Hand Held MS2100 Series

Moisture Analyzer

〖Operation Instruction〗

for HBD5 MS2100 Series Humidity/Water Activity/Moisture Analyzer

Ref:HMS2100_Me
Instrument Version:4.6
Revision:2.2
Date:2002-12-10

Contents

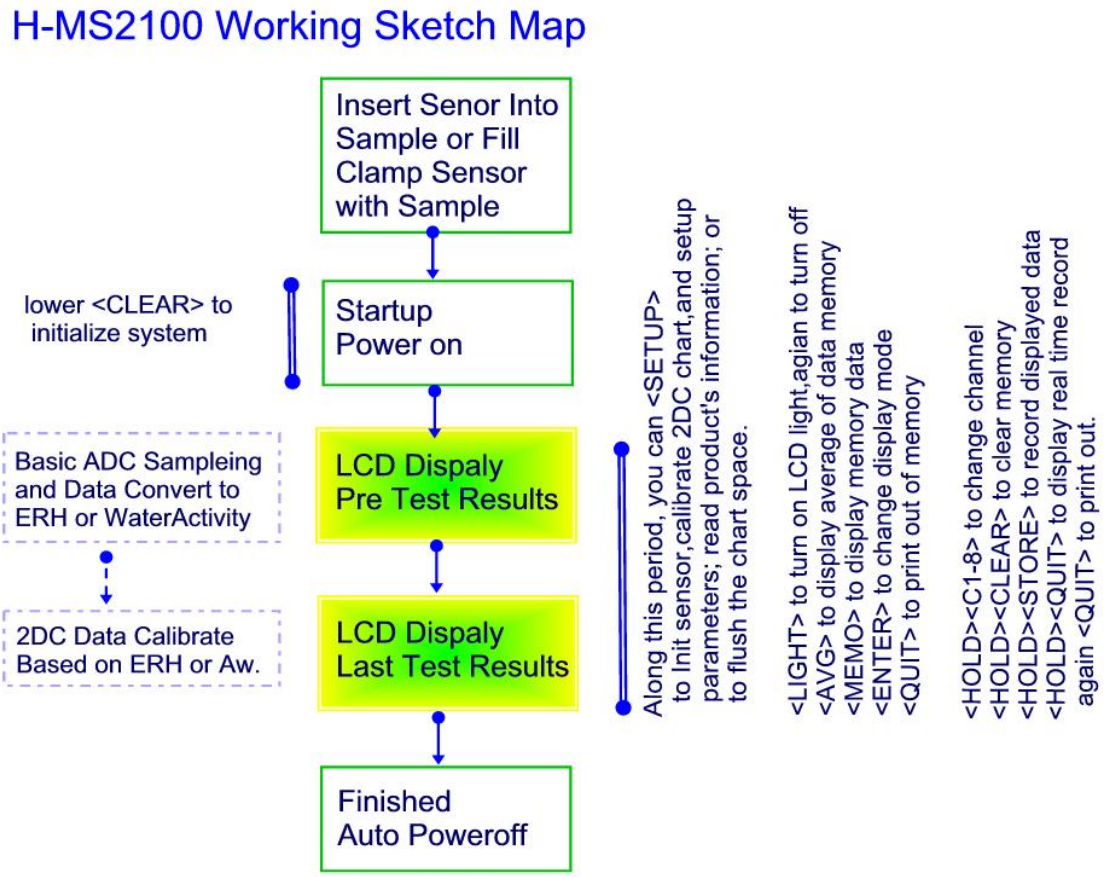
1. General Description

Hand held MS2100 Moisture analyzer is one modest full function industrial instrument. Equipped with different series sensor for diverse applications for both of industry and laboratory.

MS2100 is general for air, gas, liquid and solids moisture analysis with suitable accessories.

Related Check after Receival

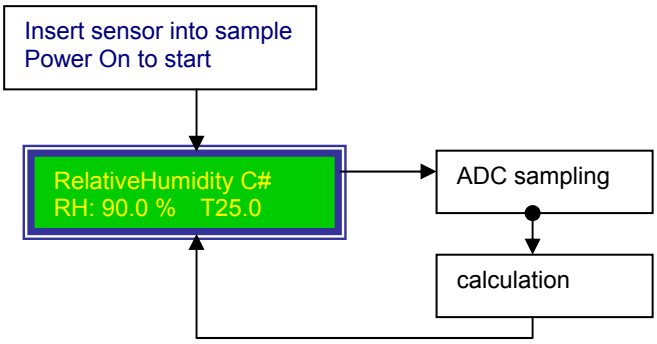
1) Aspect: Pay attention if some obvious damage from transfer or other situation concerned.
2) Open Package Check: check integrality for each unit listed.
3) Connect to test: Refer to chapter 4.2.
4) Prepare to start: Get ready of correct power supply, as well correct wired.
5) Put/Off the power switch to see if it is normal displaying? If running without abnormal events. It means the instrument is complete. And ready to use.
6) If abnormal events happened, you must inform us as soon as possible, the limit is inside 7 days to find out the dilapidator in delivery system. We offer 30 days to be responsible for any faults belong to manufacture, or mistakes by negligence.



