



MOISTURE SENSOR PRODUCT LINE



AgriChem: Masters of Moisture Control

ADDRESS AgriChem, Inc.
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AgriChem, Inc's complete line of moisture monitoring and control technologies allows you to improve your processes. Our patented moisture sensors are designed to make your life easier by giving you simple, accurate, and timely moisture measurement of your product.

We at AgriChem pride ourselves on producing reliable and economical solutions for difficult moisture monitoring problems. Give us a call with your problem and our experienced engineers can guide you to the right solution.

+ Flow Through (FT) Series Moisture Sensors

FT-11C Basic Sensor
FT-14C Advanced Sensor
FT series size schematic

+ Flat Plate (FP) Series Moisture Sensors

FP-21C Basic Sensor
FP-24C Advanced Sensor
FP-2 series size schematic
FP-32C Miniature Sensor
FP-3 series size schematic

+ Displays / Interfaces

MDS Display
DiMDI Display/Programmer
SCI Computer Interface

+ Other Products

Grain Prep Processing Aid

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AgriChem, Inc. was founded on the concept of innovation. Today, our patented and proprietary technology allows processors of particulate materials to accurately monitor and manage moisture as an ingredient – rather than **being** controlled by the moisture content of their particulate materials.

We are searching constantly for new ways to combine chemistry, precision electronics, and the latest computer technology to enhance the efficiency and accuracy of process moisture monitoring.

Your questions, ideas and technical challenges are always welcome. Please feel free to give us a call.

History of AgriChem, Inc.

- 1985** Incorporated
- 1987** Installed first on-line whole grain moisture control system in a commercial cattle feedlot.
- 1993** Awarded U.S. Patent 5,194,275 for whole grain moisture control system.
- 1995** Awarded U.S. Patent 5,437,882 for Grain Prep Auto Delivery System® Controller.
- 1997** FT Series On-Line Moisture Sensor installed in a large commercial feed mill.
FP Series On-line Flush-Mounted Moisture Sensor sold to a commercial feed company.
Installed first MoisturePLUS® On-Line Sensor in a commercial feed mill receiving area.
- 1998** Awarded U.S. Patent 6,192,750 B1 for FT Series On-Line Moisture Sensor sample cell.
- 2001** Awarded U.S. Patent 6,249,130 B1 for FP Series Flush-Mounted On-Line Moisture Sensor design.
- 2002** Awarded U.S. Patent 6,388,453 B1 for MoisturePLUS® On-Line Moisture Sensor.
- 2003** Awarded U.S. Patent 6,571,641 B1 for On-Line Sensor Mount Assembly.
- 2004** Awarded U.S. Patent 6,700,394 B2 for Device to Monitor Particulate Moisture, Temperature, and Volumetric Flow Rate.
- 2006** Installed first FP series moisture sensor as part of OEM grain dryer controller.
- 2010** Installed first FP-32 miniaturized sensor.

Products and Systems



Moisture Monitoring Solutions

FT Series On-Line Moisture Sensors

- Reg. U.S. Pat. Off. No. 6,192,750 B1
- On-line monitoring of flowing particulate materials

FP Series Flush-Mounted On-Line Moisture Sensors

- Reg. U.S. Pat. Off. No. 6,249,130 B1
- On-line monitoring in a mixer, chute, conveyor, etc.



Grain Moisture Control Solutions

Processing Aid

- Increases digestibility of processed grain
- All ingredients are food and feed grade
- Provides rapid, uniform absorption of applied process moisture

Auto Delivery System®

- User-friendly grain moisture process-control system
- Permits controlling moisture content as an ingredient
- Includes controller and patented moisture sensors

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FT-11C On-Line Moisture Sensor

Reg. U.S. Pat. Off. Nos. 6,192,750 B1

- + **Accurately monitors moisture content of flowing whole grain or other particulate materials**
- + **Reliable, rugged, economical choice for moisture monitoring applications**
- + **Easily integrated into process control systems**



FT Series sensors combine proven capacitive moisture sensing technology with a patented flow-through sample cell design to provide unmatched accuracy.

Moisture and temperature output may be displayed on our Moisture Display System (MDS) and/or transmitted as an analog signal for integration into a process control system.

