

## **SONO GUIDE COMMANDbatch**

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## General Overview:

### General Notes:

- This document is a comprehensive guide for installing and interfacing SONO-VARIO Xtrem moisture probes to a COMMANDbatch E-Z Cal Manual Station.
- Wiring and interfacing in this guide are based on the use of the SONO-VIEW, suitable for interfacing one or multiple SONO probes.
- **If not using the SONO-VIEW**, please refer to supplemental guide “SONO GUIDE\_COMMANDbatch\_SM-USB” for instructions.





### General Step-by-step:

1. Mechanical Installation: How to properly install Mounting Plate Assembly for a SONO-VARIO Xtrem.
2. Wiring: Correct wiring of one or more SONO-VARIO Xtrem probe(s) to the COMMANDbatch Manual Station panel using the SONO cable with the SONO-VIEW.
3. Electrical Interfacing: Interface SONO-VARIO Xtrem for interfacing, calibrations, and/or adjusting offsets using the SONO-VIEW.

### Required Equipment from MESA Systems Co.:

- **SONO-VARIO Xtrem** (M308074) probe(s)
- **SONO-VIEW** (M300131)
- **Mounting Plate Assembly for SONO-VARIO Probe** (M308037)
- **SONO cable**, available in (13-feet) 4m (M308029)
- **COMMANDbatch Panel** with an MPI (Moisture Probe Interface) module (one for each SONO probe).
- A 6-conductor shielded cable or a **Command Alkon CABLE (PN-19320)** previously used to connect the Alkon 7102 moisture probe to a Manual Station.
- **A 500-ohm precision resistor**. A resistor can be found attached to M308029 probe cable or taped to the inside of the SONO probe shipping carton.

- **Junction box** with 7-terminals (for each SONO Probe) suitable for connecting two cables.

Table 1: Required Equipment Supplied by MESA Systems Co.	
Product Name	Product Image
<b>SONO-VARIO Xtrem Moisture Probe</b> (M308074)	
<b>SONO-VIEW</b> (M300131)	
<b>Mounting plate Assembly</b> (M308037)	
<b>SONO Probe cable</b> (M308029)	

## Mechanical Installation: SONO Probe below a clam gate

### Installation Overview:

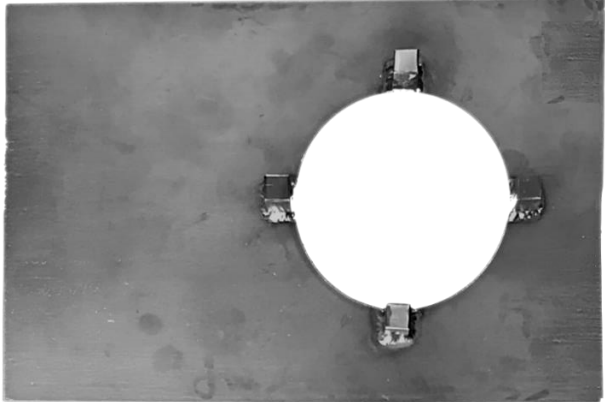

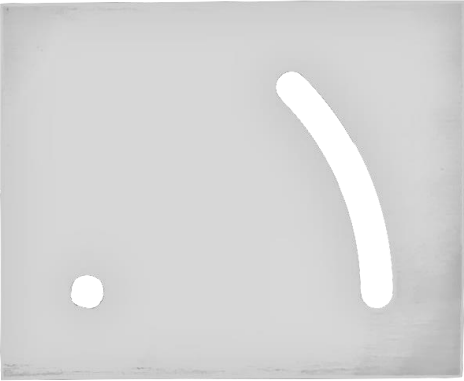

- The SONO-Probe Mounting Plate Assembly is designed to conveniently and securely hold a SONO-VARIO Xtrem probe below the clam gate.
- This guide is specifically designed to help with installation and positioning of the SONO probe under a bin/hopper/silo with a clam gate. Installation will vary to some degree, based on your plant's specifications.

**DO NOT WELD WITH THE PROBE MOUNTED IN THE PLATE!**

### Installation Notes

- The pitch angle of the SONO-VARIO Xtrem probe-face and distance of the probe-face below the gate are specified by aggregate type.
- The probe-face should be positioned for optimal contact with the moving material. Accurate placement is required for the best results.
- The SONO-VARIO Xtrem probe-face should be angled to keep the face clear of standing material between batches.
- A properly installed and angled probe requires only a small final offset adjustment.

**Table 2: Mounting Plate Assembly (M308037) Parts**

Product Name	Product Image (not to scale)
12" x 8" <b>Mounting Plate</b> with Ø108.5mm cutout and set screws.	
12" x 2" <b>Bracket</b> , one end has a 45° angle.	
8" x 6.5" <b>Plate</b> with bolt hole and angle adjustment slot. 2- each	
7/16" - 20 Thread Hex Screw 1-1/2" long with Hex Nut and Washers	

**IMAGE: Item # M308037 (shown assembled) with SONO-VARIO Xtrem probe installed**



The SONO-Probe Mounting Plate Assembly includes the following items: (shipped knocked-down).

- 12" x 8" **Mounting Plate** with Ø108mm cutout and set screws.
- 12" x 2" **Bracket**, one end has a 45° angle.
- 8" x 6.5" **Plate** with bolt hole and angle adjustment slot.
- 2-each, 7/16" - 20 Thread Hex Screw 1-1/2" long with Hex Nut and Washers.

## Installation Step-by-step

- 1) The 12" x 2" Bracket is fabricated with a 45° angle on one end. The 45° end of the Bracket is to be welded to the back of the Mounting Plate as shown in the image above.
- 2) The additional 8" x 6.5" Plate with bolt hole and angle adjustment slot is to be bolted to the Bracket and can allow for easy adjustment to the desired angle.
- 3) The 8" x 6.5" Plate is to be securely attached to the plant structure, typically this is achieved through welding.

### **DO NOT WELD WITH THE PROBE MOUNTED IN THE PLATE!**

- 4) After all welding is finished, the SONO-VARIO probe is to be installed in the Ø108.5mm cutout, such that the front of the probe is flush with the front of the mounting plate.
- 5) Secure the probe in the mounting plate using four (4) ¼" set screws [18-8 Stainless Steel Cup-Point Set Screws, 1/4"-20 thread, ½" long], located on the back of the 12" x 8" mounting plate.
- 6) The SONO probe should be installed about 8 to 12-inches (20 to 30mm) below the clam gate.
  - The mounting must be rigid.
- 7) Position the 12" x 8" Mounting Plate directly under a clam gate, such that the flowing aggregate completely covers the face of the SONO-VARIO Xtrem probe. (See diagrams below)
  - The direction of the aggregate flow should drop directly on and against the plate such as to cover the probe's surface when the clam gate opens.

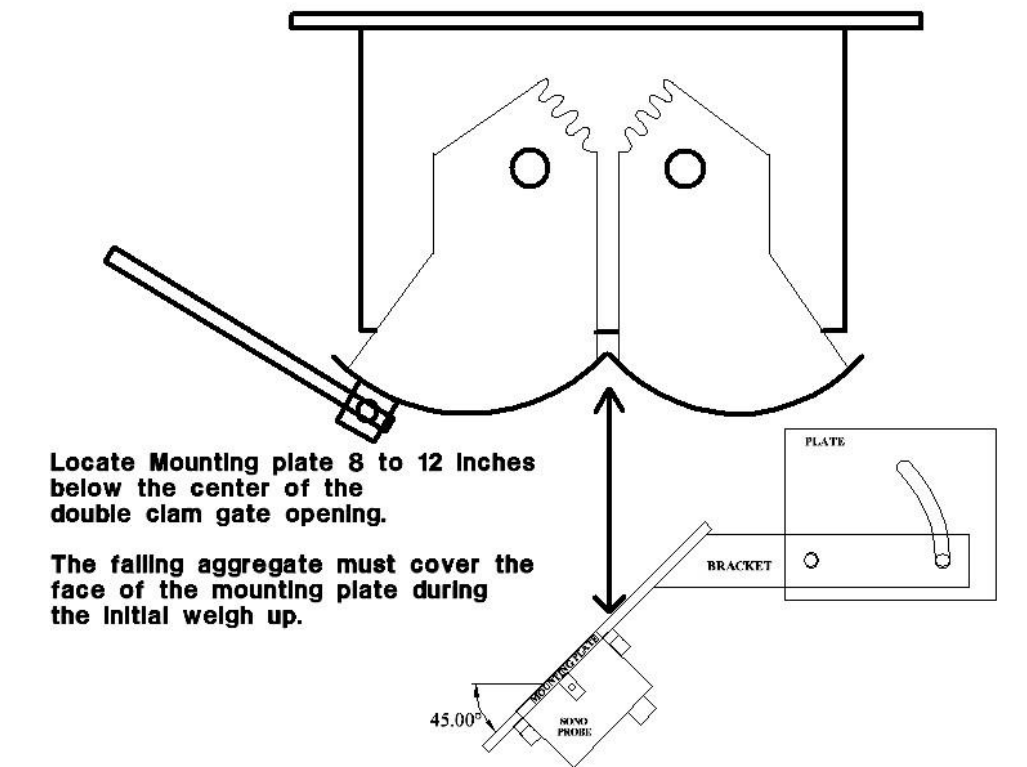
- This ensures that the SONO probe is covered with material immediately upon the opening of the gate, resulting in fast and accurate moisture measurements as soon as possible and during shorter duration openings.

