



The dedicated sensory system for engineering machinery



# SENSORS FOR MOBILE MACHINERY | 2026

Magnetostrictive Sensor - Pressure/Temperature Transmitter - Rotary Encoder - Draw Wire Sensor

# About US

**12000m<sup>2</sup>**  
Production

**260**  
Staff

**>30%**  
Proportion of R&D staff

**40+**  
Export country

Trusted by **1,000+** leading companies



Founded in 2014, TBF Electronic Technology specializes in magnetostrictive linear displacement sensors, delivering reliable, certified solutions worldwide.

**Nationally high-tech enterprise**

Five sensing platforms, led by ultra-high-resolution magnetostrictive sensors (down to 0.1µm) designed for stable performance in demanding environments.

**High-reliability product solutions**

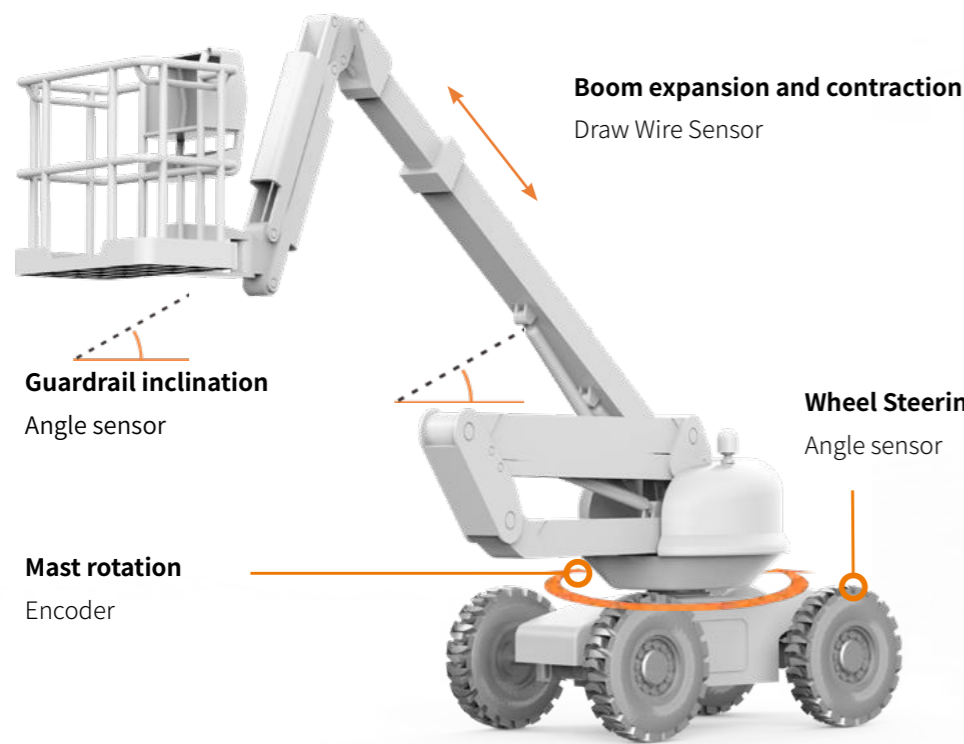
With a European subsidiary in Munich, TBF supplies customers across Europe, North America, the Middle East, and Southeast Asia, serving a global customer base that includes leading multinational industrial groups.

**A global market presence**

# Industrial application -Construction machinery

With the characteristics of high precision, high reliability and fast response, accurate operation control is realized. By accurately monitoring the information such as equipment position, attitude and pressure, the construction efficiency, safety and equipment life are greatly improved.

TBF products have high environmental adaptability, and can run stably under the working conditions of high temperature, high humidity, dust, high impact and strong vibration.



