Temposonics
AN AMPHENOL COMPANY

Sensor Selector Guide

Magnetostrictive Linear Position Sensors

INDUSTRIAL

– TRUST THE EXPERTS –

MEET EVERY INDUSTRIAL APPLICATION CHALLENGE WITH US

PAPER

Simultaneous position measurement of up to 30 knives during knife adjustment, cutting and wrapping device

PLASTICS

Position measurement during material ejection of the injection moulding machine

TEXTILE

Simultaneous position measurement of up to 30 needles

PRESSES

Precise position measurement in industrial presses

LINEAR MOTORS

Reliable position measurement in linear motors

Temposonics also offers solutions for Mobile Hydraulics (off-highway vehicles) and Liquid Level applications.

CONTENTS

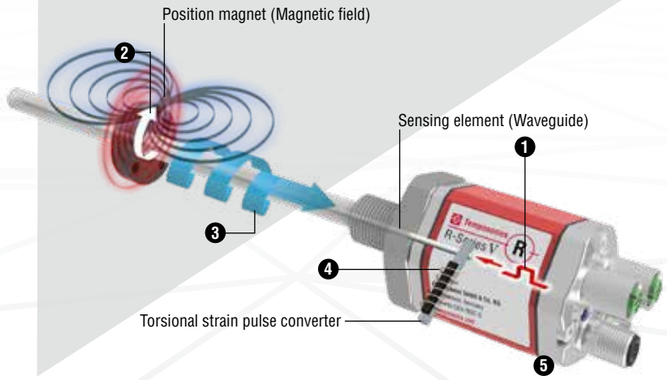
COMPANY

Temposonics is recognized as an industry leader in sensing technologies and solutions. These sensors and transmitters permit high-precision and dynamic position and/or speed measurement in state-of-the-art automation and safety-relevant systems. With a versatile and ever-increasing product portfolio and a focus on superior regional support, Temposonics cooperates closely with customers, to optimize performance and reduce downtimes.

Outstanding quality associated with practical know-how ensures that customers achieve utmost productivity and success. Continuous research, development and production of sensor systems constantly enable new solutions for measuring tasks in the industrial, mobile hydraulics as well as process technology fields to be created.

Temposonics is part of Amphenol Corporation (NYSE: APH). Amphenol is one of the largest manufacturers of interconnect products in the world. The company designs, manufactures and markets electrical, electronic and fiber optic connectors, coaxial and flat-ribbon cable, and interconnect systems. As sensor solutions manufacturer, Temposonics matches the portfolio of the group of companies that are all part of Amphenol, enabling customers to benefit from an extended, complementary product selection.

Pioneers and innovators since 1975.
– TRUST THE EXPERTS –



Measurement Cycle

1	Current pulse generates magnetic field
2	Interaction with position magnet field generates torsional strain pulse
3	Torsional strain pulse propagates
4	Strain pulse detected by converter
5	Time-of-flight converted into position

MEASURING TECHNOLOGY

The absolute, linear position sensors provided by Temposonics rely on the company's proprietary Temposonics® magnetostrictive technology, which can determine position with a high level of precision and robustness.

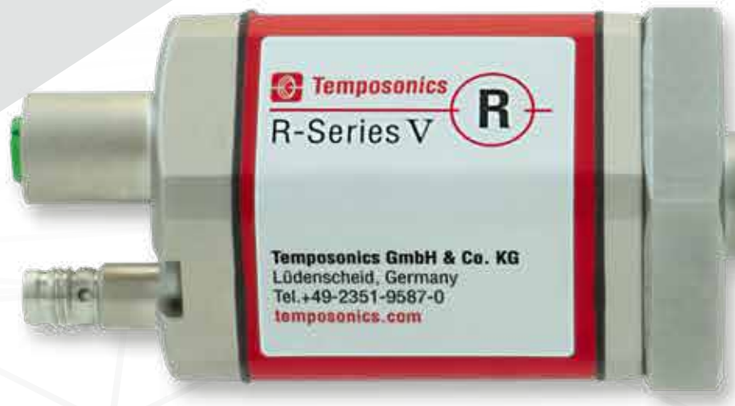
Each Temposonics position sensor consists of a ferromagnetic waveguide, a position magnet, a strain pulse converter and supporting electronics. The magnet, connected to the object in motion in the application, generates a magnetic field at its location on the waveguide. A short current pulse is applied to the waveguide. This creates a momentary radial magnetic field and torsional strain on the waveguide. The momentary interaction of the magnetic fields releases a torsional strain pulse that propagates the length of the waveguide. When the ultrasonic wave reaches the end of the waveguide it is converted into an electrical signal. Since the speed of the ultrasonic wave in the waveguide is precisely known, the time required to receive the return signal can be converted into a linear position measurement with both high accuracy and repeatability.

The technology, based on magnetostriction, does not rely on moving parts and is not exposed to mechanical stress. Therefore, the sensors exhibit considerably longer lifespans and much higher reliability when compared to other technologies, even in harsh working conditions. Furthermore, since the output from sensors with magnetostrictive technology corresponds to an absolute position, rather than a relative value, it is not required to recalibrate sensors.

THE NEW GENERATION

Temposonics® R-Series V position sensors are the most advanced magnetostrictive sensors in the market and are ready for Industry 4.0 applications. They support predictive maintenance with a variety of smart features that enable users to retrieve additional information from inside the application. Users of the absolute, non-contact position sensors benefit from an improved performance as they have a higher resistance against shock, vibration, and high temperatures than ever before.
The backwards compatibility of the R-Series V enables the easy replacement of the previous sensor models. This means that also existing applications can benefit from the new features of Temposonics® R-Series V.

Industry 4.0 starts with information
With the new sensor generation and the TempoLink® and TempoGate® smart assistants it is possible to evaluate more parameters while the application is continually running.



TRUST IN WHAT YOU KNOW. NOW EVEN BETTER.

"Temposonics® R-Series V is the follow up to our fourth generation. Based on our long-standing experiences, R-Series V is the next step in the innovative evolution of magnetostrictive position sensors. By maintaining the qualities we are well-known for and at the same time pushing the boundaries, we are able to provide our customers the best R-Series we ever made."

André Beste, Technical Marketing Manager

SUPERIOR PERFORMANCE

Have a challenging application?
Need reliable performance combined with resistance to high temperature, dirt and vibration?

Extreme demands require extraordinary solutions. Temposonics responds to this with an extensive range of measuring stroke options, simultaneous measurement of multiple magnets, smart electronic designs with built-in diagnostics, innovative housing concepts and a wide variety of controller interfaces. Our Temposonics® magnetostrictive technology is maximized with powerful electronics. The robust designs guarantee maximum reliability, high-precision position measurements and long-term operation in the harshest environments.

Success where others fail.

30 POSITIONS

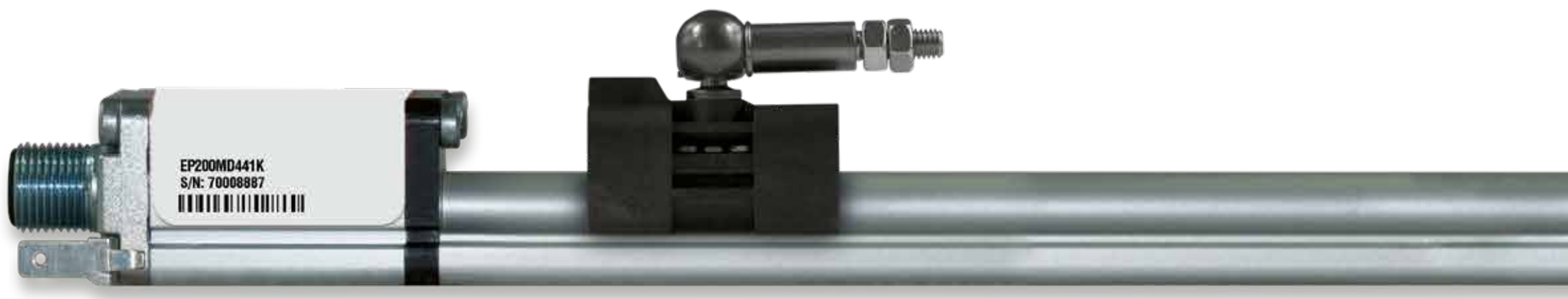
20 METERS

COMPACT SOLUTIONS

Need a reliable sensing solution designed for limited space or difficult access?