MEASUREMENT ACCURACY

Particulate sample temperature	$\pm 1^{\circ}F$
Particulate moisture content [typical]	$\pm 0.25\%$

OUTPUTS

Moisture content	0 to 5V DC
Temperature	0 to 2V DC

OPERATIONAL TEMPERATURES

Sensor, ambient	$-40^{\circ}F$ to $120^{\circ}F$
Particulate sample	$0^{\circ}F$ to $120^{\circ}F$

OPERATION

Minimum particulate flow	150 pounds per minute
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ELECTRICAL POWER

Required	10 to 12V DC
Consumption	2 Watts maximum

DIMENSIONS

Physical size [inches]	9 x 9.5 x 13.5
Sensor area [inches]	5.5 x 7 x 11

MATERIALS OF CONSTRUCTION

Sensor surface	ceramic
Sensor body	UHMW, stainless steel wear surfaces

OPTIONS

MDS operator interface	Can serve one or two sensors
Mounting box	
Mounting plate	

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FT-14C On-Line Moisture Sensor

Reg. U.S. Pat. Off. Nos. 6,192,750 B1 & 6,388,453 B1



- + Accurately monitors moisture content of flowing whole grain or other particulate materials**
- + Reliable, rugged, economical choice for moisture monitoring applications**
- + Configurable to meet specialized requirements**
- + Easily integrated into process control systems**

FT Series sensors combine proven capacitive moisture sensing technology with a patented flow-through sample cell design to provide unmatched accuracy.

Its milliamp moisture and temperature outputs resist electromagnetic interference, can be displayed on a Digital Moisture Display Interface (DiMDI) and/or transmitted as an analog signal for integration into a process control system.

MEASUREMENT ACCURACY

Particulate sample temperature	$\pm 1^{\circ}\text{F}$
Particulate moisture content [typical]	$\pm 0.25\%$

CALIBRATION

Moisture content	4 to 20mA
Gain and offset	Adjustable [DiMDI required]
Frequency	Adjustable [DiMDI required]

OPERATION

Minimum particulate flow	150 pounds per minute
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OPERATIONAL TEMPERATURES

Sensor, ambient	-40°F to 120°F
Particulate sample	0°F to 120°F

OUTPUTS

Moisture	4 to 20mA
Temperature	4 to 20mA

ELECTRICAL POWER

Required	12 to 36V DC
Consumption	3 Watts maximum

DIMENSIONS

Physical size [inches]	9 x 9.5 x 13.5
Sensor area [inches]	5.5 x 7 x 11

MATERIALS OF CONSTRUCTION

Sensor surface	ceramic
Sensor body	UHMW, stainless steel wear surfaces

OPTIONS

Digital Moisture Display Interface (DiMDI)	Controls up to 8 sensors
Mounting box	
Mounting plate	

