# HBK
HOTTINGER BRÜEL & KJÆR

PMX measuring amplifier system

PMX is the precision multichannel data acquisition system that is particularly suitable for measuring and monitoring tasks in test benches, machines and plants used for quality control.

THE INDUSTRY STANDARD IN APPLICATIONS WORLDWIDE

PMX is a measuring amplifier system specially developed for use in industrial production and test benches. Powerful, precise, reliable and highly efficient.
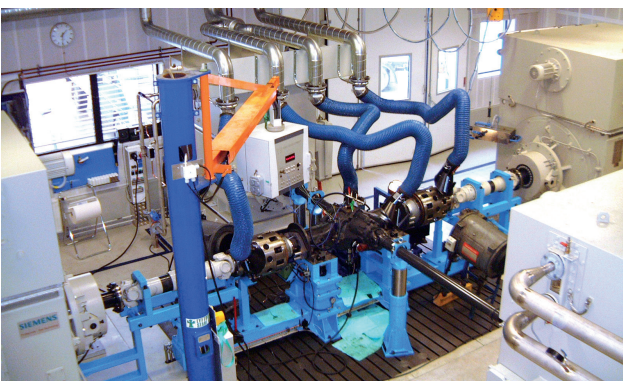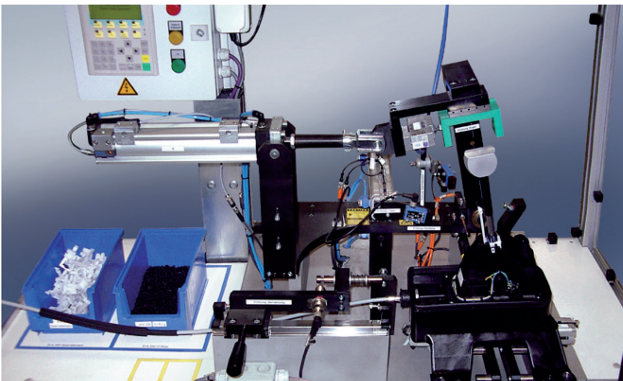
Monitoring pressing and joining

PMX allows you to achieve maximum efficiency in monitoring of pressing and joining processes. PMX shows its strengths with integrated math monitoring functions and real-time signal calculations.

End-of-line test benches

PMX ensures optimum professional quality control and quality improvement during and after the production process. Hundreds of channels and integrated control and regulating functions by way of internal computing channels make it possible to use PMX in small and medium-sized test benches without any problems.


Monitoring of machines/systems

Early detection of machine damage allows for cost-effective preventive maintenance, thereby minimising machine and system downtimes. Real-time monitoring with integrated intelligence in the measuring amplifier reduces the load on the central control system and speeds up control cycle times.

Industrial test benches

Automation makes use of fast analogue output signals or limit values and Ethernet-based fieldbuses. The additional integrated Soft-PLC (as per EN61131) is able to perform demanding automation and visualisation tasks. Because PMX is multi-client capable, data can be stored in parallel via Ethernet.

PMX COMBINES MEASUREMENT TECHNOLOGY WITH CONTROL AS PER IEC 61131

PMX can be equipped with CODESYS V3 Soft-PLC and is then ready to be used for automation tasks with appropriate control and visualisation.
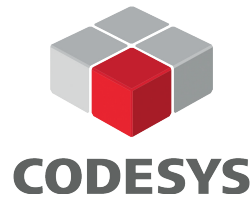
Everything from a single source

When you choose PMX, you benefit from the entire HBK measurement chain. We provide you with transducers, sensors, measuring amplifiers and the right professional software, all from a single source. For you, that means a capable and competent source of measurement technology for use in production through a worldwide service and support network.

Factory automation

PMX worldwide in series production and special machines for industrial goods and merchandise of all kinds, for example, in press manufacturing, printing of books and magazines and manufacturing of furniture or components for motor vehicles.

Mobile automation

PMX in construction machinery, cranes, industrial trucks and open-cast mining machines.

Energy automation

PMX used in industrial applications for producing and distributing energy, for example, to control small solar energy systems, pump stations and wind power plants.

