

DIGITAL GRAIN MOISTURE MEASUREMENT & CONTROL SYSTEM

(SAVES ELECTRICITY BY 15-20 PERCENT)



$$F = K_1.Mg/M + K_2.T^{0.8-1.3}/M^{0.6-0.8} - K_3.Mg^{1.8}.T^{0.2}/M$$

F= water flow rate, M=moisture, T= Amb. Temperature, Mg = grain mass flow meter

Dimensional specs of moisture controller system:

MMCS-00001	12x24x15 inch	0010	ton/day	MMCS-00020	0020 ton/day	30x30x36 inch
MMCS-00002	15x24x20 inch	0040	ton/day	MMCS-00050	0080 ton/day	36x40x42 inch
MMCS-00005	18x24x24 inch	0150	ton/day	MMCS-00100	0250 ton/day	35x45x42 inch
MMCS-00010	24x24x30 inch	0400	ton/day	MMCS-00100	0800 ton/day	35x45x42 inch
MMCS-00100	35x45x42 inch	1500	ton/day	MMCS-00200	3000 ton/day	35x45x42 inch

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DIGITAL IN-LINE MOISTURE METER & CONTROLLER

MTFM-Series

Introduction:

MTFM series of moisture meters/controllers are available in more than 10 different modes, virtually offering solutions to moisture measurement/control for Paddy, rice, corn, wheat, cane crushes, powders (organic/in-organic) in moisture control range from 8-20%. These meters are offered in material like SS-316 (ceramic/Teflon coating), polypropylene, derelin etc to make up with corrosion, thermodynamical and other pertinent physical parameters of grain under measurement/control. On account of above, these moisture sensors system are first choice for agro, biomedical, petrochemical, , organic/inorganic chemical, textiles, beverages,

Operating Principle:

These hybrid resistance/capacitance type moisture controllers measure moisture/ flow rate/temperature of grain using moisture/mass flow/thermal signal conditioner respectively. Grain moisture meter /signal conditioners measures/conditions the capacitance/resistance using high frequency/voltage pulse to measure %resistance/capacitance, which is proportional to moisture in grain. These high frequency co-axial pulse type moisture sensors are able to finely detect/measure any change in the grain flow and give instant feedback signal to master controller which after considering the status of grain mass flow rate/temperature/inlet water flow rate, correct the dosing of water using sliding mode control technique to ensure set moisture level. Accuracy of these controllers is further strengthened by intelligent software (Kalman-filtering), which takes into account dynamic change in atmospheric temperature/density of grain. Moisture Vs grain mass flow and moisture Vs water flow rate is given as under....

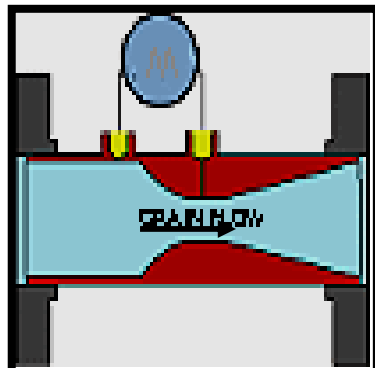
$$F = K_1 \cdot Mg/M - K_2 \cdot T/M^{0.6-0.8}$$

F= water flow rate, M=moisture flow, T= Amb. Temperature, Mg = Grain flowmeter

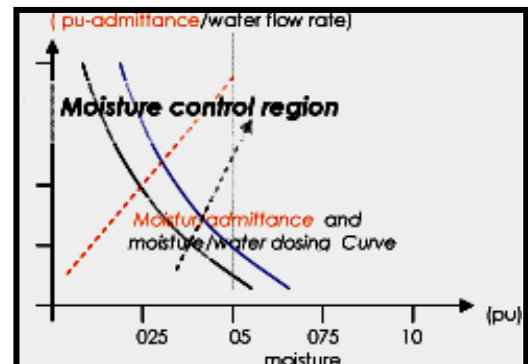
(Maximum moisture flow varies between 8-20%)



Moisture flow sensor



Sectional view of grain moisture sensor



characteristic of moisture flow control system/sensor

model	Flow range (kg/hrs)	Size(inch)	Accuracy	Repeatability	Grain Flow tube-Liner	O.D.P.	leak rate	Output signal
MGMM-0010	2,000.0	2.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MGMM-0020	3,000.0	3.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MGMM-0050	5,000.0	4.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MGMM-0100	20,000.0	6.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MGMM-0200	30,000.0	8.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MGMM-0500	50,000.0	10.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MGMM-0800	80,000.0	12.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MGMM-1000	100,000.0	14.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0

