



Introduction to Hydronix

- First company to develop microwave technique in 1982
- Focus on sensor technology, concrete applications and service
- Over 30,000 installations world wide in more than 50 countries
- Continually investing in research
- Industry leading digital sensors, controls and service



Contents

Introduction

Contents

Overview of equipment

Benefits, costs savings

Sensor features

accuracy

connection

calibration

configuration

Hydro-Probe II

Hydro-Mix VI

Hydro-Probe Orbiter

Hydro-Control V and Hydro-View

Overview of equipment

Mixer Systems

Hydro-Control V, water controller



Hydro-Mix VI, mixer sensor



Hydro-Probe Orbiter, mixer sensor



Aggregate Systems

Hydro-View, stand-alone calibration unit



Hydro-Probe II, aggregate sensor





Benefits, Cost Savings

Savings in materials

Microsoft Excel - Cement saving with moisture measurement Version 1.0.0. 9Aug2006.xls

Recipe		Reality			
Total weight	2300 kg	Total weight	2212 kg	Moisture	Water in Aggregates
Sand 0-2	800 kg	Sand 0-2	751 kg	6.5%	49 Ltr
Sand 0-4	500 kg	Sand 0-4	474 kg	5.5%	26 Ltr
Agg 8-16	650 kg	Agg 8-16	637 kg	2.0%	13 Ltr
Cement	350 kg	Cement	350 kg	0.0%	0 Ltr
Add Water	135 Ltr	Add Water	47 Ltr		
W/C Ratio	0.39	W/C Ratio	0.39		

Problem 1 : Too much water in the mixer			
135 litres on the full batch:	5.9%	Moisture	(Recipe)
135 litres on the full batch:	6.1%	Moisture	(Reality)

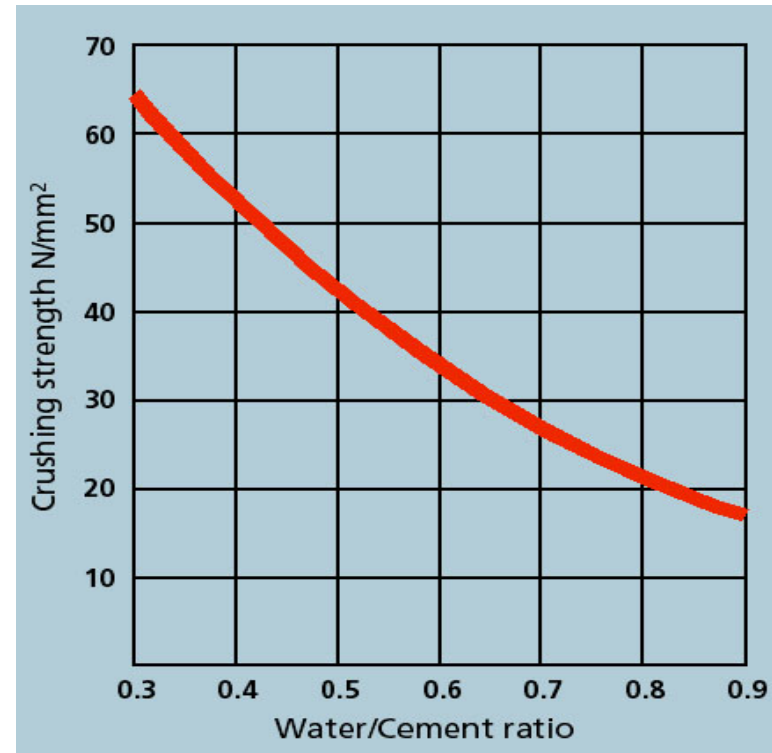
Problem 2 : Wasting cement			
350 kg Cement on	1950 kg	total Aggregates	(Recipe)
350 kg Cement on	1802 kg	total Aggregates	(Reality)
% Difference Aggregates	4.5%		
Waste of cement	16 kg		

time / batch	3 Min	=	160	Batches / day
hrs / day	8 Std			

Waste of cement		Cement price / t	
per batch	16 kg	=	0.02 t
per day	2517 kg	=	2.52 t
per week	12584 kg	=	12.58 t
per month	50336 kg	=	50.34 t
per year (40 W)	503355 kg	=	503.36 t

Waste of cement: 60.00 €
 Cement price / t: 60.00 €

Improved quality and efficiency





Typical moisture variations

Where to measure

■ Lightweight aggregate.....	0-60%
■ Fine sand.....	0-16%
■ Coarse sand.....	0-12%
■ 6mm aggregate.....	0-10%
■ 10mm aggregate.....	0-8%
■ 20mm aggregate.....	0-4%
■ Fresh concrete.....	0-12% or higher



Hydronix

Sensor Features



Robust, Reliable, Simple

Linear output

Digitally, factory configured to all be identical

0-20mA, 0-10V or 4-20mA linear outputs

RS485/232 & USB connectivity

Network up to 16 sensors

25 readings per second

Temperature output available

On-board functionality & alarms

Configurable I/Os

Power +15Vdc to 30Vdc

Advanced Temperature Compensation

Supported by...

Optional 3 Year warranty available.

Immediate exchange units.

Comprehensive warranty service





System accuracy

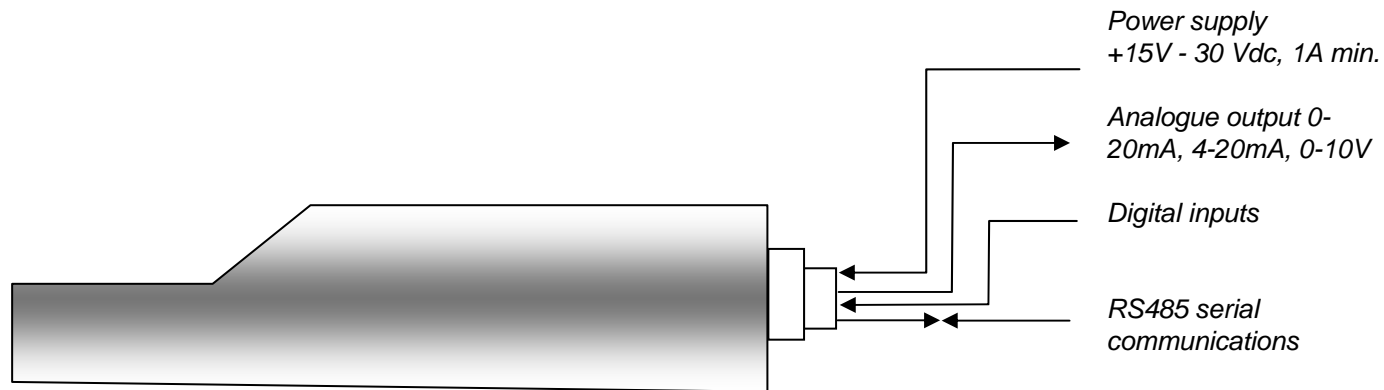
- Resolution of electronics +/- 0.13 unscaled units (0-100 range)
(equivalent to +/- 0.04% moisture in sand*)
- System accuracy in practice, depends on:
 - *sampling of material being measured*
 - *accuracy of laboratory tests*
- In practice, for sand and aggregates $\pm 0.2\%$ moisture
(*effectively... as accurately as the user can calibrate*)
- System accuracy for measurement in mixers: *Within $\pm 0.1\%$*

*Accuracy is covered in more detail in an accompanying presentation, 'Calibration'.



Sensor connection

All sensor models connect similarly



External Converters



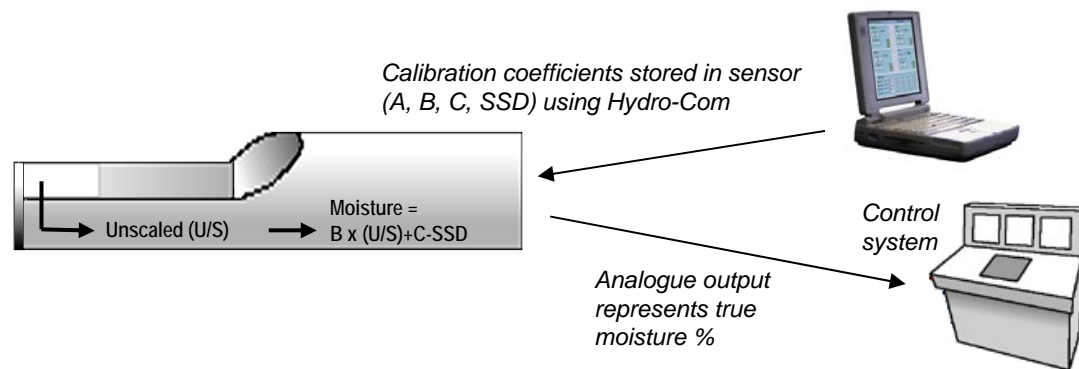
RS485, RS232



Storing calibration data

There are two ways of storing the material calibration data.

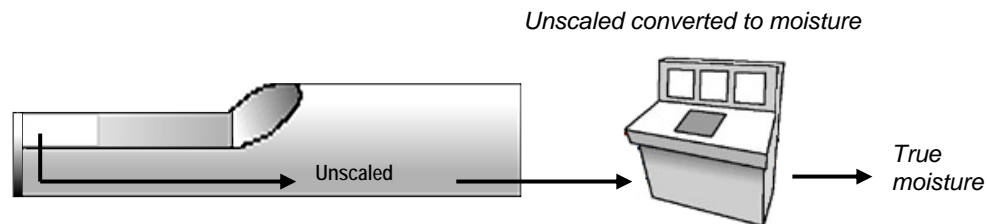
1 In the sensor



Advantages

- Calibration using Hydro-Com
- Control system does not need modification to calibrate the sensor.
- Ability to use Hydronix known calibration data for different materials.
- Calibrations can be transferred between sensors.

