E+E

your partner
in sensor
technology.

Fruit and Vegetable Storage

in a Controlled Atmosphere

Condition Monitoring in Fruit and Vegetable Storages

Maintaining the long-term freshness of stored fruits and vegetables has challenged people throughout human history. Technological advancements have been developed by nearly all participants in the supply chain including growers, traders and consumers. Once harvested the freshness and quality of the fruit and vegetable starts to diminish. Placing the produce into the proper conditions maintains its freshness over time. Results indicate that with proper climate control and monitoring, the fruits and vegetables can last 3-4 times longer than under non-controlled conditions. These conditions can be monitored using E+E Elektronik CO_2, humidity and temperature sensors.

Traditional farming creates specific harvesting seasons such as the summer and autumn. However, demand for high quality produce can remain steady throughout the year. In order to maintain a continuous supply, fruits and vegetables are stored under very specific and stable conditions. Potatoes, carrots, onions, apples, pears and cherries all need different climates to maintain their freshness. Any change to the temperature, humidity and CO_2 levels of their storage environment can cause early ripening and ageing. Controlling these conditions is critical to maintain freshness and reduce waste.

One way to slow down the ageing of fruits and vegetable is to store them in ultra or extremely low oxygen (ULO/XLO) environments. O_2, C_2H_4 and CO_2 concentrations impact the rate at which produce ripens and ages. Controlling exposure to these gases is essential but is not the only factor. Temperature

EE211

EE210 Outdoor

EE872-M10

and relative humidity are also critical and must be controlled with a reliable air conditioning system. These systems rely on accurate sensors. Maintaining a proper climate has proven to keep fruits and vegetables fresh until the next harvest replaces the existing supply. By controlling these key variables, this method also reduces the need for harsher storage methods that use chemicals.

ULO and XLO technologies can achieve O_2 concentrations from 0.7% to 1.0% at fruit specific CO_2 levels. Under these conditions the fruit does not degrade.

Typical storage conditions are:

- < 2% O_2
- 0.5 – 5.0 °C
- 0.0 – 5.0% CO_2
- Humidity up to 98% rH

Monitor Conditions with Highly Precise Sensors from E+E Elektronik

Above described conditions turn storage into demanding applications. Precise, stable and moisture-resistant CO_2, temperature and humidity sensors from E+E ensure accurate readings over long periods of time in these conditions. The EE211 series sensor features a heated humidity probe designed to deliver accurate measurements even under continuous high humidity conditions. The anticorrosive E+E sensor coating is formulated for industrial use and this makes it useful for agricultural applications as well. The heated EE872 features a NDIR two-beam CO_2 sensor that automatically compensates for the effects of age and pollution. The IP65 housing and replaceable sensor module also improve the reliability.

Additionally measuring temperature and humidity outdoors is also important. The EE210 Outdoor is the right choice to do so. Not only does it read temperature and relative humidity but can also offer dew point, frost point and specific enthalpy. Its electronics are sealed and a special E+E coating on the sensor element ensures that the device will work in dusty outdoor conditions. Additional protection is provided with the HA010501 radiation shields. These protect the probe from solar radiation and precipitation while allowing natural ventilation. This natural ventilation also helps to maintain a short response time.

The Challenge.

- Provide stability in high humidity over long periods of time
- Maintain accuracy even at low temperatures
- Ensure no interruption to the storage operation
- Easy device maintenance and calibration

The Solution.

- EE872 for CO_2 monitoring
- EE211 for humidity / temperature monitoring
- EE210 Outdoor for monitoring the outdoor climate

Product Benefits.

- Heated probes provide long-term stability
- Excellent measurement accuracy
- Interchangeable sensor modules
- Reliable in rough and condensing conditions
- Easy to integrate to ensure safe storage

Overall Value.

- Maintaining the freshness and firmness of the fruits and vegetables improves total yield
- Reduced cleaning costs
- Competitively priced

Company Headquarters
& Production Site

E+E Elektronik Ges.m.b.H.
Langwiesen 7
4209 Engerwitzdorf | Austria
T +43 7235 605-0
F +43 7235 605-8
info@epluse.com
www.epluse.com

your partner
in sensor
technology.

Version v1.4 | 08-2025

www.epluse.com