



# PEWATRON

SENSORS • POWER SUPPLIES

## CONTACTLESS HALL ROTARY SENSORS



- » Large number of product variants
- » 0-360° rotary angle
- » Analog and digital output signal
- » Customer specific configurations possible
- » Low and high volume production
- » Cost effective solutions

a member of the Angst+Pfister Group

## CONTENTS

- **22 Multi interface precision series - ball bearings** ..... 3
- **25 / 30 Speed connect series - plain bearings** .....5
- **36 / 50 Multi interface contactless series - ball bearings** ..... 6
- **Electrical options for analog versions** .....7
- **Electrical options for incremental versions** .....7
- **Electrical options for SPI / SSI versions** ..... 8
- **Mechanical options and accessories**..... 8
- **Interconnections** ..... 8

## ORDER FORM:

To recommend the best technical and commercial solutions we need to know your electrical and mechanical requirements.

### Electrical Requirement

Supply voltage (V)

Output: Analog, PWM, SPI, Incremental, SSI Supply current (mA)

Effective electrical angle (0)

Update rate (KHz)

Electrical option (see datasheets).


### Mechanical Requirement

Housing dimensions (mm)

Shaft diameter (mm)

Shaft length from mounting surface (mm) Mechanical angle (0)

Shaft Load (axial/ radial)

Starting torque (Ncm)

Max. rotating speed (rpm)

Connections

Rotational life (shaft rotations) Mechanical options


## MULTI-INTERFACE PRECISION CONTACTLESS ROTARY POSITION SENSORS - BALL BEARINGS

Pewatron range of precision contactless rotary position sensors offer in three sizes - 22 mm, 36 mm and 50 mm a wide range of mechanical & electrical possibilities at very cost effective prices. Multi-Interface types with many different output signals such as analog, PWM, incremental, SPI & SSI are available. The advantage of Multi-Interface is that all listed output signals are available integrated in the sensor housing.

In each of these different types many mechanical options such as different rotating torque, special shafts and the SPEED CONNECT system with cable gland, two types of terminal blocks and miniature connector are possible. Besides these mechanical modifications, a variety of electrical specification is available. (See page 7/8). For maximum speed explanation see page 9.

### 22A PBB



#### 22 mm Precision Analog Contactless Rotary Position Sensor (Ratiometric 5V Output)

- Metalcase - 1 Ball bearing
- Hall effect magnetic
- Precision potentiometer replacement
- Robust metal aluminium housing
- Bush mounting M9 x 0.75
- Shock & vibration proof
- Long life

Type	22A PBB	22A PBBF
Electrical angle	20° - 360° (in 1° steps prog.)	360°
Supply voltage	5V ± 10%	15 - 30V
Output signal	0 - 5V (ratio.)	0 - 10V; 4 - 20 mA
Resolution	4096 step (12 bit)	2096 step (12 bit)
Speed (max.) rpm	Mechanical 500/ Electrical 160	Mechanical 500/ Electrical 160
Life (approx.)	20x10 <sup>6</sup> rotations	20x10 <sup>6</sup> rotations

### 22A PBBF



### 22A PBBL



#### 22 mm Precision Analog Contactless Rotary Position Sensor

- Metalcase - 1 Ball bearing
- Hall effect magnetic
- Precision potentiometer replacement
- Output : 0 - 5V, 0 - 10V, 4 - 20 mA, 0 - 20 mA, PWM
- Robust metal aluminium housing
- Bush mounting M9 x 0.75
- Shock & vibration proof
- Long life

Type	22A PBBL	
Electrical angle	20° - 360° (in 1° steps programmable)	
	Supply voltage	Output signal
signal type 0505	5V ± 10%	0 - 5V (ratiometric)
signal type DC05	9 - 30V	0 - 5V
signal type 2410	15 - 30V	0 - 10V
signal type 2442	15 - 30V	4 - 20 mA
signal type 2420	15 - 30V	0 - 20 mA
PWM	5 V ± 10%	PWM
Resolution	4096 step (12 bit)	
Speed (max.) rpm	Mechanical 500 / Electrical 160	
Life (approx.)	20x10 <sup>6</sup> rotations	

