# Taking efficiency to new heights

## Process performance premium efficiency motors

*"Did you know that over its life a motor can cost 100 times more to run than it did to buy? A high efficiency motor can pay for itself many times over in lower energy costs. High efficiency motors not only help to save money but also protect the environment."*

In 1999 the European Union established a scheme to boost the efficiency of low voltage motors. This program, a collaboration between CEMEP and the European Commission, is part of a larger Europe-wide effort to improve energy efficiency and reduce carbon dioxide emissions.

**By promoting the use of high efficiency motors, the scheme aims to:**

- Decrease energy consumption
- Reduce costs for companies
- Lower carbon dioxide emissions

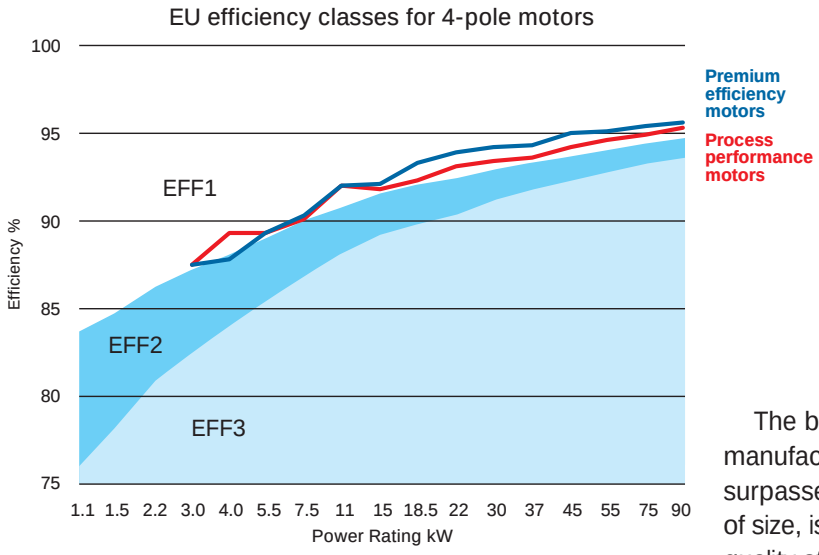



ABB has developed its process performance premium efficiency motors to meet the toughest requirements for reliability and energy efficiency. They offer top-class operating performance, low starting currents, high cos φ, an excellent torque curve, and highest quality throughout. These motors are the perfect workhorses for industry.

The best materials are combined with advanced manufacturing methods to produce a result that surpasses all expectations. Each motor, regardless of size, is manufactured to meet the same demanding quality standards. These high standards give ABB the confidence to guarantee every motor for three years.

Extensive cooperation with leading process industry companies around the world has given ABB a full understanding of the factors affecting motor operation over the long term. ABB has used this know-how to develop the premium efficiency motors to provide continuous, trouble-free and energy efficient operation over a service life of 30 years or more.

## Process performance premium efficiency motors help to cut energy costs

Every premium efficiency motor incorporates ABB's unique knowledge and extensive experience of motor applications, backed by efficient support services. This can be seen not only in special design features, such as the added flexibility of windings for all voltages, but also in new standards of reliability and efficiency. Many customers report that they see the best aspect of the new motors in their electricity bills – premium efficiency motors can produce big savings in energy costs.

## Helping Europe to save energy and protect the environment

Over its life a motor can cost 100 times more to run than it did to buy. A high efficiency motor (efficiency class EFF1) can pay for itself many times over in lower energy costs, thus helping to save money and protect the environment.

The European efficiency classification scheme for low voltage AC motors has been in operation since 1999. Established through cooperation between CEMEP and the European Commission, the scheme is an important element of Europe's efforts to decrease energy consumption, reduce costs for companies, and lower carbon dioxide emissions.

The scheme informs motor users – by means of labeling on motor name plates and detailed information in catalogues – about the importance of electric motor efficiency. It thus makes users more aware of the choice available when specifying or selecting motors.

## LKAB achieves significant savings with energy efficient motors

**LKAB is an international high tech minerals group based in Sweden. It supplies upgraded iron ore products and industrial minerals, and has more than 3,500 employees and net sales in excess of SEK 14.3 billion (2005).**

Electric motor efficiency is a very important issue for LKAB as the company has almost 15,000 motors at its mines and other facilities. These motors account for 90 % of LKAB's annual electricity consumption of around 1.7 TWh, which represents 1% of Sweden's total consumption.