In line with your application requirements, Temposonics delivers solutions which fit your exact needs in terms of design and performance – from ultra-low profiles and detached electronics to compact hazardous area approved housings. In food & beverage, plastics, textiles and other industries, Temposonics® technology guarantees maximum productivity.

Always the smartest solution.



MAXIMUM SAFETY

Explosive environment or a dangerous area?

The position sensors from Temposonics are the first choice when it comes to meeting hazardous area standards – including ATEX- (Europe), UK Ex (England, Wales, Scottland), NEC- (USA), CEC- (Canada), IECEx- (global market), KCs- (South Korea), CCC (Chinese market) and the Japanese approval for use in Class I, II, III, Division 1, Division 2 and Zone 0/1, Zone 1, Zone 2, Zone 21 and Zone 22. Optimized for applications where there is potential for exposure to flames and caustic substances, as well as the possibility of explosive atmospheres, our sensors are highly suited to implementation in chemical plants, offshore oil/gas rigs and other applications of this kind.

Maximum safety for machines and their operators.

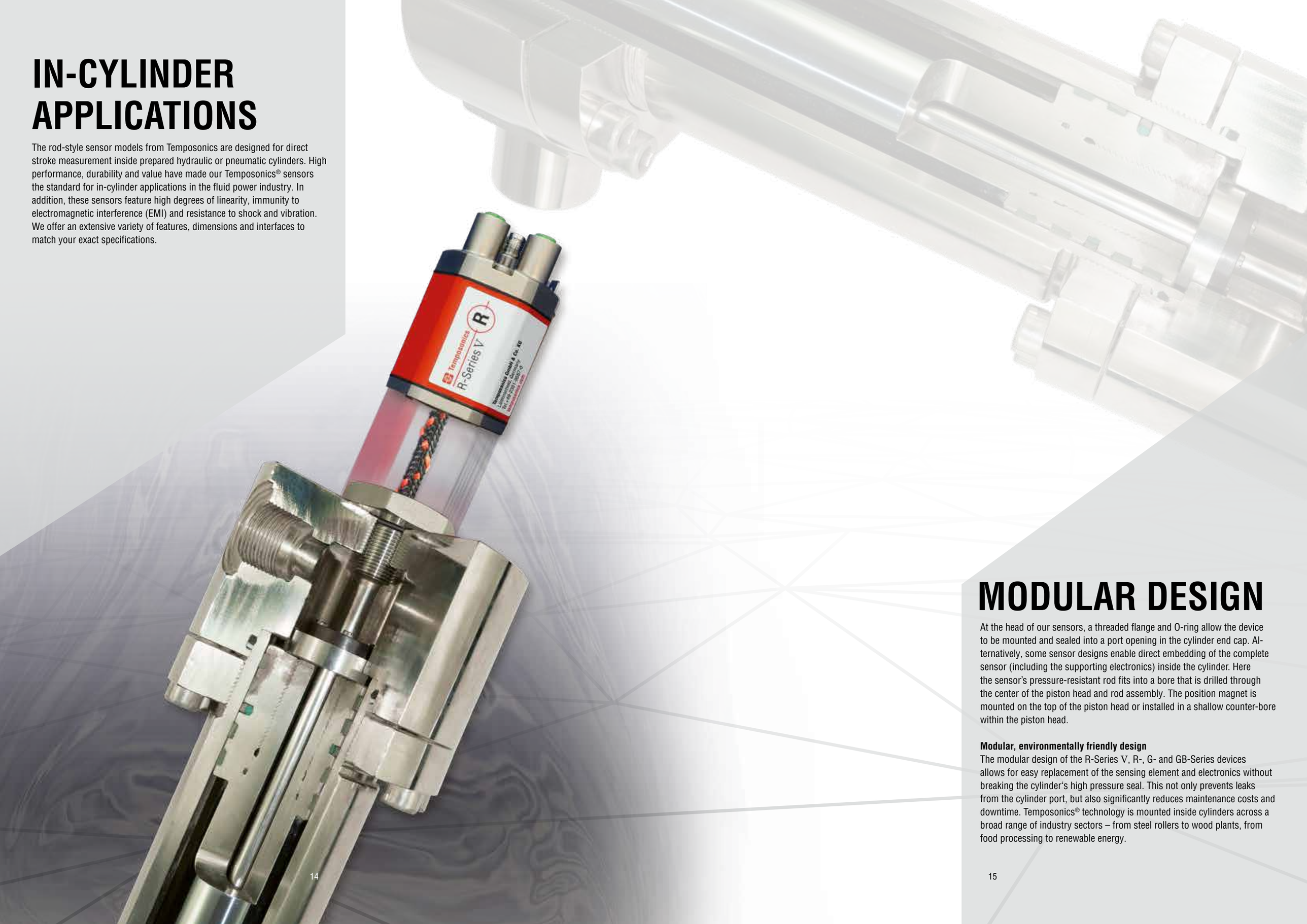
INNOVATIVE TECHNOLOGY

Our mission at Temposonics is to provide outstanding quality and application knowledge. We focus on understanding your challenges and delivering the best sensor solution to let you attain the highest level of productivity. Our resources are dedicated to the continual development of new products and delivering unparalleled application-oriented solutions with agility. It is no coincidence that our R&D is one of the largest team within our organization.

Local R&D & Production, Application Know-How & Service

IN-CYLINDER APPLICATIONS

The rod-style sensor models from Temposonics are designed for direct stroke measurement inside prepared hydraulic or pneumatic cylinders. High performance, durability and value have made our Temposonics® sensors the standard for in-cylinder applications in the fluid power industry. In addition, these sensors feature high degrees of linearity, immunity to electromagnetic interference (EMI) and resistance to shock and vibration. We offer an extensive variety of features, dimensions and interfaces to match your exact specifications.



MODULAR DESIGN

At the head of our sensors, a threaded flange and O-ring allow the device to be mounted and sealed into a port opening in the cylinder end cap. Alternatively, some sensor designs enable direct embedding of the complete sensor (including the supporting electronics) inside the cylinder. Here the sensor's pressure-resistant rod fits into a bore that is drilled through the center of the piston head and rod assembly. The position magnet is mounted on the top of the piston head or installed in a shallow counter-bore within the piston head.

Modular, environmentally friendly design
The modular design of the R-Series V, R-, G- and GB-Series devices allows for easy replacement of the sensing element and electronics without breaking the cylinder's high pressure seal. This not only prevents leaks from the cylinder port, but also significantly reduces maintenance costs and downtime. Temposonics® technology is mounted inside cylinders across a broad range of industry sectors – from steel rollers to wood plants, from food processing to renewable energy.

