



直线位移传感器
角度位移传感器

非接触式
无磨损/非接触式
电位器式

Position Transducers
and Rotary Sensors

non-contacting,
touchless,
potentiometric

我们的产品通过
ISO/TS 16949:2002认证

We are certified according to
ISO/TS 16949:2002.

登录www.novotechnik.de
可获取产品目录

Brochures are available at
www.novotechnik.de

数据如有更改，恕不另行通知。

Data are subject to change.

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Novotechnik -- 拥有60年历史的传感器专家
测量精确，应用广泛，值得信赖……

Novotechnik – 60 years on:
Precision you can trust ... anywhere on earth.



左图：公司销售、行政及研发总部，
位于德国西南部城市斯图加
特附近的Ostfildern-Ruit

Our sales, administration and development functions are based at our headquarters in Ostfildern-Ruit near Stuttgart, Southwest Germany

Novotechnik公司始创于1947年，60多年的专业技术追求诠释了无数的成功，使Novotechnik传感器成为工业控制领域和制造业直线和角度位移测量的首选！

成功来自对技术更精确、更可靠的不懈追求。我们乐于寻求解决方案，及时开发新材料，不断改善生产工艺；更重要的是，我们坚持客户至上的原则，努力为客户提供正确的建议和顶级服务以不断优化我们的产品。

Novotechnik真正的成功在于为每个客户提供最适用的个性化方案；使客户在有新的应用时首先想到的就是我们。为此，我们将一如既往，不辱使命。

Novotechnik作为行业技术的先驱者，所生产的直线和角度位移传感器获得了国际一流OEM厂商的广泛认同，广泛应用于通用制造业、液压、气动、控制测量技术、医疗技术以及汽车工业。仅汽车工业，每天就有超过3万只传感器被装入新车中。

Wherever positions and angles need measuring with the utmost precision, sensors from Novotechnik are the first-choice solution. The expertise in measuring technology that we have amassed in the course of 60 years is just one of the secrets behind a success story that began back in 1947:

The other cornerstones of our success include a passion for technology and an obsession with precision and reliability. Then there is our delight in devising solutions, coupled with a fascination with new materials and production methods. And of course there is our constant awareness of the importance of providing sound advice and top-class service, as we strive day-by-day to optimise our measuring systems.

But the true secret of our success has always been our pas-

sionate pursuit of the best possible solution for each individual customer application. And to ensure that we remain the first-choice partner for our customers, in future we will be staying focused on the strengths that made us the successful company that we are today.

Leading OEMs from a whole spectrum of industries put their trust in position transducers and rotary sensors made by Novotechnik: be it general engineering, hydraulics, pneumatics, measuring technology, medical technology or automotive engineering. And talking of the automobile industry, every day more than 30,000 of our sensor components are built into new cars.



Novotechnik产品类别包括：
直线位移传感器、角度位移传感器、
汽车传感器、信号调节器等测量设备

Picture: Products

Our product portfolio comprises position transducers, rotary sensors, automotive products, signal conditioners and measuring devices.

产品质量

Novotechnik公司是全球范围内最早获得ISO/TS 16949认证的企业之一。产品质量符合最高品质要求，Novotechnik的每个产品生产过程都自始至终处于规范化管理之下。并经过全面的检测以确保优异的工作性能。

全球销售网络

Novotechnik通过分公司或授权代理商组成的销售网络遍及全球。整个销售网络理念效率一致，确保客户无论在哪里，都能得到一流的服务。

合作伙伴

为了最大程度上保证产品质量，Novotechnik在斯图加特Ostfildern设立了研发、设计、生产和装配中心。还选择一些知名的、经验丰富的合作伙伴，共同创新。

Quality products

Just how high our quality requirements are is documented by the fact that we were one of the first companies in the world to have its operations certified to ISO/TS 16949. And at Novotechnik the process that begins with stringent and demanding specifications ends with a 100% inspection of every single product. That way, we can be sure that every product we manufacture works perfectly.

A worldwide network

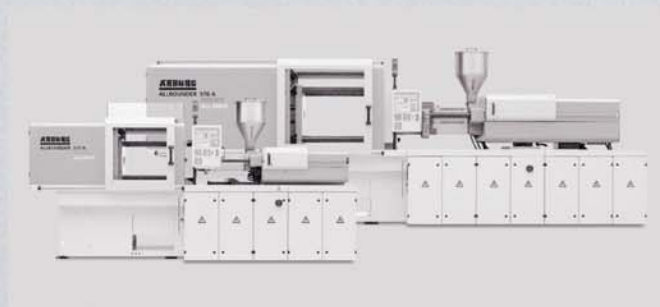
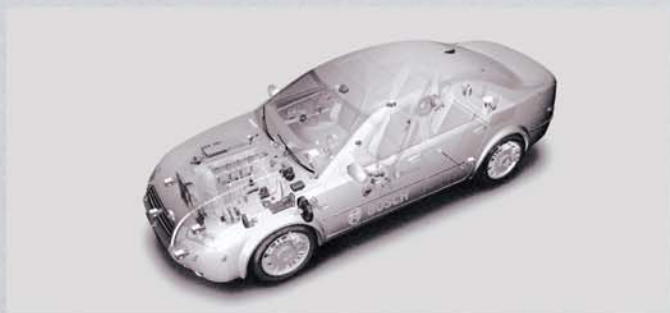
Today, Novotechnik is represented in all of the world's major markets – be it with our own offices or by approved dealers. Thanks to this tightly-knit network we can ensure that, wherever they happen to be, our customers can rely on first-class service and customer care.

Our partners

In order to guarantee maximum quality, we develop, design, manufacture and assemble the majority of our products ourselves at our sophisticated production facilities in Ostfildern near Stuttgart. Whenever we are unable to make the required product ourselves, we can rely on the support of a selection of proven and renowned partner companies. As a result, we are in a position to fill almost every order of any size from anywhere in the world.

陆上应用, ...

On land, ...



Novotechnik传感器应用广泛, 主要包括:

- 太阳能发电设备
- 风力发电机组
- 高速列车
- F1赛车
- 农用机械
- 工程建筑机械
- 注塑机
- 汽车制造
- 医疗设备等等

我们的传感器在开/闭环控制系统、自动化控制、过程控制、汽车/摩托车制造领域创造了无数成功应用。

There are countless applications for Novotechnik sensors. For example, our solutions ensure maximum efficiency of large solar and wind power plants. They enable innovative steering of Human Transporters and assume control tasks in the high-speed ICE 3 train.

Formula 1 teams put their trust in Novotechnik sensors in the chassis, gearboxes and engines, as do a large number of mobile machine manufacturers in the agricultural and construction machine industry. Our sensor solutions have traditionally proven themselves in open and closed-loop control systems, automation and monitoring of processes in mechanical engineering and specifically in the field of plastic injection moulding technology. Novotechnik products can also be found in engine management of motor vehicles and in medical technology.



Novotechnik 生产多种尺寸、各种不同系列的产品以满足客户的需求。直线位移传感器规格齐全，行程从5mm至5000mm，采用电位器式或非接触式的不同原理，配置多种信号输出方式，既可作为传感器成品，也可作为元件使用。

Novotechnik 角度传感器的机械尺寸规格齐全。产品外壳坚固、结构精巧、灵敏度极高。

Novotechnik 角度传感器广泛应用于汽车行业。提高了汽车的驾驶安全性能、节油以及环保等。



We offer our products in many of sizes and versions to best meet the requirements of our customers.

As a result, our position transducers are available in an extremely broad range of designs and in measuring lengths from 5 to 5,000 mm. Potentiometric or contactless models, with various signal outputs, as a complete sensor or as components.

Our rotary sensors are also available in a wide variety of mechanical configurations from extremely small diameters with very low torque to sealed units in heavy cast housings. Our sensors are used extensively within the automotive industry to keep vehicles safely on track at their limits and generate signal feedback for optimum gearbox control. They also provide intelligent engine power control for environmentally conscious operation.

... 海上应用, ...

... at sea, ...



Novotechnik传感器广泛应用于全球各种海洋和河流的船舶上。用于测量和控制渡船、游艇、以及集装箱船只的舵叶和螺旋桨推进器系统。用于高性能的赛艇稳定航行以及石油勘探采掘平台等。

Novotechnik传感器还应用于大型航海船只，帮助其进行自动导航以减少人工干预。

Novotechnik sensors are also at home on the seven seas and countless rivers. In the highly modern control systems of ferries, cruise liners and container ships they measure and control rudder blades and rudder propeller systems. They also ensure a consistently optimum position of the drive propellers of high-powered sports boats and perform valuable services on many oil drilling platforms worldwide. Novotechnik even provides sensors on large sailing ships, providing signal information for optimal alignment and lowering of the sails from the command bridge.