Nearly ten years ago LKAB put itself at the forefront of efficient energy use in industry when it announced that in future it would acquire only energy efficient motors. "They are slightly more expensive to purchase, but you save money in the long run – the purchase price is actually only around 1 % of the total costs over the motor's service life," says LKAB's *Lennart Mukka*.

For LKAB and other industrial customers, process performance premium efficiency motors are now the obvious choice. By replacing its existing motors with premium efficiency motors, LKAB has achieved significant savings. At the same time, energy efficient motors provide LKAB with the operating capacity it needs without requiring any extra maintenance.

A further benefit of the premium efficiency motors is that ABB can – on request – guarantee the efficiency of its motors. LKAB understood the importance of this when an audit of electric motor use was conducted at one of its plants during the 1990s. The audit revealed that motors supplied by other manufacturers often had a lower degree of efficiency than that specified by the vendor. By contrast, when ABB markets its premium efficiency motors as 'the most energy efficient motors in the world' it can back its claims with an efficiency guarantee.

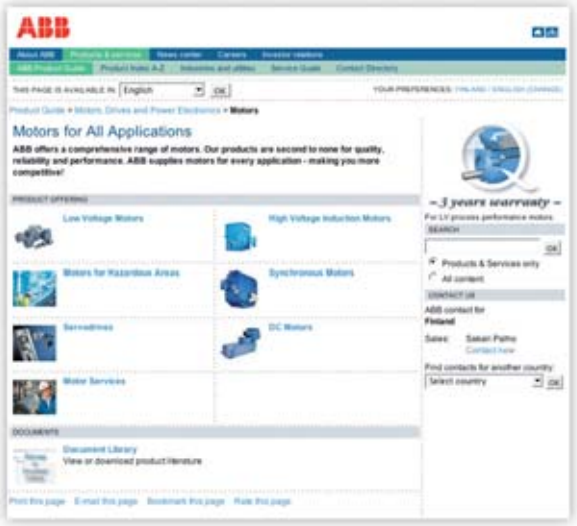
## LV Process performance premium efficiency motors

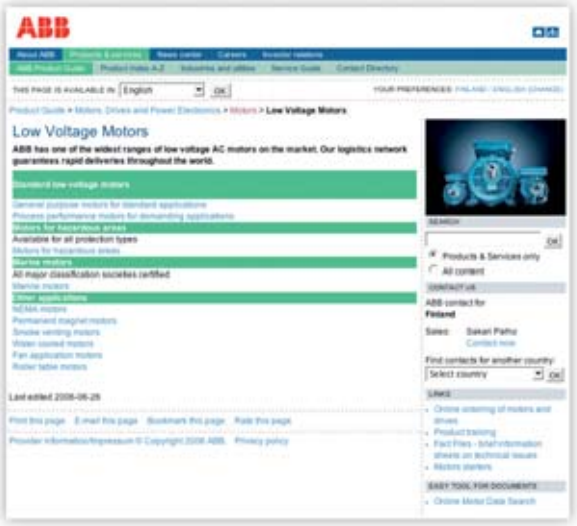
### Technical data for totally enclosed squirrel cage three phase motors