SERIES QUICK GUIDE

FEATURES	E-Series Compact Solutions	G-Series High Durability	GB-Series Innovative Design	R-Series V The New Generation	R-Series Superior Performance	T-Series Rugged Design
Velocity measurement	•			•	•	•
Multi-position measurement	•	•		•	•	•
Programmable sensor parameters		•	•	•	•	•
Diagnostic LEDs		•		•	•	
Redundant version		•			•	

OUTPUT	E-Series Compact Solutions	G-Series High Durability	GB-Series Innovative Design	R-Series V The New Generation	R-Series Superior Performance	T-Series Rugged Design
Analog – Current	•	•	•	•	•	•
Analog – Voltage	•	•	•	•	•	
Start/Stop	•	•				
PWM		•				
SSI	•		•	•	•	•
PROFIBUS					•	
CANbus	•				•	•
DeviceNet					•	
EtherCAT®				•		
EtherNet/IP™				•		
POWERLINK				•		
PROFINET				•		
IO-Link	•					

MINIMUM STROKE LENGTH	E-Series Compact Solutions	G-Series High Durability	GB-Series Innovative Design	R-Series V The New Generation	R-Series Superior Performance	T-Series Rugged Design
25 mm (1 in.)			•	•	•	•
50 mm (2 in.)	•	•				

MAXIMUM STROKE LENGTH	E-Series Compact Solutions	G-Series High Durability	GB-Series Innovative Design	R-Series V The New Generation	R-Series Superior Performance	T-Series Rugged Design
1500 mm (60 in.)	ER					
2540 mm (100 in.)	EH, EE	GTE			RT4	
2900 mm (114 in.)		GT2/GT3				
3000 mm (118 in.)	EP, EL, EP2, ET					
3250 mm (128 in.)			GB			
5080 mm (200 in.)		GP		RDV	RP, RD4	
6350 mm (250 in.)				RP5		
7615 mm (299.8 in.)				RM5		
7620 mm (300 in.)		GH		RH5	RH, RS	TH
20000 mm (787 in.)				RFV	RF	

CERTIFICATES

	CE	UKCA	EAC	UL/cUL	ATEX	UK Ex	NEC/CEC	NEC/CEC	IECEx	KCs	Japanese Approval	CCC	ClassNK
E-SERIES													
EH	•	•	•	•									
ET	•	•	•	•	•	•		•	•			•	
EP	•	•	•	•									
EL	•	•	•	•									
EP2	•	•	•	•									
ER	•	•	•	•									
EE	•	•	•										
G-SERIES													
GH	•	•	•	•	•								
GP	•	•	•	•	•								
GT2/GT3	•	•	•										
GTE	•	•	•		•	•			•			•	
GB-SERIES													
GB	•	•	•				•						
R-SERIES V													
RH5	•	•	•	•									
RP5	•	•	•	•									
RM5	•	•	•	•									
RFV	•	•	•	•									
RDV	•	•	•	•									
R-SERIES													
RH	•	•	•	•									
RP	•	•	•	•									
RF	•	•	•										
RD4	•	•	•										
RT4	•	•	•										
RS	•	•	•										
T-SERIES													
TH (Analog)	•	•	•		•	•		•	•	•	•	•	•
TH (SSI, CANbus)	•	•	•		•	•		•	•		•	•	
HPH FOR G-/R-SERIES & R-SERIES V													
GH	•	•			•		•		•				
RH	•	•			•		•		•				
RH5	•	•			•		•		•				

SAVE YOUR TIME FOR THE THINGS YOU LOVE.

Have you ever thought about how much time you're wasting waiting for adequate support or your order?

Our commitment at Temposonics is to consistently deliver quality products on time to meet your schedules and provide first-class service. Trust in our continuous product development of high-performance position sensors and rely on our highly qualified personnel.
At Temposonics, we live by the promise of unparalleled service that enables us to take all available means to exceed your expectations. Our goal is to support you optimizing your productivity and we love the idea to make you save your valuable time.

Your Temposonics Team
– TRUST THE EXPERTS –

E-SERIES
(EH, ET, EP, EL, EP2, ER, EE)

The Temposonics® E-Series are very compact sensor models suitable for situations where space-constrained mounting is a critical factor. Temposonics offers different designs to meet the needs of various industrial applications.

This series features three rod models for in-cylinder integration: EH, ET, EE (embedded in cylinder). The space-saving profile models EP, EL, EP2 and ET impress with their compact housings. On the EP2 sensor, the position magnet can travel along the entire flat housing profile.
The ER sensor has an aluminum cylinder with a guided driving rod which contains both the sensor element and the electronics. The position is detected via the solid extractable driving rod. Temposonics® E-Series IO-Link now available with multi-position measurement. These sensors can now detect the position of up to eight magnets or the position and the velocity of up to four magnets simultaneously.

Typical applications for E-Series sensors are plastics processing, food & beverage processing, control systems and packaging.

Output (resolution)

	EH	ET	EP/EL	EP2	ER	EE
Current	Infinite	16 bit*	Infinite	Infinite	Infinite	Infinite
Voltage	Infinite	16 bit*	Infinite	Infinite	Infinite	–
Start/Stop	**	**	**	**	**	–
SSI	20 µm	5 µm	20 µm	20 µm	20 µm	–
CANopen	10 µm	–	10 µm	10 µm	10 µm	–
IO-Link	5 µm	–	5 µm	5 µm	5 µm	–

Operating conditions

Temperature	EH/EP/EL/EP2/ER:	–40…+75 °C (–40…+167 °F)
	ET (Analog):	–40…+85 °C (–40…+185 °F)
	ET (SSI):	–40…+90 °C (–40…+194 °F)
	ET (Start/Stop):	–40…+105 °C (–40…+221 °F)
	EE:	–40…+85 °C (–40…+185 °F)
Shock test	100 g (single shock), IEC standard 60068-2-27	
Vibration test	EH/EP/EL/EE:	15 g/10…2000 Hz
	ET:	20 g/10…2000 Hz
	EP2:	8 g/10…2000 Hz
	ER:	5 g/10…2000 Hz
	IEC standard 60068-2-6 (excluding resonant frequencies)	

Design

Stroke length	EH/EE:	50…2540 mm (2…100 in.)
	ET/EP/EL/EP2 :	50…3000 mm (2…118 in.)
	ER:	50…1500 mm (2…60 in.)

Accuracy

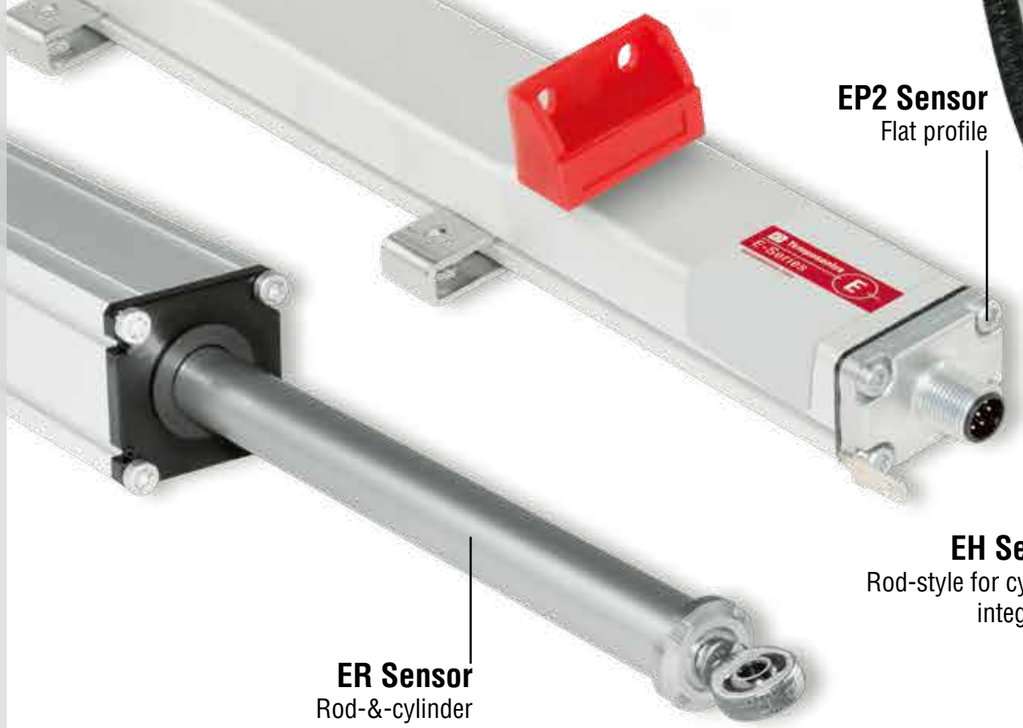
Linearity	≤ ±0.02 % F.S.