**The attitude detection of pump arm**  
Angle sensor (arm 1-7)

**Supporting leg**  
Draw Wire Sensor

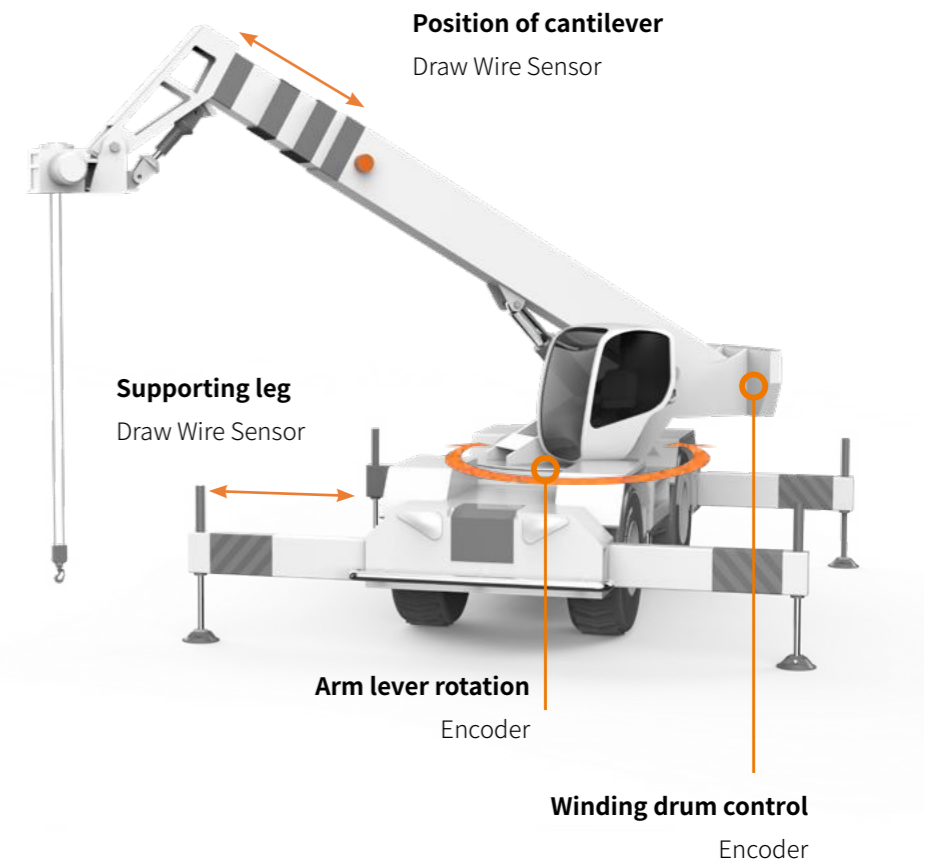
**Mast rotation**  
Encoder

**Pumping system**  
Magnetostrictive displacement sensor

**Monitoring of concrete grouting pressure**  
Pressure transmitter for grouting/mud water  
pressure transmitter

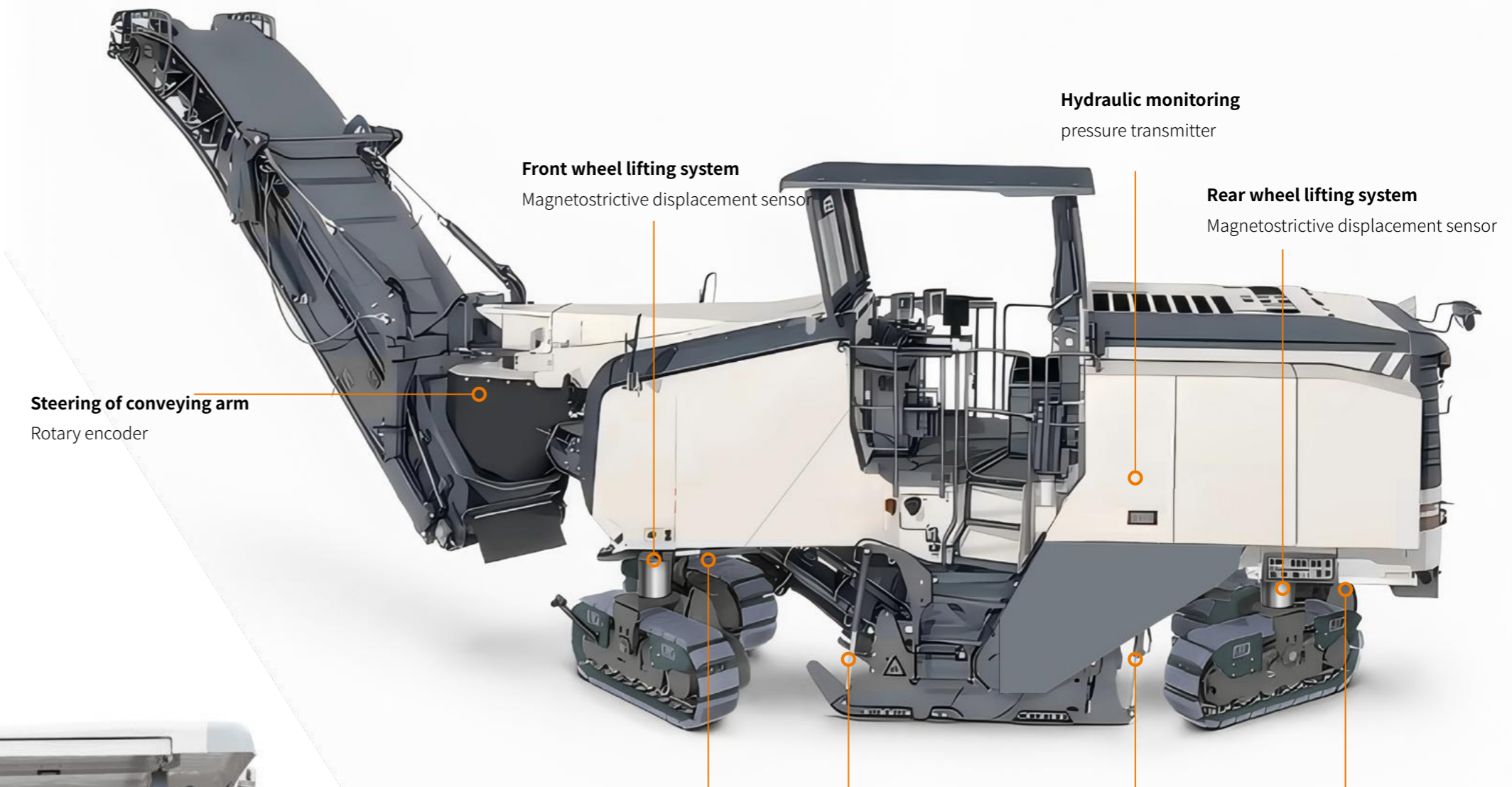
**Supporting leg**  
Magnetostrictive displacement sensor

**Hydraulic monitoring**  
pressure transmitter



# Industrial application -Road machinery

The application of sensor in road machinery (such as grader, paver, milling machine, asphalt mixing equipment, etc.) is one of the core technologies of modern intelligent construction and unmanned operation. Pass through reality Monitoring the status of the equipment in real time significantly improves the construction efficiency, safety and accuracy.



**Steering of conveying arm**  
Rotary encoder

**Front wheel lifting system**  
Magnetostrictive displacement sensor

**Hydraulic monitoring**  
pressure transmitter

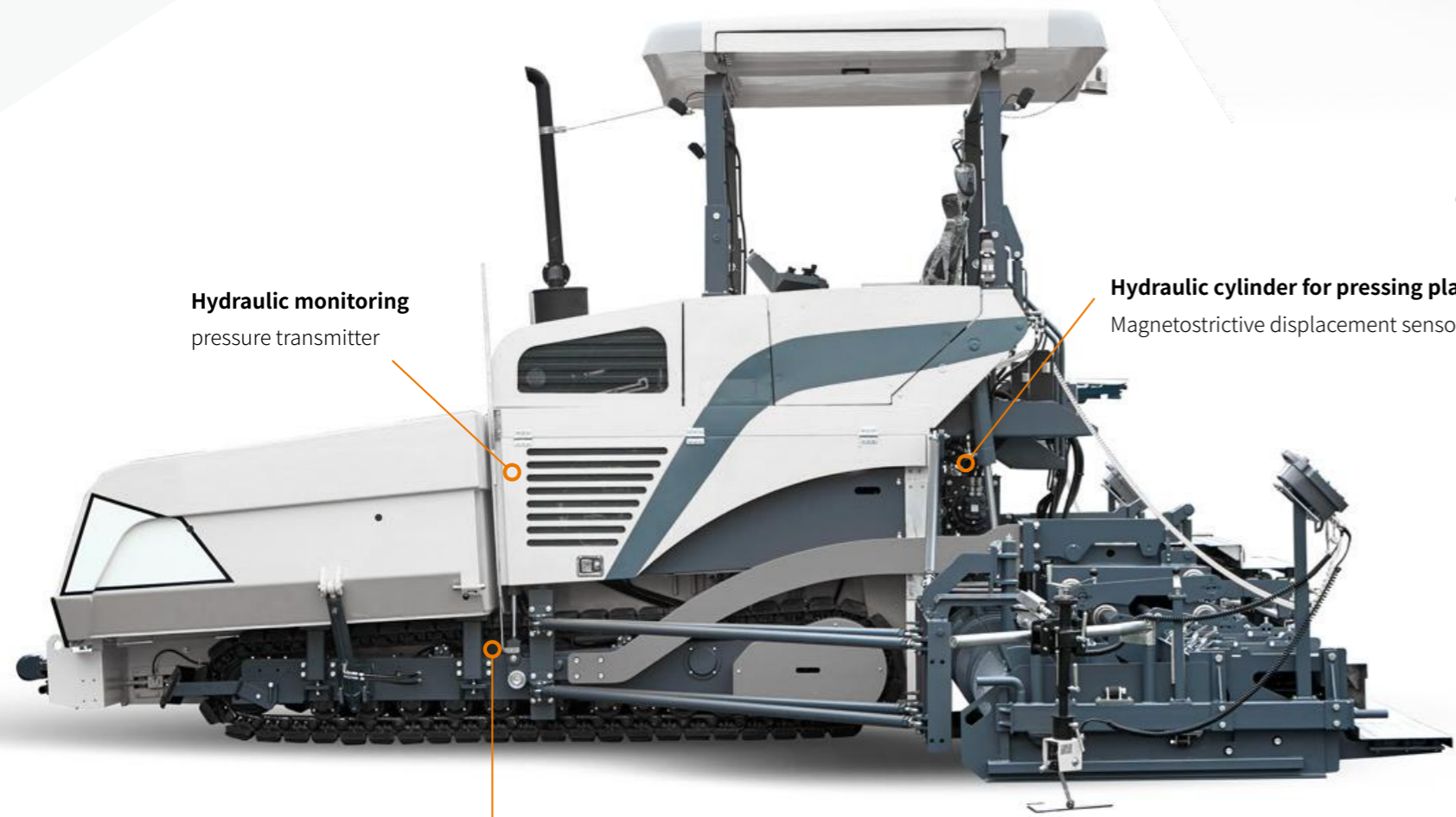
**Rear wheel lifting system**  
Magnetostrictive displacement sensor

