



ESI Technology Ltd

ZERO & SPAN ADJUSTMENT



What is ZERO OFFSET?

- ▶ Zero offset is the **deviation in output** or reading from the ideal point at zero pressure.
- ▶ Pressure transducers and transmitters are factory calibrated to read a **fixed output range** ... example... **4-20mA**
- ▶ Zero offset and span tolerance are the **actual signal outputs** at zero and full span.
- ▶ Offset tolerance is usually expressed as a percentage of full span (difference between zero and full scale output).





Zero offset explained

- ▶ If the pressure transmitter is to be calibrated when installed, the zero and span offset can be easily eliminated.
- ▶ This can be done using system settings or by using adjustment features incorporated in the pressure transmitter
- ▶ But if the pressure transmitters have to be installed or replaced without calibration they must be included in the overall accuracy of the pressure sensor.
- ▶ Typically the tolerances are indicated as separate items on a data sheet expressed as [Zero Offset and Span Tolerance](#)



Effects of tightening on zero reading

Torque effects on output reading...

- ▶ In addition to manufacturing tolerances the effects of tightening when installing a pressure transducer or transmitter can affect the output reading
- ▶ Tightening is necessary in order to make an effective pressure seal

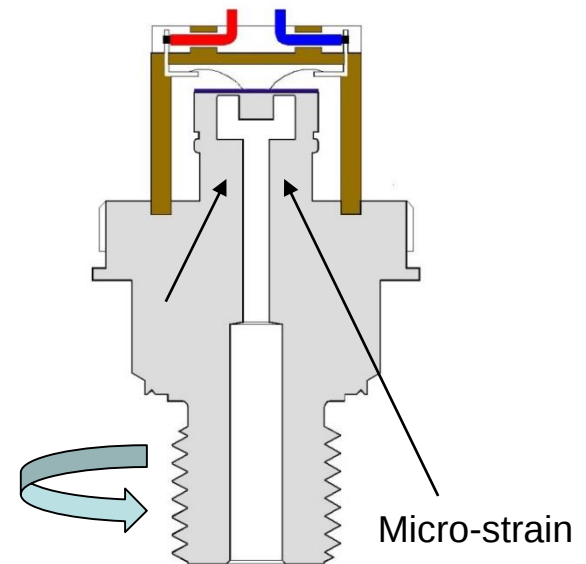




Effects of tightening on zero reading

Torque effects on output reading...

- ▶ Tightening can induce stress to the housing which may transfer to the sensor and **create a small zero offset**
- ▶ Often this small offset can be adjusted/corrected in the software/control system/data logger
- ▶ If the pressure sensor is going to be calibrated when installed, the zero and span offset can be easily eliminated in this way, **or by using in-built features of the transmitter (if present)**





How to adjust zero

Zero offset can therefore be present...

1. before installation (within stated tolerance of product)

or

2. induced during installation (tightening)

Extract from competitor website....

*“After the installation it is recommended to adjust the offset of the pressure transmitter.
The calibration is not affected by post-adjustment of the offset”*

Important: Adjustment of zero point does not mean a change in calibration!



How to adjust zero

Adjustment using transmitter features

Many ESI products have accessible calibration adjustment potentiometers for the purpose.