Novotechnik传感器常被应用于盐含量高、湿度大、温差极大和其他极端恶劣的海洋环境中，不但稳定性高，而且精确度有保证。60多年来，我们不断地顺应客户的特殊需要，同时在上和海底世界提供了无数的成功产品应用，从中验证了我们产品的耐用性和可靠性。

Salty sea air, high humidity and extreme temperature fluctuations place the most demanding requirements on the performance of sensors at sea. Here the linear position and rotary sensors from Novotechnik prove to be not only durable, but very precise as well. In the course of our 60 years of experience, we have adapted our solutions in the best possible way to the special operating conditions that prevail both above and under water. Our knowledge and experience are also reflected at sea in the long life and high reliability of our products.

...航天航空应用

... and in the air.



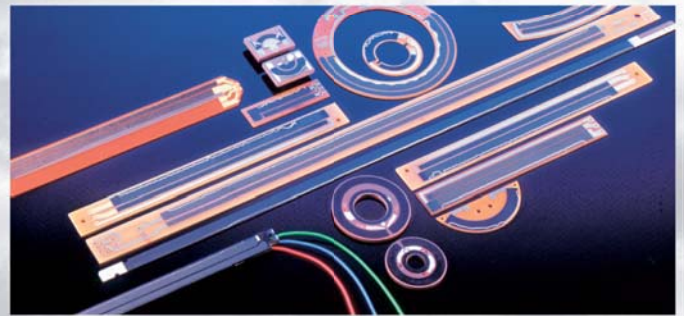
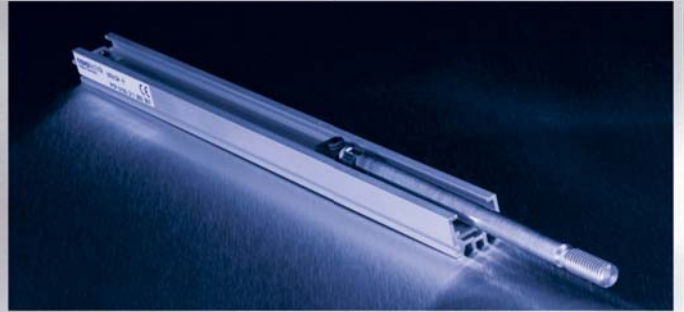
精确控制是航天航空领域的至高要求。得益于直线位移传感器和角度传感器极高的精度和稳定性，我们的产品在这一领域中得到广泛应用并做出突出贡献。

空中客车飞机、航天飞机、Cassini-Huygens任务组探测土星及其卫星等，他们的操纵杆上都安装了Novotechnik的传感器，来帮助这些飞行设备准确入轨并驰往目的地。

Precise control information is a vital requirement in the aerospace industry. Thanks to their high precision and reliability, our position and rotary sensors have also earned an outstanding reputation in this discipline.

Whether in the joystick of an Airbus, during down-to-the-millimeter ground transport of a space shuttle or onboard the Cassini-Huygens Mission for investigating Saturn and its moons - measuring sensors from Novotechnik make a major contribution to keeping aircraft, space shuttles and satellites on course and bringing them safely to their destinations.





巨大的压差和温差，包括超低温的航天航空环境，都是对传感器的最大挑战。Novotechnik传感器以其卓越的性能面对这些挑战。为保证飞行安全，仪表测量系统的专家、工程师们无不对Novotechnik传感器投以信赖的眼光。

Major air pressure fluctuations and large temperature differences including extreme cold are the greatest challenges for sensors in the aerospace sector. That's an environment in which our linear position and rotary sensors can provide impressive proof of all their strengths. In the field of flight safety, in which the reliability of measurement systems is vitally important for survival aircraft builders and aerospace engineers put their trust in measuring sensors from Novotechnik.



电子踏板传感器

电子踏板传感器包括踏板、角度传感器及机械装置等。使驾驶员踩踏板动作电子化。

当加速踏板被下压时，踏板传感器将此动作信号传递给电子控制单元，由此确定节气门体开度。



Electronic pedal Sensor

Electronic pedal sensor modules comprise an accelerator pedal, angle sensor and mechanics for simulating the traditional feeling of the accelerator pedal for the driver.

When the accelerator pedal is pressed down, the pedal sensor transmits the information to the control electronics. Based on this information, the position of the throttle valve is calculated.



电子节气门体E-Gas
怠速控制节气门体

通过电子控制和校核，将电子踏板传感器检测到的信号传递给电子节气门体，电子节气门体开度通过集成的或独立的角度传感器来测量。

怠速电子节气门装置用于怠速状态下优化控制燃油燃烧。



Throttling device E-Gas, Throttling device for idle speed control

The information detected from the pedal sensor are transmitted to the electric motor-driven throttle valve positioner via control and correction electronics. The current throttle valve position is measured by an integrated or adapted angle sensor.

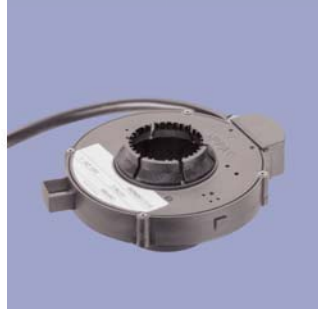
The idle controller regulates independent of the load the idling speed of the engine through the throttle position. This leads to an optimised fuel consumption.



转向角度传感器

转向角度传感器一般由非接触式角度测量组件或接触式测量组件组成。中空轴设计，一般安装在方向转动轴或转向齿轮上。

当今的自适应控制系统大大提高了汽车驾驶的安全性能。这些控制系统改进了汽车的传动动态特征。帮助驾驶员在各种正常和紧急驾驶状态下安全转向。



Steering-angle Sensor

The steering-angle sensor basically consists of a non-contact angle-measuring device or resistive tracks and wipers. The sensor, which is designed as a hollow shaft, is normally mounted on the steering column or at the steering gear.

Today adaptive control systems contribute significantly to increasing driving safety in motor vehicles. These types of control systems improve the transversal dynamic behavior and assist the driver in critical steering maneuvers, e.g. when veering quickly or passing.



齿轮档位位置传感器

齿轮档位位置传感器由非接触式或接触式传感器组件组成。内置集成处理器，用于测定齿轮箱中的变速排挡。

齿轮档位位置传感器是一个机电一体化系统。机械部件与电子设备集成一体，变速排挡与传动装置在机械上进行间接耦合。驾驶员通过侧向拨动变速排挡就能选择不同档位。



Gear selection Sensor

Amongst other things, the gear selection sensor consists of a resistance element and wiper support or a non-contacting Sensor. The gear selection sensor has an integrated processor and is used for detecting the position of the gearshift.

Since it is a mechatronic system, this sensor comprises mechanical components as an integrated unit (electronically controlled automatic transmission). The gearshift is decoupled mechanically from the transmission.

When necessary, the driver can select gears in different gear positions by tapping the gearshift sideways.

