

Précis' patented crystals offer ultimate design configurability at low cost without compromising performance. To assist you in building a winning product, we offer the following recommendations:

Pressure Crystals



Once the crystal is enclosed in an oil-filled housing, oil damping provides robust shock protection. Until the crystal is mounted in an oil-filled housing, avoid hard impacts to the crystal.



Never place a quartz crystal in an ultrasonic cleaner. The high frequencies can cause DLD (drive-level disorder), which will affect the start-up reliability of the crystal.



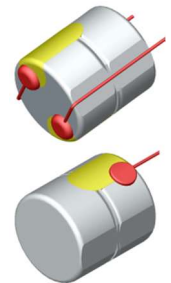
Each crystal is serialized with a 7-character alphanumeric: P + 6 digits, i.e., P181042. The high-temperature epoxy ink is stable and resists propanol. If you wish to remove the marking, soak the crystal in acetone for an hour and then wipe it off.



We pre-condition all crystals with pressure and temperature. Afterwards, we wipe the surfaces with propanol to remove most of the oil from this process. You should do a thorough surface cleaning prior to attaching wires to the product.

Wires should be attached on or near the end of the sensor. Never attach wires near the mid-line of the sensor—this will negatively impact performance. Since wire attach is critical for reliability,

- For conductive epoxy attach, surface cleanliness is critical:
 - Repeatedly clean the quartz surface with acetone then propanol.
 - Clean the attachment wires, particularly if they have been pre-tinned with solder.
 - Consider UV-ozone or plasma as a final surface-cleaning step.
 - Use a fixture or kapton tape to secure the wires during attachment.
- The Précis metallization is uniquely adapted for a reliable solder attach. However, soldering will damage the crystal if done too hasty. Contact us for specific guidelines on solder attach.



The crystal must free-float in its housing: the crystal interprets any force as pressure, resulting in calibration errors. Avoid features that squeeze the crystal in the temperature range. Also, since there are gold electrodes on the outside of the crystal, a non-conductive material must be placed between it and the housing. The ID of this insulator should be large enough that the crystal slips easily into the housing.



Since the ends of the sensor are smooth, rapid de-pressurization will force the crystal against the port hole in the housing, sealing off the pressure inside. Make sure your housing has an offset feature to prevent this.



For downhole tools, install a bellows or diaphragm isolator on your product to protect the crystal from corrosive downhole fluids. We recommend a stable high-temperature oil like silicone or Paratherm™. Be aware that some fluids like di-ethylhexyl sebacate turn acidic above 150°C over long periods of time.

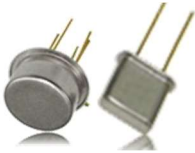
Temperature & Reference Crystals



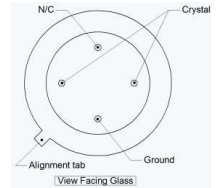
Inside each canned crystal is a mounted disc of quartz.

The serial number of each crystal is an 8-character alphanumeric:

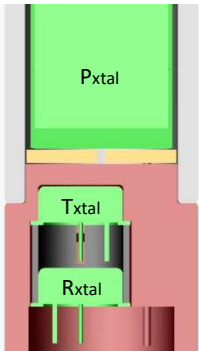
- Reference (SC-cut, 7.20 MHz): R + 4 digits YYWW code + 3 digit number, i.e., R2104215
- Temperature (AC-cut, 7.15 MHz): T + 4 digit YYWW code + 3 digit number, i.e., T2104101
- Temperature (Y-cut, 7.045 MHz): Y + 4 digit YYWW code + 3 digit number, i.e., Y2104052



The crystal leads are glass-sealed. The glass can be cracked by bending or cutting the lead next to the glass surface. If your design requires one of these two operations, gently hold the lead close to the base with needle-nosed pliers during the bending/cutting operation.



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The placement and mounting of the crystals are important. Since the pressure crystal is temperature sensitive, a transient error may occur when the crystals are temporarily at different temperatures. For best reliability and performance, incorporate these suggestions:

- Place the temperature crystal as close as possible to the pressure crystal. (See side picture for an example.)
- Add a small amount of thermal paste around the temperature crystal to improve contact with the metalwork. If the paste is also electrically conductive, the ground lead from the temperature crystal will serve as an electrical ground for your circuit.
- Ensure that the crystals cannot move. A crystal that vibrates in the pocket will eventually fail. Thermal paste will do this, or a screw/washer that doesn't stress the package.



There are several ways to make a reliable connection to the crystals. We prefer a wire wrap including 1-2 wraps of insulation around the pin. Welding is also an option, but make sure you understand the patents in this space beforehand.

Vibration and fatigue failure of the lead is a function of the lead length and mass of the connection. You may need to add a potting material around the leads to prevent this type of failure.

We would be pleased to do any integration activity you need. Please contact us to discuss.