Embedded automation

PMX in special applications for industrial compressors, integrated weighing and filling control systems and for medical technology.

Process automation

PMX for control of processes and systems, for example, in steel and aluminium rolling mills and for monitoring and control of sewage treatment or paper converting processes and in remote control technology.

Building automation

PMX for automation of business buildings and private homes, for example, for intelligent lighting control, shading and climate control monitoring.

PRECISION AND DYNAMICS FROM HBK – OPTIMISED FOR PRODUCTION

HBK stands for quality and precision in measurement technology. PMX gives you maximum precision in your production. Now you can benefit from greater efficiency through high accuracy!

- High accuracy through low-noise 24-bit A/D conversion with high signal resolution and larger measuring bandwidth
- Galvanic isolation, compensation for line lengths and interference frequencies, and good EMC stability ensure high measurement quality
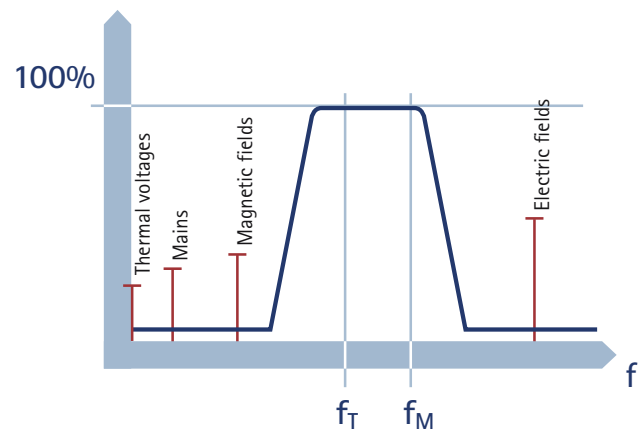

The carrier frequency amplifier signal systematically masks interference

### Case study: process monitoring

Your advantages with PMX:

- Greater accuracy makes it possible to record manufacturing tolerances more precisely
- Components are precisely tested and manufactured with the necessary tolerance
- Reduces rejects and conserves resources while maximising output

...without PMX
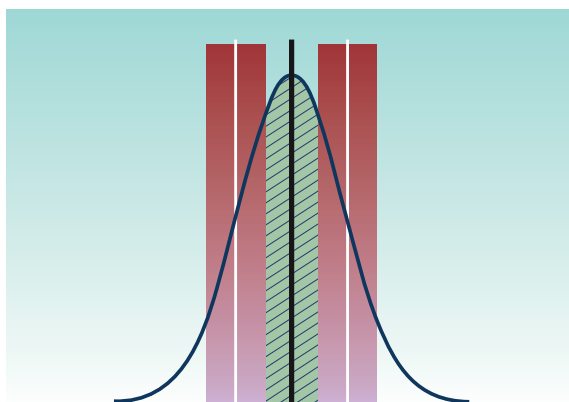
Process monitoring with conventional measuring amplifiers, high rejection rate due to measurement inaccuracies

...with PMX
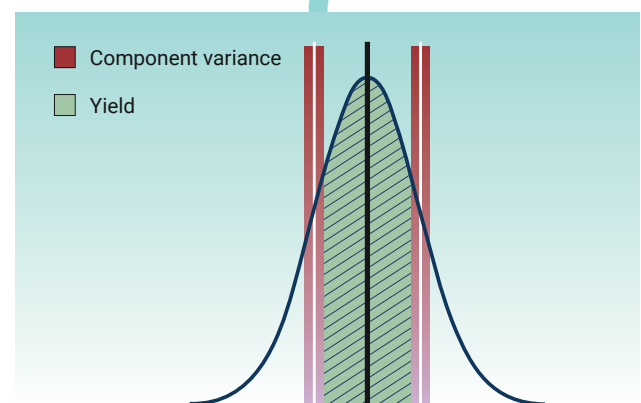
Increased efficiency with PMX, optimum yield with precise measurement results