Electrical connection

Operating voltage	+24 VDC (–15/+20 %)

* Minimum 1 µm depending on stroke length
** Controller dependent

More information available at:
www.temposonics.com



ER Sensor
Rod-&-cylinder housing with strong piston for flexible mounting

EL Sensor
Ultra low profile-style

EP Sensor
Profile-style

EP2 Sensor
Flat profile

ET Sensor
ATEX certified & high temperature resistant

EH Sensor
Rod-style for cylinder integration

EE Sensor
For embedded cylinder applications

G-SERIES
(GH, GP, GT2/GT3, GTE)

The Temposonics® G-Series provides high durability and accurate position measurement solutions in harsh industrial settings. The sensor element is installed in a pressure-resistant stainless steel rod or aluminum profile. A double-shielded housing protects the electronics and offers excellent EMI immunity.

The GT2/GT3 and GTE models feature multiple independent measuring systems contained in one compact housing. Each measuring system has its own channel with sensor element, power and evaluation electronics and output signal. The GTE model is embedded in a cylinder for added robustness. Example applications include control valves, fluid cylinders, turbine pitch control, ship control systems and floodgates.

Output (resolution)

	GH	GP	GT2/GT3	GTE
Current	Infinite	Infinite	Analog	Infinite
Voltage	Infinite	Infinite	Analog	Infinite
Start/Stop	*	*	–	–
PWM	*	*	–	–

Operating conditions

Temperature	GH/GP:	–40…+80 °C (–40…+176 °F)
	GT2/GT3:	–40…+75 °C (–40…+167 °F)
	GTE:	–20…+75 °C (–4…+167 °F)
Shock test	100 g (single shock), IEC standard 60068-2-27	
Vibration test	GH**:	15 g/10…2000 Hz
	GP:	15 g/10…2000 Hz
	GT2/GT3:	5 g/10…2000 Hz
	GTE:	10 g/10…2000 Hz
	IEC standard 60068-2-6 (excluding resonant frequencies)	

Design

Stroke length	GH:	50…7620 mm (2…300 in.)
	GP:	50…5080 mm (2…200 in.)
	GT2/GT3:	50…2900 mm (2…114 in.)
	GTE:	50…2540 mm (2…100 in.)

Accuracy

Linearity	< ±0.02 % F.S.

Electrical connection

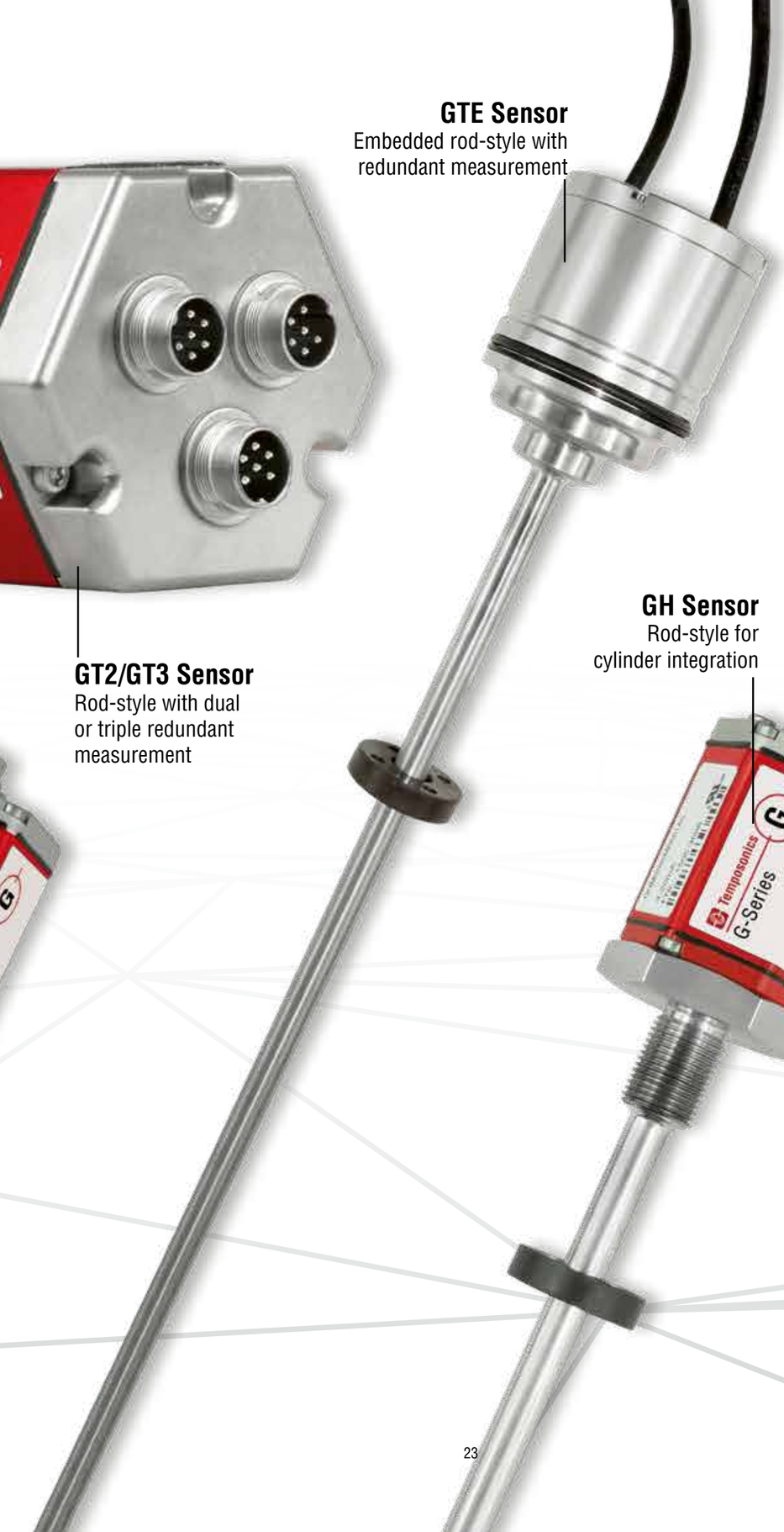
Operating voltage	+24 VDC (–15/+20 %)

* Controller dependent
** Option: High vibration resistant

More information available at:
www.temposonics.com

GP Sensor
Profile-style

GT2/GT3 Sensor
Rod-style with dual or triple redundant measurement



GTE Sensor
Embedded rod-style with redundant measurement

GH Sensor
Rod-style for cylinder integration

GB-SERIES

With threaded flange (GB-M, GB-T) or pressure fit flange (GB-J, GB-K, GB-N, GB-S)

The Temposonics® GB-Series is designed to be incorporated into hydraulic cylinders, such as those typically used in power generation plants. The flat, compact electronics housing facilitates deployment in restricted spaces.

The operational advantages of these sensors are: high pressure resistance (the GB-J sensor offers up to 800 bar operating pressure), strong immunity to EMI and ability to operate in temperatures up to +100 °C (+212 °F). High durability and increased resistance to rust is achieved by using 316L stainless steel (GB-N model). The GB series sensors can be programmed using a handheld programmer connected to a USB port on a computer.

The GB with threaded flange (GB-M/GB-T) offers further advantages such as a sensor electronics housing with its electrical connection that can be rotated 360 degrees to easily achieve the necessary connection orientation. If needed, the sensor element and electronics can be replaced while the flange is still installed in the cylinder. This means that the hydraulic circuit is not interrupted which results in lower maintenance costs and reduced downtime.

