e.series

Gantner
instruments

BRILLIANT CONCEPTS

Intelligent Solutions for
Measurement and Test Automation

e.series

OUT OF TRADITION COMES INNOVATION: YOU CAN COUNT ON THAT

Over 25 Years of new Ideas in Test and Measurement

Gantner World Headquarters in Schruns, Austria

TRADITION UND INNOVATION

Founded by Wilhelm Gantner in 1982, Gantner Instruments is a specialist in flexible and distributed measurement and I/O systems. As a pioneer in industrial fieldbus I/O, Gantner Instruments has been delivering innovative I/O solutions for more than 25 years, including the introduction of one of the industry's first Profibus I/O modules (the ISM01) in 1988.

Gantner Instruments in Darmstadt, Germany

EXPERIENCE AND COMPETENCE

Gantner Instruments is the specialist in the acquisition of electrical, thermal and mechanical quantities. You will find our know how in all of our products and services. While our products exhibit high performance and flexibility they remain simple to operate and easy to understand, even in complex applications.

QUALITY AND RELIABILITY

Every Gantner product is designed and built to provide high precision and reliable operation in the most extreme industrial environments. High temperatures and EMC conditions are no problem for us. Our products are manufactured to EN ISO 9000 standards and have an average MTBF (Mean Time Between Failure) of over 20 years.

PRICE AND PERFORMANCE

All Gantner products provide an excellent price to performance ratio. Nowhere else you find more value for the money. First class products with a scalable, modular structure that is built for the future. With Gantner Instruments your investment is safe.

FAIRNESS AND SERVICE

Customers are our partners. We are glad to be working for you. We provide extensive consultation before purchase, practical support during installation, and direct and flexible service for the life of the system. We will work with you to satisfy all your unique system requirements.

e.series

Signal Acquisition,
Signal Conditioning, Data Transfer

Gantner Instruments specializes in the acquisition of electrical, thermal, and mechanical quantities.
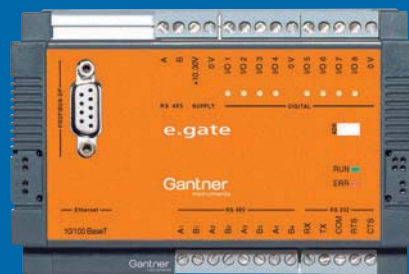
The measurement modules and test controllers of the e.series product family, offer an optimal signal acquisition and processing solution on all levels.

All Gantner products are:

- **Dynamic**
- **Precise**
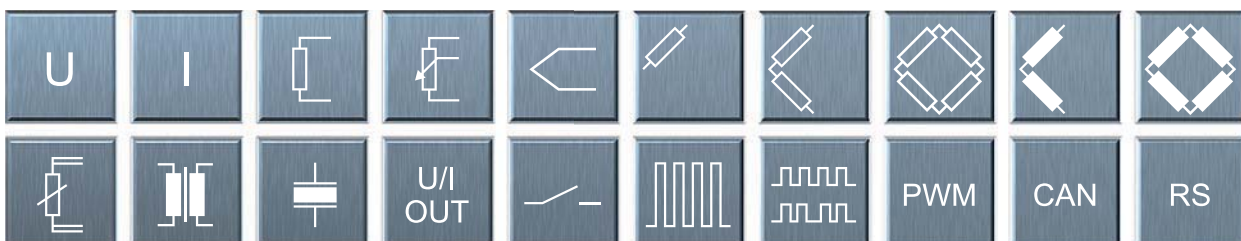- **Flexible**
- **Durable**
- **Reliable**

HOST LEVEL

CONTROLLER LEVEL

MEASUREMENT AND I/O LEVEL

U | I | U/I OUT | PWM | CAN | RS

5

SIGNAL ACQUSITION:
THE MEASUREMENT AND I/O LEVEL | Connecting Signals and Sensors with the System

e.bloxx

The reliable measurement module

The e.bloxx modules acquire sensor and process signals with precision, speed and stability. To ensure durability the inputs, the power supply, and the interface ports are all galvanically isolated from each other. The industrial design reduces EMC and temperature influences to a minimum. We guarantee that our modules meet all specifications over a temperature range of -20°C to +60°C. All units can be powered with 10 to 30 VDC.

Complete functionality – standard fieldbus in every unit

The e.bloxx modules are fully functional, intelligent stand alone devices. Each e.bloxx module has its own RS-485 serial port that can communicate to the automation system using Profibus-DP, Modbus-RTU or ASCII strings.
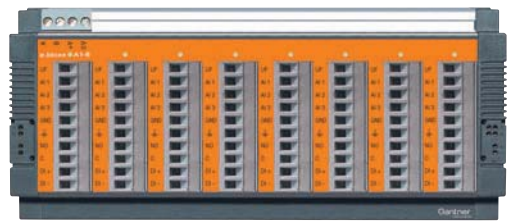
Immune to variations in temperature

One of our customers wanted to validate the overall accuracy of our units. An e.bloxx A5 was placed in a climatic chamber. A reference RTD (Pt100) signal was connected to the input of the module. The A5 was then subjected to temperature variations of -25°C and +65°C over a 40 hour period. The overall measured deviation on the output of the A5 module was less than 0.05°C. That's less than 0.005%. That's accuracy defined.

e.bloxx in full-scale

e.bloxx Module	
INPUT TYPES	
U	Voltage
I	Current
	Resistance
	Pt100, Pt1000
	Potentiometer
	Thermocouple
	Cryo Sensor
	Single Strain Gage
	Half Bridge Strain Gage
	Full Bridge Strain Gage
	Inductive Half Bridge
	Inductive Full Bridge
	LVDT
	ICP Sensor
	Frequency Signal
	Pulse Width
	Counter
	Status
CAN	CAN Data
RS	Serial Sensors, SSI
OUTPUT SIGNAL	
U	Voltage
I	Current
	Frequency
	Pulse Width
	Status
	Relays
CAN	CAN Data
RS	Serial Actuators
NUMBER OF CHANNELS	
DATA RATES MAX. PER CHANNEL PER SECOND	

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	A1	A2	A3	A4TC	A5	A5CR	A6CF	A6-2CF	A9	D1	D2	D3
	1 (4,8)	1	4 (16)	4 (16)	2/3/6	2	1 (3)	1	4	8 (32)	4	16
	1000	5000	100	100	10	1	500	1000	1000	1000	100	1000

**Practical resolution of the
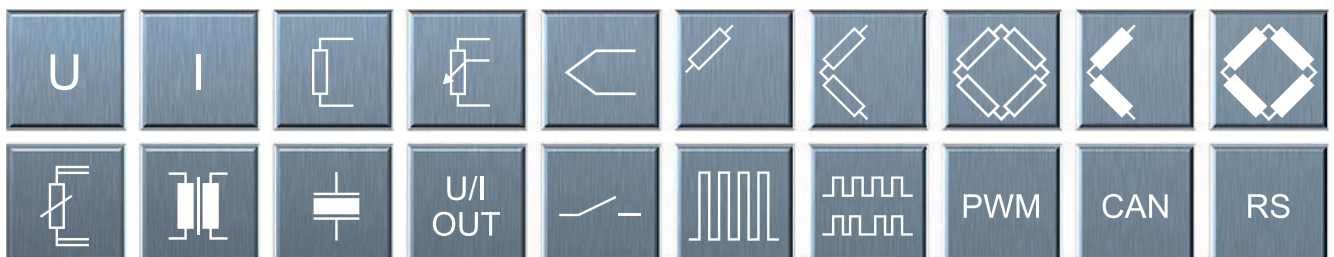measurement signal**

All channels are digitized with
24-bit (>16 million steps) reso-
lution. However, in practice,
24-bit resolution is seldom
ever needed. In the e.series
products we have reduced the
precision to 19-bit to optimize
the acquisition speed and
signal stability.

With a resolution of 19-bit
the input signal is divided into
+/- 250,000 steps. For example:
a voltage of 10 volts can be
measured to a resolution of
40 microvolts.

