

Making cars

using Lenze drive technology



Lenze

Auto mobile | from the press shop to final assembly

Press shop, body shop, paint shop, undercarriage assembly, final assembly – in the automotive industry, the flow of materials can be divided into these five areas.

When producing a vehicle, the manufacturer depends on reliable materials handling technology, accurate positioning systems, high-speed handling systems and a variety of different robotics applications.

Lenze has experience in these fields and offers appropriate system solutions for drive and automation technology – from geared motors to servo inverters with an integrated PLC. Our solutions will increase your productivity as you will be able to shorten set-up times and benefit from improved plant availability.



Press shop

From a metal sheet to a car door

Lenze drive and automation solutions can also be used to meet the special requirements of press shops. For example, they ensure the shortest possible set-up times and maximum flexibility in a variety of handling and feeding production tasks. Sheet metal is integrated into the production process for the first time in the press shop of an automobile factory, and it is here

that the first contours of the vehicle being produced take shape. Numerous transportation tasks have to be performed between the press shop and the body shop area; these tasks can be carried out by monorail overhead conveyor systems, for example.



Body shop

From sheet metal to car body

Lenze drive and automation solutions provide you with drive components whose technologies are perfectly matched to one another. They ensure maximum flexibility and ease of use for a variety of applications.

Numerous applications and automation solutions are used in the body shop area of an automobile factory. The level of automation is higher than anywhere else in the entire system.

Robots driven by Lenze technology guarantee a high-quality, clean welding process.



Paint shop

How the sheet metal is painted

Over the course of several worksteps, dirt and grease is first removed from the surface to be painted using immersion baths. The painting process itself then takes place, for which Lenze supplies special ATEX-compliant geared motors. Immersion processes involving whole car bodies are carried out via electronic cam profilers. This ensures that

as little as possible of the expensive liquids have to be used in modern immersion tanks. Spraying robots apply layers of paint to the sheet metal, which is then followed by the drying process. Large, high-performance fan drives ensure that air is circulated within the halls. The freshly painted car body then leaves the paint shop.



Assembly

Automotive production assembly

The landscape of an assembly hall is characterised by monorail overhead conveyors, which are used for transporting whole vehicles, and by bonding and joining processes as well as other transport and logistics tasks. Industrial trucks bring vendor parts to the vehicles to be assembled.

Screwing stations and skilnet conveyors also form part of the Lenze-equipped workstations.



Test benches

Automotive production final test

Before a vehicle can be delivered, the functionality of the entire system must be tested as accurately and realistically as possible. Thus, each individual vehicle is subjected to a meticulous final test. Lenze supports automotive production in carrying out these tests by providing high-precision servo inverters, for example, which are used as loaders of drive torque in roller-type dynamometers.

The vehicle is exposed to various load conditions without actually moving. Speeds of up to 250 km/h are simulated on the rollers at rated loads. Accelerations expose the vehicle to real load influences in order to prevent premature failures at delivery and enable production errors to be detected at an early stage.



Press shop | From a metal sheet to a car door



Sheet metal is integrated into the production process for the first time in the press shop, and it is here that the first contours of the vehicle being produced take shape. Monorail overhead conveyor systems and, occasionally, roller conveyors are used to carry out various transport tasks between the press shop and the subsequent body shop area. Lenze provides complete drive systems for this purpose.

Servo drives are used to perform complex tasks within presses, as their dynamic performance and flexibility ensure excellent machine availability. Our drive and automation solutions provide you with the shortest possible set-up times and maximum flexibility in performing handling and feeding tasks.



Materials handling technology connects all the different areas of an automotive production site. Sheet metal and/or embossed semi-finished parts are also taken to their destination via monorail overhead conveyors.