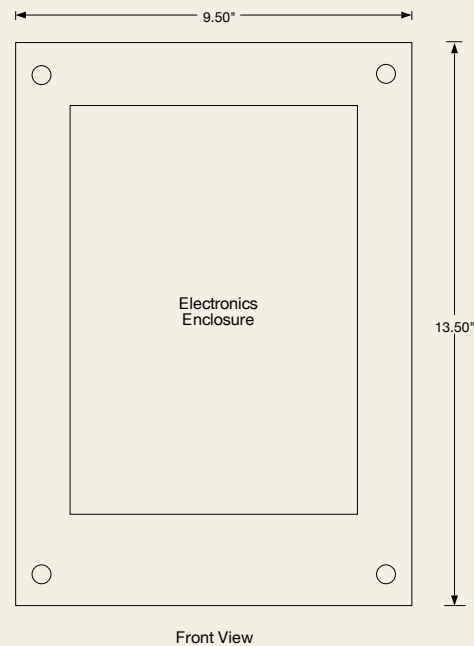
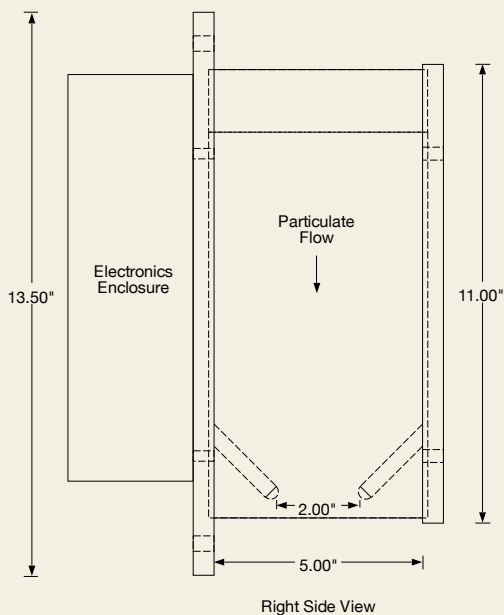
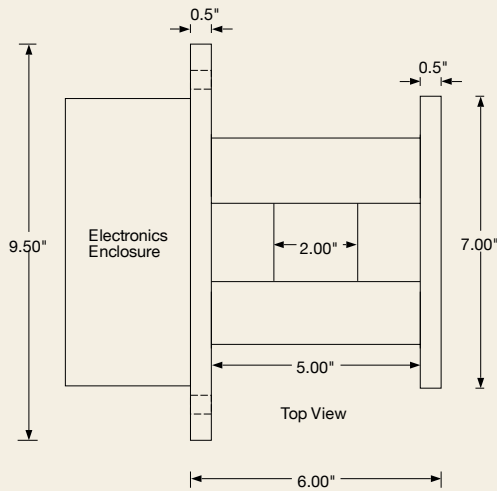
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FT Series On-Line Moisture Sensor

Reg. U.S. Pat. Off. Nos. 6,192,750 B1 & 6,388,453 B1


PHYSICAL SIZE

Dimensions [inches]

9.500 x 13.500 x 9.000

MATERIALS OF CONSTRUCTION

Mount body

UHMW, 316 Stainless steel

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FP-21C Flush Mounted On-Line Moisture Sensor

Reg. U.S. Pat. Off. No. 6,249,130 B1



- + **Accurately monitors moisture content in grains and other particulate materials**
- + **Designed for physically hostile environments such as mixers, chutes, conveyors, and augers**
- + **Reliable, rugged, economical solution for moisture monitoring applications**
- + **Easily integrated into process control systems**

FP Series sensors feature proven capacitive moisture sensing technology in a flat plate configuration. This allows its mounting in a mixer, an auger, a chute, or a sled riding on granular material being transported by a belt conveyor for continuous measurement of moisture content.

Its analog moisture and temperature outputs can be displayed on our Moisture Display System [MDS] and/or transmitted for integration into a process control system.

MEASUREMENT ACCURACY

Particulate sample temperature	$\pm 1^{\circ}F$
Particulate moisture content [typical]	$\pm 0.25\%$

OUTPUTS

Moisture content	<i>0 to 5V DC</i>
Temperature	<i>0 to 2V DC</i>

OPERATION

Minimum sample depth	<i>4 inches [10cm]</i>
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OPERATIONAL TEMPERATURES

Sensor, ambient	<i>-40°F to 155°F</i>
Particulate sample	<i>0°F to 100°F</i>
	<i>Other ranges available</i>

PHYSICAL SIZE

Surface dimensions [inches]	<i>4.625 x 7.625</i>
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ELECTRICAL POWER

Required	<i>10 to 12V DC</i>
Consumption	<i>2 Watts maximum</i>

MATERIALS OF CONSTRUCTION

Sensor face	<i>Ceramic</i>
Sensor body	<i>Electroless nickel-plated aluminum</i>

OPTIONS

Sensor body	<i>316 Stainless Steel</i>
MDS operator interface	<i>Can serve one or two sensors</i>
Defined Area Flow Restrictor [DAFR]	<i>For chute mounting</i>
Sled mount	<i>For belt conveyor mounting</i>
Hinged door mount [shown]	<i>For mixer or auger mounting</i>

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FP-24C Flush Mounted On-Line Moisture Sensor

Reg. U.S. Pat. Off. Nos. 6,249,130 B1 and 6,388,453 B1



- + **Accurately monitors moisture content in grains and other particulate materials**
- + **Designed for physically hostile environments such as mixers, chutes, conveyors, and augers**
- + **Reliable, rugged, economical solution for moisture monitoring applications**
- + **Configurable to meet specialized requirements**
- + **Easily integrated into process control systems**

FP Series sensors feature proven capacitive moisture sensing technology in a flat plate configuration. This allows its mounting in a mixer, an auger, a chute, or a sled riding on granular material being transported by a belt conveyor for continuous measurement of moisture content.