The purpose of this feature is to permit fine adjustment



Remove DIN Socket



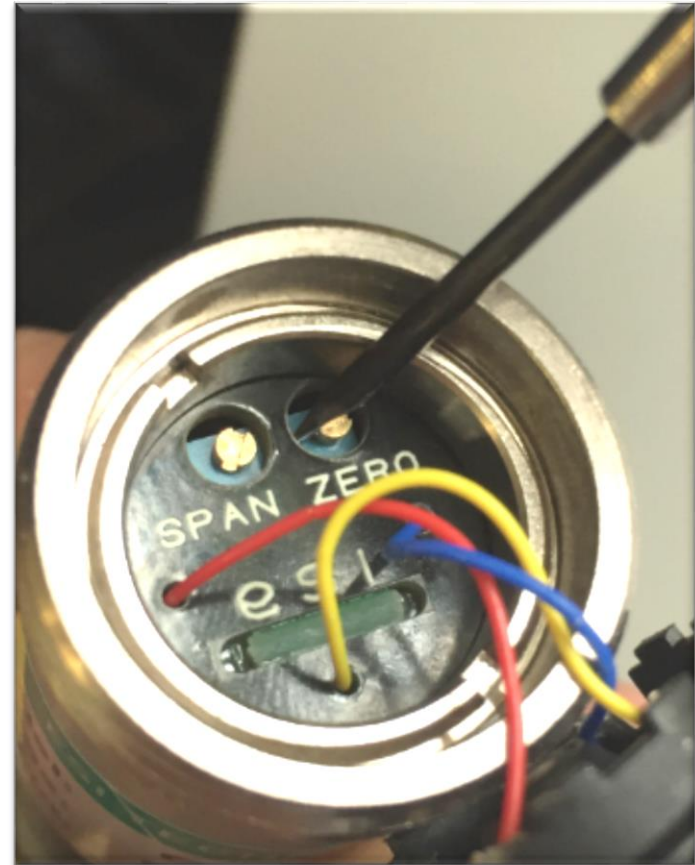
Remove DIN retaining nut



How to adjust zero



Carefully remove DIN plug taking care not to stress coloured wires.



Use adjustment potentiometers to adjust settings.



How to adjust zero

Zero adjustment – When is it necessary?

Zero adjustment will normally be used for 'fine-tuning' to compensate for

1. Torque 'tightening' effects
2. Temperature effects
3. Positioning of the unit - orientation
4. Effects of attaching specialised adaptors or filled barrier seals

Important:

Not all customers will want to make adjustments providing the zero reading is within our published tolerance





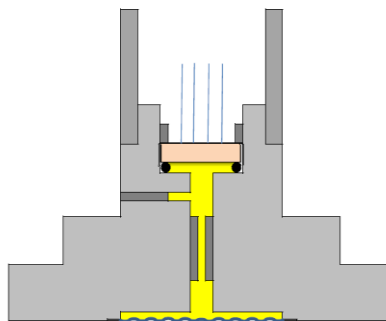
How to adjust zero

Zero adjustment – When is it necessary?

When barrier seals are attached to a pressure transducer or transmitter a fill liquid will be introduced

In most cases this will change the output signal at zero pressure due to the fill oil content

Orientation can also affect reading



Reversed position exerts positive pressure on sensor

Upright position fill liquid exerts negative pressure on sensor





What is the purpose of span adjustment?

Span adjustment – Is it necessary?

- Under normal circumstances it is not necessary to adjust the span setting
- ESI do not promote the use of span adjustment
- It should only be used when a certified pressure measurement source is available to use as a comparison standard





What is the purpose of span adjustment?

Span adjustment – When would you use it?

Normally it will be used to set full scale signal output to a new full scale pressure range