PMX: LAB MEASUREMENT QUALITY FOR INDUSTRIAL ENVIRONMENTS

The PMX measuring amplifier system is ideally suited for integration with your production and testing applications. With a wide range of hardware and software interfaces, PMX supports many commonly used automation systems and communication protocols that are needed for industrial automation.
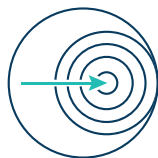
- High accuracy through low-noise 24-bit A/D conversion with high signal resolution and larger measuring bandwidth
- Galvanic isolation, compensation for line lengths and interference frequencies, and good EMC stability ensure high measurement quality

Industrial Ethernet   *Modularly expandable*   *Precise, reliable*

Benefit from saving time

- Easy integration, even with complex production and test bench environments
- Optimum control and parameterisation of the measuring amplifier with TEDS sensor detection and web server operation
- Boosts operating safety and transparency with internal device diagnostics

Industrial Ethernet for more productivity

- Operation, visualisation and data storage in networked structures including remote maintenance using network-capable FastEthernet (TCP/IP with 100 Mbit)
- Fast control and regulating processes through real-time Ethernet (ProfiNET, EtherCAT up to 9.6 kHz, Ethernet/IP) with high user data rate and diagnostics
- Increase the number of channels and complexity of your application by integrating additional CAN field modules with CAN interface

Measurement

Evaluation

PMX detects your transducers automatically via TEDS for the most important measurement variables.

This saves time and prevents errors. The high resolution of 24 bits allows for accurate partial load measurements and high measurement bandwidths. A sampling rate of 19.2 kHz or 38.6 kHz for frequency measurements for every channel ensures high measuring bandwidths.

SG full bridges

SG half bridges

Inductive full bridges

Inductive half bridges

Active sensors for current and voltage

LVDTs

Potentiometric sensors

Piezoresistive sensors

Current-fed piezoelectric sensors (IEPE)

Resistance thermometers (Pt100)

Frequency signals

Angular/incremental encoders

SSI sensors

PWM sensors

Magnetic transducers

Pulse counters

PMX analyzes and processes your data in real time (<1 millisecond).

The measuring amplifier system has integrated algorithms to support the actual measurement and pre-process data. Thirty-two computing channels are available. That replaces small and mid-size machine control units and saves a tidy sum of money.

Scaling

- Two-point scaling
- Characteristic curve table
- Polynomial
- Taring
- 6 × 6 matrix
- SG stress analysis

Technology functions

- Two-point controllers
- PID controllers
- Pt100 to PX455
- Signal generators
- Logic blocks
- Multiplexer 4:1
- Deadband
- Edge detector
- Pulse-width measurement
- Timer
- CODESYS channel

Mathematical functions

- Adder/subtractor
- Multiplier
- Divider
- Counter
- Integrator
- Differentiator
- Cartesian to polar coordinates
- Polar to cartesian coordinates
- Modulo function
- Constant signal

Evaluation

- Filter
- Angle-synchronous filter (CASMA)
- Peak values
- Tolerance window
- Hold (analog triggering)
- Hold (digital triggering)
- Mean value/RMS
- Moving average
- Trigger (range)
- Trigger (pulse)

PMX transfers data to your automation system.

Ethernet-based fieldbuses and Soft-PLC as well as digital inputs/outputs and monitoring outputs ensure fast machine control and automation.

|	
EtherCAT	EtherCAT®
PROFINET	PROFINET®
EtherNet/IP	EtherNet/IP TM
CODESYS	CODESYS
CANopen	CANopen (1 Mbit/s)
ETHERNET	Fast Ethernet (100 Mbit/s)
	Digital in-/outputs

Analogue output: voltage

PMX GROWS WITH YOUR REQUIREMENTS

Your production changes and PMX adapts. With practical plug-in cards for different measurement variables, the system can be expanded flexibly to meet your specific needs.

