OPERATING INSTRUCTIONS FOR
WIRELESS KILN DATA ACQUISITION SYSTEM

consisting of Kiln Data Collectors and Kiln Data Transmitters

INTRODUCTION

These instructions are intended for professional manufacturers of

- lumber drying equipment who use the Wireless Data Acquisition System as part of their kiln control system
- monitoring equipment for wood moisture, temperature and relative humidity (RH)

PRODUCT SUMMARY

The Wireless Data Acquisition System features individual, battery-powered Kiln Data Transmitters, sending the readings they determine via radio frequencies to at least one Kiln Data Collector.
The Kiln Data Collector picks up data from Kiln Data Transmitters and also determines dry bulb temperature readings and wet bulb temperature readings (both optional).

Several models of Kiln Data Transmitters are available:

a. Model MCT&RH-TX:
Determining wood moisture content (MC) and relative humidity (RH) and temperature

b. Model MCT-TX:
Determining wood moisture content (MC) or equilibrium moisture content (EMC) and wood temperature (internal or external sensor)

c. Model WT-TX:
Determining wood temperature (external sensor)

d. Model W-TX:
Determining weight of a sample board on a scale equipped with a load cell

All modules are encapsulated in a highly insulating epoxy compound with maximum hydrolytic stability protecting them against high ambient air humidity.

The Kiln Data Collector and Kiln Data Transmitter models MCT-TX, WT-TX and W-TX can be installed in dry kilns; they have been designed to withstand the corrosive, hot air conditions existing there. They are specified for ambient temperatures of up to 85°C/185°F.

The Kiln Data Transmitter MCT&RH-TX is specified for ambient temperatures of up to 70°C/160°F.

KILN DATA COLLECTOR

INSTALLATION OF DATA COLLECTORS IN KILNS:

Mount one Data Collector on one side of the lumber packs (front of kiln) and one on the other side (back of kiln). These are the best locations to make sure the signals of all transmitters are being picked up.

Do not mount Data Collectors in the corners of the kiln. This is a bad place for radio frequency reception.

Make sure no metal objects (like baffles) are shielding the Data Collectors from the transmitters in the kiln.

Front Kiln Data Collector:
This Data Collector can be mounted above the front door of the kiln, somewhere in the middle. Do not mount it above the level of the fan deck.

Mount the Data Collector in such a way that the antenna is oriented vertically and not horizontally.

Back Kiln Data Collector:
Mount this Data Collector somewhere in the middle of the wall, in about the same elevation as the transmitters are placed in the lumber.

Mount the Data Collector on a small metal plate and mount this plate with a 90-degree angle to the wall.

The antenna is then oriented vertically and not horizontally. This gives better results than mounting the Collector flat on the wall.

Follow instructions in separate document describing how to connect Kiln Data Collector.

WARNING

Note that the Data Collector does not detect incorrect readings if they are within the measuring range. Whenever false readings are suspected, the accuracy of the readings must be checked by taking comparative readings.

To prevent secondary product damage caused by malfunction of the Data Collector, appropriate fail-safe functions must be incorporated into any control system using the readings delivered by the Data Collector.

KILN DATA TRANSMITTERS

CONNECTIONS TO TRANSMITTERS (all models):

WARNING: FIRE, EXPLOSION AND BURN HAZARD!
Every transmitter contains one or two Lithium batteries which are not replaceable or rechargeable.

Transmitters may ONLY be connected to the sensors / transducers that belong to the specific model, they MUST NOT be connected to anything else:

a. Model MCT&RH-TX:
Stainless steel banana plugs: Connect to wood or wafer in EMC-Station
Circular 4-conductor connector (optional): Connect to wood temperature sensor
3.5mm Stereo jack: Connect to RH BluePeg sold by Lignomat

b. Model MCT-TX:
Stainless steel banana plugs: Connect to wood or wafer in EMC-Station
Circular 4-conductor connector (optional): Connect to wood temperature sensor

c. Model WT-TX:
Circular 4-conductor connector: Connect to wood temperature sensor

d. Model W-TX:
4-conductor cable without connector: Connect to load cell
Follow instructions in separate document when connecting load cell.
Only trained technicians should connect/remove a load cell to/from the transmitter.

DO NOT connect the antenna to anything.

SAFE OPERATING CONDITIONS FOR TRANSMITTERS (all models):

WARNING: FIRE, EXPLOSION AND BURN HAZARD!
Every transmitter contains one or two Lithium batteries which are not replaceable or rechargeable.

DO NOT heat transmitters above limit specified on warning label 85°C/185°F or 70°C/158°F.
DO NOT puncture, crush or incinerate transmitters.

A lumber drying control system should limit the temperature in the kiln to a maximum of 85°C/185°F if transmitters are part of the lumber drying equipment.
Make sure manual control of heat and spray will not lead to temperatures in excess of 85°C/185°F.