**Front steering system**  
Magnetostrictive displacement sensor

**Front baffle hydraulic cylinder**  
Magnetostrictive displacement sensor

**Rear baffle hydraulic cylinder**  
Magnetostrictive displacement sensor

**Rear steering system**  
Magnetostrictive displacement sensor



**Hydraulic monitoring**  
pressure transmitter

**Hydraulic cylinder for pressing plate**  
Magnetostrictive displacement sensor

**Elevation adjustment of pressing plate**  
Magnetostrictive displacement sensor



**Steering cylinder**  
Magnetostrictive displacement sensor

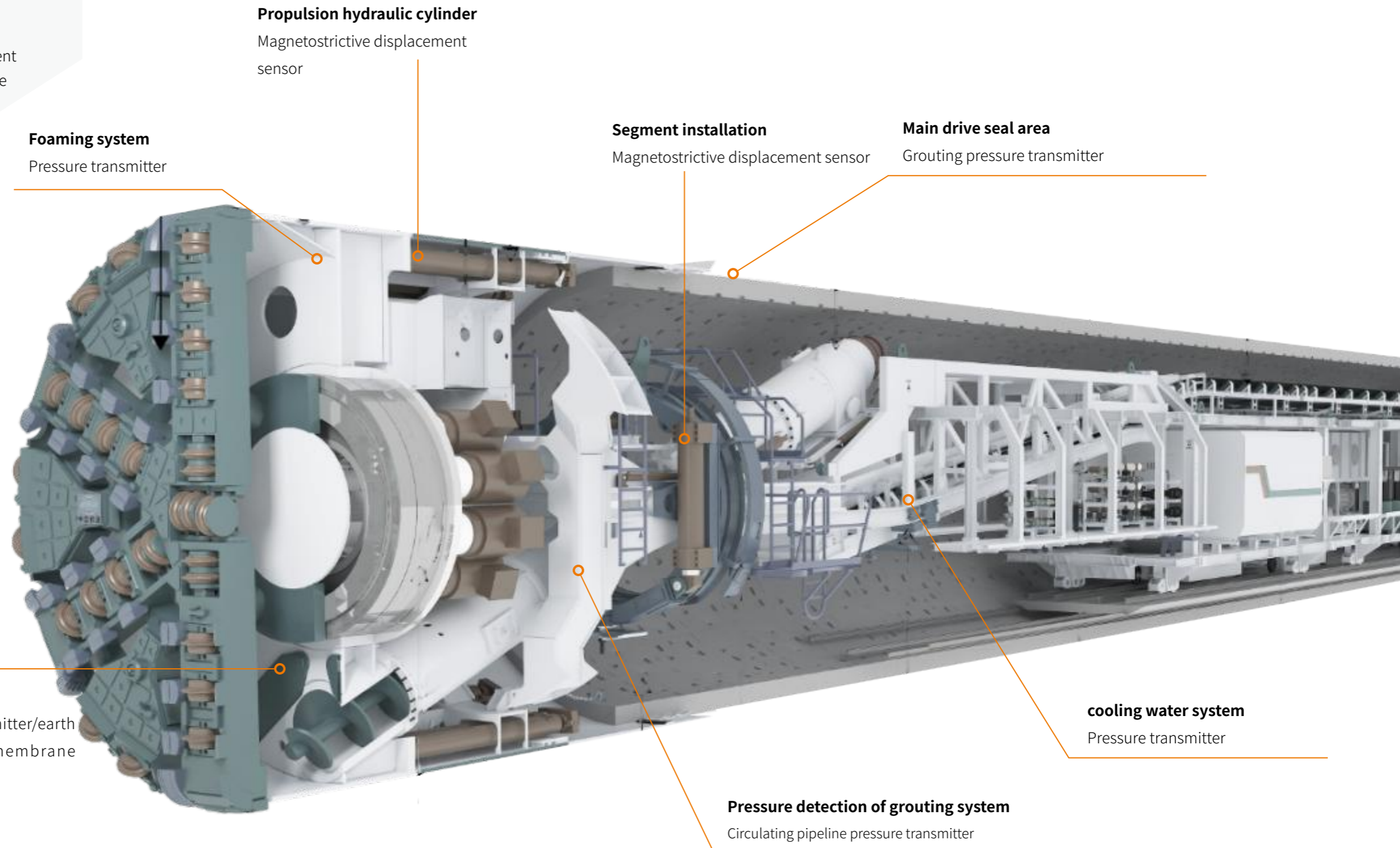
**Scraper lifting cylinder**  
Magnetostrictive displacement sensor

# Industrial application —tunnel boring machine (TBM)

**Construction safety:** By monitoring the parameters of earth pressure and mud, safety problems such as ground subsidence can be avoided.

**Optimize the construction process:** provide data support for operators, optimize the working parameters of shield machine and improve the construction efficiency.

**Fault diagnosis:** it is helpful to find the equipment fault early and ensure the normal operation of the equipment.



**Foaming system**  
Pressure transmitter

**Propulsion hydraulic cylinder**  
Magnetostrictive displacement sensor

**Segment installation**  
Magnetostrictive displacement sensor

**Main drive seal area**  
Grouting pressure transmitter

**Earth silo pressure detection**  
Recommended model: mud transmitter/earth pressure transmitter/Ceramic membrane piezometer

**Pressure detection of grouting system**  
Circulating pipeline pressure transmitter

**cooling water system**  
Pressure transmitter

# T-Series

## Magnetostrictive displacement sensor

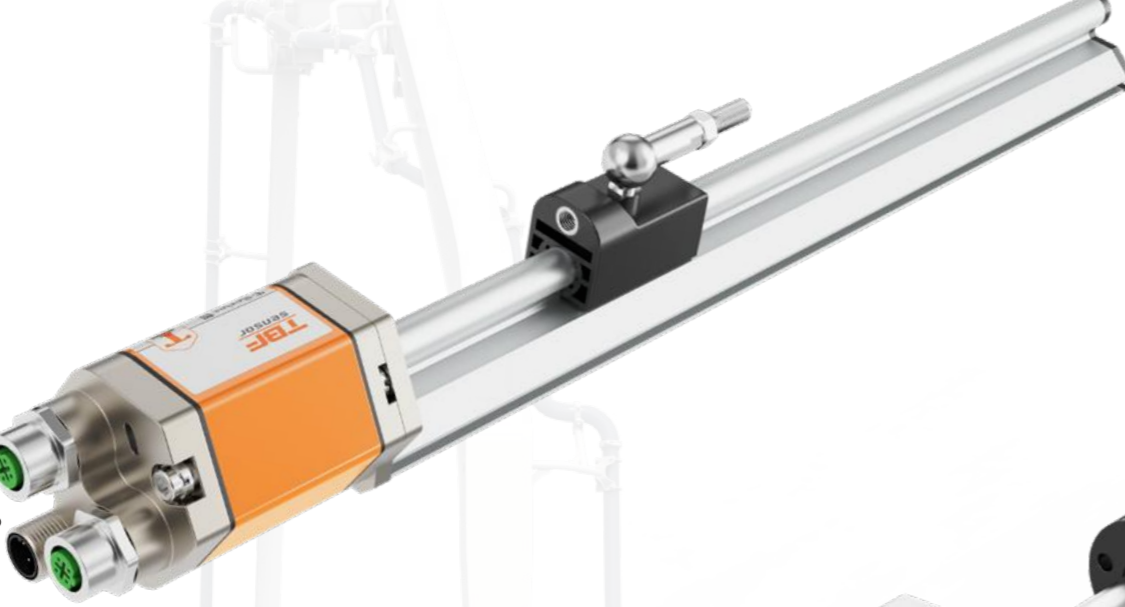
T-Series III is an upgraded product based on the second generation products. It has been innovated while maintaining our consistent high quality, and the new generation products are more reliable and stable, with strong performance.

- + High precision: highest resolution 0.1μm
- + Double anti-interference
- + Resistance to shock and vibration
- + Support 30 magnets online at the same time
- + Polarity protection, overvoltage protection
- + Enhanced monitoring and diagnosis functions
- + Wide operating voltage (9VDC~36VDC)

Type	T3H	T3P	T3D	T3F
<b>Output</b>	Position, speed			
<b>Measuring Range</b>	25-7650	25-5600	25-5600	100-20000
<b>Interface type</b>	Analog Start-Stop	SSI CANopen	EtherCAT <sup>™</sup> PROFINET <sup>®</sup> IO-Link	IO-Link
<b>precision</b>	Interface	Resolution	Nonlinear degree	Repeatability
	Analog	16 bit D/A	0.01%F.S.	0.001%F.S.
	SSI	0.1μm	0.01%F.S.	0.001%F.S.
	Start/Stop	**	0.02%F.S.	0.001%F.S.
	CANopen	1μm	0.01%F.S.	0.001%F.S.
	Profibus-DP	1μm	0.01%F.S.	0.001%F.S.
	Profinet	0.5μm	0.01%F.S.	0.001%F.S.
	IO-Link	1μm	0.01%F.S.	0.001%F.S.
EtherCAT	0.5μm	0.01%F.S.	0.001%F.S.	
EtherNet/IP	1μm	0.01%F.S.	0.001%F.S.	
T3F Nonlinear degree 0.02%F.S.				
<b>Operating voltage</b>	9VDC~36VDC *SSI: 24VDC(-15/+20%)			
<b>Shock</b>	T3H/T3P: 150 g/11 ms T3D : 100 g/11 ms T3F : 100 g/6 ms, IEC standard 60068-2-27			
<b>Vibration resistance</b>	T3H/T3P: 30 g/10~2000 Hz T3D : 10 g/10~2000 Hz T3F : 5 g/10~2000 Hz IEC standard 60068-2-6 (excluding resonance frequency)			

\*\* Depending on the controller

For more information: [www.tbfsensor.com](http://www.tbfsensor.com)



### T3P External guide rail type

Aluminum profile shell, easy to install on the machine surface or outside.