GKL 07/09 helical-bevel gearbox for transport units

- ▶ High power density
- ▶ Three-stage helical-bevel gearbox up to 2800 Nm
- ▶ High output torque but with a small construction volume
- ▶ Low-noise geometry of the gear teeth
- ▶ Extremely functional housing



9400 servo inverter for infeed drives

- ▶ Single Drive single-axis controllers or Multi Drive multi-axis system
- ▶ Active and passive power supply modules with the capacity for regenerative feedback
- ▶ Integrated brake chopper
- ▶ Latest backplane technology
- ▶ Flexible equipment thanks to modular construction: PROFIBUS, PROFI-safe, Ethernet, etc.
- ▶ Drive-based safety to IEC 61508
- ▶ Freely programmable according to IEC 61131-3
- ▶ Diagnostic interface and memory modules



MCS/MCA servo motor for infeed drives

- ▶ High dynamic performance – low mass inertia
- ▶ Compact design – high power density
- ▶ Robust feedback systems – resolver
- ▶ Optional high-resolution absolute value encoder
- ▶ Plug-in connections for easy assembly and servicing
- ▶ IP54 enclosure/IP65 opt.
- ▶ Two series using synchronous and asynchronous technology



Inverter Drives 8400 for materials handling technology

- ▶ Designed for consistent process optimisation throughout your entire value-added chain
- ▶ 0.25 to 45 kW
- ▶ Functionality and drive behaviour clearly scaled within the inverter series
- ▶ Uniform handling at the same time
- ▶ Easy to service thanks to L-force diagnostic interface and memory module (memory chip)
- ▶ Optional drive-based safety (STO)
- ▶ Integrated brake chopper
- ▶ Energy-saving function





Body shop | From sheet metal to car body

Scissor-type lift tables – helical-bevel gearboxes save space

Lenze has developed a three-stage helical-bevel gearbox in order to meet the specific requirements of the automotive industry, e.g. for use in scissor-type lift tables. This gearbox complies with demands for a low overall height and effective speed/torque delivery. As well as the space-saving structure, the gearbox offers other features such as low maintenance requirements, flexible mounting facilities and simple options.



Electromechanical welding gun

Servo motors with an internal spindle, e.g. a rolled ballscrew spindle, which are also known as servo spindle motors, are today used in a variety of applications. These motors are an economic alternative to using pneumatics. It all began in the automotive industry, where they are used as main or compensating drives and move the welding gun located on the robot arm.



Skid conveyor

The skid conveyor is a modular conveying system for individually adapted plant concepts in the body shop, paint shop and final assembly areas. Standardised systems for mechanics and electrics as well as uniform components enable you to keep a reduced stock of spare parts whilst retaining maximum availability ($\geq 99.5\%$). Continuous or cyclic operation is possible.



Servo spindle motor for welding tongs or seaming processes

- ▶ Two sizes
- ▶ Stroke up to 170 mm
- ▶ Rolled ballscrew spindle with 5 mm leadscrew pitch
- ▶ Based on servo motor technology
- ▶ Feed force up to 15.0 kN
- ▶ 20 million stress cycles
- ▶ Support or mounted A bearing



9400 servo inverter for servo process technology

- ▶ High dynamic performance
- ▶ Modular safety engineering
- ▶ Modular fieldbuses
- ▶ Ethernet diagnostics
- ▶ Innovative backplane system
- ▶ Safety certified by the TÜV testing authority
- ▶ Integrated brake control
- ▶ Simple DC-bus connection



LCU frequency inverter for scissor-type lift tables and rotary tables

- ▶ Distributed IP54 field device
- ▶ Two sizes up to 11 kW
- ▶ Operation with open-loop or closed-loop control
- ▶ Pluggable connection system
- ▶ Optional connection to an encoder system
- ▶ Safety certified by the TÜV testing authority
- ▶ Integrated brake control
- ▶ Status display with diagnostic interface



8400 protec frequency inverter for roller conveyors

- ▶ Distributed IP65 field device
- ▶ Two sizes, 0.75 kW to 4 kW
- ▶ Pluggable connection system
- ▶ Integrated brake control
- ▶ Safety engineering certified by the TÜV testing authority
- ▶ Status display and pluggable memory module
- ▶ Scaled functional range



Servo Drives 930K fluxxtorque for bonding processes

- ▶ Robust system
- ▶ Reduces costs
- ▶ Saves space
- ▶ Flexible
- ▶ For dosing pumps and automation solutions





Paint shop | How the sheet metal is painted

Immersion bath – painting – drying

These are the processes that are carried out in the automotive industry to treat surfaces.

