Hydro Control IV
Operators Manual

Hydronix part number: HD0151
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CUSTOMER RESPONSIBILITY

The customer in applying the product described in this documentation accepts that the product is a programmable electronic system which is inherently complex and which may not be completely free of errors. In doing so the customer therefore undertakes responsibility to ensure that the product is properly installed commissioned operated and maintained by competent and suitably trained persons and in accordance with any instructions or safety precautions made available or good engineering practice and to thoroughly verify the use of the product in the particular application.

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The product described in this documentation is subject to continuous development and improvement. All information of a technical nature and particulars of the product and its use including the information and particulars contained in this documentation are given by Hydronix in good faith.

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AKNOWLEDGEMENTS

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Chapter 1 Introduction

Introduction

The Hydro Control IV system from Hydronix is used in the concrete industry for completely controlling the mix cycle to provide precisely the correct addition of water in the shortest possible mixing time.

Using the reading from a single Hydro-Mix microwave sensor inside the mixer, the Hydro Control IV accurately monitors the percentage moisture throughout the mix cycle in both wet and dry mix periods. The correct amount of water is added based on pre-set recipes in order to achieve the required target for the percentage moisture.

The display provides a wide range of information via a series of menus including mixing cycle status, recipe information, sensor signal trend and error analysis. The Hydro Control IV can also be connected to a printer or batch controller via an RS232 serial link as shown in a typical installation in Figure 1.

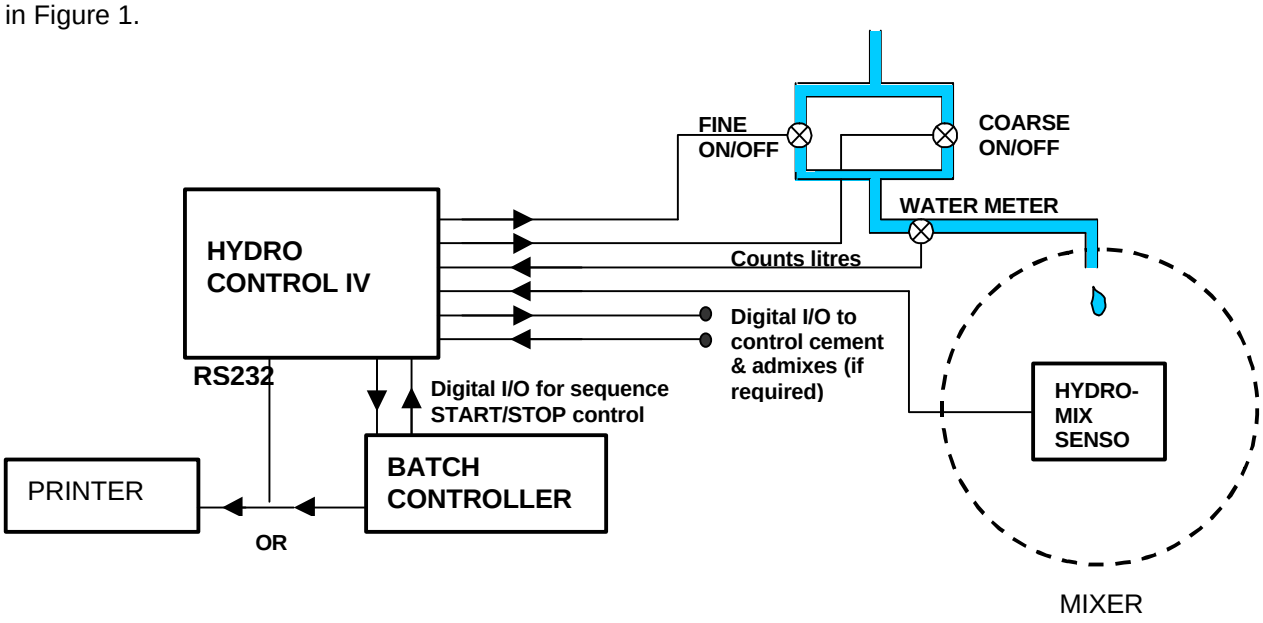


Figure 1 Hydro-Control IV typical system installation

About this manual

This manual describes the day-to-day operation of the Hydro Control IV. It assumes that the unit has already been correctly installed (reference *Hydro Control IV Installations and Reference manual HD0044 Rev2.0*) but that the user has had no previous experience of operating this type of device.

Chapter 2 "Front Panel" describes how to use the front panel and lists the keypad functions.

Chapter 3 "Quick Start" shows you how to get started and find your way around the menus.

Chapter 4 "Setting up a recipe" describes how to enter, edit and copy a recipe.

Chapter 5 "Calibration" describes three different methods for calibrating a recipe.

Chapter 6 "Running the mix cycle" describes the day to day running of the mix cycle.

Software version

This manual applies to software versions **V3.01** and above as displayed on the start-up screen.

A number of soft key functions and calibration routines have changed from previous versions of software and operators should read and understand the changes before operating the unit.

The main changes to the software version **V3.01** from previous versions are as follows:

Polish Language

Polish language option added

German Language

Minor corrections made.

Auto Track

The Auto Track facility now has two sets of parameters allowing different limits to be set for the dry mix and wet mix cycles.

Remote recipe selection

Option to select up to 4 recipes remotely using the digital inputs of the HC IV.

Keypad function changes

 Hand key renamed ''Manual hold''. Toggles between Manual hold mode and Automatic.

 Automatic key renamed ''Water Addition''. Toggles between Automatic, Preset and Two point calibration modes of water addition.