### T3H Pressure-resistant outer tube type

Threaded installation, suitable for use in hydraulic cylinder or cylinder.



### T3D Split type

A variety of rod types, suitable for U-shaped and other limited hydraulic cylinders.



### T3F Flexible outer tube type

Flexible outer tube type, the maximum range is 20 meters, which is convenient for transportation and installation.

# Integral pressure-resistant outer tube type

## Magnetostrictive displacement sensor

The compact or flat electronic component shell is convenient for the sensor to be installed in a limited space;

The integrated design makes the equipment have higher durability and higher protection level(Max IP68/IP69K);

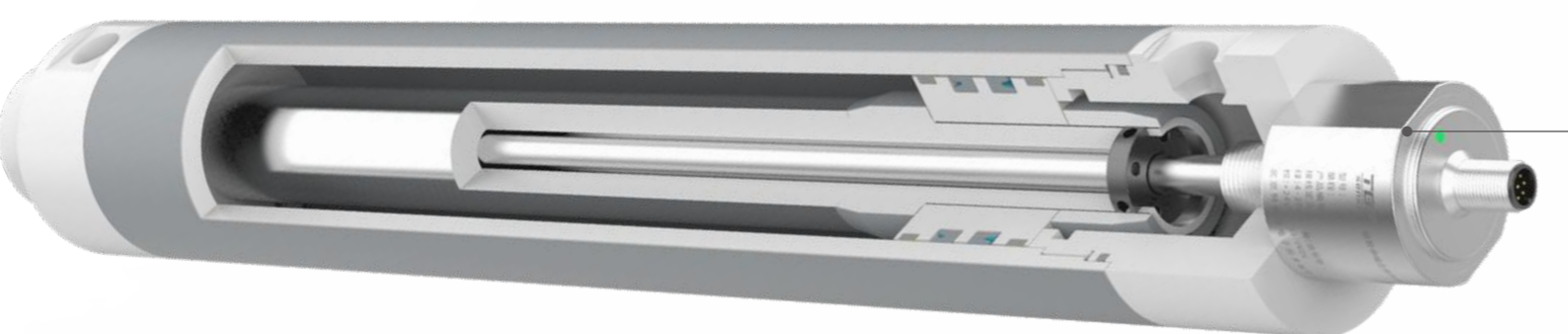
The whole machine is made of 304/316L stainless steel, which has excellent corrosion resistance and is suitable for various harsh working environments.



**GB**  
Horizontal organization design, flange installation

**CH**  
All stainless steel shell, high reliability is widely used in metallurgical industry.

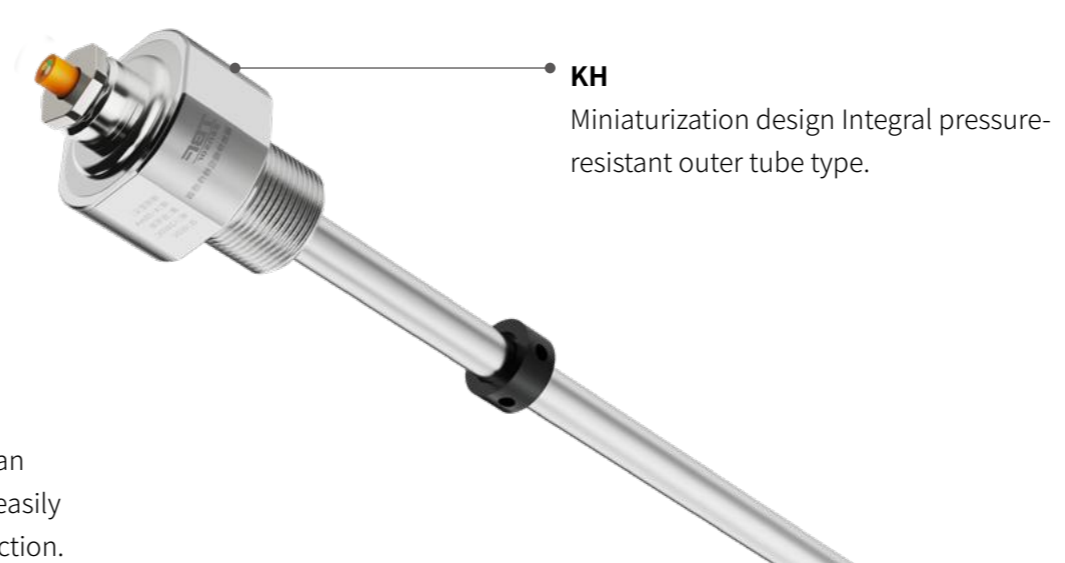
**DH**  
Miniaturization design Integral pressure-resistant outer



**GA**  
IO-Link interface sensor with LED indication function



**GBM**  
The electronic compartment can rotate 360 degrees, which can easily realize the required wiring direction.



**KH**  
Miniaturization design Integral pressure-resistant outer tube type.

### Output (accuracy)

Resolution	GB/GBM	CH	DH	KH	GA
Analog	16 bit D/A	16 bit D/A	16 bit D/A	16 bit D/A	16 bit D/A
Start/Stop	-	**	-	-	-
SSI	0.5μm	0.5μm	0.5μm	-	0.5μm
CANopen	2μm	-	2μm	-	-
IO-Link	-	1μm	-	-	1μm

Nonlinear degree ≤ ±0.02%F.S.

\*KH ≤ ±0.04%F.S.

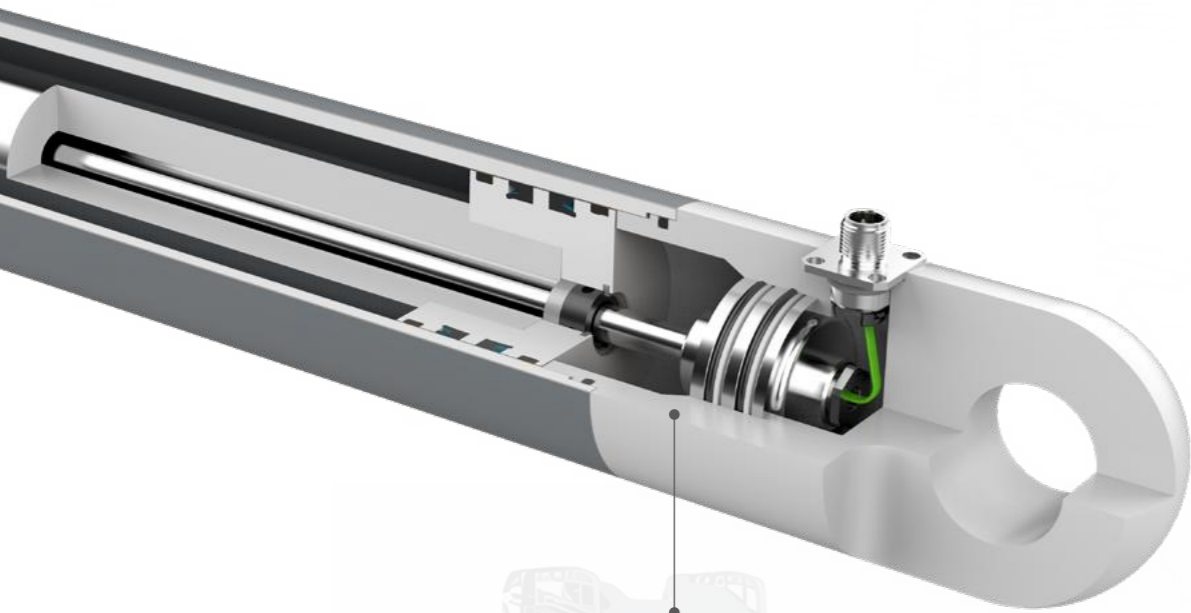
### Working conditions

Operating voltage	9VDC~36VDC	*GA/GB/CH(SSI):24VDC(-15/+20%)
Temperature	-40~85°C	*CH(Start/Stop) : -40~120°C
Ingress protection	IP68(Direct-out cable) IP67( Aerial insertion type)	*CH: IP69K
Shock	100 g/6 ms, IEC standard 60068-2-27	
Vibration	15 g/10~2000 Hz IEC standard 60068-2-6 (excluding resonance frequency)	