For production to run efficiently, it is vital that the car body is precisely controlled in the immersion bath. Optimum use must be made of the available space, in order to keep the use of expensive fluid to a minimum. Complex machine processes such as these are carried out by means of our electronic cam profiler.

We offer ATEX-compliant geared motors for use in explosion-proof atmospheres.

During the drying process, large, high-performance fan drives circulate exhaust air within the halls. With its 8200 series motors and inverters and its 9300 and 9400 series servo inverters, Lenze is providing intelligent drive solutions.



9400 servo inverter for fan drives

- ▶ Large power range
- ▶ High degree of modularity
- ▶ DC-bus connection available
- ▶ Wide variety of functions
- ▶ Comprehensive diagnostic interface
- ▶ Safety certified by the TÜV testing authority
- ▶ Integrated brake control
- ▶ Ethernet communication



H605 operator terminal for user-friendly operation

- ▶ LCD, 4 shades of blue, STN 5.6 in
- ▶ Matrix 20x16 (16x15 pixels each)
- ▶ Resolution 320x240 pixels
- ▶ 128 screens, 34 variables per screen
- ▶ Four online languages, 16 kB recipe management
- ▶ IP65 front enclosure



GKR bevel geared motor for reliable movement

- ▶ Higher efficiency and starting efficiency reduce running and procurement costs
- ▶ Efficient bevel gear toothing
- ▶ Low backlash, even after an extended operating time
- ▶ Wear-free
- ▶ Wide range of applications, in particular, materials handling technology



GST helical geared motor for materials handling technology

- ▶ More cost-effective one, two or three-stage geared motor in a robust design
- ▶ Adaptable and compatible thanks to a variety of drive and output-end designs
- ▶ 0.06 to 45 kW
- ▶ Closely stepped ratios for adaptation to various machine and process parameters
- ▶ High permissible radial forces