**Signal conditioning –
remote and intelligent**
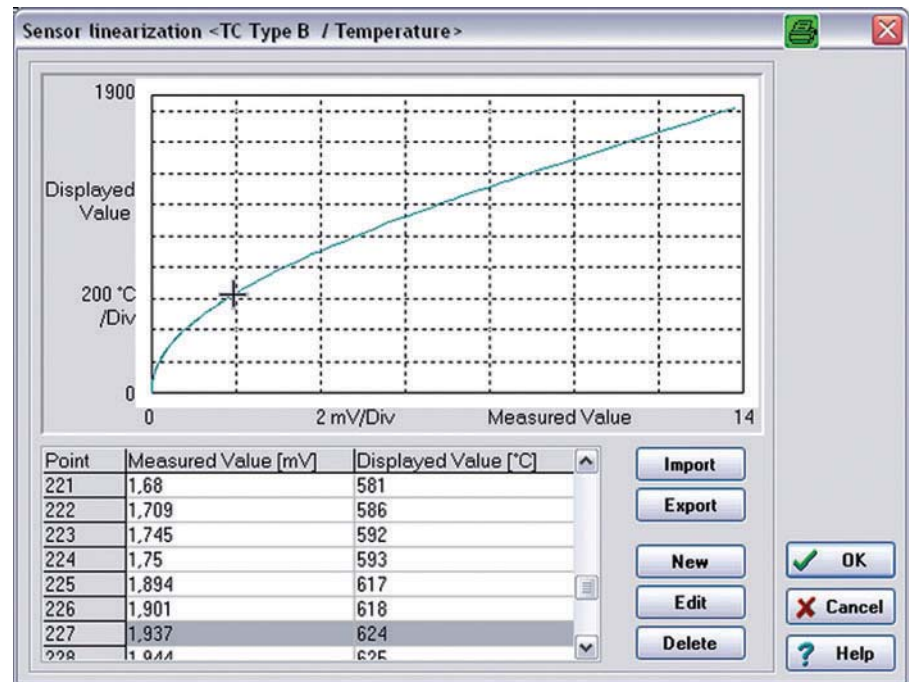
- Linearization of all sensors
  using standard (or custom)
  look up files
- Converting the sensor
  input into engineering
  units right from the start
- Digital low pass filter and
  averaging
- Signal processing such as:
  alarms, limits, tolerance
  bands, min and max
  values, arithmetics, etc.

Analog and digital – Inputs for all common signals and sensors

Frequency Characteristics

[V]

$f_{Carrier}$

[Hz]

Signal noise
is filtered out
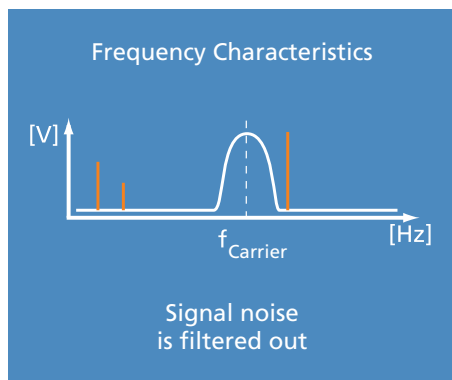
**The advantage of
carrier frequency when
measuring strain gages**

Because of band-pass
characteristics of carrier
frequency (CF) measurements,
the result is a low sensitivity
to noise and an excellent
long term stability. Carrier
frequency amplifiers can
accommodate a variety of
sensors; such as: strain
gages, strain gage based
transducers, inductive bridges,
LVDTs, as well as, piezo-
resistive sensors.

**TEDS –
Transducer Electronic
Data Sheet**

The e.bloxx product family
can accommodate sensors
with TEDS (Transducer Elec-
tronic Data Sheet) based on
the IEEE 1451.3/4 standard.
Certain amplifiers in the
e.bloxx family automatically
recognize a sensor with
TEDS. When connected, the
amplifier reads the TEDS
data, such as the manufacturer
ID, serial number, sensor
type, and determines wheth-
er the sensor corresponds to
a standard template. This
information is used to setup
the e.bloxx module with the
connected sensor. The confi-
guration of the module is
overwritten with the TEDS
data. This information is
transferred to the test con-
troller (e.g. e.gate) The user
no longer needs to worry
about the channel setup,
channel name, measuring
range, amplification, or
signal offsets. This is all done
automatically. The benefit
of TEDS is that it reduces
the setup time, reduces human
error and increases the
process integrity.

**Chronos –
The precise way to
measure frequency signals**

To measure a very low
frequency (1 Hz) and a very
high frequency (12 MHz)
without modification to the
measuring method, the
digital inputs of the e.bloxx
module D1 and e.rack D1
employ the Chronos method
to measure frequencies
accurately. The Chronos
method precisely measures
in parallel, both the number
of pulse edges and the time
"T" from the first edge to
the last edge within a selec-
table time window. This is
why frequency from 1Hz to
12 MHz can be measured
with high accuracy. The
frequency is calculated from
the Time "T" and the number
of edges combined
(e.g. 126,887 Hz).
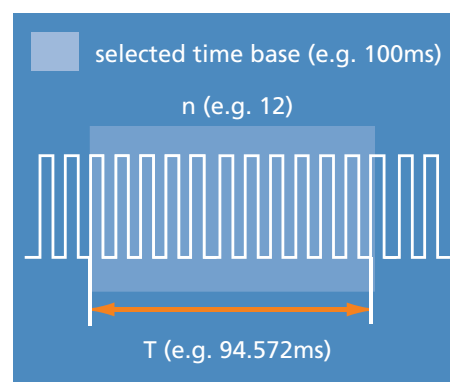
selected time base (e.g. 100ms)

n (e.g. 12)

T (e.g. 94.572ms)

SIGNAL CONDITIONING:
THE CONTROLLER LEVEL

Conditioning and Data Transfer with
Logging, Logic and Control Possibilities

The test Controllers transform the I/O modules into an efficient and powerful measuring system. They are the interface between the e.bloxx modules and the supervisory system. Depending on the application and requirements, several test controllers can be combined together to create a larger and more powerful system. Using the Ethernet TCP/IP port on the test controller, any PC can be connected to the measuring system. Optionally, other interfaces are available depending on controller type; such as: Profibus-DP, USB 2.0, CAN Open, and EtherCAT.

e.gate – The connection to the measurement and I/O level

Test Controller
HOST INTERFACES
Ethernet TCP/IP
Profibus-DP (12Mbps)
EtherCAT
USB 2.0
CANopen
RS-232
RS-485
SLAVE INTERFACES
RS-485 Localbus
RS-485 variable
SDI-12
DATA STORAGE
16 MB RAM
128 MB Flash
USB expandable
MIN. CYCLETIME
REALTIME CLOCK
DIGITAL I/Os
Relays Outputs
Analog Inputs
Analog Outputs
FREE PROGRAMMABILITY (E.CON)
Modem Interface
e-Mail
FTP-Client
POWER CONSUMPTION TYPICAL [W]

	e.gate				e.pac					e.xact				e.reader
	IP	DP	EC	CO	IP	DP	EC	DL	CO	IP	DP	EC	CO	
	■	■	■	■	■	■	■	■	■	■	■	■	■	■
		■				■					■			
			■				■					■		
								■						■
				■					■				■	
	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	4				4					1				1
														1
														2
	■	■	■	■	■	■	■	■	■	■	■	■	■	■
								■						■
								■						■
	1 ms				1 ms					100 µs				1 s
								■						■
	8 x fixed				8 x fixed					8 x fixed				6 x configurable
														2
											4			8
											4			
					■	■	■	■	■	■	■	■	■	■
								■						■
								■						■
								■						■
	4	4,5	4,5	4,5	4	4,5	4,5	4,5	4,5	5	5,5	5,5	5,5	100 mW Sleep mode

SIGNAL CONDITIONING: THE CONTROLLER LEVEL

Conditioning and Data Transfer with Logging, Logic and Control Possibilities

e.gate

The gate to automation

The basic unit for the connection to the measurement and I/O level.

- up to 200 variable over 4 UARTs
- Synchronization of the I/O modules
- 16 MByte data memory
- Ethernet and optional fieldbus interfaces
- Open file structure

Increase the efficiency and data rate of your system by employing one or more e.gates.