Output (resolution)	
Current	16 bit
Voltage	16 bit
SSI	5 µm

Operating conditions	
Temperature	–40…+100 °C (–40…+212 °F)
Shock test	100 g (single shock), IEC standard 60068-2-27
Vibration test	15 g/10…2000 Hz IEC standard 60068-2-6 (excluding resonant frequencies)

Design	
Stroke length	25…3250 mm (1…128 in.)

Accuracy	
Linearity	< ±0.02 % F.S.

Electrical connection	
Operating voltage	+24 VDC (–15/+20 %)

More information available at:
www.temposonics.com

GB Sensor with threaded flange
Sensor element & electronics can be easily replaced

GB Sensor with pressure fit flange
High pressure rod-style for high operating temperature

R-SERIES V
The new generation
(RH5, RP5, RFV, RDV, RM5)

Temposonics® R-Series V is the successor to our R-Series 4. The new sensors have higher resistance to vibration and high temperatures, are ready for Industry 4.0 and fit perfectly into existing applications.

The new Industry 4.0 features for all outputs offer users unique advantages, as they provide additional information about the process in addition to the pure process data (position/speed). Status and statistical data are recorded and processed during operation and can be used to better understand the processes within the application.

In combination with the increased performance and improved robustness, the user is offered the certainty that existing applications work even more reliably and that future requirements are already being met.

The new sensor generation is available as rod version (RH5) for cylinder integration, profile version (RP5) for position measurement of motion axis, with detached electronics (RDV), with flexible rod (RFV) for stroke lengths up to 20 m and with protective housing (RM5) with ingress protection IP68/IP69.

Output (resolution)

	RH5	RP5	RFV	RDV	RM5
Current	16 bit	16 bit	16 bit	16 bit	16 bit
Voltage	16 bit	16 bit	16 bit	16 bit	16 bit
SSI	0.1 µm	0.1 µm	0.1 µm	0.1 µm	0.1 µm
EtherCAT®	0.5 µm	0.5 µm	0.5 µm	0.5 µm	0.5 µm
EtherNet/IP™	1 µm	1 µm	1 µm	1 µm	1 µm
POWERLINK	0.5 µm	0.5 µm	0.5 µm	0.5 µm	0.5 µm
PROFINET	0.5 µm	0.5 µm	0.5 µm	0.5 µm	0.5 µm

Operating conditions

Temperature	–40…+85 °C (–40…+185 °F)
Shock test	RH5/RP5: 150 g/11 ms RM5/RFV: 100 g/6 ms RDV: 100 g/11 ms IEC standard 60068-2-27
Vibration test	RH5/RP5: 30 g/10…2000 Hz RFV: 5 g/10…2000 Hz RM5/RDV: 10 g/10…2000 Hz IEC standard 60068-2-6 (excluding resonant frequencies)

Design

Stroke length	RH5: 25… 7620 mm (1…300 in.) RP5: 25… 6350 mm (1…250 in.) RM5: 25… 7615 mm (1…299.8 in.) RFV: 150…20,000 mm (6…787 in.) RDV: 25… 5080 mm (1…200 in.)

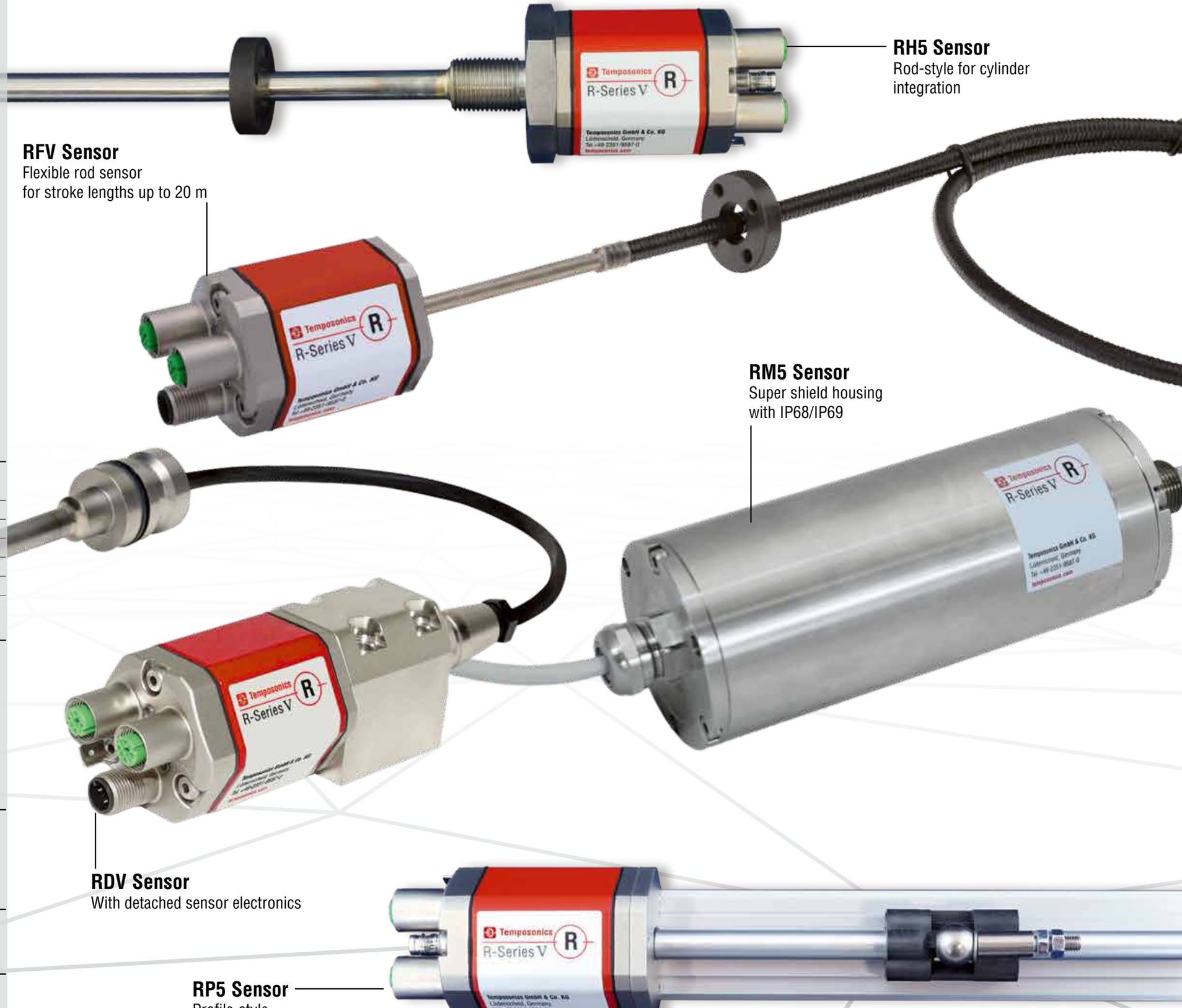
Accuracy

Linearity deviation	RH5/RP5/RM5/RDV: < 0.01 % F.S. (minimum ≤ ±50 µm) RFV: < ±0.02 % F.S. (Minimum ±100 µm)

Electrical connection

Operating voltage	+12…30 VDC ±20 % (9.6…36 VDC)

More information available at:
www.temposonics.com



RH5 Sensor
Rod-style for cylinder integration

RFV Sensor
Flexible rod sensor for stroke lengths up to 20 m

RM5 Sensor
Super shield housing with IP68/IP69

RDV Sensor
With detached sensor electronics

RP5 Sensor
Profile-style

SMART ASSISTANT
TempoLink®

The TempoLink® smart assistant is designed for mobile use and thanks to its compact design it fits in any pocket. The accessories supports the integration of the sensor into the application and the transfer of additional information to the user. With the assistant, the user can call up data such as the current sensor status, the internal sensor temperature, the number of operating hours and the distance travelled by the position magnets. An evaluation of these values can help in the creation of predictive maintenance plans and thus lead to an optimization of production.