### Effective range

Effective range 50~4500mm

\*\* Depending on the controller

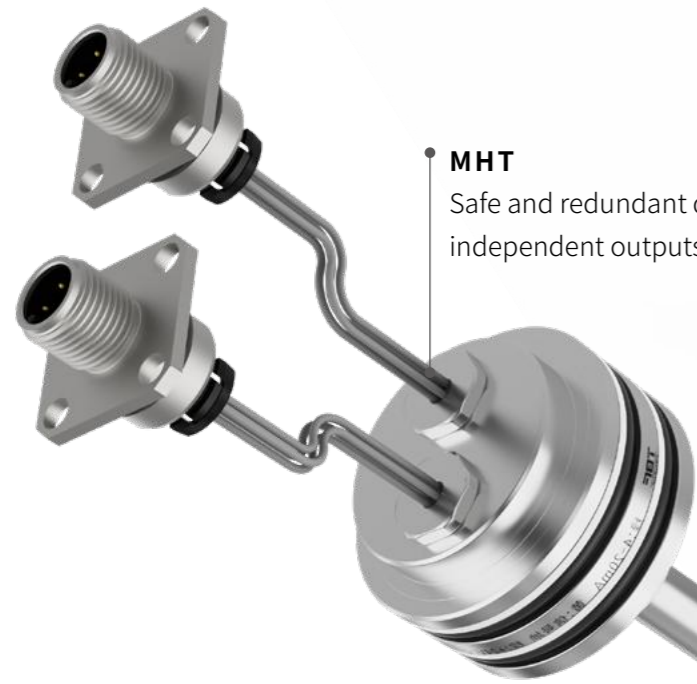


**MH**  
 Various sealing and fixing forms  
 Shock resistance and vibration  
 resistance  
 Widely used in engineering equipment  
 industry

**ES**  
 Miniaturization design



**MHT**  
 Safe and redundant design with two  
 independent outputs.



## Embedded type

### Magnetostrictive displacement sensor

In order to meet the integrated application in the cylinder, the product can be embedded in the hydraulic cylinder, and the equipment provides a variety of installation and fixation methods such as thimble type, double seal type and single seal type.

#### Output (accuracy)

Resolution	EE	ES	MH	MHT
Analog	16 bit D/A	16 bit D/A	16 bit D/A	16 bit D/A
Start/Stop	-	-	-	-
SSI	0.5μm	-	-	-
CANopen	-	100μm	0.5μm	0.5μm

Nonlinear degree	EE	≤ ±0.02%F.S.
	ES	≤ ±0.04%F.S.
	MH/MHT(Analog)	≤ ±0.04%F.S.
	MH/MHT(CANopen)	≤ ±0.02%F.S.

#### Working conditions

Operating voltage	9VDC~36VDC
Temperature	-40~105°C
Ingress protection	IP68(Direct-out cable) IP67( Aerial insertion type)
Shock	100 g/6 ms, IEC standard 60068-2-27
Vibration	15 g/10~2000 Hz IEC standard 60068-2-6 (excluding resonance frequency)

#### Effective range

EE/MH/MHT	50~4500mm
ES	50~2500mm

# Draw wire sensor Long angle sensor

The cable displacement sensor has the characteristics of compact structure, high precision and long measuring stroke. Its principle is to convert mechanical motion into electrical signals that can be measured, recorded or transmitted. RTQ7 and RTQ12 are long-angle sensors with the function of measuring length and inclination.



# Encoder

## Compact, Standard, Heavy-Duty

Encoder is used to record the angle and rotation speed, so as to realize accurate control, facilitate real-time monitoring and adjustment of component state, and thus improve the automation degree and work efficiency of construction machinery.



**Standard Encoder  
BNMA58**  
Diameter: 58mm  
Single lap resolution: 8...16bit  
Number of pturns: < 24bit  
Interface: SSI/SSI+increment, CANopen/  
CANopen+increment



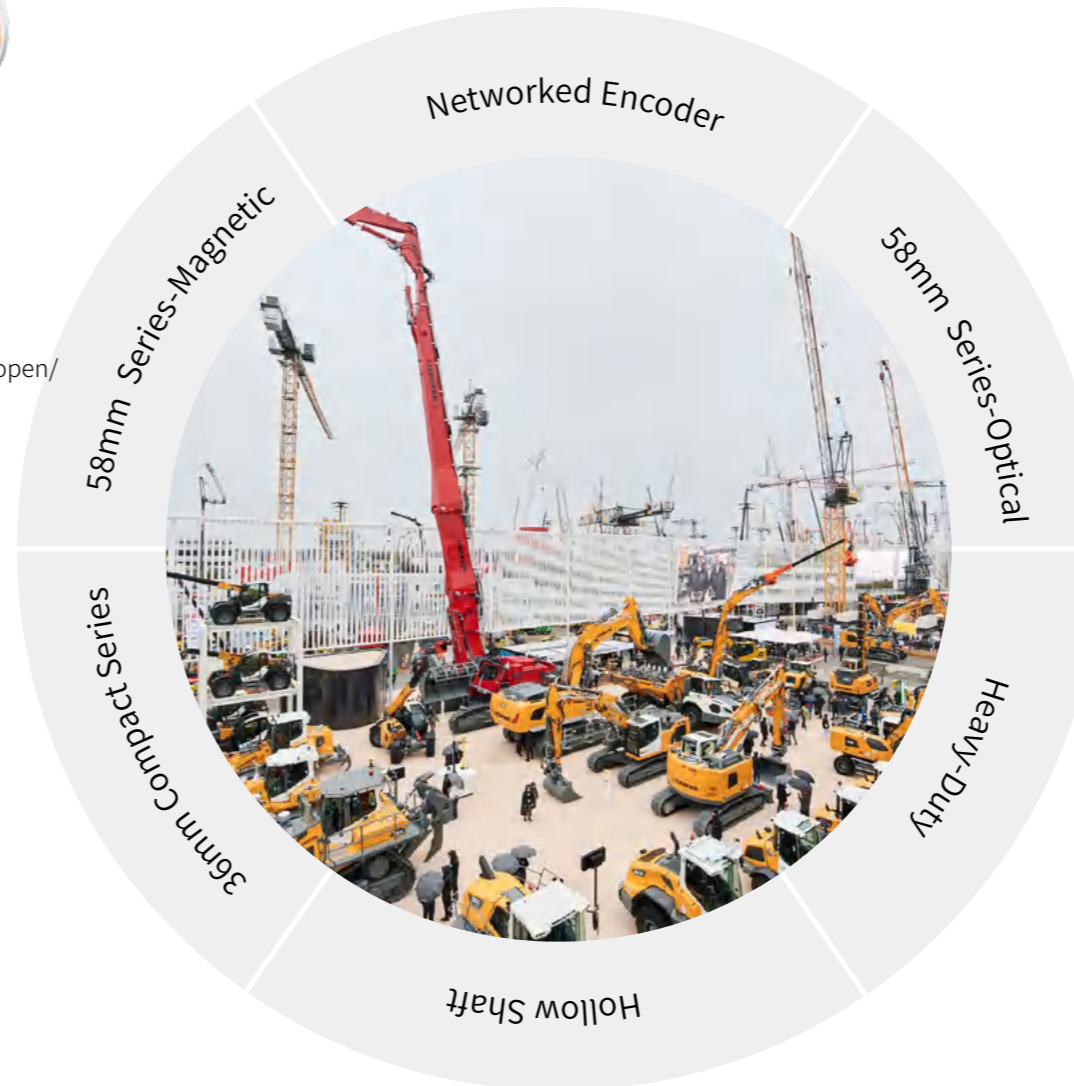
**Networked Encoder  
BNMA58**  
Diameter: 58mm  
Single lap resolution: 8...16bit  
Number of pturns: < 24bit  
Interface: Profinet