Ethernet TCP/IP · Profibus-DP · EtherCAT · CANopen
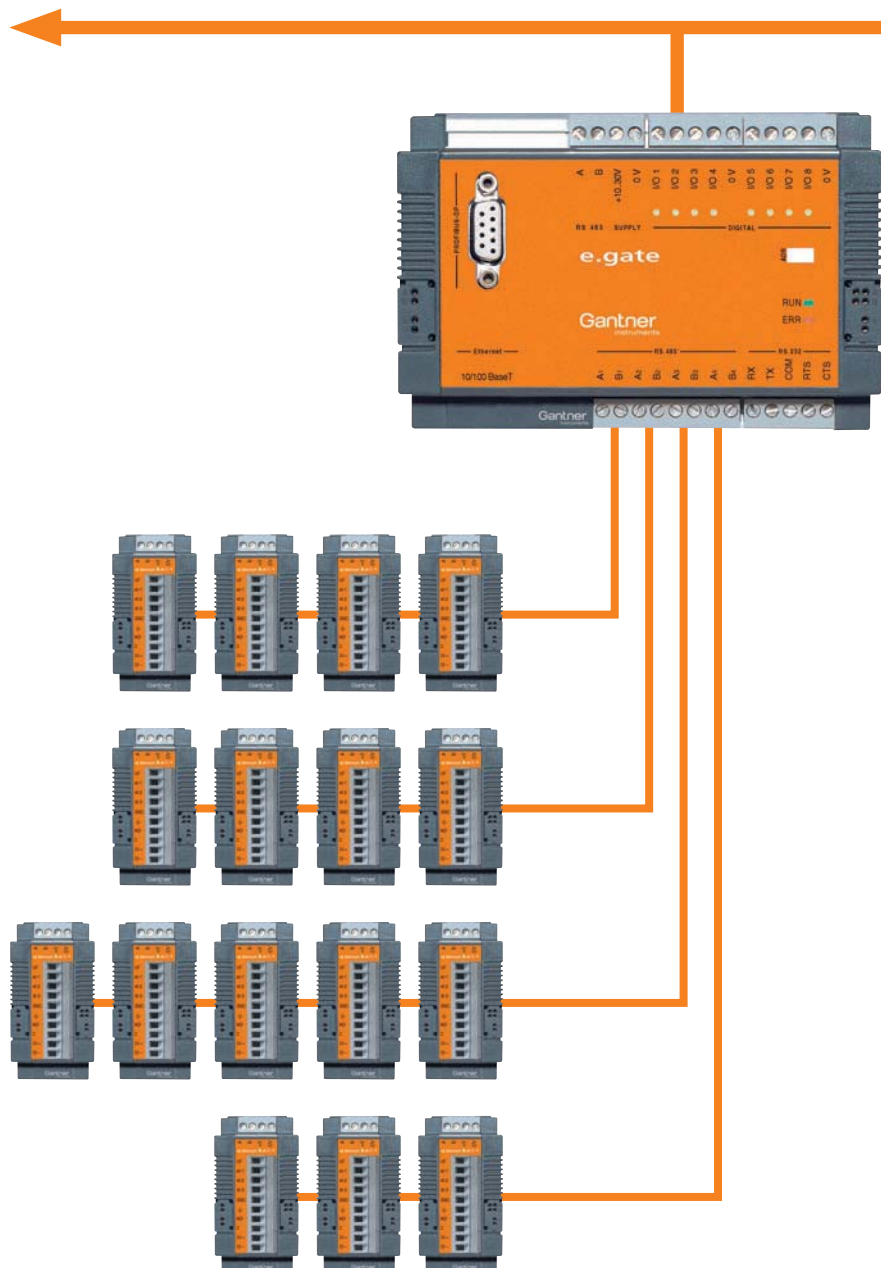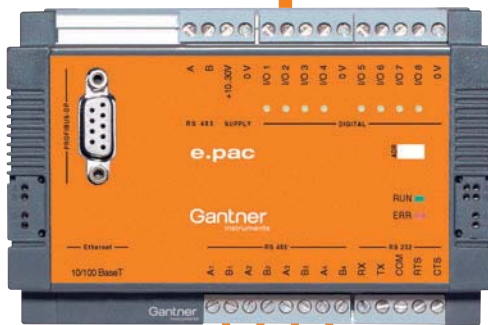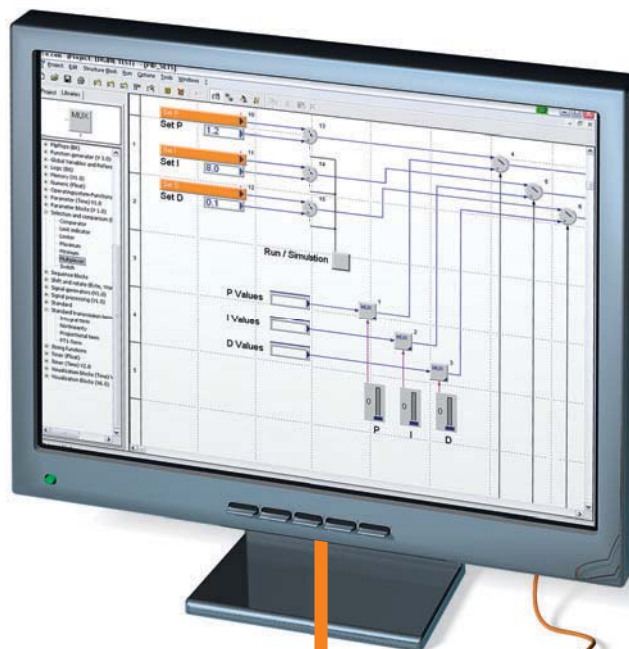
e.pac
The Programmable Automation Controller

With e.pac and the graphical software interface e.con on the PC, arbitrary functions from several measured variable, I/O's, computations, timers, statistics, data storage, PID control loops, flow control, etc. can be programmed. These functions can run on the PC or downloaded to the e.pac to run independently of the PC at rates of up to 1000 Hz.

- Complete test sequences
- Control with set points
- Extensive logic, math functions, object linking and transfer functions
- Logical linking of object data lines
- Data logging with various trigger functions
- 16 MByte RAM, optional 128 MByte Flash
- Visualization
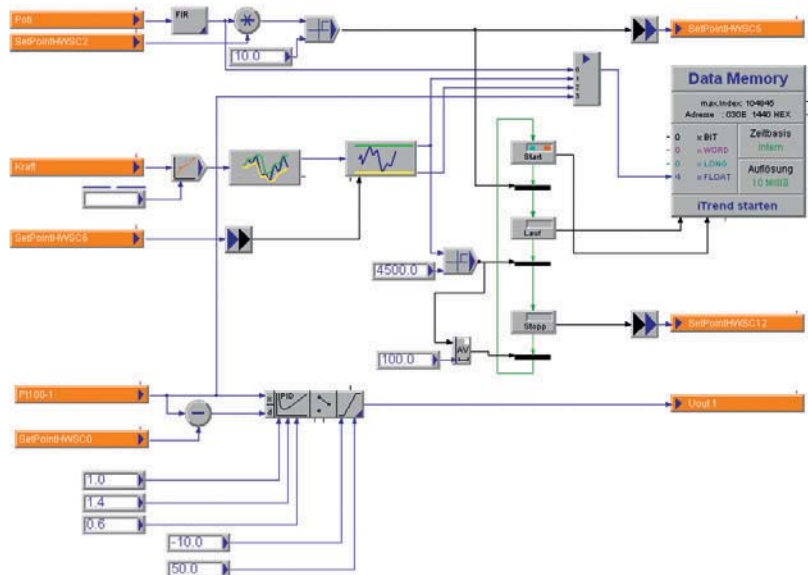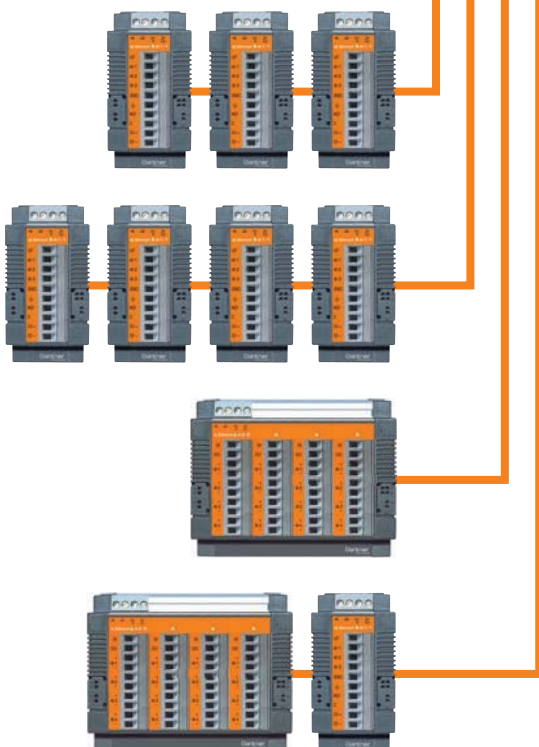
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SIGNAL CONDITIONING: THE CONTROLLER LEVEL
Conditioning and Data Transfer with Logging, Logic and Control Possibilities