## Installation Best Practices:

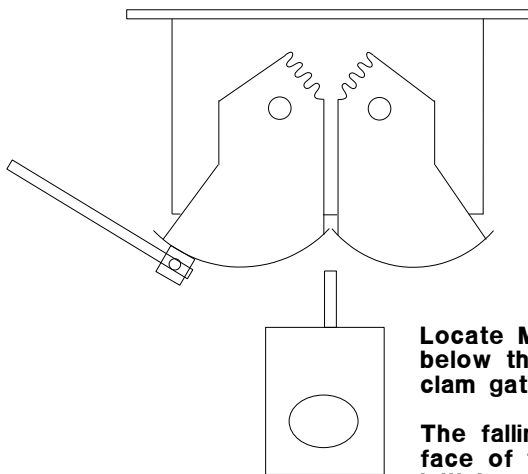
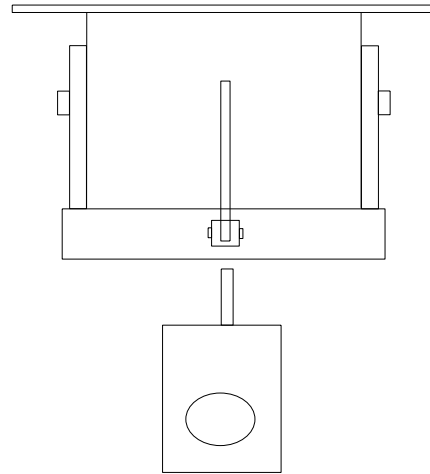
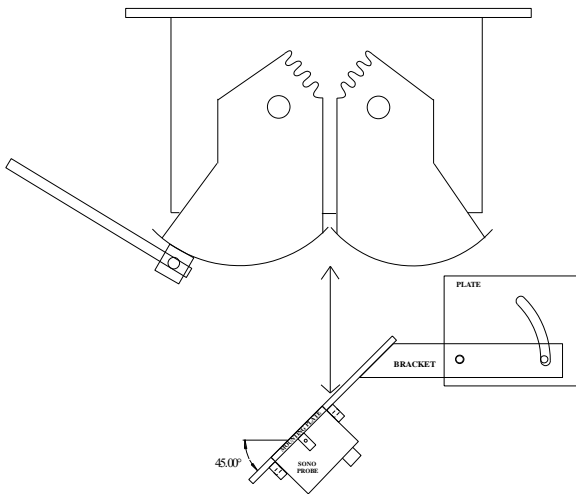
### *Recommended Positioning:*

- For sand, the angle of the mounting plate should be between 45° and 55°.
- For gravel and rock and stone, the angle must be steeper, between 55° and 65°.
- Adjust the mounting plant angle such that material does not sit on the probe-face between batches.
- Please refer to *the SONO-VARIO Installation Images* document, for examples of installations.

### *Recommended Position below a Double Clam Gate:*

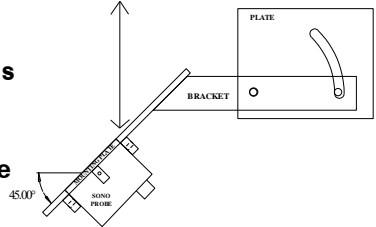




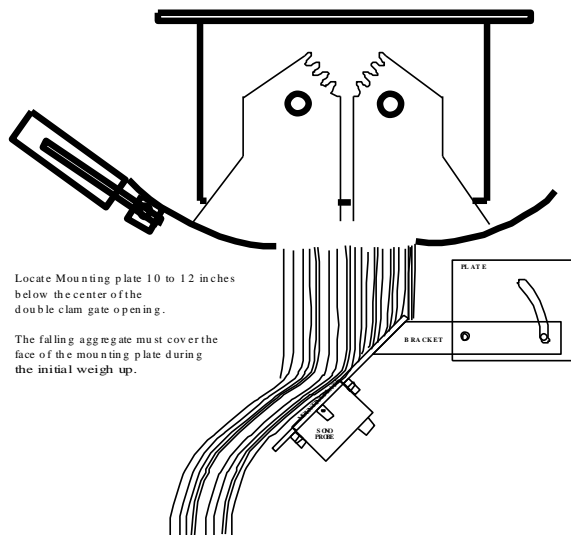
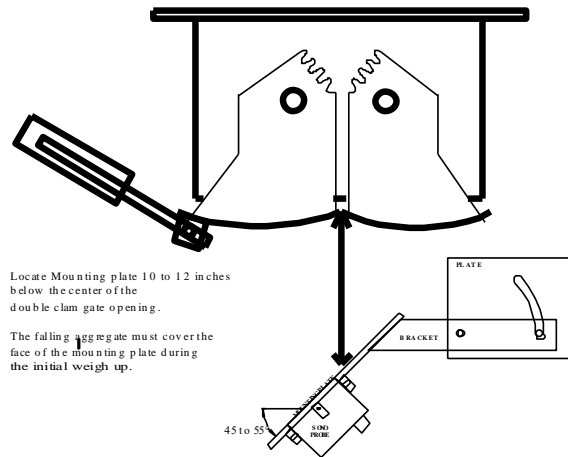


**Locate Mounting plate 8 to 12 inches below the center of the double clam gate opening.**

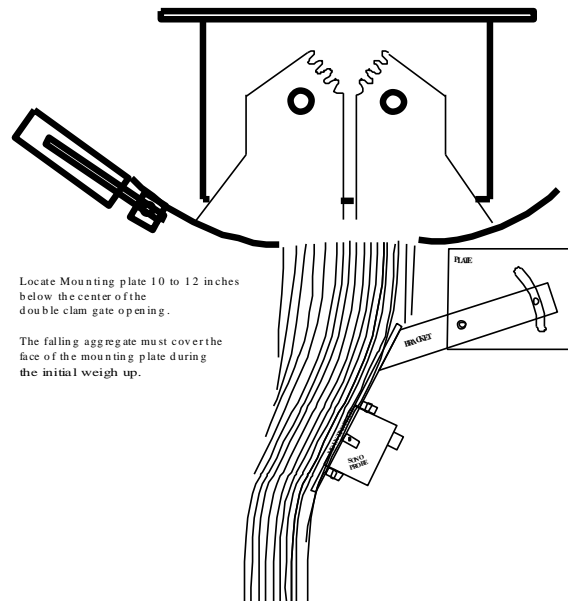
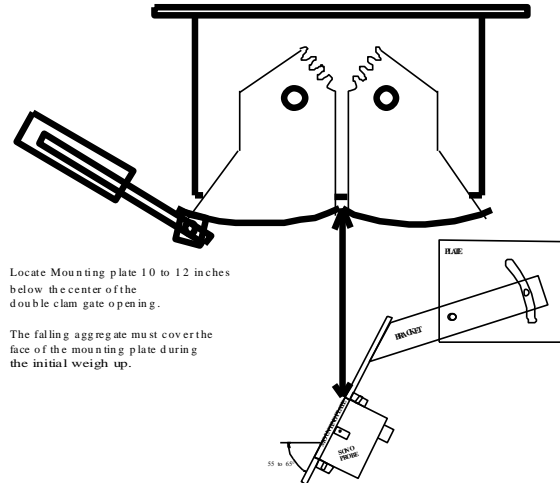
**The falling aggregate must cover the face of the SONO Probe during the initial weigh up.**



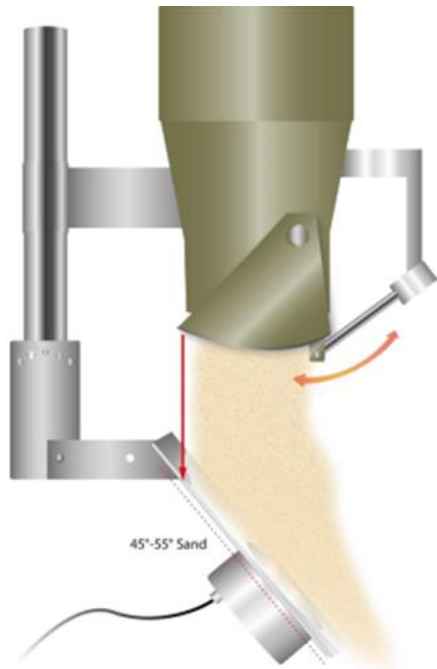
## SAND INSTALLATION



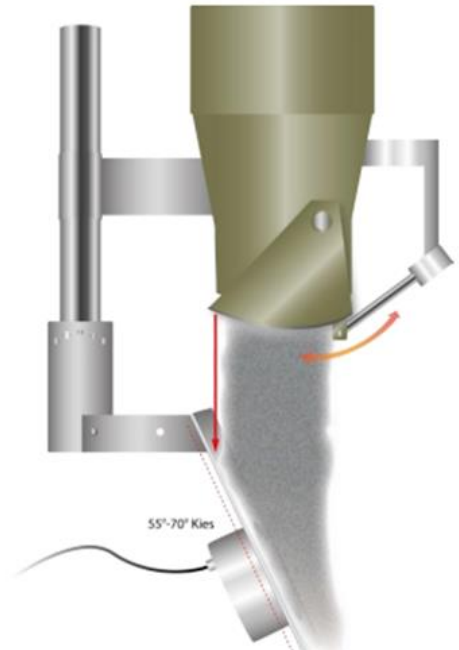
## ROCK and STONE INSTALLATION



*Recommended Position below a Single Clam Gate:*



**Sand:** Angle sensor holder 45° to 55°



**Gravel:** Angle sensor holder 55° to 70°

## Wiring:

### Wiring Overview

- This section provides detailed guidance on wiring SONO-VARIO Xtrem Probe(s) to the COMMANDbatch Manual Station. **Six wires plus a shield are needed.**
- Figure 1 through 5 provide graphics and diagrams of the step-by-step instructions below. These figures can be found labeled at the end of this section.

### Wiring Notes

- One option is to use new cabling, to wire between the SONO-VARIO probe's 13-foot-long cable (M308029) **Figure 1** and the COMMANDbatch panel **Figure 5**. Please make sure you review the wiring table and diagram shown in **Figure 2 and Figure 3**. The new cable requires six (6) 24 or 22 AWG lead wires that are shielded.
  - Install a junction box close to the SONO probe(s) to connect SONO probe cable wires to the new cabling.
- A second option is to use the lead wires from a previously installed Command Alkon Cable PN-19320 to connect the SONO-VARIO Xtrem to the manual station.