- Ready for operation immediately

- Use as a stand-alone device or as part of a group, depending on your needs

- Scalable and time-synchronous within the group of devices, with up to 300 measurement channels and 600 math computing channels

- Can be synchronised with other recording systems via NTP, for example, with MGCplus, QuantumX or optical interrogators

- Visualisation and option for connecting additional devices via USB for backup and data storage

- Can be expanded with additional field modules via CAN interface

- Flexible with up to 100 internal measurement and test programs (parameter sets)

- Freely programmable with internal Soft-PLC control as per EN61131-3

Control and operating level
- Parameterisation
- Data storage with PMX software
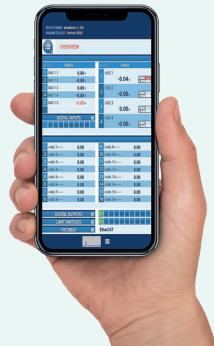
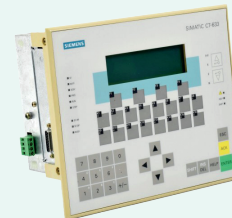Up to 20 PMX devices

Production and field device level

Users can customise the graphical user interface with PMX command libraries (PMX command set, dotNET-API, LabVIEW driver [4], DIAdem driver, MLab sd.Solutions)
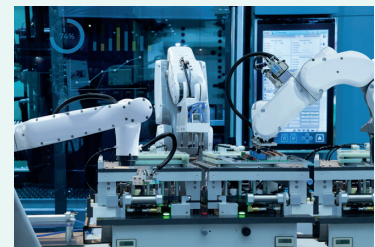
Standard tools such as STEP7[5], TwinCAT[6] and LogixStudio[7] are used for machine control and programming

Production or test bench

INNOVATIVE WEB TECHNOLOGY

PMX software features impressive user friendly features, flexibility and the option of remote maintenance

PMX features innovative GWT web technology and is ready for operation immediately without software installation.

- Simple touchscreen operation with zoomable PMX web browser and data monitoring

- Can be used on different browser-based devices, without any need for training

- Network-capable with standard Ethernet technology

- Ideal for remote maintenance via company network or Internet

- Use of web server on mobile terminal devices via W-LAN

Flexible and cost-saving

Whether you are a machine operator or installer, configurable, three-level user administration (operator, service, administrator) always gives you access to all relevant device and diagnostic data. This cuts down on the number of software tools you need and reduces complexity and system faults.

Easy integration with the control system

HBK measurement technology can be easily integrated with the control system and test bench environment using various software drivers, the PMX command set, LabVIEW and the .NET/API programming interface. That makes it easy to implement individual solutions and safeguard application know-how.