2. Test Routine

2.1. Parameters Test for Gas

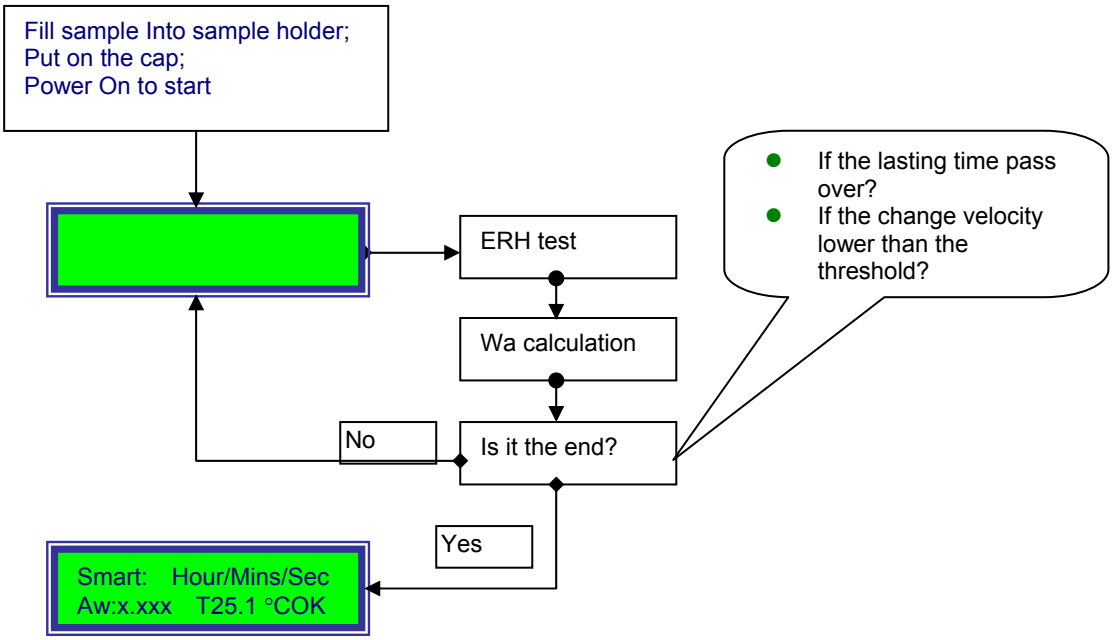
Absolute moisture, Volume ratio, %volume, Partial pressure, Saturation moisture, Relative humidity, Specific quantity, Dew point, Humidity Ratio



2.2. Water Activity

ERH Technologically

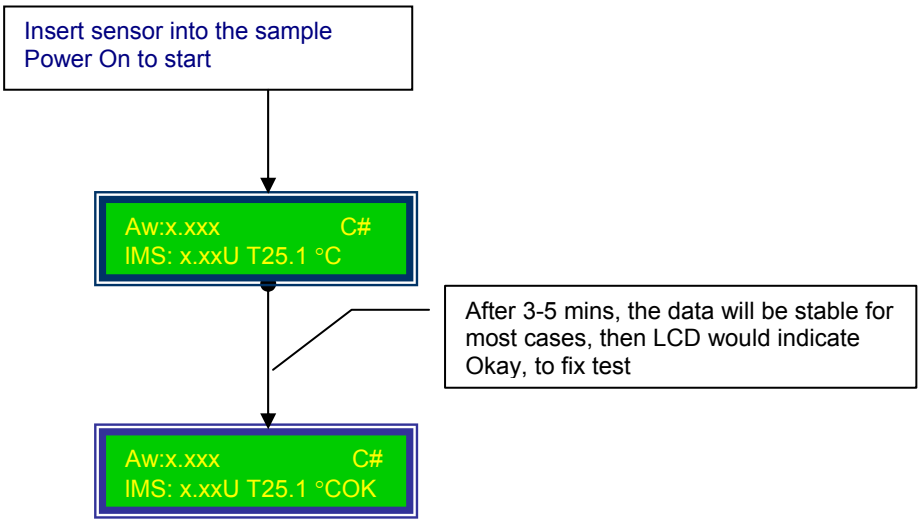
The test method is selected when you start to calibrate first time.
Always use Smart Method for it's generous suitability.



2.3. Trace Moisture Test for Liquids

Direct Sink the sensor into samples

This is limited to some organic liquids. Users need get certification from our engineer for new application.



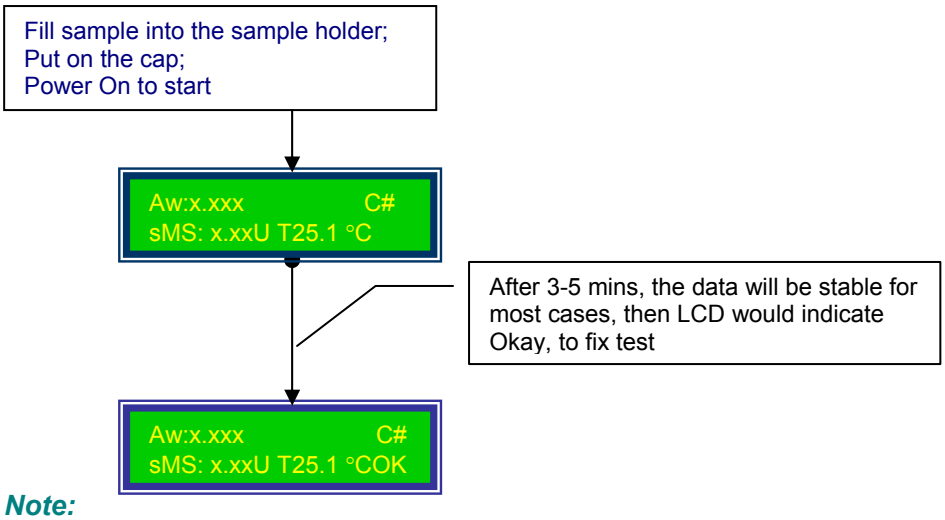
Note:

1) To measure the moisture by this way, users must calibrate the instrument first, to establish the pertinence chart quantificationally between water activity and moisture against user sample. Once calibrated, you just need to select the right channel each time to test the relavant samples(need not to calibrate every time).
2) After Direct Insertion test, clear the residential solvents.Using suitable mild solvents, such as gasoline, benzine, toluence etc, to wash the sensor if the liquid sample is erosive to the sensor before storage;

2.4. sMoisture Measurement

ERH Technologically

sMoisture is always indirect test for high water content moisture for solids, powder samples with **MS2123-Clamp Kit, MS2123-Poke,MS2123Lance**. Or trace solids' moisture test with **MS2123-Vap Kit.**
Also this method can be used for liquid test as well, if so, do not direct sink the sensor into the sample, but keep about 1-5cm air space upon the sample



Note:

To measure the moisture by this way, users must calibrate the instrument first, to establish the pertinence chart quantificationally between water activity and moisture against user sample. Once calibrated, you just need to select the right channel each time to test the relavant samples(need not to calibrate every time).
For clean solid particles test, you can directly insert the sensor into sample stack. Otherwise use indirect way to test. Be aware, you must keep the same way to calibrate and test.

3. Instrumental Function Operation

3.1 Read the last period tested data records

After test, press <HOLD>, LCD display ”HLD” at the upper right corner, then press<QUIT>, LCD will display the last period tested data records one by one in 6 seconds interval. If you hurry to read, any key can stop each data

The record interval is equal to the interval set when you started calibration. So that each calibration chart has it’s own interval.

3.2 Test Results Records

When you want to record any ready data for long time storage, press <HOLD>, LCD display ”HLD” at the upper right corner, then press <STORE>.

This is power off memory.

You can read out the stored data by press <MEMO>. Data will be displayed sequentially by order. This time you can press <ENTER> print out the current data.

If the stored data pass over 200, the old one would be deleted automatically if you restore a new one.

3.3 Printer

And also you can print out the current LCD data, by press <QUIT> or<ESC>.

3.4 Get Product Information

Press <ENTER>, pass the password check, LCD displays

Made by BDp

Key <3>, then key<ENTER>, the information would be appeared on the LCD:
Version number: H MS2123 V2.1
Manufacture Date: year: month:data
Product Number(SeriesNum):
Sensor Number(SensorNum):

4. System Configuration

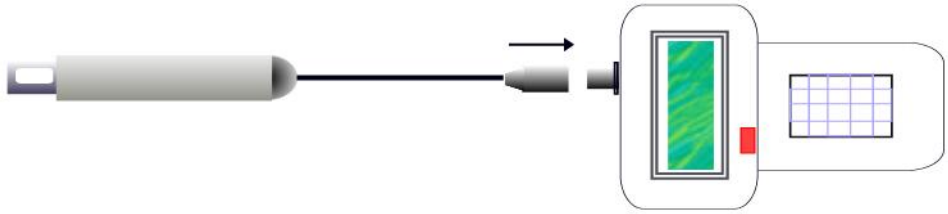
4.1. Configuration for Normal Test

4.1.1. Gas or Direct Liquid Insertion Sensor System

Basic Parts

Items	Introduction	References
Analyzer H-MS2100N	Data processor Probe should be connected to analyzer	

Connection



Special Accessories

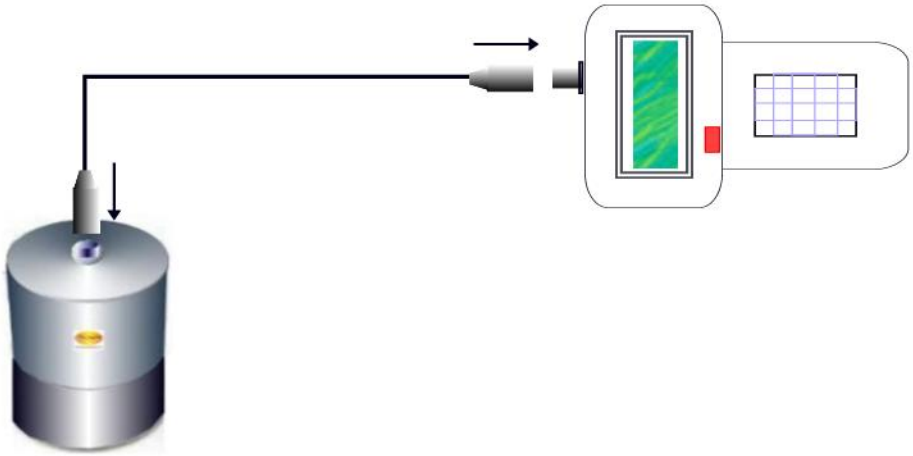
Items	Model	Type	Remarks
N-P Fit	ST1 Fitter	ZG1",NPT1"	Screw Fixing to pipe line For temporary on-line pipe continuous test usage
N-B Fit	B25 Fitter	Dia.25	Fixing to glass instruments For temporary continuously test usage

4.1.2. Clamp Sensor System

Basic Parts

Items	Introduction	References
Analyzer H-MS2100 Clamp	Data processor Probe should be connected to analyzer	