### Wiring Step-by-step

*Note:* You have and will use the Alkon cable PN-19320

- 1) If you have decided to use the Command Alkon CABLE PN-19320, these steps are specific for wiring a SONO probe to the Alkon COMMANDbatch Manual Station, MPI module, PN-20757 CONNECTOR

- 2) Unplug the PN-20757 (green) connector from the top of the Manual Station, then disconnect wires from terminals. These wires will be rewired in a different order as shown in **Figure 2**.
- 3) Removing the connector will disconnect the power, while wiring!
- 4) At the probe end of the PN-19320 Alkon cable, remove (cut off) the PN-21759 CONNECTOR. Strip back the shield and the 6 connectors. Use a junction box to splice together the SONO M308029 cable wires to the PN-19320 wires. as shown in **Figure 2 and Figure 3**. Make sure the wiring is correct!
- 5) At the E-Z Cal Manual Station PN-20757 CONNECTOR, terminate the wires according to **Figure 2 and Figure 5**.
- 6) Connect the Command Alkon CABLE PN-19320 **Brown** wire to terminal **+ SIG**.
- 7) Connect the Command Alkon CABLE PN-19320 **Blue** wire to terminal **– SIG**.
- 8) Install the 500 Ohm precision resistor across terminals + SIG and – SIG. You will find the 500 Ohm resistor inside the manual inside the probe carton.
- 9) **Do not connect** the Green and Black wires from the MPI module terminals (PN-20757). These two wires will be connected to the IMPbus at the SONO-VIEW.
- 10) You should locate the SONO-VIEW close to the Manual Station. To power the SONO-VIEW you can jumper the +12V and the -12V power from the PN-20757 Connector, see **Figure 4** (SONO-VARIO Wiring to PN-19320 Diagram).
- 11) The SONO-VIEW is used to communicate digitally with SONO probe(s). You will need to connect the IMPbus COM and IMPbus RT wires to the SONO-VIEW and supply power. You can jumper from the +SIG and -SIG terminals to the SONO-

VIEW power supply. See **Figure 4** (SONO-VARIO Wiring to PN-19320 Diagram). If you have more than one SONO Probe you can parallel wire all the IMPbus COM and separately parallel wire together all the IMPbus RT wires. The SONO-VIEW can be connected to 12-SONO Probes. See **Figure 7** and refer to the SONO-VIEW technical manual.

- 12) Confirm wiring is consistent with **Figure 4** (SONO-VARIO Wiring to PN-19320 Diagram) then plug the PN-20757 connector back into the MPI module.

## Wiring Figures:

**Figure 1: M308029 Cable and Cable Tails**

*Image: Cable tails of the SONO-VARIO cable M308029*

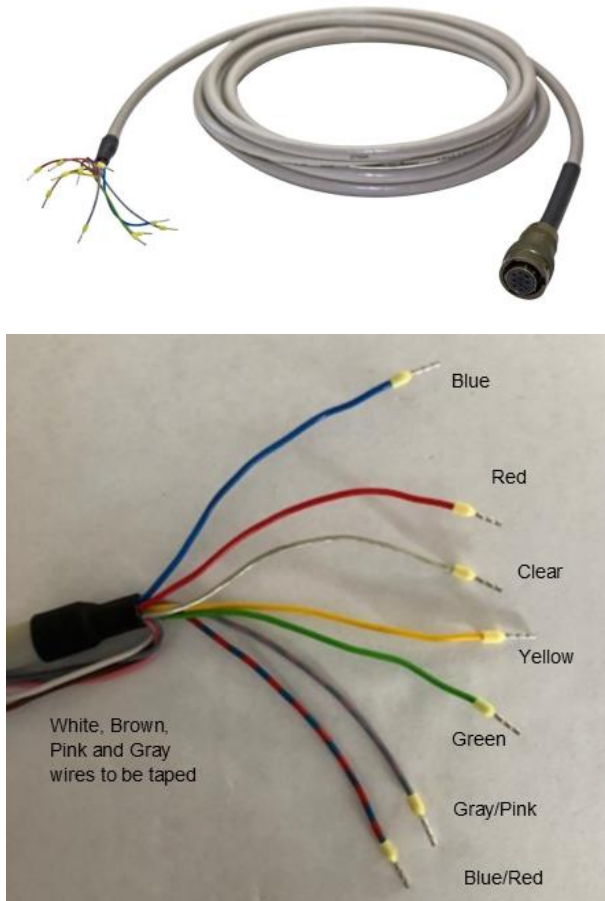

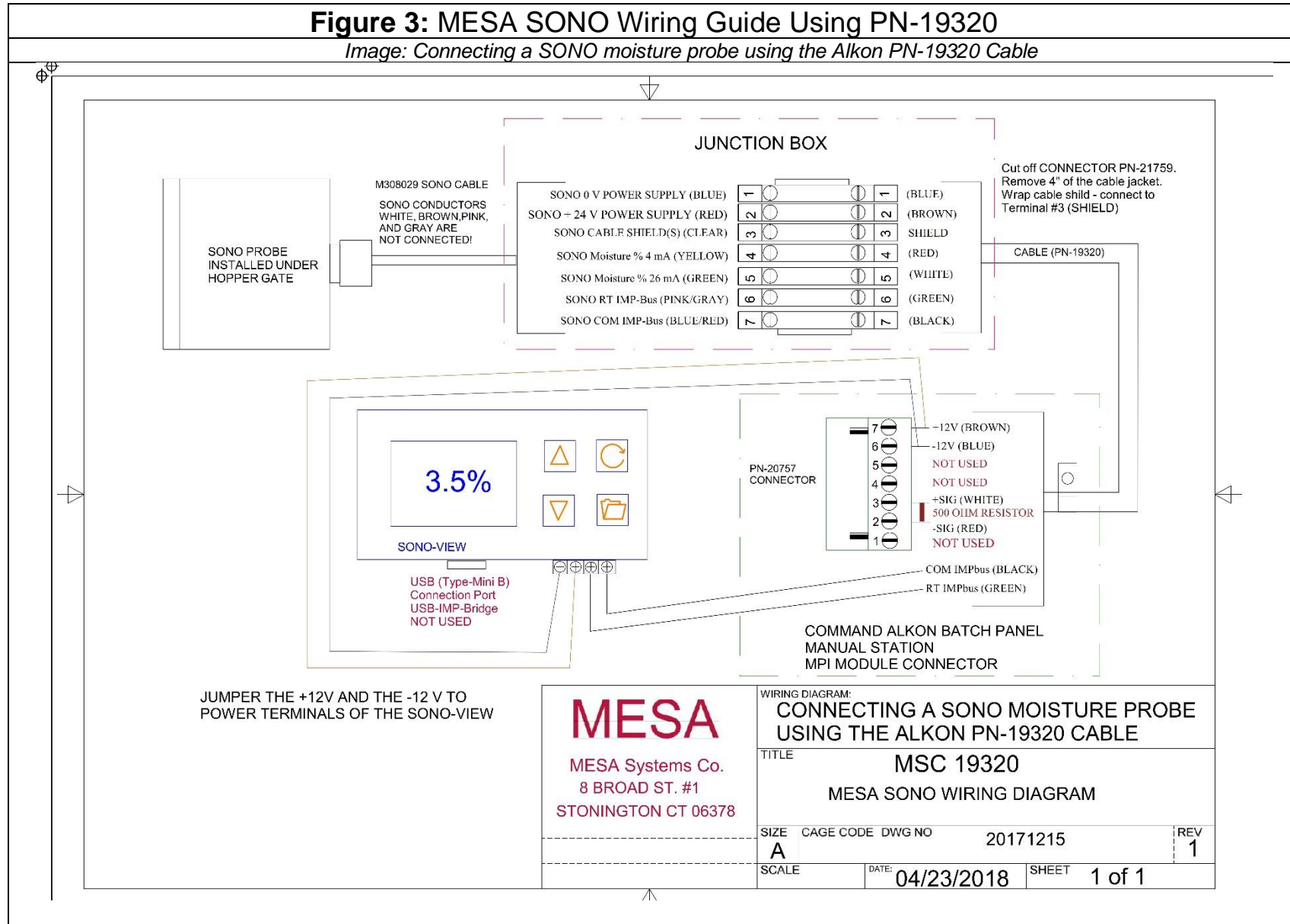


Figure 2: SONO-VARIO Wiring with PN-20757 Connector					
Wiring of a SONO Probe to a COMMANDbatch Manual Station PN-20757 Connector.					
SONO Probe Functionality	M308029 SONO-Probe Cable Wire Lead Colors	Resistor 500-ohm	PN-20757 connector terminal at the E-Z Cal Manual Station.		If wiring using the Alkon Cable PN-19320: conductor terminations
			Terminal #	Function	Wire color
24 VDC Power:	Red		7	+12V	BROWN
0 VDC Power:	Blue		6	-12V	BLUE
Cable Shield:	Clear		Ground to Panel		
Percent Moisture: (20 mA) plus a 500-ohm resistor = 10 VDC	Green		3	+SIG	WHITE
Percent Moisture: (4 mA) plus a 500-ohm resistor = 2 VDC	Yellow (Yellow)		2	-SIG	RED
The two IMPbus wires are not connected to the COMMANDbatch Panel. They are connected <u>only</u> to the SONO-VIEW.					
IMPbus RT	Gray/Pink (multicolored)			IMPbus	GREEN
IMPbus COM	Blue/Red (multicolored)			IMPbus	BLACK
NOTE: The SONO cable's White, Brown, Pink and Gray wires <u>are not used</u> .					



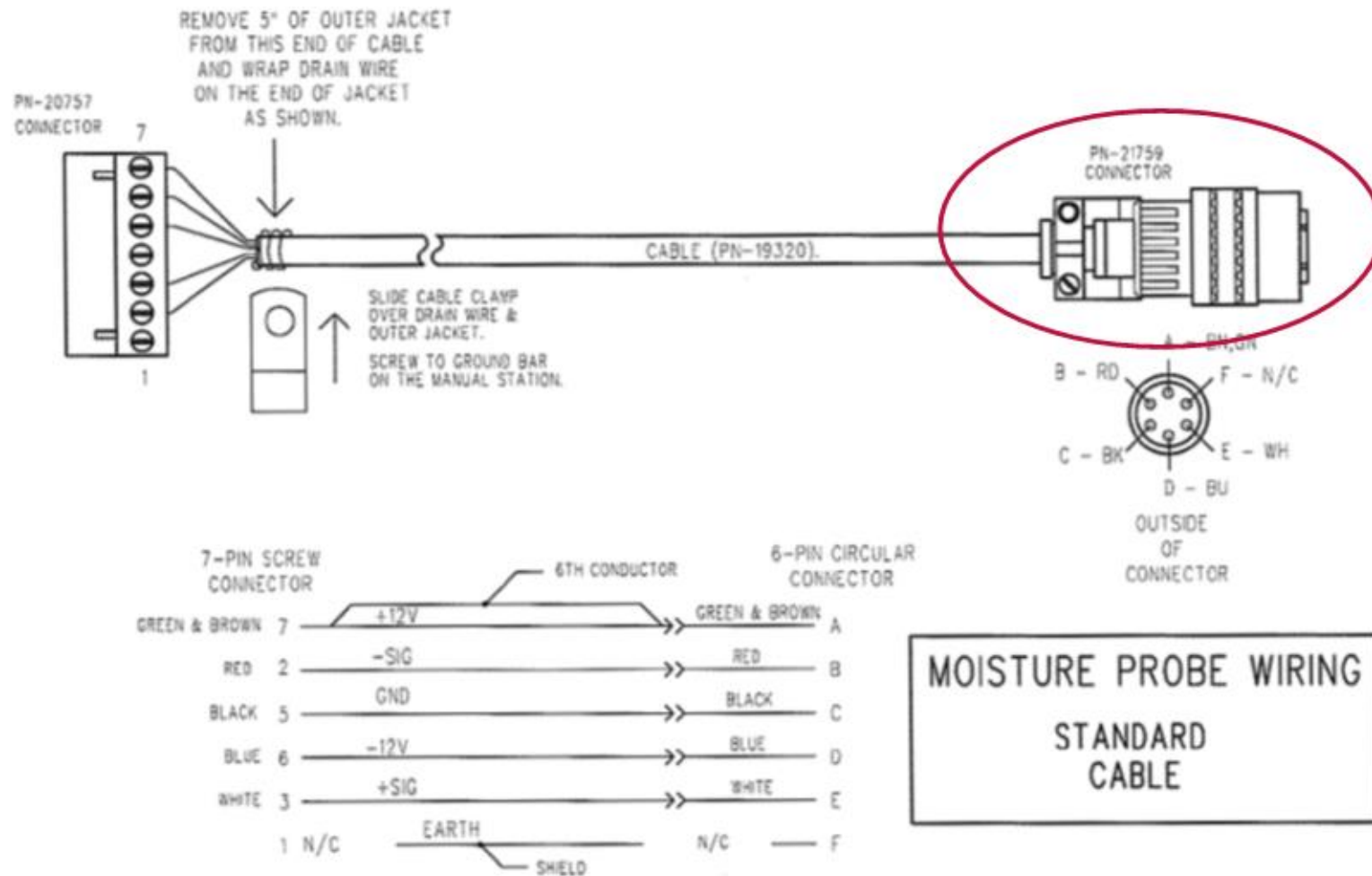
## Figure 3: MESA SONO Wiring Guide Using PN-19320

