Drive technology for the chemical industry
More so than in other industrial sectors, drive and automation systems in the chemical industry must comply with the strictest safety standards for the protection of life, machines and the environment. Our extensive drive technology program – from AC inverters through decentralized drive technology up to geared motors, low-voltage motors or special customized variants – fully complies with these requirements. We can supply our rugged explosion-protected motors adapted to the challenges which the chemical industry faces. We can also provide AC drives according to the NAMUR Standard and class of protection PELV (Protective Extra-Low Voltage) for maximum safety and the highest efficiency over the complete life cycle of your plant.

Our scope of drive technology for the chemical industry extends from a few watts up to megawatts. In this brochure you will find a range of low-voltage motors and MICROMASTER 440 inverters which are especially suited for the chemical industry.
Motors which drive everything
The complete range of low-voltage motors covers an output range from 0.06 up to 1000 kW. Motors which have been specifically designed for applications in the chemical industry — for example with explosion protection — are available. Beyond this we can also provide, depending on the application, energy-saving motors to keep your operating costs low. We also manufacture motors according to NEMA standards for applications to comply with the local specifications of the North American market, as well as motors for specific industry sectors and customers. All of these motors, produced in factories worldwide, are certified in accordance with DIN EN ISO 9001 and are equipped as standard with a wide range of features for safety and efficiency — and especially cost-effective operation.

Frequency inverters for the chemical industry
The MICROMASTER® family of inverters couple sophisticated technology with versatile functionality. From the basic version on a mounting plate, up to a complete cabinet unit. They are optimally suited for the requirements in the chemical industry. Extremely easy to configure, having standard parameter sets, menu-guided commissioning and documented factory settings ensure that the drives are quickly installed and are easy to operate. Similarly, subsequent modification to handle new requirements can easily be undertaken. Inputs and outputs can be interconnected flexibly so that a wide range of digital and analog signals can be cross-linked. All important protective and overload functions are integrated as standard. Every inverter complies with the EU Low-Voltage Directive, has the CE marking and is certified according to UL, CUL and c-tick. This means that they can be used simply and safely worldwide.

Part of Totally Integrated Automation
All of the Siemens standard drives can be incorporated into Totally Integrated Automation (TIA) using the PROFIBUS. The unified automation platform allows operations and processes to be vertically and horizontally integrated for the best possible optimization of your complete plant or system. This means that you not only reduce your total cost of ownership, but also sustainably improve your competitiveness. In turn you are best equipped to handle the special challenges of the chemical industry.
Explosion-protected motors
Maximum safety with highest efficiency
In hazardous and aggressive environments in the chemical industry, motors have to comply with the strictest safety standards for the protection of life, machines and the environment. With the explosion-protected motors from Siemens you are going further than the basic safety requirements for gas as well as dust explosion protection: our rugged EEx motors operate completely reliably even under the most extreme conditions, worldwide a hundred thousand times over. And what is more, there are no gaps in the EEx motor range, they meet all requirements with maximum safety and high efficiency during operation.

**Product spectrum**
- Unified series of gray iron cast motors – both standard and explosion-protected
- Motors according to VIK-recommendation are available as option
- “Increased safety” degree of protection – “e” (EEx e II)
- Explosion-proof enclosure – “d” (EEx de II C)
- Non-sparking – “n” (EEx nA, Ex nA)
- Dust explosion-proof

**Quality tested**
All explosion-protected motors from Siemens have been tested by the German Federal Institute of Science and Technology (PTB) or by the German Coal and Steel Technology (DMT) authorities.

Our low-voltage motors are reliable and efficient for every drive application.

**Explosion-protected motors – Technical overview**

<table>
<thead>
<tr>
<th>Motors</th>
<th>Type of protection “e”</th>
<th>Type of protection “d”</th>
<th>Type of protection “n”</th>
<th>Dust explosion-proof</th>
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<tbody>
<tr>
<td>Frame size</td>
<td>63M to 315L</td>
<td>71M to 450</td>
<td>63M to 450</td>
<td>56M to 315L</td>
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<tr>
<td>Output range</td>
<td>0.12 kW to 165 kW</td>
<td>0.25 kW to 950 kW</td>
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<td>2/4/6/8</td>
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<td>Temperature class</td>
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<td>T1–T4</td>
<td>T3</td>
<td>–</td>
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<tr>
<td>Type of protection</td>
<td>II 2 G EEx e II acc. to EN 50014/EN 50019</td>
<td>II 2 G EEx de II C acc. to EN 50014/EN 50018</td>
<td>II 3 G EEx nA II Ex nA II acc. to IEC/EN 60079-15</td>
<td>Zone 21: II 2D IP65 T 125°C Zone 22: II 3D IP55 T 125°C acc. to EN 50281/IEC 61241</td>
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<td>Guideline</td>
<td>94/9/EG, ATEX 95</td>
<td>94/9/EG, ATEX 95</td>
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<td>IP55</td>
<td>IP55</td>
<td>Zone 21: IP65 Zone 22: IP55</td>
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<td>All common construction types</td>
<td>All common construction types</td>
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<td>Housing</td>
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<td>Cast iron</td>
<td>FS 63M ... 160L aluminium FS 100L ... 450 cast iron</td>
<td>FS 56M ... 225M aluminium FS 100L ... 315L cast iron</td>
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<td>F used as B</td>
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<td>DURIGNIT® IR 2000, inverter-compatible up to 500 V, 690 V on request</td>
<td>DURIGNIT® IR 2000, inverter-compatible up to 500 V, 690 V on request</td>
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</tbody>
</table>
MICROMASTER 440 frequency inverters
Packed with functionality for a wide range of applications

