Pressure Transducer Training

CONTENTS

Safety

Stability

Reliablity

Csherun was founded in 2009, with products covering multiple industries such as power, medical, chemical, electronics, mechanical manufacturing, and instrumentation. Instrumentation is an important component of our company, and the company is committed to establishing new product quality standards for instrumentation (Herun Standard). Starting from the research and development of the most basic parts, the company has gathered the wisdom of all researchers and has developed a variety of products with quality leading global industry standards.

The product quality of the company has been recognized by a large number of customers, and in the manufacturing of instruments and meters, we have developed a fully automated assembly production line system that is leading globally, and have put forward a quality commitment guarantee that is superior to that of our peers in the industry.

With the joint efforts of dealers around the world and the high-quality staff, we provide high-precision instruments and comprehensive services. Nowadays, our products can meet the requirements of most industrial measurement technologies.

Changshu Herun Import & Export Co., Ltd

The core team comes from top multinational companies in the instrumentation and sensor manufacture enabling us to develop and deliver more innovative solutions for industrial challenges.

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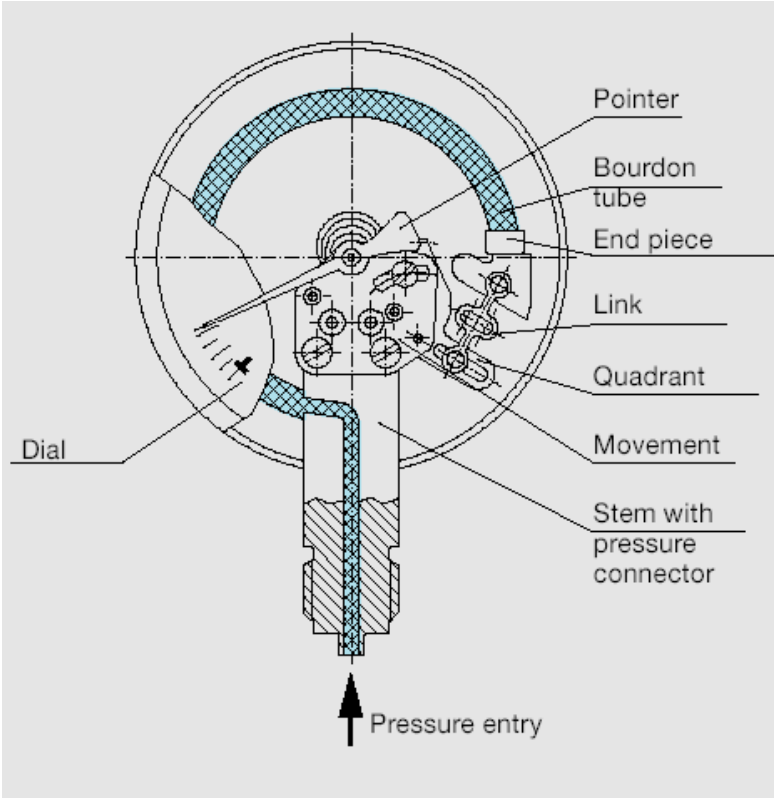
What is a Pressure Transducer??

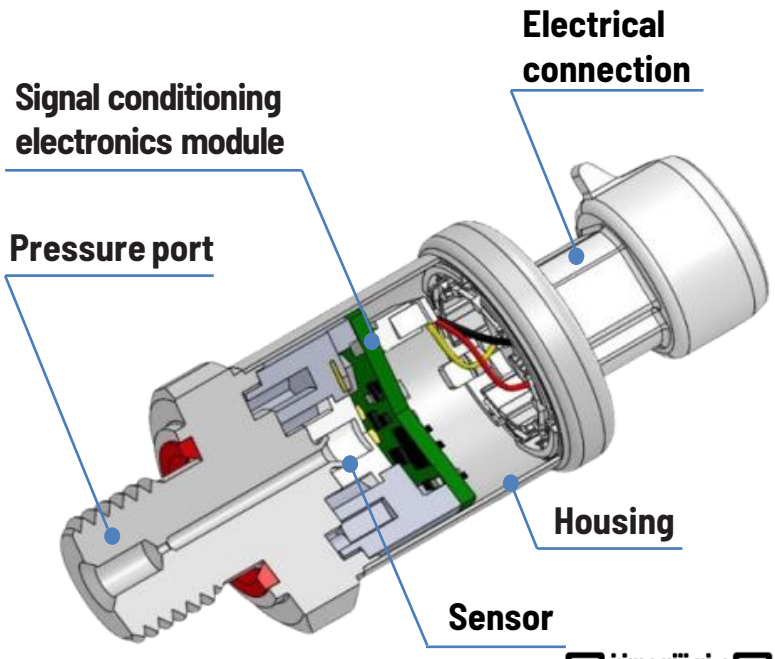
Dial Gauge

A Dial Gauge receives pressure and converts it into the mechanical movement of a pointer on a gauge