**Standard Encoder  
BNTI58**  
Diameter: 58mm  
Single lap resolution: 5000PPR  
Output: TTL/HTL



**Compact Encoder  
BNMA36**  
Diameter: 36mm  
Single lap resolution: 12...14bit  
Number of pturns: 13bit  
Interface: SSI, SSI+increment,  
CANopen



**Heavy-Duty Encoder  
BNTI100**  
Diameter: 99.5mm  
Resolution: 1024/5000PPR  
Output: TTL/HTL



**Hollow Shaft Encoder  
BNTI99**  
Diameter: 99mm  
Resolution: 1024/5000PPR  
Output: TTL/HTL

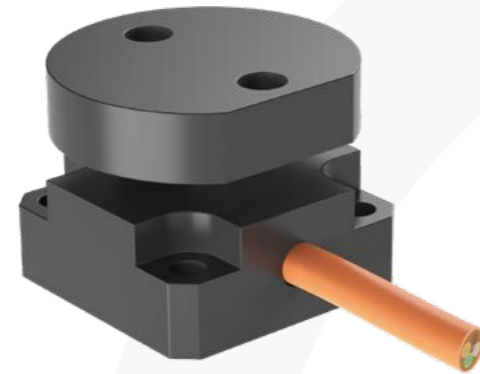
## Inclination sensor

It can be used in the application field of pursuing safety and high stability under harsh environmental conditions. A 3-axis gyroscope and a high-performance microcontroller are integrated inside. It can measure the attitude angle of xyz axis at the position where the sensor is installed, and can achieve stability in harsh environment. Fixed sensing.

## Angle sensor

The angle sensor is a device for measuring the rotation angle, which measures the change of the angle based on the physical principle. When there is a change between the rotating magnetic field and the Hall sensor, the Hall sensor can measure different magnetic field signals to determine the rotation angle.

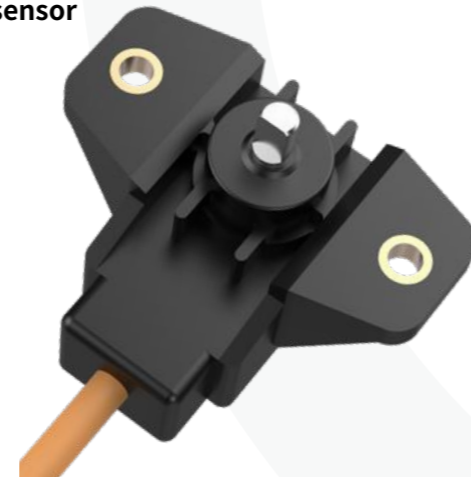
QM Angle sensor



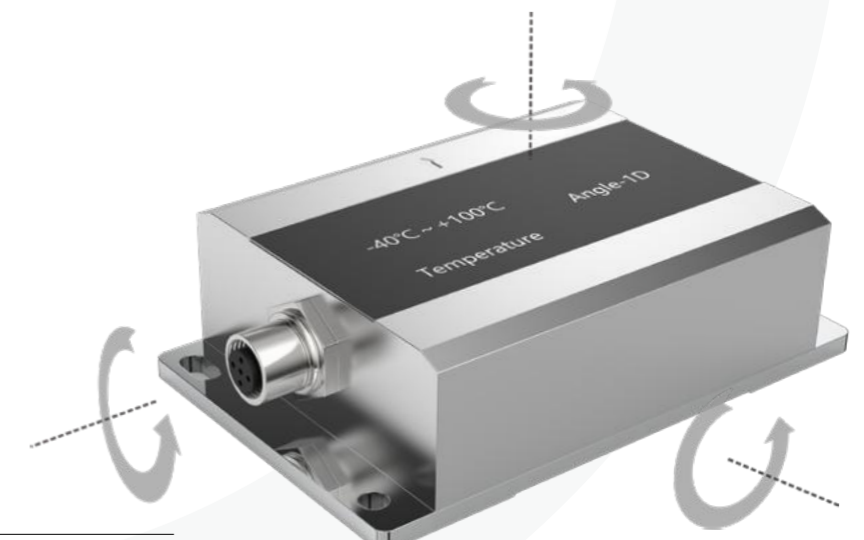
BNS74 Angle sensor



QF Angle sensor



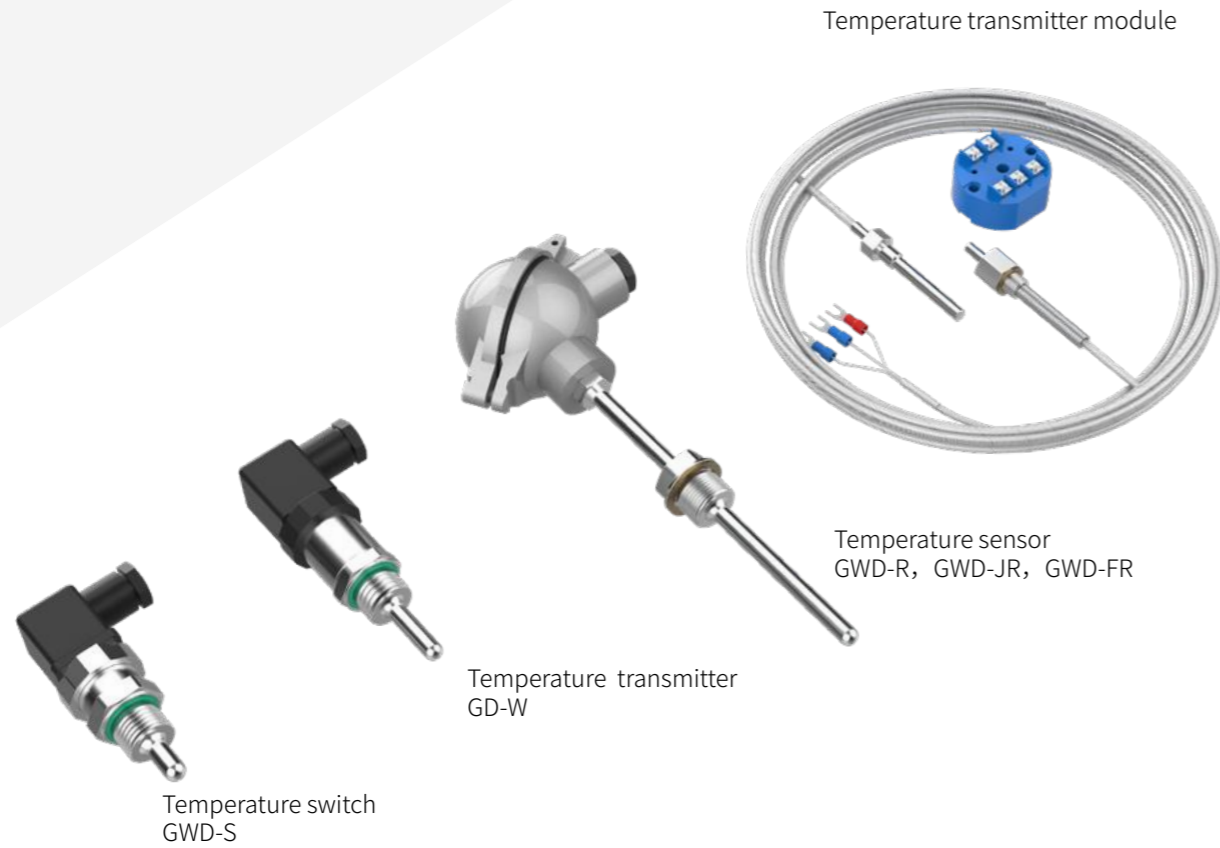
DAT12076-1D Angle temperature sensor



Type	QM Angle sensor	QF Angle sensor	BNS74 Angle sensor	DAT12076 Angle temperature sensor
Measurement data	Angle	Angle	Angle	Inclination and temperature
Output:	Analog	Analog	CANopen	CANopen
Measuring range	0° -360°	0° -90°	0~360°	X-axis: -180°...+180°, Y-axis:-90°...+90°, Z-axis:0...360° Temperature:-40°C...+100°C
Resolution	Angle: 0.09°	Angle: 0.1°	0.1° /0.01° /0.001°	Inclination: 0.1° Temperature: 0.1°C

