

Airflow Monitoring for Indoor Farming



KANOMAX
The Ultimate Measurements

Application Note

A NEW TREND IN FARMING

As cities become more and more pressed for space, the need for alternative solutions to field farming is becoming more and more essential to supply food for ever-growing populations. Forward thinking agriculturalists have moved toward indoor farming, which can be done on both horizontal and vertical planes, which both have their fair share of strengths and weaknesses. Of course, some crops grow much better in an indoor environment than others, like carrots, beans, tomatoes, and avocados, while some crops are more suited for outdoor farming, like rhubarb or squash and other plants that require plenty of room for sprawling vines or bushy leaves. Nevertheless, indoor farming is a huge leap forward for space-saving food production, and it can be done effectively right in the middle of a metropolitan area.



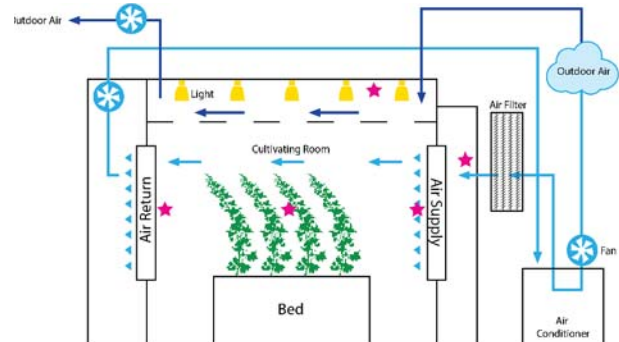
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Indoor farming is not necessarily a solve-all solution, as it does come with its fair share of challenges. Beyond the obvious ones – start-up costs for buildings and equipment, limited crop range – it gets a little more complex. The control parameters for farming, in any capacity, include lighting, water/moisture, CO2 levels and photosynthesis rates. So, as would be expected, lighting system design and implementation, architectural design, and irrigation techniques are matters that require constant education and adjustment. But, more recently, the airflow of these indoor farming facilities has become a topic of much discussion.

Airflow is crucial in indoor farming for several reasons. One, it forces air through the filtration systems that limit the number of microbes that enter the facility in the first place. Many believe that indoor facilities are immune to a lot of the challenges that face outdoor farm in terms of bacteria, pests, and mold or rot, but indoor facilities are just as much at risk for these types of crop-killers as field growing operations.

Airflow circulates CO2 through these indoor farming facilities, which both supplies the plants with the crucial gas for growth and reduces the level of humidity. Too much moisture gathering on the crops can create a quite hospitable environment for mold and mildew. The circulated air also reduces the build-up of heat, which can create the perfect environment for pests, pathogens, disease and bacteria. In fact, without constant and substantial airflow through these indoor farms, significant growth would be downright impossible.

The catch with airflow is that too much can be



★ Airflow sensor location

SOLUTIONS TO AIRFLOW CHALLENGES

just as detrimental to crop growth as too little. Essentially, it must be “just right.” If it isn’t, farmers can face devastating losses and costly repairs, and there’s only one way to ensure that the facility is receiving optimal airflow – it must be monitored, and monitored precisely. Remember, these facilities are often a dozen stories or more, or they’re within a multi-acre warehouse-type facility, so airflow in one area of the building may be entirely different than in another. Therefore, it’s necessary to have multiple, sometimes many, test points that work on one system.

And, ideally, those test points should be designed for fixed installation so they can monitor the inflow from all the fans, pumps, vents, etc., at all times. It is also necessary to check the flow of the air throughout the room to make sure it is in fact flowing in a laminar fashion and is flowing at the desired speed (again, this number should be specified in the design specifications for the room).



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Kanomax has developed the perfect solution to these airflow monitoring challenges in the form of airflow transducers. They can be installed near the enter/exit points of the facility and they feature an analog output, which allows them to be fed information to data loggers, alarms or controllers. The transducers can measure 24/7 and all setting adjustment and measurement collection can be done from one terminal. Indoor farm hands will know immediately if airflow is either insufficient or excessive immediately so adjustments can be made quickly, avoiding waste or loss of crops.

The instruments measure air velocity with hot-wire technology, meaning that the speed of the moving air is translated by the time it takes for the inner mechanism to cool, resulting in extremely accurate results. This, paired with the wide selection of probes available for the transducers, promises the most precise measurements possible for 24/7, fixed installation monitoring. The probes can be selected specifically for individual tasks, which greets these instruments seemingly boundless versatility. When farmers determine the velocity range of the air leaving the pumps, fans for vents, they can then make a probe selection based on that value as well as the instrument's velocity tolerance limits and the need for either uni- or omni-directional measuring.



Some of the more common probes selected have their own strengths. The Model 0962-00 is a uni-directional probe and is ideal for measuring the airflow inside a duct or air supply tube. This will allow farmers to determine whether the airflow mechanisms themselves are working properly, prior to any factors that may alter the air's circulation like facility design and boundary layers of the plants.

The Model 0965-01, on the other hand, is ideal for measuring airflow in the area near plants. Its airflow sensitivity is only 0.01 m/s; therefore, it will supply a reading almost 100% of the time and the farmer or facility manager can define a sufficient airflow reading based on the 0965-01 reading.

The Model 0965-04 is a miniature probe and is the best suited for measuring airflow inside lighting devices to ensure that the correct cooling efficiency is maintained. In short Kanomax offers the ideal probe for every type of airflow that is important to an indoor farming facility.

3 Monitoring Airflow in Indoor Farms



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There are also two versions of the transducers themselves; the difference is that the Model 6332D actually shows the measurement value digitally on the transducer itself, so farmers can make quick checks on measurement values as they walk the facility. However, both models are more than sufficient for the constant, accurate monitoring of a facilities airflow, therefore protecting the crops from bacteria, disease, pests, etc. and affording farmers of indoor facilities some well-deserved peace of mind.



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