 Water trim key has added functionality when in Preset or Two point calibration mode. Allows the operator to set the pre-set water volume.

 Calibration key has added functionality when in Two point calibration mode. Allows the Two point Calibration Water amount to be adjusted.

Calibration

Changes made to calibration methods to improve performance of the system for wet cast products.

A “Two Point Calibration” method has been added to the water addition method. This simplifies the calibration process when the system is used in Wet Mix applications or when Admixes are used.

There are now three methods of calibration.

- Automatic. Dry cast and Block products **without** colour or additives. The user selects a “good mix” from the mix log for a batch that produced the correct product and presses the calibrate button. No other action required.
- Preset Dry cast and Block products **without** colour or additives. Used when a new recipe is being configured for the first time to “teach” the HC IV the new mix design. Also used as an emergency backup mode in the event of damage to the sensor. The system adds a set amount of water to the mix and records the effects of the water addition in the mix log. When the correct amount of water has been added, the “good mix” can be calibrated by selecting batch record

from the mix log and pressing the calibrate button. No other action required. The Hydro-Control IV can then be set to run in Automatic.

- Two Point calibration. Dry cast and Block products **with** colour or additives, where the HC IV admix 1 and/or 2 control signals are used, and **wet cast** with or without additives. This mode is essentially the same as Preset mode except the Hydro-Control IV adds the water in two amounts. The first water addition, Calibration water, is normally set at 50% of the Preset water but may be adjusted to any value up to the Preset water value. The second water addition is then calculated by the HC IV as the Preset water value minus the calibration water. Admixes if used will be added to the mix during the second water addition.

These methods are described in detail in *Chapter 5 "Calibration"* .

The following calibration items have been removed:-

- Multipoint calibration and graphical displays.
- Quadratic calibration
- Two Shot water addition.
- Run Mix Cycle setup.

Chapter 2 Front Panel

Switching on

When the Hydro-Control IV is first switched on at the mains (there is no ON/OFF switch), the display defaults to the Status Display screen in Figure 2. This shows the current status of the mix cycle and, in particular, the percentage moisture.

Adjusting the display contrast

If the front panel display is not very clear when the unit is switched on, the display contrast can be adjusted for optimum viewing by pressing the key.

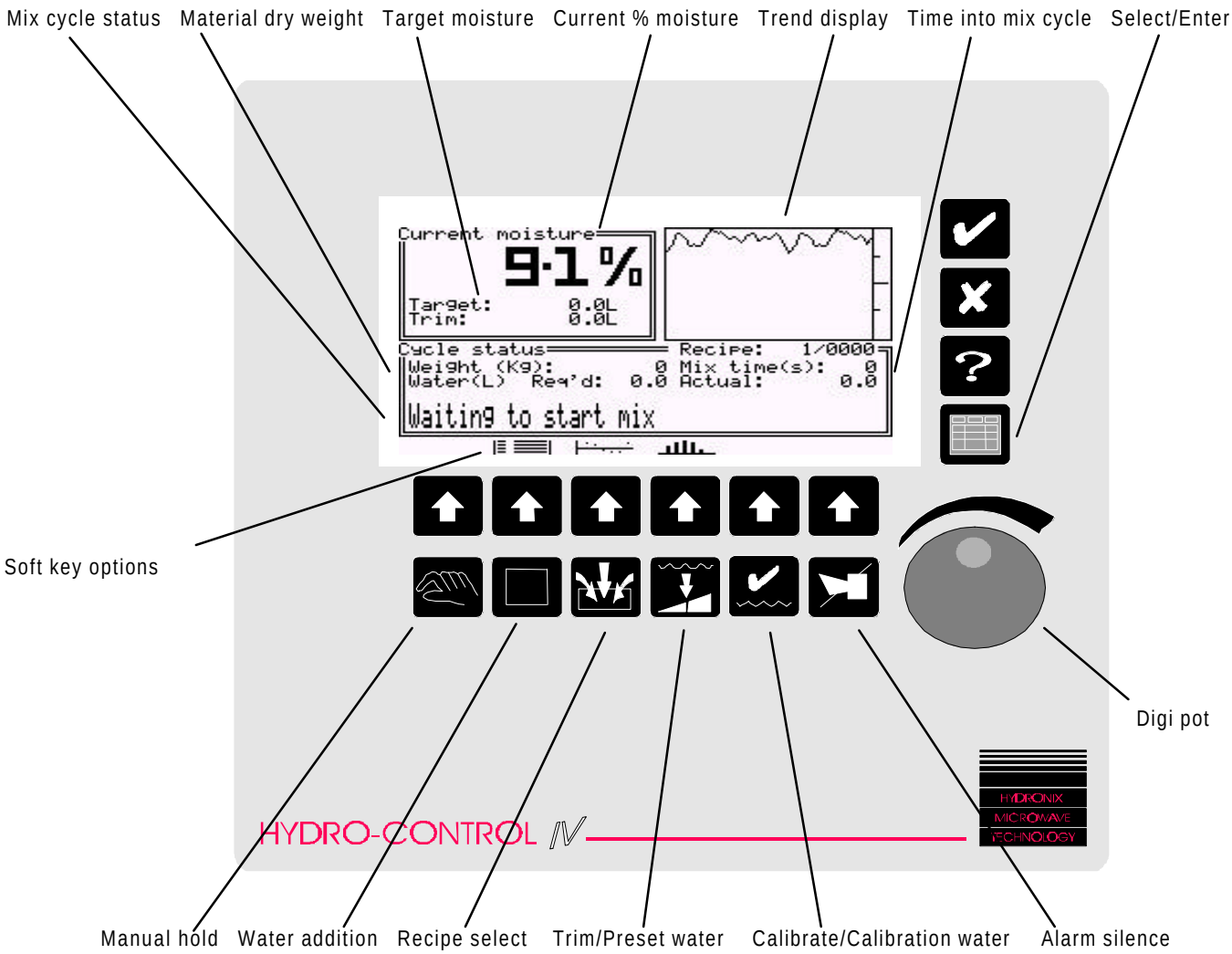


Figure 2 Hydro Control IV showing the Status Display

Digipot

The **dig**ital **pot**entiometer on the front panel is used for data entry and selecting items from the menus by rotating clockwise or anti-clockwise.