Image: Connecting a SONO moisture probe using the Alkon PN-19320 Cable



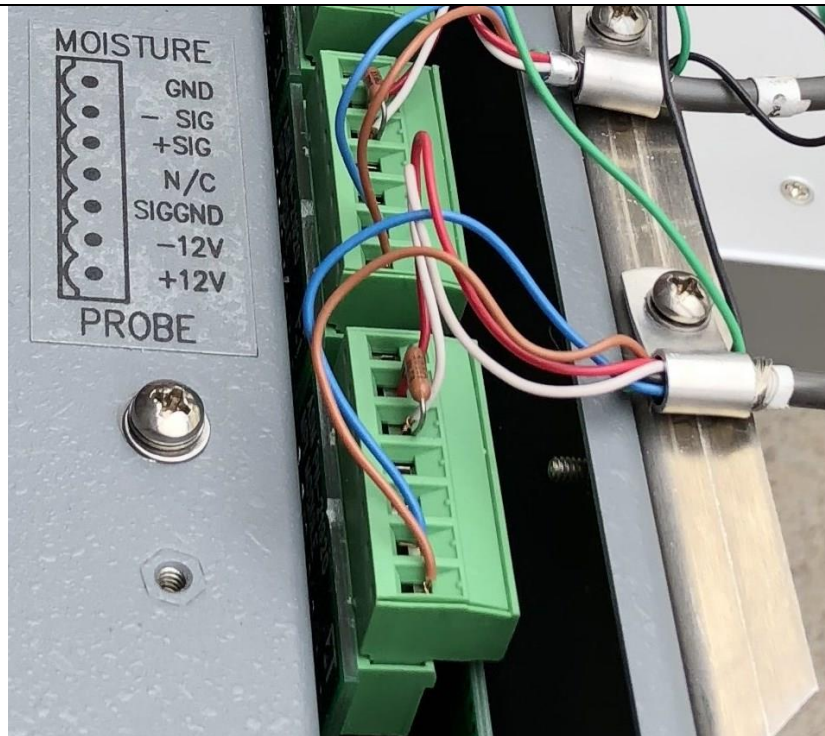
**Figure 4: COMMANDbatch Cable Wiring**

Image: Copied from COMMANDbatch V1.7.5.0 Moisture Systems Setup, Manual page 27



**Figure 5: PN-20757 wired to Cable PN-19320**

*Image: COMMANDbatch MPI Module wired for SONO probes when reusing the Command Alkon CABLE PN-19320.*



## Interfacing SONO Probes:

### Interfacing Overview

- After wiring, the SONO-VIEW, will be used to interface individually to all connected SONO Probes.
  - Perform a **NEW INSTALLATION** using a SONO-VIEW.
  - Any wiring or communication issues can be identified.
  - Individual SONO Probes can be assigned to a number by bin/material.
  - The correct material calibration can be selected using the SONO-VIEW.
- Set the E-Z Cal Hardware to interface to a SONO Probe moisture reading using the function **Analog Simulation**.
- Each probe can be adjusted (offset) to correspond to a reference (ASTM bake-off) moisture.
- **SONO Probes measure and display the Total Moisture of the Aggregate.**

### Interfacing Notes

- All SONO probes are delivered set to **#1 Universal-Sand-Mix** calibration.
  - If this probe is to be used to measure the moisture of sand, you need not make a change to the calibration setting.
  - If you are working with coarse aggregate 5/32-inch up to 1-1/4-inch (#57, #67 or #89 Stone) you should change the calibration to **#6 Gravel and Grit** using the SONO-VIEW.
- All SONO probes are shipped for optimum operation when installed below a silo clam-gate, provided 3-seconds of aggregate, flows over the face of the SONO probe.
  - **If your aggregate flow is shorter than 3 seconds**, please see Part 4, to speed up the average moisture readings.

- You will need a bake-off moisture value to adjust the SONO probe offset to correspond to the material moisture.
- Before you can make an offset adjustment, the SONO probe should be measuring and the moisture visible in the SONO-VIEW display.
- The SONO probes are delivered in CH-averaging mode, set to read the Total moisture from an aggregate during the batch, and to hold the average moisture value at the end of the batch.
  - While jogging the average moisture in the display may go down as jogged material does not flow across the probe uniformly.
- Look at the display during the initial weigh up (take a video of the SONO-VIEW display) so you can review the reading in detail). Record the average moisture value for the batch, when you collect the reference sample. The best average moisture is viewed near the end of the initial weigh up (See **Figure 7**).

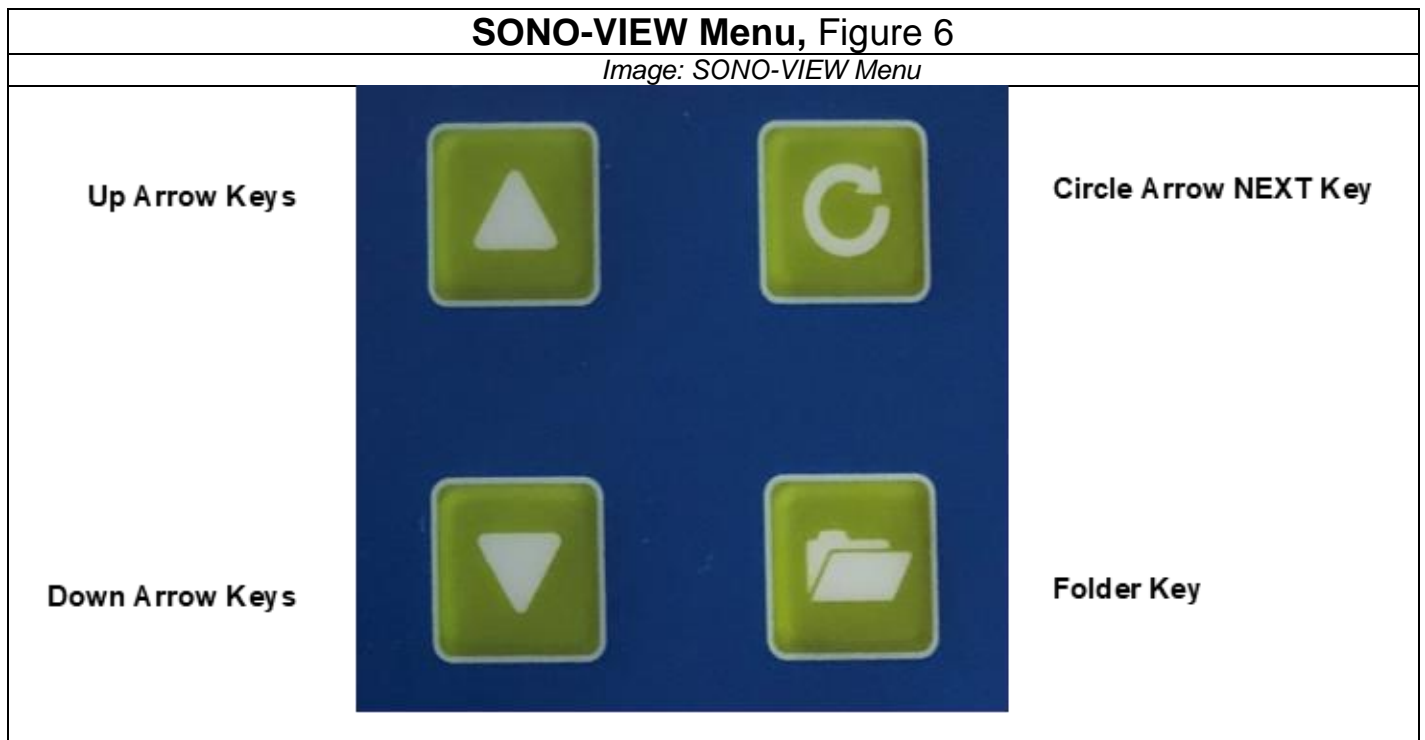
## *Working with the SONO-VIEW Overview*

- The SONO-VIEW is used to connect to all the SONO Probes to make setting adjustments, to achieve correct and optimum performance.
- Use the following SONO-VIEW keys to select the menu item you want to work with. A Summary can be found in **Figure 6** (SONO-VIEW Menu).

The **Circle Arrow NEXT Key** moves you to the **NEXT** step and saves a new setting.

The **Folder Key** moves you **BACK**.

The **Up and Down Arrow Keys** move you within a menu.





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## Interfacing Step-by-step:

### *Part 1: Using SONO-VIEW to connect to the SONO Probes.*

- 1) Press the Folder Key, then use Up and Down Arrow Keys to find **NEW Installation** in the **Setup** menu.



- 2) Press the **Circle Arrow NEXT Key** and wait for all SONO probes on the IMPbus to be found.



