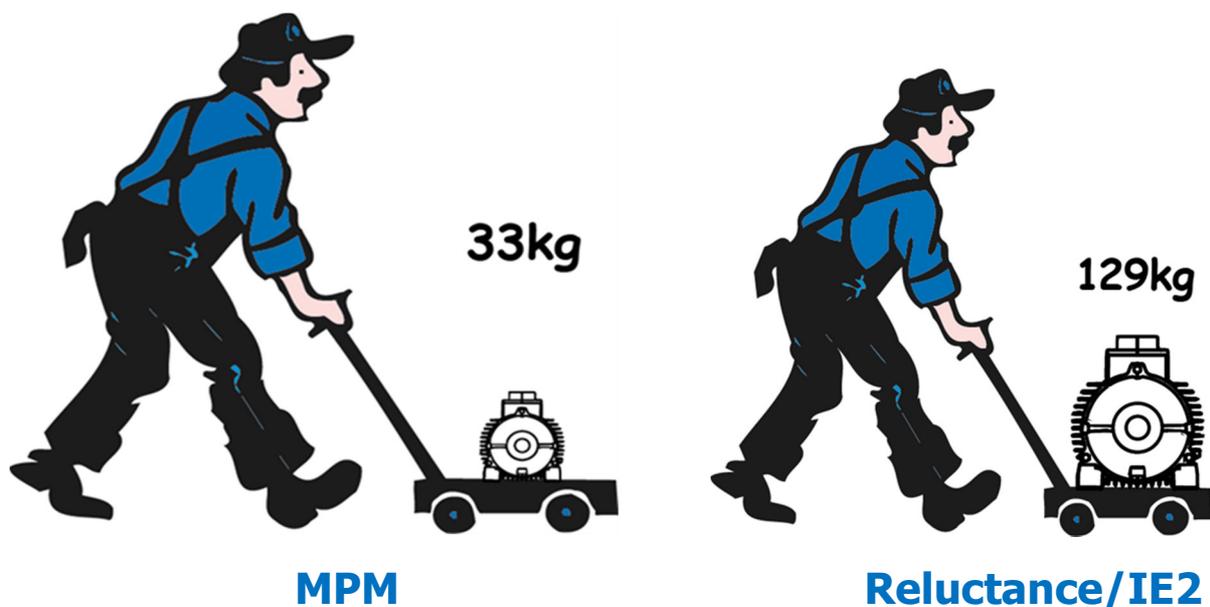


## Not just Energy Saving

The motor series MPM was developed by the best possible combination of decisive material and technology. Following the efficiency class IE4 results in this "super premium efficiency" motor series. In fact of several further determine parameters the user takes great benefits which allows him a leading position.

- Weight reduction up to 1:5 with the synchronous motor
- Up to two sizes smaller dimensions than IE2 norm-motors
- Consequent with permanent magnets and asymmetrically inductivity
- Up to 98,3% motor efficiency
- From 0 – 4.000 rpm at 400 VAC rated voltage



## Technological situation 2014:

The motor series MPM was developed by the use of mass production components. Physically this series is a synchronous motor series with permanent magnets located not onto but into the rotor (buried magnets). In combination with frequency inverters owning "sensorless-vector-control" function there are electrical frequency fields possible up to some hundred hertz. This allows to operate the motors up to 200 hertz at 4.000 rpm. Further improvements of the material features result in a constant torque within 1.000 - 4.000 rpm. The stated power of for example 4,0 kW is at 1.000 rpm. At higher speed passing 2.000 rpm, 3.000 rpm up to 4.000 rpm the power increases by multiplier 4 to finally 16,0 kW. The constant torque is the key factor in comparison to other motor technologies.

## Comparison of the three most used motor technologies:

motortyp MPM synchronous technology*			motortyp IE2 asynchronous technology**			motortyp IE4 reluctance technology**		
power kW	size	weight kg	power kW	size	weight kg	power kW	size	weight kg
4,4	80M	15	4,0	112	29,5	4,7	132S	57
8,8	90L	20	7,5	132S	50	8,7	160M	121
16,0	112M	33	15	160L	115	15	160L	129

Note: x\* = 4.000 rpm, x\*\* = 3.000 rpm (common motor datas)

Interpretation: The rated data of the motor series MPM are achieved at 4.000 rpm in S1 operation. Therewith this speed at constant torque is given. All tested frequency inverters in the market owning "sensorless-vector-control" are operating solely with the 200 hertz output frequency of the inverter to achieve this speed.

At here shown power levels the impressing differences at the sizes and weights of the motor technologies are clearly to see. If a motor has to be built into a machine - and we compare 33 kg with 129 kg at same power – this is a decisive fact for the construction.

Moreover fact is that the mass difference for the same electrical power is a crucial thing regarding steel, copper and aluminum demand. Environmental and energy efforts and costs for this motor technologies are no more up-to-date in comparison with permanent magnet motors.

## Consistently permanent magnets:

Seeing a simple calculation the reluctance motor has a specific weight of approximately 14kg/kW.

A synchronous motor with permanent magnets, as the MPM motor, has approximately 2kg/kW. This values are more or less pending between different power levels but the tendency in the material input is clearly to see.

Next to the energy ratio the user asks for a stable supply of the magnet material. Of all known 17 rare earth materials 5-10 are connected with the basic material. Even considering that China has a 90% monopole we have to consider world wide occurences. The recovered occurences are allocated of all countries and the rare earth materials are even given in higher quantities than gold or platinum.

The quality and build-in-position of the magnets has a direct meaning for the torque and motor inductivity. The inductivity parameters  $L_d$  and  $L_q$  for example are asymmetrically ones. That means a significant better work for the sensorless-control function of the frequency inverter.

## Considering „Energy Saving“:

This flyer mainly shows the technical facts of the MPM motor technology. Also there are more benefits.

The common models to calculate the energy saving in kWh and EUR showing more or less the same and correct results. The MPM motors of Merkes GmbH with a high efficiency factor up to 98,3% are a fundamental part of them. Of course it is simple proved that - by replacing correct drives – there is a saving of energy costs. But our industry works and sells globally. There are energy costs, like current, very lower in comparison to the German costs. For example in France, Switzerland, Norway, USA and other there is also a substantial discussion of the energy saving topic. But the costs for current is not such a great factor in these countries as it is in Germany.

## Proposal of the Merkes GmbH:

Let us also discuss about motor weight, efficiency factor, generator applicability, dimensions and control features.



**Merkes GmbH**  
Holzkamper Weg 19  
D-42699 Solingen

Telefon: +49 (0) 212 2641416

Telefax: +49 (0) 212 2641417

Homepage: [www.merkes.de](http://www.merkes.de)

[www.ie4-motor.de](http://www.ie4-motor.de)

E-Mail: [info@merkes.de](mailto:info@merkes.de)