Keypad functions

The functions of the keys on the Hydro Control IV front panel are shown in Figure 3 below:

Legend	Name	Description
	Yes	Confirms changes to data.
	No	Cancels changes to data. Adjusts display contrast on some systems.
	Help	Not yet implemented.
	Select/Enter	Selects Main menu. Selects highlighted item in a menu. Accepts entered data.
	Manual hold	Toggles between Manual hold and Automatic modes. In manual hold mode the automatic cycle is paused and allows manual operation via soft key functions. May be User-code protected.
	Water Addition	Selects water addition method i.e. Automatic, Preset or Two Point calibration modes.
	Recipe select	Selects recipe number for next automatic mixing cycle.
	Water trim	Adjusts final mix by ”trimming” the calculated amount of water when in automatic water addition mode. Sets pre-set water volume when in pre-set water or two point calibration mode.
	Calibration	Calibrates the selected recipe from the mix log. Adjusts Calibration Water amount when Calibration mode is selected.
	Alarm Mute	Clears external alarm and displays historical log of alarms.
	Soft key	Selects soft key functions represented by the icons described in Figure 4 opposite.

Figure 3 Keypad functions

Soft key functions

The functions of the soft keys varies depending on which menu has been selected and which mode the Hydro Control IV is operating in.
The functions are represented as icons above the soft keys and their meaning is given in Figure 4.

Icon	Name	Description
	Status display	Changes default display to show current cycle status and moisture content.
	Mix log display	Selects mix log display to show results of 100 most recent mixing cycles.
	Error trend display	Displays contents of mix log as an error trend graph showing the difference between required and actual final moisture content.
	Error distribution	Displays contents of mix log as an error distribution graph with tolerance bands set by user.
	Add water	Opens fine water valve for as long as the key is pressed. Available in hand mode only.
	Abort cycle	Aborts current automatic cycle and resets cycle to beginning. Available in hand mode only.
	Exit	Returns to the previous display or menu.
	Cursor up	Moves highlight cursor to previous menu item. This can also be done with the digi pot.
	Cursor down	Moves highlight cursor to next menu item. This can also be done with the digi pot.
	Increment value	Increases numeric value during editing. Holding the key down will speed up the count. This can also be done with the digi pot.
	Decrement value	Decreases numeric value during editing. Holding the key down will speed up the count. This can also be done with the digi pot.
	More	Indicates more information is available.
	Record	Starts recording sensor capture data.
	Zoom in	Increases magnification on sensor capture display.
	Zoom out	Decreases magnification on sensor capture display.

(continued)

Icon	Name	Description
	Log in	Logs in operator by requesting a user code. *See Chapter 3 for further information.*
	Log out	Logs out operator.
	One	Enters digit **1** in User code.
	Two	Enters digit **2** in User code.
	Three	Enters digit **3** in User code.
	Four	Enters digit **4** in User code.
	Five	Enters digit **5** in User code.

Figure 4 Soft key functions

Chapter 3 Quick Start

This chapter is a quick reference guide to get you started on the Hydro Control IV front panel as quickly as possible.
It describes how to find your way around the menus and how to log in and out of the system by entering the correct user code.

Using the menus

Communication with the Hydro Control IV is done via the front panel through a series of menus which allow you to view or edit information about your system or the recipe to be used in the mix cycle.
The following simple tasks are designed to help you learn how to operate the front panel keypad and find your way around the menus:

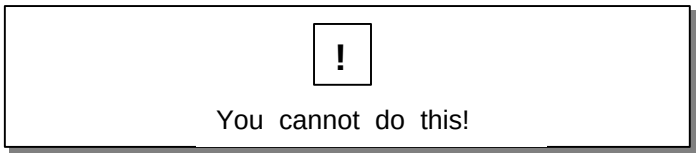
Task	Action	Comment
To select Main Menu	**Press** 	Screen displays Main Menu with a list of options or sub menus.
To scroll through options	Rotate digipot or use soft keys  and 	The highlighted cursor moves up/down the menu options. Keep scrolling forward to see if any more options are available.
To select an option	When required option is highlighted **Press** 	Selected option is displayed.
To enter a value	Rotate digipot until required value is reached or use soft keys  or  **Press** 	Screen displays new value.
To Exit	Press soft key	

Logging In/Out with the user code

The Hydro Control IV has different levels of security and some of its menus or data may not be accessible without entering the correct user code.

When the unit is first switched on, it is in 'Operator' mode; this requires no user code and allows a limited choice of menus and restricted access to some of the functions.

If you attempt a task for which you have insufficient access, the following warning is displayed:



To gain access to all the features on the system, you will need to "Log In" with the Supervisors' code as described below.

Note: Some Engineering and Backup/Restore functions will still not be available to you as they require different passwords and are outside the scope of this manual.

