



**Drives with PROFIBUS and PROFINET  
move the world**

# ... with numerous benefits.

## **Innovative and future-proof**

When drives are used in conjunction with PROFIBUS and PROFINET, it is possible to expand equipment and machines at any time. Because devices of different manufacturers on the same bus are fully compatible, these technologies ensure flexible and future-proof solutions. This innovation provides competitive advantages.

## **Safety solutions conforming to standards**

Using PROFIsafe, PROFIBUS and PROFINET can satisfy all requirements when it comes to ensuring complete safety for humans, equipment, and the environment. The use of PROFIsafe enables therefore a single network for standard and safety-related communication on the same cable as well as wirelessly via Industrial WLAN. Drive technology also fits in seamlessly here with the integrated safety functions according to IEC 61800-5-2.\*

## **Energy-efficient energy management**

It has been demonstrated that the use of conventional PROFINET- and PROFIBUS-capable drives alone can reduce energy costs by up to 60%. The additional use of PROFInergy optimizes energy consumption even more. Non-required loads can be switched off selectively at defined times, and a simple OFF/ON switching operation of technologically-related plant sections can be automated.

As with other PROFIBUS and PROFINET products, drives can also be used without difficulty in wireless applications by integrating them via Industrial WLAN gateways.

## **Wireless applications**

By networking drives with PROFIBUS and PROFINET, you can easily carry out commissioning and diagnostic activities for your system via remote access. For this purpose PROFIdrive provides standardized mechanisms for monitoring functions.

## **Remote access, commissioning, diagnostics, and condition monitoring**

\*Integrated safety functions (according to IEC 61800-5-2). The basic safety functions „Safe Torque Off“, „Safe Stop 1“, and „Safe Brake Control“ always leads to a safe disconnection of the energy feed to the motor when selected, e.g., in a hazard situation. The advanced safety functions „Safe Operating Stop“, „Safe Stop 2“, „Safety-Limited Speed“, and „Safe Speed Monitor“ allow reliable monitoring of the drive during operation or when a temporary exceptional situation, such as setup or maintenance work, occurs. Because the position control normally remains active, the intended operation of the drive axis can be resumed immediately once the exceptional situation ends. It is possible to carry out maintenance work conveniently and safely, which significantly reduces machine and equipment downtimes.

# Drive technology with PROFIBUS and PROFINET ...



*Drive technology is a fundamental requirement for all automation tasks. The tasks performed and the related requirements are heavily dependent on the particular application. The range of applications includes:*

- *Drives with fixed and variable speed, such as pumps, fans, and compressors, and drives for transport tasks*
- *Single-axis positioning controllers for applications, such as moving, resetting, and positioning*
- *Applications with multi-axis interpolation for packaging, printing, and milling*

## **PROFIBUS and PROFINET** – approved and innovative

PROFIBUS, the most successful fieldbus system in the world, and PROFINET, the continuation of this success story with an open vendor-neutral Industrial Ethernet standard, integrate as the most widely used digital communication system drives into automation solutions. The combination of the PROFIdrive, PROFIsafe, and PROFInergy technologies provide additional opportunities for designing applications that meet all requirements.

## **PROFIdrive** – vendor-neutral

PROFIdrive was developed by PROFIBUS & PROFINET International (PI) specifically for drive technology applications. It contains standardized definitions (syntax and semantics) for communication between drives and automation systems and thus ensures vendor neutrality and interoperability.

## **PROFIsafe** – safe

Increasingly, the market is showing a trend towards drives that offer integrated safety. This offers an advantage in that there is no longer any need for external monitoring devices (reduces wiring and saves space). From this point of view, PROFIdrive and PROFIsafe are the perfect complements to each other. Together, the two profiles create a unified whole that can be used for controlling safety functions and standard drive functions via the same bus.\*

## **PROFInergy** – thrifty

Electrical drives account for almost two-thirds of industrial power demand. With continuously rising energy prices, this cost factor is driving up production costs. This represents an enormous savings opportunity for practically all companies. In energy-intensive sectors, in particular, savings of up to 60% are possible through use of energy-efficient drives. Take the first step – with energy-efficient drive technology based on PROFInergy.

## ... from applications with fixed or variable speed ...



Pumps are used in many industrial sectors – including chemicals, pharmaceuticals, oil and gas, food and beverage, textiles, paper, mining, and water and wastewater treatment.

Pumps transport a wide range of liquids. To achieve this, reliable, trouble-free, efficient operation is critical for all continuous and variable-speed pumps alike.

Fans are used in many different industries and applications – such as building systems, water and wastewater treatment, chemicals, paper, and mining.

Fans serve to convey atmospheric air. Energy efficiency and low-noise operation are important criteria.