Assembly | marriage in a minute cycle

Distributed drive concepts

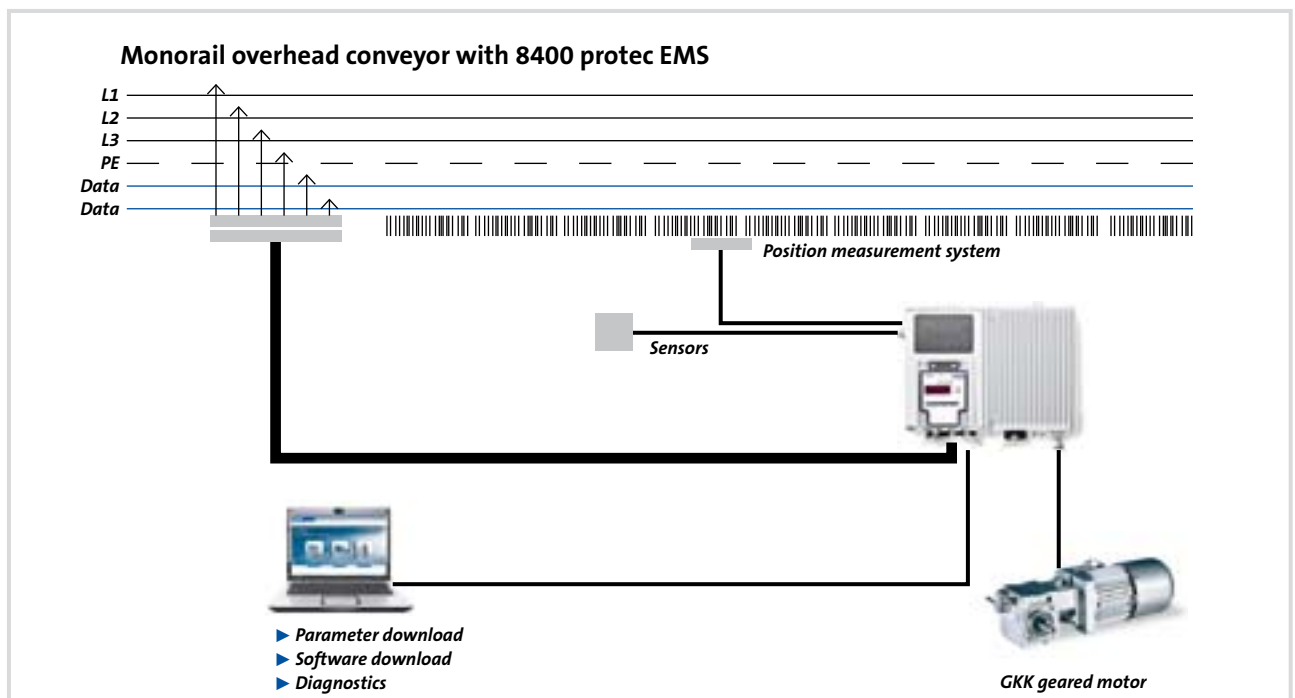
Distributed drive concepts are becoming ever more popular in comparison to traditional centralised solutions.

A modern drive architecture consists of a range of products that are matched to one another, including drive electronics and geared motors.

In this way, Lenze assists you to reduce the time you have to spend on installation and maintenance and configure your systems in a more cost-effective manner.

AGVS – Automated Guided Vehicle Systems

Industrial trucks transport missing materials or semi-finished parts to final assembly in order to complete the vehicles. Variable speeds, contactless data transmission and a wide variety of steering versions are achieved by means of flexible function software to IEC 61131-3. Here too, Lenze uses standard components so that the application requirements can be responded to flexibly.



GKK geared motor for monorail overhead conveyors in a system

- ▶ Low noise thanks to optimised geometry of the gear teeth
- ▶ High efficiency, resulting in energy savings
- ▶ Flange mounting or mounting via threaded holes on the bottom/top
- ▶ Can be mechanically isolated at the output end via a disconnect clutch
- ▶ Drive torques up to 900 Nm
- ▶ Reinforced bearings for heavy duty range for radial loads up to 36,000 N
- ▶ Up to 5.5 kW



8400 protec EMS for monorail overhead conveyors and automated guided vehicle systems

- ▶ Integrated PLC
- ▶ Energy and data transmission via brushgear or inductively
- ▶ EMS-specific communication
- ▶ Additional digital inputs and outputs
- ▶ Connection for position measurement systems
- ▶ SSI interface
- ▶ Memory module
- ▶ Formation of multi-axis systems
- ▶ Power 0.75 – 4 kW, even higher with multi-axis systems



CCU – monorail overhead conveyor control

- ▶ User-friendly parameterisation
- ▶ Die-cast aluminium housing
- ▶ IP54 enclosure
- ▶ Compact design
- ▶ Memory stick
- ▶ Infrared interface for data exchange
- ▶ Can be used in lighter load range (up to 2.2 kW)



GKS geared motor for conveyor lines

- ▶ Foot or flange
- ▶ Solid or hollow shaft
- ▶ Various steering versions
- ▶ Up to 45 kW
- ▶ Drive torques up to 11.790 Nm
- ▶ Seven sizes





Test benches | final vehicle test

Keeping (to the) track

On the carriage test benches, experts have 180 seconds per vehicle to precisely calibrate the car. Accuracy is the number one priority here because the more precisely the carriage is calibrated, the greater the safety and driving comfort.