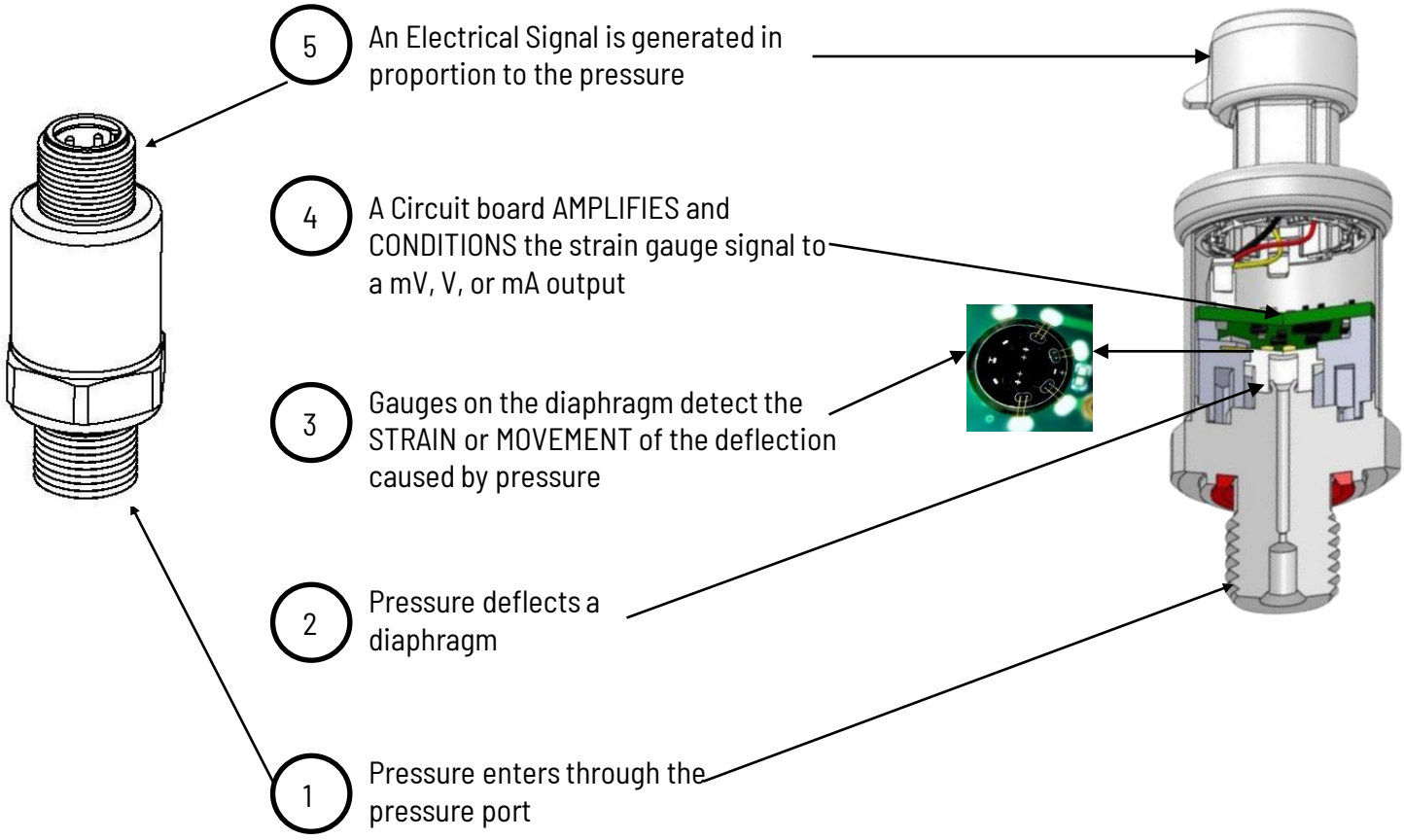


Pressure Transducer

A Pressure Transducer receives pressure and converts it into an electrical signal



1 How a Strain Gage Pressure Transducer Works



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Pressure Modes

Absolute Pressure is the pressure difference between *Absolute Vacuum* and the measurement

Absolute Pressure is commonly also measured in Gas Supply Systems, Refrigerant, and Altimeters.

Gauge Pressure is the pressure difference between *ambient* pressure and the measurement.

90% of what we encounter in the industrial world requires a gauge pressure measurement

Differential Pressure is the difference in pressures from two different readings

Flow measurement is commonly done with a differential, or DP measurement

Vacuum Pressure

Causes confusion, and needs to be carefully understood, as it can mean TWO different things:

- Negative Gauge pressure ie (-15psi or 29 inches of vacuum), a 30/30 gauge (30 inches of Mercury to 30 psi), or a compound (-15 to 100psi)
- OR it can also mean an Absolute pressure ie (10 microns of vacuum)

ALWAYS ask ....NEVER assume !

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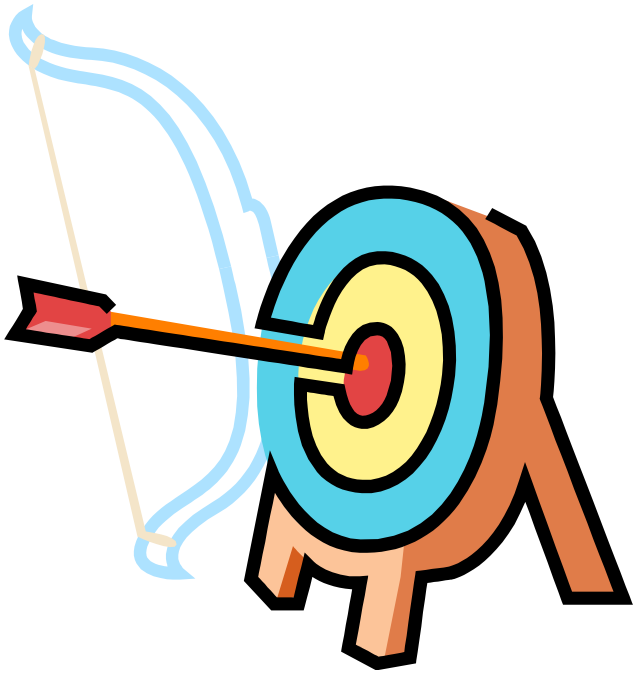
Concepts of Static Accuracy

