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Installation Issues for Dusty Environments

General

Infrared moisture meters are used more and more in various biofuel production machines. In sawmills and wood pellett production facilities, where either the sawdust is entering pressing stations or pellets are coming out before packing and shipping, one must measure the moisture content. This is very important to keep up the high quality and to avoid any complaints by the buyer. The moisture must not be too high else a complaint will follow and drying the material too much causes high energy bills and lots of static dust. Dry wood dust is prone to inflammation or explosion. Besides, usually the end product is sold by weight and a nominal amount of water is allowed. Measuring water content and adjusting the production line will pay back the meter investment in a few weeks in a production line.

Often, the ambient temperature is high and usually there is a lot of dust or particles (dry or moist) flying with the air. To keep the meter running without interruptions and to minimize servicing needs, the meter should be protected by some means. This technical note instructs in a simple way on how to arrange a solution by using some low-cost standard box for covering the meter. The boxes main function is to create a local climate for the meter to better survive and to keep it clean. The production facility's own workshop is usually quite capable of building the required hardware. When a proper cover is built around the meter, it will serve you for many years without any service needs offering both moisture and material temperature signals. Just make occasionally sure that the air flows are sufficient to keep the meter clean. If the air flow fails, it is wise to dust off carefully the instruments and its compartment.

Dusty Positions

Fig. 1 shows the box needed when there is dust or flying dirt in the air. The box gives a good protection in hot conditions too. The boxes air flow must be sufficient to keep the dust away and should be adjusted experimentally. The meter's air flow should not exceed 2L/s. A box having good fastening holes or flanges is a plus. ABS boxes are easy to machine and stainless steel boxes are notoriously hard. ABS boxes are very economical and accepted for industrial environments.

Notes

The bottom opening must be wide enough to allow free working of the meter without obstructing the light beams going out/in. If this is not observed, the meter may have false readings due to unexpected reflections from the walls. Also, the IR thermometer's viewing angle (17 degrees cone) must be free. Else it will measure the temperature of the boxes wall. Refer to mechanical drawings of the meter and experiment with the meter when installing it to the box. No change to the moisture reading nor the web temperature should be observed when the box is used while measuring a test target, like a sheet of cardboard.

Try to install the meter for the working distance which is marked as nominal distance (e.g. 250 mm with a range of 200 to 400 mm). Installing at the minimum distance gives no tolerance against material top level variations at all. This fact is especially important for conveyor systems where material height varies continuously. The working distance must never fall below (grow higher in fact) the indicated minimum. The worst case height of the material on conveyor must be known or limited mechanically to prevent this (use a plow). Else the moisture reading will be badly distorted. The maximum distance is not so critical and if a small error in moisture reading is allowed, you can use distances up to 500 mm.

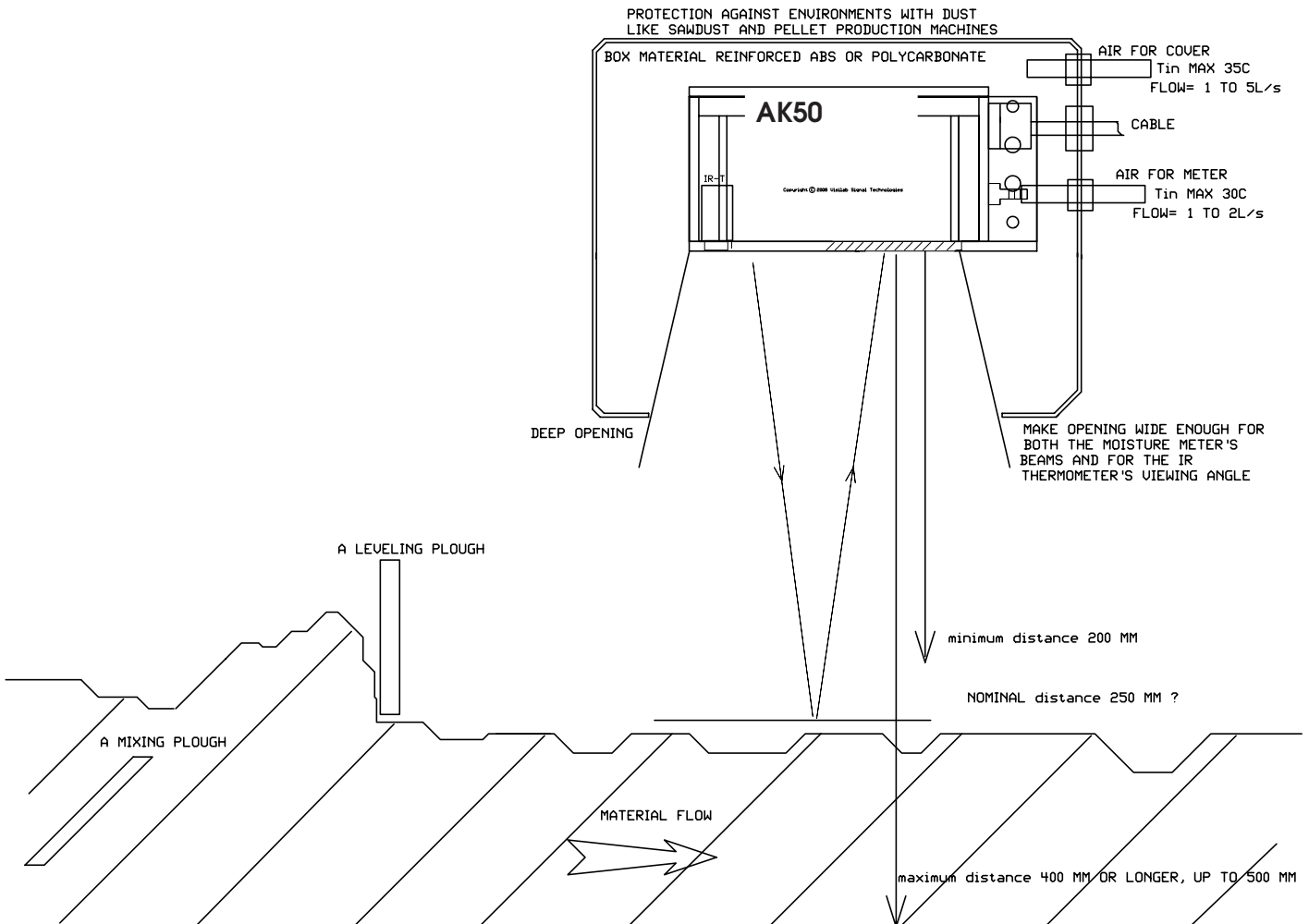


Figure 1. Protection against hot environments by using a standard box. An opening is machined or sawed to the bottom. Drawing is not to scale.

Fixing the box over a running conveyor must be done securely and keeping safety in mind. **No loose bolts or parts are allowed in any conditions.** Use metal parts inside the box for mounting the meter securely with Nylon locking nuts.