For this reason, automotive manufacturers rely on systems using contactless laser measuring technology - driven by Lenze servo controllers which provide accurate positioning.

These power linear drives which position the car on the middle of the central axis. Laser cameras measure the vehicle's track, king pin angle and level. Our servo controllers set the measuring heads and level laser cameras in accordance with the vehicle dimensions.

Roller-type dynamometer

Roller-type dynamometers simulate real driving and road conditions quickly and accurately using dynamic mass simulation. They are used in final assembly, as a stand-alone test unit in vehicle development and in quality audits.

With Lenze drive technology, function tests are carried out accurately and realistically. The mass is distributed across the rollers in accordance with the vehicle's weight distribution. Depending on the vehicle type, acceleration values of up to 4.5 m/s^2 or even higher (0 km/h to 100 km/h in 6 seconds) are possible.

This powerful drive technology enables a variety of functions to be tested on the test benches, such as the ABS, electronic differential lock, electronic stability program and traction control system. All test cycles up to 250 km/h can be checked on a test bench.



9400 servo inverter for torque control

- ▶ Large power range
- ▶ High degree of modularity
- ▶ DC-bus connection available
- ▶ Wide variety of functions
- ▶ Comprehensive diagnostic interface
- ▶ Safety certified by the TÜV testing authority
- ▶ Integrated brake control
- ▶ Ethernet communication



9400 servo inverter for servo process technology

- ▶ High dynamic performance
- ▶ Modular safety engineering
- ▶ Modular fieldbuses
- ▶ Ethernet diagnostics
- ▶ Innovative backplane system
- ▶ Safety certified by the TÜV testing authority
- ▶ Integrated brake control
- ▶ Simple DC-bus connection



Servo Drives 930K fluxxtorque for distributed servo technology

- ▶ Robust system
- ▶ Compact design
- ▶ Smooth surface
- ▶ IP54 and IP55
- ▶ PROFIBUS, CAN or RS232
- ▶ 24 V DC, 42 V DC or 230 V AC voltage
- ▶ 140 W – 650 W



GPA planetary geared servo motor for actuating drives

- ▶ High overload capability
- ▶ Torsionally stiff
- ▶ Low backlash
- ▶ Solid shaft with or without featherkey
- ▶ Flange mounting



Drive-based safety | Our drive, your advantage

The advantages of drive-based safety at a glance

Take advantage of our expertise and our components to find a straightforward yet comprehensive solution to implementing safety engineering in your machines.

- ▶ **Lower system costs**
 - Reduction in space requirement
 - Reduction in wiring
 - No external safety engineering hardware required
- ▶ **Simplification of the system structure**
 - Reduction in wiring
 - Greater transparency
- ▶ **Making complex topics easy to understand**
 - All functions integrated in the controller
 - Greater transparency
- ▶ **Increasing system performance**
 - Shorter switch-off times due to the absence of contactors
 - Shorter restart times as the DC bus remains charged

▶ Improved EMC

- No interruption in shielding required, as there is no need for the mains and/or motor contactor