HANDLING OF MCT-TRANSMITTERS and WT-TRANSMITTERS:

MCT-Transmitters (MCT-TX) and WT-Transmitters (WT-TX) have been designed for everyday use in a harsh kiln environment. However, damage (mechanical and to the circuitry) can occur if these guidelines are not followed to avoid conditions of abuse:

Lithium Batteries can only take mechanical shocks to a certain degree. A free-fall of a transmitter on a hard surface can lead to internal short circuits of the battery.
As a consequence the battery is drained and the transmitter will fail. When transmitters get stuck between the boards during the drying process in the kiln, they must not be freed by means of a hammer or the like for the same reason.

It should be generally avoided to get the transmitters stuck between boards because this can also lead to excessive mechanical stress for the battery.
When in doubt it’s better to have MCT-Transmitters hang from their probe wires.

The probe wires of MCT-Transmitters and the wood temperature sensor cable of WT-Transmitters are not intended to be used as pulling devices when the transmitter gets stuck to the lumber. The same is true for the antenna. Don't disconnect the wires from the probes and don’t remove the wood temperature sensor from the hole in the wood by yanking on the transmitter.

PLACING OF MCT-TRANSMITTERS AND WT-TRANSMITTERS:

The MCT-Transmitter (MCT-TX) can either be permanently connected to an EMC-Station or to electrodes (probes) that are placed in wood to measure the moisture content.
The electrodes must be placed in the wood in predrilled holes of 3mm (5/32") at a distance of 30mm (1 1/4").

The wood temperature sensor of the WT-Transmitter (WT-TX) is placed in a hole in the wood that is no smaller than 8mm (5/16”).

Position transmitters so that the antennas are pointing outwards from the pack.

Don't "bury" them in the packs. They need some "air" between them and the Data Collectors. If they are completely surrounded by wet lumber, then the radio frequency signal will be weakened too much. Placing the packs in the kiln with a small gap between each other not only improves airflow but also opens up an unobstructed path for the radio signal.

If MC-based drying schedules are used right from the beginning of a kiln charge, then it can be necessary to place at least 2 MCT-Transmitters on the OUTSIDE of the lumber packs.
Readings from these 2 MCT-Transmitters can be used for the average MC at the beginning of the kiln charge when the lumber is wet and when transmitter signals originating from within the packs might be unreliable.
When more or all wood probes recover, the average MC can be based on the readings coming from all valid MCT-Transmitters placed within the packs.

TRANSPORTATION OF TRANSMITTERS (all models):

Every transmitter contains one or two Lithium batteries which are not replaceable or rechargeable.

Lithium batteries are considered hazardous material.

When shipping, follow all limitations for primary (non-rechargeable) lithium metal cells specified in the US national dangerous goods regulations contained in Code of Federal Regulations Title 49 (49 CFR). The basis of the limitations for primary lithium metal cells (with a lithium metal content not exceeding 1g) contained in equipment (UN 3091) is reflected in State Variations USG-02 (IATA).

TRANSPORTATION OF TRANSMITTERS (MCT&RH-TX, MCT-TX and WT-TX):

Unless transmitters are in silent mode, they send out radio signals in regular time intervals which could interfere with aircraft systems.

Put transmitters in Silent Mode before shipping, this will deactivate the transmitter:

a. Model MCT&RH-TX:
   Disconnect RH BluePeg or disconnect temperature sensor
b. Model MCT-TX:
   Short out probe wires
c. Model WT-TX:
   Disconnect temperature sensor

Putting transmitters in Silent Mode when they are not used will also extend battery life.

TRANSPORTATION OF W-TRANSMITTERS (W-TX):

W-Transmitters that are connected to a load cell send out radio signals in regular time intervals which could interfere with aircraft systems.

W-Transmitter/Load cell assemblies must not be shipped on an aircraft.

OTHER IMPORTANT NOTES:

Transmitter function should be checked at least every 3 months or whenever false readings are suspected, using the appropriate Test Unit for each model and following the test procedure.

The surface between the terminal posts on MCT-Transmitters (MCT-TX) and MCT&RH-Transmitters (MCT&RH-TX) needs to be periodically cleaned of any deposits to ensure accurate readings. Deposits between the terminal posts can lead to elevated EMC/MC-readings at the low end of the EMC/MC-measuring range with detrimental effects on drying time and kiln energy consumption.

At the end of the life cycle of the transmitters, dispose in accordance with all Federal, State and Local regulations.

REGULATORY INFORMATION

FCC Compliance Statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.
These limits are designed to provide reasonable protection against harmful interference.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by monitoring reception with the equipment being active and inactive (see below), try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult your dealer or an experienced radio/TV technician for help

This equipment can be deactivated by powering down the Kiln Data Collector and putting all Kiln Data Transmitters in Silent Mode.

Warning: Changes or modifications to the equipment that are not expressly approved by the manufacturer could void the user's authority to operate the equipment.