Typical Components

- Non-linearity
- Hysteresis
- Non-repeatability
- Zero / Span setting errors
- Thermal Effects
- Thermal coefficient data
- Thermal error band
- Stability



Expressed

- Best Fit Straight Line (BFSL)
- Terminal Point Method
- Root Sum Square

"Allowable deviation of transducer output values from a specified line"

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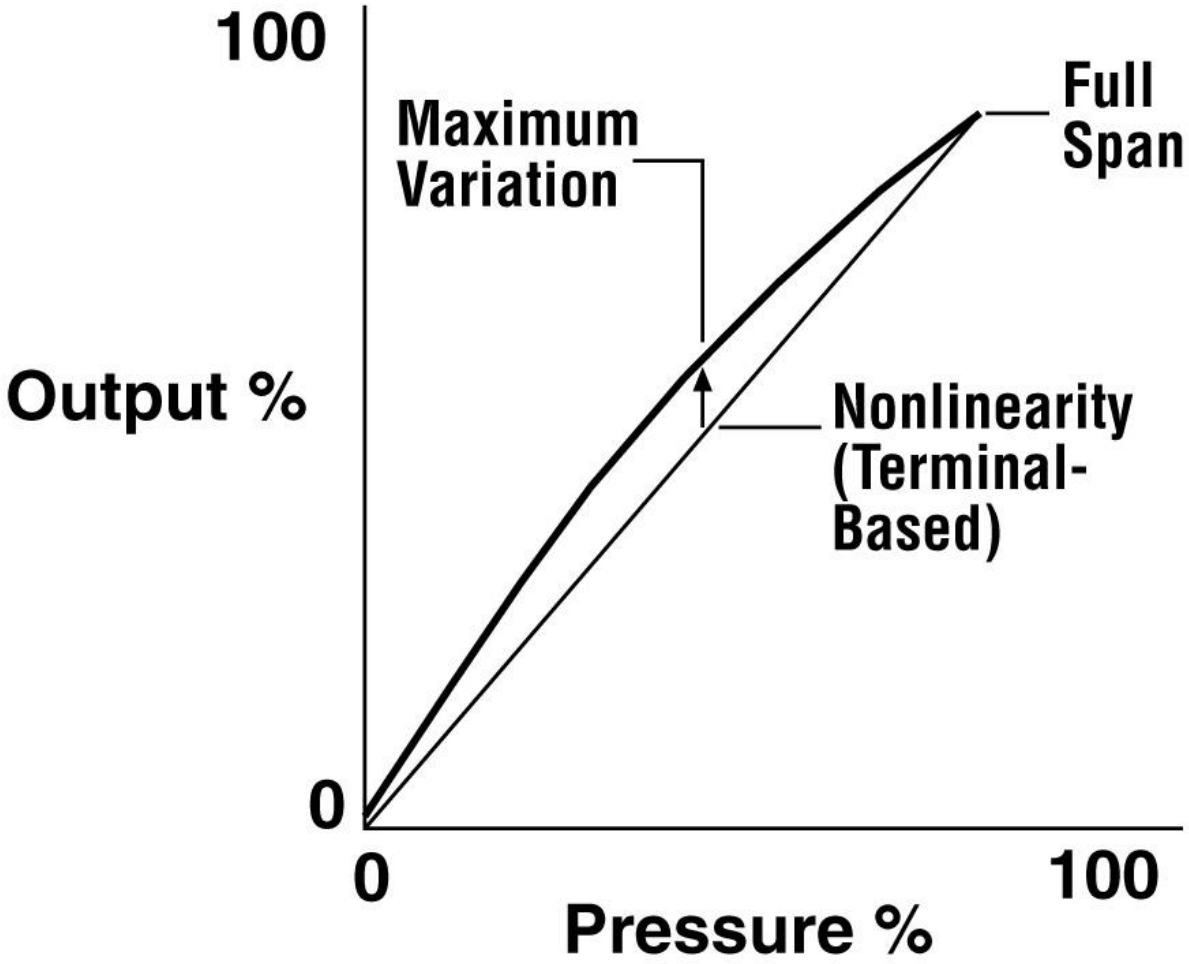
Concepts of Static Accuracy:

Non-Linearity

Non-Linearity: Terminal Point



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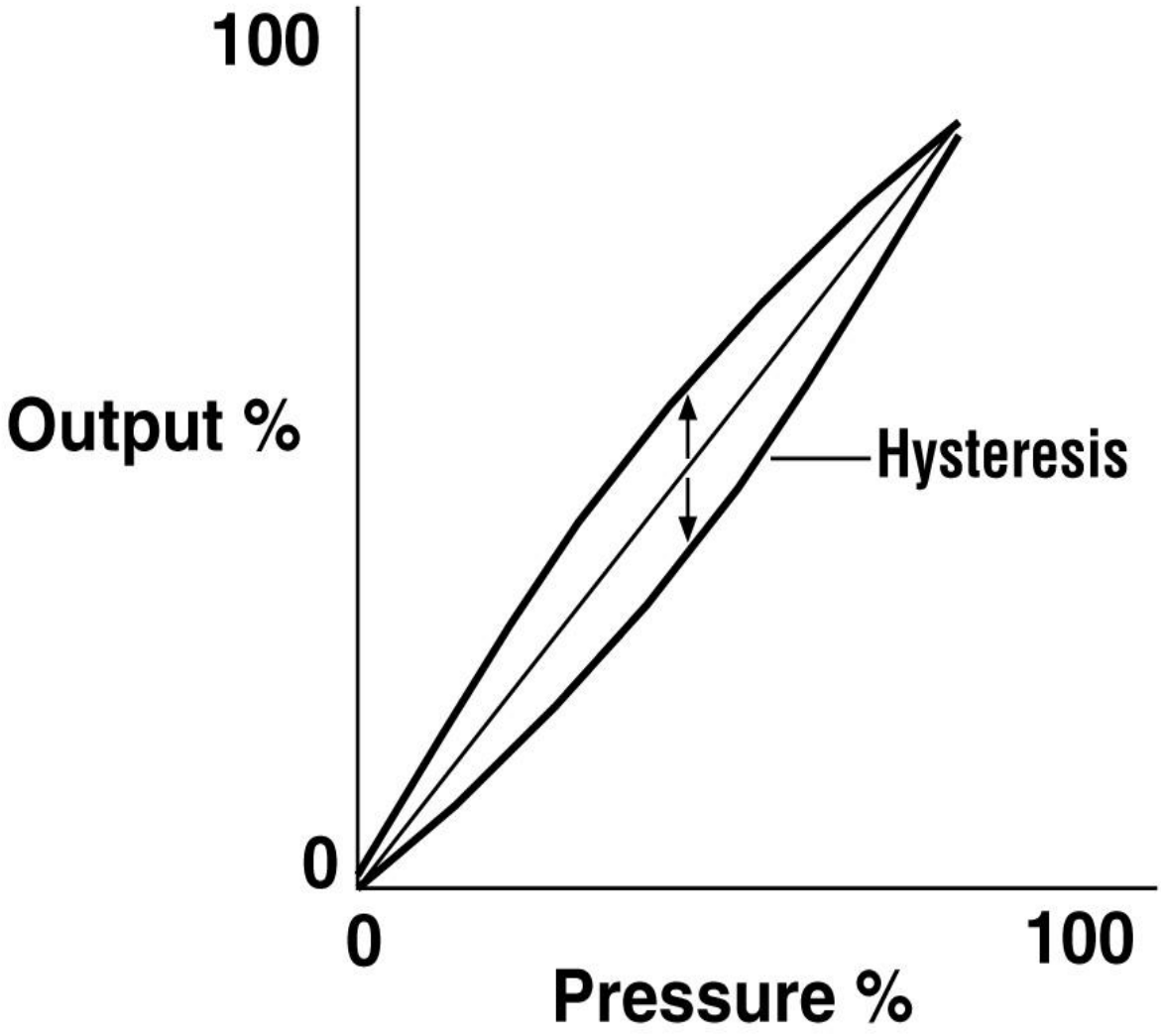
Concepts of Static Accuracy:

Hysteresis



Difference in output reading at a given pressure point
Increasing from zero
Decreasing from full scale