DIGITAL MOISTURE MEASUREMENT SYSTEM/SIGNAL CONDITIONER SPECIFICATION:

Operating voltage 220 volts/28 volts D.C.
 Excitation frequency 2.5/7.5/15.0/25.0 Hz
 Measurement range: Moisture content 8-20%
 Grains: Paddy, rice, corn, wheat
 Accuracy 98% of set point
 Repeatability 100 percent
 Response time 0.5 -1.1 milli-seconds
 Interface Signal 0.0-12.0 volts D.C. (proportional to moisture)
 Moisture control range: 8-20%
 Step down ratio 1:50(1:100)
 Sensor tube material SS-316/Brass/DERELIN with option of flange coupling
 Electrode material SS-316/Has-alloy
 Weight (not including probe): 18 k.g.
 Control option feed back control



MGMM-0050

Multi flow synchronized control (interactively)
 Display 3½ & 4½ digit red glow LED/LCD display (moisture, water flow/temperature)

Controller size 6x8x8 inch

Other optio: RS-232

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DIGITAL GRAIN MASS FLOW MEASUREMENT & CONTROL

MTFM-Series

Introduction:

MGFM series of Grain mass flowmeters/controllers are available in more than 10 different modes, virtually offering solutions to flow measurement/control for any grain in varied flow range i.e. 1.0 kilo grams per minutes to 1000 ton per minutes. These flow meters are offered in material like SS-316 (ceramic/Teflon coating), polypropylene, derelin etc to make up with corrosion, thermodynamical and other pertinent physical parameters of grain/powder under measurement. On account of above, these performance parameters, motoron's flow meters are first choice for medical diagnostic, agro, biomedical, petrochemical, automobile, organic/inorganic chemical, milk plant, sugar, textiles, beverages, water management/treatment, academic and defense.

Operating Principle:

Grain mass flowmeters sensor is mounted on vibrating wire sensor head, which measures the time weighted differential weight of grain/powder over three successive samples. This flow rate is further signal process to generate error free flow rate proportional digital output signal to display desired mass flow rate.

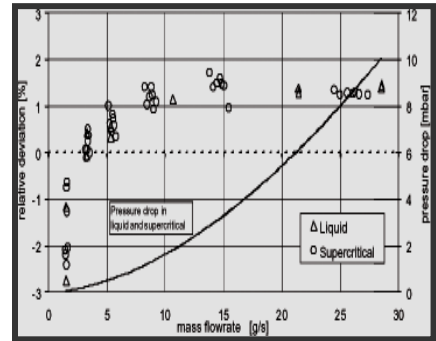
$$dM/dt = d(M_{in}(t) - M_{out}(t))/dt + \text{noise} \dots\dots\dots \text{noise} \ll d(M_{in}(t) - M_{out}(t))/dt$$



In-line grain mass flowmeter



In-line grain enthalpy



Performance of grain mass flowmeter

model	Flow range (KG/hrs)	Size(inch)	Accuracy	Repeatability	Flow tube-Liner	O.D.P.	leak rate	Output signal
MDMM-0001	1000.0	2	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MDMM-0002	2000.0	2	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MDMM-0004	4800.0	2	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MDMM-0007	7000.0	3	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MDMM-0010	10,000.0	3	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MDMM-0020	20,000.0	3	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MDMM-0050	50,000.0	4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MDMM-0100	100,000.0	6	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MDMM-0200	200,000.0	8	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MDMM-0500	500,000.0	10	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0
MDMM-0800	800,000.0	12	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0

DIGITAL GRAIN/POWDER/CANE CRUSHES MASS FLOW CONTROLLER SPECIFICATION:

Operating voltage 220 volts/28 volts D.C.
 Excitation frequency 2.5/7.5/15.0/25.0 Hz
 Accuracy 98% of set point
 Repeatability 100 percent
 Response time 0.5-1.1 milli-seconds
 Interface Signal 0.0-12.0 volts D.C.(proportional to grain mass flow range)
 Flow range 10.0 - 1000.0 ton/hrs
 Step down ratio 1:50(1:100)
 Flow tube material SS-316/Brass/DERELIN with option of flange coupling
 Electrode material SS-316/Has-alloy
 Control option Flow rate/totalization control against set point
 Multi flow synchronized control (interactively)
 Display 3½ & 4½ digit red glow LED/LCD display
 Controller size 6x8x8 inch
 Other optio: RS-232



FLOW COMPUTER-MTFM-0800

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