Its milliamp moisture and temperature outputs resist electromagnetic interference, can be displayed on our Digital Moisture Display Interface (DiMDI) and/or transmitted as an analog signal for integration into a process control system.

MEASUREMENT ACCURACY

Particulate sample temperature	$\pm 1^{\circ}\text{F}$
Particulate moisture content [typical]	$\pm 0.25\%$

OUTPUTS

Moisture	4 to 20mA
Temperature	4 to 20mA

CALIBRATION

Moisture content	4 to 20mA
Gain and offset	Adjustable [DiMDI required]
Frequency	Adjustable [DiMDI required]

OPERATION

Minimum sample depth	4 inches [10cm]
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OPERATIONAL TEMPERATURES

Sensor, ambient	-40°F to 180°F
Particulate sample	0°F to 200°F
	<i>Other ranges available</i>

PHYSICAL SIZE

Surface dimensions [inches]	4.625 x 7.625
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ELECTRICAL POWER

Required	12 to 36V DC
Consumption	3 Watts maximum

MATERIALS OF CONSTRUCTION

Sensor face	Ceramic
Sensor body	Electroless nickel-plated aluminum

OPTIONS

Sensor body	316 Stainless Steel
Digital Moisture Display Interface [DiMDI]	Controls up to 8 sensors
Defined Area Flow Restrictor [DAFR]	For chute mounting
Sled mount	For belt conveyor mounting
Hinged door mount [shown]	For mixer or auger mounting

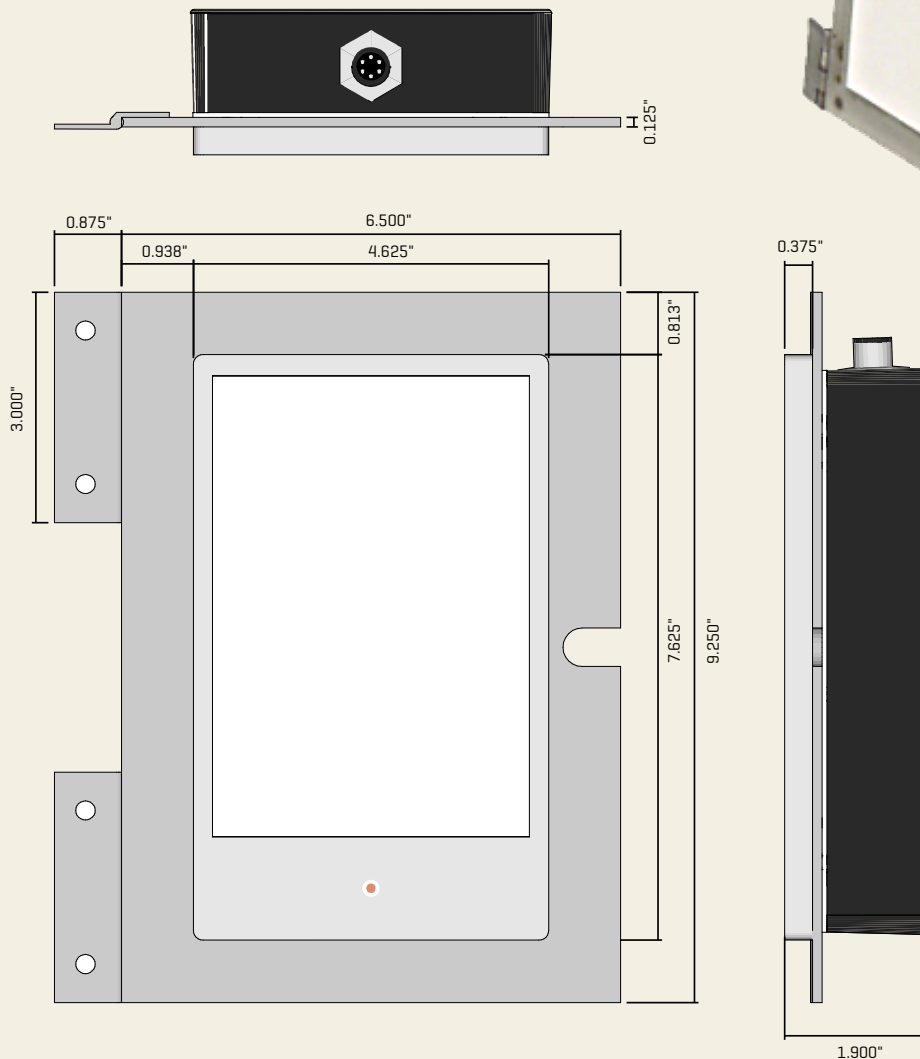
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FP Series On-Line Moisture Sensor