▶ Improved diagnostics

- All safety states can be scanned via diagnostic channels in the standard drive

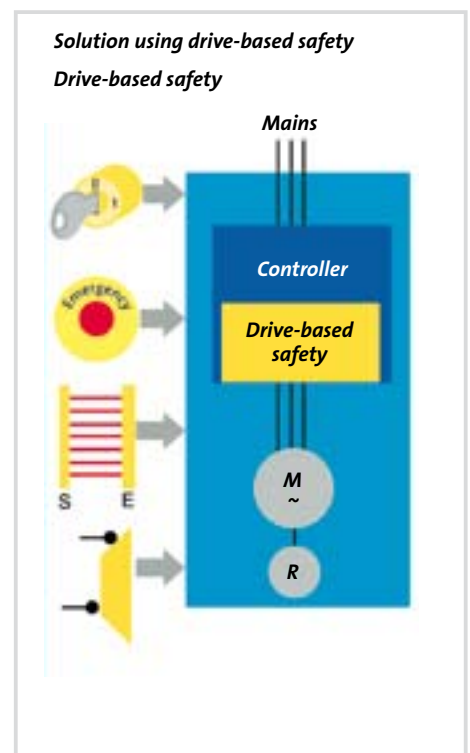
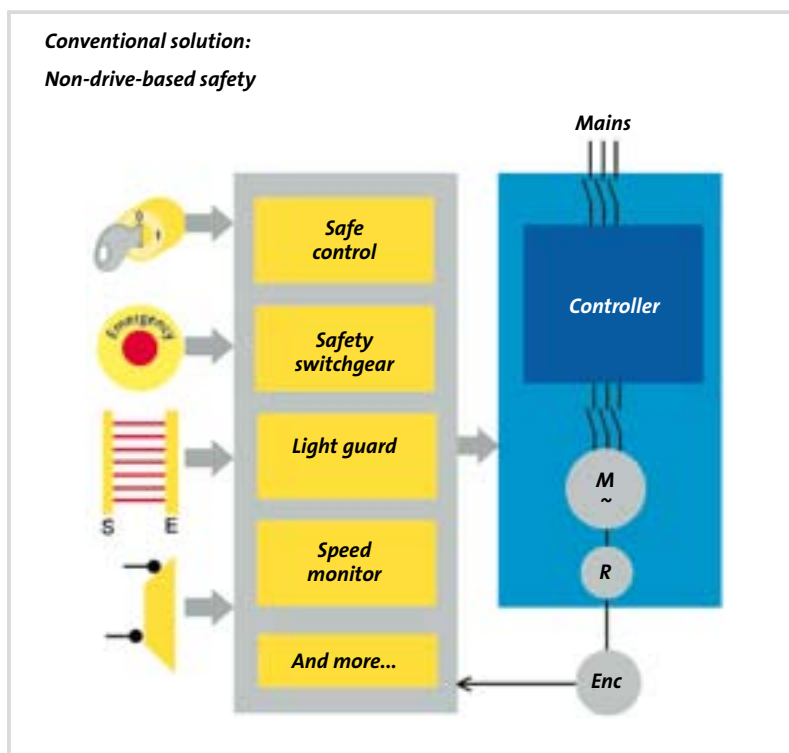
▶ Compliance with valid standards by means of certification

- Certification of entire system made easier

▶ Scalability

- Only the required safety functions need to be installed

Conventional solutions for implementing safety functions use external switching elements and monitoring devices. Here, cost-cutting potential is achieved by means of the integrated safety engineering we call "drive-based safety".



L-force engineering | from the initial idea right through to acceptance

L-force engineering

Printed catalogues, electronic catalogues (DSC) and documentation – all of these help you to engineer your machine. With this practical, complete package, Lenze provides the best possible engineering support.

L-force Engineer

The new L-force Engineer software, which has an intuitive user interface that is easy to learn how to use, is a key component.