直线位移传感器 非接触式

Position Transducers non-contacting



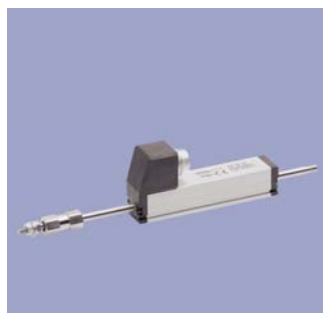
系列 Series	TLM	TMI	TIM
工作量程 Stroke length	0...50 mm, 0...4 500 mm	0...50 mm, 0...4 500 mm	0...50 mm, 0...2 500 mm
外壳尺寸 Housing size	38 mm	Ø 10 mm (杆) (rod)	Ø 10 mm (杆) (rod)
线性度 Linearity	±50 µm...±30 µm (绝对线性) (absolute)	±50 µm...±30 µm (绝对线性) (absolute)	± ≤ 0,04 % (独立线性) (independent)
工作电压 Supply voltage	24 VDC ±20 %	24 VDC ±20 %	10 ... 32 VDC / 18...30 VDC
输出信号 Output signal	Start/Stop, SSI, DyMoS, CANopen, 0...10 V, 0...20 mA, Quadrature	Start/Stop, SSI, DyMoS, CANopen, 0...10 V, 0...20 mA, Quadrature	0,5...4,5 V, 0,25...4,75 V, 0...5 V, 0...10 V, 4...20 mA
可重复性 Repeatability	≤ 2 µm	≤ 2 µm	± ≤ 0,01% FS
温度系数 Temperature coefficient	≤ 20 ppm/K	≤ 20 ppm/K	≤ 50 ppm/K
工作温度 Operating temperature	-40...+105 °C	-40...+105 °C	-40...+105 °C
功耗 Current drain	通常 ≤ 100 mA	通常 ≤ 100 mA	通常 ≤ 60 mA
刷新速率 Update rate	≤ 16 kHz	≤ 16 kHz	> 500 Hz
抗冲击指标/ shock 防振指标 / vibration	100 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)	100 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)	100 g (11 ms) 25 g (5...2000 Hz, A _{max} =0,75 mm)
防护等级 Protection class	IP 67, IP 68 带直出电缆 IP 67, IP 68 with cable connection	IP 67, IP 68 带直出电缆 IP 67, IP 68 with cable connection	IP 67
备注 Remarks	<p>高速动态磁致伸缩NOVOSTRICKIVE®测量技术，非接触式浮动磁块移动测量，保证数据传输刷新率达16 kHz。</p> <p>Highly dynamic NOVOSTRICKIVE® measuring system. Non-contact operation with floating position markers. Secure data transfer with 16 kHz update rate.</p>	<p>高速动态磁致伸缩NOVOSTRICKIVE®测量技术，可安装在带有压力的液压缸和气压缸内，保证数据传输刷新率达16 kHz。</p> <p>Highly dynamic NOVOSTRICKIVE® measuring system. Embeddable in pneumatic / hydraulic cylinders. Secure data transfer with 16 kHz update rate.</p>	<p>无机械磨损的磁致伸缩测量技术，可安装在液压和气压活塞缸体内，非接触环型磁块拾位器。</p> <p>Touchless magnetostrictive measuring process. Embeddable directly in the pressurized zone of cylinders. Non-contact guiding with ring-shaped position marker.</p>



FTI	F200
0...10 mm	0...5 mm, 0...20 mm
25 mm	Ø 20 mm
±0,4...±0,1 % (绝对线性) (absolute)	±0,3...±0,1 % (独立线性) (independent)
24 ±6 VDC	24 ±4,8 VDC
0(4)-20 mA	±10 VDC
< 1 µm	< 1 µm
< 80 ppm/K	typ. 25 ppm/K
-25...+70 °C	-25...+70 °C
通常 ≤ 50 mA	通常 ≤ 50 mA
50 g (11 ms)	10 g
IP 50, IP 67	IP 65
<p>LVDT传感器带集成信号处理电路，设计结构紧凑，功能可靠。带真空泵连接拉杆外壳。</p> <p>同类替换无需校准。</p> <p>LVDT sensors with integrated signal conditioning. Compact, robust design with encapsulated housing.</p> <p>Exchangeable without new calibration.</p>	<p>LVDT传感器带集成信号处理电路，设计结构紧凑，功能可靠。带真空泵连接拉杆外壳。</p> <p>LVDT sensors with integrated signal conditioning. Compact, robust design with encapsulated housing.</p>

直线位移传感器 电位器式

Position Transducers potentiometric



系列 Series	T / TS	TR / TRS	TEX 带球眼接头
工作量程 Stroke length	0...25 mm, 0...150 mm	0...10 mm, 0...100 mm	0...10 mm, 0...300 mm
外壳尺寸 Housing size	18 mm	18 mm	Ø 18 mm
独立线性度 Independent linearity	±0,2...±0,075 %	±0,25...±0,075 %	±0,25...±0,05 %
输出信号 Output signal	分压器 Voltage divider	分压器 Voltage divider	分压器 Voltage divider
可重复性 Repeatability	0,002 mm	0,002 mm	0,01 mm
温度系数 Temperature coefficient voltage divider	通常 5 ppm/K	通常 5 ppm/K	通常 5 ppm/K
工作温度 Operating temperature	-30...+100 °C	-30...+100 °C	-40...+100 °C
最大工作速度 Max. operating speed	10 m/s	2 m/s	10 m/s (IP40, IP54), 5 m/s (IP67)
抗冲击指标/shock 抗振指标/vibration	50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)	50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)	50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)
防护等级 Protection class	IP 40	IP 40	最高 IP 67
寿命 (运动次数) Life (movements) typ.	100 x 10 ⁶	100 x 10 ⁶	最多 100 x 10 ⁶
备注 Remarks	外形尺寸设计精巧，应用于精确测量和控制领域。 Small sized position transducers for precise measuring and control applications.	内置复位弹簧，行程高达100mm。应用于精确测量和控制领域。 Spring-loaded position transducers up to 100 mm stroke length for precise measuring and control applications.	极高防护等级，外形尺寸精巧，性价比高。 Highest protection, combined with smallest dimensions identify this cost effective linear transducers.



TEX 带传动杆	TEX 带复位弹簧	PTP
0...10 mm, 0...300 mm	0...10 mm, 0...200 mm	0...10 mm, 0...300 mm
Ø 18 mm	Ø 18 mm	13 mm
±0,25...±0,05 %	±0,25...±0,05 %	±0,25...±0,05 %
分压器 Voltage divider	分压器 Voltage divider	分压器 Voltage divider
0,01 mm	0,01 mm	0,01 mm
通常 5 ppm/K	通常 5 ppm/K	通常 5 ppm/K
-40...+100 °C	-40...+100 °C	-40...+100 °C
10 m/s (IP40, IP54, 5 m/s (IP67)	5 m/s	10 m/s
50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)	50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)	50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)
最高 IP 67	最高 IP 67	开放式 open System
最多 100 x 10 ⁶	50 x 10 ⁶	50 x 10 ⁶
极高防护等级，外形尺寸精巧，性价比高。 Highest protection, combined with smallest dimensions identify this cost effective linear transducers.	极高防护等级，外形尺寸精巧，性价比高。 Highest protection, combined with smallest dimensions identify this cost effective linear transducers.	开放式系统为客户提供定制产品。 Open guided system providing a base for customized solution.

直线位移传感器 电位器式

Position Transducers potentiometric



系列 Series	LWG	LWX-001	LWX-002
工作量程 Stroke length	0...50 mm, 0...750 mm	0...50 mm, 0...750 mm	0...50 mm, 0...750 mm
外壳尺寸 Housing size	Ø 35 mm	Ø 35 mm	Ø 35 mm
独立线性度 Independent linearity	±0,2...±0,04 %	±0,2...±0,04 %	±0,2...±0,04 %
输出信号 Output signal	分压器 Voltage divider	分压器 Voltage divider	分压器 Voltage divider
可重复性 Repeatability	0,01 mm	0,01 mm	0,01 mm
温度系数 Temperature coefficient voltage divider	通常 5 ppm/K	通常 5 ppm/K	通常 5 ppm/K
工作温度 Operating temperature	-30...+100 °C	-30...+100 °C	-30...+100 °C
最大工作速度 Max. operating speed	5 m/s	5 m/s	5 m/s
抗冲击指标/shock 抗振指标/vibration	50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)	50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)	50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)
防护等级 Protection class	IP 65	IP 67	IP 67
寿命（运动次数） Life (movements) typ.	50 x 10 ⁶	50 x 10 ⁶	50 x 10 ⁶
备注 Remarks	带有万向球铰的高防护等级直线位移传感器。 插拔式接头的防护等级为IP 67。 Gimballed position transducers with high protection class. Plug connector with protection class IP 67.	专为极端恶劣的工作环境设计。金属结构，压力平衡专利技术，能抵抗潮湿的侵袭。 Designed for extreme operating environments. All-metal construction and patented pressure equalization technology prevent reliably against humidity of the measuring system.	专为极端恶劣的工作环境设计。金属结构，压力平衡专利技术，能抵抗潮湿的侵袭。 Designed for extreme operating environments. All-metal construction and patented pressure equalization technology prevent reliably against humidity of the measuring system.



