



**World's First
Super Premium
Efficiency
Gear Motors for
Explosion
Hazardous Areas**



 **Bauer Gear Motor**[®]
Altra Industrial Motion

Boosting energy efficiency with variable speed drives

EU Regulation 640/2009/EC exempts motors for use in explosion hazardous areas from the minimum efficiency requirements for placing new products on the market, because explosion protection takes precedence over the energy savings that can be achieved with motors. This does not mean that there is no potential for energy savings with the electric motors used in the chemical industry. This is why the VIK pamphlet „VIK Recommendation 1: Three-Phase Induction Motors – Technical Requirements“ recommends the use of efficiency class IE2 (High Efficiency) for motors with explosion protection types Ex d and Ex nA and efficiency class IE1 (Standard Efficiency) for motors with explosion protection type Ex e.

For many years, only encapsulated motors (type Ex d) could be used for variable speed operation in explosion hazardous areas. With the launch of motors with explosion protection type Ex e for use next to the inverter, customers now have a economical alternative to encapsulated motors when procuring motors for use in explosion hazardous areas. Variable speed drives create opportunities for major energy savings. For applications in

explosion hazardous areas as well as other areas, retrofitting frequency inverters in existing plants and achieving higher energy savings by using highly efficient motors are both attractive options. Most currently available variable-speed three-phase induction motors with explosion protection type Ex e are only available in standard efficiency class IE1. This means that potential energy savings are only partially utilised.

For the **first time ever**, the S series of permanent magnet synchronous geared motors (PMSM) from **Bauer Gear Motor GmbH** offers variable-speed motors in **efficiency class IE4*** for use in explosion hazardous areas. This is the highest energy efficiency that can be achieved with the current state of motor technology.

Bauer Gear Motor GmbH helps amongst others the chemical industry fully exploit potential energy savings with high efficiency IE4 motors, even at the highest level.

Motor data

| Type | Design | | | | | | | |
|----------|----------------|-------------|--------------|--------------|----------------|-------------|--------------|--------------|
| | 1500 1/min | | | | 3000 1/min | | | |
| | Speed 1/min | Power kW | Torque Nm | Current A | Speed 1/min | Power kW | Torque Nm | Current A |
| S..08MA4 | 150 | 0,08 | 5 | 1,9 | 150 | 0,08 | 5 | 3,7 |
| | 500 | 0,29 | 5,6 | 2,1 | 500 | 0,29 | 5,6 | 4,1 |
| | 1000 | 0,68 | 6,5 | 2,3 | 1000 | 0,7 | 6,5 | 4,7 |
| | 1500 | 1 | 6,5 | 2,3 | 3000 | 2 | 6,5 | 4,7 |
| | 1800 | 1,2 | 6,5 | 2,3 | 3600 | 2,5 | 6,5 | 4,7 |
| S..08LA4 | 150 | 0,1 | 6,5 | 2,5 | 150 | 0,1 | 6,5 | 5,2 |
| | 500 | 0,42 | 8,0 | 3,0 | 500 | 0,42 | 8,0 | 5,9 |
| | 1000 | 1 | 9,55 | 3,5 | 1000 | 1 | 9,55 | 7,0 |
| | 1500 | 1,5 | 9,55 | 3,5 | 3000 | 3 | 9,55 | 7,0 |
| | 1800 | 1,8 | 9,55 | 3,5 | 3600 | 3,6 | 9,55 | 7,0 |
| S..09SA4 | 150 | 0,13 | 8 | 2,5 | 150 | 0,13 | 8 | 5,2 |
| | 500 | 0,53 | 10 | 3,2 | 500 | 0,53 | 10 | 6,4 |
| | 1000 | 1,36 | 13 | 4,0 | 1000 | 1,36 | 13 | 8,25 |
| | 1500 | 2 | 13 | 4,0 | 3000 | 4 | 13 | 8,25 |
| | 1800 | 2,2 | 11,5 | 4,0 | 3600 | 4,15 | 11 | 7,3 |
| S..09XA4 | 150 | 0,2 | 13 | 4,0 | 150 | 0,196 | 12,5 | 8,0 |
| | 500 | 0,84 | 16 | 5,0 | 500 | 0,84 | 15,7 | 9,9 |
| | 1000 | 2,1 | 20 | 6,3 | 1000 | 2,1 | 20 | 12,5 |
| | 1500 | 3,1 | 20 | 6,3 | 3000 | 6,3 | 20 | 12,5 |
| | 1800 | 3,6 | 19 | 6,3 | 3600 | 5,5 | 14,5 | 9,2 |
| S..11SA6 | 150 | 0,28 | 18 | 5,6 | 150 | 0,28 | 18 | 12 |
| | 500 | 1 | 20 | 6,2 | 500 | 1 | 20 | 13,3 |
| | 1000 | 2,4 | 22,5 | 7,0 | 1000 | 2,4 | 22,5 | 15 |
| | 1500 | 3,5 | 22,5 | 7,0 | 3000 | 7,1 | 22,5 | 15 |
| | 1800 | 6,1 | 22,5 | 7,0 | 3600 | 8,5 | 22,5 | 15 |
| S..11MA6 | 150 | 0,42 | 26,5 | 8,5 | 150 | 0,42 | 26,5 | 17 |
| | 500 | 1,6 | 30 | 9,5 | 500 | 1,6 | 30 | 19,3 |
| | 1000 | 3,7 | 35 | 11 | 1000 | 3,7 | 35 | 22,5 |
| | 1500 | 5,5 | 35 | 11 | 3000 | 11 | 35 | 22,5 |
| | 1800 | 6,5 | 35 | 11 | 3600 | 12,9 | 34,3 | 22,5 |
| S..11LA6 | 150 | 0,51 | 32,5 | 9,8 | 150 | 0,5 | 32,5 | 20 |
| | 500 | 2 | 39,4 | 12 | 500 | 2,1 | 39,4 | 24 |
| | 1000 | 5 | 48 | 14,7 | 1000 | 5 | 48 | 30 |
| | 1500 | 7,5 | 48 | 14,7 | 3000 | 15 | 48 | 30 |
| | 1800 | 9 | 47,5 | 14,7 | 3600 | 15 | 40 | 25,8 |