To Log In

Task	Action	Comment
Select **Main Menu**	**Press**	Displays Main Menu
Log In	**Press**	Display prompts you for user code.
Enter user code	Enter code using soft keys through as required and press	Enter **supervisor's user code:** **11111**
Return to Status Display screen	**Press**	

If the user code is valid, more menu options are displayed. If the code is invalid, a warning will be displayed to say that you have entered the wrong code.

Once you have completed the required operations under the Supervisors' code, you can reset the Hydro Control IV back to Operators' mode by "Logging Out" as follows:

To Log Out

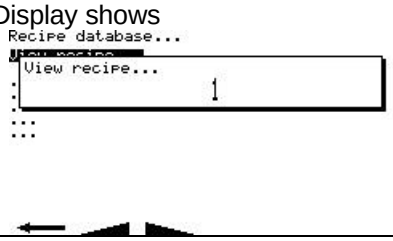
Select **Main Menu**	**Press**	Displays Main Menu
Log Out	**Press**	Display asks you to confirm you want to log out
Confirm	**Press**	

Chapter 4 Setting up a recipe

This chapter describes how to enter a new recipe and edit it. It also describes how to create a default recipe which can then be copied and edited since this is the quickest way of setting up new recipes.

Note: To perform any of these operations you will need to be Logged In to the system under the Supervisors' user code as described in *Chapter 3 "Quick Start"*.

Entering/editing a new recipe

Task	Action	Comment
Enter the main menu	**Press**	Main Menu is displayed
Select **Recipe database**	Rotate digipot until **Recipe database** is highlighted and **Press**	**Recipe database** options are displayed
Select **View recipe**	Rotate digipot until **View recipe** is highlighted and **Press**	Display shows 
Enter recipe number to be edited	Rotate digipot to required value and **Press**	Display shows contents of selected recipe 
Edit recipe	Rotate digipot until value to be edited is highlighted and **Press**	Screen prompts for new value.

See table overleaf for descriptions and example values for items in the Recipe Database.

Enter new values	Rotate digipot to required value and **Press** Scroll to next value to be edited and repeat above	This saves the new value. To exit without saving **Press**
Update recipe	**Press** to exit menu **Press** ☑ to update recipe	Screen prompts **"Update recipe?"** Screen returns to **Recipe database** menu
To exit	**Press**	Screen returns to **Main Menu**

Recipe Database description and example values

Item	Description	Example
Dry weight of mix (kg)	Total dry weight of materials in mixer **including** weight of cement.	1000
Cement weight (kg)	Used to calculate water/cement ratio in mix log.	100
Pre-wet water (litres)	Volume of water to dispense during pre-wet phase.	0
Pre-wet mix time (sec)	Delay between addition of pre-wet water and cement call (if enabled).	0
Cement call enable	0 = not enabled 1 = enabled. System will output a Cement Call and wait for a Cement Done input before continuing.	0
Pre-set water (litres)	Total Volume of water to dispense in pre-set water mode.	60.0
Calibration water (litres)	Volume of water to be dispensed at first water addition in Two Point calibration mode.	0
Auto water (%)	Final target % moisture.	8.0
Water trim (litres)	Adjustment by operator to automatic volume calculated by system.	0
Auto water limit (litres)	Maximum amount of water which may be added in automatic mode.	100.0
Auto water enable	0 = recipe can only be used in pre-set mode. 1 = recipe can be used in pre-set or automatic mode. Must be set to 1 for calibration.	1
Dry mixing time (sec)	Number of seconds to run for dry mix period.	30
Admix 1 call enable or Admix 2 call enable	0 = not enabled 1 = enabled. System will output an Admix 1/2 Call and wait for an Admix 1/2 Done input before continuing.	0
Wet mixing time (sec)	Number of seconds between end of water addition to end of mix.	30
+ tolerance (%)	Acceptable tolerance at end of wet mix before the mix is alarmed as “too wet”.	0.5
- tolerance (%)	Acceptable tolerance at end of wet mix before the mix is alarmed as “too dry”.	-0.5
Batch counter	Increments each time a mix is started on this recipe. Used to identify a mix in the mix log by assigning a batch code number	20
Unscaled input 1	Unscaled input value read from sensor at end of dry mix period. Updated by a calibration.	??
Moisture 1	Inferred moisture reading at end of dry mix period. Updated by a calibration.	??
Unscaled input 2	Unscaled input value read from sensor at end of inserted wet mix phase (for mix set-up cycles). Updated by a calibration.	??
Moisture 2	Inferred moisture reading at end of inserted wet mix phase (for mix set-up cycles). Updated by a calibration.	??
Unscaled input 3	Unscaled input value read from sensor at end of wet mix phase. Updated by a calibration.	??
Moisture 3	Inferred moisture reading at end of wet mix phase. Updated by a calibration.	??

Copying a default recipe

The simplest method of creating a new recipe is to copy and edit an existing recipe that closely resembles the new one.
It is recommended that a default recipe be set up in, say, **recipe 200** as described in the previous section and that this is copied and edited as shown below:

Task	Action	Comment
Enter the Main Menu	**Press**	Main Menu is displayed
Select **Recipe database**	Rotate digipot until **Recipe database** is highlighted and **Press**	**Recipe database** options are displayed
Select **Source recipe**	Rotate digipot until **Source recipe** is highlighted and **Press**	Screen prompts for **"Source recipe"**
Enter recipe number to be copied **FROM**	Rotate digipot or use soft keys or then **Press**	Select recipe **200** as the source.
Select **Destination recipe**	Scroll down with digipot and **Press**	Screen prompts for **"Destination recipe"**
Enter recipe number to be copied **TO**	Rotate digipot or use soft keys or then **Press**	
Copy recipe	Scroll to **Copy recipe** and **Press**	Screen displays **"Confirm copy recipe"**
Confirm copy	**Press** ✔	The **Source recipe** is now copied into the **Destination recipe**
Reset recipe numbers	Set the **Source recipe** and **Destination recipe** to **1**.	This is an important step because it prevents accidental overwriting of recipes when copying is next performed
Exit	**Press**	Screen returns to status display

The new recipe can now be edited as described in the previous section and it is then ready for calibration.