LWH	TLH	阻抗元件
0...75 mm, 0...900 mm	0...100 mm, 0...3000 mm	带有滑刷的电位器套件。 可根据客户的要求定制特殊规格。
31,8 mm	38 mm	
±0,1...±0,04 %	±0,1...±0,02 %	Resistance elements including wiper as integrated potentiometers. Special versions are available according to customer's specification.
分压器 Voltage divider	分压器 Voltage divider	
0,01 mm	0,01 mm	
通常5 ppm/K	通常5 ppm/K	
-30...+100 °C	-30...+100 °C	
10 m/s	10 m/s	
50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)	50 g (11 ms) 20 g (5...2000 Hz, A _{max} =0,75 mm)	
IP 55	IP 40 (IP 54)	
100 x 10 ⁶	100 x 10 ⁶	
拉杆型直线位移传感器， 应用于各种精确测量和控制领域。 All-purpose position transducers with actuating rod for precise measuring and control applications.	滑块型高动态性能直线位移传 感器。 Position transducers with side actuator for highest dynamic.	

角度传感器 非接触式

Rotary Sensors non-contacting



系列 Series	RSC2800 - 600	RSC2800 - 700
工作量程 Electrical angle	0...30°, 0...360° (每10°递增) (in 10° steps)	0...30°, 0...360° (每10°递增) (in 10° steps)
外壳尺寸 Housing size	Ø 28 mm	Ø 28 mm
独立线性 Independent linearity	±0,5 %	±0,5 %
工作电压 Supply voltage	24 ±6 VDC, 5 ±0,5 VDC	24 ±6 VDC, 5 ±0,5 VDC
输出信号 Output signal	0-10 VDC, 5 - 95 % Ub 4-20 mA	Ch 1: 5 - 95 % Ub; Ch 2: 95 - 5 % Ub
可重复性 Repeatability	0,1 %	0,1 %
温度系数 Temperature coefficient	通常 50 ppm/K	通常 50 ppm/K
工作温度 Operating temperature	-40...+85 °C, -40...+125 °C	-40...+85 °C, -40...+125 °C
功耗 Current consumption	通常 15 mA	通常 30 mA
工作速度 Operating speed	120 min ⁻¹	120 min ⁻¹
防护等级 Protection class	IP 54 / IP 65	IP 54 / IP 65
备注 Remarks	非接触式磁感应测量技术，专门应用于苛刻的工作环境，与SP2800机械安装尺寸兼容。 Contactless magnetic sensors for use in harsh environments. Mounting compatible to SP2800.	RSC2800-600的冗余输出型。 Redundant (two-channel) version of RSC2800-600.



系列 Series	RFC4000	RFC4800 - 600	RFC4800 - 700
工作量程 Electrical angle	0...360°	0...30°, 0...360° (每 10° 递增) (in 10° steps)	0...30°, 0...360° (每 10° 递增) (in 10° steps)
外壳尺寸 Housing size	30 x 30 x 7 mm ³	Ø 48 x 13,4 mm	Ø 48 x 13,4 mm
独立线性度 Independent linearity	±0,5%	±0,5 %	±0,5 %
工作电压 Supply voltage	5 ±0,5 VDC	5 ±0,5 VDC, 24 ±6 V, 9...34 VDC	5 ±0,5 VDC, 24 ±6 V, 9...34 VDC
输出信号 Output signal	5...95 % Ub	5...95 % Ub, 0,5...4,5 VDC, 4...20 mA, 0,1...10 V	5...95 % Ub, 0,5...4,5 VDC, 4...20 mA, 0,1...10 V
可重复性 Repeatability	0,1 %	0,1 %	0,1 %
温度系数 Temperature coefficient	通常 100...50 ppm/K	通常 100...50 ppm/K	通常 100...50 ppm/K
工作温度 Operating temperature	-40...+125 °C	-40...+125 °C	-40...+125 °C
功耗 Current consumption	通常 15 mA	通常 15 mA	通常 15 mA
刷新速率 Update rate	通常 5 000 次 /s typ. 5 000 measurements /s	通常 5 000 次 /s typ. 5 000 measurements /s	通常 5 000 次 /s typ. 5 000 measurements /s
防护等级 Protection class	IP 67	IP 67	IP 67
备注 Remarks	体积小巧的非接触式角度传感器， 适合客户集成应用。 需配置磁块，请参见辅件。 Touchless magnetic angle sensors in miniature size for integration in customer applications. (Necessary position marker and magnets see accessories).	成本低、设计紧凑的角度传感器。 一体化接头。 需配置磁块，请参见辅件。 Robust, fully moulded, touchless angle sensors. Many electrical types avai- lable. Highly accurate and very attracti- ve price. (Necessary position marker and magnets see accessories).	RFC4800-600的冗余输出型。 需配置磁块，请参见辅件。 Redundant (two channel) version of RFC4800-600. (Necessary position marker and magnets see accessori- es).

角度传感器 电位器式

Rotary Sensors potentiometric



系列 Series	P2200	P2500	P4500 / P6500
工作量程 Electrical angle	0...345°	0...345°	0...350° / 0...355°
外壳尺寸 Housing size	Ø 27 mm (伺服尺寸 11) (Servo size 11)	Ø 27 mm (伺服尺寸 11) (Servo size 11)	Ø 36,5 mm / 50,8 mm (伺服尺寸 / Servo size 13 / 20)
独立线性度 Independent linearity	±0,1 %	±0,2 %	±0,075 % / ±0,05 %
输出信号 Output signal	分压器 Voltage divider	分压器 Voltage divider	分压器 Voltage divider
可重复性 Repeatability	0,004°	0,01°	0,007°
温度系数 Temperature coefficient voltage divider	通常 5 ppm/K	通常 5 ppm/K	通常 5 ppm/K
工作温度 Operating temperature	-40...+100 °C	-40...+100 °C	-40...+100 °C
工作速度 Operating speed	600 转/分	10 000 转/分	10 000 转/分
防护等级 Protection class	IP 50	IP 40	IP 40
正常寿命 (运动次数) Life (movements) typ.	100 x 10 ⁶	100 x 10 ⁶	100 x 10 ⁶
备注 Remarks	高精度、低扭矩的电位器式角度传感器。 High precision low-torque potentiometers.	高精度电位器式角度传感器。应用于测量和控制领域以及仪表配套等。 High precision potentiometric rotary sensors for measuring, control and instrumentation applications.	高精度电位器式角度传感器。应用于测量和控制领域以及仪表配套等。 High precision potentiometric rotary sensors for measuring, control and instrumentation applications.



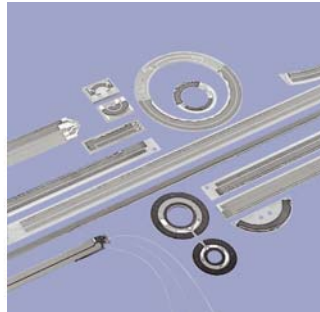
SP2500	SP2800	SP3200	SP5000
0...120°, 0...335°	0...100°, 0...308°, 0...345° 0...100° 冗余型 / Redundant	0...90°	0...120°
Ø 27 mm	Ø 28 mm	30 x 30,5 x 18,1 mm 32 mm 孔距 / hole distance	30,8 x 38 x 17,4 mm 50 mm 孔距 / hole distance
±0,6...±0,3 %	±1...±0,3 %	±2 %	±2 %
分压器 Voltage divider	分压器 Voltage divider	分压器 Voltage divider	分压器 Voltage divider
0,01°	0,03...0,01°	1,0°	1,0°
通常 5 ppm/K	通常 5 ppm/K	通常 15 ppm/K	通常 15 ppm/K
-40...+85 °C	-40...+100 °C (-40...+150 °C)	-40...+125 °C	-40...+125 °C
10 000 转/分	120 转/分	100 转/分	100 min ⁻¹
IP 40	IP 54, IP 65	IP 69 (正确安装O型圈的基础上) IP 69 if mounted correctly	IP 69 (正确安装O型圈的基础上) IP 69 if mounted correctly
50 x 10 ⁶	50 x 10 ⁶	5 x 10 ⁶	5 x 10 ⁶
体积小、性价比高，电位器式角度传感器，带三个托架法兰，安装简易，测量精确。 Compact and well-priced sensor potentiometers. Robust and precise ball bearing - easy mounting and adjustment via 3 mounting plates.	电位器式角度传感器，体积小、带稳定的托架法兰，安装简易。 Compact and very robust sensor potentiometers. Easy mounting and adjustment via stable mounting plates.	电位器式角度传感器，体积小、成本低，一体化接头。 Low cost potentiometric, compact rotary sensors with integrated connector.	电位器式角度传感器成本低，一体化接头。 Low cost potentiometric rotary sensors with integrated connector.