**22I PBBL****22 mm Precision Incremental Contactless Rotary Position Sensor**

- Metalcase - 1 Ball bearing
- Hall effect magnetic
- A - B - Z channels  
Any pulse from 2 - 128 programmable, 256, 512, 1024 ppr
- Robust metal aluminium housing
- Bush mounting M9 x 0.75
- Shock & vibration proof
- Long life

Type	22I PBBL
Electrical angle	0 - 360°
Supply voltage	5V ± 10% / 9 - 30 VDC
Output signal	5V TTL, 5V / 24V Open collector
Pulses	2 to 128, 256, 512, 1024 ppr
Resolution	4096 steps (12 bit)
Speed (max.) rpm	Mechanical 5000 / Electrical 1600
Life (approx.)	20x10 <sup>6</sup> rotations

**22P PBBL****22 mm Precision SPI Digital Contactless Rotary Position Sensor**

- Metalcase - 1 Ball bearing
- Hall effect magnetic
- Direct SPI interface to microcontroller
- Robust metal aluminium housing
- Bush mounting M9 x 0.75
- Shock & vibration proof
- Long life

Type	22I PBBL
Electrical angle	0 - 360°
Supply voltage	5V ± 10%
Output signal	Absolute SPI
Resolution	16383 steps (14 bit)
Speed (max.) rpm	Mechanical 5000 / Electrical 800
Life (approx.)	20x10 <sup>6</sup> rotations

**22Y PBBL****22 mm Precision Digital Serial Synchronous Absolute Contactless Rotary Position Sensor**

- Metalcase - 1 Ball bearing
- Hall effect magnetic
- Direct serial synchronous interface for direct input to PLC etc.
- Robust metal aluminium housing
- Bush mounting M9 x 0.75
- Shock & vibration proof
- Long life

Type	22Y PBBL
Electrical angle	0 - 360°
Supply voltage	5V ± 10% / 9 - 30 VDC
Output signal	Digital serial synchronous (SSI) 5V/ 24V
Resolution	4096 steps (12 bit)
Speed (max.) rpm	Mechanical 5000 / Electrical 1600
Life (approx.)	20x10 <sup>6</sup> rotations

**Electrical options ( Details see page 7/8 )**

**Mechanical options ( Details see page 8 )**

**Options require price adders**

## 25/30 PP B/F/K SPEED CONNECT SERIES - PLAIN BEARINGS

The Pewatron 25/30 PP B/F/K SPEED CONNECT serie is available with outside diameter 25 and 30 mm. For easy connection the standard is a miniature cable gland (OCG) with 1 m unshielded or shielded (at extra surcharge) multicore cable of 3, 5 or 6 cores depending on the interface.

As a mechanical option, available at the same price as cable gland, a vertical entry terminal block (OCTV) or horizontal entry terminal block (OCTH) is available. As option against surcharge, an integrated fixed socket miniature connector (OCM) with 3, 5 or 6 pins according to interface together with a self latching plug is available.

### 25 PP B



### 25/30 mm Bushing Version SPEED CONNECT (default is cable gland with 1 m unshielded cable)

Version	Analog (A)	Incremental (I)	SPI (P)	SSI (Y)
Type	22/28A PPB	22/28A PPB	22/28A PPB	22/28Y PPB
Electrical angle	20° to 360° (in 1° steps programmable (standard 360°))	2 to 128, 256, 512, 1024 ppr	0 - 360°	0 - 360°
Supply voltage	5V±10% / 9-30 VDC / 15-30 VDC	5V±10% / 9-30 VDC	5V ± 10%	5V±10% / 9-30 VDC
Output signal	0 - 5V ; 0 -10 V 0 - 20mA ; 4 - 20mA PWM	5V TTL; 5V / 24V Open collector	Absolute SPI	5V / 24V SSI
Resolution	4096 step (12 bit)	4096 step (12 bit)	16383 steps (14 bit)	4096 step (12 bit)
Mech. speed (max.)	800 rpm	800 rpm	800 rpm	800 rpm
Elec. speed (max.)	160 rpm	1600 rpm	800 rpm	1600 rpm
Bearing life	~ 10x10 <sup>6</sup> rotations	~ 10x10 <sup>6</sup> rotations	~ 10x10 <sup>6</sup> rotationS	~ 10x10 <sup>6</sup> rotations