Connection



Special Accessories

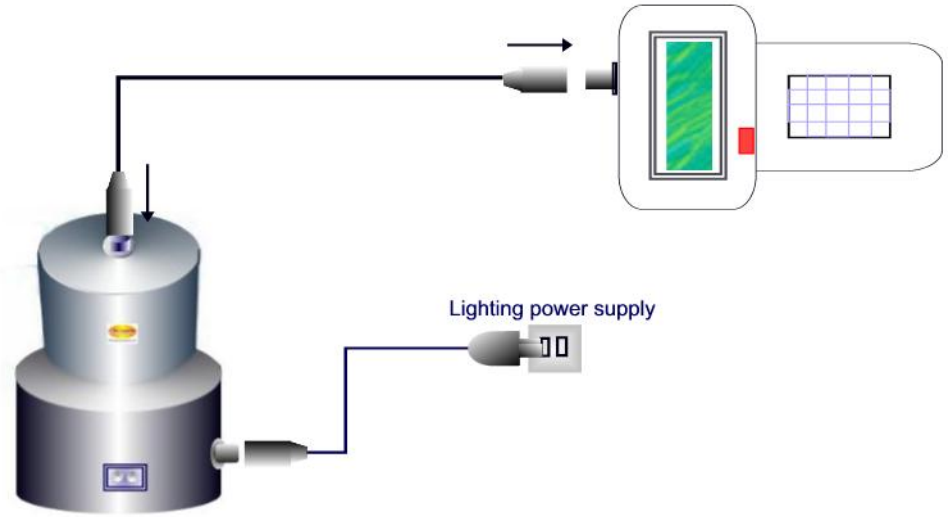
Items	Introduction
DSC Kit	Accessory for Clamp Kit and Vap Kit. Each pack consists of 100 disposable sample cups (14mm deep and or 40mm)

4.1.3. Vap Sensor System

Basic Parts

Items	Introduction	References
Analyzer	Data processor	
H-MS2100 Vap	Probe should be connected to analyzer	

Connection



Special Accessories

Items	Introduction
DSC Kit	Accessory for Clamp Kit and Vap Kit. Each pack consists of 100 disposable sample cups (14mm deep and or 40mm)

4.1.4. MS2100 Lance and Poke Sensor

Basic Parts

Items	Introduction	References
BD5MS2100 Analyzer	Data processor	
H-MS2100 Poke	Probe should be connected to analyzer	For loose materials, such as cotton, earth, etc.
H-MS2100 Lance	Probe should be connected to analyzer	For loose materials or layer stack , such as paper, carpet ,belt etc.

Connection

The same as to H-MS2100N,refer to 4.1.1.

4.2. Basic Parts for All Instrument

Items	Model	Remarks
Battery		included
Power Adapter	DC12 V,220V/110V	Specify the user local power standard, 110 V or 220V AC
Packing Case		Included

4.3.Common Consumes

Calibration Kit	1 EA35 (35 %RH)and 1 EA80 (80%RH) Standards	MS2123 is long time stable. If found any err, you can get chemicals to make samples. Refer to Appendix 2

4.4. Selective Accessories

Items	Model	Type	Remarks
Micro-Printer	TPUP	T40	Dot printer, general record paper support
Record paper			Consumable for printer
DC Power			for printer
PC Software	Acquisition		
RS485 Kit			Remote connect to PC

4.5.Spare Sensors

MS2123M12T85	Spare sensor for HMS2123N probe replacement
MS2123pM12T85	Spare sensor for HMS2123N probe replacement, with pressure connector
MS2123M12T100	Spare sensor for HMS2123N probe replacement
MS2123pM12T100	Spare sensor for HMS2123N probe replacement, with pressure connector
MS2123M12T180	Spare sensor for MS2123N probe replacement
MS2123pM12T180	Spare sensor for MS2123N probe replacement, with pressure connector
MS2110M12T300	Spare sensor for MS2110N probe replacement
MS2110pM12T300	Spare sensor for MS2110N probe replacement, with pressure connector

*Refer to HMS2100_DS_E for details

4.6. Software and Hardware for Computer Acquisition

Computer Acquisition	Win98.1-MS	RS485, STIM/Modbus communication, IEEE1451.1 NCAP
RS485 Kit		232 to 485 converter for PC serial port.

5. Preparation for Operation

1) Assure well charged or with enough energy in the cell. Once complete charge needs to be lasting to 6 hours.
2) Connect all the necessary parts.
3) Switch the power on, and watch if the LCD is displaying normally. For humidity parameters, it will directly show the test results. If for liquids or solids, it usually start from testing, while displaying the water activity at the beginning, then alarm “OK” and display the test results. All these routine depend on the setup and calibration state or history.
4) If the LCD displays gradually to low strength of light, you should charge the battery.
5) If still not normal after charge, maybe you should check something wrong in connect or setup.
6) If still not display, however try, maybe you should check other reasons.
7) If normal, check if the test result is in coincide with the environ humidity, that the data you can get by other way. If not too exact, you might consider to check (by “Init Sensors” inside of the <SETUP> function)), if the set data is the same with the data attached. If not, you can input it. If still not accurate enough, you have to calibrate it.

If you found the trouble that you can not solve however, please contact with our engineer for help.