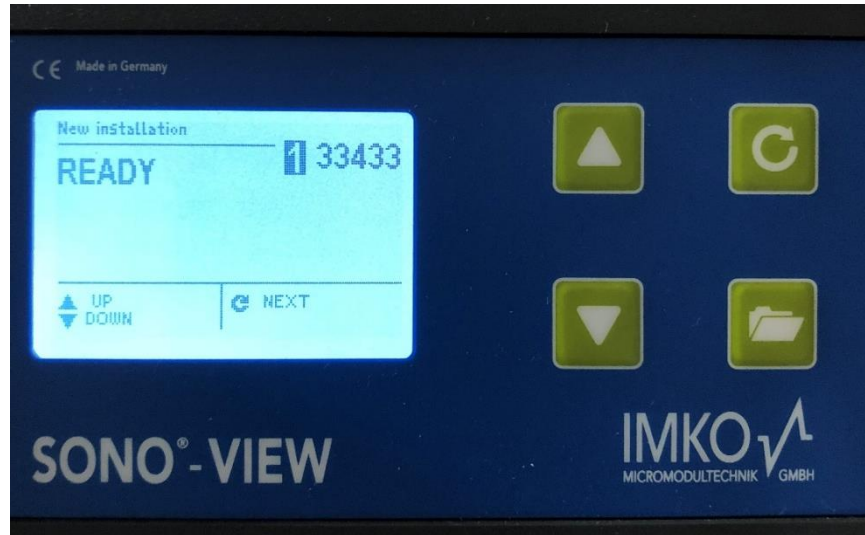


- 3) Assign a number to the probe(s) using the **Circle Arrow**, **NEXT Key**. If you have only one probe connected to the SONO-VIEW, the only number available is “1”.
- 4) If you have more than one SONO Probe, you can assign a “Bin” number to each SONO Probe. SONO Probes are listed by serial number. Use the Up and Down Arrow Keys to select the probe you want to number. Name each probe for the bin it is installed under! Once you have assigned the probe numbers, save the assigned numbers to the probes, use the **Circle Arrow**, **NEXT Key**.





- 5) Press the **Circle Arrow NEXT Key** until the setup is saved and you see **READY**.



- 6) Press the **Folder Key** to see the moisture display.



## *Part 2: Setting the E-Z Cal Hardware to interface to a SONO Probe*

*Note:* The E-Z Cal panel is not used to adjust the calibration or offset of the SONO Probe. This is done using the SONO-VIEW and will be discussed later.

- 1) The COMMANDbatch E-Z Cal Manual Station MPI-modules accepts the analog input signal of 0...10 VDC from a SONO Probe.
  - Each SONO Probe connected to an MPI module needs to be interfaced as explained below.
  - Interfacing is not a calibration of the SONO Probe. It is steps to assure that the SONO Probe moisture values correctly interface to the E-Z Cal Hardware.
- 2) Using the SONO-VIEW you can select a SONO Probe by pressing the Circle Arrow button and entering the **Probe Configuration** Menu.

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- If you have more than one probe, use the SONO-VIEW Up and Down Arrows to select the individual SONO Probe (by number) that you will be working with.
- 3) Once you have selected the Probe number, scroll to the **Analog Simulation** menu Item.
  - 4) Press the SONO VIEW Up arrow to the display shows **25%**. You are now (simulating 25% of the 0....20% moisture range equaling 5.0% moisture) The SONO Probe is simulating, sending 5.0% moisture to the E-Z Cal Manual Station.
  - 5) Follow the steps [a through f] below to set up the E-Z Cal manual station for each SONO Probe:

- a. With the E-Z Cal turned on, press the “Setup/Calib”. button. The E-Z Cal display look like the following:

Info					
Info,	Setup,	Calib,	or Exit?		

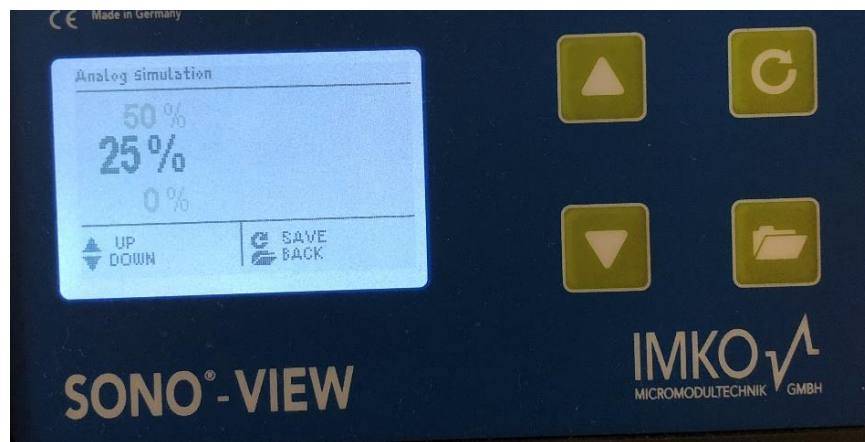
- b. Using the UP and Down Button on the E-Z Cal Panel select “Calib.” and press the Enter Button. The Displays shows:

Enter	current	Moisture	value		
0.00 %					

- c. Using the UP and Down Button on the E-Z Cal Panel select the appropriate display (e.g., “Disp. 7” for a single probe) and press the Enter button. The displays show:

Disp. 1						
Select	the	scale	to calib			

- d. Using the UP or Down buttons, set the moisture to 5.0%, as simulated by the SONO-VIEW. Then press the Enter button. (See images of the SONO-VIEW and the EX-Z Cal panel below).



*Image: 25% = 5% moisture simulated on SONO-VIEW*



Image: 5% moisture simulation, shown on the COMMANDbatch E-Z CAL Panel

- e. Using the UP or Down buttons to set the “probe factor” to 0.75. **All SONO Probes require the probe factor of 0.75.** Press the enter key when finished.

Enter	probe	factor				
1.00						

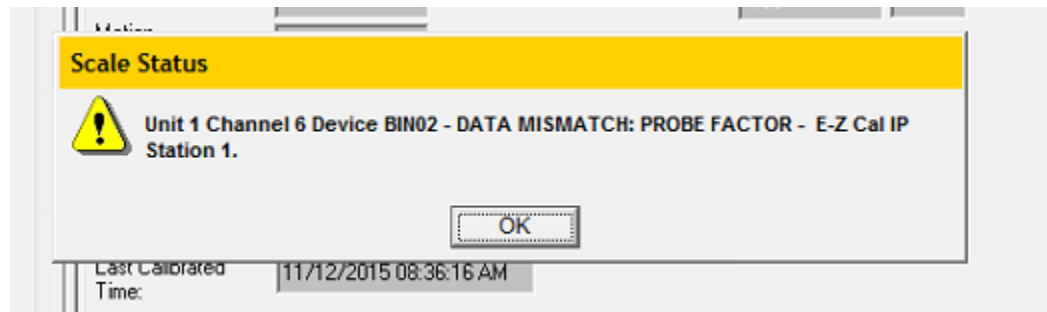
- f. Press the Enter Button to exit the Setup/Calib mode.

	No					
Calib	another	display?				

- g. If the COMMANDbatch software displays an error message (example below) there is a mismatch between the E-Z CAL and the

COMMANDbatch software. To clear up this mismatch, you will need to do the following.

1. Restart the E-Z Cal manual station.
2. Restart the PC.



### *Part 3: Establishing a calibration offset with SONO-VIEW.*

*Note:* Adjusting the SONO Probe offset can be done after you set the probe factor and simulate the moisture to the E-Z Cal panel.

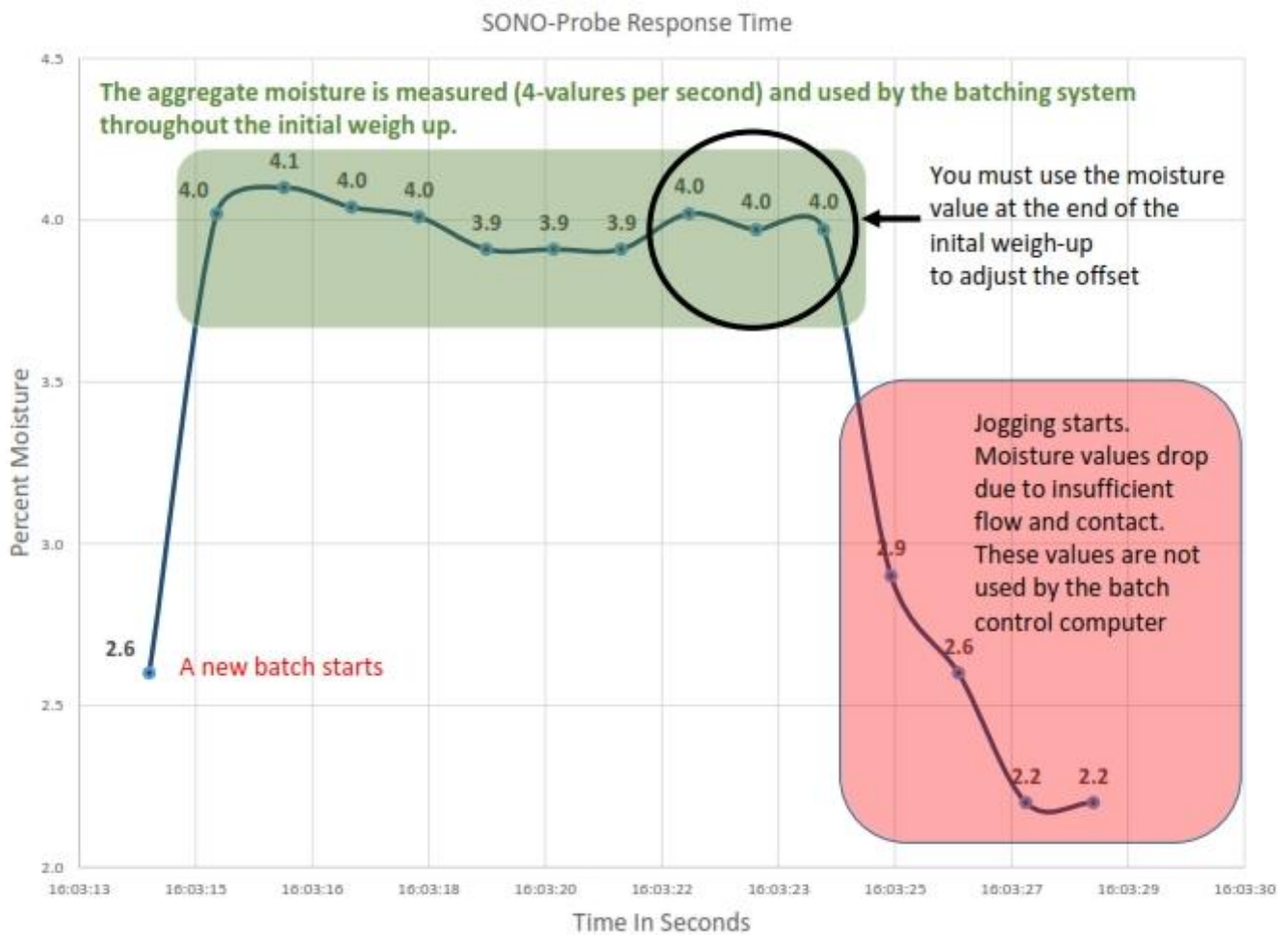
- 1) Enter the SONO-VIEW **Probe Configuration menu** to adjust the offset to correspond to the Bake-off moisture.
- 2) Record the moisture readings in the SONO-VIEW display, at the same time you collect the reference sample, to bake-off. Write this value Down. **The SONO probe is reading the total moisture percent.**
- 3) Do a bake-off of the sample.