Example: **GS4200 0-10 bar 4-20mA**

Adjust 0-10 bar transmitter to 0-150psi - where 150psi = 10.34 bar

It is possible to adjust the span setting to 20mA when 150psi is applied

Firstly ensure zero = 4.00mA – Adjust if required

Increase pressure to 150psi (10.34 bar) using calibrated pressure source

Signal output will increase to approx. 20.54mA

Adjust Span potentiometer until output reduces to 20.00mA



ESI Products with Zero & Span Adjustment

Product ranges with zero and span adjustment

The following product series have similar zero and span adjustment design

- *GS4200*
- *HP1000*
- *LP1000*
- *PR3100*
- *PR3110*
- *PR3800*



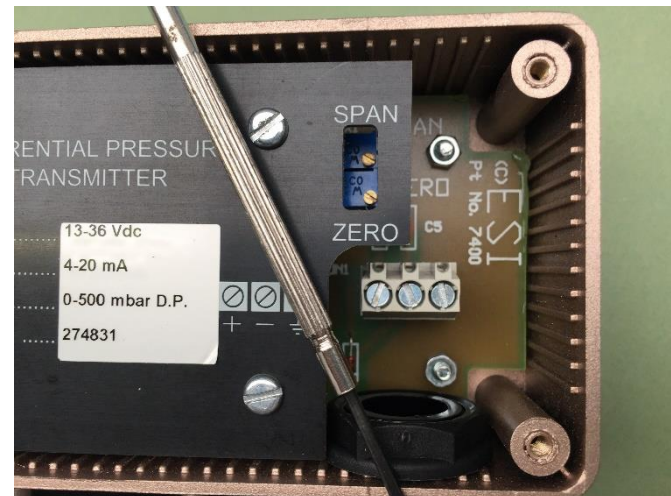
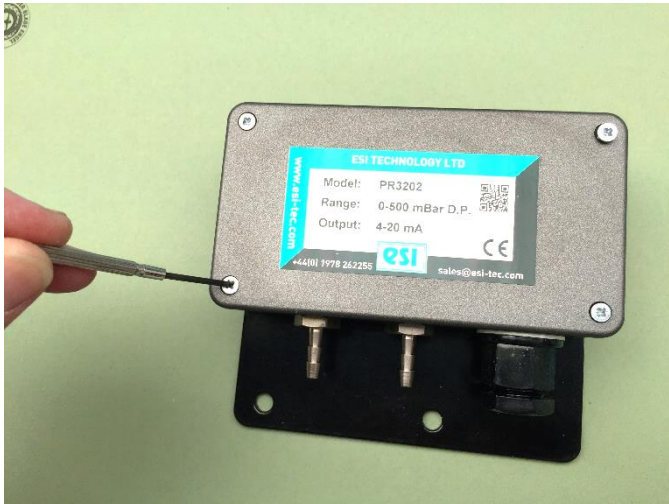


ESI Products with Zero & Span Adjustment

Product ranges with zero and span adjustment

Air differential pressure transmitter PR3202 has different access

➤ PR3202



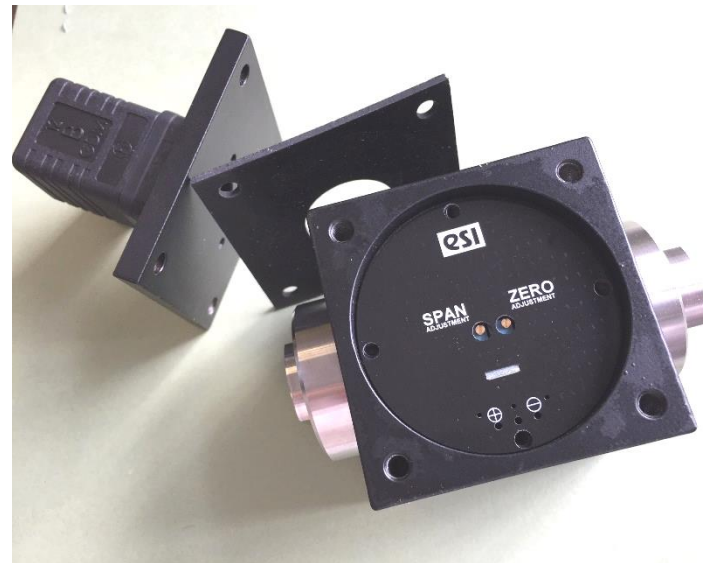


ESI Products with Zero & Span Adjustment

Product ranges with zero and span adjustment

Differential transmitter PR3200 adjustment for zero and span is similar but with different access

➤ PR3200





ESI Products with Zero & Span Adjustment

Product ranges with zero and span adjustment

Heavy duty pressure transmitter PR9000 has 'field access' adjustment

➤ PR9000





Span Adjustment – Warning!

Span adjustment – Caution!



- Under normal circumstances adjustment of Span setting is not required
- Span is factory set and pre-calibrated to a specific range
- Do not adjust without good reason and have available a calibrated pressure source for comparison
- Do not adjust span without firstly checking / setting Zero
- Typical adjustment available +/-5% on Zero and Span (independent)