Chapter 5 Calibration

This chapter explains why it is necessary to calibrate the Hydro Mix sensor each time a new recipe is created and describes the three methods used by the Hydro Control IV unit.

Why calibrate?

The Hydro-Mix sensor measures the moisture content of the dry and wet mixes by measuring a change in a physical property of the material caused by the presence of water.

However, this property is not entirely dependent on water content and so it is necessary to calibrate the sensor for each different recipe or combination of raw materials.

The output of the sensor is linear with respect to moisture for relatively dry mixes, although it can become non-linear for wet applications.

Due to the non-linear characteristics of the sensor as the mixture approaches saturation, the method of calibration will depend on whether a dry or wet cast is required and on whether admixes are to be added during the mix cycle.

The Hydro Control IV calculates the slope of the calibration line by taking readings from the sensor during a mix cycle at points defined by the selected method of calibration.

It is therefore very important to choose the correct calibration method for your particular application.

Calibration methods

The Hydro Control IV uses three methods of calibrating the sensor depending on the type of product required:

- **Preset** for dry cast and block products **without** colour or additives. This is used when a new recipe is being configured. A preset amount of water is added to the mix to give the required percentage of moisture and then calibration takes place.

- **Two Point calibration** for dry cast and block products **with** colour or additives and **wet cast** with or without additives. This is essentially the same as Preset mode except that the water is added in two amounts and readings are taken at two points. This is necessary for wet mixes where the sensor characteristics become less linear as the material reaches saturation. It also allows for the addition of admixes, if required, and this is done at the second water addition.

- **Automatic** for dry cast and block products **without** colour or additives. This uses a historically “good mix” from the mix log for a batch that previously produced the correct product.

Preset Mode

This mode is used when a new recipe is being configured for a dry cast mix without colour or additives.

A preset amount of water is added to the mix to achieve a target percentage moisture and the system is calibrated once a satisfactory mix has been obtained. Since this is a dry mix, the sensor characteristics are linear and an accurate calibration can be obtained by taking sensor readings at the start and end of the mix cycle and calculating the slope.

Once calibration is complete, the data is stored in the mix log as a "good mix" ready for future calibrations. The Hydro Control IV can then be set to run in Automatic mode.

Example

Assume a new recipe has been set up with the following parameters:

Dry weight of mix = **1000kg**
Auto water (Target moisture content) = **8%**

Assume: Moisture content before mix cycle begins = **2%**

Therefore: Amount of water present in mix at start = **20 litres** (since 1 litre weighs 1 kg)
Amount of water required by end of mix cycle = **80 litres**.
Preset amount of water needed to achieve correct moisture content = **60 litres**.

The following sequence demonstrates how to perform a Preset calibration using the example above:

Step 1: Select Preset mode

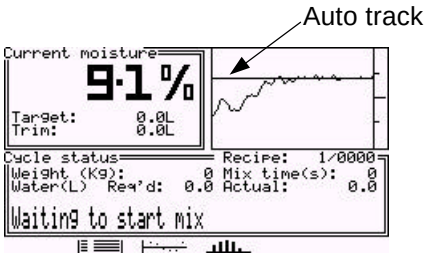
Task	Action	Comment
Select water addition method	**Press** 	Screen prompts "Water method:"
Select Preset mode	Rotate digi pot to "**Preset"** and **Press**	Screen displays **"Preset mix next"**

Step 2: Enter Preset water

Set Preset water volume	**Press** 	Screen prompts **"Adjust water for recipe:"**
Enter the number for the new recipe	Rotate digi pot to required value and **Press** 	Screen prompts **"Preset water (L)"**
Enter Preset water to be added to mix during Main Water addition e.g. **60 litres**	Rotate digipot to required value and **Press** 	Screen returns to status display. *NB: The total amount of water does not include any Pre Wet water*

(continued)

Step 3: Make the new mix

Start mix cycle and observe Hydro Control IV display.		Dry mix cycle begins. Screen displays both dry and total mixing time elapsed.
Ten seconds before end of **DRY MIX** cycle	**Press** 	Dry mix cycle will be paused. Screen displays **"Hand mode selected"**
Observe trend display on front panel	Wait until **trend display** is stable and that the **auto track** line is drawn across the display	The display will show:  Note time taken from start of cycle to auto track line being drawn; this will be used as the dry mix time
	Wait a few more seconds to ensure moisture content does not drift or auto track line disappear	If it does, wait until moisture content stops drifting or auto track line is drawn once more. Note time taken from start of dry mix cycle
Return system to **automatic**	Press 	The system will now complete the dry mix cycle, add the Preset water and enter the wet mix cycle.
Ten seconds before end of **WET MIX** cycle	**Press** 	The Wet Mix cycle will be paused. Screen displays **"Hand mode selected"**
Observe the mix in the mixer to confirm that it is of the **correct moisture content**	**Press**  if more water is required	Take care not too add to much water as water can only be added not removed
Observe the trend display on the front panel	Wait until **trend display** is stable and that the **auto track** line is drawn across the display	Note time taken from start of wet mix cycle to auto track line being drawn; this will be used as the wet mix time
	Wait a few more seconds to ensure moisture content does not drift or auto track line disappear	If it does, wait until moisture content stops drifting or auto track line is drawn once more. Note time taken from start of wet mix cycle
Return system to **automatic**	Press 	The system will now complete the wet mix cycle.