角度传感器 电位器式

Rotary Sensors potentiometric



系列 Series	IP / IPE	GP / IGP	AW / AWS
工作量程 Electrical angle	0...90°, 0...355° / 0...90°, 0...345°	3, 5, 10 (转) (turns)	0...360°
外壳尺寸 Housing size	Ø 55 mm	Ø 55 (GP) / Ø 111 mm (IGP)	Ø 55 (AW) / Ø 82 mm (AWS)
独立线性度 Independent linearity	±0,3...±0,075 % / ±0,3...±0,1 %	±0,1 %	±0,07...±0,035 % / ±0,07 %
输出信号 Output signal	分压器 / 0(4)...20 mA Voltage divider / 0(4)...20 mA	分压器 Voltage divider	0...10 VDC
可重复性 Repeatability	0,007°	通常 0,002 %	0,007°
温度系数 分压器 Temperature coefficient voltage divider	通常 5 ppm/K / 通常 15 ppm/K	通常 5 ppm/K	100 ppm/K
工作温度 Operating temperature	-40...+100 °C / -25...+70 °C	-40...+100 °C	0...+70 °C
工作速度 Operating speed	2 000 转/分	3 000 转/分	2 000 转/分
防护等级 Protection class	IP 65	IP40 / IP 67	IP 65 / IP 67
正常寿命 (运动次数) Life (movements) typ.	100 x 10 ⁶	100 x 10 ⁶	50 x 10 ⁶
备注 Remarks	工业级电位器式角度传感器，适合各种恶劣工况应用。可选电流输出方式。 Industrial grade potentiometers, also with current output.	齿轮型，工业级电位器式角度传感器，适合各种恶劣工况应用。 Industrial grade potentiometers as geared version.	360°电位器式角度传感器，可用于高负载应用。 Rotary potentiometric sensors for measurement across full 360°, also applicable under highest loads.



IPX7900

0...120°, 0...200°, 0...350°
有冗余输出型 / also redundant

Ø 79 x 35 mm

0,1... 0,2 %

分压器
Voltage divider

0,01°

通常 5 ppm/K

-40...+120 °C

2 000 转/分

IP 67, IP 69

100 x 10⁶

电位器式角度传感器，高负载应用。
结实耐用，多重防护，防腐蚀。

Rotary potentiometers, also applicable
under highest loads. Extremely robust,
proof and corrosion protected.

阻抗元件

带有滑刷的电位器套件。可根据客户要求定制特殊规格。

Resistance elements

including wiper as integrated potentiometers. Special versions are available according to customer's specification.

Signal Processing



系列 Series	MUW	MUP 100 / 150	MUP 400
外壳尺寸 Housing size	34,2 x 72 x 39 mm	77 x 63 x 25 mm	90.5 x 79 x 25 mm
独立线性度 Independent linearity	通常 0,01 %	通常 0,01 %	通常 0,01 %
工作电压 Supply Voltage	18 ... 30 VDC	18 ... 30 VDC	10 ... 30 VDC (电隔离) (Electrically isolated)
输出信号 Output signal	0...10 V, ±10 V, 0/4...20 mA	MUP 100: 0/4...20 mA, 0...10 V MUP 150: 0...10V, 0/4...20 mA, ±10 V, 20 mA	0...10V, 4...20 mA (最大500 Ω)
温度系数 Temperature coefficient	通常 30 ppm/K	通常 20 ppm/K	25 ppm/K
工作温度 Operating temperature	-25 ... 70 °C	-25 ... 70 °C	0 ... 60 °C
零位和量程范围调节 Scope and offset adjustable	MUW 200: - MUW 250: •	MUP 100: • MUP 150: •	• 手动 / by teach-in 非交互式 / non-iterative
防护等级 Protection class	IP 65	IP 50 / IP 00 (终端夹) IP 50 / IP 00 (Terminal clamps)	IP 20
最大功耗 Max. current consumption	35 mA	70 mA	12 mA (无负载/without load)
备注 Remarks	<p>专为TLH系列和LWH系列位移传感器配置的信号调节装置，采用与传感器相匹配的插座连接方式，无干扰信号传输。</p> <p>Interface module for position transducers series TLH and LWH. Sensor proximity in the plug connection. Interference-free signal transmission.</p>	<p>传感器信号接口模块，标准导轨固定安装。MUP150系列带电隔离保护功能可选。</p> <p>Interface module for position sensors for top hat rail mounting. Available with electrical isolation (MUP 150) as option.</p>	<p>微机控制的位移传感器信号接口模块，标准导轨固定安装。有2个按钮可进行非交互式手动调节。可选带/不带电隔离保护功能。</p> <p>Computer controlled interface module for position sensors for top hat rail mounting. Adjustment using non-iterative teach-in procedure via 2 buttons. Available with or without electrical isolation.</p>



MUK

64 x 58 x 35 mm

通常 0,01 %

18 ... 30 VDC

0/4...20 mA, 0...10 V, ± 10 V

通常 30 ppm/K

-25 ... 70 °C

•

IP 66

35 mA

为电位器式位移传感器配置的信号接口模块，压铸铝合金外壳。

Interface module for potentiometric position sensors in an aluminium diecast housing.



系列 Series	MAP 300 / 400	MAP 4000	MAX 100
外壳尺寸/屏显高度 Housing size / Display height	96x135x48mm, 14 mm	96x120x48mm, 14 mm	多功能测量及显示仪器，适合所有数字直线位移传感器。 兼容的接口有： SSI 24, SSI 25, SSI 48 (DyMoS) 以及 Start/Stop
显示范围 Display projection	-9 999...+40 000	-99 999... 999 999	功 能： • 二进制代码和格雷码 • 单键操作 • RS232-接口 • 显示语言可选（德语/英语）
精度 Accuracy	0,01 % FS	0,1 % FS + 1 Digit	Multifunctional measuring and display device for all kinds of digital linear transducers. Supported interfaces are SSI 24, SSI 25, SSI 48 (DyMoS) and Start/Stop
最大刷新速率 Update rate max.	32 /s	40 /s	Features: • Binary and Gray Coding • One button operation • RS232 interface • Display languages (german / english)
输入方式 Inputs	电位计/电流/电压 Potentiom./Current/Voltage	电位计/电流/电压/电阻器 Potentiom./Current/Voltage/Resistance	
温度系数 Temperature coefficient	20 / 50 ppm/K	100 ppm/K	
工作温度范围 Temperature range	0...50 °C	0...60 °C	
对比输出 Comparator outputs	0 / 2 / 4	0 / 2 / 4	
工作电压 Supply voltage	24 VDC, 110 / 220 VAC	10...30 V AC/DC 80...250 V AC/DC	
模拟量输出 Analogue output	•	•	
接口 Interface	RS232	RS232 / RS485	
防护等级 Protection class	IP 40 / IP 00 (夹子) IP 40 / IP 00 (clamps)	IP 65 / IP 00 (夹子) IP 65 / IP 00 (clamps)	
备注 Remarks	过程控制显示器，带数字显示。 该显示器能读取所有电位器原理传感器，还能读取带标准输出信号的传感器。 Process-controlled indicator with digital display. Adaption of potentiometric transducers or active sensors with standardized output signals.	高性价比、多功能的过程控制显示器，多种输入方式，内置数据存储功能。 Cost efficient process-controlled multifunction instrument for various input dimensions. Useable also as a data logging instrument due to internal data recording ability.	



• **球铰 Z301**
球铰可避免侧向力，与LWH系列的直线位移传感器配套使用，传动杆与内螺纹M6x12接头连接。

• **滚珠接头 Z 50**
滚珠接头与TR/TRS系列传感器和FTI系列电感式精密传感器配套使用。坚固的不锈钢材质。接头外螺纹M2.5，与滚花头螺杆连接。

• **球窝联轴器 Z 60**
球窝联轴器与LWH系列的直线位移传感器配套使用，最大允许侧偏13°，孔径6^{H7}。M6x12内螺纹接头。

• **Ball coupling Z301**
Ball coupling that avoids side loads. For use with transducers series LWH. Connection with internal thread M6x12 at actuating rod.

• **Roller head Z 50**
Roller head to be used with transducers series TR/TRS and inductive precision sensor FTI. Hardened steel roll. Connection with external thread M2.5, lock with a knurled screw.

• **Ball and socket coupling Z 60**
Ball and socket coupling to be used with transducers series LWH. Tilt angle max. 13°. Bore diameter 6^{H7}. Connection with internal thread M6x12.