2 In the controls



Advantages

- Direct calibration without the need for an additional computer or RS485 adapter.
- No need to learn how to use additional software.
- If it is necessary to replace the sensor, a replacement Hydronix sensor can be connected and valid results obtained immediately without connecting the sensor to a PC to update the material calibration.
- Calibrations can be switched between sensors easily.



Sensor Configuration – Hydro-Com

Sensor frame

Key features

■ Up to 16 sensors may be networked

Active Sensor buttons

Sensor ID	Sensor Name	Update	Value 1	Value 2
1	HP02-Bin1	Update	3.29	23.40
2	HP02-Bin2	Update	31.92	25.90
3	HP02-Bin3	Update	28.53	25.20
4	HP02-Bin4	Update	39.92	24.70
5	HP02-Bin5	Update	0.74	24.40
6	HP02-Bin6	Update	2.68	21.70



Sensor Configuration – Hydro-Com

Configuration frame

Key features

- Select output
- Configure I/O
- Average/Hold Delay
- Scaling
- Alarms (bin empty)

Hydro-Com (HS006B v1.10)

Language Com Port: Help

Sensor Configuration Diagnostics

Address 16 1738E270 HydroProbe II

Material Calibration

	A	B	C	SSD% / D
Moisture %	0.00	0.2857	-4.00	0.00

Calibration

Analogue Output

O/P Type: 0-20mA (0-10V)

O/P variable 1: Filtered Moisture %

High %: 20.00 Low %: 0.00

Averaging

Average/Hold Delay: 0.5

	Moisture %	Unscaled
High Limit	20.00	100.00
Low Limit	0.00	0.00

Digital Input/Output

I/P 1 use: Average/Hold

Signal Processing

Filtering Time: 1.0

Slew Rate +: Light

Slew Rate -: Light

Write



Sensor Configuration – Hydro-Com

Diagnostics frame

Key features

- Analogue output test
- Factory settings
- Temperature records

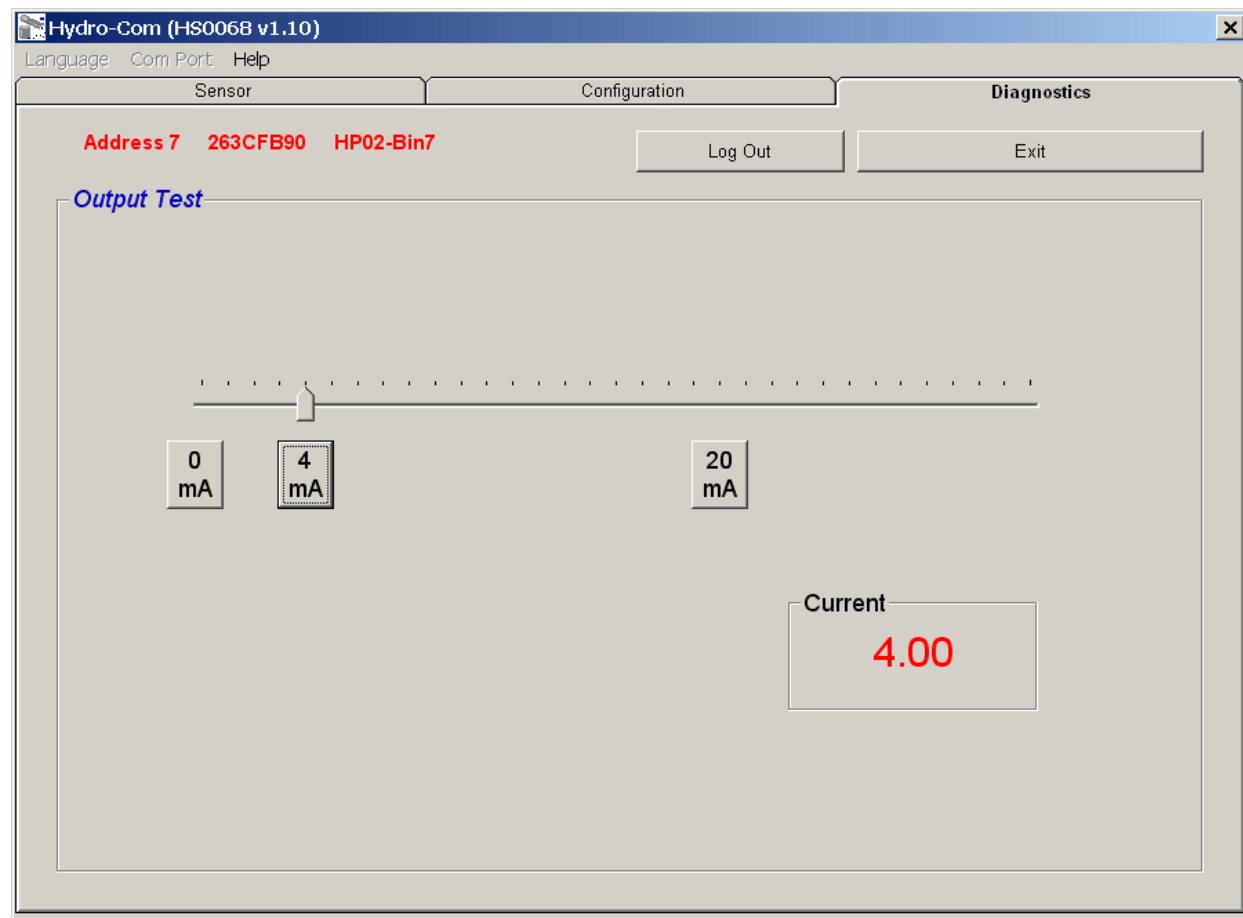


Sensor Configuration – Hydro-Com

Analogue output test

Key features

- Force the analogue output for ease of installation and diagnostics.



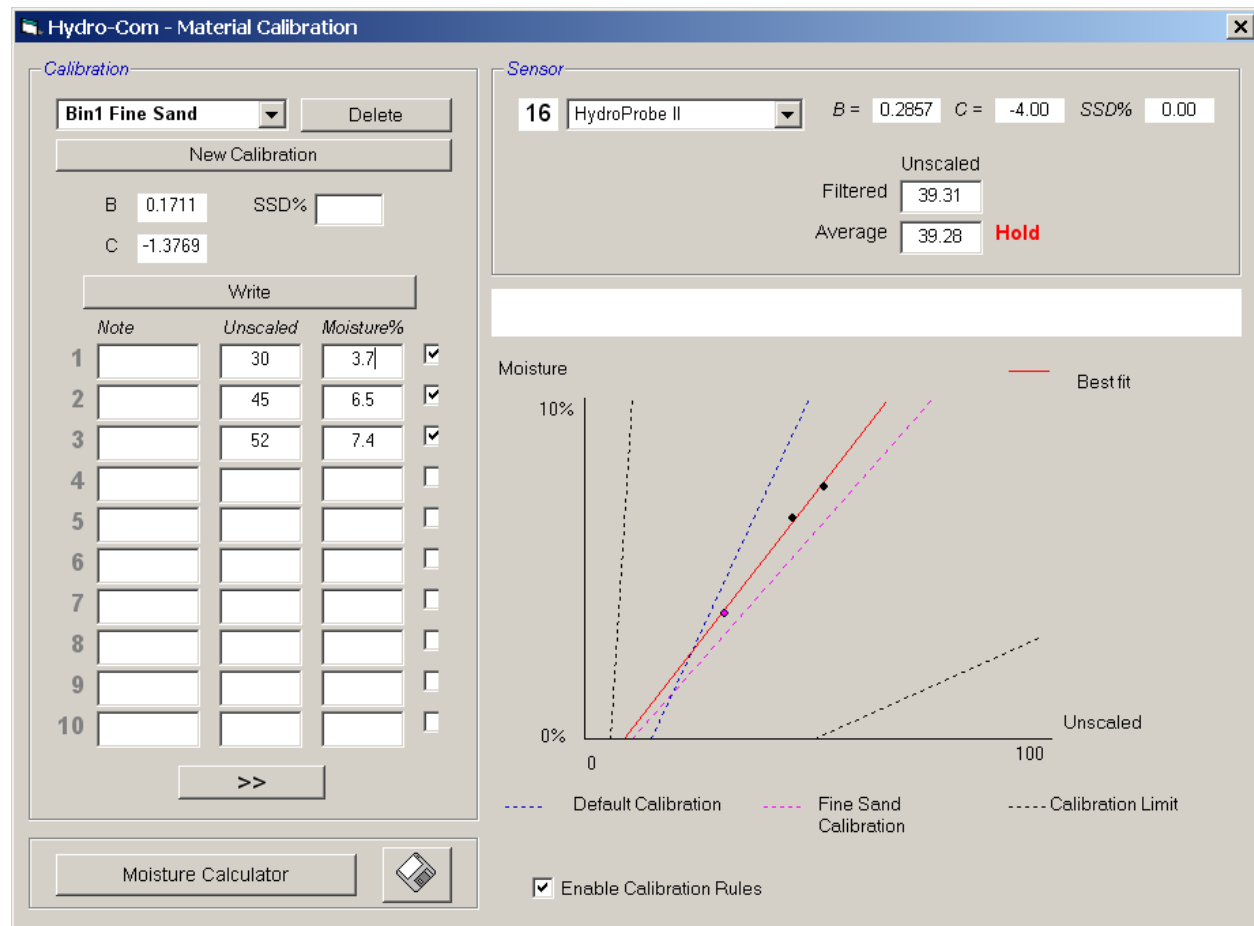


Sensor calibration using Hydro-Com

Calibration frame, for use with Hydro-Probe II

Key features

- Store multiple material calibrations and copy to multiple sensors
- Easy to start averaging a batch with remote averaging
- Calibration 'Rules' to ensure sensible data
- Graphical display of calibration points