- 4) Determine the total dry weight percent moisture (%M) using the formula:  $(\text{Wet weight} - \text{Dry weight}) / \text{Dry Weight} = M \times 100 = \%M$ .
  - For example:  $(950 \text{ gram} - 915 \text{ gram}) / 915 \text{ gram} = 0.038 \times 100 = 3.8 \%M$ .
- 5) Calculate the offset between the SONO probe moisture reading and the bake-off moisture.
  - For example: If the SONO probe display is 3.4% and the bake-off is 3.8% the offset of the SONO probe must be adjusted + 0.4%.

**Figure 7: SONO-VARIO Xtrem Response Time**

The graph below shows how the SONO probe measures during one batch.



- 6) When you are ready to make an offset adjustment to a SONO Probe, you press the **Circle Arrow NEXT Key** to get to the **Probe Configuration** menu.
- 7) Select the probe you want to work with using the arrow keys. Press the **Circle Arrow NEXT Key** to open the SONO probe menu. Use the arrow keys to find the **Offset-balancing** window. Press the **Circle Arrow** key to enter the menu.





- 8) Use the **Up and Down Arrow Keys** to change the offset to **+0.40**. Press **Circle Arrow NEXT Key** to save the new offset. Press the **Folder Button** to exit.



*Note:* A properly installed and angled probe requires only a small adjustment (+/- 1 %). An offset adjustment compensates for the pitch angle of the probe-face based and or the distance of the probe is installed below the gate. If you need to make a very large adjustment, you should double check that the mechanical and electrical settings are correct, for your plant and batch control system!

- 9) At the COMMANDbatch E-Z Cal Manual Station and **set the probe factor to 0.75 for all SONO probes!**
- 10) To confirm that each SONO probe is correctly communicating with the E-Z Cal panel by using the SONO-VIEW to simulate a range of moisture values. Select the SONO Probe you want to work with. Select **Probe Configuration, Analog Simulation** function, one probe at a time. (Shown below)

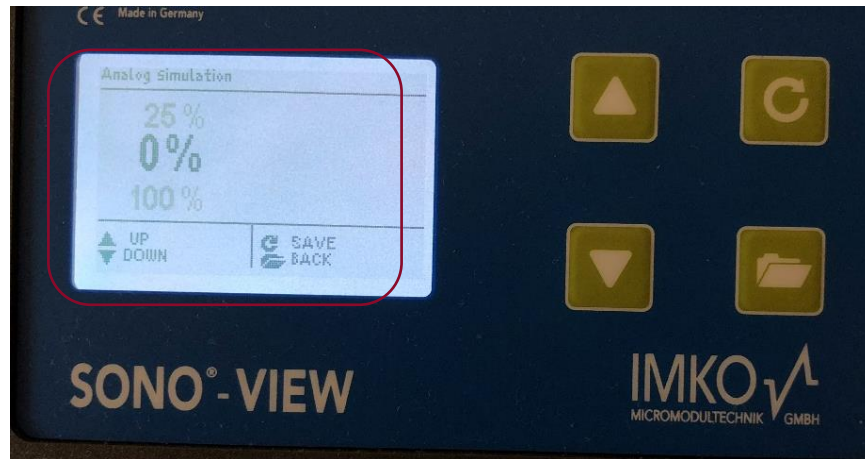


11) For each individual SONO probe, you can simulate 0%, 5% and 10% moisture to the E-Z Cal panel by selecting the probe you want to work with the by moving up and down using the arrows of the SONO-VIEW, between 0%, 25% and 50% of the moisture scale: 0...20%). You will then see the simulated moisture values on the E-X Cal Manual Station.

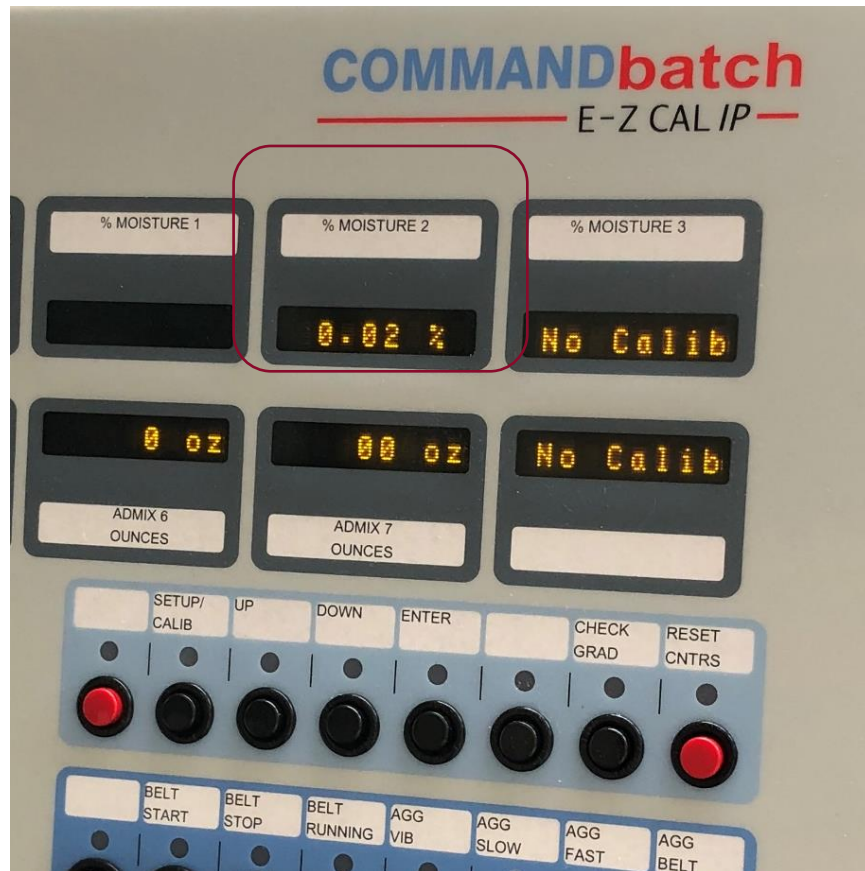
- The following table of simulated moisture values from the SONO-VIEW = the Percent Moisture in the E-Z Cal panel:

SONO-VIEW Analog Simulation in Percent of Moisture Scale (0....20%)	Percent moisture simulated to the E-Z Cal Panel
0%	0%
25%	5%
50%	10%

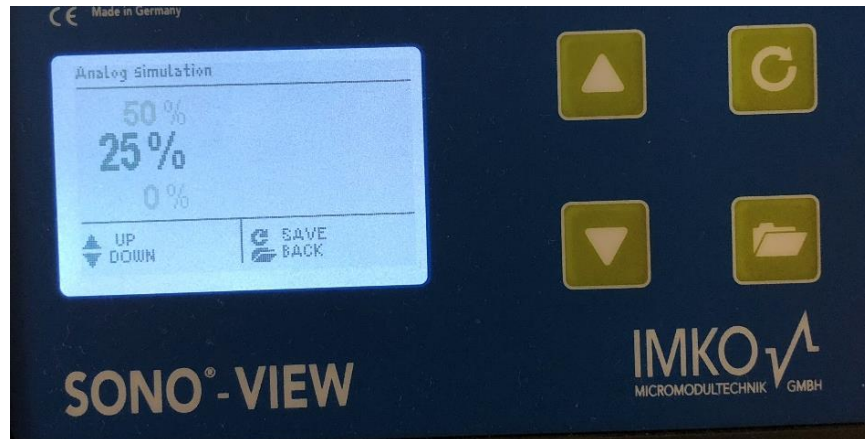
- The three values should align correctly, **if not, you need to confirm that the probe factor = 0.75.**



*Image: 0% = 0.0% moisture simulated by the SONO-VIEW*



*Image: 0.0% moisture simulation, shown on the COMMANDbatch E-Z CAL Panel*



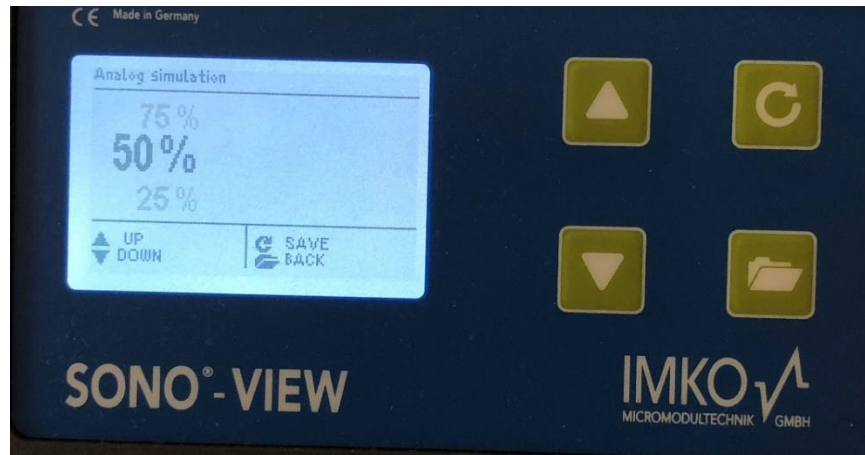
*Image: 25% = 5% moisture simulated on SONO-VIEW*