# Temperature Series

Temperature sensor/Transmitter/Switch  
Liquid level temperature sensor



<b>Temperature measuring range</b>	-50~300°C (normal -50~250°C)					
<b>Graduation number/resistance value</b>		The standard resistance value R at 0°C	The standard resistance value R at 100°C			
	PT100	100.00	138.51			
	PT1000	1000.00	1385.1			
<b>Measurement Error</b>	Grade	Error of resistance at zero degree%		Temperature error °C		
	A	±0.06		± (0.15+0.002   t   )		
	B	±0.12		± (0.30+0.005   t   )		
<b>Response time</b>	Rod diameter mm	5	6	8	10	12
	Thermal response time s (T0.5)	≤ 8	≤ 15	≤ 30	≤ 30	≤ 30

# Liquid level temperature series

—Precise monitoring of liquid level and temperature, stable and reliable.

The float-type liquid level temperature sensor adopts the integrated design of float and temperature probe, which can measure liquid level height and liquid temperature at the same time, and has the characteristics of simple structure, corrosion resistance, strong antiinterference and long service life.



Type	LH-YT	YW
Liquid level range	40...2000mm	50...4500mm
Temperature range	-40...125°C	-40...125°C
Output	4 channels of NPN/PNP+2 channels of analog signals	Analog, CANopen

# Pressure transmitter series

## Pressure transmitter, digital display pressure, pressure switch

Adopting international advanced metal sputtering film pressure core, high-precision silicon pressure core and high-precision silicon flat film core, the equipment has high long-term stability, small temperature drift, wide temperature range, high precision and high pressure impact resistance.

### Digital pressure transmitter

- The electronic compartment can rotate freely 330°
- Analog+Two-way switch output



### Hessman digital display pressure transmitter

Adapting hessman connector of pressure transmitter



Type	PC-T / PE-T	PC / PE / PC-J
Name	Digital pressure transmitter	Hessman digital display pressure transmitter
Explain	Digital display pressure transmitter with integrated display; The electronic compartment can rotate freely by 330°.	Adapted to hessman connector of pressure sensor, it can set pressure unit, zero/full position correction point, upper/lower range and other functions.

### PC-type pressure transmitter

- High precision silicon pressure core
- Measuring range:-1~600Bar



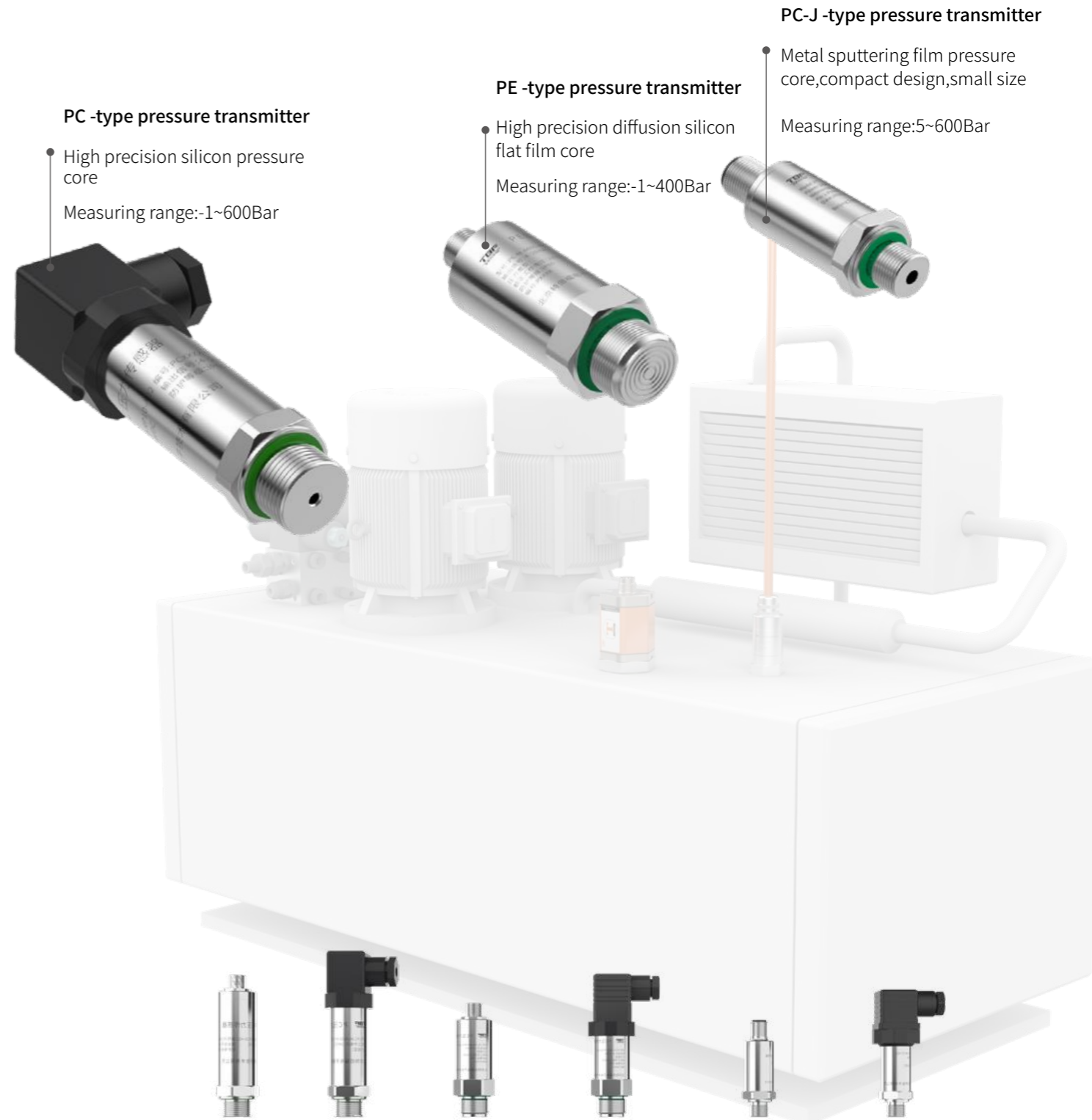
### PE-type pressure transmitter

- High precision diffusion silicon flat film core
- Measuring range:-1~400Bar



### PC-J-type pressure transmitter

- Metal sputtering film pressure core, compact design, small size
- Measuring range:5~600Bar



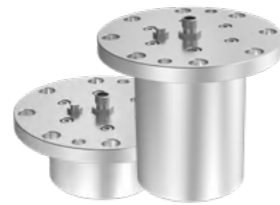
Type	PC	PE	PC-J
Pressure core	Diffused silicon	Diffused silicon flat film	Metal sputtering film
Measuring range	-1~600Bar	-1~400Bar	5~600Bar
Pressure Type	Gauge pressure, absolute pressure and sealed gauge pressure	Gauge pressure and absolute pressure	Gauge pressure

# Pressure transmitter series

It is used to monitor the earth pressure in the earth cabin of shield machine, that is, the pressure of mud or soil. This is a very important parameter in the construction of shield machine, because it directly reflects the stability of soil and the tunneling conditions of shield machine.

**Earth pressure monitoring:** measure the pressure of the soil in front of the shield machine in real time to help the operator control the advancing speed and direction of the shield machine.

**Mud parameter monitoring:** including mud density, viscosity and other parameters to ensure that the mud performance meets the construction requirements.












