

### Melt Pressure Transducer Data

#### Transducer and Gauge Standard Material Diaphragm and Options

The standard Tempco transducer diaphragm is machined out of a single piece of type 15-5 PH stainless steel (.0045") and then heat treated and finally Armoloy coated. This material gives Tempco transducers the transverse strength and toughness needed for most standard applications.

There are, however, certain extrusion processes that require different types of diaphragm materials and/or coatings. Tempco is able to supply customers with diaphragms and coatings specifically suited to their needs and applications.

#### HASTELLOY® TIP AND DIAPHRAGM

This option gives the transducer a Hastelloy® C-276 tip. This Hastelloy® tip extends along the stem and includes the 45° cone and threads. The diaphragm (.0045") is also manufactured of Hastelloy®. Hastelloy® should be used when the following chemicals are present in the process:

HCl	Hydrochloric Acid
HF	Hydrofluoric Acid
HBr	Hydrogen Bromide
HI	Hydrogen Iodide

For example, HCl is present when processing PVC and HF is present when processing Teflon®. If Hastelloy® is not used during these processes, the transducer diaphragm will fail prematurely due to stress cracks as a result of stress corrosion.

**Recommended Use:** Applications that are extremely corrosive.

#### SPECIAL DIAPHRAGM

Special 0.006" thick Inconel® diaphragm with a proprietary coating of Titanium Aluminum Nitride.

This special diaphragm is designed to be used in extremely abrasive environments. Superior to all other diaphragm materials for corrosion and abrasion resistance, examples of applications requiring this diaphragm option are ceramics or glass-filled nylon.

**Recommended Use:** Applications that are extremely abrasive.

#### INTERNAL RESISTANCE CALIBRATION TRACKING

An internal compensation circuit insures that the shunt calibration output will track any changes in pressure sensitivity (output) due to changes in temperature of the strain gauge housing. The simulated output, therefore, is 80%, ±0.25% of the full scale pressure output over the entire operating temperature range.

#### CHROMIUM NITRIDE COATED DIAPHRAGM

The chromium nitride diaphragm option gives the transducer an advantage in abusive environments. The chromium nitride offers abrasion resistance and corrosion resistance. This is due to a phenomenon called reduced skin friction. This material will also cut down on diaphragm failures due to adhesion of melt to diaphragm during the process.

There are two different versions of this diaphragm option available. The first is a standard thickness (0.0045") diaphragm made of 15-5 PH stainless steel and then coated with a 0.0002" chromium nitride coating. This version is applicable for use in any pressure range plastic extruder. The second version is a 0.0080" thick diaphragm made of 15-5 PH stainless steel coated with a 0.0002" chromium nitride coating. This version is applicable for use in plastic extruders with pressure ranges of 7,500 PSI and up.

#### TITANIUM NITRIDE DIAPHRAGM

The titanium nitride diaphragm is offered for its excellent abrasion resistance. Its abrasion resistance is superior to the chromium nitride coated diaphragm and like the latter diaphragm the titanium nitride diaphragm comes in two different versions. The first is a standard thickness (0.0045") diaphragm made of 15-5 PH stainless steel and then coated with a 0.0002" titanium nitride coating. This version is applicable for use in any pressure range plastic extruder. The second version is a 0.0080" thick diaphragm made of 15-5 PH stainless steel coated with a 0.0002" titanium nitride coating. This version is applicable for use in plastic extruders with pressure ranges of 7,500 PSI and up.

#### INTERNAL RESISTANCE CALIBRATION

Tempco strain gauge sensors rely on the small change in resistance of each strain gauge to generate an analog signal that is proportional to the applied physical input. This resistance change is generated by straining a structural element to which the gauges are attached. The same output can be accomplished by electrically offsetting the resistance of one of the strain gauges through a simple shunt resistor network. This offsetting resistance network is built into each Tempco transducer.

During manufacturing, each Tempco transducer is pressure calibrated using highly accurate pressure sources and instrumentation. The signal output versus pressure input characteristic is thereby precisely known. The internal resistance network is adjusted so that the output generated by the shunt resistor simulation method matches precisely the calibrated output of the transducer at a selected point on its calibration curve. The standard simulation value is 80% of the full range rating of each transducer but other values may be chosen.

#### Applications of Melt Pressure Transducers

Pressure monitoring is a fundamental quality control technique used in modern extrusion processing. Typical applications include:

**Film** Adaptable for either blown process or slit casting, pressure monitoring can help produce thinner, more uniform film at faster process speeds. The pressure transducer also provides primary process information helpful for maximizing productivity and minimizing start-up scrap.

**Synthetic Fibers** Accurate, reliable pressure monitoring helps deliver greater consistency with less waste by reducing high speed variations, even with high performance fibers.

**Wire Coating** Pressure monitoring right in the crosshead die where the wire is coated with plastic insulation improves throughput, quality, and profits. This process parameter has become even more important as wire take-up systems go to higher and higher speeds.

#### Pipe, Tubing, and Profile

A basic process parameter, pressure monitoring allows tighter tolerances, improves product quality and significantly improves cost effectiveness even for complex and multi-hollow extrusion.