



Advantages of Artisan Controls Corporation's *Capacitive Touch Through Glass Technology*

Artisan Controls has designed and manufactured controllers with LCD displays and touch technology for the commercial kitchen market since 2004 with the introduction of our EPC-13787 and EPC-13811 products. These controllers used monochrome displays with resistive touch technology and are still operating reliably in the field to this day. Over the years we have closely followed the incredible growth of display and touch technology to enable us to supply the most reliable and user-friendly graphical cooking controllers available on the market.

In 2017 we introduced our latest controller, our **Model 5700**, which incorporates a 7" diagonal color display and is available with either resistive touch or our unique *Capacitive Touch Through Glass* (CTTG) technology. Our CTTG system is the end result of years of research and testing of various non-resistive touch technologies including standard capacitive touch, projected capacitive touch (PCAP), and various other non-touch gesture recognition technologies.

Artisan's CTTG technology is not the kind of capacitive touch you would find on your smartphone, tablet, or in your newer vehicles. These capacitive touch systems do not reliably function in harsh conditions without the touch detection surface being directly available to the user. Additionally, even with their touch surface available to the user gloves and surface contamination can hamper their proper operation. There are two types of capacitive touch technologies available today: *(credit Wikipedia)*

Surface capacitance:

In this basic technology, only one side of the insulator is coated with conductive material. A small voltage is applied to this layer, resulting in a uniform electrostatic field. When a conductor, such as a human finger, touches the uncoated surface, a capacitor is dynamically formed. Because of the sheet resistance of the surface, each corner is measured to have a different effective capacitance. The sensor's controller can determine the location of the touch indirectly from the change in the capacitance as measured from the four corners of the panel: the larger the change in capacitance, the closer the touch is to that corner.

Projected capacitance:

Projected capacitive touch (PCT or PCAP) technology is a capacitive technology which allows more accurate and flexible operation, by etching the conductive layer. An X-Y grid is formed either by etching one layer to form a grid pattern of electrodes, or by etching two separate, parallel layers of conductive material with perpendicular lines or tracks to form the grid; comparable to the pixel grid found in many liquid crystal displays.

(continued)

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Projected Capacitance: *(continued)*

The greater resolution of PCT allows operation with no direct contact, such that the conducting layers can be coated with further protective insulating layers, and operate even under screen protectors, or behind weather and vandal-proof glass. Because the top layer of a PCT is glass, PCT is a more robust solution versus resistive touch technology. Depending on the implementation, an active or passive stylus can be used instead of or in addition to a finger. This is common with point of sale devices that require signature capture (credit Wikipedia).

Gloved fingers may not be sensed, depending on the implementation and gain settings. Conductive smudges and similar interference on the panel surface can interfere with the performance. Such conductive smudges come mostly from sticky or sweaty finger tips, especially in high humidity environments. Collected dust, which adheres to the screen because of moisture from fingertips can also be a problem. (content Wikipedia, italics by Artisan Controls)

Additional Potential Problems:

Scratches or wearing of the film on the outer glass surface of PCT/PCAP sensors can cause detection problems, and can also require additional calibration of the touch sensor due to drift and sensor surface degradation.

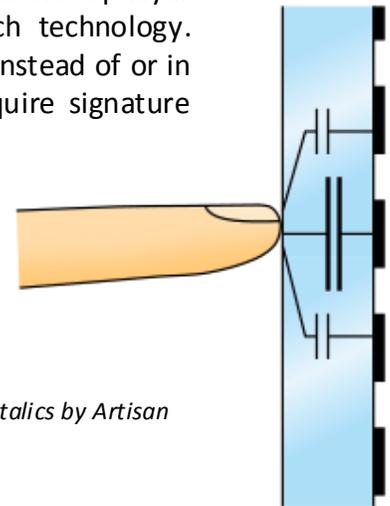
These capacitive touch technologies are dependent on a change in the capacitance between the front surface of the sensor and the conductive films or printed ink deposited on the back of the sensor.

So What Makes Artisan's CTTG Technology So Unique?

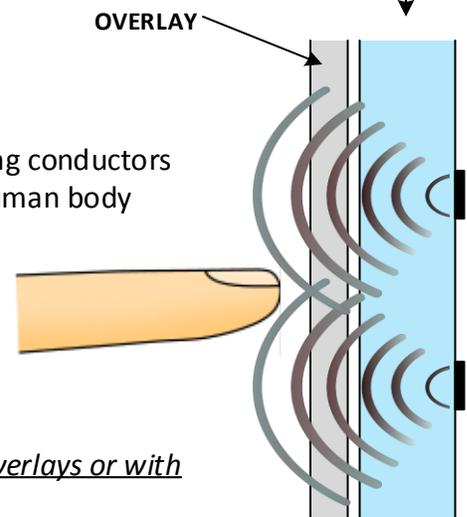
Similar to standard cap touch systems, our CTTG technology has sensing conductors attached to the back of the sensor glass, and the capacitance of the human body is detected but the coupling of the human body to earth ground produces *a shift in frequency, not a change in capacitance!*

The signals produced by the sensor wires extend far beyond the front surface of the sensor, through plastic overlays or glass which can be up to 10mm thick!