Reg. U.S. Pat. Off. No. 6,249,130 B1


PHYSICAL SIZE

Surface dimensions [inches] 4.625 x 7.625
 Overall dimensions [inches] 6.500 x 9.250 x 1.900

MATERIALS OF CONSTRUCTION

Body *Electroless nickel-plated aluminum*
 Sensor Face, Mount *Ceramic, 316 Stainless Steel*

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FP-32C Flush Mounted On-Line Moisture Sensor

Reg. U.S. Pat. Off. No. 6,249,130 B1



- + **Accurately monitors moisture content in grains and other particulate materials**
- + **Designed for physically hostile environments such as mixers, chutes, conveyors, and augers**
- + **Reliable, rugged, economical solution for moisture monitoring applications**
- + **Easily integrated into process control systems**

The FP Series Flush Mounted On-Line Moisture Sensors are designed specifically for mechanically hostile environments and feature proven capacitive moisture sensing with a patented flat plate configuration. This allows sensing of granular materials in a mixer, an auger, or a chute.

Sensor output can be displayed on local display and/or transmitted as an analog signal for integration into a process control system. Temperature data are also readily available.

MEASUREMENT ACCURACY

Particulate sample temperature	$\pm 1^{\circ}F$
Particulate moisture content [typical]	$\pm 0.25\%$

OUTPUTS

Moisture content	<i>0 to 20mA</i>
Temperature	<i>0 to 20mA</i>

OPERATION

Minimum sample depth	<i>4 inches [10cm]</i>
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OPERATIONAL TEMPERATURES

Sensor, ambient	<i>-40°F to 180°F</i>
Particulate sample	<i>0°F to 150°F</i>

ELECTRICAL POWER

Required	<i>12 to 24V DC</i>
Consumption	<i>3 Watts maximum</i>

MATERIALS OF CONSTRUCTION

Sensor face	<i>Ceramic</i>
Sensor body	<i>Hardcoat Anodized Aluminum</i>

OPTIONS

Sensor body	<i>316 Stainless Steel</i>
MDS operator interface	<i>Abrasion Resistant Steel</i>
Local display	<i>Can operate 1 or two sensors</i>