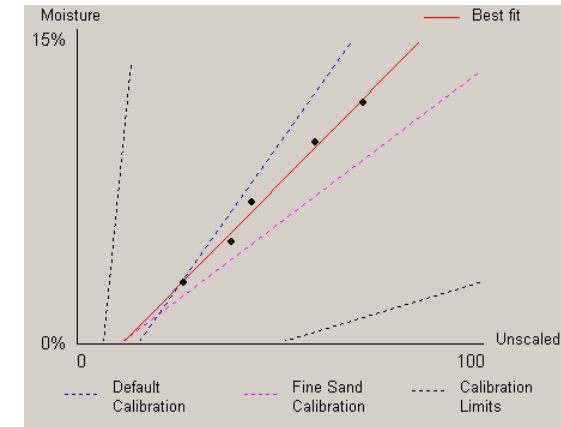
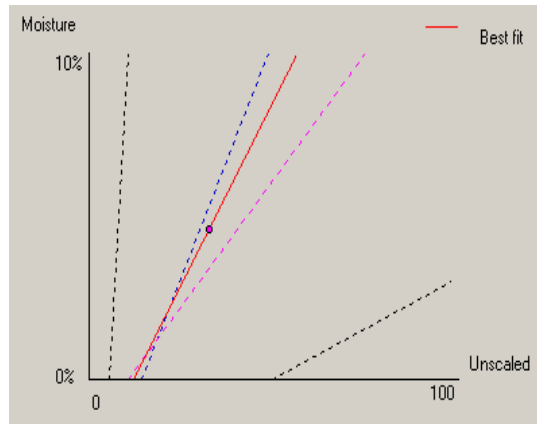


Hydronix

Sensor calibration using Hydro-Com

Quick start calibration, one point technique

Quick Start Default Calibrations	
Aggregate size (mm)	Coefficient B (slope)
0-2	0.1515
0-4	0.2186
0-8	0.2857



Moisture Calculator

Hydro-Com - Moisture Calculator

A 0.478 Kg B 1.478 Kg C 1.405 Kg

$$\text{Moisture} = \frac{(B - C)}{(C - A)} = 7.9 \%$$

Moisture



Hydronix

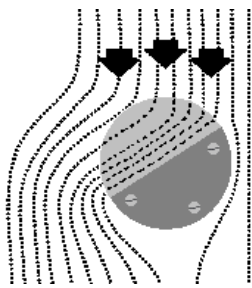
Hydro-Probe II (HP02)