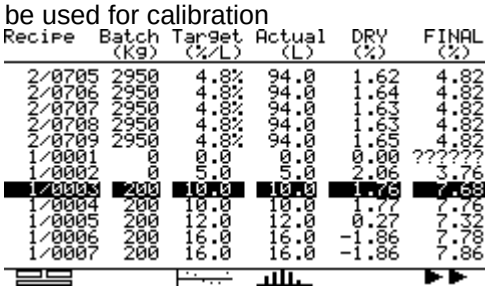
When the wet mix cycle is complete the status display will show **"Mix Complete"** and the mix can be **discharged** from the mixer.

If the Dry and Wet Mix times recorded during the calibration are different from those in the recipe, then you will need to **Edit** the recipe with the revised values.

Step 4: Calibrate the recipe from the mix log

Once the mix cycle is completed, all the readings are stored automatically in the mix log. A batch number is assigned to that mix, in the form RRR/BBBB where RRR denotes recipe number and BBBB the batch number.

It is now necessary to calibrate the Hydro Control IV to that recipe batch.

Task	Action	Comment
Display the mix log	**Press**	The results of the most recent 100 mixing cycles (or less if 100 cycles have not been completed) will be displayed.
Select the required recipe from the mix log	Rotate digipot to **highlight the mix** to be used for calibration 	Select the batch number of the mix you have just completed Pressing ▶▶ will display more columns of information
Calibrate the mix	**Press**	Screen prompts "Calibrate to this mix?"
Confirm you wish to use this mix log entry for calibration	**Press**	Screen displays **"Calibration was successful"**.
Exit	**Press**	Screen returns to status display
Select Automatic mode	**Press**	Screen prompts: "Water method:"
	Rotate digi pot to "**Automatic"** and **Press**	Screen displays **Auto Mix Next**

Step 5: Re-calibrate the recipe in Automatic mode

Although the new recipe is now calibrated, it is recommended that you run the system in fully Automatic mode to produce another batch to confirm the calibration.

In Automatic mode, the water will be added automatically although some manual trimming may still be necessary to produce the exact required product.

Once mix cycle is completed and the **"mix complete"** message is displayed, **repeat step 4 above**, this time selecting the **new** batch number as the calibration mix.

The Hydro Control IV is now fully calibrated for the new mix design and each time the new recipe is mixed, it will use the calibration data from that batch to ensure that the correct product is produced.

Note: An asterix is displayed in the mix log beside the batch number used for calibration.

Two Point Water Addition Mode

This mode is used when colour or additives are to be added to dry cast products or for wet cast with or without additives.
The water is added in two parts and calibration readings are taken at the start of the mix cycle and after the first water addition when the sensor characteristics are still linear.
The amount of water added at the first water addition is defined as the **Calibration water**.
The **total** amount of water added to the mix (excluding any water in the pre-wet mix) is known as the **Preset water** and this is defined in the recipe. The Hydro Control IV automatically calculates the second water addition by subtracting the Calibration water from the Preset water.
It is recommended that the Calibration water be set to 50% of the Preset water for wet cast and 90% for dry cast.
Any admixes controlled by the Hydro Control IV admix signals will be added during the second water addition.

Example

Assume a new recipe has been set up for a wet cast application with the following parameters:

Dry weight of mix = **1000 kg**
Auto water (Target moisture content) = **11%**

Assume: Moisture content before mix cycle begins = **2%**

Therefore: Amount of water present in mix at start = **20 litres** (since 1 litre weighs 1 kg)
Amount of water required by end of mix cycle = **110 litres**.
Preset water needed to achieve correct moisture content = **90 litres**.
Calibration water required at first water addition = **45 litres**

The following sequence demonstrates how to perform a Two Point calibration using the example above:

Step 1 : Select Two Point Water Addition Mode

Task	Action	Comment
Select water addition method	**Press** 	Screen prompts "Water method:"
Select Two Point Water Addition mode	Rotate digi pot to "**2 Point Calibration"** and **Press** 	Screen displays **"Calibration mix next"**

(continued)

Step 2: Enter Calibration water (first water addition)

Set Calibration water volume	**Press** 	Screen prompts **"Adjust water for recipe:"**
Enter recipe number	Rotate digipot to required value and **Press**	Screen prompts **"Set calibration water"**
Enter Calibration water to be added to mix at first water addition e.g. **45 litres**	Rotate digipot to required value and **Press**	Screen returns to status display. **NB:** Set calibration water to 50% of Preset water. *For dry cast with admix or colour set to 90% of Preset water.*

Step 3: Enter Preset water

Set Preset water volume	Press 	Screen prompts **"Adjust water for recipe:"**
Enter recipe number	Rotate digipot to required value and **Press**	Screen prompts **"Preset water (L)"**
Enter Preset water e.g. **90 litres**	Rotate digipot to required value and **Press**	Screen returns to status display. ***NB:*** *Preset is the total amount of water to be added (excluding any pre wet water).*

Step 4: Make the new mix

As described in Preset mode except that the water will be added in two parts.
Any checks on the mixture, or trimming of the water should be done at the end of the second water addition.