### 30 PP B



### 25 PP F



Miniature connector option

### 25/30 mm Flange Version SPEED CONNECT (default is cable gland with 1 m unshielded cable)

Version	Analog (A)	Incremental (I)	SPI (P)	SSI (Y)
Type	25/30A PPF	25/30I PPF	25/30P PPF	25/30Y PPF
Electrical angle	20° to 360° (in 1° steps programmable (standard 360°))	2 to 128, 256, 512, 1024 ppr	0 - 360°	0 - 360°
Supply voltage	5V±10% / 9-30 VDC / 15-30 VDC	5V±10% / 9-30 VDC	5V ± 10%	5V±10% / 9-30 VDC
Output signal	0 - 5V ; 0 -10 V 0 - 20mA ; 4 - 20mA PWM	5V TTL; 5V / 24V Open collector	Absolute SPI	5V / 24V SSI
Resolution	4096 step (12 bit)	4096 step (12 bit)	16383 steps (14 bit)	4096 step (12 bit)
Mech. speed (max)	3000 rpm	3000 rpm	3000 rpm	3000 rpm
Elec. speed (max)	160 rpm	1600 rpm	800 rpm	1600 rpm
Rotary life	~ 15x10 <sup>6</sup> rotations	~ 15x10 <sup>6</sup> rotations	~ 15x10 <sup>6</sup> rotations	~ 15x10 <sup>6</sup> rotations

### 30 PP F



Terminal block option

### 25 PP K



Hollow shaft  
Terminal block option

### 25/30 mm Kit Version SPEED CONNECT (default is cable gland with 1 m unshielded cable)

Version	Analog (A)	Incremental (I)	SPI (P)	SSI (Y)
Type	25/30A PPK	25/30I PPK	25/30P PPK	25/30Y PPK
Electrical angle	20° to 360° (in 1° steps programmable (standard 360°))	2 to 128, 256, 512, 1024 ppr	0 - 360°	0 - 360°
Supply voltage	5V±10% / 9-30 VDC / 15-30 VDC	5V±10% / 9-30 VDC	5V ± 10%	5V±10% / 9-30 VDC
Output signal	0 - 5V ; 0 -10 V 0 - 20mA ; 4 - 20mA PWM	5V TTL; 5V / 24V Open collector	Absolute SPI	5V / 24V SSI
Resolution	4096 step (12 bit)	4096 step (12 bit)	16383 steps (14 bit)	4096 step (12 bit)
Elec. speed (max)	160 rpm	1600 rpm	800 rpm	1600 rpm

### 30 PP K



Hollow shaft

For interconnection options such as terminal blocks and connectors refer page 8.

## 36/50 PBS/PBSL PRECISION MULTI-INTERFACE CONTACTLESS ROTARY POSITION SENSORS - BALL BEARINGS

To get the best electrical accuracy, precision rotary position sensors and encoders require rugged and precision machined mechanical parts and bearings. The Pewatron 36 PBS, PBSL, and 50 PBS, PBSL house precision machined metal housings, double ball bearings and high quality stainless steel shafts and are still affordable. The Multi-Interface with Analog, PWM, incremental, SPI, digital SSI outputs allow replacement of older technologies used such as optical encoders or precision potentiometers.

Other SPEED CONNECT interconnections such as cable gland (with 1 m cable), terminal blocks (horizontal & vertical) and miniature connectors respond to international synchro sizes 15 and 20. The mechanical and electrical data except dimensions are identical for Pewatron 36 PBS/PBSL and 50 PBS/PBSL. Only Metric shafts. For maximum speed explanation see page 2. The standard interconnections are 3, 5 or 6 pins according to the integrated interface.