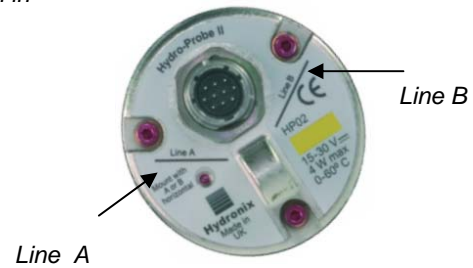
Hydronix

Positioning

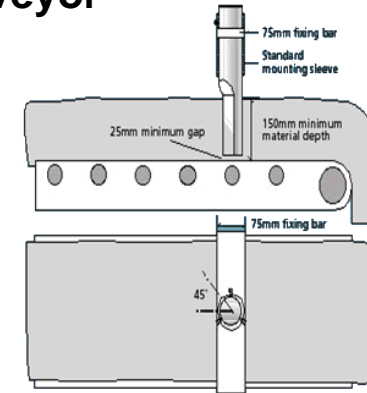


Flow of material in bin/silo/hopper

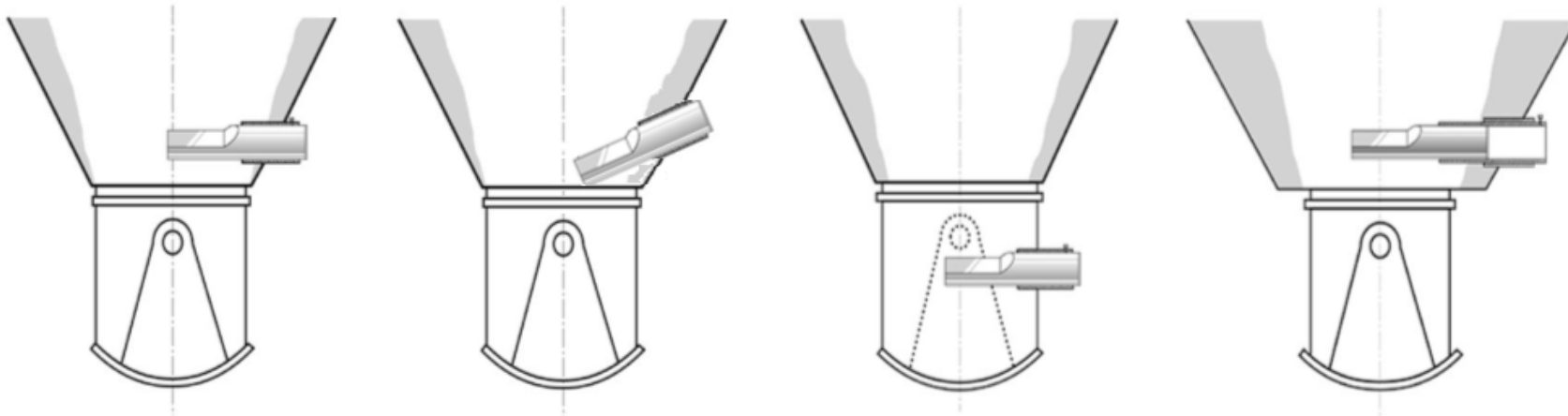
30°



Typical conveyor installation



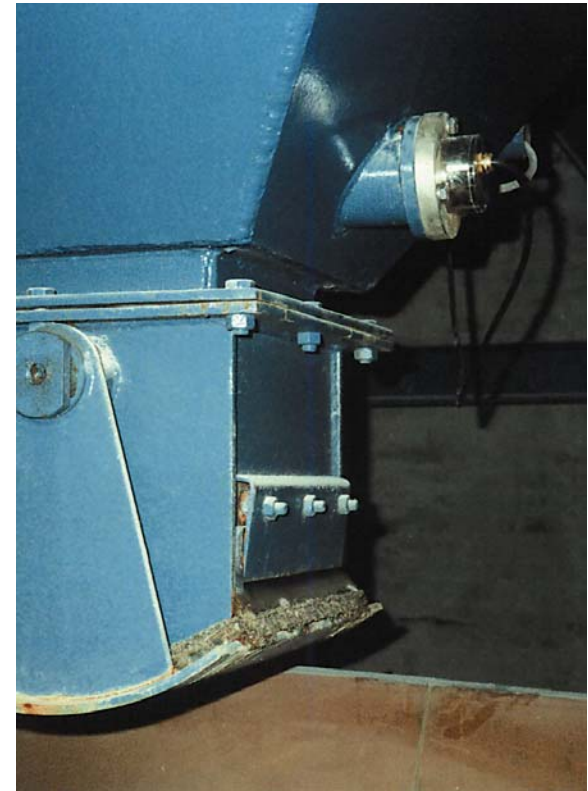
Typical hopper or silo installations





Hydronix

Installations

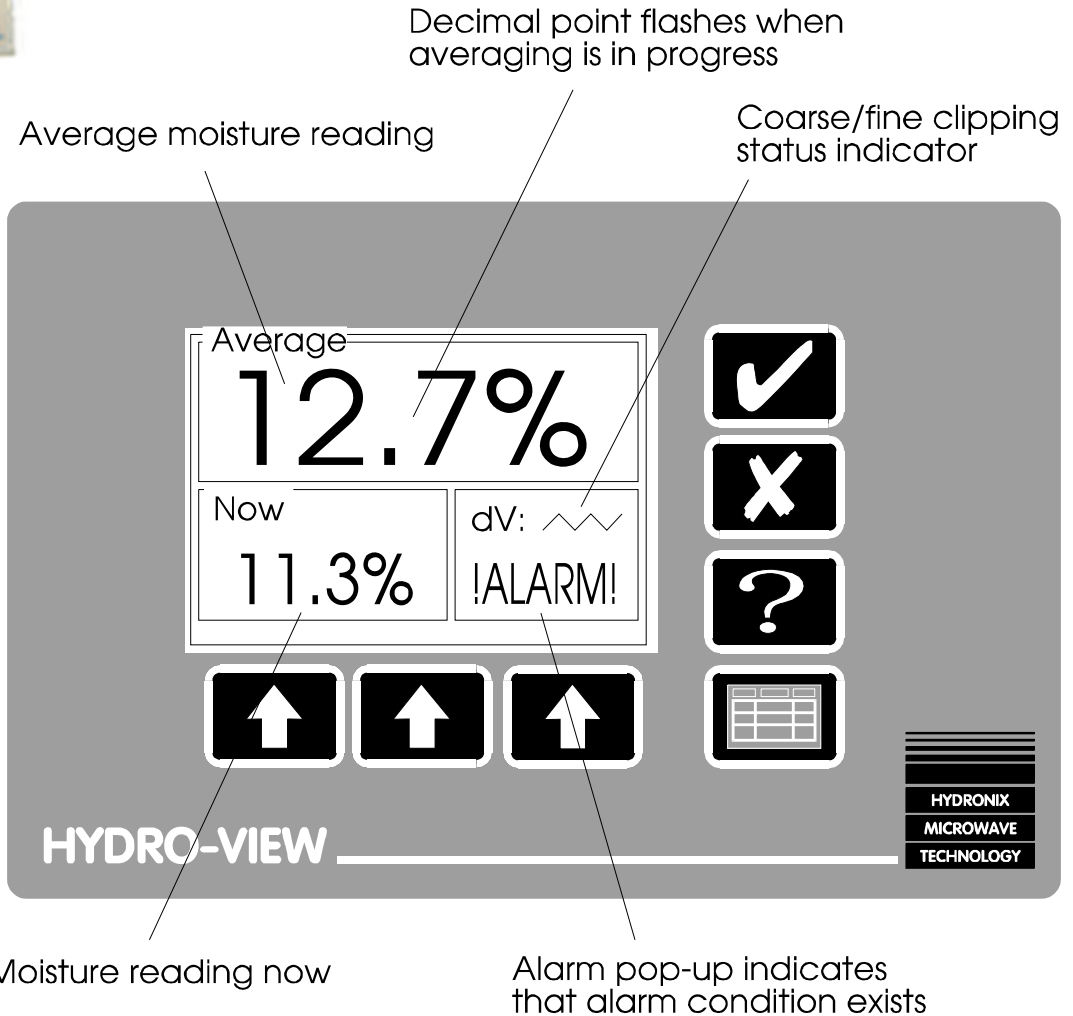




Optional Hydro-View Interface

Key features

- Dedicated calibration unit
- Hydro-Com functionality
- One per sensor
- Average multiple sensors





Hydronix

Mixer Systems

Sensor Integration



Hydro-Mix and
Hydro-Probe Orbiter
connect similarly

Hydro-Control V Connection



Digital Connection



Hydro-View Connection



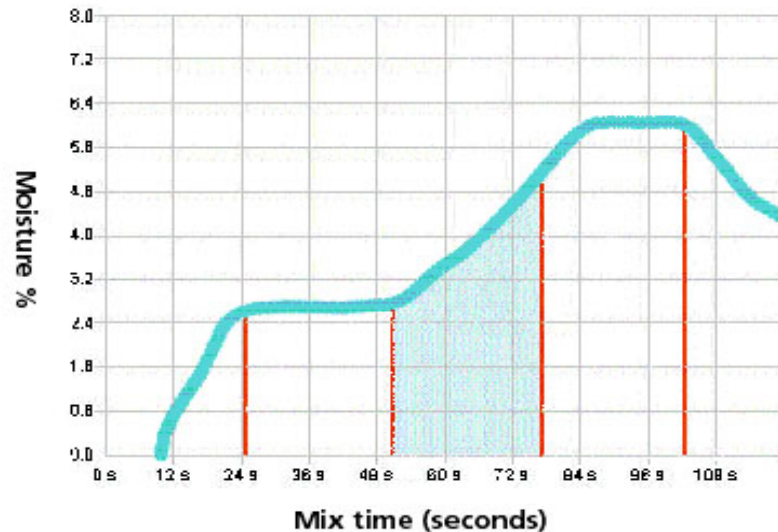


Hydronix

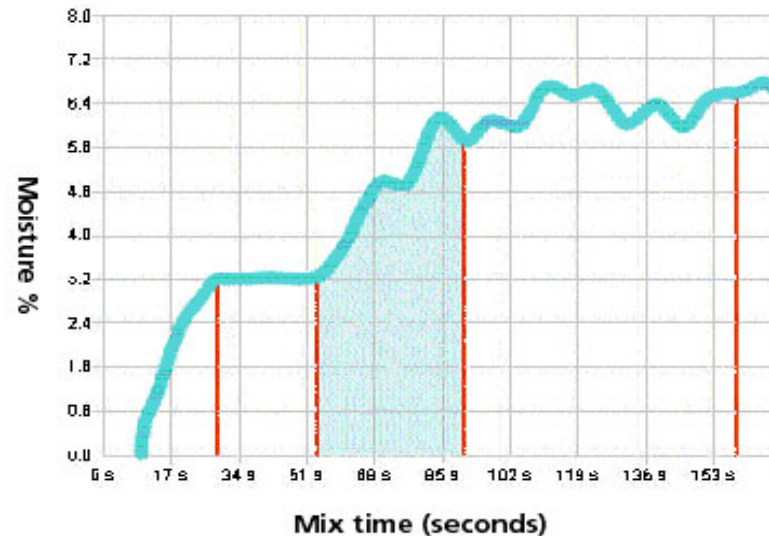
Hydronix Mixer Systems

A Clear Picture of your Mixer's Performance

Good mixing action achieves rapid homogeneity. dry mix time could be further reduced still. Slow water addition results in short wet mixing time.



Poor mixing action requires long dry mix time and fails to achieve fully homogeneous wet mix.



INVALUABLE DIAGNOSTIC FACILITY. FULL DETAILS OF LAST 100 MIXES MAY BE VIEWED OR PRINTED



Hydro-Mix VI

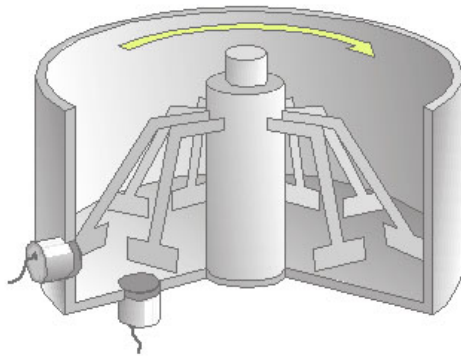




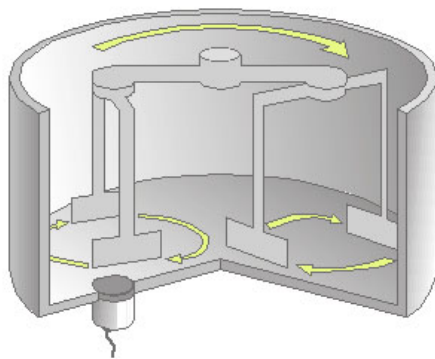
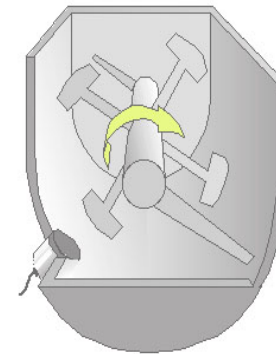
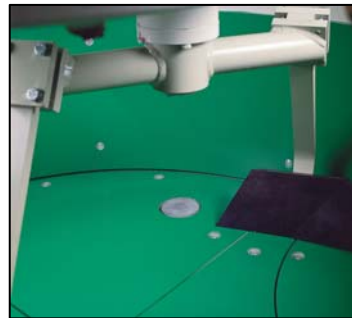
Hydronix

Hydro-Mix Installation

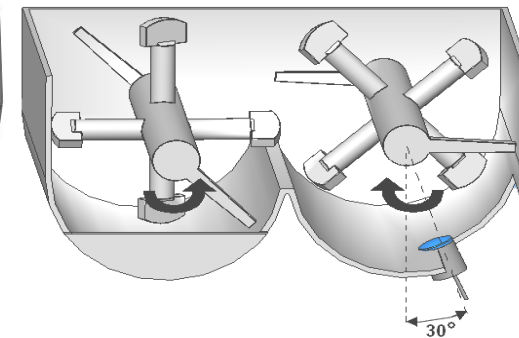
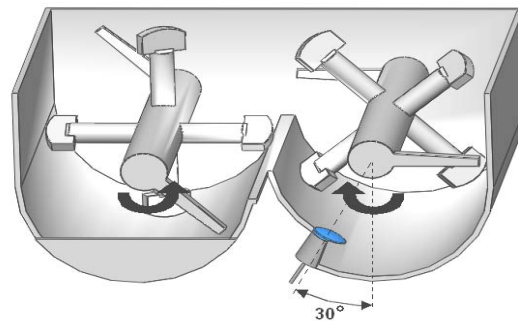
Turbo Mixer