PHYSICAL SIZE

Surface dimensions [inches]	<i>3.000 x 6.000</i>
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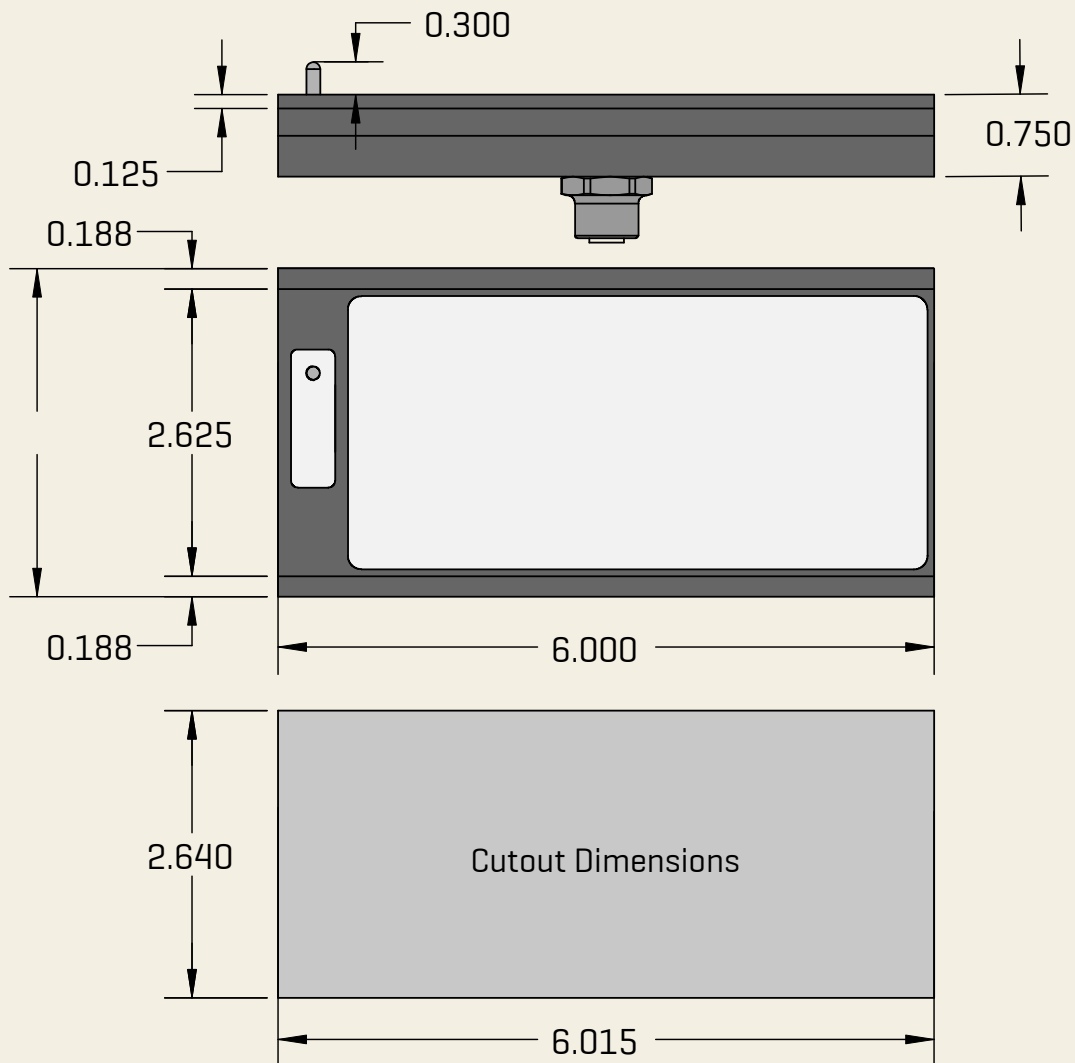
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FP-32C

On-Line Moisture Sensor

Reg. U.S. Pat. Off. No. 6,249,130 B1


PHYSICAL SIZE

Dimensions (inches)

 $6.000 \times 3.000 \times 1.050$
MATERIALS OF CONSTRUCTION

Mount body

Hardcoated aluminum, ceramic

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Moisture Display System (MDS)



- + Operator interface for FT-11C and FP-21C Sensors
- + Can serve two sensors
- + Continuously displays material type, moisture content, alarm status and temperature
- + Can be calibrated for six separate particulates and/or powder materials
- + Provides high/low alarms for both moisture content and temperature
- + Can be integrated into a process control system with optional analog output board to transmit sensor data to a computer or PLC
- + Records average moisture content and total processing time for each product monitored

COMPONENTS

LCD display
 16-key keypad
 MDS board with integrated power supply
 Two dry contact relays and signal conditioning for FT-11C and FP-21C moisture sensors

OUTPUTS

Temperature	$\pm 1^{\circ}F$
Moisture [typical]	$\pm 0.25\%$

OPTIONS

Analog output board	<i>0 to 2.5VDC and 4 to 20mA</i>
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OPERATIONAL TEMPERATURES

Ambient	<i>-40°F to 120°F</i>
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ELECTRICAL POWER

Required	<i>120VAC standard 240VAC optional</i>
Consumption	<i>9 Watts</i>

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Digital Moisture Display Interface (DiMDI)