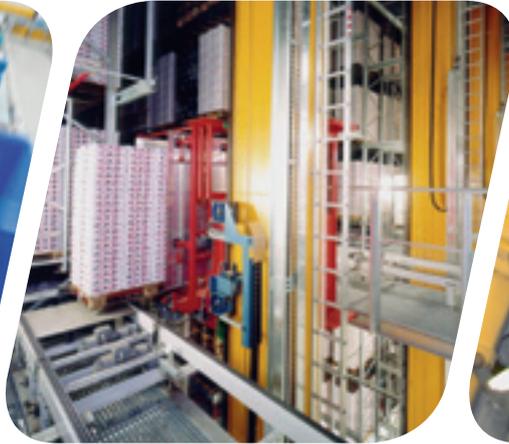
Compressors have many application areas: air conditioning and refrigeration systems, chemicals, pharmaceuticals, oil and gas, water and wastewater treatment, machine building, food and beverage, mining, and paper.

Their function is to convey and compress gases of any amount of pressure. In addition to satisfying global requirements for efficiency, availability of a high energy density plays a decisive role.

### Operation and maintenance can be optimized

- Flexible process control due to fast, precise flow rate adjustment
- Extensive functionality for different tasks such as dry-running protection, cascading
- High plant availability and long service life
- Potential energy savings as a result of highly efficient motors and speed control
- Safety-related shutdown
- Easy-to-maintain thanks to networking with centralized monitoring units
- High plant availability (example: V-belt monitoring)
- Potential energy savings as a result of highly efficient motors and speed control
- Prevention of torque loads above limits
- Fast and precise adjustment of setpoints for flow rate and pressure
- Low-stress equipment operation
- Flexible implementation
- Low-maintenance
- High plant availability (precise pressure monitoring and switch-off thresholds)
- Potential energy savings as a result of high efficiencies and speed control

# ... to positioning tasks and interpolating multi-axis applications.



Applications exist for variable speed drives in all industrial sectors: conveying, sorting, warehousing, and picking.

Positioning applications are required, for example, in the packaging industry, for logistics, and in laboratory and medical engineering.

Multi-axis applications are being used increasingly for handling and assembly, printing, packaging, and machine tools.

For conveyor technology, integrated productivity is a key success factor, whether for cost-effective material flow control or highly accurate positioning, or efficient bridging of long distances or innovative solutions in tight spaces.

These applications require the use of variable-speed drives, which handle all necessary positioning functions as well as control of both synchronous servo motors and asynchronous motors.

Robots, pick-and-place machines, and machine tools carry out multi-dimensional movements in space. Motion controllers control this process. The interface between the drive and the motion control system must meet stringent requirements for real-time capability and synchronism.

## through the use of drives with PROFIBUS or PROFINET.

- Excellent availability thanks to the high quality and comprehensive diagnostics for preventive maintenance
- High energy savings potential
- Easily expandable and fast device replacement available to minimize downtime and retrofit time
- Higher productivity due to integrated safety functions
- High cycle times as a result of digital setpoint interface
- Satisfaction of growing requirements for multiple axes and performance
- Good scalability and flexibility of the system
- Support of flexible machine concepts for fast implementation of customer-specific requirements

# PROFIBUS and PROFINET – the solution for drives integration!

- Advantages** The use of PROFIBUS and PROFINET for integrating drives in the automation world satisfies the requirements of a wide range of target groups. Thanks to use of these communication technologies the drive components are economical for manufacturers as well as for end users. Drive, controller, I/O, and HMI are networked in a highly flexible manner using a single integrated communication technology. The low installation costs result in cost savings. The use of PROFIdrive ensures that the devices used are vendor-neutral and interoperable. Drives with PROFIBUS and PROFINET provide integrated safety functions as well as international acceptance based on IEC standardization and recommendations of end user organizations such as OMAC or VIK/NAMUR.
- Certification** Many manufacturers around the world support the PROFIBUS and PROFINET technologies as well as the PROFIdrive, PROFIsafe, and PROFIenergy profiles. To ensure the quality of devices, the PI Test Labs certify manufacturers' devices.
- Workshops** PI Training Centers and numerous technology providers and manufacturers offer workshops on PROFIBUS and PROFINET and their related profiles. For information and schedules, go to [www.profibus.com/training](http://www.profibus.com/training).
- Support** Accredited PI Competence Centers around the world are available to help you in case of technical questions and support requests. For additional information on the technologies and on workshops, technical documentation (e.g., system descriptions), and products, go to [www.profibus.com](http://www.profibus.com) or [www.profinet.com](http://www.profinet.com). You can also obtain information about current topics and development activities on the web site [www.profidrive.com](http://www.profidrive.com) at any time.