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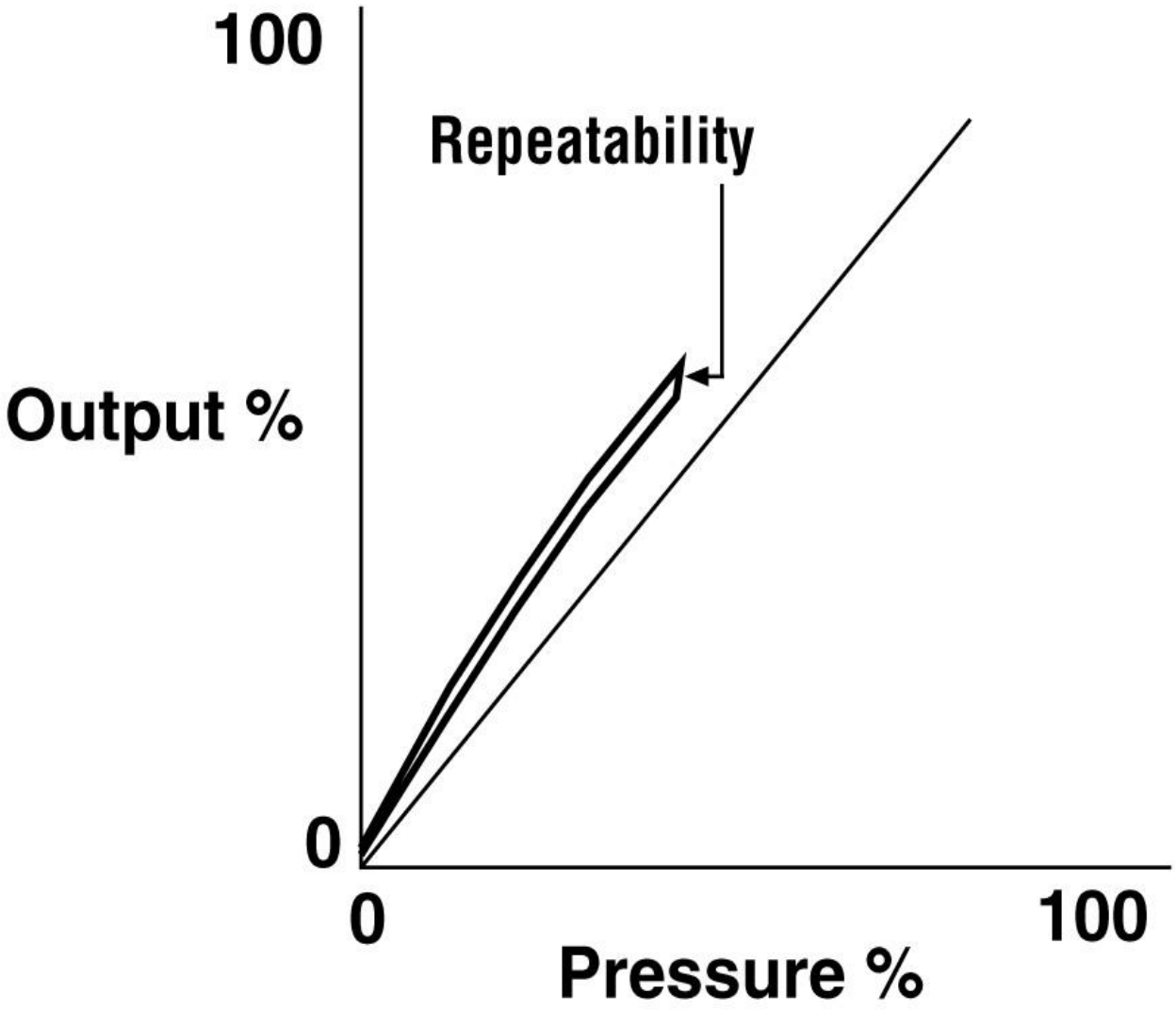
Concepts of Static Accuracy:

Non-Repeatability



Difference in output reading to a given pressure point

Applied to the same point consecutively

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Concepts of Static Accuracy:

Typical Herun Pressure Transducer Static Accuracy Statement, Definition:

"Terminal Point Method-To include the combined effects of non-linearity, hysteresis, non-repeatability, and zero offset and span setting errors at reference temperature".

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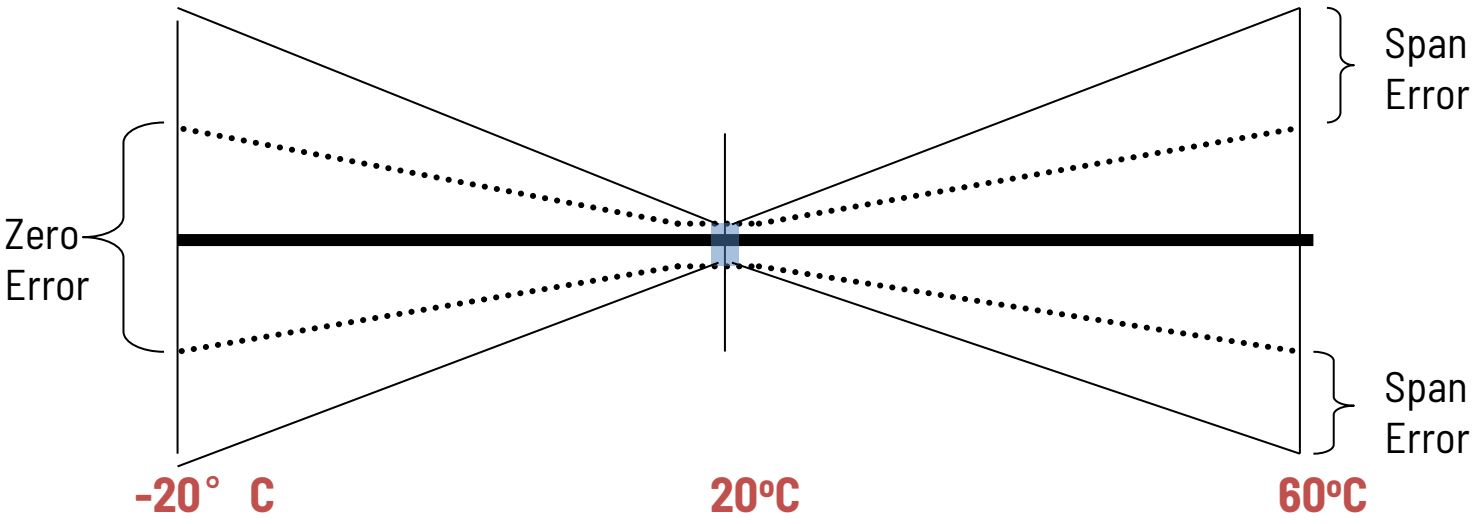
Thermal Coefficient Specification:



Zero and Span Temperature Specification that is proportional to the change in Temperature.

Typical Specification is : +/- x % of span/ °C or+/- x % of reading/ °C

Terms "Zero Thermal Coefficient" or "Zero T.C."