The connection and communication between the Temposonics® R-Series V sensor and the TempoLink® smart assistant is via the power supply. The assistant can transfer the various sensor parameters wirelessly or via the USB port while the sensor continues to operate.

Because the TempoLink® smart assistant provides its own WiFi access point, WiFi-enabled devices such as smartphones, tablets or laptops can access it very easily. No software installation or app is required, nor is access to a company network.

SMART ASSISTANT
TempoGate®

The TempoGate® smart assistant is designed for the permanent integration into control cabinets and supports all R-Series V sensors with smart diagnostics and operating statistics. Once connected via power supply, the sensors and the assistant can communicate bidirectional. Via the integrated OPC UA server, this data can also be transmitted to other devices via OPC UA during operation. This allows the user to monitor additional sensor parameters and combine this information with other machine status data. In addition, the data can be transfered via LAN or WiFi to a graphical user interface on the smartphone, tablet or computer.
The Temposonics® R-Series V position sensors, in conjunction with the TempoGate® smart assistant, provide the operator with detailed information to improve machine performance, optimize maintenance cycles and detect problems early to increase machine operating availability.

More information available at:
www.temposonics.com

INDUSTRY 0.4 STARTS WITH INFORMATION

Sensor Smart Assistants for R-Series V

TempoLink®
Compact and portable

TempoGate®
For installation in cabinets

R-SERIES
(RH, RP, RF, RD4, RT4, RS)

The Temposonics® R-Series features the highest performance, accuracy and reliability in magnetostrictive linear position sensors designed for advanced motion control implementations. With a variety of housing styles and electrical interfaces, the R-Series can be integrated into a wide range of applications. They have a modular construction and are extremely robust. The double-shielded design assures the best immunity against EMI. Whether it is a rod version (RH), profile version (RP), has detached electronics (RD4), built-in redundancy (RT4) or a flexible rod (RF), the R-Series is a highly compelling sensor solution. For extremely harsh environments Temposonics offers the RS sensor with IP69K protective housing.

Output (resolution)

	RH	RP	RF	RD4	RT4	RS
Current	–	–	–	–	–	16 bit
SSI	–	–	–	–	1 µm	–
PROFIBUS	1 µm	1 µm	1 µm	1 µm	–	1 µm
CANbus	2 µm	2 µm	2 µm	2 µm	–	2 µm
DeviceNet	2 µm	2 µm	2 µm	2 µm	–	–

Operating conditions

Temperature	–40…+75 °C (–40…+167 °F)
Shock test	100 g (single shock), IEC standard 60068-2-27
Vibration test	RH/RP*: 15 g/10…2000 Hz RF: 5 g/10… 150 Hz RD4: 10 g/10…2000 Hz RT4: 5 g/10…2000 Hz IEC standard 60068-2-6 (excluding resonant frequencies)

Design

Stroke length	RH: 25… 7620 mm (1…300 in.) RP/RD4: 25… 5080 mm (1…200 in.) RF: 150…20000 mm (6…787 in.) RT4: 25… 2540 mm (1…100 in.) RS: 50… 7620 mm (1…300 in.)

Accuracy

Linearity	RH/RP/RS: < ±0.01 % F.S. RF/RD4/RT4: < ±0.02 % F.S.

Electrical connection

Operating voltage	+24 VDC (–15/+20 %)

*Option: High vibration resistant

More information available at:
www.temposonics.com

RT4 Sensor
Redundant sensor with detached electronics

RH Sensor
Rod-style for cylinder integration

RF Sensor
Flexible sensor rod for stroke lengths up to 20 m

Diagnostics LEDs

RP Sensor
Profile-style

RS Sensor
Super shield housing with IP69K

RD4 Sensor
With detached sensor electronics

T-SERIES
(TH)

The Temposonics® T-Series sensors are designed for hazardous working environments, where they may have to deal with flames, caustic substances and potentially explosive atmospheres (such as chemical plants, offshore oil/gas rigs, etc.).

The T-Series carries the ATEX certification for Europe, the UK Ex certificate for market in England, Wales and Scotland, the NEC and CEC certificates for the US and Canada, the IECEx certificate for the global market, the KCs certificate for the South Korean market, the CCC certificate for the Chinese market as well as the Ex certificate for Japan for use in Class I, II, III, Division 1, Division 2 and Zone 0/1, Zone 1, Zone 2, Zone 21 and Zone 22.

Output (resolution)	
Current	Minimum 16 bit
SSI	Minimum 0.5 µm
CANbus	Minimum 2 µm

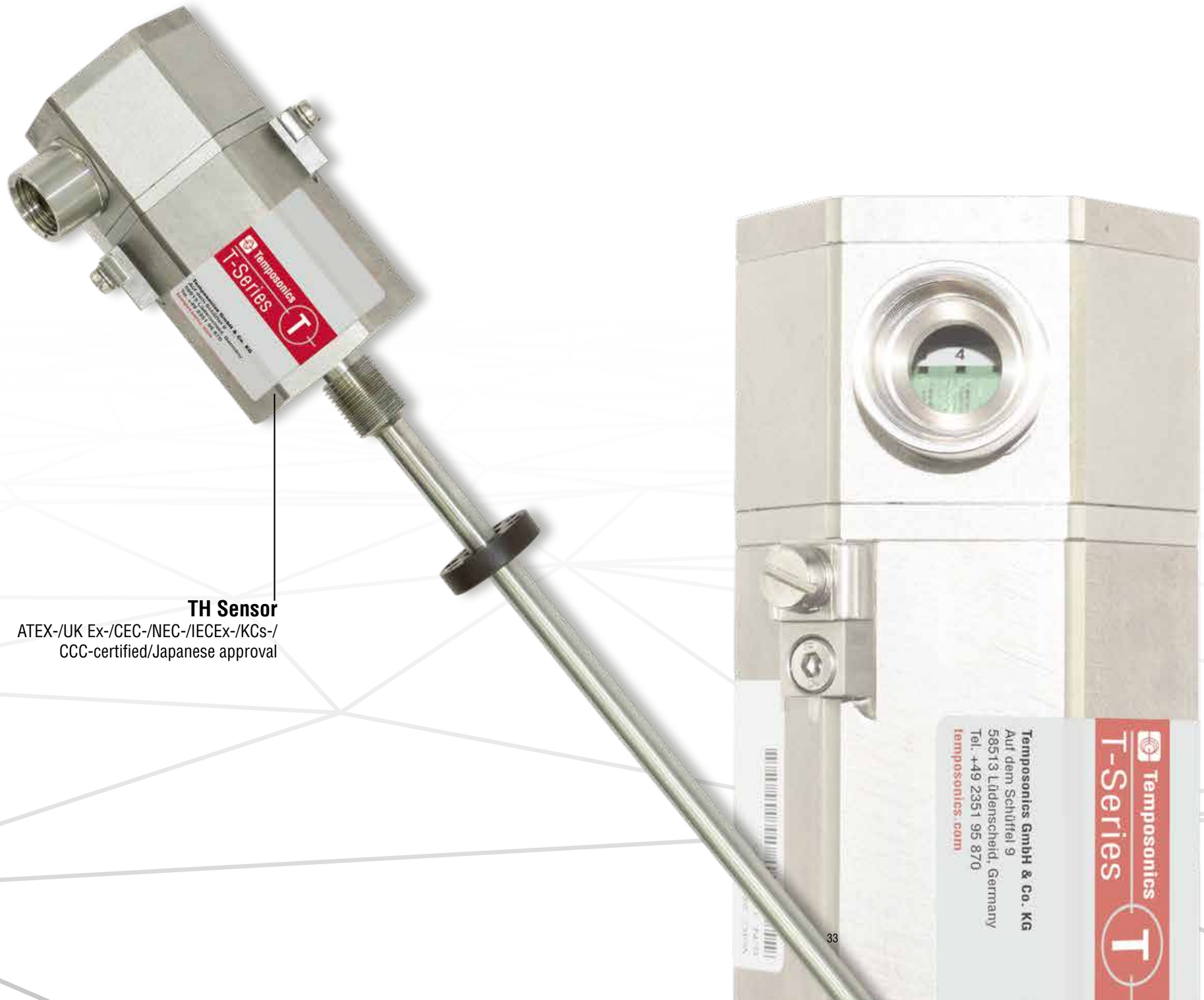
Operating conditions	
Temperature	–40…+75 °C (–40…+167 °F)
Shock test	100 g (single shock), IEC standard 60068-2-27
Vibration test	15 g/10…2000 Hz IEC standard 60068-2-6 (excluding resonant frequencies)
Ingress protection	IP66/IP67/IP68/IP69 and NEMA 4 (NEMA 4x)

Design	
Stroke length	25…7620 mm (1…300 in.)