Step 5: Calibrate the recipe from the mix log

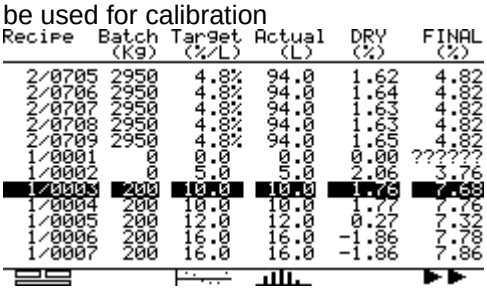
As described in Preset mode.

Note: Having calibrated a mix using the Two Point calibration method, it is not possible to recalibrate using the Automatic calibration method. The calibration must be carried out using the Two Point method once more.

Automatic Calibration Mode

This method is used when a previous “good mix” has already been produced and the data for that batch has been stored in the mix log.
The system must be running in **Automatic mode** and any recipe (**except** those calibrated using the Two Point method) can be recalibrated simply by selecting a good mix from the mix log and pressing the Calibrate key.
For example, assume that while running in Automatic mode, it is necessary to keep making the same minor adjustments to a recipe each time a batch is made in order to achieve a satisfactory product at the end of the cycle. By selecting the latest ‘good’ batch from the mix log and pressing the Calibrate key, the recipe will now be recalibrated to that mix without having to perform a complete Preset calibration as though it were a new recipe.
In the mix log, an asterisk will be displayed beside the batch number of the mix which is being used to calibrate a particular recipe.

Note: A warning will be displayed if recalibration is attempted of a recipe previously calibrated by the Two Point method. This can be overwritten, but the resulting calibration may be incorrect.

Task	Action	Comment
Display mix log	**Press**	The results of the most recent 100 mixing cycles (or less if 100 cycles have not been completed) will be displayed.
Select a recipe from the mix log	Using the digipot, **highlight the mix** to be used for calibration 	Pressing will display more columns of information
Calibrate the mix	**Press**	Screen prompts “Calibrate to this mix?”
Confirm you wish to use this mix log entry for calibration	**Press**	Screen displays **“Calibration was successful”** The data stored in the mix log has been used to calibrate the selected recipe.
Exit	**Press**	Screen returns to status display
Select Automatic mode	**Press**	Screen prompts: “Water method:”
	Rotate digipot to “**Automatic”** and **Press**	Screen displays **Auto Mix Next**

Calibration problems

The following is a list of some of the more common problems that may occur during calibration:

Problem	Remedy
Alarm recorded	Determine cause of alarm
Mix not stable at end of dry or wet mix cycle	Increase dry or wet mix time. Both dry and wet mix times are recorded in mix log.
Insufficient moisture change	Hydro Control IV requires minimum of 1% moisture change between wet and dry cycles.
Sensor has build up of material on the ceramic	Adjust position of sensor and/or adjust mixer paddles to ensure ceramic is kept clean.
Problems during small or part batches	Insufficient material in mixer to provide good sensor coverage. Increase mix size or run in Preset mode with small batches.

Chapter 6 Running the mix cycle

This chapter describes the day to running of the mix cycle and how to perform some basic operations including how to trim the water, how to clear alarms and how to abort the mixing cycle.

Note: One very useful operation that is not included in this chapter is recalibration of an existing recipe when the system is running in Automatic mode; this has already been described in detail in *Chapter 5, "Calibration"* in the section entitled *"Automatic calibration mode".*

Starting the mix cycle

Task	Action	Comment
Choose recipe for the next mix cycle	**Press** 	Screen prompts: "Select recipe number"
	Rotate digipot to required recipe number and **Press** 	If a mix cycle is currently in progress, the new recipe number will not be displayed until the present cycle has been completed.
Select water addition method	**Press** 	Screen prompts: "Water method"
Select Automatic	Rotate digipot to **"Automatic"** and **Press** 	Screen displays **"Automatic mix next"**

The system is now ready to start the mix cycle.

Choosing Manual hold or Automatic mode

Sometimes it is necessary to pause the mix cycle during Automatic operation, for example to check the mix visually or to manually add water. To do this, the system needs to be in Manual/Hand mode.

Task	Action	Comment
To change to Manual mode	**Press** 	Mix cycle will be paused. Screen displays **"Hand mode selected"**
To return to Automatic mode	**Press** 	Mix cycle restarts. Screen displays **"Hand mode selected"**

Trimming the water manually

If the mix seems too dry, it is possible to open the water valve and manually trim the water during the Automatic mix cycle as follows:

Task	Action	Comment
Select Manual mode	**Press** 	Mix cycle will be paused. Screen displays **"Hand mode selected"**
Select add water	**Press** and hold soft key  until sufficient water has been added then release	The fine water valve will be held open while the key is pressed. The amount of water added is shown in "Actual" on the status display.
Return to Automatic mode	**Press** 	Mix cycle restarts. Screen displays **"Automatic"**

Adjusting the scale of the trend display

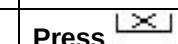
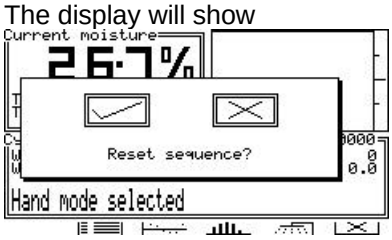
The trend signal on the status display shows the signal from the Hydro-mix sensor in graphical form.