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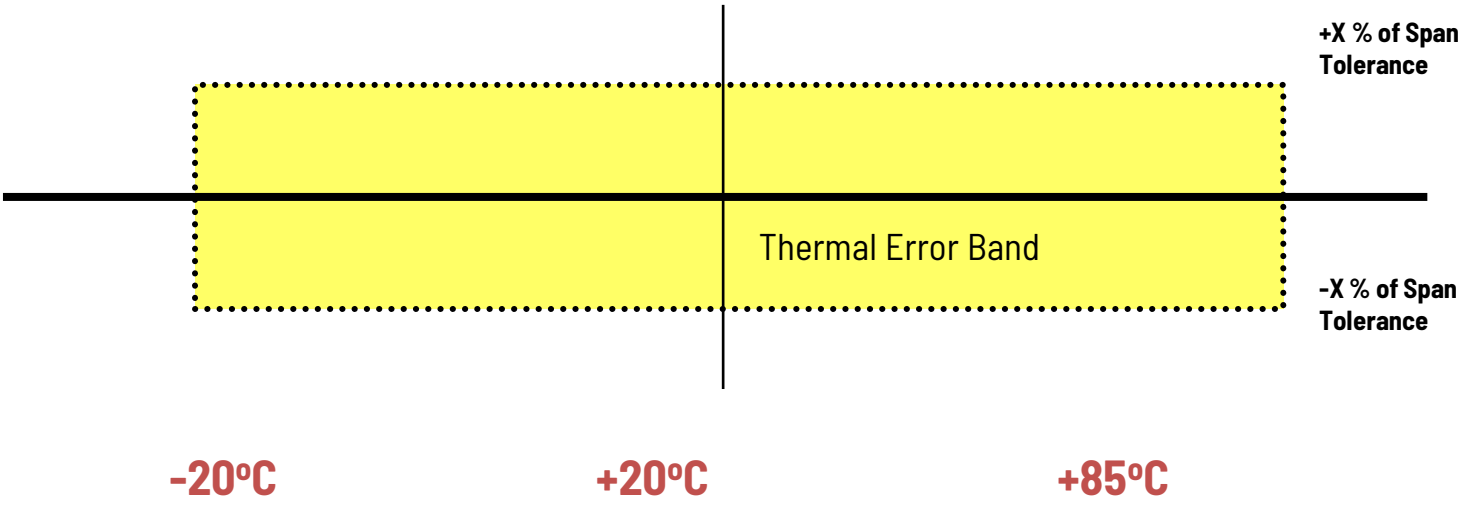
Thermal Error Band



Thermal Error Band: Specification that is constant over a given temperature range.

Typical Specification is: +/- x % of Span from - 20 ° C to +85 ° C

Terms: "Thermal Error Band" or "Total Error Band" -if including additional static accuracy components.

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What to Know About Accuracy

Static Accuracy (without including temperature effects)

- 1% is Low Accuracy
- 0.5% is Average
- 0.25% is Good
- Better than 0.1% is High Accuracy

Temperature Effects from -5 to 185 F

- 5% is Low Accuracy
- 3% is Average
- 1.5% is Good
- Better than 1% is High Accuracy

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Lead the Selling Process !!!

- What's your pressure connection?
- What's your process media?
- What's your operating pressure, proof pressure?
- What output signal do you use?
- What electrical connection do you need?
- What type of environment will the unit be used in?
- Will the unit be exposed to pulsation, vibration, shock?
- What range of temperature will the unit see?
- What level of accuracy is needed- how do you define accuracy?
- Are any agency listings required?
- Do you incorporate a calibration cycle-why?