**36A PBS  
36A PBSF**



**36/50 mm Precision Analog Multi-Interface Contactless Rotary Position Sensor**

Type	36/50A PBS	36/50A PBSF
Electrical angle	20° - 360° (in 1° steps programmable)	360°
Supply voltage	5V ± 10%	15 - 30V
Output signal	0 - 5V (radiometric)	0 - 10V; 4 - 20 mA
Speed (max.) rpm	Mechanical 9000/ Electrical 160	
Life (approx.)	40x10 <sup>6</sup> rotations	
Standard version	360° elec. & mech. angle, CW, 2 ball bearings, Metric shaft, 12 bit	

**50A PBS  
50A  
PBSF**



**36A PBSL**



**36/50 mm Precision Analog Multi-Interface Contactless Rotary Position Sensor**

PBSL Type	36/50A PBSL	
Electrical angle	20° - 360° (in 1° steps programmable)	
	Supply voltage	Output signal
Signal type 0505	5V ± 10%	0 - 5V (radiometric)
Signal type DC05	9 - 30V	0 - 5V
Signal type 2410	15 - 30V	0 - 10V
Signal type 2442	15 - 30V	4 - 20 mA
Signal type 2420	15 - 30V	0 - 20 mA
Signal type PWM	5V ± 10%	PWM
Speed (max) rpm	Mechanical 9000/ Electrical 160	
Life (approx.)	40x10 <sup>6</sup> rotations	
Standard version	360° elec. & mech. angle, CW, 2 ball bearings, Metric shaft, 12 bit	

**50A**



**36I PBSL**



**36/50 mm Precision Incremental Contactless Rotary Position Sensor**

Type	36/50 PBSL
Electrical angle	0 - 360°
Supply voltage	5V ± 10% / 9 - 30 VDC
Output signal	5V TTL, 5V / 24V Open collector
Pulses	2 to 128, 256, 512, 1024 ppr
Speed (max.) rpm	Mechanical 9000 / Electrical 1600
Life (approx.)	40x10 <sup>6</sup> rotations
Standard version	360° elec. & mech. angle, CW, 2 ball bearings, 1024 ppr, Metric shaft, 12 bit

**50I PBSL**



**36P PBSL**



**36/50 mm Precision SPI Digital Contactless Rotary Position Sensor**

Type	36/50 PBSL
Resolution	16383 steps (14 bit)
Supply voltage	5V ± 10%
Output signal	Absolute SPI
Speed (max.) rpm	Mechanical 9000 / Electrical 800
Life (approx.)	40x10 <sup>6</sup> rotations
Standard version	360° elec. & mech. angle, CW, 2 ball bearings, 5V SPI, Metric shaft

**50P PBSL**



**36Y PBSL**



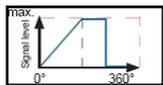
**36/50 mm Precision SSI Digital Contactless Rotary Position Sensor**

Type	36/50Y PBSL
Resolution	4096 steps (12 bit)
Supply voltage	5V ± 10% / 9 - 30 VDC
Output signal	Digital serial synchronous (SSI) 5V / 24V
Speed (max.) rpm	Mechanical 9000/ Electrical 1600
Life (approx.)	40x10 <sup>6</sup> rotations
Standard version	360° elec. & mech. angle, CW, 2 ball bearings, 5V SSI, Metric shaft

**50Y PBSL**

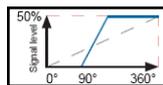


## ELECTRICAL OPTIONS FOR ANALOG VERSIONS



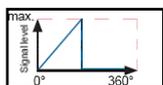
### Non-effective Electrical Angle (PE1) - Delta 1/2

If the electrical effective angle is programmed smaller than 360°, the remaining electrical non-effective angle is divided in two equal parts: high level & low level (Delta 1/2)



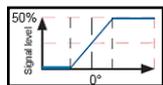
### Zero point Programming (POZ)

Mechanical zero point is aligned with marking on the sensor housing. Electrical zero point can be aligned to mechanical zero point. Zero point can be programmed at any offset.



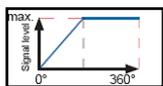
### Low level (PE2)

If the electrical effective angle is programmed smaller than 360°, after reaching the maximum, the signal level falls to low level.



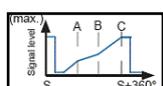
### Center Point Programming (POC)

Effective electrical angle is aligned with the mechanical zero point in such a way that equal effective angles in both rotating directions are achieved. Center point can be programmed at any offset.