*Image: 5% moisture simulation, shown on the COMMANDbatch E-Z CAL Panel*



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*Image: 50% = 10% moisture simulated on SONO-VIEW*



*Image: 10% moisture simulation, shown on the COMMANDbatch E-Z CAL Panel*

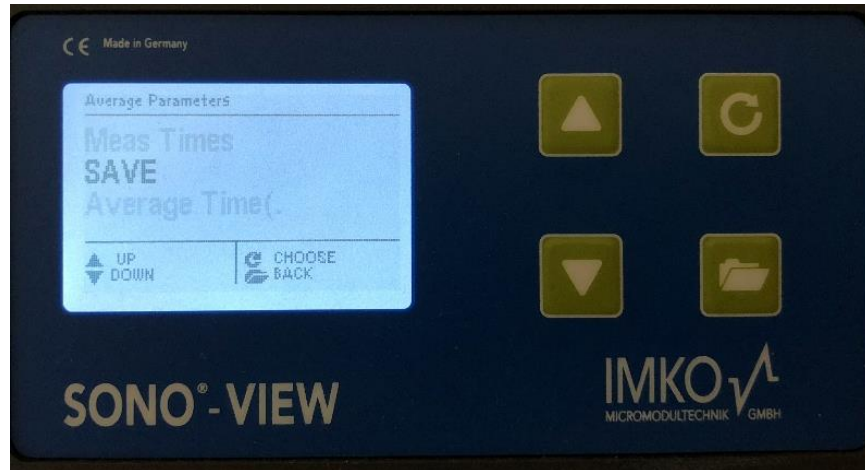
## *Part 4: Optional adjustments for short duration aggregate flow (2 seconds)*

- All SONO probes are shipped for optimum operation when installed below a bin with a clam gate, provided that 2-seconds of aggregate flows over the face of the SONO probe.
  - If the aggregate flow is shorter than 2-seconds, it is recommended to speed up the average moisture readings by adjusting the following setting, using the SONO probe's **Averaging Parameters** using the **SONO-VIEW**.
  - If you are unsure about how best to make these setting adjustments, please contact MESA Systems Co.
  - It is highly recommended to check with the batching systems supplier to make sure their software settings are not overriding the SONO probe settings.
- 1) Press the Circle Arrow Key to enter the **Probe Configuration** menu. Press the Down Arrow until you see **Average Parameters**. Press the Circle Arrow Key to enter the **Invalid Measurement Count**.





- 2) Adjusting the Invalid Measurement Count: The Invalid Measurement Count is the number of readings not used in the moisture average. The default setting is “2” (moisture readings). If you want to start the moisture averaging more quickly, change the value to “1”.
- 3) Adjusting the Moisture Threshold: The Moisture Threshold is the lowest moisture (percent absolute) that will be added into the moisture average. The default setting is 0.1%. If you know the lowest dry weight moisture the aggregate this probe is measuring, you can set the Moisture Threshold to discard any reading below the set value.
  - *Note:* The Moisture Threshold setting can be below SSD.
  - *For example.* If you are measuring sand and you know that the sand is never lower than 2.5% moisture, you can set the Moisture threshold to 2.5 (percent absolute). Now, any moisture value measured which is less than 2.5% will not be used in the moisture average. By setting the Moisture Threshold at a higher value a more accurate average moisture values will be reached sooner.
- 4) Once satisfied with these settings, use the down arrow key to the SAVE function. Press the Circle Arrow Key to save your changes.



## Interfacing Best Practices

### *How the moisture values are used by the batching system:*

- During the initial weigh-up “feed” (up to where a timed feed or jog feed would start), the moisture probe readings and scale value changes are used to calculate the amount of water in the aggregate. During a timed or jog feed, the last moisture probe value captured during the initial feed is used.
- An exception to this is when the material is configured to use the “Snapshot” moisture mode.
  - In this case, the moisture percentage displayed on the graphics screen at the start of the batch is used until the “Probe Delay” timer expires. At this point the current probe reading is captured and used for the remainder of the weighing cycle for the material.
- Please refer to the E-Z Cal manual, if needed.



**Disclaimer:** This document is to help support the installation of the SONO Probes and interfacing to a COMMAND Alkon batching control system. It is impossible to cover all situations in detail. The SONO Probes supply an average moisture value that can be used by the batch control system. The SONO Probes measure the aggregate. They do not control the batching. No guarantees are implied.

Visit <http://mesasystemsco.com> for manuals and support documentation.

Additional Questions? Contact MESA at  
[support@mesasystemsco.com](mailto:support@mesasystemsco.com) or +1 (508) 655-6372.

## Y-Intercept mode

**To calibrate multiple materials that use the same bin and probe combination use the Slope Y-Intercept mode.**

If a customer has our CB version 2016.x.x or higher and has our EZ-CAL firmware 2.04F or higher, then we can use the Slope Y-Intercept mode to calibrate multiple materials that use the same bin and probe combination. The EZ-CAL display window would need to be set up for the Slope Y Intercept mode, defaults to Classic mode. Then in the CB software's calibration record for the probe, the Calibration Type needs to be changed to Slope Intercept and a Slope of .20 and Y-intercept of 0.00 can be entered if you scale your output for 0 – 20mA for 0 – 20% moisture. Then you can use the Y-Intercept to shift the calibration. For every material they assign to this bin, they will need to set the Slope and Y-Intercept as needed for each new material assigned. Once those materials have been initialized to that bin, the system will revert to the slope and y-intercept when changing materials.

Below are crude images of the boot-up displays when the EZ-CAL manual station is powered on. They can use this to determine if they have the correct firmware. Versions 1.xx – 2.04E support classic mode only and 2.04F and above supports either Classic or SlopeYin modes.



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Also, on a side note, moisture values are normally assumed to be SSD (free moisture) values. If you are going to calibrate your signal to CB as Total Moisture you will need to educate the customer on entering in the material absorptions for all aggregates, even manual moisture materials. CB will allow all to be entered/calibrated either as Free (SSD) or Oven Dry (Total) in the moisture fields. In the System parameter's form, they configure how the mix designs aggregate and water targets are referenced and how the probes / manual entries are referenced with respect to Oven Dry or SSD. I included some screenshots of the forms that you need to pay close attention to.

System Parameters

Batching | Rules | Units | Groups | Network | Exports | History | Diag

Slump / Consistence

Type: **Slump**

Design: 4.00 in

Minimum: 0.00 in

Maximum: 10.00 in

Moisture Calc. Method

Mix Entry: **SSD**

Probe / Entry: **SSD**

Temperature Compensation

Temperature Activated ☐

Default Temp Adjust Enable ☐

Target: °F

Min: °F

Max: °F

Reship Allowed ☒

Max Age of Reshipped Mix: 89 Min

Default Scene: Plant1

Min Cement: 0 kg

Max Cement: 0 kg

Batchbook Trial Cement Qty: 0

Batchbook Format: bbbnrncxyz

Mix Integrity

Min Yield Tol Pct: 5.00 %

Max Yield Tol Pct: 5.00 %

System Max W/C Ratio: 0.7000

System Air Content: 3.00 %

# MESA Systems Co.

**Set Moisture**

Material:

	Bin	Current Item Code	% Mst	Probe Active	Control Sys	Control Node
1 >>	BIN02	1789004	0.90	<input type="checkbox"/>	Sys1	1
2	BIN01	1789004	1.00	<input type="checkbox"/>	Sys1	1
3	BIN04	1789004	1.00	<input type="checkbox"/>	Sys1	1
4	BIN05	1789004	2.50	<input type="checkbox"/>	Sys1	1
5	BIN03	1789004	0.00	<input type="checkbox"/>	Sys1	1

**Mix Designs**

	Mix	Desc
1 >>	111	4000 psi ca ash
2	112	4000 psi ca ash
3	113	4000 psi ca ash
4	114	4000 psi ca ash
5	115	4000 psi ca ash
6	116	4000 psi ca ash
7	117	4000 psi ca ash
8	118	4000 psi ca ash
9	119	4000 psi ca ash
10	120	4000 psi ca ash
11	121	4000 psi ca ash
12	122	4000 psi ca ash
13	123	4000 psi ca ash
14	124	4000 psi ca ash
15	125	4000 psi ca ash
16	126	4000 psi ca ash
17	127	4000 psi ca ash
18	128	4000 psi ca ash
19	129	4000 psi ca ash
20	130	4000 psi ca ash
21	131	4000 psi ca ash
22	132	4000 psi ca ash
23	133	4000 psi ca ash
24	134	4000 psi ca ash
25	135	4000 psi ca ash
26	136	4000 psi ca ash
27	137	4000 psi ca ash
28	138	4000 psi ca ash
29	139	4000 psi ca ash

Mix:

Description:  Short Desc:

Ext Description:  Consistence Class:

Locations:

Constituents | Qualities | **Batching** | Options | Units | Groups | User Fields | Notes | History | Diag

Batch ☒ Water Trim:  / yd Moisture Method: **SSD**

Allow Modify ☒ Special Alias:  Mix Entry Type: **Standard**

Disable Ticket ☐ Disable Auto Load Mix ☐

	Plant	Max Batch	Mixing Time	Sequence
1 >>	111	6.50	yd	0.00 sec
*				

**Materials**

	Material	Desc
1	GRAVEL	GRAVEL 3/4"
2	GRAVEL	GRAVEL 1/2"
3	GRAVEL	GRAVEL 3/8"
4	GRAVEL	GRAVEL 1/4"
5	GRAVEL	GRAVEL 3/16"
6	GRAVEL	GRAVEL 1/8"
7	GRAVEL	GRAVEL 1/16"
8	GRAVEL	GRAVEL 1/32"
9	GRAVEL	GRAVEL 1/64"
10	GRAVEL	GRAVEL 1/128"
11	GRAVEL	GRAVEL 1/256"
12	GRAVEL	GRAVEL 1/512"
13	GRAVEL	GRAVEL 1/1024"
14	GRAVEL	GRAVEL 1/2048"
15	GRAVEL	GRAVEL 1/4096"
16	GRAVEL	GRAVEL 1/8192"
17	GRAVEL	GRAVEL 1/16384"
18	GRAVEL	GRAVEL 1/32768"
19 >>	GRAVEL	GRAVEL 1/65536"
20	GRAVEL	GRAVEL 1/131072"
*		