Accuracy	
Linearity	< ±0.01 % F.S.

Electrical connection	
Operating voltage	+24 VDC (–15/+20 %)

More information available at:
www.temposonics.com



TH Sensor
ATEX-/UK Ex-/CEC-/NEC-/IECEx-/KCs-/
CCC-certified/Japanese approval

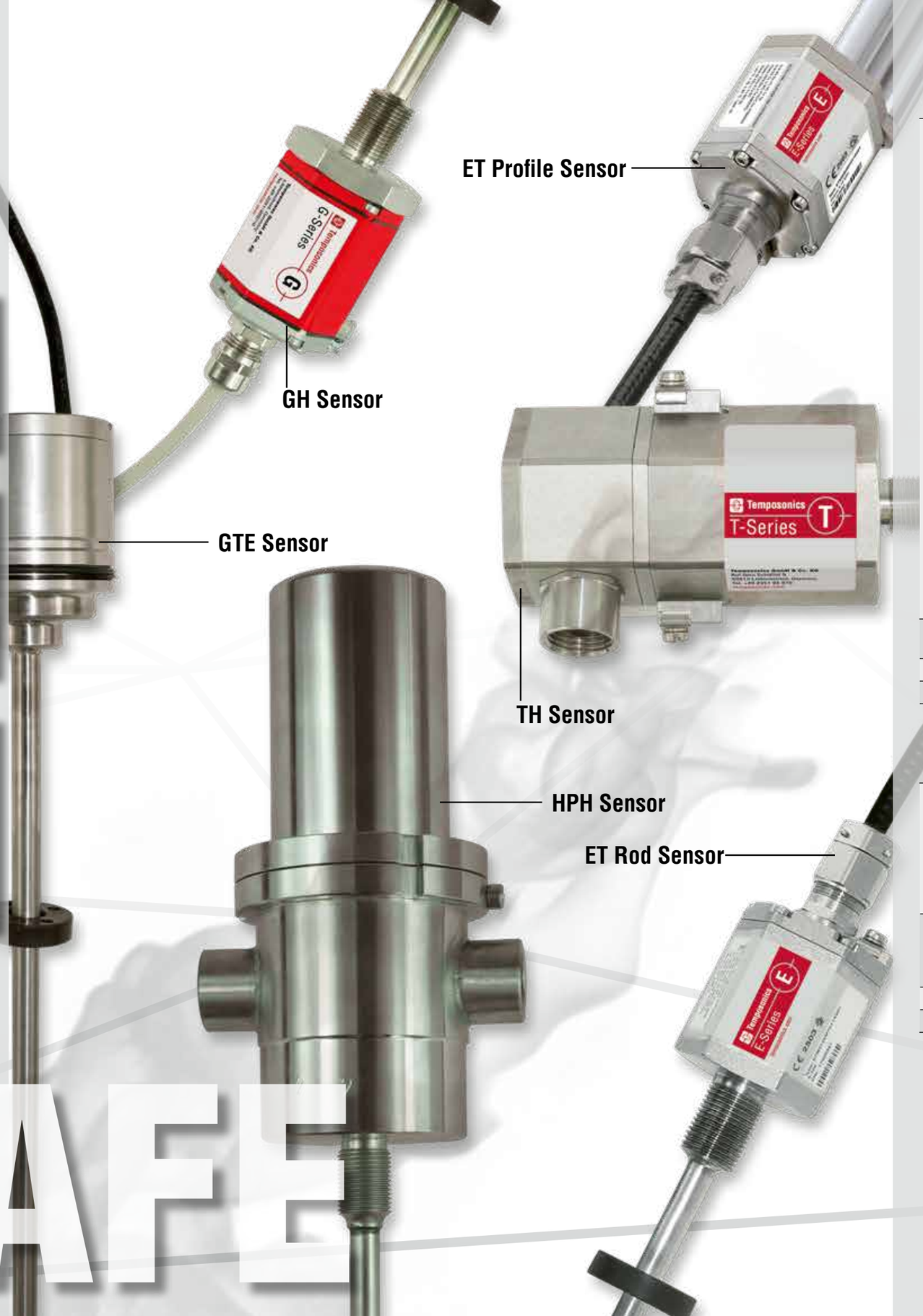
HAZARDOUS AREAS

Temposonics responds to the user's need of maximum safety with sensor models specifically designed for applications found in hazardous areas (type of protection: flameproof, increased safety, protection by enclosure, non-sparking electrical equipment and sealed device).

	G-Series GH/GP
Stroke length	50…1650 mm (2…65 in.)
Marking	Ⓔx II 3G Ex ec IIC T4 Gc Ⓔx II 3D Ex tc IIIC T101°C Dc
Operating temperature	–20 °C (–4 °F) ≤ Ta ≤ 75 °C (+167 °F)
Ingress protection	GH: IP67/GP: IP65
Outputs	Analog & Start/Stop

	G-Series GTE
Marking	Ⓔx II 3G Ex ec II T4 Gc Class I/II/III Div 2 T4 ABCDFG Class I Zone 2 AEx/Ex nA IIC T4 Gc Class II/III Zone 22 AEx/Ex tc IIC T130°C Dc Ex ec II T4 Gc
Operating temperature	–20…+75 °C (–4…+167 °F)
Ingress protection	IP64
Output	Analog

	HPH (G-/R-Series/R-Series V)
Marking	Ⓔx II 2G Ex db IIC T5 Gb Ⓔx II 2D Ex tb IIIC T100°C Db Class 1, Div 1, Groups A, B, C, D
Operating temperature	–40…+75 °C (–40…+167 °F)
Ingress protection	IP68
Outputs G-Series	Analog, Start/Stop & PWM
Outputs R-Series	PROFIBUS, CANbus & DeviceNet
Outputs R-Series V	Analog & SSI



	T-Series TH
Marking	**Enclosure type D/G:** ATEX, IECEx, UK Ex: Ⓔx II 1/2G Ex db IIC T4 Ga/Gb Ⓔx II 1G/2D Ex tb IIIC T130°C Ga/Db Ex db IIC T4 Ga/Gb Ex tb IIIC T130°C Da/Db Ex db IIC T4 Gb Ex tb IIIC T130°C Db Japanese approval: Ex d IIC T4 Ga/Gb Ex t IIIC T130°C Db ClassNK approved: 19A037 **Enclosure type G:** Class I Div. 1 Groups A, B, C, D T4 Class II/III Div. 1, Groups E, F, G T130°C Class I Zone 0/1 AEx d/Ex d IIC T4 Class II/III Zone 21 AEx tb/Ex tb IIIC T130°C Group A is not approved for Canada **Enclosure type E:** ATEX, IECEx, UK Ex: Ⓔx II 1/2G Ex db eb IIC T4 Ga/Gb Ⓔx II 1G/2D Ex tb IIIC T130°C Ga/Db Ex db eb IIC T4 Ga/Gb Ex tb IIIC T130°C Da/Db Ex db eb IIC T4 Gb Ex tb IIIC T130°C Db Japanese approval: Ex d e IIC T4 Ga/Gb Ex t IIIC T130°C Db
Operating temperature	–40 °C (–40 °F) ≤ Ta ≤ 75 °C (+167°F)
Ingress protection	IP66/IP67/IP68/IP69 and NEMA 4 (NEMA 4X)
Outputs	Analog, CANopen & SSI