- + Operator interface for FT-14C and FP-24C Sensors
- + Designed for easy integration into existing control systems
- + Drives up to eight sensors
- + Continuously displays moisture content, product identification, temperature, and alarm status
- + Can be programmed for eight separate particulate and/or powder calibrations
- + Provides high/low alarms for moisture and temperature
- + Provides sensor frequency selection
- + Records average moisture content and total processing time for each material monitored

COMPONENTS

LCD display
7-key keypad
Power supply
Battery back-up

ACCURACY

Temperature $\pm 1^{\circ}F$
Moisture [typical] $\pm 0.25\%$

SENSOR CONNECTIONS

Standard 1
Optional 2 to 8

OPERATIONAL TEMPERATURES

Ambient $-40^{\circ}F$ to $120^{\circ}F$

CALIBRATION

Zero-Math™ calibrations 8
Gain Adjustable
Sensor frequency Adjustable
Temp Compensation Adjustable

ELECTRICAL POWER

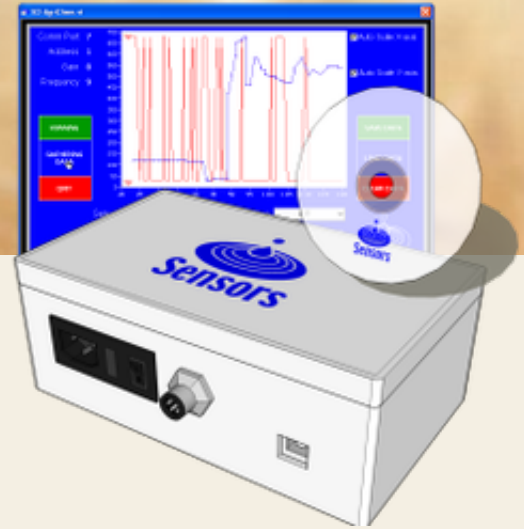
Required 120V AC or 240V AC
Consumption 12.5 Watts
Up to 50 Watts
with multiple sensors

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Sensor Computer Interface (SCI)



- + **Display of sensor moisture and temperature**
- + **Data Acquisition with tab-delimited data export available**
- + **Simple product calibration wizard**
- + **Sensor programmer interface for configuration of analog outputs**

The Sensor Computer Interface is a simple way to interface AgriChem's FP-24C and FT-14 Moisture Sensors to a personal computer.

The SCI's hardware provides power to an AgriChem Moisture Sensor. A simple USB interface connects the SCI hardware to any Microsoft Windows PC.

The SCI software records data from the attached AgriChem Moisture Sensor and displays moisture and temperature on trend graphs. Data can be exported to a tab-delimited [spreadsheet] format for further analysis.

Calibration is simplified with a software wizard. Multiple calibrations are stored to easily switch from product to product.

The SCI programs AgriChem Moisture Sensors' 4-20mA analog outputs to customize the sensor to an installation. The SCI offers terminals for analog signal pass-through to a control device.

COMPONENTS

USB to sensor converter
 Windows compatible software [CD-ROM]
 Sensor power supply

SENSOR CONNECTIONS

Standard

1

OPERATIONAL TEMPERATURES

Ambient 0°F to 120°F

ELECTRICAL POWER

Required 120V AC or 240V AC
 Consumption 27 Watts [max]

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"The Processing Aid"

+ Physical Data:

Specific Gravity	1.25
pH	6.6
Viscosity [15°C]	184 centipose
Color	Dark brown
Freezing Point	Below -35°C
Solubility	Completely soluble in water
Toxicity	None, to warm blooded animals
Flammability	None, aqueous liquid
Sarsaponin content	8.0% minimum

+ Intended Use:

Grain processing aid in commercial livestock feed manufacturing

+ Ingredients

Item	Composition (%)	IFN
Yucca schidigera extract	40	8-19-700
Propylene glycol	25	8-03-809
Sucrose or	20	4-04-701
High fructose corn syrup		
Potable water	15	

+ Special Handling:

Grain Prep processing aid is irritating to mucous membranes. Flush contacted surfaces with clean cool water. It also readily forms a very stable foam. Avoid surface agitation when mixing or diluting.

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