**IP 55 IC 411 - Insulation class F, temperature rise class B**

| Output | Motor type | | Product code | | Speed | Efficiency at | | Power | Current | | Torque | | | Moment of inertia | Weight | Sound pressure |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| kW | | | | | | FL | 3/4 | factor | $I_N$ | $I_s$ | $T_N$ | $T_s$ | $T_{max}$ | J = 1/4 $GD^2$ | | level $L_P$ |
| | | | | | r/min | 100 % | 75 % | cos φ | A | $I_N$ | Nm | $T_N$ | $T_N$ | $kgm^2$ | kg | dB(A) |
| 3000 r/min = 2 pole | | | | | 400 V 50 Hz | | | | | | | | | | | |
| 4 | M3APP | 112 M | 3GAA | 111 022-••CE2 | 2860 | 87.6 | 89.2 | 0.93 | 7.1 | 7.5 | 13.4 | 2.6 | 3.4 | 0.012 | 38 | 63 |
| 5.5 | M3APP | 132 SA | 3GAA | 131 023-••CE2 | 2900 | 88.6 | 89.6 | 0.88 | 10.3 | 9.7 | 18.1 | 3.8 | 4.3 | 0.016 | 48 | 69 |
| 7.5 | M3APP | 132 SB | 3GAA | 131 024-••CE2 | 2915 | 91.0 | 91.4 | 0.90 | 13.3 | 11.0 | 24.6 | 5.1 | 5.2 | 0.022 | 62 | 69 |
| 11 | M3APP | 160 MA | 3GAA | 161 121-••CE2 | 2935 | 92.1 | 92.3 | 0.90 | 19.2 | 7.4 | 36 | 2.7 | 3.1 | 0.047 | 95 | 69 |
| 15 | M3APP | 160 M | 3GAA | 161 122-••CE2 | 2940 | 92.9 | 93.1 | 0.90 | 26 | 8.0 | 49 | 3.0 | 3.3 | 0.053 | 105 | 69 |
| 18.5 | M3APP | 160 L | 3GAA | 161 123-••CE2 | 2935 | 93.2 | 93.4 | 0.89 | 32.5 | 8.3 | 60 | 3.1 | 3.3 | 0.058 | 111 | 69 |
| 22 | M3APP | 180 M | 3GAA | 181 121-••CE2 | 2945 | 93.6 | 93.9 | 0.91 | 37.5 | 7.1 | 71 | 2.7 | 2.9 | 0.092 | 150 | 70 |
| 30 | M3APP | 200 MLB | 3GAA | 201 021-••CE2 | 2950 | 93.8 | 93.8 | 0.90 | 52 | 7.9 | 97 | 3.0 | 2.9 | 0.18 | 220 | 72 |
| 37 | M3APP | 200 MLC | 3GAA | 201 022-••CE2 | 2960 | 94.6 | 94.6 | 0.89 | 64 | 8.8 | 120 | 3.6 | 3.3 | 0.19 | 230 | 72 |
| 45 | M3APP | 225 SMC | 3GAA | 221 021-••CE2 | 2970 | 94.7 | 94.7 | 0.88 | 78 | 6.9 | 145 | 2.3 | 2.9 | 0.29 | 285 | 74 |
| 55 | M3APP | 250 SMB | 3GAA | 251 021-••CE2 | 2970 | 94.8 | 94.6 | 0.91 | 93 | 7.5 | 177 | 2.5 | 3.0 | 0.57 | 364 | 75 |
| 75 | M3APP | 250 SMC | 3GAA | 251 022-••CE2 | 2965 | 95.4 | 95.8 | 0.93 | 124 | 7.5 | 242 | 2.3 | 2.7 | 0.6 | 374 | 75 |
| 75 | M3BPP | 280 SMB | 3GBP | 281 220-••G | 2976 | 95.2 | 94.8 | 0.90 | 126 | 7.2 | 241 | 2.0 | 2.7 | 0.9 | 665 | |
| 90 | M3BPP | 280 SMC | 3GBP | 281 230-••G | 2978 | 95.7 | 95.3 | 0.91 | 150 | 8.0 | 289 | 2.6 | 3.0 | 1.15 | 725 | |
| 110 | M3BPP | 315 SMB | 3GBP | 311 220-••G | 2982 | 96.0 | 95.7 | 0.89 | 185 | 7.5 | 352 | 2.1 | 2.8 | 1.4 | 940 | |
| 132 | M3BPP | 315 SMC | 3GBP | 311 230-••G | 2980 | 96.2 | 96.0 | 0.90 | 221 | 7.5 | 423 | 2.2 | 2.7 | 1.7 | 1025 | |