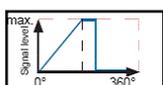
### High level (PE3)

If the electrical angle is programmed smaller than 360°, the signal level remains high after reaching the full level.



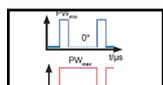
### Multi Point Programming (POM)

Output characteristics : 3 to 6 rising or falling linear segments. Minimum and maximum signal level can be defined within the total electrical angle. First and last linear segment (min./max.) is always horizontal. 1 to 3 settable calibration points.



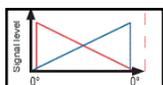
### Variable level (PE4)

If the electrical angle is programmed smaller than 360°, remaining electrical non effective angle can be divided into high and low level in any ratio according to customer request.



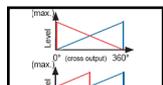
### Pulse Width Modulation (PWM)

PWM provides a constant carrier frequency which defines high to low ratio. The ratio between high & low corresponds to the signal characteristics. It is in a fixed relation to the angle. Generally, for further signal processing, no A/D converter is required because many microcontrollers already have PWM input (valid only for 0505 output).



### Direction of Rotation (CW/CCW)

By default the direction of rotation is clockwise (CW). With this option it is also possible to change the direction from clockwise (CW) to counter clockwise (CCW).



### 2 Channel Redundant Output (2C)

This is realized by a Hall sensor chip consisting of 2 galvanically separated sensing elements. One magnet provides a magnetic field simultaneously for both elements. Both elements can be programmed identically, or channel 2 can also be programmed independently from channel 1. (Valid only for 0505, DC05, and 2410 outputs).

## ELECTRICAL OPTIONS FOR INCREMENTAL VERSIONS

<p><b>Number of Pulses &amp; Direction (XXX CW/CCW)</b></p> <p>As a unique feature any number of pulses from 2 - 128 pulses per revolution (ppr) can be programmed in a 3 channel configuration. Above 128 ppr the following resolutions are possible as standard option: 256, 512, 1024 ppr. The default direction of rotation is clockwise (CW). With this option it is also possible to change direction from clockwise (CW) to counter clockwise (CCW).</p>	<p><b>Start Up Performance</b></p> <p>In the basic default version, when the sensor is switched on, first the output A-B pulses are received only if the shaft rotates. After reaching the Z pulse it is used for resetting the counter (identical to optical encoders). In this option, when the electronic is switched on, the A and B output pulses are received automatically till the Z pulse is reached. Then the counter can be reset without rotating the shaft. From this point, the A, B and Z outputs are received corresponding to the shaft rotation.</p>	<p><b>Z Pulse</b></p> <p>A counter which is connected to the sensor is reset once per revolution by the Z - pulse. Within one rotation a simulation of non-true power on encoder is possible. In the basic type the counter is reset manually.</p>
<p><b>Zero Positioning (POZ)</b></p> <p>It is possible to position the Z Pulse in line with the marking on the shaft and the bushing. Also any offset to this marking is possible.</p>	<p><b>Inverted Signal (POI)</b></p> <p>The channels A and B can be inverted or not inverted independent of each other. The basic type is not inverted.</p>	<p><b>Push Pull Function (POP)</b></p> <p>In an open collector mode the driver current is limited by pull up resistor. In push-pull mode the driver current goes up to 300 mA. Longer distances and faster switching are possible.</p>

## ELECTRICAL OPTIONS FOR SPI / SSI VERSIONS

<b>Zero Point Programming (POZ)</b>  The electrical zero point is at the beginning of the signal rise. If a shaft marking is brought in line with the housing marking, the electrical zero point can be set to that position. Beside that, it is also possible to position the zero point at any position within the mechanical angle. In any case it is necessary to have a reference to the shaft marking.	<b>Direction of Rotation (CW / CCW)</b>  The default direction of rotation is clockwise (CW). It is also possible to change the direction of turning to counter clockwise mode (CCW).	<b>2 Channel Output (2C)</b>  The Hall sensor chip which is integrated into the sensor consists of 2 galvanically separated sensor units which are influenced by the same magnetic field. The sensor provides 2 operating modes: 1) redundancy i.e. channel one and channel two are identical. If one channel fails the other channel remains active. 2) It is also possible to have 2 different programs in the 2 channels. For this, additional functions can be obtained. (Valid for SPI version).
--	---	---

## STANDARD AND CUSTOMIZED MECHANICAL OPTIONS AND ACCESSORIES

### Standard Mechanical options (SM)

Standard mechanical options (SM) = Deviation from list price version. All products are manufactured in batch production. If premanufactured components or changed processes can be used, no minimum quantity orders apply. A surcharge as adder according to the list price is applicable.