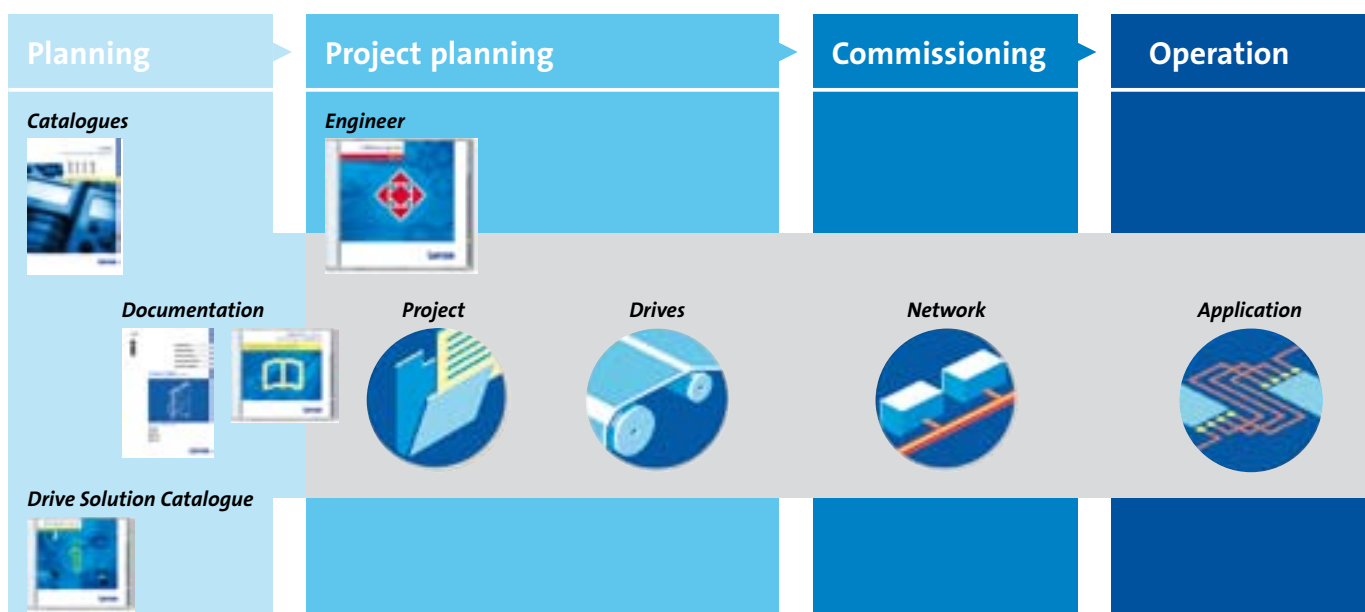
Basic navigation is achieved by means of different views in which important functions are categorised and clearly displayed. Numerous graphics-based views and screens also make it easier to configure and set the parameters of the

devices. Instead of having to carry out programming, you only have to create simple configurations.

Comprehensive

That you can engineer multiple drives using the L-force Engineer goes without saying. A number of functions based on Lenze drive and automation technology enable you to configure, commission and diagnose your machine perfectly.

Project phases



It's good to know | why we are there for you



"Our customers come first. Customer satisfaction is what motivates us. By thinking in terms of how we can add value for our customers we can increase productivity through reliability."



"We will provide you with exactly what you need – perfectly co-ordinated products and solutions with the right functions for your machines and installations. That is what we mean by 'quality'."



"Take advantage of our wealth of expertise. For more than 60 years now we have been gathering experience in various fields and implementing it consistently and rigorously in our products, motion functions and pre-configured solutions for industry."



"The world is our marketplace. Wherever you are in the world, we are nearby, providing you with our drive and automation solutions."

Algeria · Argentina · Australia · Austria · Belarus · Belgium · Bosnia-Herzegovina · Brazil · Bulgaria · Canada · Central America · Chile · China · Colombia · Croatia · Czech Republic · Denmark · Egypt · Estonia · Finland · France · Germany · Greece · Hungary · Iceland · India · Indonesia · Iran · Israel · Italy · Japan · Latvia · Lebanon · Lithuania · Luxembourg · Macedonia · Malaysia · Mauritius · Mexico · Morocco · Netherlands · New Zealand · Norway · Philippines · Poland · Portugal · Romania · Russia · Serbia-Montenegro · Singapore · Slovak Republic · Slovenia · South Africa · South Korea · Spain · Sweden · Switzerland · Syria · Taiwan · Thailand · Tunisia · Turkey · Ukraine · United Arab Emirates · United Kingdom/Eire · USA · Vietnam

You can rely on our service. Expert advice is available 24 hours a day, 365 days a year, in more than 30 countries via our international helpline: 008000 24 Hours (008000 2446877).

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