Sometimes it may be necessary to adjust the vertical scale of the display in order to get better resolution as follows:

Task	Action	Comment
Enter Main Menu	**Press** 	Displays Main Menu
Select **sensor set up**	Rotate digipot until required option is selected and **Press** 	Displays sensor **setup menu**
Select **trend upper limit**	Rotate digipot until required option is selected and **Press** 	Display prompts **"trend upper limit"**
Enter new scale	Rotate digipot until required value is reached and **Press** 	The trend lower limit or trend interval can be changed in the same way if required.
To exit	**Press**	Screen returns to Main Menu

Aborting the current cycle

It may be necessary to terminate the current mixing cycle from the keypad, for example in the event of a sequence fault elsewhere in the control system.
To perform this operation:

Task	Action	Comment
Select **Manual hold**	**Press** 	Mix cycle will be paused. Screen displays **"Hand mode selected"**
To abort cycle	**Press** 	 is a softkey function.
		The display will show 
To reset cycle	**Press** ✔	This will reset the sequence. ✘ will return to trend display with **"Hand mode selected"**
		The display will show 
Confirm	**Press** ✔	Hydro Control IV returns to trend display with **"Hand mode selected"**. A Mix Complete signal will be generated once Automatic mode is selected ✘ will return to trend display with **"Hand mode selected"**. No Mix Complete signal will be generated.
Return to Automatic mode	**Press** 	Screen displays **"Auto mix next"** Mix Complete will be displayed and Mix Complete signal generated if selected as above

The sequence will not be reset or the Mix Complete signal generated until the system is returned to the Automatic mode.

Clearing alarms

The Hydro Control IV alarm system has two types of alarms; **alarms** which require acknowledgement from the operator, and **events** which are logged but otherwise require no action.
If a problem occurs during a mix cycle, either an audible alarm will sound, or a message will appear on the screen.
To clear the alarm:

Task	Action	Comment
Clear alarm	**Press** 	Screen displays alarm log showing last 100 alarms or events.

Alarms and events are printed automatically if a printer is installed.

Appendix A Specification

PERFORMANCE

Percentage moisture range:	0 – 20%
Accuracy:	
Synchronised sensor reading:	3 methods of filtering sensor signal to eliminate effect of air pockets during mixing
Mix data log:	Records data from last 100 mixes
Error analysis:	Graphical display of deviation from target of last 100 mixes

ELECTRICAL

Mains supply voltage:	100/110/230V ac, 50/60 Hz
Power rating:	12W max (Operator terminal) 6W max (Input/output unit)

MECHANICAL

Dimensions (width x height x depth)

Operator terminal (panel mounted):	220mm x 230mm x 120mm max (including connectors)
Panel aperture:	202mm x 212mm
Steel enclosure:	480mm x 360mm x 240mm
Input/output module:	395mm x 110mm x 100mm max (including DIN rail mounting)

Weight

Operator terminal:	4kg
Steel enclosure:	13kg
Input/output module:	1kg

ENVIRONMENT

Temperature range:	5 – 40 °C
Relative humidity:	80% at 31 °C derating linearly to 50% at 40 °C
Altitude:	200m max
Environmental rating:	IP54
Safety approval:	IEC 664 Installation category II, pollution degree 2
Insulation Class:	
Operator Terminal:	Class I
Input/Output Rack:	Provides BASIC insulation only. This unit must be installed in an enclosure which provides additional protection in the advent of a single fault through either .. • Use of a protective ground conductor • Supplementary, double or reinforced insulation
Wall mounted enclosure:	When installed in the wall mounted enclosure, the Hydro-Control IV system is insulation CLASS I

INPUTS

Sensor inputs:	1 x Hydro-mix microwave sensor
Analogue input:	1
Digital inputs:	7
Voltage:	Specified by customer (typically 10–32V AC/Dc or 9-140V AC/DC or 180-280V AC/DC)

OUTPUTS

Digital outputs:	9
Voltage:	Specified by customer (typically 10–32V AC/Dc or 9-140V AC/DC or 180-280V AC/DC)

COMMUNICATIONS

RS485 interface:	1 port for connecting to batch controller
RS232 interface:	1 port for connecting to printer or computer
Baud rate:	**9600**
Data bits:	**8**
Stop bits:	**1**
Parity:	**None**

ALARM AND SECURITY

Total number of alarm:	17
Alarm configuration:	User configured for silent or with siren
Alarm log:	Displays last 100 alarm occurrences
Security:	Four levels of access to system depending on user code as follows:
Operator:	**No user code required**

GENERAL

Maximum number of recipes:	200
Keyboard:	Sheet keyboard with polyester overlay
Graphic display:	240mm x 128mm graphics module with backlighting
Languages:	English, French, German, Italian, Dutch, US Customary

Appendix B Electromagnetic Compatibility

When installed and operated according to the instructions given in this guide, this equipment conforms to the requirements of Council Directive 89/336/EEC according to the following schedule:

Equipment type:	Hydro-Control IV Operator terminal unit model number HC04 (revision D or later)	
Manufacturer:	Hydronix Ltd. 70, Smithbrook Kilns, Cranleigh, Surrey, England	
Conformity criteria:	*Conducted emissions:*	EN55011:1991 Group 1 Class A
	Radiated emissions:	EN55011:1991 Group 1 Class A
	Radiated immunity:	prEN50082-2:1992
	Electrostatic discharge:	prEN50082-2:1992
	Fast transient/burst immunity:	prEN50082-2:1992

Appendix C User codes

Certain operations on the Hydro Control IV have restricted access and may only be executed using the correct user code.
There are four levels of access to the system as shown below with the appropriate user code:

Operator:	**No code required**
Supervisor:	**11111**
Engineer:	**141421**
Back-up/Restore:	**31415**

You may like to remove this page from the manual for security reasons.

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