### Customized Mechanical options (CM)

If special parts are not in stock, or no standard process can be changed, a minimum order quantity is applicable.

Type / Series	Standard mechanical options	Customized mechanical options
22 PBL	OCTA, OCTR, OCB, OCM (larger housing dia of 25 mm - see 25 RCB)	Special shaft length; special cable
25/30 PPB	Low/high torque (no bearings), end stop at 90°, 180°, 270°	Special shaft end, special end stop
36 M/Z SL PBS	Cable gland (OCG); Terminal block (OCT); miniature connector (OCM)	Special shaft length and shape; special cable
50 PBL	Cable gland (OCG); Terminal block (OCT); miniature connector (OCM)	Special shaft length and shape; special cable

## INTERCONNECTIONS

In order to make the assembly for our customer as easy as possible, we offer certain interconnections possibilities for different series

### Standard Interconnections (No surcharge)

25 / 30 PP (B) (K) - Cable gland for 3,5,6 cables according to interface with 1m cable  
 22A PBB - 3 Pins

22 PBBL - 3,5,6 Core flat cables according to interface (0.2 m)  
 36 PBS / PBL - 3,5,6 Pins in metal housing  
 50 PBS / PBL - 3,5,6 Pins in metal housing

Generally all cables are provided unshielded. As a standard interconnection, with a surcharge all 3,5,6 core cables are available in shielded version.

### Other standard Interconnections (With Surcharge)

In the following drawings only the interconnections themselves are shown, with dimensions

#### Cable gland (OCG)

3,5,6 core cable of 1 m length according to interface

#### Miniature connector (OCM)

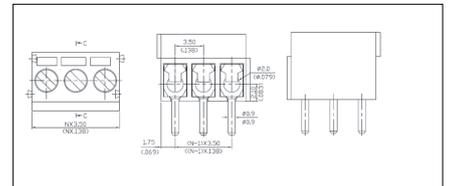
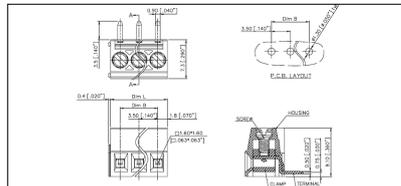
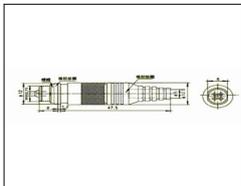
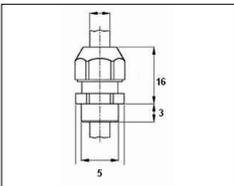
3,5,6 pin in integrated socket with plug according to interface

#### Terminal block (Axial) - OCTA Wires leaving axial to shaft axis

3,5,6 sockets according to interface

#### Terminal block (Radial) - OCTR Wires leaving radial to shaft axis

3,5,6 sockets according to interface



## CONTACTLESS HALL ROTARY SENSORS + ENCODER - INTERFACES

Contactless magnetic rotary sensors replace more and more optical encoders and precision potentiometers. Software instead of hardware provide together with state of the art semiconductors with integrated RISC processor a large variety of standard and customized output signals for position control feedback applications and any conversion of a rotary movement into an electrical signal.

### Multi-Interface

Our sensors are available with a variety of integrated interfaces. The main advantage is that it offers inbuilt interfaces for the end user. The following interfaces are available with Analog, Incremental, Absolute digital SPI and SSI. Some types have additionally to the chip integrated RISC processor, a second PIC - microcontroller for further look up table programming. Maximum mechanical speed data depends on the type of bearing.