e.xact

With 10 kHz acquisition rate, conditioning and output

For most applications the e.series product line with sample rates of 1000 Hz is more than enough. However there are some test processes that require higher sample rates. For applications requiring higher sample rates, the e.xact was developed. The e.xact is designed for dynamic and precise measurements, fast signal conditioning with analog outputs and data transfer via standard interfaces.

PAC functionality such as: PID control loops, flow control, flexible data storage with a set of trigger options, math functions, and linking control blocks round out the capabilities of the e.xact.

As a stand alone solution or as part of a larger e.series project, the e.xact opens a door to new possibilities in the 10 kHz class of intelligent distributed processing.

- 4 Signal inputs for voltage, current, or stain gage at 10 kHz
- 4 analog outputs at 10 kHz
- Full PAC functionality
- 16 MByte data memory
- Interface for connecting additional e.bloxx modules

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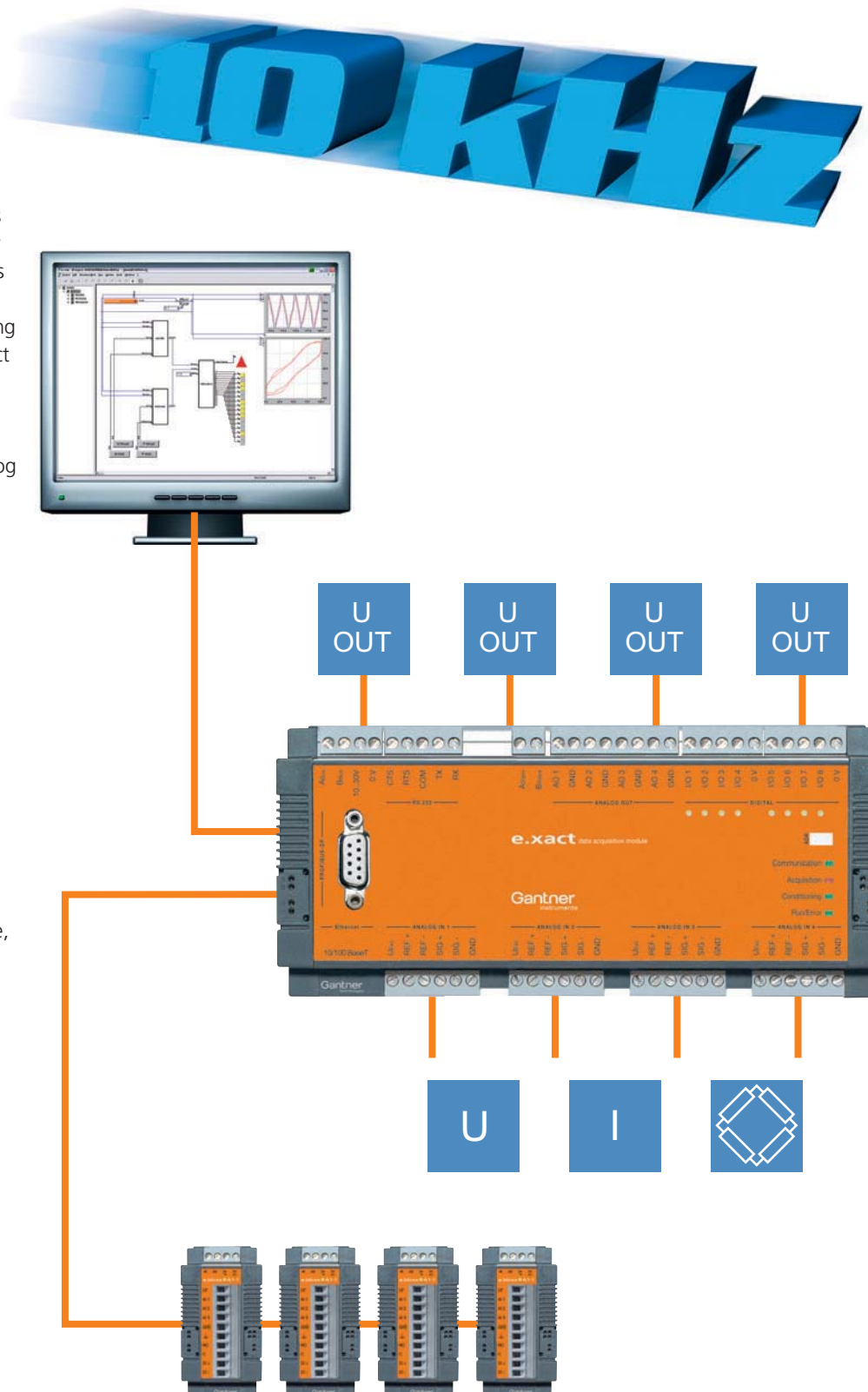
e.reader

Data logger with exceptional communication selections

Eight analog inputs: voltage, current and resistance; 6 digital inputs and outputs and 2 relay outputs with the ability to add more modules. Configure and read data over the RS-485 port (3x), RS-232 port or Ethernet port. The intelligent data logger e. reader has much to offer.

A 128 MByte memory saves the measurement values in intervals of 1 second to 24 hours. In the selectable sleep mode the logger will wake up for one measurement and fall asleep again after storing the results. Power consumption in the "Sleep-Mode" is very low and is ideal for remote locations using solar energy as a power source.

The PAC functionality allows for the graphical programming and functions such as: arithmetics, logic and control.

Ethernet TCP/IP

Serial RS-232/RS-485
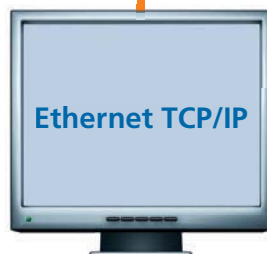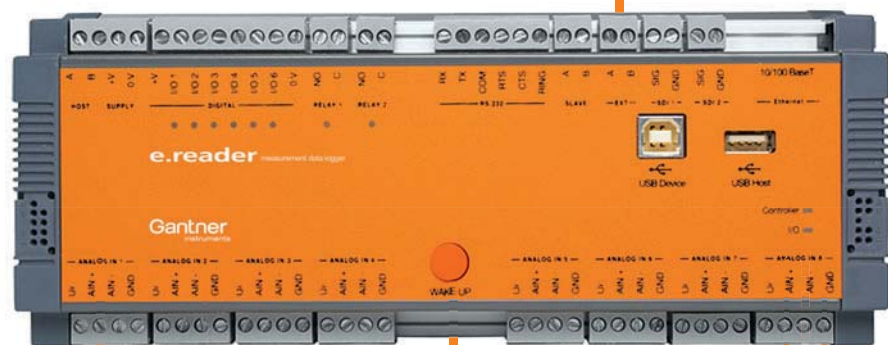
VPN/E-Mail

SIGNAL TRANSFER: THE HOST LEVEL

Configuration, Evaluation, Visualization and Archiving of Data

e.commander

A goal and philosophy of the e.series product group software is maximum control for the user.
This means:

- Configuration of the measurement system
- Graphical programming of the PAC functions
- Process visulization
- Standard software packages to acquire data
- Drivers for Standard software packages

Configuration of the measuring system

For quick and easy setup, e.commander is the setup software tool for all of the e.series systems. Intuitive operation, a logical structure and online help windows guarantee system operation in a short time. The e.commander setup software supports the Ethernet communications standard. As an FTP-Client, e.commander reads and writes configuration data and has access to all system parameters. Included in the e.commander software is the ICP100 module configuration software and

the GreenEye visualization software. The concept behind the File-Transfer (FTP-Client) and open data structure of the e.series is to allow all

users with any FTP-Client the possibility to access the e.series system configuration data. The user can read, modify and write the configuration data back to the system. User access levels can be set to protect the system setup and integrity. Special knowledge of the manufacturer's software is not necessary.

e.con

Graphical programming of the PAC functionality

Applications and PAC functionality are easily graphically programmed on the PC using e.con. Arrange desired functions on your screen with a simple mouse click. Connect the function as desired with a mouse click. Not one line of code is needed to program using e.con.