PMX software is also very easy to operate by touchscreen

DATA ANALYSIS MADE EASY

Would you like to analyze your production data?
catman EASY/AP software from HBK makes it easy to
display and save your production data for monitoring
purposes. This is a great advantage for service and
maintenance.
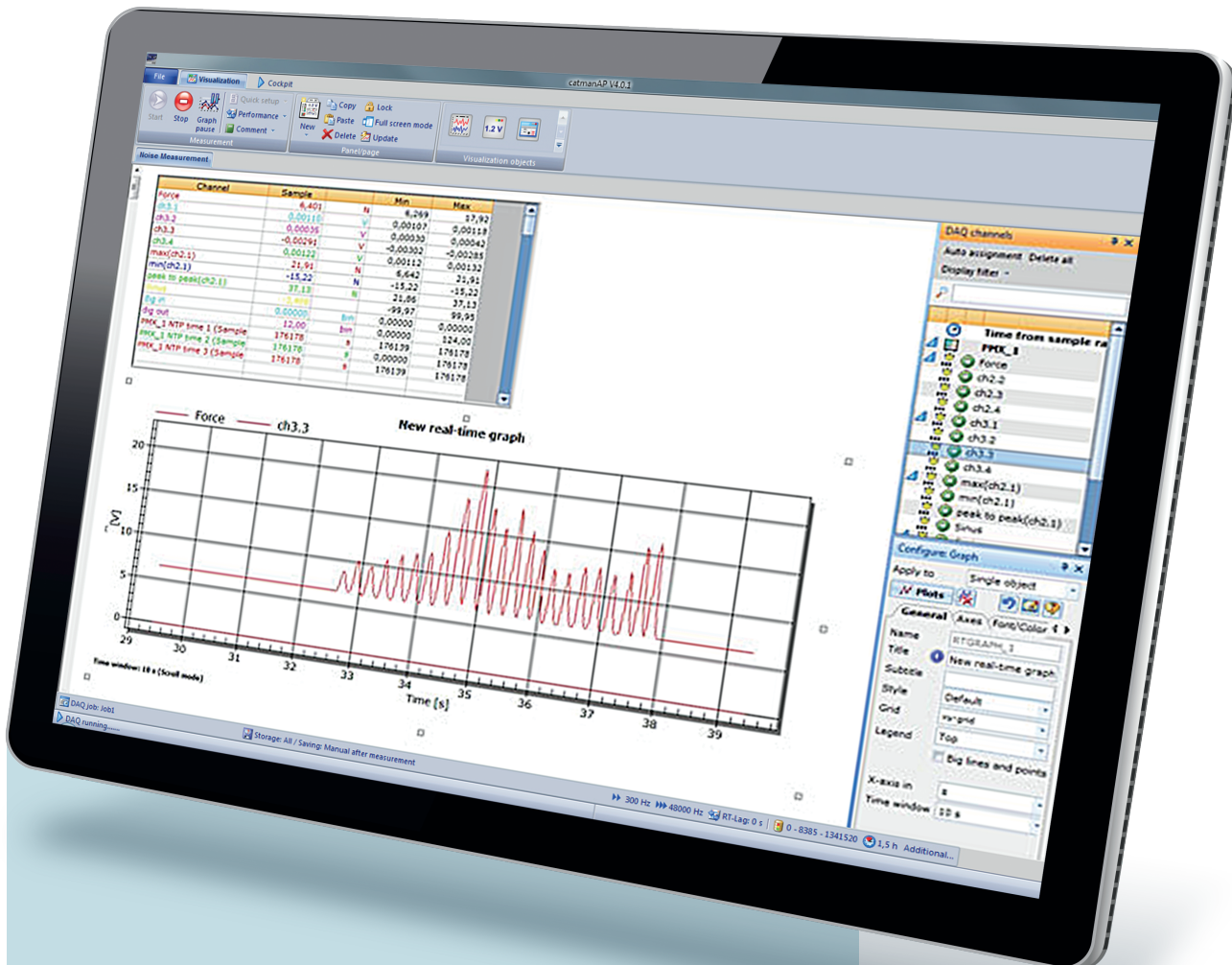
- Professional software for visualisation, storage and analysis of
  PMX measurement data, internal PMX computing channels and digital
  inputs/outputs

- Easy PMX system and channel configuration
  (sensor database, TEDS editor, sampling rate, filter, etc.)

- Start recording measured values via PMX digital inputs
  (pre/post trigger, cyclic storage, long duration measurement, etc.)

- Powerful data analysis (signal-to-signal, zoom, magnifying glass, ruler,
  min/max, cut to size, eliminate outliers, etc.)

- Create reports and export measurement data and displays automatically
  (to Microsoft® Word, Excel®)