Single Horizontal Shaft



Planetary Mixers

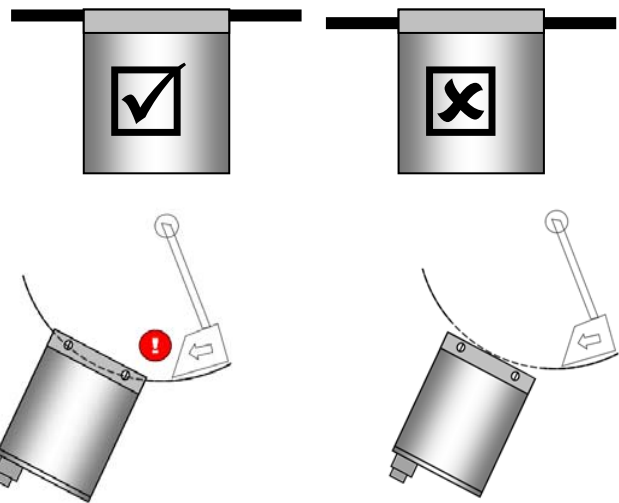


Twin Shaft Mixers

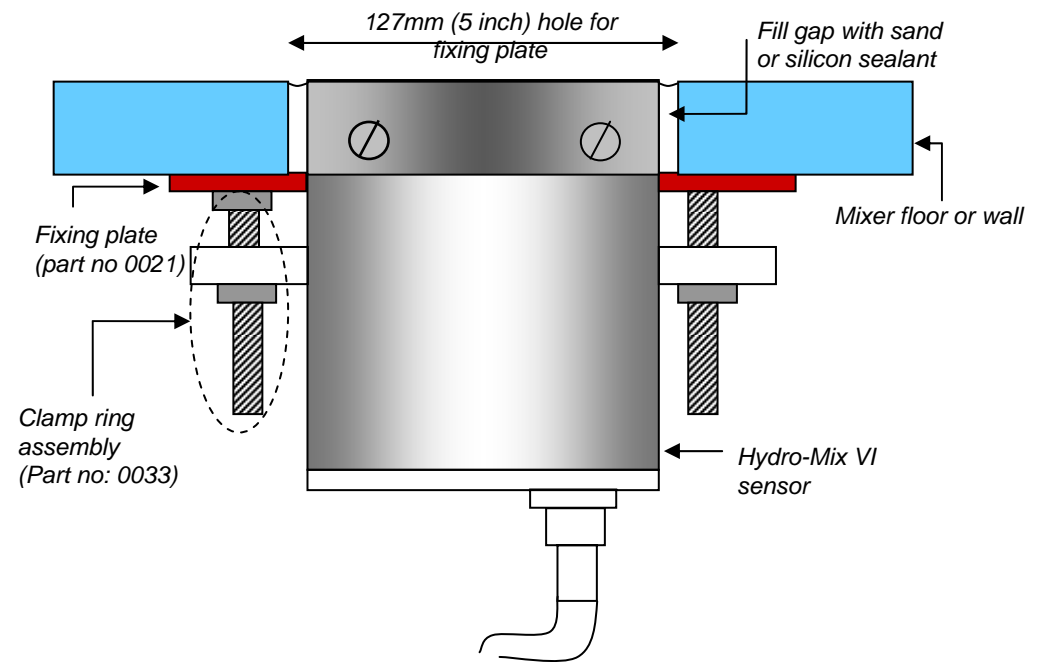


Hydronix

Hydro-Mix Installation



Adjustable Clamp Ring





Hydro-Probe Orbiter

Rotating Connector



Complete Sensor



Head Unit

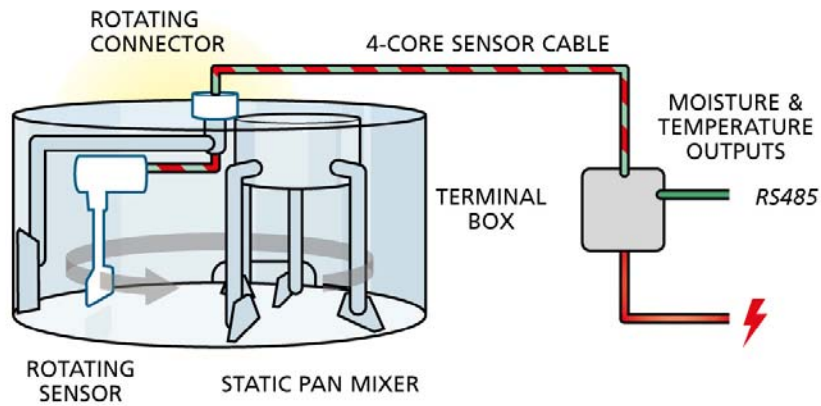


Replaceable Sensing Arm

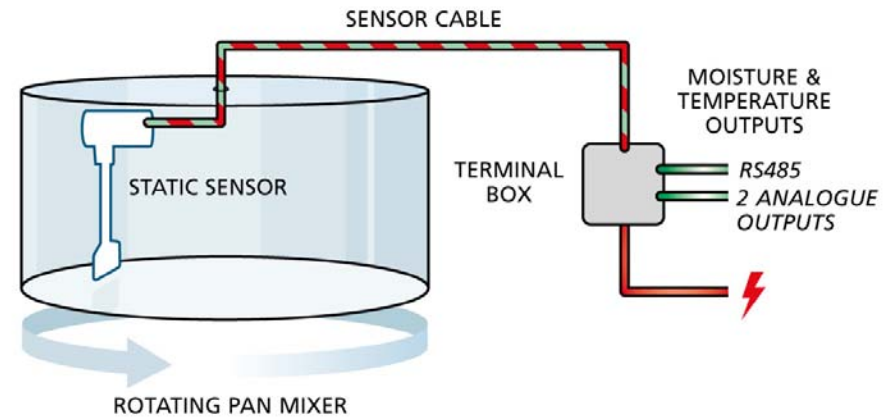


Hydro-Probe Orbiter

Planetary mixer

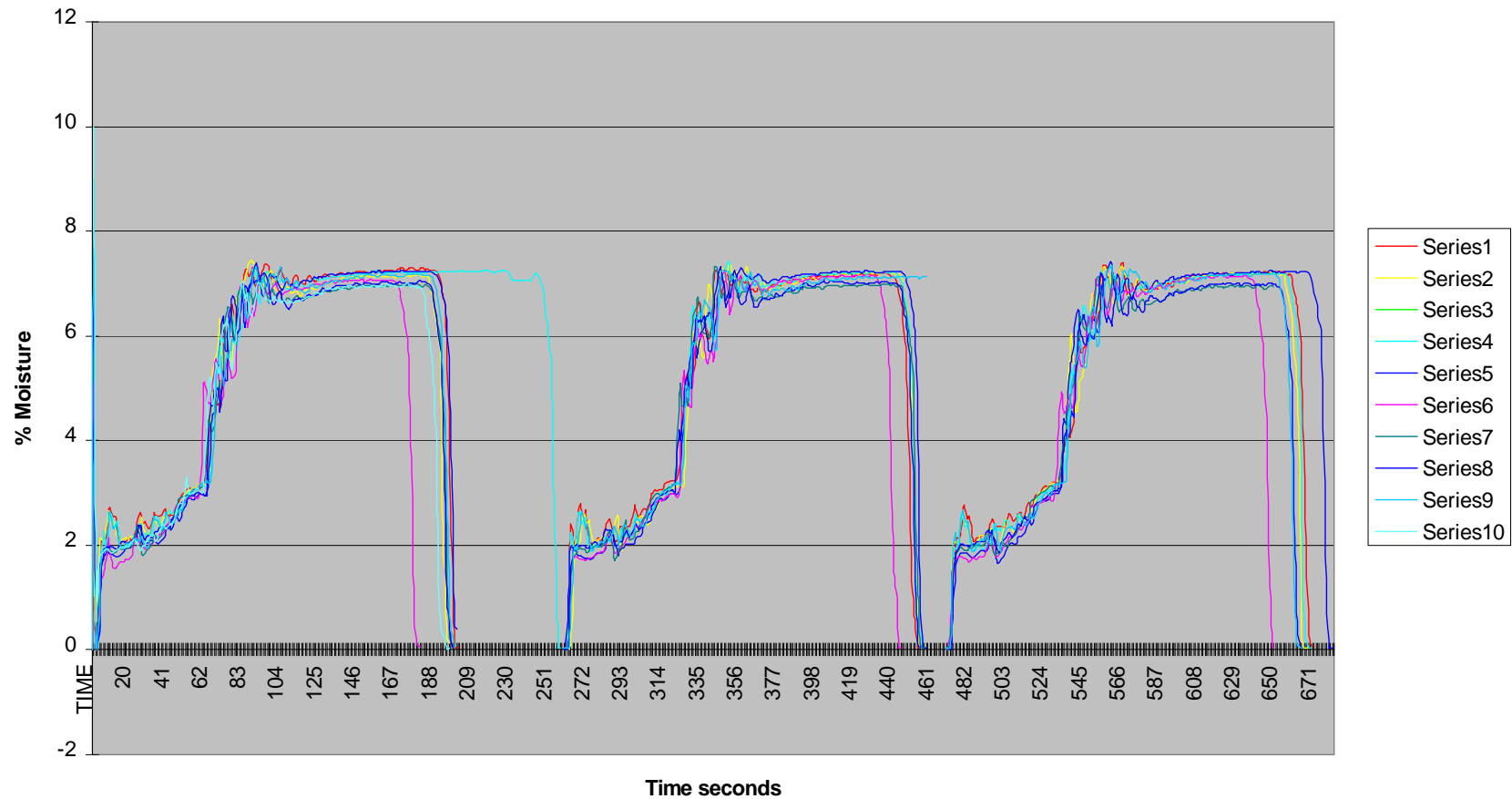


Rotating pan mixer



Hydro-Probe Orbiter

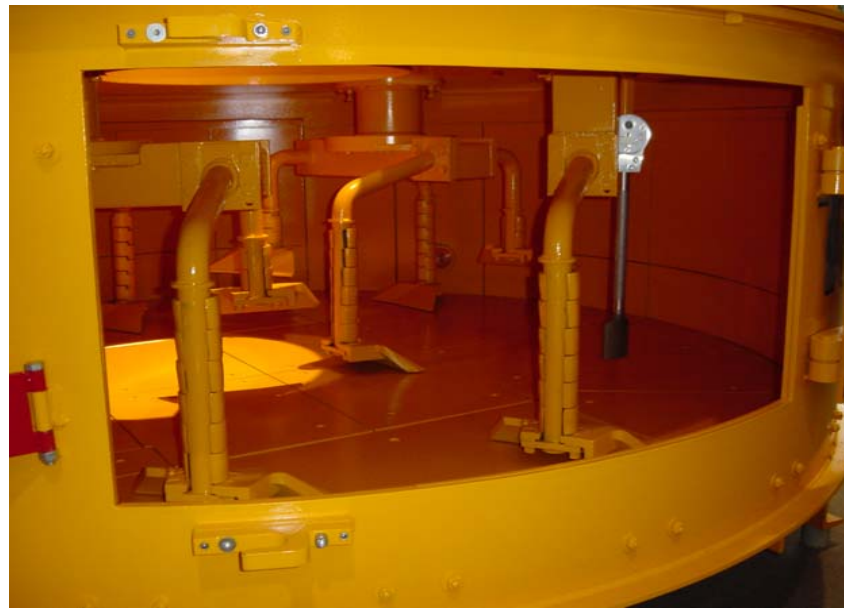
Results of 10 sets of 3 Batches





Hydro-Probe Orbiter Installations

Couvrot Planetary



Couvrot planetary, 2004



Hydronix

Couvrot 1.5m³ planetary mixer

Hydro-Probe Orbiter Installations

AMN, France



Positioned on scraper arm



Hydronix

Croker 0.55m³ rotating pan mixer

Hydro-Probe Orbiter Installations

Fortcrete, Stretton, U.K.



Video clip available File : N:\Images\Site Phot.\Orb.Ints.\Fortcrete Stratton

Wain Brothers, Stoke, U.K.





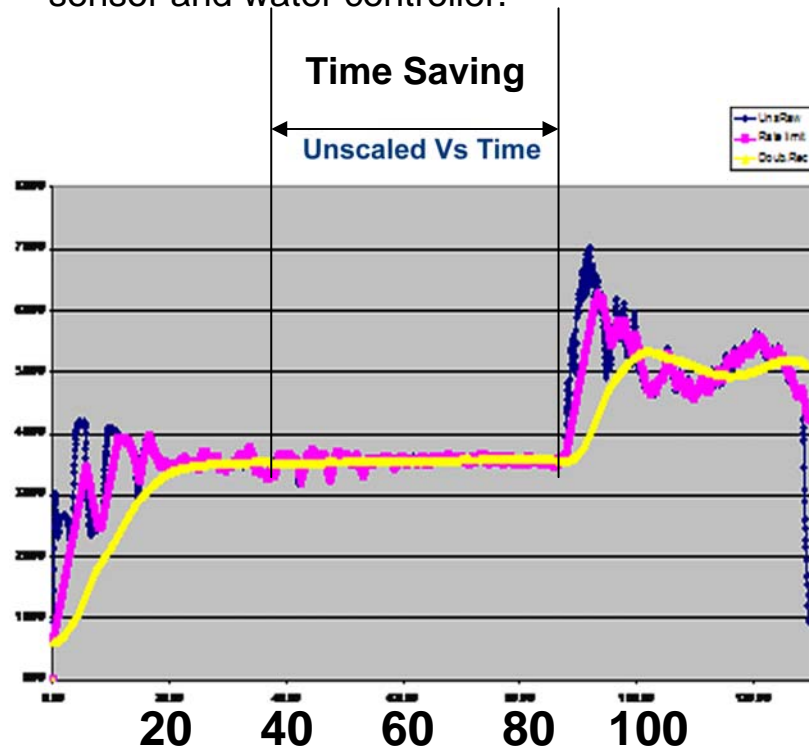
Hydro-Probe Orbiter Installations

Eirich cycle times, standard type mixer



Eirich, standard type mixer.