6.Setup Routine

Version 2.1

Press <SETUP> to enter the setup window
LCD display:

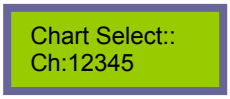
6-0

Use <PgDn> key to choose the right set item. Or <clear> to goback toward left.
Also you can direct select by number if you remember the function code.
Once <ENTER> to set your select

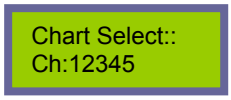
Using key value to index the functions:
There are 4 valid functional setup routine here involved

1) **Calibrate**: there is the entrance to buildup the user favored data convert program. 2DC insertion table is employed in the MS2100 program. For further comprehension please refer to Appendix 6.1. Refer to 6.1. Calibrate for details of operation procedure.
2) **Chart Initialize**: this is to zero the selected channel before calibration. The data established via initialization is not assured to be correct. Refer to 6.4. Initialize the Chart..
3) **System Information**: this is to flush the EEProm memory for available, must executed at startup in plant. User can use alterable “Delete” function in Calibration program instead of this operation. Some time experienced or user defined data might be initialized
4) **System Setup**: Functions to setup alarm point and output range, refer to “Alarm&output”; to input sensor basic data or device control parameters, refer to "DeviceCtrlSetup"; main sensor calibration,refer to “PrimarySensorCal"; Temperature sensor calibration, refer to "TempSensorCal"; Pressure sensor calibration, refer to "PresureSensorCal"; Power saving mode setup, refer to "PowerManage";
   For procedure details, refer to 6.4. System Control.

Select the channel you want to setup:



It would automatically change to new window, the first line would remind information of current channel.
Such as it was set to Water Activity parameter before, the window is like this



6.1. Calibrate

Step Operation Outline:

- If first time to calibrate, you need to setup some necessary parameters for your application to current channel;
- Then you can execute calibration with samples according the guide of LCD clew. Refer to step instructions following

Utility Direction

- When you want to start to use or give up one Calibration chart, you need to <Delete> the old chart data at first.
- You need 2 samples and implement twice times to calibrate one new chart at least to start one new channel. The more samples calibration pint to be established, the higher accuracy were expected. But always to keep it as simple as possible. It means, only if 2 points calibration could not satisfy your test, then insert one more point again. The exact valued standard sample calibration results might be overlaid after repeated.

Starting Calibrate Operation

Case 1:

First time to calibrate, or if the chart at current channel was deleted in last operation, the LCD will clew to select the test parameters.

61-1

Use <PgDn> key to choose the right set item. Or <clear> to goback toward left.
Also you can direct select by number if you remember the parameter code.
If current number >8, then you have to key the new number(the <PgDn> and <Clear> not work in this case)
Once <ENTER> to set your select

If for gMoisture configuration, it would reminds: RelativeHumidity, WpartialPressure, VolumeRatio, HumidityRatio, VolumePercent, SpecificHumidity, AbsoluteHumidity, Dew Point, Enthalpy.
You can select any one from above list to test in any channel.

gMS2100 initialized as Chart 1=RelativeHumidity; Chart 2=WpartialPressure; Chart 3=VolumeRatio; Chart 4=HumidityRatio; Chart 5=VolumePercent; Chart 6=SpecificHumidity; Chart 7=AbsoluteHumidity; Chart 8=Dew Point.

If configured to test other parameters, LCD direct goes to following window

If you want to change parameter existed in this channel, you should delete chart data first;
Refer to "6..1.5. Test Method Selection Routine" for further operation instructions. When first time to calibrate.

After finished first time setup(Return from "Set Parameter"), LCD prompts

61-2

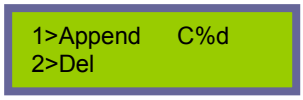
Select <1> to start first sample calibration; refer to "1.1. Calibrate with Sample"
Key<3 > to give up first calibration this time, and use the initial data.

Note:

- As to gMoisture configuration, the initial data is very exact, do not calibrate it unless obvious errors found.
- If you test water activity, also not to calibrate here, unless you can not correct the humidity sensor itself.

Case 2:

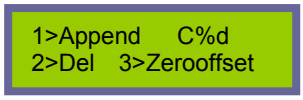
If second time afterward to calibrate the same table chart, system would clew to



61-3

Case 3:

If third times later to calibrate the same table chart, system would clew to



61-4

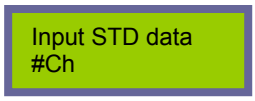
If you want complement the last chart with new samples, please key <1>
If you want clear the old chart, please key <2> to delete it
If you only want to zero the existed chart with one standard "Zero" sample, key <3>
Also, if you want to change the paramter of calibration chart in current channel, u need to delete the table first, then reentrant from normal 'SETUP' to setup the test mode.

Attention:

1) Zero function is not recommend to startup, unless you are dealing very complex curve calibration convert for moisture of special materials. For most case 2DC is more easy to start, 2 points calibration can get quiet good accuracy, especially for MS2123 sensor.
2) But convert from water activity to moisture needs more point to be exact.

6.1.1. Calibrate with Sample

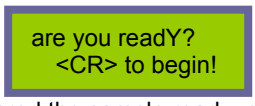
After entrance to the calibrate step. System progress some routine check, then LCD display as following



611-1

Now, please input the standard value of the Standard Sample this time you are used to calibrate with keypad.
You can input float data currently. Such as "1.0123" alike.
The click <ENTER> to finish your inputing.