PMSM S-series in IE4* for explosion hazardous areas

Design torque M_N :

5 Nm – 48 Nm

Rated power P_N :

0,75 kW – 15 kW

Protection type

Increased Safety – Zone 1

⊕ II 2 G Ex e IIC T1 - T3 Gb

S.XE.08MA4

S.XE.08LA4

S.XE.09SA4

S.XE.09XA4

S.XE.11SA6

S.XE.11MA6

S.XE.11LA6

Dust explosion protection - Zone 21

⊕ II 2 D Ex tb IIC T 160°C ... 120° Db

S.XC.08MA4

S.XC.08LA4

S.XC.09SA4

S.XC.09XA4

S.XC.11SA6

S.XC.11MA6

S.XC.11LA6



* The data corresponds to the characteristic curve of the motor, lower efficiency classes as IE4 can occur at the rated point.

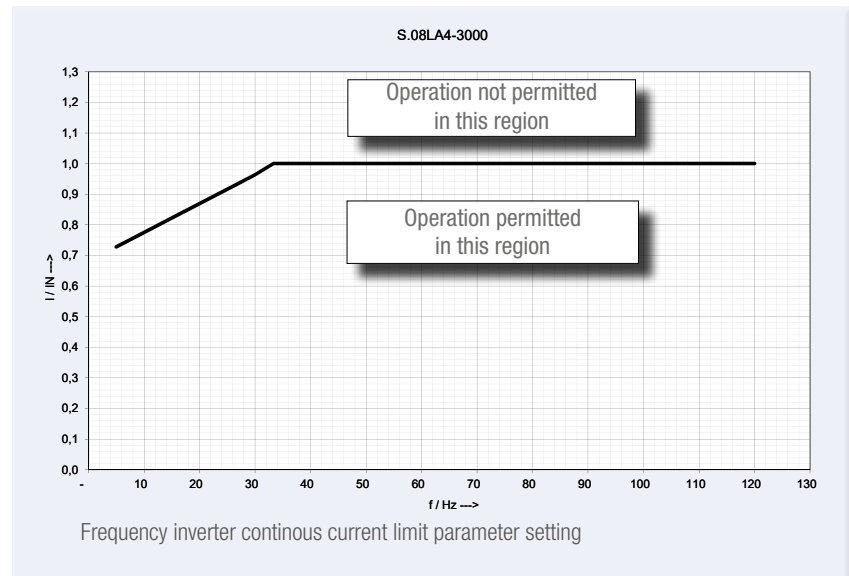
Inverter Settings

| | |
|--|---|
| Minimum clock frequency: | 3 kHz |
| Short-term current limit: | 160 % x I_N |
| Maximum overload time: | 60 s |
| Minimum frequency: | 5 Hz |
| Maximum frequency: | up to 180 Hz, depending on motor design |
| Permissible operating time below f_{min} : | 60 s (in open loop mode) |

All other settings must be selected according to the requirements of the drive. The maximum overload time and the permissible operating time below f_{min} are based on an interval of 10 minutes. Non-standard operating conditions are available on request.

Frequency-dependent current limit

The continuous current limit of the frequency inverter must be set in accordance with the current versus frequency diagram (motor type example below S..08LA4-3000 rpm).



Investment security for the future

Electrically driven machinery accounts for around 70 % of overall energy demand for industrial consumption. Energy savings of 135 billion kilowatt-hours per year would be possible within Europe with the use of modern drive systems.

Bauer Gear Motor GmbH pursues its goals with minimum consumption of raw materials and energy, the lowest possible environmental impact, and efficient utilisation of resources. This philosophy is reflected in our product strategy, and we want to share it with our customers in

What we offer

- 90 years of experience in drive technology
- Advice from gear motor specialists
- A high level of engineering expertise for custom drive solutions
- A high level of application expertise
- Global availability
- Exceptional flexibility
- A broad product spectrum
 - Pioneering technologies for energy-efficient drives
 - Standard Efficiency (IE1) and Premium Efficiency (IE3) with standard induction motor technology