The trace below was taken using a Hydro-Probe Orbiter during a mix controlled by a competitor's sensor and water controller.





Hydro-Probe Orbiter Installations

Eirich

Redland Roofing, South Cerney, U.K.



The Hydro-Probe Orbiter dramatically reduced wastage upon installation





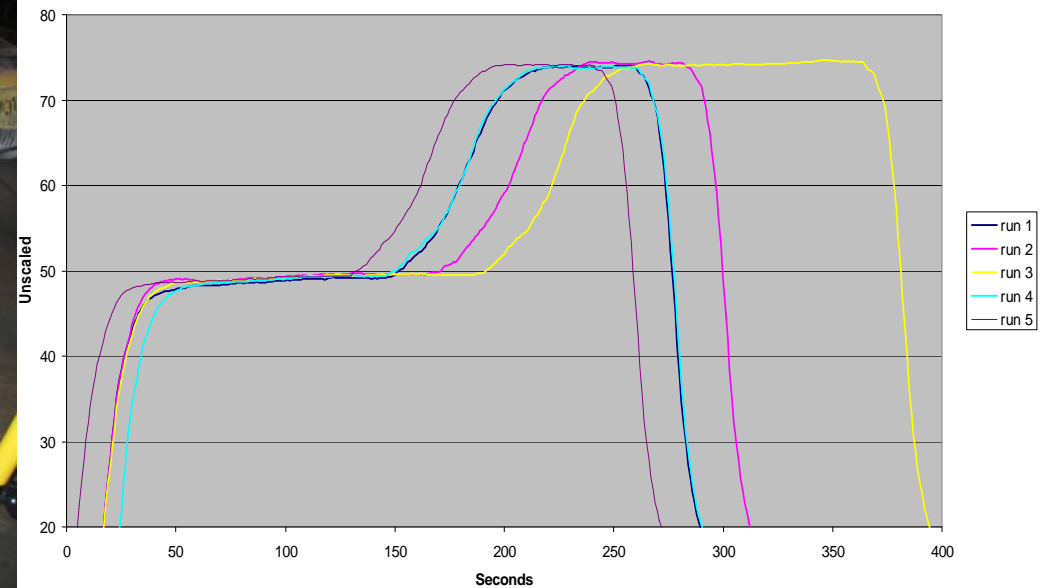
Hydronix
OMG 1.5m3 Planetary

Hydro-Probe Orbiter Installations

Bournecrete, U.K.



Hydronix Mixer Analysis





Hydronix
OMG 1m3 Planetary

Hydro-Probe Orbiter Installations

Bison, Iver, Buckinghamshire, U.K.

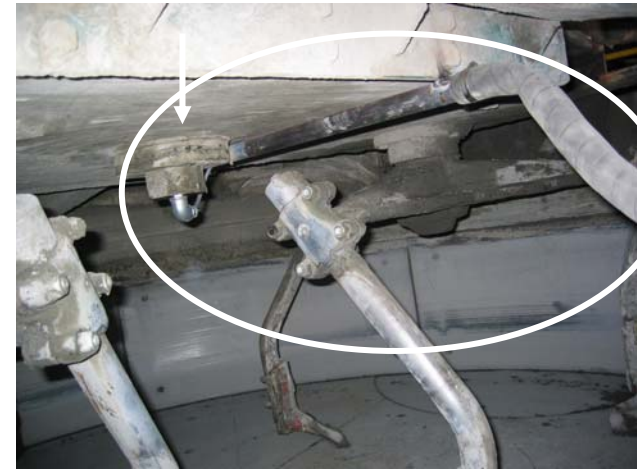
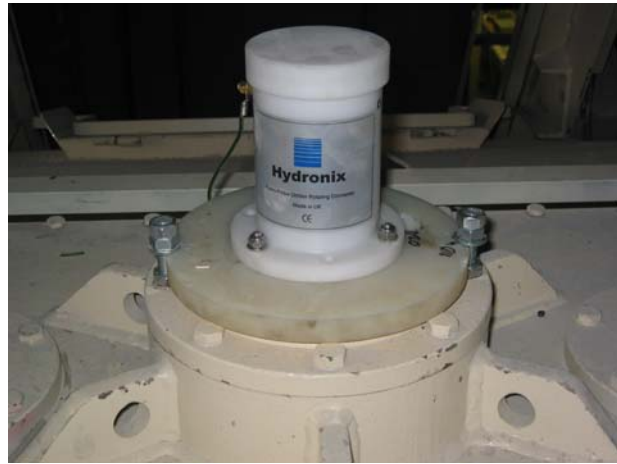




Hydronix
OMG 2m3 Planetary

Hydro-Probe Orbiter Installations

Saval, Spain





Hydronix
Rapid 0.5m³ turbo mixer

Hydro-Probe Orbiter Installations

Coltman, Lichfield





Hydro-Probe Orbiter Installations

Teka 1m3 turbo mixer
Falcarragh, Ireland

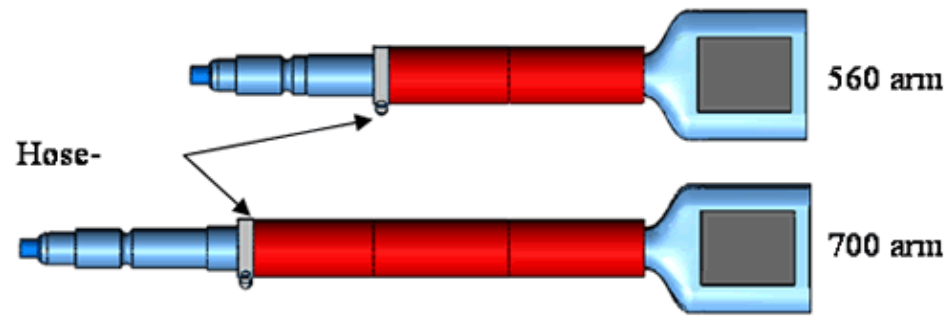




Hydro-Probe Orbiter Installations

Accessories and Ordering

Rotating Connector



Wear Sleeves





Hydronix

Protective Wear Bands

Hydro-Probe Orbiter Installations

Wear Bands

Additional wear protection for sensing, generally not required for most applications.