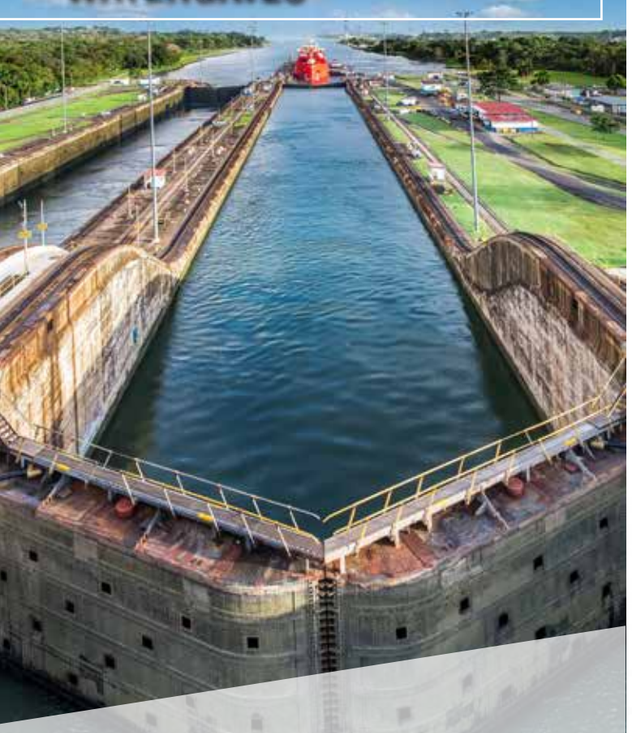
	E-Series ET
Marking	Ⓔx II 3G Ex nC IIC T4 Gc Ⓔx II 3D Ex tc IIIC T130 °C Dc Class I/II/III Div 2 T4 ABCDFG Class I Zone 2 T4 IIC Class II/III Zone 22 AEx tc/Ex tc IIIC T130 Dc Ex nC IIC T4 Gc Ex tc IIIC T130°C DC
Operating temperature	–40 °C (–40 °F) ≤ Ta ≤ +75 °C (+167 °F) (Analog) –40 °C (–40 °F) ≤ Ta ≤ 85 °C (+185 °F) (Analog) –40 °C (–40 °F) ≤ Ta ≤ 105 °C (+221 °F) (Start/Stop) –40 °C (–40 °F) ≤ Ta ≤ 194 °C (+381 °F) (SSI)
Ingress protection	IP66/IP68
Outputs	Analog, Start/Stop & SSI

Ⓔx SAFE

More information available at:
www.temposonics.com

MEET EVERY INDUSTRIAL APPLICATION CHALLENGE WITH US

WATERGATES



Position measurement when opening and closing the lock gates

OFFSHORE

Position measurement of clamping cylinders/feed/ level/stabilizers

FILLING

Level control

EXPLOSIVE ENVIRONMENT

Safe position measurement in harsh environments

GEOMONITORING

Exact position measurement of earth movements

Temposonics also offers solutions for Mobile Hydraulics (off-highway vehicles) and Liquid Level applications.

TRUST THE EXPERTS

...AND SAVE YOUR TIME, FOR THE THINGS YOU LOVE.

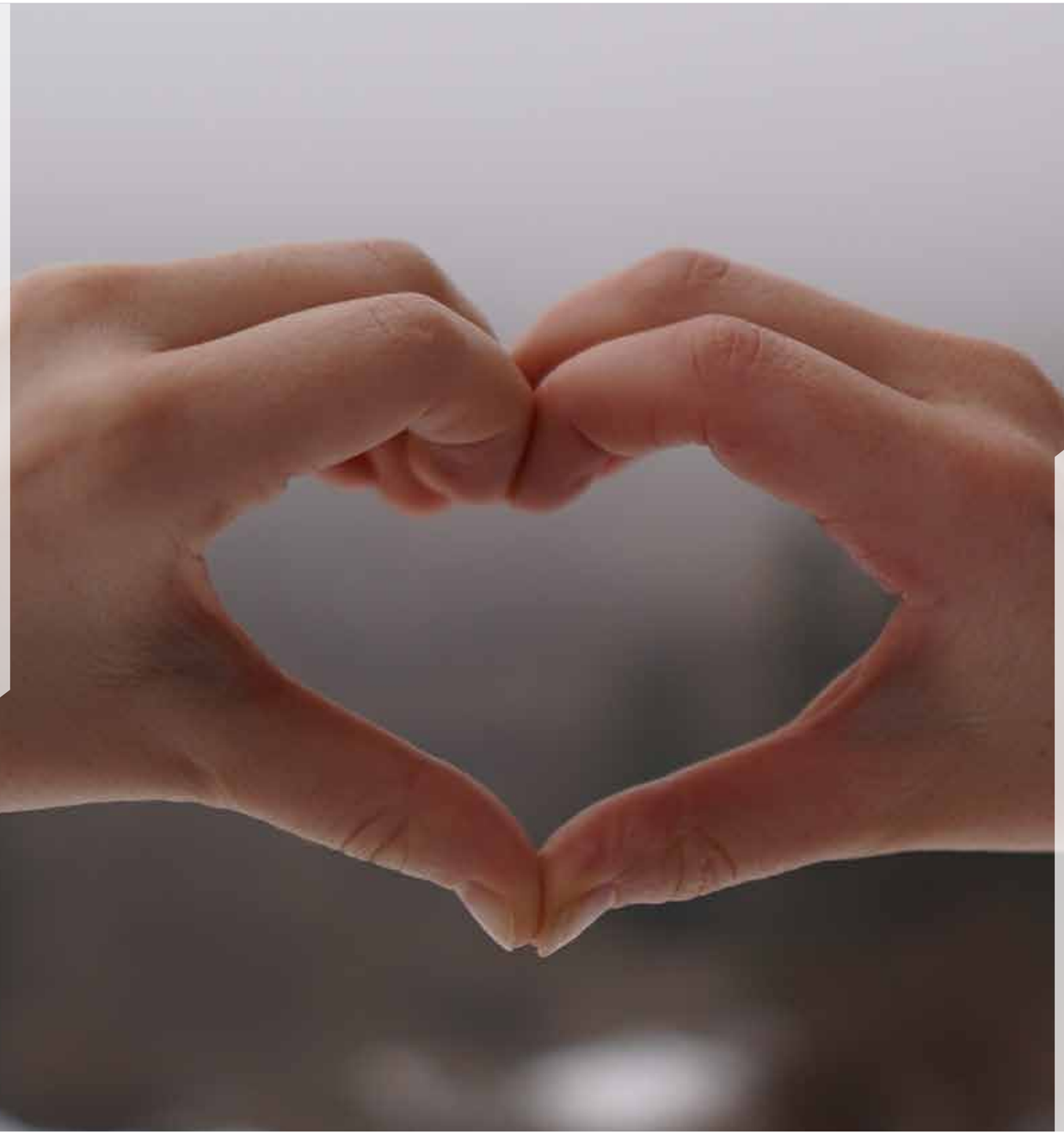
IN-HOUSE
R&D

OWN
PRODUCTION

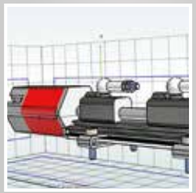
QUALITY
CONTROL

ON-TIME
DELIVERY

INNOVATION
WORKSHOP



APPLICATION
ENGINEERING



CAD
MODELS

DIRECT
SALES

CUSTOMER
SERVICE

START-UP &
ON-SITE SERVICE

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