Drag & Drop

Programming is easy, just drag and drop the desired variable and drag and drop the desired function from our extensive library to the work page on the PC. Connect the input and output of the various function blocks with each other and in a short time the application is built.

Macros

Macros improve the clarity, streamline the program, and save time developing recurring functions.

Function Library

A very extensive function library is available to the user for developing the application.

Documentation and Help

Behind each function is a help page describing the use of that particular function. The extensive help function supports the user at every stage of programming.

Simulation and Online Test

Simulate the application function-by-function in the PC before downloading the application. Also, online testing is possible in the measuring system. In online testing the actual values are used.
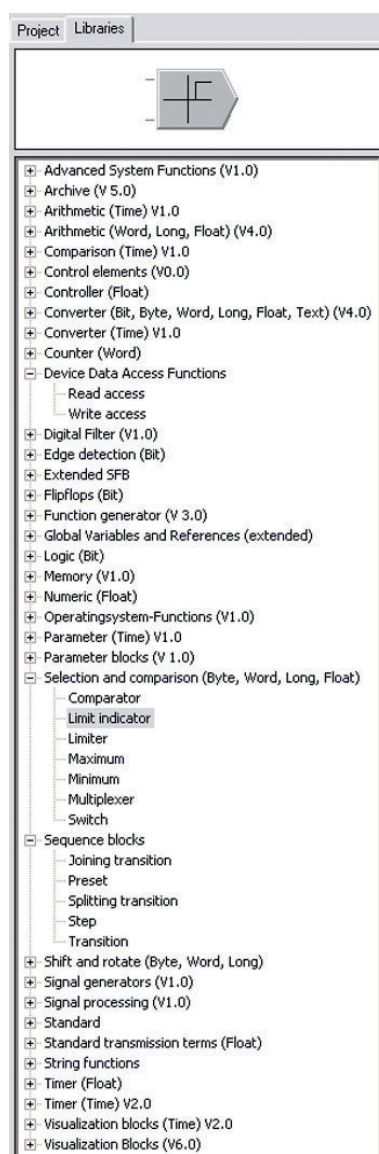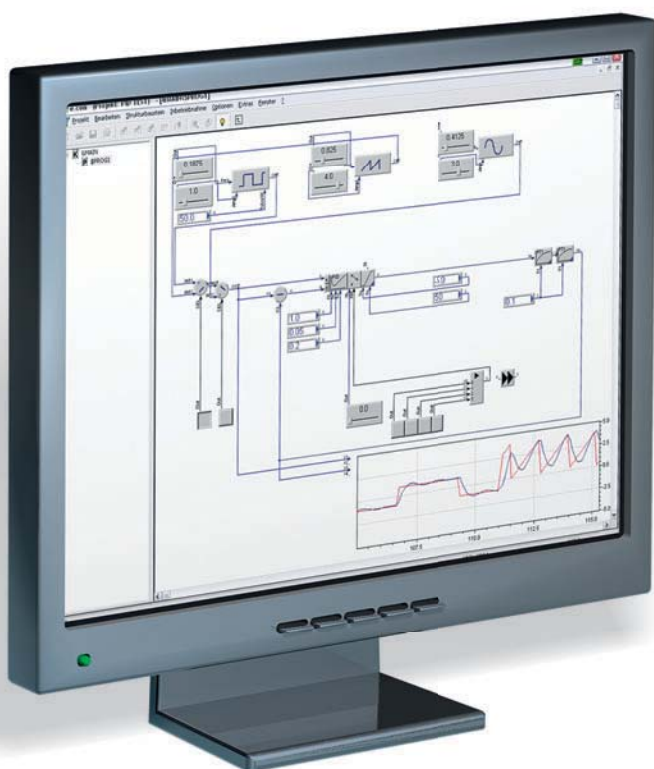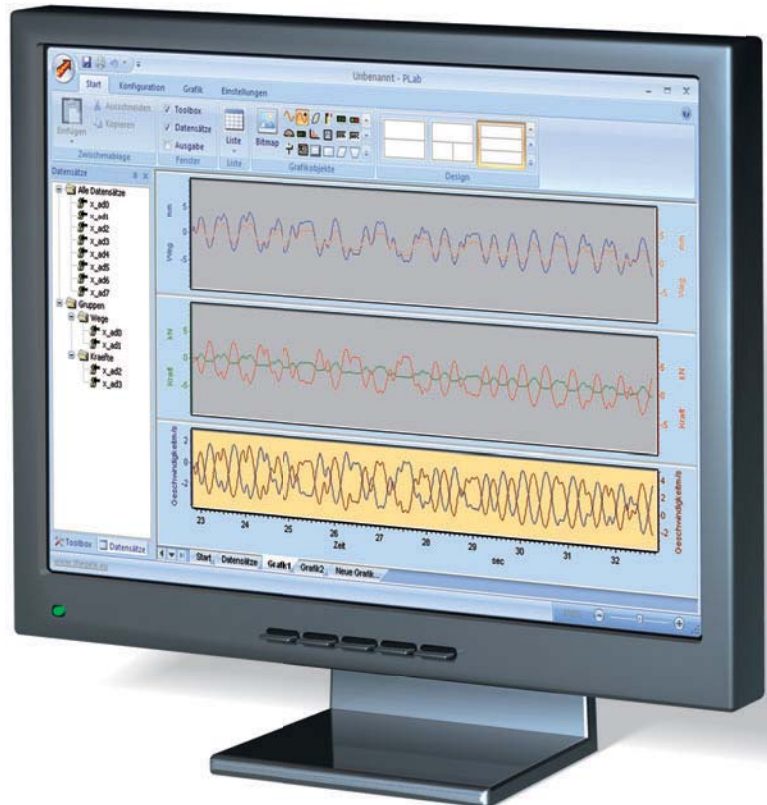
Configuration, Evaluation, Visualization
and Archiving of Data

Standard software packages for data acquisition

All Gantner products are designed to work with many standard off-the-shelf software packages, such as MLab/MGraph, PLab/PGraph, and Signasoft. For convenience, we offer these software packages together with our products as a complete solution.

Drivers for other standard software packages

Keep your freedom and flexibility by implementing the e.series products with software packages that you choose.
To support this, we offer:

- Drivers to implement our products in DIAdem projects

- Drivers to implement our products in DASYLab projects

- Free VI examples to implement our products in LabVIEW

- Free example projects to implement our products in MSCPP60, MSVBasic60 and DELPHI2006

DIAdem®
DASYLab™
LabVIEW®

Process visualization

GreenNode is the software solution for measurement recording in a distributed system. The software consists of the GreenNode server software, and as many clients that are needed or desired.

Be free and flexible in your decision on which software architecture is optimal and fits your individual application.

