 x 3,000 l	2290 x 3580 x 2560 mm	2,450 kg
EPM4/1 DUO	2 x 5,000 l	2500 x 4020 x 2950	2,800 kg

		mm	

Models and accessories

Starters:

EPM1/1	Liquid rotor starter with mobile electrodes – Size 1
EPM2/1	Liquid rotor starter with mobile electrodes – Size 2
EPM3/1	Liquid rotor starter with mobile electrodes – Size 3
EPM4/1	Liquid rotor starter with mobile electrodes – Size 4
EPM1/1 DUO	Liquid rotor starter with mobile electrodes – Size 1 – Double tank
EPM2/1 DUO	Liquid rotor starter with mobile electrodes – Size 2 – Double tank
EPM3/1 DUO	Liquid rotor starter with mobile electrodes – Size 3 – Double tank
EPM4/1 DUO	Liquid rotor starter with mobile electrodes – Size 4 – Double tank

Delivered in standard with:

- A complete steel tank (painted steel) with polypropylene compartments (one per phase), electrode guides and isolators
- 3 fixed and 3 moving electrodes
- Main short-circuiting contactor
- MV IP54 cubicle for connection with rotor wire connection plate delivered undrilled
- LV IP65 control cubicle for commands
- Electrodes drive motor, supply 400 V / 50 Hz 3 phases
- Agitator motor, supply 400 V / 50 Hz 3 phases
- Control cubicle supplied in 230 V / 50 Hz monophase
- Upper and lower electrode position contactors
- Security thermostat (85°C) for electrolyte
- Agitator control thermostat (40°C) when the starter is short circuited
- Electrolyte level detector
- Paint finish RAL7030
- Electrolyte and anti-evaporation oil for one filling
- Comprehensive set of documentation: overall dimension drawing, wiring connection diagram, item and spare parts list, maintenance and operation manual in FR / EN / DE / IT / RU / ES

Options and accessories:

Further supply voltage for electrodes drive motor and agitator motor
Further paint color
Further language for maintenance and operation manual
Anti freeze heaters in tank
Tropicalisation (special paint and nut, bolt and screw treated against humidity)
Space heater (anti-condensation) in MV cubicle
Variable starting time (gear motor electrodes replaced by frequency drive)
Anti blocking rotor detection
Brush lifting
Electrodes position sensor
Digital panel meter with temperature probe for tank
IP55 instead of IP54 for the MV cubicle
Heat exchanger for high duty start or high number of starts (electrolyte-water or electrolyte-air)
Main motor speed variation (starter drives the speed variation of the main motor)
High speed torque variation for shredder (motor electrodes replaced by pneumatic drive)

CSA and UL certification
GOST certification
Resistance ratio 100:1 instead of 50:1
Final insertion resistor
Slip resistor
Roof
Cable glands
Transformer for LV control cubicle (if 230 V / 50 Hz non available)
PLC and programming