Many applications in the chemical industry are predestined for variable-speed operation using inverters. Whether it involves mixing drives in conjunction with offset shaft geared motors, agitators in hazardous areas, extruders requiring a high starting torque or, for example, foil-processing machines where several drives run in synchronized operation – our MICROMASTER 440 inverter is the best selection where maximum functionality and higher dynamic performance is demanded.

Typical applications
Transportation of fluids or gases and solid substances, metering and mixing, filtering, extruding, lifting

Its strengths in brief
• Compact housing
• Easy to install
• Guided commissioning
• Safe protective separation with degree of protection PELV
• LC output filter to limit the Vmax and dv/dt
• Sophisticated Vector control (speed/torque) for a uniform high drive quality even for sudden load changes
• Motors up to 300 m away can be operated in hazardous zones
• Operation with 200-m-long unshielded cables maintaining the Class A limit values (according to EN 55011)

• Variants acc. to NAMUR Standard NE37/NE38 are available
• PROFIBUS and DeviceNet communication modules
• Integrated into Totally Integrated Automation (TIA) with the PROFIBUS option
• Can be incorporated in SIMATIC PCS 7 through adapted face-plates
• High overload capability
• Evaluation of motor pulse encoders (optional) for the maximum control of torque at the lowest speeds (even at zero speed)
• Modular system of extension options
• Can be dimensioned for CT (Constant Torque) and VT (Variable Torque)
• Load torque monitoring
• Kinetic buffering against voltage dips
• Compound braking for controlled rapid braking
• Integrated braking chopper for power outputs up to 90 kW (125 HP)
• Free function blocks
• 4 skip frequencies minimize machine stress when resonance occurs
• Automatic restart
• Minimal stress on the motor when the inverter is connected to rotating motor
• Evaluation of the motor temperature for integrated motor protection
• Prepared for use in IT networks
• Available with and without integrated EMC filter

MICROMASTER 440 has everything to drive your machines and plant safely and reliably.

**MICROMASTER 440 – Technical overview**

| Voltage and power ranges | 200 – 240 V, ± 10%, 1 AC, 0.12 to 3 kW (0.16 to 4 HP)  
| | 380 – 480 V, ± 10%, 0.37 to 250 kW (0.5 to 300 HP) |
| | 200 – 240 V, ± 10%, 0.12 to 45 kW (0.16 to 60 HP)  
| | 500 – 600 V, ± 10%, 0.75 to 90 kW (1.0 to 125 HP) |
| Operating temperature | 0.12 to 75 kW (0.16 to 1.0 HP) (CT): −10 °C to +50 °C; 90 to 200 kW (125 to 250 HP) (CT): 0 °C to +40 °C |
| Process control | Internal PID controller (autotuning) |
| Types of control | Vector control, FCC (Flux Current Control), multipoint characteristic (parameterizable V/f characteristic), V/f characteristic |
| Inputs | 6 digital inputs, 2 analog inputs, 1 PTC/KTY input |
| Outputs | 2 analog outputs, 3 relay outputs |
| Link-up to automation | The ideal partner for your automation needs, from connection to SIMATIC S7-200 to integration in TIA with SIMATIC and SIMOTION |
Interested?

Additional information about the Standard Drives product range is available in the Internet:

Motors
www.siemens.com/motors
www.siemens.com/gearedmotors

Frequency inverters
www.siemens.com/micromaster
www.siemens.com/sinamics-g110

Decentralized drive technology
www.siemens.com/et200s-fc
www.siemens.com/combimaster

Service and Support
www.siemens.com/automation/service&support

Your contact partners
www.siemens.com/automation/partners

You can order and download informative material here:
www.siemens.com/motors/printmaterial

Siemens AG
Automation and Drives

www.siemens.com/drives

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