Auto-Cal Dongle

A re-usable device required to replace a Hydro-Probe Orbiter Sensing Arm





Hydronix

Hydronix Control Systems

Hydro-View standalone calibration and display unit

■ Basic calibration



Hydro-Control V water controller

■ Automatic control



Remote Recipe Module (optional)

■ Binary or up to 10 discrete inputs

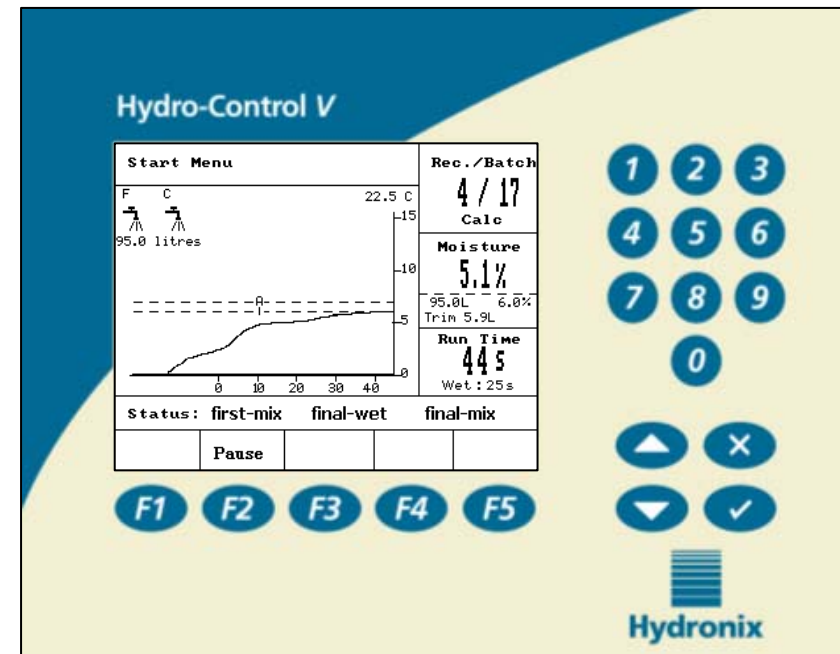




Hydro-Control V

Key features

- Automatic or Manual operation
- 3 modes of adding water to reach moisture target
- Control fine and coarse valves for accurate control of moisture in mixer
- Stores up to 99 recipes
- Graphical display of moisture throughout the batch
- Repeatable batches +/-0.1% moisture
- Calibrate recipe to a previous 'good' batch
- Records batch history of previous 99 batches





Hydro-Control V Connections

■ **On-board voltage-selectable opto-relays: (24Vdc, 110Vac etc):**

For connection to water valves and control system for automatic control.

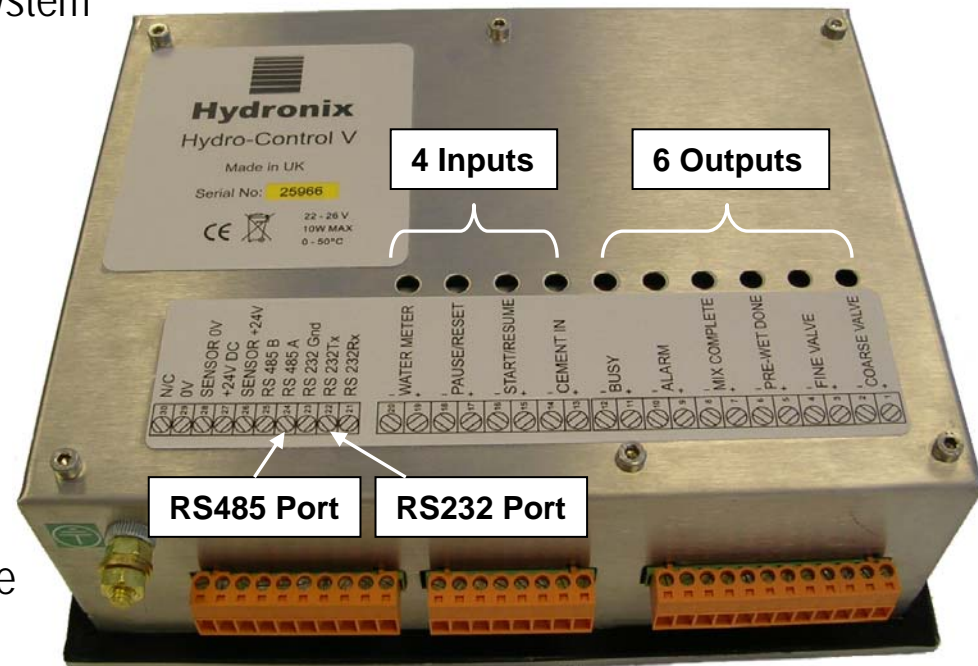
6 Outputs

4 Inputs

■ **RS232 Port:** For sending recipe and control information including:

- Recipe number
- Live recipe batch weights.

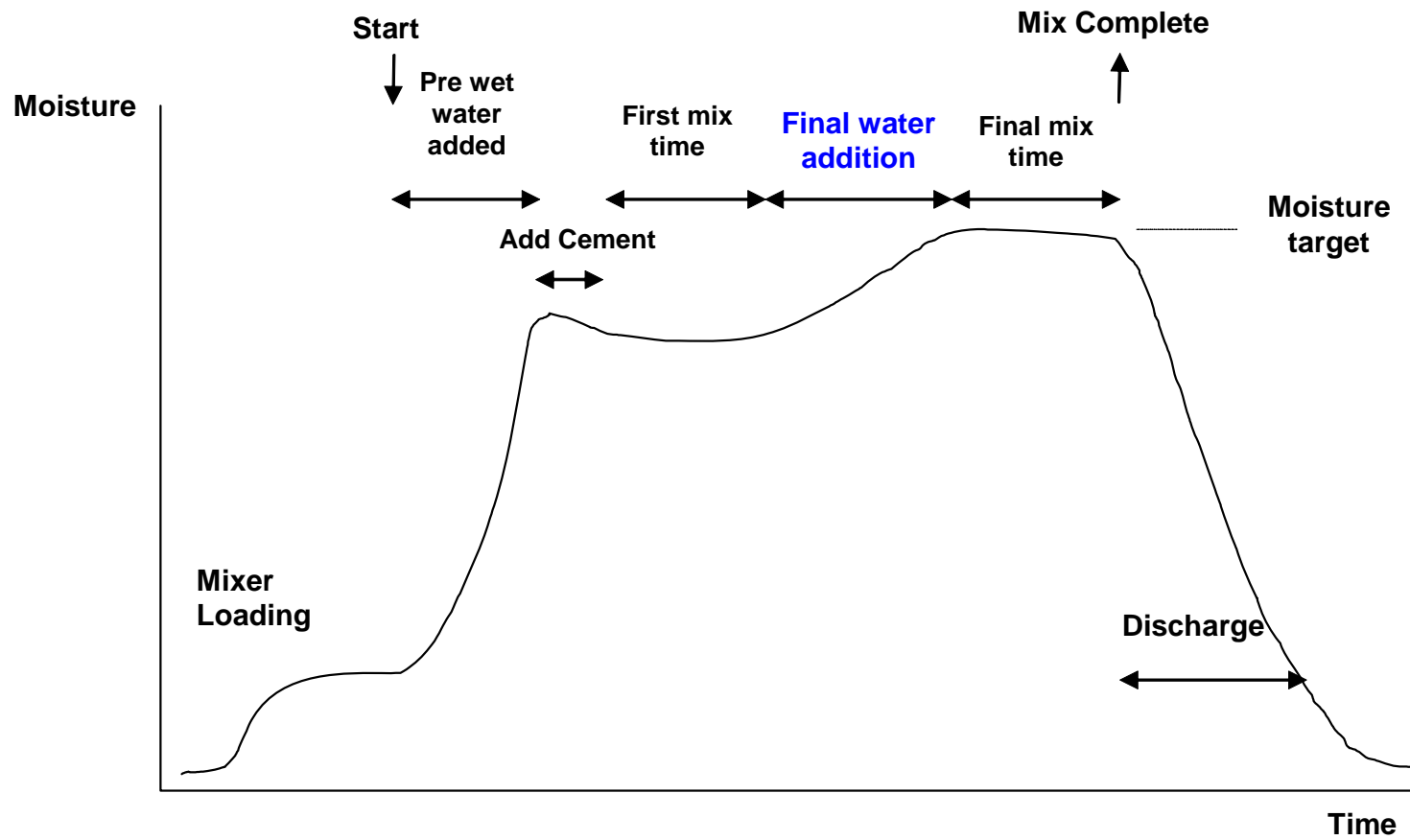
■ **RS485 Port:** Connection to Hydronix moisture sensor for moisture & temperature readings and sensor diagnostics





Hydro-Control V

Mix Cycle sequence





Hydronix

Hydro-Control V

Water modes

3 modes of adding water:

Pre-Set:

Adds a fixed amount of water set in the recipe. No moisture sensor required.

Auto:

Dribble feed method using advanced PID algorithm, progressively adds water until target moisture is reached

Calc:

Calculates the water required to reach target moisture and adds in one shot.