• **联轴器 Z103 G 2.5/Z 103 G 3**
夹型耦合，可连接轴直径2.5mm-3mm，不锈钢材质。带固定销。

• **联轴器 Z 104 G 6**
夹型耦合，可连接轴直径6mm，不锈钢材质。带固定销。

• **联轴器 Z 105 G 6**
夹式耦合，直径6mm，黑色阳极氧化铝材质。带固定销。

• **联轴器 Z 110 G 10**
耦合槽可连接轴直径为10mm，黑色阳极氧化铝材料。带固定销及磷铜缓冲弹簧。

• **Shaft coupling Z 103 G 2.5 Z 103 G 3**
Fork coupling with low backlash for shaft diameters 2.5 mm or 3 mm. Stainless steel, ground driving pin.

• **Fork coupling Z 104 G 6**
Fork coupling with low backlash for shaft diameter 6 mm. Stainless steel, ground driving pin.

• **Fork coupling Z 105 G 6**
Backlash-free fork coupling for shaft diameter 6 mm. Black anodized aluminium, driving pin and spring hardened.

• **Coupling Z 110 G 10**
Backlash-free coupling for shaft diameter 10 mm. Black anodized aluminium, driving pin and spring in phosphor bronze.



• **定制凹形转换接头，非塑包电缆插头**
径向和轴向的防护等级高达IP 67。

• 其他接头

• **Female connectors for customized conversion and with on-moulded cable**
Coupling sockets radial and axial protection class up to IP 67

• connector



• **磁块拾位器**
浮动式磁块、导轨式磁块、环形磁块，与TLM系列、TMI系列和TIM系列非接触式直线位移传感器配套使用。

还有专与RFC系列的非接触式角度传感器配套使用的磁块拾位器和磁铁。

• **Position markers**
Floating and guided Position marker as well as ring position marker and float position marker for non-contacting linear transducers series TLM, TMI and TIM.

Position markers and magnets for non-contacting rotary sensors series RFC.

技术原理

- 电位器式传感器技术
- 霍尔原理
- 非接触式磁致伸缩传感器技术

Technical Information

- Potentiometer
- Hall
- Magnetostriction

1. Potentiometer (电位器式传感器技术特点)

电位器式传感器的技术核心在于导电基板涂层材料和滑刷材料构成一个系统，包括筛网喷涂电阻材料墨水 and 与之接触的金属滑刷。

该原理传感器的主要特点：结构简单，内部没有复杂电子电路，使用容易，价格低廉。分辨率最高到16位，仅受限于某些用户的电子制造工艺水平。

Novotechnik电位器式传感器以机械结构精美、坚固，测量数据准确而闻名于世。在技术上的突出特点是耐磨损，达亿万次的工作往返动作，工作温度范围在-40°C到+125°C。

Novotechnik能提供满客户应用要求的，面向客户定制的传感器基板和滑刷材料。两种刚柔结合的传感器材料在最大限度满足可靠性的前提下极大方便客户进行应用设计。

产品品质保证文件敬请在本公司主页下载。

2. Hall (霍尔原理传感器技术特点)

如果磁场同时垂直作用在霍尔元件和电流上，当电流通过霍尔元件时，就会产生一个垂直于电流方向的电压。该电压和磁场强度成比例关系，所以通过在旋转轴上安装磁块就可以非常简单地获得角度变化值，实现非接触测量。

在过去几年中，该技术进步很快，高度集成化的传感器材料和数据处理系统等制造的非常小巧，是传感器的安装空间非常小，角度的测量应用渐趋完美。

传感器工作可靠性不因为时间长短或磁场的强弱变化而发生改变。两种非接触式的传感器，带轴和无轴的使得角度测量达到完全360°，甚至更多，实现多圈测量；高分辨率、优异的动态特性，安装简单，快速专业客户定制使该技术应用前景广阔。

1. Potentiometer

The heart of a potentiometric sensor is the layer/wiper system, which consists of a screen-printed resistor and a moving wiper.

A major advantage of this system lies in its simple design without complicated electronics, which makes the sensor system extremely inexpensive and easy to use. The resolution is only limited by the customer's electronics, up to 16 bits can be achieved.

In addition to their mechanically precise, rugged design, Novotechnik potentiometers are especially characterised by their continually low contact resistances over many million cycles within a broad temperature range of -40°C to +125°C. Due to the selective, customer-specific design of the layer/wiper system, the sensor system can be exactly tailored to the requirements in the application. The usability of both flexible and rigid substrates increases design freedom without surrendering reliability in the process.

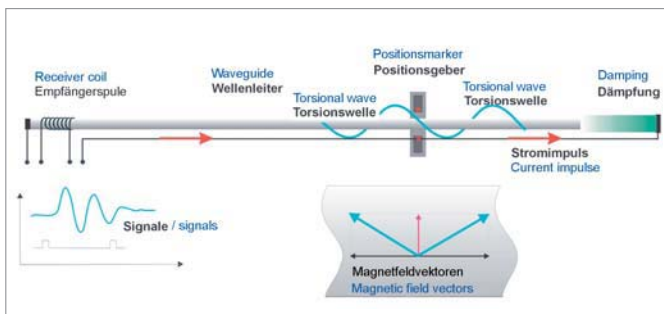
A compact summary of the quality criteria for potentiometers is available on our homepage for downloading.

2. Hall

When current flows through a Hall element, it supplies a voltage perpendicular to the current flow if a magnetic field acts vertically on both. As this voltage runs proportionally to the magnetic field strength, it is extremely simple to conduct a contact-free angular measurement by attaching a position magnet on a rotating shaft.

In the recent past this technology has made advances that make this sensor ideal for exact angular measurement. By combining several sensor elements and integrating the entire signal processing system in a few components, complex systems are possible in an extremely small space.

The systems operate virtually insensitive to ageing and independently of field strength fluctuations of the sensor magnets. Both contact-free, shaft-guided and contact-free systems without a mechanical shaft connection enable measurement over up to a full 360° or even over several rotations. High resolutions with excellent dynamics, broad mechanical tolerances and fast feasibility of special customer-specific solutions are additional convincing properties of this technology.



3. Magnetostrictive

(非接触式磁致伸缩传感器技术特点)

利用两个不同磁场相交产生一个应变脉冲信号，然后计算这个信号被探测所需的时间周期，进而换算出准确的测量位置。这两个磁场一个来自传感器外的活动磁铁，另一个则源自传感器内波导管（Waveguide）的电流脉冲，而这个电流脉冲其实是由传感器头的固有电子部件所产生的。当两个磁场相交时，所产生的一个应变脉冲会以声音的固定速度返回电子部件的感测线圈。从产生电流脉冲的那一刻到测回应变脉冲所需要的时间周期乘以这个固定速度，我们便能准确的算出位置磁铁的变动。这个过程是连续不断地，所以每当活动磁铁被带动时，新的位置很快就会被感测出来，而且输出信号是一个真正的绝对位置输出值。应用NOVOSTRICTIVE®非接触式磁致伸缩测量技术的传感器可在控制、定位和测量工艺中对行程和长度进行直接、精确、绝对的测量。由于采用先进的测量原理，温美的设计和精选的原材料，改系列产品安装简易、使用寿命长，具有很高的抗冲击和振动性能。

3. Magnetostriction

The elastic deformation of the molecular structure of ferromagnetic materials like iron, nickel, cobalt and their alloys is called magnetostriction. The micromechanical deformation takes place during a change in the magnetisation. The magnetic structure of ferromagnetic materials consists of the summagnets. The elementary magnets with the same magnetic orientation are grouped in limited areas called Weiss domains. The magnetic orientation of the Weiss domains is arbitrary in the non-magnetised state. When exposed to an external magnetic field, a certain number of domains spontaneously orient themselves in the direction of the magnetism. The number of domains that orient themselves in the direction of magnetisation is dependent both on the magnetic field strength of the external field and on the mechanical properties of the ferromagnetic material. The change in magnetisation of the domains produces a spontaneous change in the mechanical form, whereby a mechanical wave results. The mechanical wave is a torsion wave which results at the location of the excitation by the external magnetic field. The torsion wave is propagated in the ferromagnetic material at a speed of 2,800 m/s. This physical property is the basis for magnetostrictive position transducers. A ferromagnetic material with a marked magnetostrictive property (waveguide) is positioned along the measuring path in a rugged housing. An external magnetic field (position transducer) marks the measuring position. The spontaneous change in magnetisation is triggered by the interaction of the external magnetic field and a very short current pulse, which flows through the waveguide. The torsion wave is propagated in the waveguide. The time between excitation and the reception of the torsion wave in a wave converter is converted to the corresponding position value in the electronics.