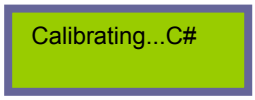
Then System remind you to insert the sensor into the sample, or fill the sample into the sensor holder of clamp.



611-2

After prepared the sample ready, please key any key button to go on, except <QUIT> to give operation.

LCD cheers



611-3

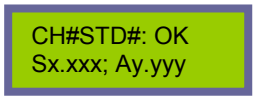
And rapidly go to calibrating information as following:

611-4

CH# is the chart number you are calibrating now
STD# is the serial order of sum numbers you calibrated till now
x.xx is the value of the standard you just input
y.yy is the value of ADC or basic converted data. This is internal data in CPU. (If ADC value it is just numbers to scale the signal of sensor, not hints any physical meanings. But if buffered sensor application, that also means basic data specially). Do not try to change it, but check if it is changing with sample variety in specially law, along your calibrating history.

When the sample condition fixed, the ADC data should be more and more being close to stable. Then you can click <ENTER> to finish the calibrate.

Then system will display the recorded data



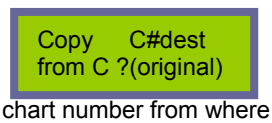
611-5

If it is correct as you memory, that you have done well of one sample point calibration.
Then short time of routine check, it will return to normal test state.

Attention:

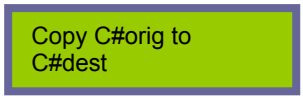
- Generally speaking, the more points you calibrated, the more accuracy you might get. But you must use reliable and accurate sample. Once wrong sample will absolutely ruin the accuracy of the chart.
- for more times of sample calibration, just repeat the calibration routine.
- At least you need 2 samples points to start this chat to working correctly.
- You can stop operation anytime by turn off the power for urgent cases.

6.1.2. Copy A Chart



612-1

key the chart number from where you want to copy
LCD alarms while coping



612-2

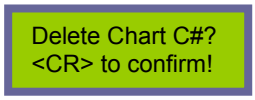
Then suggest to setup new name of the current chart

612-3

*Refer to 1.4. **Select Sample Name** for further operation*

After named, it would be finished in this routine.

6.1.3. Delete the Chart



613-1

key <ENTER> to delete the current chart.
Or key other key to keep the chart.

LCD alrm

613-2

6.1.4. Select Sample Name

while LCD guides to

614-1

Use <PgDn> key to choose the right set item. Or <clear> to goback toward left.
Also you can direct select by number if you remember the name order.

There are always fixed 12 names for user's convenience to distinguish samples
This is just a symbol, none of relations to any virtual operation, but display flips.

6.1.5. Test Parameter Selection Routine

615-1

Use <PgDn> key to choose the right set item. Or <clear> to goback toward left.
Also you can direct select by number if you remember the parameter code.
If current number >8, then you have to key the new number(the <PgDn> and <Clear> not work in this case)
Once <ENTER> to set your select

Now select the paramter you want to test by the following order code

1) RelativeHumidity
2) WpartialPressure
3) VolumeRatio
4) HumidityRatio
5) VolumePercent
6) SpecificHumidity
7) AbsoluteHumidity
8) Dew Point
9) Enthalpy
10) gMoisture
11) WaterActivity
12) sMoisture
13) lMoisture

*if possibly some err in relations, you first accept the remind of LCD memo displayed.

gMS2100 V2.0 embedded following test mode for various applications

- RelativeHumidity_____ *normal moisture parameter of air and gas*
- WPartialPressure_____ *normal moisture parameter of air and gas*
- VolumeRatio_____ *normal moisture parameter of air and gas*
- HumidityRatio_____ *normal moisture parameter of air and gas*
- VolumePercent_____ *normal moisture parameter of air and gas*
- SpecificHumidity_____ *normal moisture parameter of air and gas*
- AbsoluteHumidity_____ *normal moisture parameter of air and gas*
- Dew Point_____ *normal moisture parameter of air and gas*
- Enthalpy_____ *normal moisture parameter of air and gas*

Water activity configuration selection

- WaterActivity_____ *Switch for water activity test of solids*

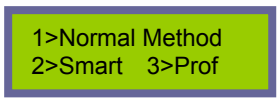
sMS2100 configuration selection

- ERHMoisture_____ *ERH method switch to test moisture of solids or liquids, with clamp always*

LMS2100 configuration selection

- lMoisture_____ *Switch for liquid moisture direct sensor insertion test*

IF you water activity, ERH method was selected, the system would guide you to setup test mode



615-2

***Important**

If you are not professional , or you do not want to change these following parameters for bassic function. You just need to <ENTER> each step LCD stoped and reminded to select or setup, so that the old defaulted data would be kept available.

Select test mode by key number
Following choices are available:

1) Conventional_Method;
2) Smart_Method;
3) Extrapolate _Method;
4) Professional_Method;

Then setup if to keep the pump run or not

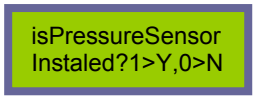
615-3

Key <1> to run the pump when it should run by the program control.
Key<2> to stop it. (Choose this if your instrument not has pump, to avoid EM interferences)

In case you directly test moisture of liquids, for sure you need not the pump in present version. Choose “2”.
If you indirect test moisture by ERH, you usually need to start pump. So choose “1”.
Otherwise to test gas parameters, always you need not pump.
Then system guided to setup control parameters for water activity test mode. Refer to 1.7. Water Activity Test Control for further setup.