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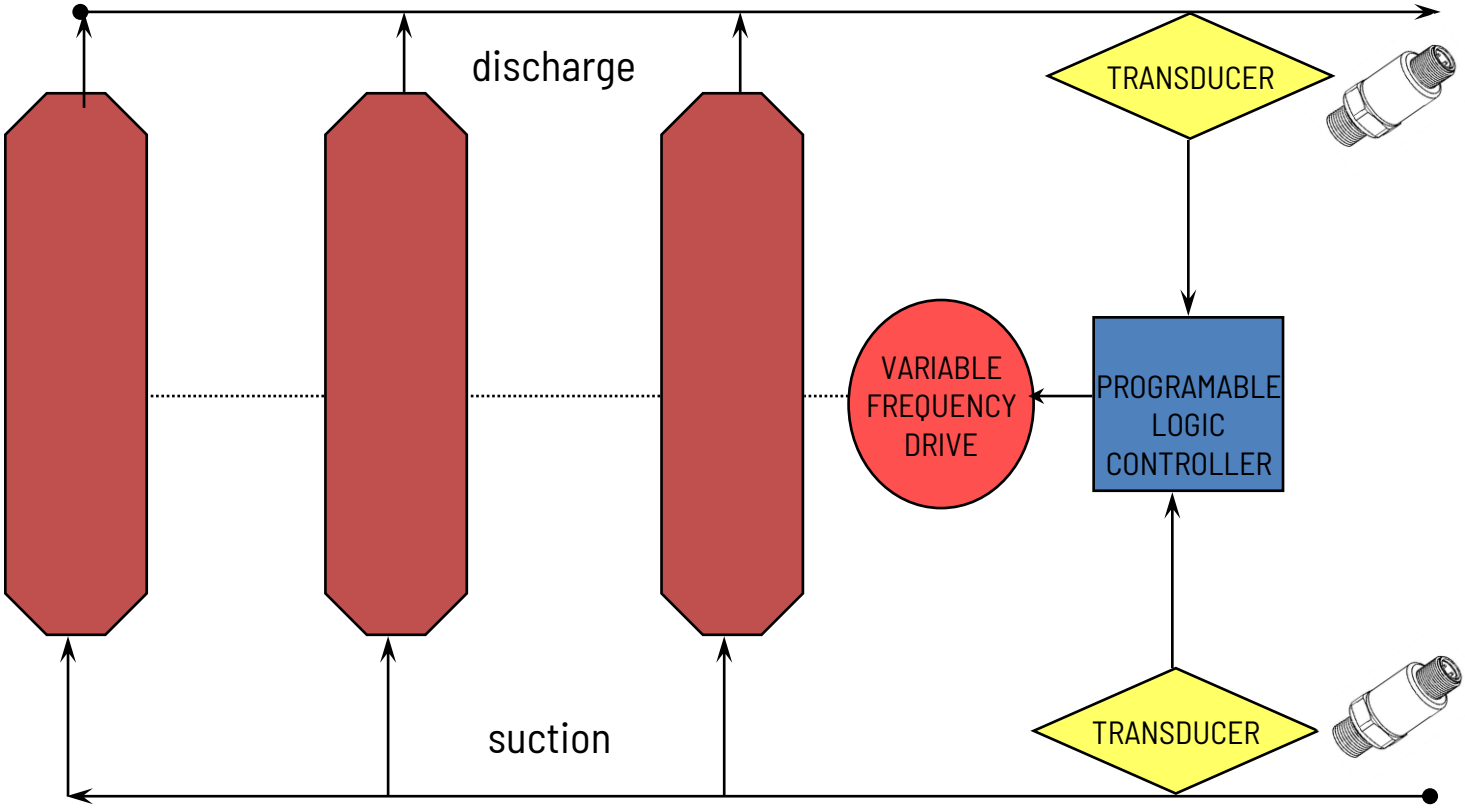
Why are pressure transducers used?



Refrigeration Closed Loop Control System

Pressure transducers / transmitters are used typically used for either monitoring or control.

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Technology Overview

Technology	Manufacturers	Strengths	Weaknesses
Bonded Silicon (Fused)	•Honeywell-Data Instruments •MSI •TI (MSI)	•Start up costs low •High gauge factor-low pressure capability (10psi+)	•Labor intensive-consistency? •Gluing-stability? •Temperature compensation
Oil Filled MEMS	•Ametek •GE Druck •Keller •Kavlico •MSI •Saginomiya •Wika	•Stability •Easy to package •Thermal shock isolation-refrigeration •Absolute is low cost •Media compatibility (isolated)	•Fast response-hammer failure •Fluid fill concern, thin isolation diaphragm •High pressure
CVD Thin Film	•Gems •Nagano-Ashcroft •AST	•Low cost •Stability •High pressure, rugged	•Low pressure •Isolation voltage •Thermal shock
Sputtered Thin Film	•Senstronics/Gems,Danfoss •Wika •Herun	•Low cost •Stability •High pressure, rugged	•Low pressure •Isolation voltage •Thermal shock
Capacitance	•Kavlico •Keller (Kavlico) •Mamac •Nagano-Ashcroft •Setra •TI •Veris (Kavlico)	•Low cost •Thermal isolation (ceramic) •Low pressure capability •Durability (ceramic)	•Media compatibility •High pressure ~ 5,000 psi •Stability ~0.5%/yr •Temperature error

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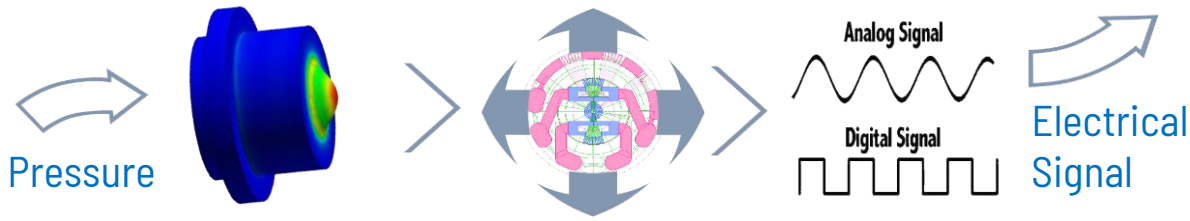
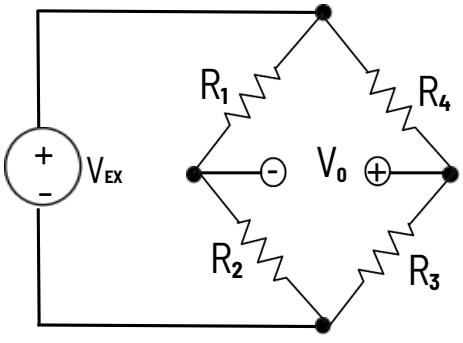
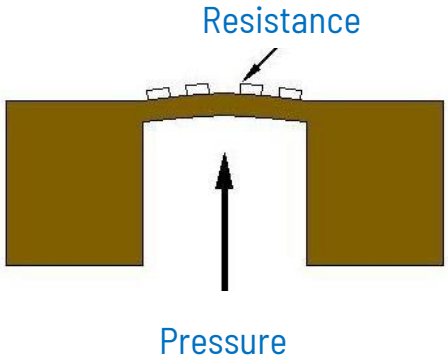
Characteristics of Herun pressure transducer