Hydronix

Hydro-Control V

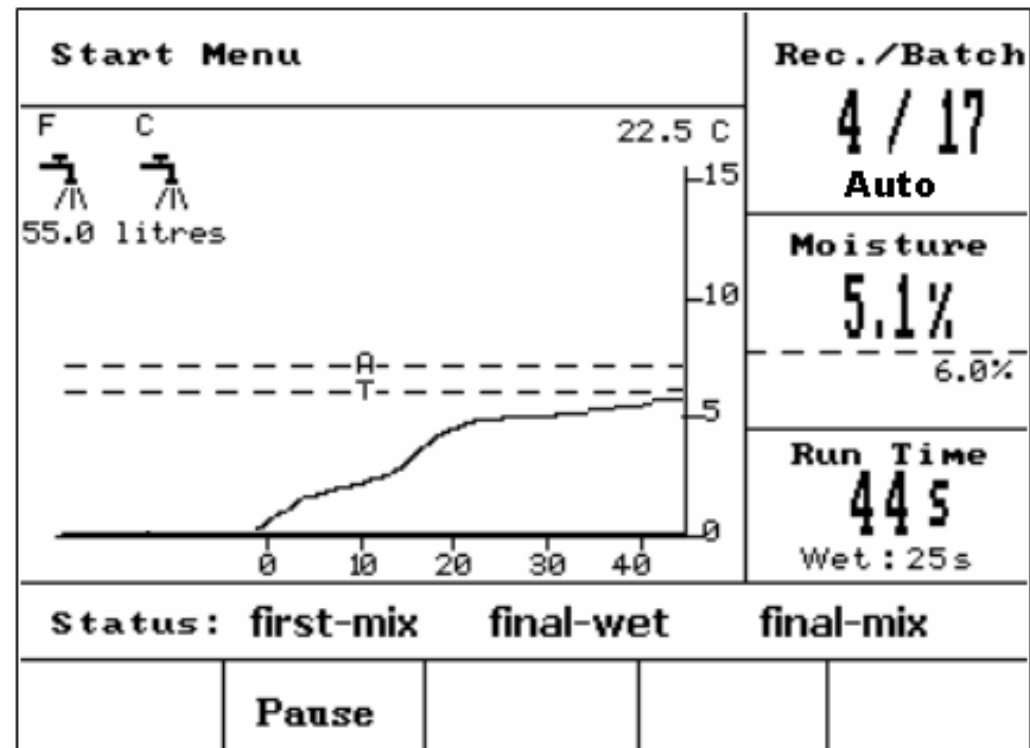
Auto mode

Advantages:

- Independent of batch weight
- No need to wait for a stable signal in the dry mix
- Easy to calibrate recipe

Disadvantages:

- PID algorithm needs to be tuned as the moisture signal is related to the mixer efficiency
- Can be slow where mixing action of mixer is slow
- Cannot be used where water pressure is variable





Hydronix

Hydro-Control V

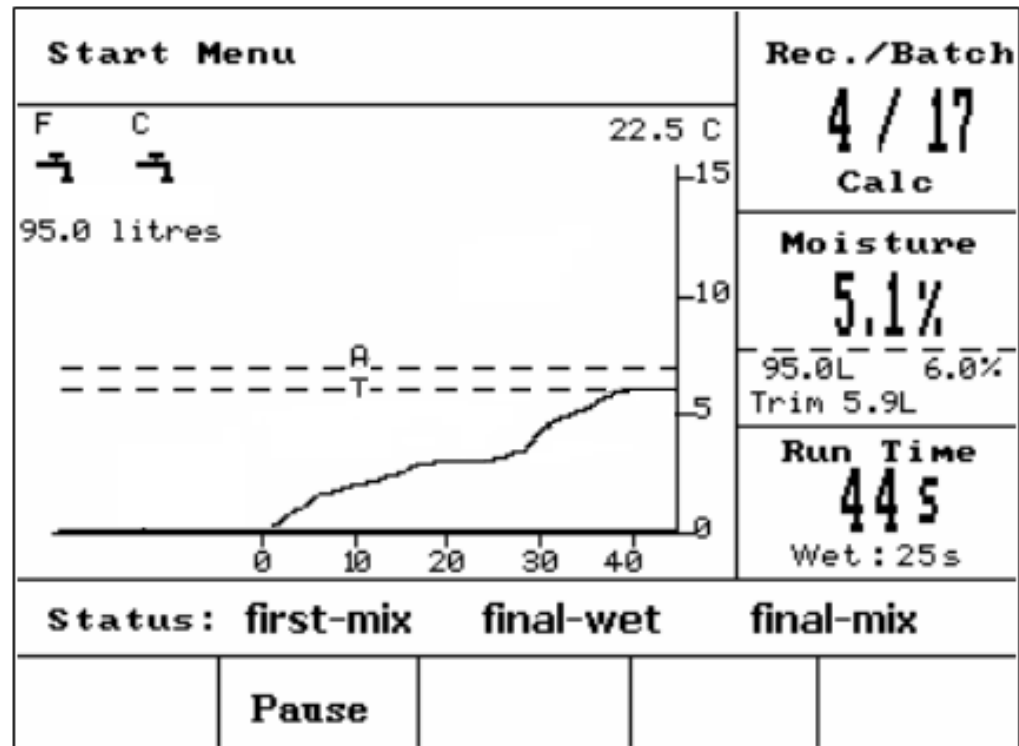
Calc mode

Advantages:

- Faster mixing times achievable in mixers with poor mixing efficiency
- Independent of water pressure

Disadvantages:

- Requires a suitable dry mixing time to produce stable signal for water calculation

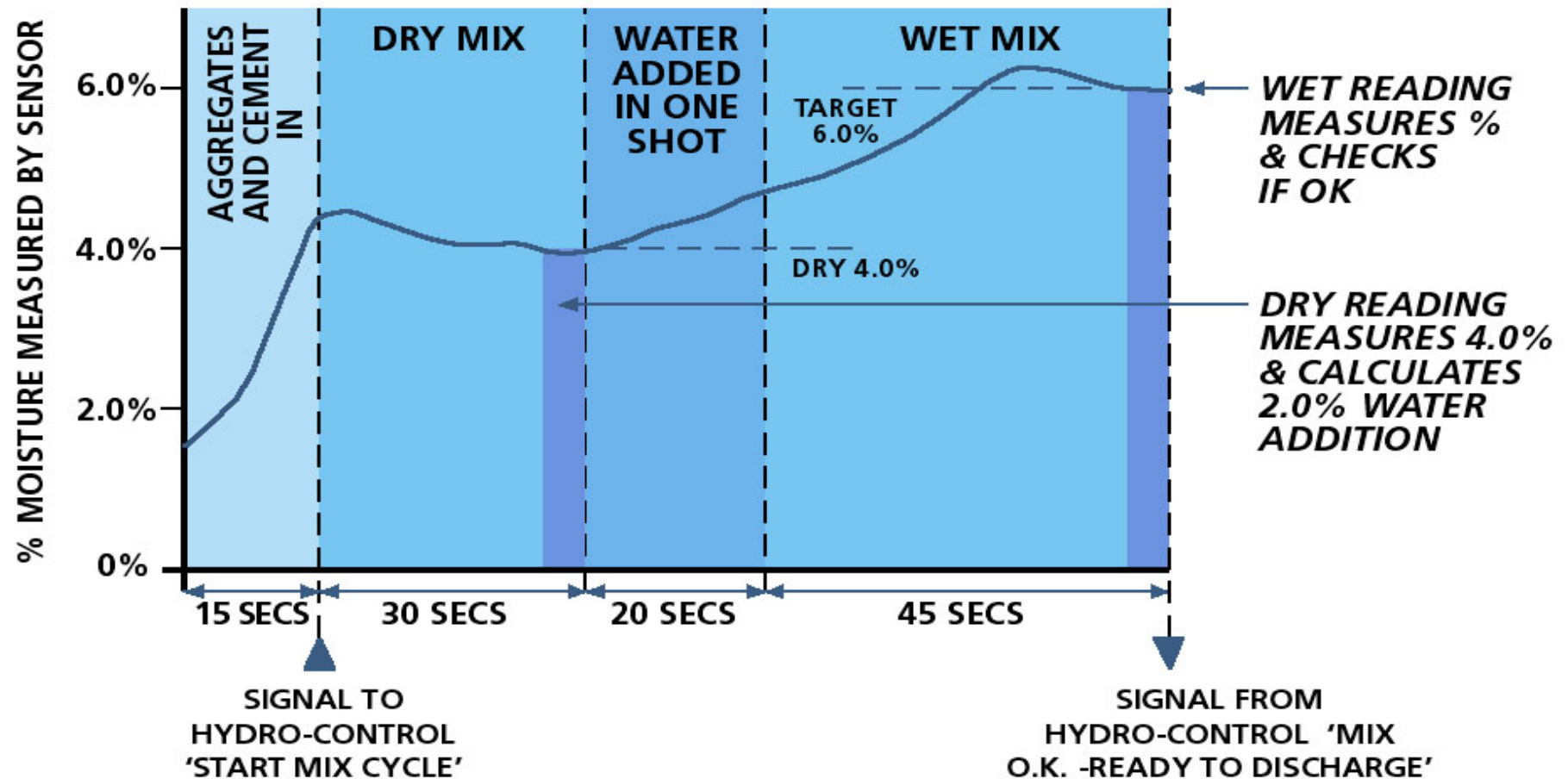




Hydronix

Hydro-Control V

Calc mode





Hydronix

~ end ~