 - Super Premium Efficiency (IE4) – the highest efficiency class technologically possible – with permanent magnet synchronous motors (PMSMs)
- Sector-specific solutions as standard

... for your benefits

- A partner on your side:
 - that speaks your language
 - that understands you
 - that gives top priority to customer satisfaction
- More added value by using:
 - The Bauer brand, with
 - a good reputation worldwide
 - sturdy and durable drives
 - a high enclosure protection rating of IP65 as standard lying above the market standard
 - extremely high quality awareness
 - Products that are tailored to your applications and give you the benefit of:
 - our expertise as drive manufacturers for over 85 years
 - our knowledge of the industry
 - Higher flexibility
 - adaptation of standard drives to your needs
 - fast time to market for product launch with custom drive solutions (SSD)
- Expert advice for fully exploiting potential energy savings
- Acquiring technology leadership by using IE4 motors
- Achieving investment security by complying with statutory provisions for energy efficiency extending beyond 2017

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The Brands of Altra Industrial Motion

Couplings

Ameridrives
www.ameridrives.com

Bibby Turboflex
www.bibbyturboflex.com

Guardian Couplings
www.guardiancouplings.com

Huco
www.huco.com

Lamiflex Couplings
www.lamiflexcouplings.com

Stromag
www.stromag.com

TB Wood's
www.tbwoods.com

Geared Cam Limit Switches

Stromag
www.stromag.com

Electric Clutches & Brakes

Inertia Dynamics
www.idicb.com

Matrix
www.matrix-international.com

Stromag
www.stromag.com

Warner Electric
www.warnerelectric.com

Linear Products

Warner Linear
www.warnerlinear.com

Engineered Bearing Assemblies

Kilian
www.kilianbearings.com

Heavy Duty Clutches & Brakes

Industrial Clutch
www.indclutch.com

Twiflex
www.twiflex.com

Stromag
www.stromag.com

Svendborg Brakes
www.svendborg-brakes.com

Wichita Clutch
www.wichitaclutch.com

Belted Drives

TB Wood's
www.tbwoods.com

Gearing

Bauer Gear Motor
www.bauergears.com

Boston Gear
www.bostongear.com

Delroyd Worm Gear
www.delroyd.com

Nuttall Gear
www.nuttallgear.com

Overrunning Clutches

Formsprag Clutch
www.formsprag.com

Marland Clutch
www.marland.com

Stieber
www.stieberclutch.com

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