PROVEN APPLICATION SUCCESS

THE RIGHT HARDWARE FOR THE APPLICATION: HARDWARE DESIGN

APPLICATION: COMPONENT TESTING

APPLICATION: ENGINE TESTING

APPLICATION: PROCESS MONITORING

APPLICATION: LONG TERM MONITORING

AT HOME IN ANY ENVIRONMENT: HARDWARE DESIGN

Adaptable to any Requirement

e.bloxx

DIN rail mountable modules

A typical design for a distributed measuring system, this packaging offers the greatest degree of flexibility. An optimal system can be put together by mixing and matching modules (granularity of 1). This is the only form factor that is ideally suited for distributed systems. This hardware design has a very attractive price per function, especially in small measuring systems.

e.wave

The design for portability

The e.bloxx and e.rack are designed for the permanent mounting in stationary systems. The e.wave is designed for portability – today on the desk, tomorrow on a cart and then at a test stand or in a vehicle. The e.wave has eight measuring channels with or without a test controller.

e.rack

19" Rack Mount (3U) System

A complete 19" rack mount or tabletop housing system with 3U plug-in modules can be configured, and if desired an e.gate or e.pac test controller can be incorporated. As an option, a graphical touch screen can be added. A 19" rack or cabinet system, for example, can accommodate 80 thermocouple channels (10 slots) or 20 carrier frequency amplifiers.
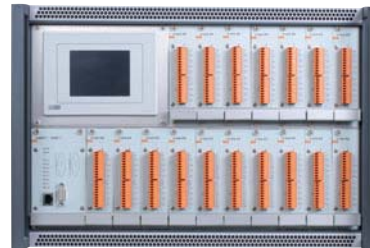
e.rack

19" Rack Mount (3U) plug-in cards

All e.bloxx functions are available in high density e.rack (3U) plug-in cards. These cards can be flexibly inserted into the e.rack 19" (3U) chassis.

e.rack *slimline*

19" System (1U)

This platform is typically found in, but not limited to engine test cells. One slimline rack can hold up to 16 I/O modules. For example the e.rack slimline can accommodate 16 universal amplifiers for voltage, current, RTDs (PT100), or strain gage devices (19bit/1000Hz); 16 thermocouple amplifiers; 16 carrier frequency amplifiers; or 64 digital I/O's. This rack system offers a high channel density in a small package.

The design of the measuring system hardware depends on the desired flexibility, environmental conditions, specified form factor, component density, and existing designs. For this reason, we offer the complete functionality of the e.series in various hardware configurations.

In today's competitive world, all manufacturers have a vital interest to meet the stated product function and to deliver quality. Product life and performance must not only meet the customer requirements, but also, government and industry regulations and standards. In addition cost savings material and manufacturing is a must in today's competitive environment.

Particularly in safety relevant applications, documentation and proof of testing is mandatory. Product testing under thermal and mechanical load to ensure the product under test meets the design specification, is an area of testing that we have specialized and developed our products for.

There are many reasons to implement the e.series in component testing

- Support for all common sensors
- Very high accuracy in particular with temperature and strain gage measurements
- High synchronous data rates
- Carrier frequency amplifier for stable strain gage measurements
- PAC functionality for control and test sequence flow
- Intuitive and simple operation for an easy and quick system installation
- Various hardware configurations
- Mix and match modules
- Integration with standard software
- A complete solution
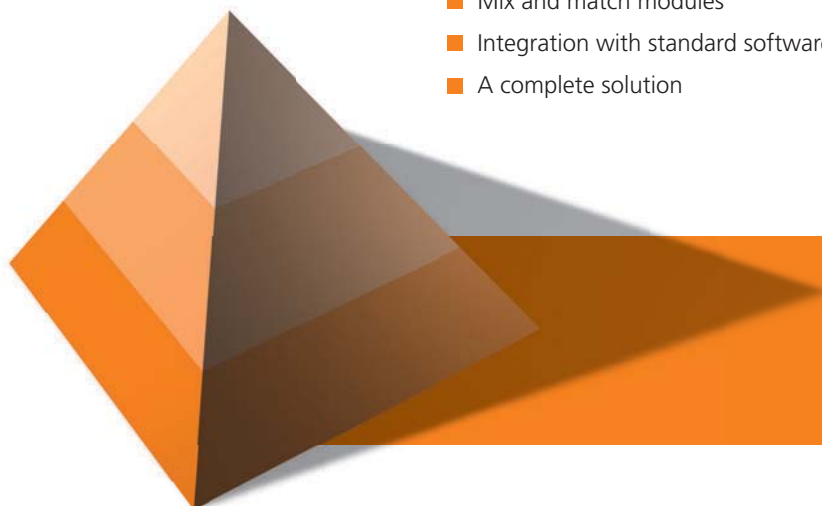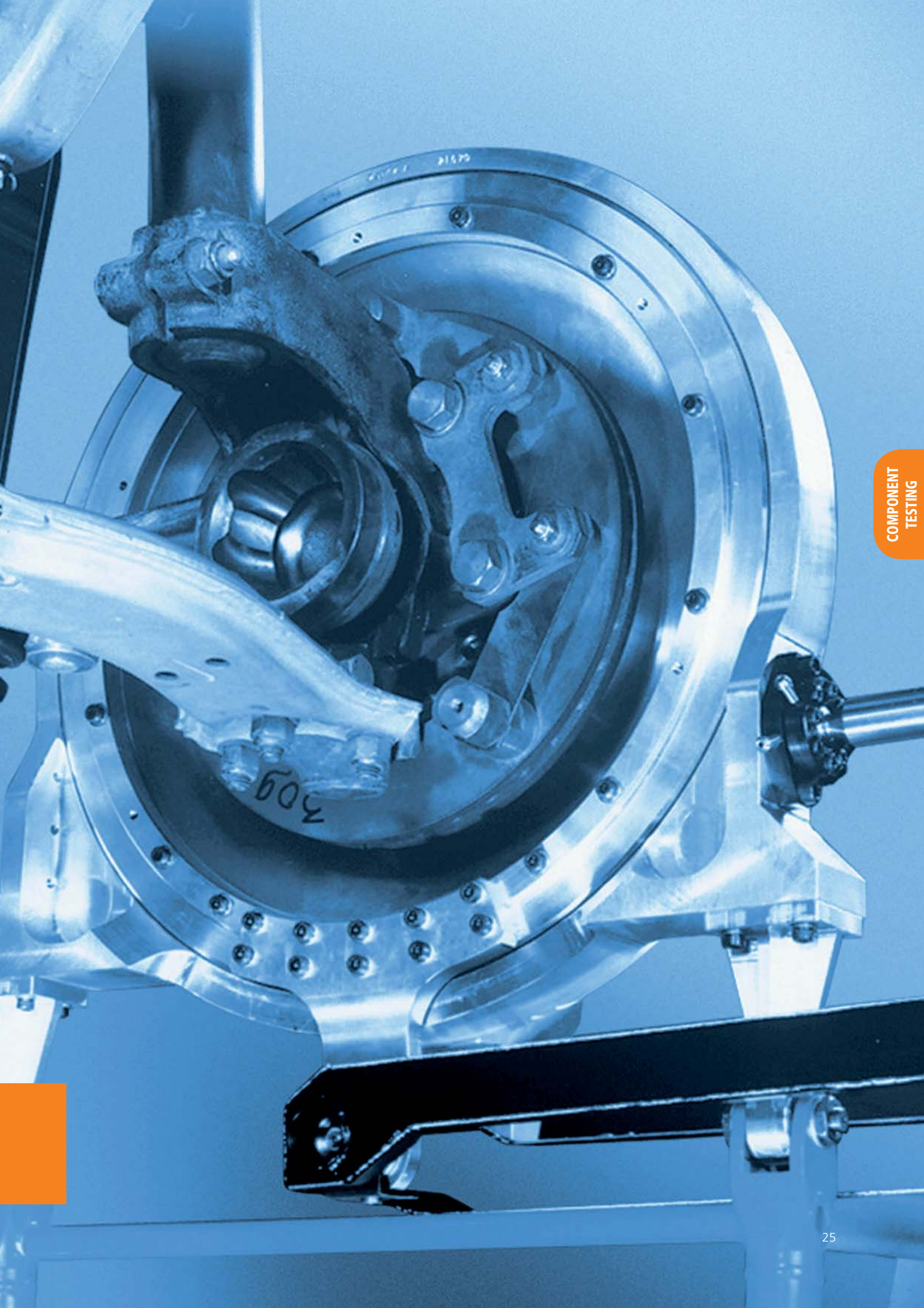
A Reliable and Proven Partner
for Test Stand Builders and End Users