| 160 | M3BPP | 315 MLA | 3GBP | 311 410-••G | 2978 | 96.5 | 96.3 | 0.90 | 265 | 7.5 | 513 | 2.2 | 2.7 | 2.1 | 1190 | |
| 1500 r/min = 4 pole | | | | | 400 V 50 Hz | | | | | | | | | | | |
| 3 | M3APP | 112 MA | 3GAA | 112 021-••CE2 | 1455 | 87.5 | 87.8 | 0.81 | 6.2 | 7.9 | 19.7 | 2.7 | 3.7 | 0.018 | 39 | 56 |
| 4 | M3APP | 112 M | 3GAA | 112 022-••CE2 | 1455 | 87.8 | 88.4 | 0.76 | 8.6 | 8.5 | 26.3 | 3.3 | 4.3 | 0.018 | 39 | 56 |
| 5.5 | M3APP | 132 S | 3GAA | 132 023-••CE2 | 1460 | 89.3 | 90.5 | 0.84 | 10.6 | 7.5 | 36 | 2.6 | 3.1 | 0.038 | 54 | 59 |
| 7.5 | M3APP | 132 M | 3GAA | 132 024-••CE2 | 1450 | 90.3 | 90.7 | 0.87 | 14 | 7.8 | 49 | 2.2 | 3.1 | 0.048 | 65 | 59 |
| 11 | M3APP | 160 M | 3GAA | 162 121-••CE2 | 1470 | 92.0 | 92.5 | 0.83 | 21 | 7.7 | 72 | 3.2 | 3.2 | 0.091 | 105 | 62 |
| 15 | M3APP | 160 L | 3GAA | 162 122-••CE2 | 1460 | 92.1 | 92.5 | 0.83 | 28.5 | 7.6 | 98 | 3.3 | 3.1 | 0.102 | 114 | 62 |
| 18.5 | M3APP | 180 M | 3GAA | 182 121-••CE2 | 1470 | 93.3 | 93.9 | 0.84 | 34 | 6.6 | 121 | 2.7 | 2.8 | 0.191 | 154 | 62 |
| 22 | M3APP | 180 L | 3GAA | 182 122-••CE2 | 1475 | 93.9 | 94.3 | 0.84 | 41 | 7.8 | 143 | 3.1 | 3.4 | 0.225 | 174 | 62 |
| 30 | M3APP | 200 MLB | 3GAA | 202 021-••CE2 | 1475 | 94.2 | 94.4 | 0.84 | 55 | 8.0 | 194 | 4.0 | 3.1 | 0.34 | 225 | 63 |
| 37 | M3APP | 225 SMB | 3GAA | 222 021-••CE2 | 1480 | 94.3 | 94.4 | 0.85 | 68 | 7.4 | 239 | 2.8 | 3.0 | 0.42 | 255 | 66 |
| 45 | M3APP | 225 SMC | 3GAA | 222 022-••CE2 | 1480 | 95.0 | 95.0 | 0.86 | 80 | 8.0 | 291 | 3.8 | 3.2 | 0.49 | 290 | 66 |
| 55 | M3APP | 225 SMD | 3GAA | 222 023-••CE2 | 1480 | 95.1 | 95.1 | 0.86 | 98 | 8.5 | 355 | 4.3 | 3.8 | 0.56 | 315 | 66 |
| 55 | M3APP | 250 SMB | 3GAA | 252 021-••CE2 | 1480 | 95.1 | 95.3 | 0.87 | 96 | 7.4 | 356 | 3.0 | 3.1 | 0.88 | 364 | 67 |
| 75 | M3APP | 250 SMC | 3GAA | 252 022-••CE2 | 1480 | 95.3 | 95.3 | 0.85 | 135 | 8.2 | 484 | 3.2 | 3.6 | 0.95 | 389 | 66 |
| 75 | M3BPP | 280 SMB | 3GBP | 282 220-••G | 1484 | 95.4 | 95.2 | 0.86 | 132 | 7.3 | 483 | 2.6 | 2.9 | 1.5 | 665 | |
| 90 | M3BPP | 280 SMC | 3GBP | 282 230-••G | 1484 | 95.6 | 95.5 | 0.88 | 156 | 7.4 | 579 | 2.8 | 2.8 | 1.85 | 725 | |
| 110 | M3BPP | 315 SMB | 3GBP | 312 220-••G | 1488 | 96.2 | 96.0 | 0.86 | 194 | 7.5 | 706 | 2.3 | 2.8 | 2.6 | 960 | |
| 132 | M3BPP | 315 SMD | 3GBP | 312 240-••G | 1487 | 96.3 | 96.2 | 0.87 | 228 | 7.4 | 848 | 2.4 | 2.8 | 3.2 | 1065 | |
| 160 | M3BPP | 315 MLB | 3GBP | 312 420-••G | 1486 | 96.4 | 96.3 | 0.87 | 275 | 7.2 | 1028 | 2.3 | 2.6 | 3.9 | 1220 | |
