Process Automation





Facts and figures

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as of: 12/2022

Sales 1980 – 2021



Sales 2021: Sales 2020:	€1.182 billion (+ 28%) €923 million (+ 2%)			 		
Average growth 2000 – 2021:	15%		 	 		
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Sales network Germany

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Beckhoff Europe





Beckhoff worldwide

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Components for industrial automation

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National Oilwell Varco









FourPhase, Norway: PC-based control optimizes solids management for oil and gas production





FourPhase, Norway: PC-based control optimizes solids management for oil and gas production

FourPhase makes changes to traditional oil and gas production processes

- ensures that solids are continuously separated from oil and gas production
- to protect other system components, provide solids-free flow, and make the oil and gas extraction process cost and time efficient



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FourPhase, Norway: PC-based control optimizes solids management for oil and gas production

Automation

- TwinCAT PLC
- TwinCAT OPC UA
- TwinCAT cable redundancy
- TwinCAT TCP/IP
- TwinCAT Modbus TCP

IPC

CPX3721-0010

Embedded PC

• CX5140-0175

I/O

- EtherCAT EL terminals
- EtherCAT EL IO-Link terminals
- EtherCAT ELX terminals



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CNOOC and Tianjin Aoling Industrial Automation Technologies, China Condition monitoring on offshore oil platforms





CNOOC and Tianjin Aoling Industrial Automation Technologies, China Condition monitoring on offshore oil platforms



System-integrated vibration analysis reliably monitors the load-bearing capacity of steel structures

- Monitoring of steel structures on the offshore platforms of China's largest oil and gas producers
- Vibration monitoring as a prerequisite for safe, environmentally friendly and longterm operation and the basis for preventive maintenance measures



Applications and solutions





The Beckhoff control architecture: barrier-free from Zone 0 into the cloud





Barrier-free system integration from Zone 0 to the cloud

- CPX series: Control Panels and Panel PCs for use in Zone 2/22
- ELX series: EtherCAT Terminal integrates safety barrier in 12 mm housing
- direct connection of intrinsically safe field devices from Zones 0/20
- extensive HART integration
- integration of the FDT/DTM technology
- certification according to ATEX, IECEx and NEC/CEC
- Redundant controllers
- Open interfaces





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All components for explosion protection





System-integrated explosion protection in process technology

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Gaznat S.A., Switzerland Monitoring a natural gas supply network in western Switzerland

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Gaznat S.A., Switzerland Monitoring a natural gas supply network in western Switzerland

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100 1/0 EtherCAT EtherCAT Terminals of the **EL** series EtherCAT Terminals of the ELX series for explosion protection applications, e.g. ELX1058 8-channel digital input terminals for the direct connection of intrinsically safe NAMUR field devices

Gaznat S.A., Switzerland Monitoring a natural gas supply network in western Switzerland

ELX EtherCAT terminals: Smart grid implementation supports efficient and accurate gas management

- natural gas supply infrastructure with approx. 600 km of gas pipelines and 50 pressure-reducing and metering stations
- transmission of an annual energy equivalent of more than 13 TWh
- reduction of gas pressure from 38 bar to less than 5 bar
- increased efficiency and accuracy in natural gas supply



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Automate-X, New Zealand Automation for a state-of-the-art tank farm





Automate-X, New Zealand Automation for a state-of-the-art tank farm





Automate-X, New Zealand Automation for a state-of-the-art tank farm

Innovative solution for hazardous areas

- automation of the tank farms for flammable chemicals of a leading global operator
- creating an efficient interface between ship and shore and facilitating agile and competitive supply chains
- resulting in state-of-the-art terminals that provide the tank farm operator's customers with high quality and safety and ensure comprehensive environmental protection





Centris Technologies and Pépin Industries, Canada Digital transformation in traditional paint production





Centris Technologies and Pépin Industries, Canada Digital transformation in traditional paint production

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Automation

• TwinCAT 3

IPC

 C6030 ultra-compact Industrial PC

1/0

- EK1100 EtherCAT Coupler
- EtherCAT Terminals in the ELX series
- EtherCAT and TwinSAFE terminals

Engelhard Arzneimittel, Germany Automated liquids production





Engelhard Arzneimittel, Germany Automated liquids production





Engelhard Arzneimittel, Germany Automated liquids production

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Fully integrated process and building automation

- integrated solution for safe control of pharmaceuticals production
- simple integration of areas with explosion protection requirements
- integrated interfaces with building automation and production planning
- straightforward expansion options
- fine-granular operating concept



Nel Hydrogen, Denmark Environmentally friendly hydrogen filling stations





Nel Hydrogen, Denmark Environmentally friendly hydrogen filling stations

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Automation

- TwinCAT PLC
- TwinCAT HMI
- TwinCAT Modbus RTU
- TwinCAT Modbus TCP
- TwinCAT IoT

IPC

- CX5140 Embedded PC
 I/O
- digital input and output terminals EL1809, EL2809

PWR

- analog input and output terminals EL3058, EL3064, EL3208, EL4004, EL4024
- serial interface terminals EL6021



Nel Hydrogen, Denmark Environmentally friendly hydrogen filling stations

Sustainable mobility

- The development and manufacture of hydrogen filling stations and dispensers for cars, buses and trucks aims to advance environmentally friendly mobility.
- Using hydrogen as a fuel source is more efficient than using conventional engines, and no CO₂ or other pollutants are emitted in the process.
- Refueling a hydrogen vehicle takes only three minutes and one tank filling is enough for a range of 600 km.



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Space











Control and monitoring system for rocket launching pad GTD Sistemas de Información Spain

Process Automation and Explosion Protection





From Sensor to Cloud





Non-hazardous area







Embedded PCs





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EtherNet/IP





PC UA



<u>P</u>ROFO[®] Bods**b**



RS232 RS485



Modbus



EtherCAT Extended Distance





Fibre-optic connection





EtherCAT Terminals







EtherCAT Box



Industrial housing | IP 67





CPX Control Panels and Panel PCs





Power supplies





How Customers used Ex i before





Maximum availability, comprehensive expertise: Beckhoff, a reliable partner for the process industry





How Beckhoff Customers use Ex i





Zone 2 oder non-hazardous area

Exceptionally compact with intrinsically safe I/Os: EtherCAT Terminals for explosion protection



Wide variety of supported signals





Intrinsically safe I/O | ELX1052/ELX1054/ELX1058

- Digital 2/4 channel input terminal NAMUR
 - acquiring of intrinsically safe NAMUR sensors
 - according to EN 60947-5-6
 - Open and short circuit detection
- Function:
 - Sensors are supplied with 8.2 V and deliver a current signal with two switching thresholds (1.2 / 2.1 mA).







General structure



















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Interoberability | EK





IP67 modules for explosion protection











IP67 modules for explosion protection





Outlook – MX-System





MX-System Pluggable system solution for control cabinet-free automation





MX-System New construction kit for automation replaces the control cabinet

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Beckhoff focuses on MTP for the modularization of process plants



Modularisation of process plants





Architecture of process plants with MTP





Modular plant parts are integrated via OPC UA into the higher-level control system (DCS) from where they are orchestrated.