1. SSI 接口

SSI：同步串行接口是一个数字型接口，可以用于直线、角度位移的绝对值测量。它允许直线、角度位移数据绝对值采用数字化传送而不需要总线系统。所以它特别满足工业环境下对数据可靠性、精确性的苛刻要求。

在控制器的要求下，位移数据的每一位都伴随着时钟脉冲输出，时钟/数据信号是采用RS422 接口交错输出。

数据格式包括：二进制、格雷码（24或25位分辨率）。数据格式内也可附加奇偶校验位（SSI26）。时钟频率在60 KHZ-2MHZ，刷新速率最高达16KHZ。最大时钟频率取决于电缆长度和驱动模块。SSI接口是可靠、动态、追求性价比高的测量系统的选择。

2. CANOPEN 接口

CANOPEN 是基于7层 ISO/OSI 模型的国际标准总线协议。由CIA发展而来（CIA=CAN-IN-AUTOMATION），该协议自2002年底起一直被视为欧洲标准EN503254。

CANOPEN采用源自汽车行业（ISO 11898-2）CAN标准中的LAYER 1及LAYER 2作为数据传输技术。该总线系统允许每一个挂接的设备群发指令（多主功能）。该指令能被每一个总线上挂接的设备接收（类似广播模式）但指令的后期处理则取决于挂接设备的本地自身需要。

CANOPEN协议有多种方法设定总线设备并具有数据纠错功能。位移传感器的数据在数据控制器中形成EDS文件（电子数据表格），准确地反映相应设备的运动情况。在其他参数诸如各种开关量、速度等配合下，要检测设备的真实状态就得到准确反映。CANOPEN非常适合动态和多元网络控制系统。

1. Synchronous Serial Interface (SSI)

The synchronous serial interface is a digital interface for absolute position and rotary measuring systems. It enables position and angular information to be transmitted digitally, absolutely and without bus overhead. As a result, it is especially well-suited for applications in which reliability and signal robustness are required in an industrial environment.

Transmission is synchronous to the request of the controller, and one bit of the position value to be output is transferred with each clock pulse. The clock/data signals are transferred differentially via an RS 422 interface. Data formats are binary or Gray-encoded with a 24 or 25-bit position resolution. A parity bit for increased data security can also be attached to the data format ("SSI26").

Possible clocking frequencies are in the range from 60 kHz to 2 MHz, and update rates of up to 16 kHz can be achieved. The maximum achievable clocking frequency is dependent on the cable length and the driver blocks used. This makes the SSI interface reliable, dynamic and inexpensive.

2. CANopen Interface

CANopen is an internationally standardized bus protocol based on the seven-layer ISO/OSI reference model. It was developed by the CIA (CAN-in-Automation user and manufacturer association) and has been standardized as the European standard EN 503254 since the end of 2002. CANopen uses layer 1 and 2 of the CAN standard originally developed for use in cars (ISO technology). The bus system enables each device to send messages (multimaster capability). Messages on the bus are received by each bus device (broadcast communication). Each bus device then decides whether or not these messages are processed based on its local intelligence.

A broad range of methods for setting the parameters of bus devices and for error detection and treatment equip the CANopen protocol with outstanding properties. With reference to position sensors, all relevant device data of the higher-level controller can easily be imported via electronic data sheets (eds files). Thanks to the availability of features like cam switches, limit value switches, speed data etc., a true measured value for connected components is provided here.

CANopen is suitable for use as an interface in both dynamic applications and in complex control networks.

3. QUADRATURE 接口

QUADRATURE接口是为数字增量测量系统开发的。光扫描光栅过程中会分别产生两种不同的信号，经过处理分别代表相位差异90度的+/-A、B脉冲信号，代表不同的运动方向。A、B脉冲的数量可以反映要测量物体的移动距离，所以物体移动的速度决定了每个A、B脉冲的宽度。

此外，由于光栅测量系统常有一个参考基值，该信号在整个测量过程中仅输出一次，以便为需要测量的位置、位移做参考。这样从A、B脉冲信号中可以比较容易的获得绝对位移信息。

直线、角度位移的绝对值测量一般不需要参考基值，但磁致伸缩位移测量系统是个特例。

采用QUADRATURE接口的磁致伸缩位移测量系统实际上就是将移动的绝对位移、位置数值通过正确的A、B脉冲数量反映出来。

4. DyMos 接口

和SSI接口一样，DyMos接口也采用标准的RS422接口。它将同步串行数据处理和数据总线数据诊断功能结合在一起。数据格式为48位分别是起始3位系统数据，中间是40位数据，最后是5位CRC。这40位数据位可以分别定义为两个位置数据，也可定义为速度+位置数据，每个数据都是20位分辨率。3位系统数据位检测传感器状态；而5位CRC数据位则检测数据传输过程。

除了位置数据，传感器自身的信息，诸如型号、系列码等都可以在传感器上电（POWER ON）的同时获得，便于区别不同的传感器。该接口的最大传输速率是16KHZ。

3. Quadrature Interface

The quadrature interface was originally developed for incremental measuring systems. Here the material measure is applied to a glass pane or strip. This is then scanned with optical systems. Two signals are generated, i.e. an A and a B pulse with a positive or negative phase offset of 90° respectively, depending on the direction of movement. The number of A or B pulses is a measure of the distance covered, and the pulse width of the A/B pulses is therefore dependent on the speed of movement.

In addition, optical systems usually have a reference track, which only outputs a signal once along the entire measuring distance in order to reference the incrementally determined position. This is necessary to derive an absolute position from the A/B pulses which follow.

No reference traverse is necessary for absolute measuring position and rotary sensors as, for example, is the case with magnetostrictive position measuring systems. A magnetostrictive position measuring system with a quadrature interface transfers the correct number of A/B pulses in accordance with the current absolute position on request.

4. DyMoS Interface

Like the SSI interface, the DyMoS interface is based on the RS422 standard. With various additions, it combines the simplicity of synchronous serial transmission with the data transmission and diagnostic functions of bus interfaces. Here the data format is 48-bit, which is divided up as follows: the first three bits are system data, followed by 40 data bits and 5 CRC bits. The 40 data bits can be formatted both as position and speed (for a position transducer) and as two position data (with 2 position transducers) with a resolution of 20 bits each. The system data can be used to monitor the state of the measuring sensor and the CRC bits for monitoring transmission.

In addition to the position data, information on the sensor (model and serial number) is output via the DyMoS interface following "Power On" so that the measuring sensor can be clearly assigned in the application. As with the SSI interface, the maximum transfer rate is 16 kHz.

德国 Germany

Baden-Württemberg

Novotechnik Messwertaufnehmer OHG
Horbstraße 12
73760 Ostfildern
Telefon +49 711 4489-180
Telefax +49 711 4489-118
verkauf@novotechnik.de

Bayern

Hans Trinczek GmbH & Co.KG
Mess- und Regelungstechnik
Kolpingstraße 24
86916 Kaufering
Telefon +49 8191 66239
Telefax +49 8191 65293
hans.trinczek@trinczek.com
www.trinczek.com

Hessen, Rheinland-Pfalz, Saarland, Nordrhein-Westfalen (Süd)

Armin Bollmann Ingenieurbüro für
Mess- und Regelungstechnik GmbH
Mühlheimer Straße 337
63075 Offenbach
Telefon +49 69 865086
Telefax +49 69 865517
info@bollmann-messtechnik.de
www.bollmann-messtechnik.de

Sachsen, Thüringen, Sachsen-Anhalt, Berlin, Brandenburg, Mecklenburg-Vorpommern

TVS GmbH & Co.
Pöhlauer Straße 6
08359 Breitenbrunn, OT Rittersgrün
Telefon +49 37757 7100
Telefax +49 37757 7101
tvs@tvs-gmbh-co.de
www.tvs-gmbh-co.de

Bremen, Hamburg, Niedersachsen, Schleswig-Holstein, Nordrhein-Westfalen (Nord)

Leue Sensorics
Rehpfad 4, 29358 Eicklingen-Sandlingen
Telefon +49 5149 92129
Telefax +49 5149 92130
info@leue-sensorics.de
www.leue-sensorics.de

欧洲 Europe

波罗的海国家 Baltic States

SKS-tehnika OÜ
LIIMI 1
10621 Tallinn / Estonia
Telefon +372 6990 172
Telefax +372 6990 170
peeter.kuus@sk.fi
www.sks.fi

BENELUX

AE Sensors B.V.
P.O. Box 9084
3301 AB Dordrecht
Telefon +31 78 6213152
Telefax +31 78 6213146
aesensors@aesensors.nl
www.aesensors.nl