| 200 | M3BPP | 355 SMA | 3GBP | 352 210-••G | 1490 | 96.6 | 96.5 | 0.87 | 343 | 7.1 | 1282 | 2.1 | 2.7 | 5.9 | 1610 | |
| 250 | M3BPP | 355 SMB | 3GBP | 352 220-••G | 1491 | 96.8 | 96.7 | 0.87 | 428 | 7.9 | 1601 | 2.5 | 2.9 | 6.9 | 1780 | |
| 1000 r/min = 6 pole | | | | | 400 V 50 Hz | | | | | | | | | | | |
| 2.2 | M3APP | 112 M | 3GAA | 113 022-••CE2 | 945 | 83.6 | 84.2 | 0.76 | 5.1 | 6.0 | 22.3 | 2.4 | 2.9 | 0.018 | 38 | 54 |
| 3 | M3APP | 132 S | 3GAA | 133 024-••CE2 | 965 | 86.7 | 87.1 | 0.79 | 6.4 | 7.0 | 29.8 | 2.2 | 2.8 | 0.038 | 52 | 61 |
| 4 | M3APP | 132 MA | 3GAA | 133 025-••CE2 | 960 | 87.4 | 88.2 | 0.80 | 8.3 | 7.0 | 39.8 | 2.9 | 2.7 | 0.045 | 60 | 61 |
| 5.5 | M3APP | 132 MB | 3GAA | 133 026-••CE2 | 960 | 87.0 | 87.6 | 0.78 | 12 | 7.3 | 54 | 3.5 | 3.0 | 0.049 | 65 | 61 |
| 7.5 | M3APP | 160 M | 3GAA | 163 121-••CE2 | 975 | 90.7 | 91.1 | 0.77 | 15.6 | 7.8 | 74 | 2.4 | 3.3 | 0.107 | 113 | 59 |
| 11 | M3APP | 160 L | 3GAA | 163 122-••CE2 | 970 | 90.9 | 91.5 | 0.78 | 23 | 6.8 | 108 | 2.3 | 2.8 | 0.127 | 128 | 61 |
| 15 | M3APP | 180 L | 3GAA | 183 121-••CE2 | 970 | 92.2 | 92.4 | 0.75 | 31 | 8.3 | 147 | 2.8 | 3.9 | 0.237 | 173 | 59 |
| 18.5 | M3APP | 200 MLB | 3GAA | 203 021-••CE2 | 985 | 92.4 | 92.4 | 0.81 | 36 | 8.3 | 180 | 3.7 | 3.3 | 0.43 | 205 | |
| 22 | M3APP | 200 MLC | 3GAA | 203 022-••CE2 | 985 | 92.9 | 93.0 | 0.82 | 42 | 8.3 | 214 | 4.0 | 3.0 | 0.49 | 220 | |
| 30 | M3APP | 225 SMC | 3GAA | 223 021-••CE2 | 985 | 93.6 | 93.8 | 0.83 | 56 | 7.5 | 291 | 3.8 | 2.8 | 0.75 | 277 | |
| 37 | M3APP | 250 SMB | 3GAA | 253 021-••CE2 | 985 | 94.4 | 94.4 | 0.82 | 69 | 7.4 | 358 | 3.3 | 2.8 | 1.49 | 349 | |
| 45 | M3BPP | 280 SMB | 3GBP | 283 220-••G | 991 | 94.8 | 94.7 | 0.86 | 80 | 7.5 | 434 | 2.4 | 2.6 | 2.2 | 645 | |
| 55 | M3BPP | 280 SMC | 3GBP | 283 230-••G | 992 | 95.2 | 94.9 | 0.86 | 98 | 7.9 | 530 | 2.6 | 2.7 | 2.85 | 725 | |
| 75 | M3BPP | 315 SMB | 3GBP | 313 220-••G | 992 | 95.6 | 95.5 | 0.84 | 135 | 7.0 | 722 | 2.4 | 2.7 | 4.1 | 930 | |
| 90 | M3BPP | 315 SMC | 3GBP | 313 230-••G | 992 | 95.9 | 95.8 | 0.84 | 161 | 7.8 | 866 | 2.6 | 2.9 | 4.9 | 1000 | |
| 110 | M3BPP | 315 MLA | 3GBP | 313 410-••G | 992 | 96.0 | 95.9 | 0.84 | 197 | 7.4 | 1059 | 2.6 | 2.7 | 5.8 | 1150 | |

**Further information, including a library of documents, is available on ABB's website.**
**Please visit www.abb.com/motors&drives.**

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