AN 18–Connecting Dielectric Sensors and Cables

Introduction

Dielectric sensors connect directly to the instrument with a three-terminal Dielectric Sensor Connector or with an extension cable. To reduce noise in the response signal, the signal leads from the sensor should be shielded.

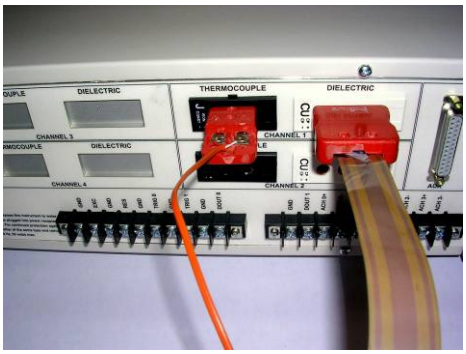
Connecting Varicon Sensors

To connect a Varicon sensor to a dielectric sensor connector:

- Remove cover from the dielectric sensor connector.
- Remove screws from connector contacts.
- Insert sensor into connector.
- Secure sensor with screws.

Figure 1
Varicon sensor in dielectric sensor connector

To connect to the rear panel of the instrument:



- Insert dielectric sensor connector, with sensor, into dielectric sensor jack.
- Insert thermocouple connector, with thermocouple, into thermocouple jack.
- If using dielectric and thermocouple extension cables, insert extension cables into dielectric and thermocouple jacks.

Figure 2
Rear panel of dielectric cure monitor showing dielectric and thermocouple sensor connections

Connecting Dielectric Sensors with Leads

An example of a dielectric sensor with leads is the Mini-Varicon sensor pictured below in Figure 3. All such sensors consist of two electrodes with one lead connected to each electrode as shown in the accompanying schematic representation.

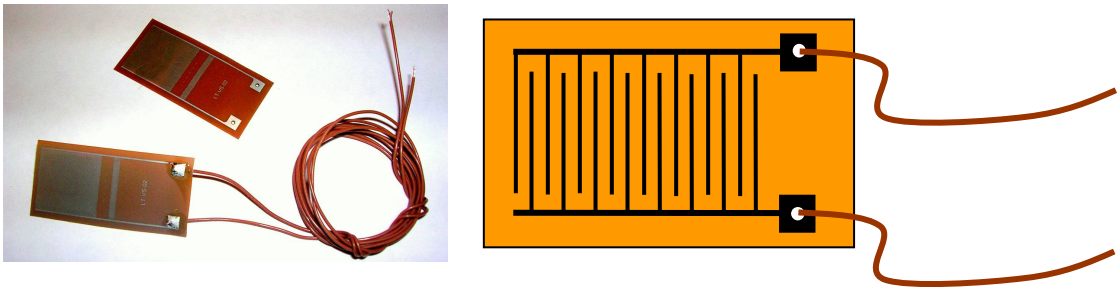


Figure 3
Mini-Varicon sensor and schematic representation

Dielectric sensors with leads are connected to a dielectric sensor connector as shown in Figure 4.

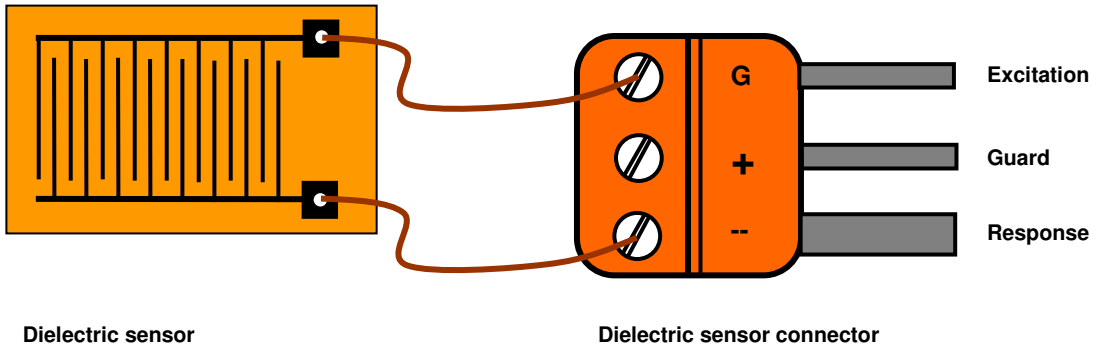


Figure 4
Connecting dielectric sensors with leads

Sensors with leads are connected as follows:

- One lead is connected the screw terminal labeled "G."
- The other lead is connected to the screw terminal labeled "-" or "E."

Note that terminals "G" and "-" or "E" are the outermost terminals of the dielectric sensor connector. The center terminal is for the guard signal, which is used with extension cables to reduce noise on the response line.

Shielding Sensor Leads and Extension Cables

Long, unshielded leads can pick up electrical interference that can produce noisy data, especially at the end of cure when signal levels are low. Shielded leads or shielded extension cables should be used whenever possible for best results. Figure 5 shows the optimal configuration of shielded leads.

Note that the shields around the excitation and response signals connect to the center terminal of the dielectric sensor connector and not to a ground. The LT-451 and LTF-631 dielectric cure monitors have interface circuits that implement a guard signal. This guard signal drives the shields with a reproduction of the response, reducing capacitive interaction between the sensitive response line and the outside world.

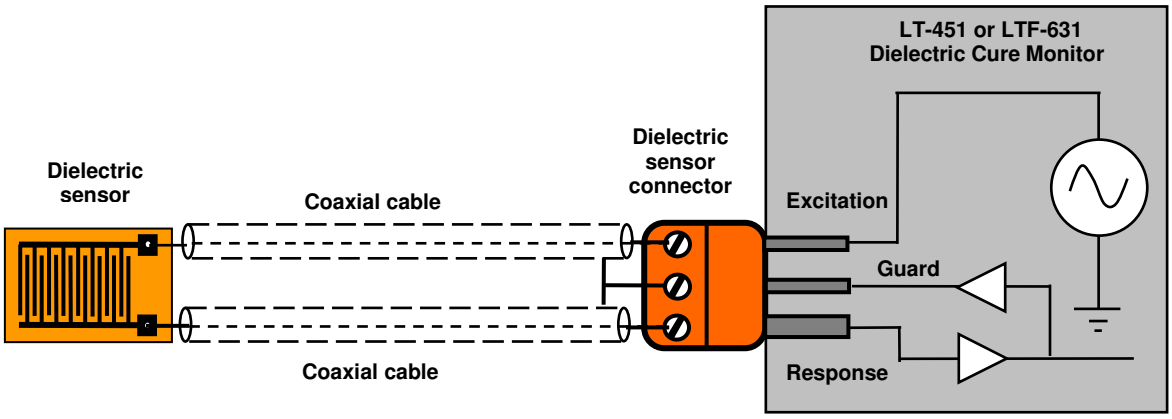


Figure 5
Connecting a dielectric sensor using shielded leads

The maximum recommended length of shielded extension cables is 20 feet. Note that phase error in the response signal increases at high frequencies with long cables. This phase error decreases the accuracy of dielectric measurements at frequencies above 10 KHz for cables longer than about five feet.

Conclusion

Dielectric sensors may be connected to the LT-451 or LTF-631 dielectric cure monitors with unshielded leads, but data at low signal levels or at the end of cure may be noisy due to electrical interference. To reduce noise, the sensor leads should be shielded and connected to the instrument guard drive whenever possible.