A device or apparatus that uses microelectronic processes such as thin film deposition to directly fabricate thin film resistance conversion elements on metal substrate sensitive elements, senses pressure through the principle of resistance strain, and converts it into usable output signals according to certain rules is called a metal based thin film pressure-sensitive chip (also known as a metal based thin film core or sputtered thin film core). After further processing the usable signals into specified standard signals, it is called a metal based thin film pressure transmitter (also known as a sputtered thin film pressure transmitter).





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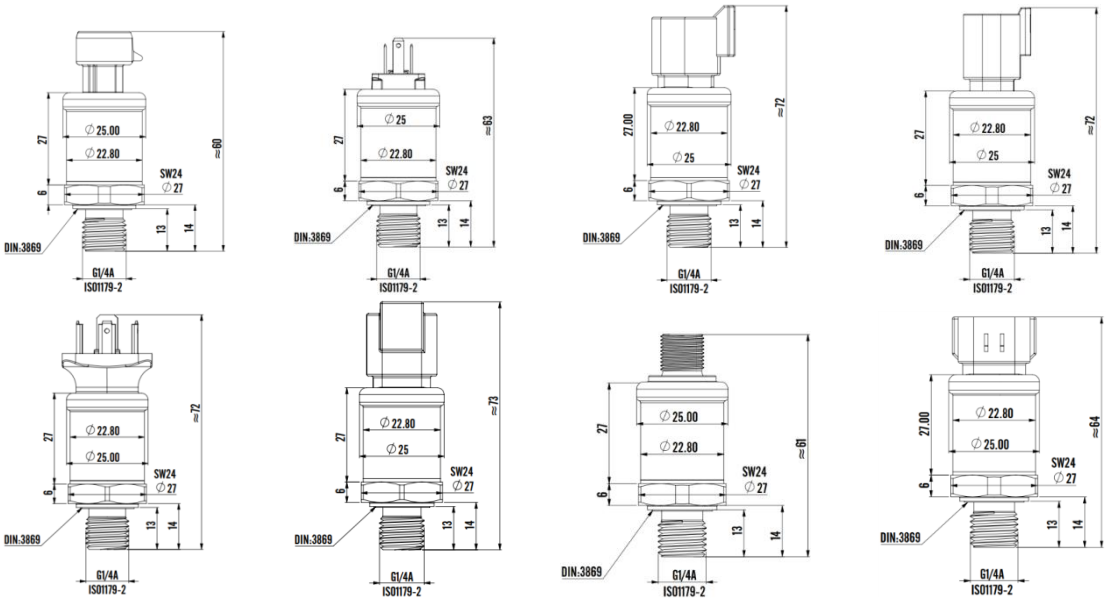
Characteristics of Herun pressure transducer

- Excellent long-term stability
- Thin-film-on-steel sensor technology
- Completely welded steel sensor system without additional seals
- Superior anti-interference,vibration resistance,electromagnetic compatibility,shock resistance and advanced insulation film material resistant to very high over pressures
- Wide temperature adaptability
- Response time ≤1ms
- Protection IP67
- Various electrical connections
- Low cost, adapt needs of customers to develop OEM solutions

Highest Accuracy 0.02% FS

General OEM Pressure Transmitter Technical Data

Measuring principle	Thin-film-on-steel	Accuracy	± 0.5% FS (±0.25% ±0.1% FS Optional)
Measuring range	-1 ~ 60psi...36000psi	Long term stability	≤ 0.1% FS/year
Output signal	4 ... 20mA 0 ... 10VDC 0 ... 5VDC 0.5 ... 4.5VDC 1 ... 6VDC IIC	EMC protection	Emission (IEC 61000-6-3) Immunity (IEC 61000-6-2)
Rise time	≤1ms	Vibration	20g, 20Hz ~ 2000H (IEC60068-2-6)
Insulation resistance	≥500MΩ/500VDC	Shock	100g, 6ms (IEC60068-2-27)
Sensor	17-4PH / 2.4711	Durability	>1,000,000 cycles
Protection	IP67	Media temperature	-40°C ... +125°C



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Application of Herun pressure transducer/transmitter

Hydraulics

- Injection molding machines
- Agricultural machinery
- Construction machinery
- Elevators
- Municipal fire protection

Heavy Truck

- Common rail injection
- Transmission
- Turbo charger
- Fuel pressure
- Air-conditioning system

Shipbuilding

- Propulsion
- Ballast water treatment
- Pumps
- Engine
- Tower crane

3

Application of Herun pressure transducer/transmitter

Railways

- Lubrication systems
- Brake systems
- Air-conditioning equipment
- Propulsion
- Sanding systems

Petrochemical

- Process technology
- Oil and gas pipeline
- Oil tank
- Tank vehicle
- Refinery

Various

- Water treatment
- Sanitary applications
- Industrial gas
- Basic materials
- Power generation
- Semiconductor
- Textile cable

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