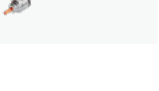
	PT Soil pressure transmitter	PT(D86) Soil pressure transmitter	LP Grouting pressure transmitter	PF Mud water pressure transmitter	PNJ Mud transmitter	PSY01 Ceramic membrane piezometer	PF-H Circulating pipeline pressure transmitter
Measurement data	Pressure, temperature	Pressure, temperature	Pressure	Pressure	Pressure	Pressure	Pressure
Pressure type	Gauge pressure and absolute pressure						
Output:	4~20mA; 0~5V; 1~5V; 0~10V	4~20mA; 0~5V; 1~5V; 0~10V	4~20mA; 0~5V; 0~10V	4~20mA; 0~5V; 0~10V	4~20mA; 0~5V; 0~10V	4~20mA HART	4~20mA; 0~5V; 0~10V
Supply voltage	12-32VDC	8-36VDC	12-32VDC	12-32VDC	12-32VDC	12-32VDC	12-32VDC
Measuring range	0~0.6MPa、0~1.0MPa、-0.1~1.6MPa (Other ranges can be stomized.) temperature: -30-100°C	Pressure: 0~1.0MPa (Other ranges can be customized.) temperature: -30-100°C	-0.1~4MPa (Other ranges can be customized.)	0~1.0MPa、0~1.6MPa、-0.1~1.5MPa (Other ranges can be customized.)	0~1.6MPa (Other ranges can be customized.)	-0.1~4MPa (Other ranges can be customized.)	-0.1~1.5MPa (Other ranges can be customized.)
Measurement accuracy	pressure: ±0.5%F.S. temperature: ±1°C	pressure: ±0.5%F.S. temperature: ±1°C	±0.5%F.S.	±0.5%F.S.	±0.5%F.S.	±0.3%F.S.	±0.5%F.S.
Overload pressure	200%F.S.	200%F.S.	200%F.S.	200%F.S.	200%F.S.	200%F.S.	200%F.S.
Working temperature	0°C ~ 70°C	0°C ~ 70°C	0°C ~ 70°C	0°C ~ 70°C	0°C ~ 70°C	-20°C ~ 70°C	0°C ~ 70°C
Procedure linkag	flanged connection	flanged connection	lathedog	G2 threaded connection	Install thread R 2", tail thread R 1 1/2"	G1 1/2、G2	R 1 1/2"
Type of TBM	Soil pressure shield machine	Soil pressure shield machine	Mud shield machine	Dual-mode shield machine	Dual-mode shield machine	Dual-mode shield machine	TBM Universal

# Product overview

## The dedicated sensory system for engineering machinery



- Magnetostrictive displacement sensor
- Draw Wire Sensor
- Angle/inclination sensor
- Process state monitoring-Temperature
- Encoder
- Pressure transmitter

### Position detection-magnetostrictive displacement sensor





Bild	Type	Range	Electrical interface
	T3H	50...7650	Analog, SSI, Start/Stop, CANopen, EtherNet/IP, IO-Link, PROFINET, EtherCAT
	T3D	50...5600	Analog, SSI, Start/Stop, CANopen, EtherNet/IP, IO-Link, PROFINET, EtherCAT
	T3F	100...20000	Analog, SSI, Start/Stop, CANopen, EtherNet/IP, IO-Link, PROFINET, EtherCAT
	CH2	50...4500	Analog, SSI, Start/Stop
	DH2	50...5600	Analog, SSI, CANopen
	K	50...5600	Analog
	GB	50...4500	Analog, SSI, Start/Stop, CANopen
	GBM	50...4500	Analog, SSI, Start/Stop, CANopen
	MH	50...4500	Analog, CANopen
	ES	50...2500	Analog, CANopen

### Position detection-draw wire sensor








Draw Wire Sensor	Type	Range	Electrical interface
	RT40D	0..1m	Analog
	RT60	0...5m	Analog CANopen
	RT60B	0...3m	Analog CANopen
	RT120S	0...4m	Analog CANopen
	RT80D	0...8.3m	Analog CANopen
	RT90S	0...3.5m	Analog
	RT175	0...12m	Canopen SSI

Long angle sensor	Type	Range	Electrical interface
	RTQ7	Range: 0...7m Inclination: 0...360°	CANopen
	RTQ12	Range: 0...12m Inclination: 0...360°	CANopen








### Monitoring of angle/inclination

Angle sensor	Type	Range	output
	QM	0...360°	Analog
	QF	0...90°	Analog
	BNS74	0...360°	CANopen
Inclination sensor	Type	Range	output
	DAT12076 (uniaxial/biaxial/triaxial)	Inclination:0...360° Temperature:-40°C ....+100°C	CANopen

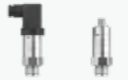










Rotational position monitoring-encoder

Absolute value	Type	Output	Resolution
	BNMA36 (magneto-electricity)	CANopen	Single circle: 12-14bit Multi-circle: 13bit
	BNMA58 (magneto-electricity)	Profinet	Single circle: 12-16bit Multi-circle: ≤ 20bit
Increment	Type	Output	Resolution
	BNTI58 (photoelectricity)	TTL / HTL Channel: A A- B B-Z Z-	10000, 5000, 2500, 1250 8192, 4096, 2048, 1024 7200, 3600, 1800, 900 PPR
	BNTI99 (photoelectricity)	TTL / HTL Channel: A A- B B-Z Z-	5000 PPR
	BNTI100 (photoelectricity)	TTL / HTL Channel: A A- B B-Z Z-	1024 PPR
Absolute value+increment	Type	Output	Resolution
	BNMA58 (magneto-electricity)	SSI/SSI+increment CANopen/CANopen+increment increment Channel: A A- B B-	Single circle: 8-16bit, Multi-circle: ≤ 24bit increment: 512PPR, 1024PPR, 2048PPR, 4096 PPR (Other values can be customized)
	BNMA36 (magneto-electricity)	SSI/SSI+increment increment Channel: A A- B B-	Single circle: 12-14bit, Multi-circle: 13bit increment: 512PPR, 1024PPR, 2048PPR, 4096 PPR (Other values can be customized)

Process state monitoring-temperature

Temperature series	Name	Type	Range	Output
	Temperature switch	GWD-S	-20~120°C	SPST
	Temperature transmitter	GD-W	0~100°C	Analog
	Temperature sensor	GWD-JR	-50~300°C	Resistance signal
	Temperature sensor	GWD-R	-50~250°C	Resistance signal
	Temperature sensor	GWD-FR	-50~250°C	Resistance signal
	Liquid level temperature sensor	YW	Liquid level : 50...4500mm temperature : -40...125°C	Analog
	Liquid level temperature sensor	LH-YT	Liquid level: 40...2000mm temperature : -40...125°C	4-way switch value+2-way Analog

Process state monitoring-pressure

Liquid, gas	Type	Range	Output
	PC-J	5...600Bar	Analog current output, analog voltage output
	PE	-1...400Bar	Analog current output, analog voltage output, RS485
	PC	-1...600Bar	Analog current output, analog voltage output
	PE-T	-1...400Bar	Analog+Two-way switch output
	PC-T	-1...600Bar	Analog+Two-way switch output
Sludge water and earth pressure	Type	Range	Pressure type
	PT (Earth pressure transmitter)	0...0.6MPa, 0...1.0MPa, -0.1...1.6MPa (Customizable) temperature: -30-100°C	Gauge pressure absolute pressure
	PT(D86) (Earth pressure transmitter)	0...1.0MPa (Customizable) temperature: -30-100°C	Gauge pressure absolute pressure
	LP (Grouting pressure transmitter)	-1...4MPa (Customizable)	Gauge pressure absolute pressure
	PF (Mud water pressure transmitter)	0...1MPa, 0...1.6MPa, -0.1...1.5MPa (Customizable)	Gauge pressure absolute pressure
	PNJ (mud pressure transmitter)	0...1.6MPa (Customizable)	Gauge pressure absolute pressure
	PSY01 (Ceramic membrane piezometer)	-0.1...4MPa (Customizable)	Gauge pressure absolute pressure
	PF-H (Circulating pipeline pressure transmitter)	-0.1...1.5MPa (Customizable)	Gauge pressure absolute pressure

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Any changes are made without prior notice

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