CREATE YOUR PMX AUTOMATION SOLUTION, INCLUDING VISUALISATION

CODESYS, the comprehensive software suite for automation technology, includes everything you need for programming, fieldbus and I/O configuration, visualisation, motion control and other tasks as well as your own plug-ins. CODESYS V3 software platform is based on the IEC 61131-3 programming system. All programming languages in that system are supported.
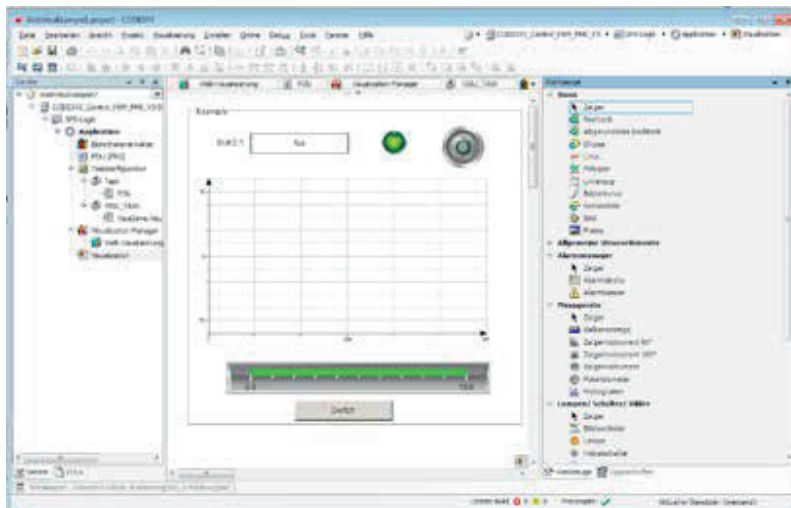
CODESYS programming environment
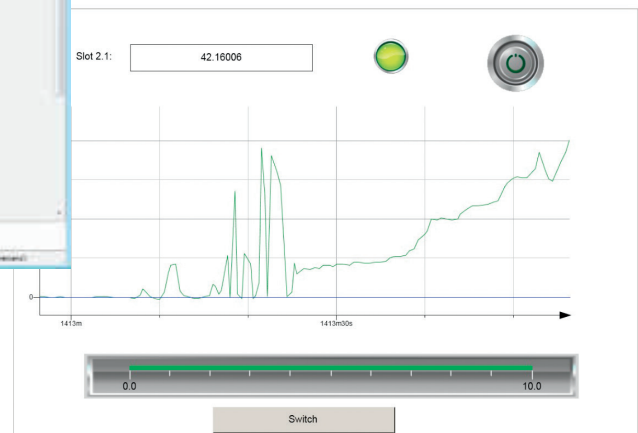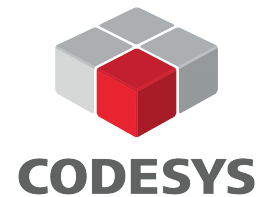
CODESYS web visualisation

CODESYS engineering

Professional engineering of IEC 61131-3 applications for specialists and software engineers – from ladder diagram to UML in one expandable platform.

CODESYS visualisation

Creation of professional visualisation interfaces, fully integrated into the PLC programming system. Display on the target device, on a PC or in the web browser.

CODESYS fieldbus

Integrated fieldbus support in the IEC 61131-3 tool (that is, the CANopen interface is supported in PMX). You can receive CAN data (CAN master) or send CAN data (SDO/PDO mode).

CODESYS WEB AND TARGET VISUALISATION VIA ETHERNET

Process control through on-site web visualisation

PMX, the modular CODESYS PLC controller with integrated visualisation

Simple remote maintenance via smart phone and micro or HTML5 browser

Transparent monitoring from plant control room or machine PC

A CODESYS runtime license is already included in PMX with the WGX001 basic device. You receive the CODESYS software V3.5 on the CD included with delivery. The corresponding PMX package and a collection of helpful sample programs for generating code, web visualisation and integration of CANopen modules are also included. The CD is included with delivery or available at: www.hbkworld.com

HBK has the CODESYS know-how for your application

Speak with our CODESYS experts. We will assess your task and create a project for you. From creation of the program to the complete application with necessary documentation.

You can reach us at:
customsystems@hbkworld.com

PMX: THE FACTS

PMX is the industry standard in measurement technology.
The most important technical data at a glance:

WGX001/WGX002	PX401	PX455	PX460
PMX basic device	**4-channel card**	**4-channel card**	**4-channel card**
5 slots Communication card 4 measurement input/output cards Ethernet system interface TCP/IP up to 100 Mbit/s USB for data/parameter backup WGX001: CODESYS Soft-PLC and CANopen interface (master/slave)	Analogue input: voltage Analogue input: current With active sensor supply Current-fed piezoelectric sensor (IEPE) (in conjunction with EICP-B-x smart module)	SG full bridge SG half bridge Inductive full bridge Inductive half bridge LVDT Piezoresistive full bridge Potentiometric transducer Resistance thermometer (Pt100) (in combination with completion resistor)	Channels 1 and 3: frequency measurements up to 2 MHz Channels 2 and 4: frequency (digital, inductive) Counter/encoder Magnetic transducer/pulse counter SSI PWM
Typical applications Industrial applications in production and test benches, system and machine monitoring Long duration measurements quality data control Simple and complex control and automation tasks **Special features** • Total sampling rate up to 400,000 measured values/s • Automatic measured value/time synchronisation with up to 20 PMX devices • Device status LED as direct diagnostics information • 32 internal computing channels • 100 parameter sets • 3-level user administration (operator, service, administrator)	**Typical applications** Universal signal acquisition of sensors that have an active output **Special features** • TEDS sensor detection • 19.2 kHz sampling rate • 24-bit A/D conversion • Bandwidth up to 3 kHz • Channel status LED as direct diagnostics information	**Typical applications** Noise-free carrier frequency measurements of force, pressure, displacement, strain and weight The sensors can also be operated in the intrinsically safe area using Zener barriers **Special features** • TEDS sensor detection • 19.2 kHz sampling rate • 24-bit A/D conversion • Bandwidth up to 2 kHz • Channel status LED as direct diagnostics information	**Typical applications** Measuring frequencies, speeds, angles of rotation and displacement with rotary encoders or angular encoders. HBK torque flanges (T10, T12, T40): with max. two torque flanges for torque and rotational speed (without measurement of direction of rotation/angle of rotation) or one torque flange for torque, rotational speed, angle and direction of rotation or reference pulse detection **Special features** • TEDS sensor detection • 38.4 kHz sampling rate • Bandwidth up to 6 kHz • Shunt calibration • Channel status LED as direct diagnostics information

PX878	PX01PN	PX01EC	PX01EP
Combination card	**Communication card**	**Communication card**	**Communication card**
Combined input/output card: • 8 digital in-/outputs • 5 analogue outputs Output of all measurement and computing channels as well as diagnostic functions	Real-time Ethernet card for PROFINET® 2 RJ45 connections Transfer of measured values and diagnostic data GSDML description file and certification are available **PROFI NET®**	Real-time Ethernet card for EtherCAT® 2 RJ45 connections Transfer of measured values and diagnostic data XML description file and certification are available **EtherCAT.**	Real-time Ethernet card for EtherNet/IP TM 2 RJ45 connections Transfer of measured values and diagnostic data EDS device description file and certification are available **EtherNet/IP**
Typical applications Recording and indicating machine and system states Data transfer to downstream measurement acquisition and control systems **Special features** Freely configurable signals can be used for control and regulation • 1 ms switching speed for I/Os • 3 kHz bandwidth of the analog outputs • 16-bit D/A conversion • Channel status LED as direct diagnostics information	**Typical applications** PMX as PROFINET® -RT/IRT slave (IO-RT device, IO-IRT device) in automation systems **Special features** • PROFINET® -RT/IRT protocol • Transmission rates up to 1 kHz • Status LEDs as direct diagnostics information • Output of all measurement and computing channels as well as diagnostic functions	**Typical applications** PMX as EtherCAT® slave (complex slave) in automation systems **Special features** • EtherCAT® protocol • Transmission rates up to 9.6 kHz • Status LEDs as direct diagnostics information • Output of all measurement and computing channels as well as diagnostic functions	**Typical applications** PMX as Ethernet/IP TM slave (communication adapter) in automation networks **Special features** • EtherNet/IP TM protocol • Transmission rates up to 1 kHz • Status LEDs as direct diagnostics information • Output of all measurement and computing channels as well as diagnostic functions

We provide exceptional sensing and insights to create solutions for a cleaner, healthier and more productive world

ACCELERATE YOUR PRODUCT INNOVATION

Hottinger Brüel & Kjær (HBK) provides integrated solutions and domain expertise across the test and measurement product life cycle, bridging the gap between the physical world of sensors, testing and measurement and the digital world of simulation, modelling software and analysis.

HBK – Hottinger, Brüel & Kjær
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