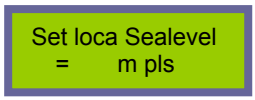
If for gas parameters,

you would be remind to setup if your ordered instrument had pressure sensor installed. If not installed, you should input the Over Sea Level height of you local area.



615-4

if key <0> to negate, input Sea Level in meters of you local area, so that gas parameters can be solidly compensated.



615-5

you can key float number here for high accuracy convert.

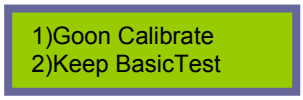
Always you need to select unit for you current chart

615-6

Use <PgDn> key to choose the right set item. Or <clear> to go back toward left.
Also you can direct select by number if you remember the name order.
Then <ENTER> to choose the current one.

Available units includes: "V", "%RH" ,"ppmv", "ppmw", "g/kg","kg/kg", "%", "g/m3", "g/Nm3", "\337C", "\337K", "\337F", "kcal/kg","Btu/lb","aw","atm"

Afterwards, LCD asks



615-7

- If you want to go further calibrate right now, please choose <1>
- Or if you want to keep intrinsic measurement by ERH, please choose <2>

6.1.6. Zero

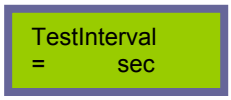
You need one real “Zero” sample to implement this routine

Attention:

- the calculation is based on the converted data from relative 2DC chart.
- Once zero finished, 2DC chart can not be modified again.
- Only after the 2DC chart has been calibrated for 2 points up, zero could be executed.

6.1.7. Water Activity Test Control

First you are prompted to set the test interval



617-1

Complement the following 3 parameters one by one

1)TestInterval: integer data. Once sample by each TestInterval.

2)TestLasting: integer data. This is the longest time lasted to finish once test. If test time over this data, test would be finished in Conventional Mode.

3)EndRateThreshold: Float data. By judging if the changing speed of water activity is bellow the threshold or not. If bellow, the test would be finished in Smart Mode.

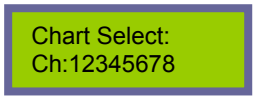
Default data:

TestInterval= sec
TestLasting= mins
EndRateThreshold\n= Wa/min

Attention:

- Once set, it should not be changed, unless to clear the 2DC chart.

6.2. Initialize the Chart



62-1

Use <PgDn> key to choose the right set item. Or <clear> to go back toward left.
Also you can direct select by number if you remember the code.
Then <ENTER> to choose the current one.

Attention:

- User calibrated data would be deleted by this operation.

6.3. System Information

To get information of manufacturer and product.
Following items included:

- Version number
- Manufacture Date
- Product Number
- Sensor Number

6.4. System Control Setup

LCD displays

64-1

The following function could be selected each time

1)Alarm&output Setup: 4 parameters would be reminded to be set in this choice: Top Limit and Bottom Limit for Analog output in DAC; Alarm Upper Level, Alarm Lower Level setup.
2)DeviceCtrlSetup: refer to above segments.
3)PrimarySensorCal: there are 2 choice to calibrate major sensor, by input of plant data, or calibrate with real sample. The sensor was initialized in plant, and the plant data is attached in the manuals of each MS2100 series products, coincident to sensor installed, so do not calibrate main sensor unless after replacement of sensor or other accident loss of data embedded. Refer to **6.2.** 1D Calibration of Sensors in 1D Chart..
4)TempSensorCal: Similar as above, refer to **6.2.** 1D Calibration of Sensors in 1D Chart.
5)PresureSensorCal: Similar as above, refer to **6.2.** 1D Calibration of Sensors in 1D Chart.
6)PowerManage:

Note：

a) *The calibration from 3）to 5）is to establish a formulae as Z=zerooffset+slope*variable relation for relative sensors. The RH sensor needs also to setup "Supply voltage" as well, it is about 5.00V(this is hardware related, can not change the value attached to each special instrument).*
b) *Don't calibrate these sensors unless required.*

6.4.1. Alarm&output Setup

It should be reminded as

641-1

Input a pair of suitable concentration data for the application from the first bit in rear of the indication of TopLimit and BotomLimit separately. Each time you needed to finish data input by key of <ENTER>.

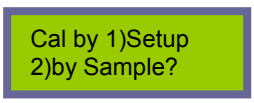
Note

- The data here is identical to the data in current channel.
- Each channel has different limit data.

The analog output was digitalized according to [*20mA * (current data-BottomLimit)/(TopLimit - BottomLimit)]*

6.4.3. Calibration of Sensors in 1D Chart

LCD reminds



643-1

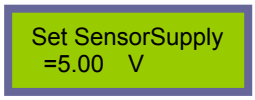
Key "1" to select Input data initialization;
Key "2" to calibrate with samples;

Tow choices are available

1)Setup: to input data of sensor attached by plant;
2)bySample: to calibrate with sample.

6.4.3.1. Input Data of sensor

the plant calibration data is always attached to the check sheet. Each sensor has it's own calibration datasheet, pay attention to get and keep it properly. If sensor is replaced, then you need to input data here.



643-2

Following the guide of LCD to setup SensorSupply, Zero Offset, and SensorSlope correctly here.

6.4.3.2. Sample Calibrate

Two samples are needed to complement this calibration, manage one sample higher and another lower.
Repeated calibration would overlay the old data existed.
Finish it according the clew from LCD.

LCD display

Enter the standard value for current sample.
Press <ENTER> to finish if the data is stable.