Standard capacitance touch systems do not operate reliably through overlays or with gloves, and cannot operate at all with both overlays and gloves



GLASS SENSORS



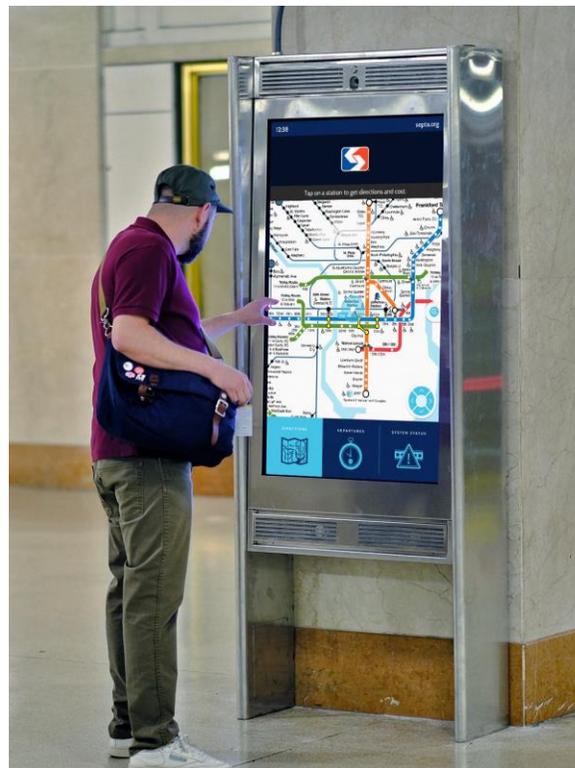
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So Where is this Unique Technology Found?

This technology was originally introduced into the ATM market due to its extreme ruggedness and reliability. Since that time, the availability of larger LCD displays and imaging technology created a whole new market. You will find it in kiosks placed inside and outside of most public areas: shopping malls, transit systems, technology show cases in large trade shows and museums, and in public eateries such as fast food restaurants for self-service meal orders.



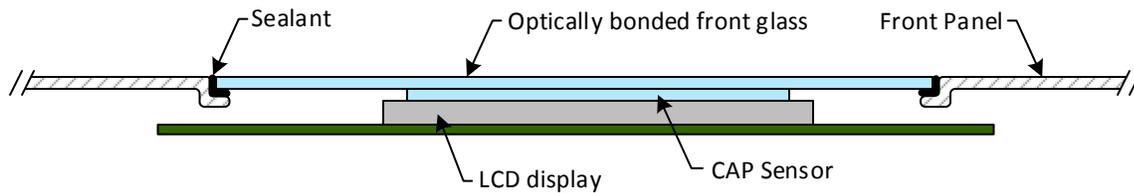
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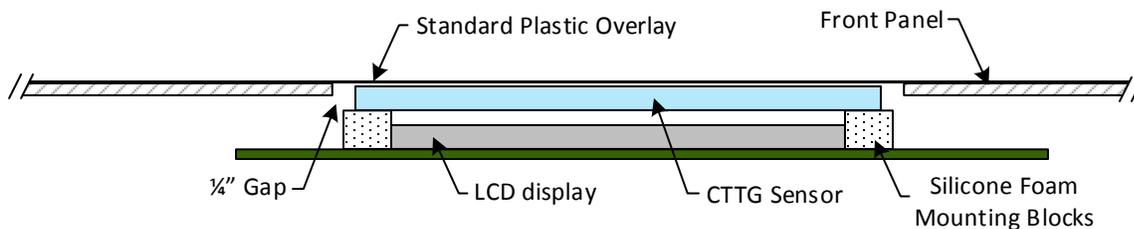
So what does the sensing difference mean? Besides the increase in reliability and long-term sensing stability, there is a very significant difference in how these different touch systems can be mounted.

Standard capacitive touch systems cannot be easily mounted into the front panel in food service equipment. You could mount them with a bezel and gasket system but that results in food entrapment issues around the edges of the capacitive sensor. Virtually all appliances using capacitive touch have additional glass panels optically bonded with the sensor built into the LCD display. This extra glass is then mounted into the front face of the machine with some combination of sealants and/or gaskets to prevent moisture and food penetration into the appliance.



This can be a difficult process to reproduce reliably in manufacturing, and to perform properly it must be firmly attach the controller system into the appliance. This could easily cost many man-hours in both manufacturing and in field service if the controller needs to be replaced at a customer location.

Artisan's CTTG controllers are simple to mount into an appliance as they can be back-mounted behind a standard plastic overlay of any thickness. The only requirement is that the grounded sheet metal of the equipment needs to be $\frac{1}{4}$ " away from the touch sensor to avoid errors due to coupling to earth ground. Simply mount the controller with four standoffs and nuts and apply your overlay.



Another important difference the mechanical strength and shock resistance. Standard cap touch sensors are firmly attached to the equipment and are susceptible to mechanical shocks due to accidents or abuse. *Artisan's CTTG sensor is attached to the controller PCB with silicone foam blocks to provide mechanical protection against any physical shock damaging the controller.*

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