Optimizing performance, reducing fuel consumption, increasing engine life, and reducing weight are the driving forces for the engine developer. Simulating up to 300,000 km is very demanding not only to the engine under test but also the measurement and I/O hardware. Our system partners select our products for that very reason, because our products offer high performance and meet the tough demands of the test and of their customers.
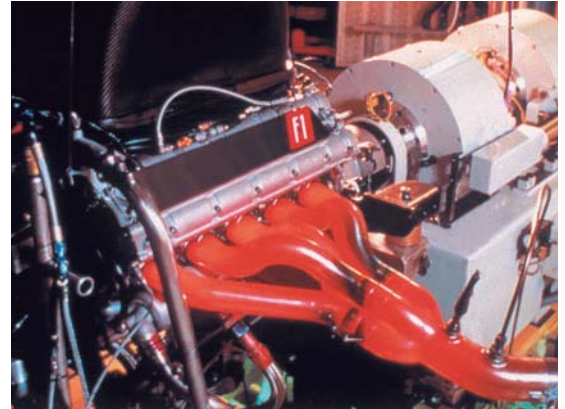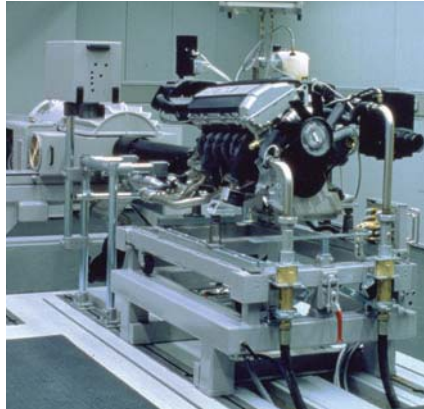
**There are many reasons to
implement the e.series in engine testing**

- Distributed intelligence – data is acquired at the source
- State-of-the-art fieldbus technology
- High accuracy and stability
- Synchronized data acquisition in a distributed system at high data rates
- Very flexible - the system can expand with the needs of the user
- The open architecture makes it simple and easy to integrate into the test stand automation system
- Robust design and outstanding EMI immunity
- Galvanically isolated inputs
- Different hardware configurations (modular, 19"rack) can be mixed in one application
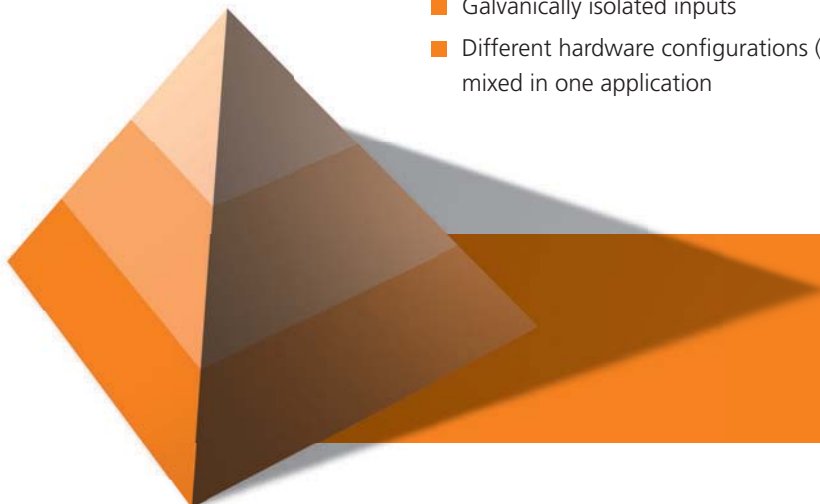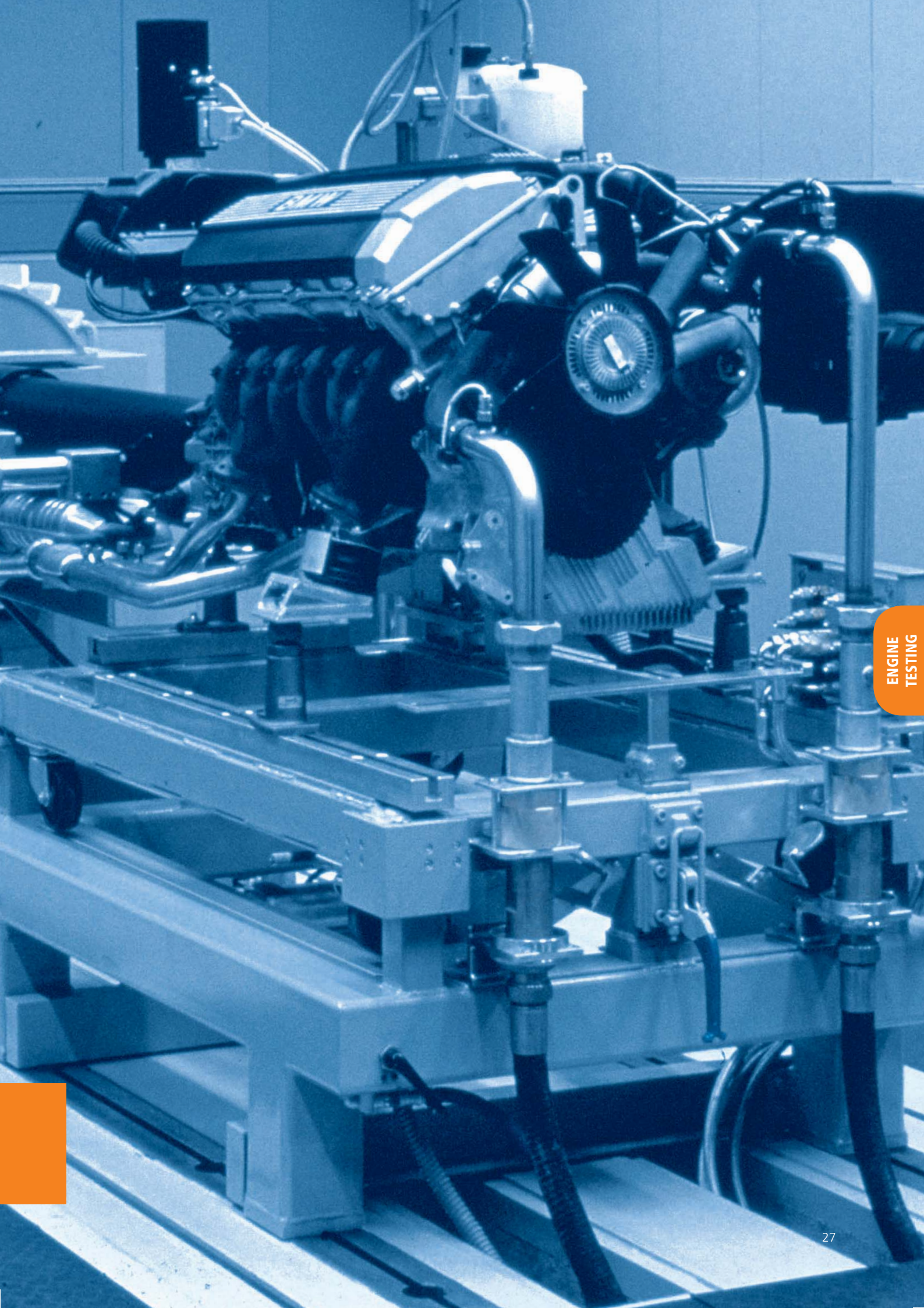
APPLICATION EXAMPLE: PROCESS MONITORING

Monitoring the Process for Quality Assurance and Machine Health

Monitoring the manufacturing and assembly processes ensures product quality. Our products measure and evaluate process, assembly and quality parameters and characteristics set by the manufacturing engineer. The products are used:

- As OEM products in machines
- By system integrators in product lines
- Direct on the assembly line

There are many reasons to implement the e.series in process monitoring

- Modular structure for individual solutions
- Outstanding stability – e.g. carrier frequency technology
- Galvanically isolated inputs
- The open architecture makes it simple and easy to integrate into the automation system
- Robust design and outstanding EMI immunity
- High Reliability - MTBF > 20 years
- Engineering assistance in finding solutions for the application
- Excellent price to performance ratio
- Long-time availability offers security in OEM applications
- A worldwide service network
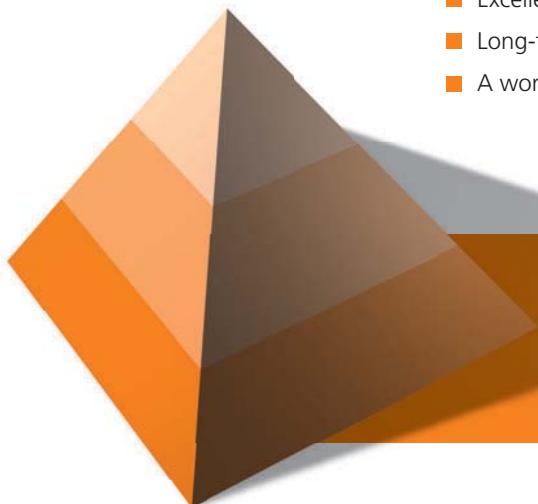
APPLICATION EXAMPLE: LONG TERM MONITORING

## Bridge, Building, Windmill Monitoring

Large buildings and bridges must be monitored due to the aging of materials and external influences, such as weather and mechanical loads, periodically or permanently. This is done for the safety of people.