Material: **NATURAL SAND**

Desc: **NATURAL SAND** Short Desc: **SAND** Locations >>

Qualities Limits Devices Batching Plants Groups Options Units Notes History Diag

**Physical**

Effectiveness: 0.000 %

Substitution Factor: 0.000

Specific Gravity: 0.000

Absorption: 0.700 %

Solids Specific Gravity: 0.000

Parts Per Million of Solids: 0

Specific Heat:

**Material Calculations**

Based On Factor: 0.000 lb / 100 Units of Other material

Correction Factor: 0.000 lb / Units of Other material

Warn If Negative ☐ K Factor: 1.00

Correction Weighting: 0.000

Slump Factor: 0.000 gl / Slump unit

Default Trim Qty: 0.000 No Trim

Update Trim ☐ Use Previous Load Adjust ☐

Use Previous Trim ☐ Use Previous Amount ☐

External Modifier Type:

**Materials**

	Material	Desc
1	GRAVEL	GRAVEL 3/4"
2	GRAVEL	GRAVEL 1/2"
3	GRAVEL	GRAVEL 3/8"
4	GRAVEL	GRAVEL 1/4"
5	GRAVEL	GRAVEL 3/16"
6	GRAVEL	GRAVEL 1/8"
7	GRAVEL	GRAVEL 1/16"
8	GRAVEL	GRAVEL 1/32"
9	GRAVEL	GRAVEL 1/64"
10	GRAVEL	GRAVEL 1/128"
11	GRAVEL	GRAVEL 1/256"
12	GRAVEL	GRAVEL 1/512"
13	GRAVEL	GRAVEL 1/1024"
14	GRAVEL	GRAVEL 1/2048"
15	GRAVEL	GRAVEL 1/4096"
16	GRAVEL	GRAVEL 1/8192"
17	GRAVEL	GRAVEL 1/16384"
18	GRAVEL	GRAVEL 1/32768"
19 >>	GRAVEL	GRAVEL 1/65536"
20	GRAVEL	GRAVEL 1/131072"
*		

Material: **NATURAL SAND**

Desc: **NATURAL SAND** Short Desc: **SAND** Locations >>

Qualities Limits Devices Batching Plants Groups Options Units Notes History Diag

Min Allowed In Mix: 0.00 lb

Max Allowed In Mix: 3,000.00 lb

Min Based-On Qty: 0.00

Max Based-On Qty: 0.00

Min Moisture: 3.00 %

Max Moisture: 16.00 %

Min Trim: 0.00

Max Trim: 0.00

Min Temperature:

Max Temperature:

## Setup Moisture Probe

Scale and Probe Modules are small printed circuit boards which are mounted in a row across the top of the inside of the E-Z CAL. Probe Modules are marked "MPI Module" (for Moisture Probe Interface); Scale Modules are marked "LCI Module" (for Load Cell Interface). Modules are numbered 1 through 8, beginning at the left. Make sure you know which modules are for scales and which are for moisture probes.

1. If you selected **Probe** in step 4 of [Do This First](#), the displays show:

Select	Probe	module	(1 - 8)		
8					

2. Use the Up/Down buttons to select the Probe Module Position and press Enter.  
Probes are automatically assigned a unit of "%", a grad size of 0.01, and a maximum capacity of 20.00%. The displays show:

Select	Probe	Calib	Type		
Classic					

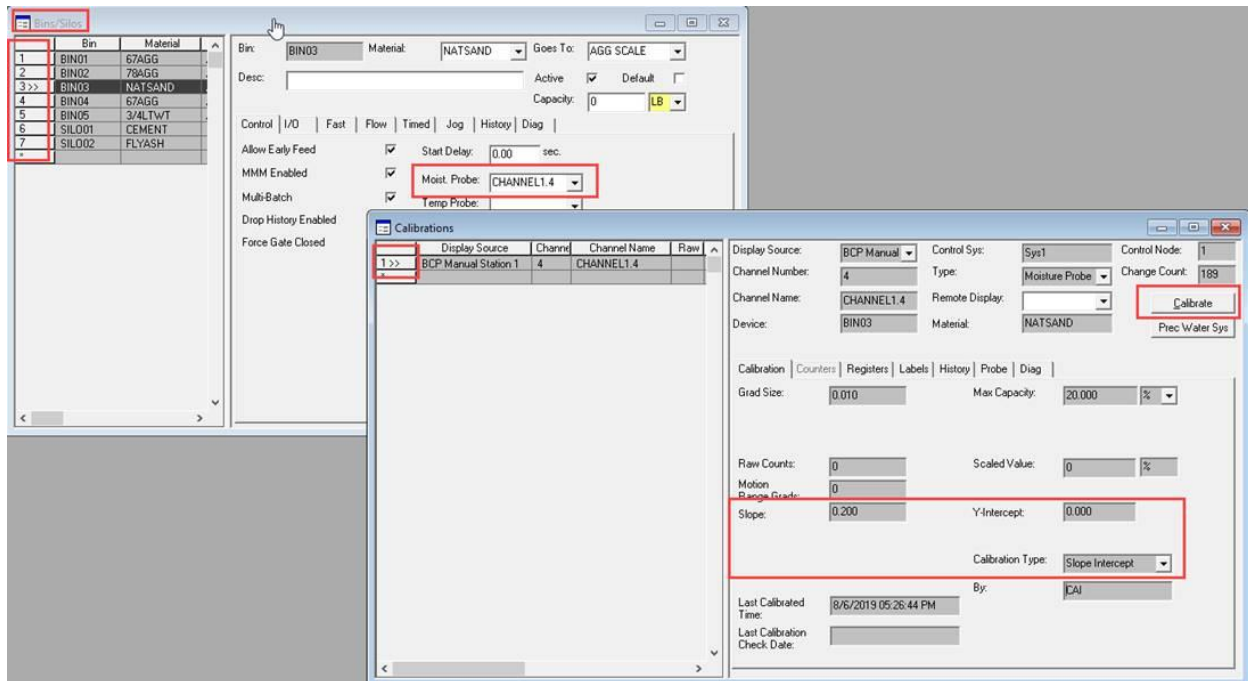
3. For standalone probes, press Enter to select "Classic". For probes used with PWS (Precision Water System), use the Up/Down buttons to select "SlopeYIn" and press Enter. The displays show:

Disabled					
Probe	Filter	Setting?			

4. Use the Up/Down buttons to select the dampening filter setting to be used for the probe then press Enter.

Dampening filter settings and their respective factors are:

- Disabled (1.00)
- Light (0.50)
- Default (0.35)
- Heavy (0.25)
- Maximum (0.10)



## Setting Max and Mins

### Overview:

- This document provides guidance on interfacing a SONO moisture probe to the COMMANDbatch Manual Station
- This document provides guidance on the option to set a maximum and minimum moisture values. These are to be used if the moisture probe reads beyond the expected moisture.
- Measurement beyond the expected moisture (especially maximums) are needed for conditions where there has been a significant rain event. This results in excess liquid water on the surface of the aggregate which can cause the moisture readings to be too high.
- When dealing with a small batch, there will not be sufficient time to measure the moisture of the aggregates. This condition can cause the moisture readings to be too low.
- **All moisture values must be in total moisture percent, irrespective if you have entered an Absorption % moisture.**

## Part 1: Maximum and Minimum moisture values:

- Command Alkon has created “guardrails” to set maximum and minimum moisture values around the readings.
- 1) In the Materials form, the “limits” tab, you can define the min/max. The system will ‘lock’ at each respective limit.
  - 2) On the batch report the system will also indicate:
    - An “E” beside the average moisture reading if one or more readings exceed the boundary.
    - An “A” beside the moisture value indicates a fully automatic average with no out of bounds readings.
  - 3) You also can get there from within the Precision Water System application. As shown below, if you click on “Probe Details”, then “Material Details”, you will see all the relevant material properties.

The screenshot displays the 'Materials' form with the 'Limits' tab selected. The left pane shows a list of materials, with 'SAND' (Concrete SAND) selected. The right pane shows the configuration for 'SAND'.

Material	Desc
1	1-1/2"
2	3/4"
3	3/8"
4	AIR
5	Calc122HE
6	CALCIUM
7	CEMENT
8	CEMENT/SLAG
9	DELVO
10	FLYASH
11	GLENNIUM
12	HOT WATER
13	M100 FIBER
14	MATRIX FIBER
15	NC534
16	POLY 997
17	POZZ-80
18	PS 1466
19 >>	SAND
20	SAND #2
21	SILICA FUME
22	VMA 358
23	WATER

Material: SAND

Desc: Concrete SAND Short Desc: SAND Locations >>

Qualities Limits Devices Batching Plants Groups Options Units Notes History Diag

Min Allowed In Mix: 0.00 lb

Max Allowed In Mix: 5,000.00 lb

Min Based-On Qty: 0.00 lb

Max Based-On Qty: 0.00 lb

Min Moisture: 2.00 % Min Temperature: 0.00

Max Moisture: 10.00 % Max Temperature: 0.00

Min Trim: 0.00

Max Trim: 500.00



**COMMANDbatch Precision Water System**

Moisture Probe: PROBE1 - BIN02 - SAND Probe Details ☒ Display Unused Points ☐ Display System Points

Captured Readings:

	Captured Date	Captured Moisture
18	5/03/2018 9:59 AM	
17	29/01/2018 12:19 PM	
16	29/01/2018 9:27 AM	
15	16/10/2017 9:44 AM	
14	16/10/2017 9:34 AM	
13	24/05/2017 11:44 AM	

Captured Probe Data (Pre-Bakeout)

Captured Date:

Notes:

Bake-Out Data

Pan Weight:

Wet Weight:

Dry Weight:

Bake-Out Date:

Notes:

Current Calibration

Slope: 0.341

Y-Intercept: -4.266

Proposed Calibration

Slope: 0.342

Y-Intercept: -4.540 Accept Calibration

Diagnostic Graph Configuration Close

99.86 %

**Probe Material Assignment**

Probe Details

Moisture Probe: PROBE1 - Save

Probe Code: PROBE1

Description:

Probe Assignments

Device: BIN02 Device Details

Material: SAND Material Details

Capture Settings

Capture Delay: 0.00

Capture Duration: 2.00

Use System Points: ☒

**Material Details**

Materials:

- GLENNIUM
- HOT WATER
- M100 FIBER
- MATRIX FIBER
- NC534
- POLY 997
- POZZ-80
- PS 1466
- SAND

Material: SAND

Description: Concrete SAND

Absorption %: 3.5000 Usable Range (+/-): 1.82

☐ Well-mixed ☐ overide: 0.000

Min Moisture %: 2.0000 Max Moisture %: 10.0000

Save Material Close