7. Maintenance

7.1. Detector cleaning

If you found abnormal response or slow reaction happened, might be the sensor was wrapped with some dirst. Then you can clear it with mild solvents that can dissolve the contaminants if you know what they are. Such as Ethanol, toluene, acetone, gas, kerosene, diesel oil etc can be used.

You can use cotton soaked of the solvents to scrub the surface of sensor softly.

If you have to use severe solvents. Do not be immerged for long time. Better use Ethanol to wash it after clearance. And dry it as soon as possible.

Afterwards, you can blow it to be dry, but assure that the temperature would not be higher than 80 ºC.

7.2 Battery replacement

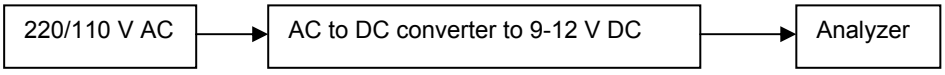
The life of battery is 1000 times charge in normal conditions. Better not to interrupt charging before enough 6 hours. Or it will reduce the life of battery.

7.3.Power Supply and Battery Charger

User can charge the battery with 12 V DC supply /adapter. Each time started, better keep continuous charging till 6-8 hours. Charge times will reduce battery life. Generally 1000 times for standard battery life.

The instrument can run test while charging.
DC 9-12V supplied via the lower PCB Mounted Socket(2.1mm Pin Diameter). Where the center is GND, and outside is positive.

The supply and charge connect route is as following



Pay attention to the polarity of the socket, especially when you use another local standard adapter. Before you use another adapter that not from BDTI, please verify the polarity with multi-meter, and judge if it matched. If reversed, please cut the wire and swap the line. Then test and start to use.

8. Troubles and Remedies

8.1. Signal Check: Confirming temperature compensation effective and MS sensor voltage correct.
8.2. Wiring and Connect Check: Confirming probe output（Input of HBD3）
8.3. Troubles Shooting:

9. Adjustment after Detector Replacement

The sensor employed is long time stable type. It is offset might inside of 1% in 5 years.
But if the sensor was damaged by accidence, you have to exchange it.
You must input the new data for new sensors, which always should be attached with order. And if you lost it, you can ask our support for help. As well, you have to delete the old calibrated chart and calibrate again for your 2DC applications.

Appendix 1. Measurement theory

Water is Activity Definition

Water activity Aw (or equilibrium relative humidity %ERH) measures the vapor pressure generated by the moisture present in a hygroscopic product.

Aw = p / ps and %ERH = 100 x Aw, where:
p : partial pressure of water vapor at the surface of the product
ps : saturation pressure, or the partial pressure of water vapor above pure water at the product temperature

Water activity reflects the active part of moisture content or the part which, under normal circumstances, can be exchanged between the product and its environment.

Water activity is usually defined under static conditions of equilibrium. Under such conditions, the partial pressure of water vapor (p) at the surface of the product is equal to the partial pressure of water vapor in the immediate environment of the product. Any exchange of moisture between the product and its environment is driven by a difference between these two partial pressures.

Accelerated water activity measurement in typically 5 minutes
Conventional water activity measurement with automatic detection of equilibrium. It lasts 10-60mins for various samples

ERH Moisture Analysis

First user must calibrate the instrument with the saturated sample at beginning. The data would be recorded by analyzer for future usage. Then for high moisture application, the analyzer can calculate the moisture directly by the measured activity data.
But for trace moisture analysis, user need to order MS2123-Vap Kit. By heating the sample and measure the difference of partial pressure of water vapor at the surface of the sample, to calculate the moisture content.

Water Activity Testing Mode

The HBD5MS2100NC is a battery operated water activity Analyzer with a single probe input. It features three operating modes:
Smart: accelerated water activity measurement with automatic end of measurement.
Normal: conventional water activity measurement with automatic detection of equilibrium and automatic end of measurement
Standard: water activity and temperature measurement, limited to just indicating the values and the trend of the values
Vap: Vap way is one special creation to gauge trace moisture

Appendix 2. General Standards

You can get chemical pure materials as following to be standards for you instrument calibration or correction.

Saturated Solution	Water activity	Humidity
MgCl2	0.328	32.8%
K2CO4	0.432	43.2%
Mg(NO3)2	0.529	52.9%
NaBr	0.576	57.6%
CoCl2	0.649	64.9%
NaCl	0.753	75.3%
KBr	0.809	80.9%
(NH4)2SO4	0.81	81.0%
KCl	0.843	84.3%
Sr((N)3)2	0.851	85.1%
BaCl2	0.902	90.2%
KNO3	0.936	93.6%
K2SO4	0.973	97.3%

Preparation for Standard Samples:

Get 10g about of chemicals as above listed. Slush it, but not let the samples hold obvious water bead. Then use it as samples for correction or calibration of instrument.

Or you can consult your local Standard Institute for consultation.

Appendix 6.1. 2DC Calibration Table

Standard Data of Samples	S1	S2	S3	S4	S5	S6	S7	S8
ADC data or Basic Professional Data								

By calibrate use can establish the data for the table. Then CPU can convert data according to the insertion principle.

Standard Data of Samples: is always got by industrial standard analysis method of the sample. Anyway it is arbitrary, user can make it whatever useful.

ADC data or Basic Professional Data: this item is varying with different parameters. Before calibration of the 2DC table, user was asked to setup the parameter to test first. Then this item would be automatically defaulted.