With the e.series product line, and particularly the data logger, e.reader, we offer an intelligent solution. The e.reader measures signals continuously or in intervals of several hours and stores the data internally or sends the data directly via SMS or electronic mail. The low power consumption of the e.reader makes it ideally suited for remote field use on battery power and/or solar power.


There are many reasons to implement the e.series in long term monitoring

- A distributed system with synchronized data acquisition
- Compact mechanical design
- Galvanically isolated inputs
- Versitle communication interfaces
- Robust design and outstanding EMI immunity
- Low energy consumption (e.reader Sleep-Mode)
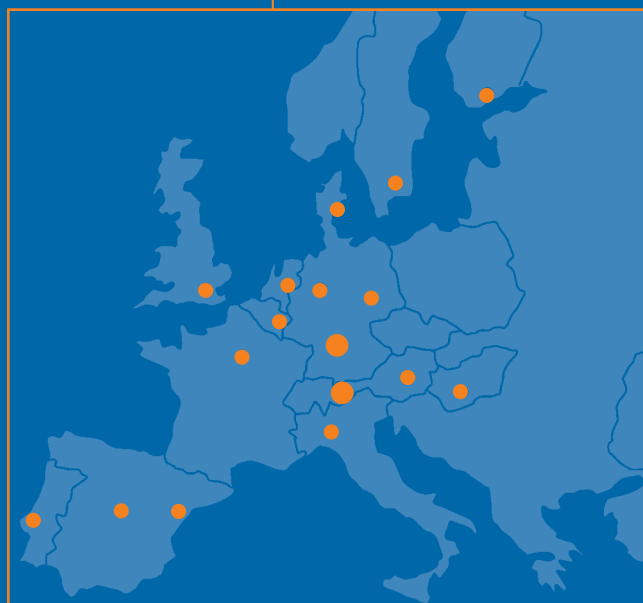- High Reliability - MTBF > 20 years

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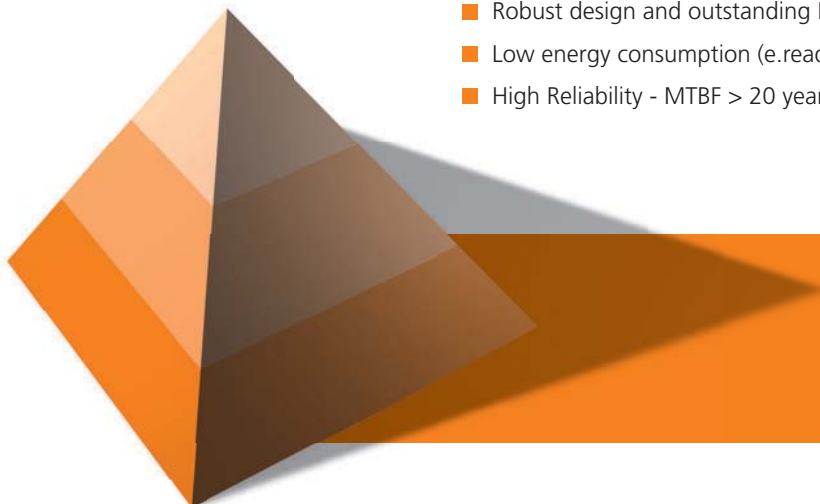
e.verywhere
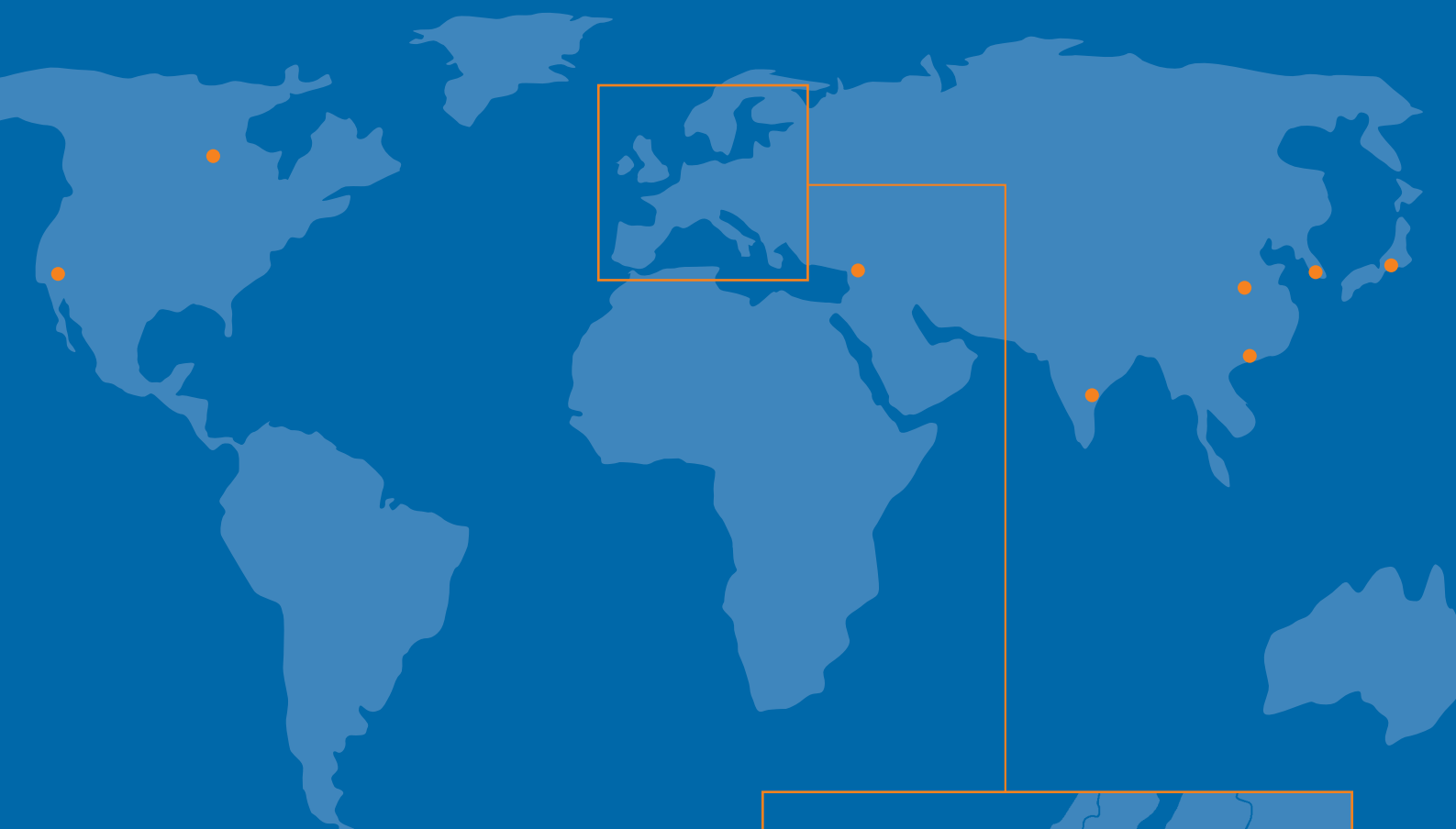
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