Electrical speed data are different for each interface and depends on Update rate. Generally the Update rate in Analog ~ 1 milli sec (1 KHz), Incremental ~ 10 KHz, SPI ~ 5 KHz, SSI ~ 10 KHz. If the resolution shall be 1° then the maximum speed because of electrical reason is as follows;

Analog ~ 160 rpm, Incremental ~ 1600 rpm, SPI ~ 800 rpm, SSI ~ 1600 rpm

### Analog Interface

At the output of sensor a variable voltage or variable current is provided proportionally to the position of shaft / axis over a complete angle range of 360° or a subrange. The contactless sensor electronic guarantees a steady signal level and a low linearity error of  $\pm 0.3\%$ . Supply voltages of 5VDC  $\pm 10\%$  ; 9 - 30 VDC & 15 - 30 VDC and output signals of 0 - 5VDC (ratiometric) ; 0 - 5VDC ; 0 -10VDC; 0 - 20 mA & 4 - 20 mA are provided. A pulse width modulation (PWM) signal can be generated by the analog interface.

### Incremental Interface A - B - Z

A and B are quadrature signals, shifted by 90° and signal Z is a reference mark. One revolution generates N pulses of signal A or B. The reference mark signal is produced once per revolution. The width of the Z pulse is 1/4 of quadrature signal period and is matched with A high and B high. The optical incremental encoders can be directly replaced by magnetic incremental encoders. They provide additional features and can much easier be adjusted to customer requirements. Contrary to optical incremental encoders the series provides an absolute sensor information by counting the number of pulses which matches with the actual absolute angle.

### SPI Interface

The serial peripheral interface (SPI) is a bus system for a serial synchronous data transmission between different integrated circuits. The bus consists of 3 lines MOSI (Master Out --> Slave In), MISO (Master In <-- Slave Out), SCLK - (Serial Clock, output from master) and SS - Slave Select (active low; output from master). By these signal lines the master selects the slave for communication. This is done because the master sets the SS line from high to low. The angular informations are calculated all 350 $\mu$ s and are available for the master on demand. There is no fixed protocol for the SPI bus. Nevertheless many microcontroller IC's have a SPI input. By programming this microcontroller IC many SPI suitable sensors can be managed by one microcontroller.

### SSI Interface

With the SSI interface the absolute angular position is provided serially and synchronous to a receiving electronic which has an input (PLC indicator etc.). The main advantage of the SSI interface is that long cable distances can be overcome by very few data lines. The actual angle of position is provided in 2 byte WORD Grey code with 12 bit over 360°. The receiving electronic provides pulse sequences and thus determines the transmission rate. With the first following signal of the pulse sequence the angular position is detected and kept. The following rising ramps control the bit-wise transmission of the data word. After a small pause a new angular value can be transmitted.



**PEWATRON**  
SENSORS • POWER SUPPLIES

Competitive sensors,  
power supplies and  
drive technology solutions.  
Worldwide.

Pewatron AG  
Zurich, Munich

## Our broad expertise for your big ideas...

Personal consultation, fast reaction times and customised solutions have set Pewatron apart for close to 30 years.

Our broad and deep range of sensors, power supplies, drive technologies, electric motors and electronic components ensure you find the right components for your particular field of application. Depending on your requirements, we deliver standard products, modified standard products or customised solutions.

We work exclusively with selected and proven partners that share our uncompromising commitment to reliability, durability, value for money and quality. In addition, the production and distribution of Pewatron's own products complement our broad portfolio.

We do not leave you alone during the development phase, but always seek the best solution for your application. Our specialists have deep technical understanding and will accompany you through the whole process.

Pewatron is an independently operating daughter company of the Angst+Pfister Group and serves customers across Europe and the globe. We are part of a worldwide network with more than 1 000 employees and 60 000 satisfied customers.

Headquarter Switzerland:

Pewatron AG  
Thurgauerstrasse 66  
CH-8052 Zürich

Phone + 41 44 877 35 00  
Fax + 41 44 877 35 25

info@pewatron.com  
www.pewatron.com

Office Germany:

Pewatron AG  
Neumarkter Strasse 86a  
D-81673 München

Phone + 49 89 260 38 47  
Fax + 49 89 43 10 91 91

infode@pewatron.com  
www.pewatron.com

a member of the Angst+Pfister Group