丹麦 Denmark

Mikkelsen Electronics AS
Havremarken 3-5
3520 Farum
Telefon +45 4434 0300
Telefax +45 4434 0310
info@mikkelsen-electronics.com
www.mikkelsen-electronics.com

芬兰 Finland

SKS Automaatio Oy
Martinkyläntie 50
01720 Vantaa
Telefon +358 20 76461
Telefax +358 20 7646820
automaatio@sk.fi
www.sks.fi

法国 France

FGP Instrumentation
24, rue des Dames
78340 Les Clayes Sous Bois
Telefon +33 1 30796540
Telefax +33 1 30540143
scom@fgp.tm.fr
www.fgp-instrumentation.com

英国 Great Britain

Variohm Components
Williams' Barns, Tiffield Road
Towcester / Northants NN 12 7HP
Telefon +44 1327 351004
Telefax +44 1327 353564
sales@variohm.com
www.variohm.com

意大利 Italy

BTS Elettronica s.r.l.
Via Rosa, 31
37026 Pescantina - Verona (VR)
Telefon +39 045 6700744
Telefax +39 045 7156927
info@btsitalia.it
www.btsitalia.it

挪威 Norway

Mikkelsen Electronics AS
P.O. Box 12135
S-102 24 Stockholm
Telefon +46 850 150760
Telefax +46 850 150765
info@mikkelsen-electronics.com
www.mikkelsen-electronics.com

奥地利 Austria

Reliste Steuerungstechnik
Enzersdorfer Straße 8-10
2345 Brunn am Gebirge
Telefon +43 2236 31525-0
Telefax +43 2236 31525-60
office@reliste.at
www.reliste.at

波兰 Poland

ELTRON
pl. Wolności 7B
50071 Wrocław
Telefon +48 71 3439755
Telefax +48 71 3441141
eltron@eltron.pl
www.eltron.pl

俄国/乌克兰 Russia/Ukraine

Technologies LLC
INPROMTEX Engineering & Industrial
Tatischeva street 15, stroenie #1
115191 Moscow
Telefon +7 095 5445935
Telefax +7 095 5445935
d.pavlenko@inpromtex.net.ru
www.inpromtex.ru

瑞典 Sweden

Mikkelsen Electronics AS
P.O. Box 12135
S-102 24 Stockholm
Telefon +46 850 150760
Telefax +46 850 150765
info@mikkelsen-electronics.com
www.mikkelsen-electronics.com

瑞士 Switzerland

Dietrich + Blum AG
Hertstraße 31
8304 Wallisellen
Telefon +41 848 300700
Telefax +41 848 300701
dbnet@dietrichundblum.ch
www.dietrichundblum.ch

斯洛文尼亚 / 克罗地亚 / 波斯尼亚-黑塞哥维那 / 塞尔维亚 / 黑山共和国 Slovenia / Croatia / Bosnia-Herzegovina / Serbia / Montenegro

ADEPT PLUS d.o.o.
p.p. 192, Hrasce 5
6230 Postojna
Telefon +386 57536136
Telefax +386 57536138
info@adeptplus.si
www.adeptplus.si

西班牙/葡萄牙 Spain/Portugal

Mapro Ingeniería, S.A.
Cami Real de Valencia nº 38
08860 Castelldefels
Telefon +34 902328328
Telefax +34 902464363
info@maprosensor.com
www.maprosensor.com

捷克斯洛伐克/斯洛伐克 Czech Republic / Slovakia

Orbit Merret s.r.o.
Vodnanská 675/30
19800 Praha 9
Telefon +42 2 81040200
Telefax +42 2 81040299
orbit@merret.cz
www.orbit.merret.cz

土耳其 Turkey

Alfa Elektronik Makine Ltd. Sti
Baglarbasi Mah. Ergenekon Sok.
Cakmak Plaza No: 6
34844 Maltepe - Istanbul
Telefon +90 216 3994404
Telefax +90 216 3054937
info@alfasanayi.com
www.alfasanayi.com

匈牙利 Hungary

Kontakt Elektro Kft Pécs
Mohácsi 79
7630 Pécs
Telefon +36 72 516067
Telefax +36 72 516069
kontakt@kontakt-elektro.hu
www.kontakt-elektro.hu

非洲 Africa

南非 South Africa

Progressive Distributing
Enterprises cc/PDE
P.O. Box 711
2026 Bruma
Telefon +27 11 6159786
Telefax +27 11 6150786
pde@pde.co.za

中东 Middle East

伊朗 Iran

Ricc Rashidian Industrial Automation
& Commercial Co. LTD.
No. 86, Suit 7, Keshavarz Blvd.

Telefon +98 2188 9657 92
Telefax +98 2188 9692 45
m.shahgholian@rashidian-enterprise.ir
www.ricc.ir

以色列 Israel

Bruno International Corp.
14 Bar Kochva St.
51261 Bney Berak
Telefon +972 3 5705323
Telefax +972 3 5705331
zeev@brunocorp.co.il

澳大利亚 Australia

MOOG Australia Pty. Ltd.
14 Miles, St.
Mulgrave Vic. 3170
Telefon +61 3 95616044
Telefax +61 3 95620246
sales.australia@moog.com

亚洲 Asia

中国 China

Novotechnik Sensors (Trading)
Co., Ltd

诺我传感器贸易(上海)有限公司
中国上海市浦东新区金海路1000号
金领之都7栋204室
邮编: 201206
电话: +86 21 58997738/36
传真: +86 21 58997737
info@novotechnik.cn
www.novotechnik.de

台湾 Taiwan

Daybreak International Corp.
3Fl., 124 Chung-Cheng Rd.
Taipei / Shihlin
Telefon +886 2 88661231
Telefax +886 2 88661239
day111@ms23.hinet.net
www.daybreak.com.tw

日本 Japan

N.N. Information from:
Novotechnik
Messwertaufnehmer OHG
73760 Ostfildern
Telefon +49 711 4489-182
Telefax +49 711 4489-150
export@novotechnik.de
www.novotechnik.de

韩国 Korea

SUN-BEE Instruments, Inc.
501, Cintree Techno Town
1254 Sinjeong-Dong
Yangcheon-Gu
158-073 Seoul
Telefon +82 2 2065 5100
Telefax +82 2 2065 8222
sunbees@unitel.co.kr
www.sunbees.co.kr

新加坡 Singapore

MOOG Singapore Pte. Ltd.
73 Science Park Drive
#03-09 Cintech 1
Singapore Science Park 1
Singapore 118254
Telefon +65 67736238
Telefax +65 67777627
sales.singapore@moog.com

印度 India

ACCENT CONTROLS (P) LTD.
Plot No. B-99, Road No. 27
Shanti Nagar, Wagle Industrial Estate
Thane 400 604 Maharashtra-India
Telefon +91 22 2582-2141/ 0162
Telefax +91 22 2582-4746 / 2548
info@accentsensors.com
www.accentsensors.com

南美 South America

巴西 Brazil

Signalworks Comercio
Importacao & Exportacao Ltda.
R.San.Alves dos Santos, 102-8ºandar
CEP 04571-090 Sao Paulo
Telefon +55 11 5501-5310
Telefax +55 11 5505-5682
info@signalworks.com.br
www.signalworks.com.br

美国、加拿大、墨西哥 USA, Canada, Mexico

Novotechnik U.S., Inc.
155 Northboro Road, Suite 5
Southborough, MA 01772 USA
Telefon +1 508 4852244
Telefax +1 508 4852430
info@novotechnik.com
www.novotechnik.com

Novotechnik U.S., Inc.
Automotive Division
39111 West Six Mile Road
Livonia, MI 48152 USA
Telefon +1 734 5917476
Telefax +1 734 5917477
mcclish@novotechnik.com
www.novotechnik.com

德国总部

Novotechnik
Messwertaufnehmer OHG

Postfach 4220
73745 Ostfildern (Ruit)
Horbstraße 12
73760 Ostfildern (Ruit)
Telefon +49 711 4489-0
Telefax +49 711 4489-118
info@novotechnik.de
www.novotechnik.de

中国公司

诺我传感器贸易（上海）有限公司
Novotechnik Sensors Trading (Shanghai) Co., Ltd

中国上海市浦东新区金海路1000号
金领之都7栋204室
邮编：201206
电话：+86 21 58997738/36
传真：+86 21 58997737
info@novotechnik.cn
www.novotechnik.cn

代理商

