

MINIMIX

User manual

MCR
PROCÉDÉS &
TECHNOLOGIES

Dear Customer,

Thank you for purchasing the **Minimix**. We want to make sure that you received the instrument in good order and that you do not have any problems with the initial operation.

After many years of process follow-up and troubleshooting in collaboration with wastewater treatment plant operators, **MCR Process & Technology** has developed new tools to assist operators in their daily tasks. The Minimix is one of these tools, and was designed to meet a need for portable jar tests.

We hope you will be pleased with the operation and performance of your new instrument. If you have any problems related to the operation or questions about the instrument, call us at 1-418-650-9154.

Thank you for letting us serve you.

Sincerely,

Alain Durocher, Eng.
President

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Quebec (Qc) G1Y 1R6

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1 INTRODUCTION

The jar test is an old water treatment test procedure, first introduced in the 1930s. It has remained essentially unchanged since then, although there have been various refinements such as increased mixing speeds and the use of square jars instead of cylindrical beakers.

As basic as the jar test may be, it remains one of the best methods of assessing and optimizing the various processes and options available for treatment of potable and other types of water and wastewater.

Properly done, it can provide a great deal of information during all phases of a treatment system's development - initial process screening and development, equipment sizing, operational optimization, troubleshooting, settling aids evaluation on secondary clarifier and evaluation of potential alternative treatment processes. All this can be achieved at relatively little cost, and without the need for a great deal of high-tech knowledge and expertise.

However, unlike most analytical procedures used in the water and wastewater supply industry, there is no standardization of jar testing procedures and the results are almost always open to different interpretations and conclusions. Therefore, a great deal of thought and care, as well as more than a little experience, is essential if the jar test procedure is to achieve its full potential.

Equipment for conducting jar tests has been available for a long time, but most of the available units tend to be bulky, heavy, and subject to various operating problems. MCR offers several jar testing systems, each intended for a different purpose. The Minimix is specifically designed for very small size, light weight, portability and ease of operation.

It is not the intent of this manual to discuss in detail all the various planning, objectives, calculations, procedures, and other considerations that are involved in conducting a jar test; this information is available from many different sources. Rather, the intent is to describe the aspects of the procedures that are specific to the Minimix.

2 SHIPPING INSPECTION

At the reception, inspect the contents to ensure that no damage occurred during shipment. If damage is present, save shipping box in case damage claim is necessary. Any damage in shipment should be reported immediately.

2.1 Packing list

The items listed below should be included in the Minimix shipping carton. Please check that all items are present and undamaged, and contact MCR if there is a problem.

1. Minimix mixer unit with control panel.
2. Sample container (jar) assembly, with 4 compartments.
3. Four of each: 1-3-5-10 mL syringe
4. Plug-in universal power supply (wall transformer) with cord.
5. Foam-lined carrying case.
6. Illumination base (**optional**).
7. Sampling ports (**optional**): Four of each: 50 mL beaker, threaded adapter, stopcock, cap, tubing adapter, tubing.
8. Other options if bought.

2.2 Shipping tape

To prevent the possibility of parts becoming separated, moving around in the carrying case, and damaging each other, the Minimix is shipped with the main mixer assembly and the jar module taped together. Remove this tape after unpacking for the first time.

For transportation in your vehicle, the Minimix can be put safely inside its padded case without this shipping tape provided minimal precautions should be used when handling.

Unfortunately, our experience of commercial couriers or when the case is transported in the cargo space of an aircraft shows that the package may be subject to constraints that can destroy or damage the briefcase and its contents. Therefore, it would probably be wise to consider retaping the two main parts if the Minimix is to be shipped by a commercial courier. For transportation in the cargo space of an aircraft we recommend the use of a more robust case and designed for this purpose.

2.3 Serial number

Each Minimix has a unique four-digit serial number. This can be found on the back of the mixer unit, immediately near the power jack.

3 DO'S AND DON'TS

3.1 Do's

- Please read the entire manual before attempting to unpack, set up, or operate the equipment and pay attention to all the warnings, cautions and notes. Failure to do so may result in injury to the operator or damage to the equipment.
- Handle the equipment with care;
- Always use this equipment indoor and preferably in a non humid and non corrosive air environment;
- Remove power before any manipulation of the apparatus or cleaning operation;
- The Minimix mixer unit is designed to operate from a 12 volt DC power source. The system is supplied with a plug-in power supply unit which provides 12V DC from any AC electrical outlet. If an alternative power source is used, be sure that the mixer unit receives only 12V DC, with positive to the center pin of the jack.
- Use only non-abrasive cleaners for plastics.
- The unit should be placed in its carrying case so that it is upright (not upside down) when being carried by the handle in the normal way. This means that the top of the unit should be nearest the handle (bottom towards the case hinge).
- Stopcocks must be removed from the jars before closing the lid of the carrying case. This takes only a few seconds. If the stopcocks are not removed, they could easily be damaged by closing the lid on them.
- Initial verification. Check the following items:
 - Water tightness of the acrylic jar assembly;
 - The light from the illumination base come on;
 - Motor is working and paddles are moving correctly.

3.2 Don'ts

- Do not submerge this equipment; The Minimix operates on low voltage DC power and is therefore very safe electrically. However, take care to avoid submerging the unit or subjecting it to unnecessary amounts of water - this can damage internal components or interfere with their operation. If water does enter the unit, immediately disconnect the equipment from the power supply and leave it to drain and dry out completely.
- Do not rinse or clean the equipment with water over 35°C. Hot water may cause damage to the acrylic and graduated scales finish and can loosen the joints.
- Do not hold the paddles while they are turning, or in any other way try to stop them from rotating. Do not try to rotate the paddles by hand. This could cause injury or damage the drive mechanism.

Warning

- The Minimix system is intended for use with samples having a water-like consistency (raw potable water, wastewater, mixed liquor, sludge to dewatering system at maximum 3% consistency, polymer solution to maximum 0,5% solids).
- Do not attempt to operate it with highly viscous liquids (like crude oil, molasses, high viscosity polymers, etc.) or very thick sludge. Doing so could overload and damage the drive system.
- Minimix is also set up with all four paddles having the same alignment (in a straight line for look). Of course, it makes no difference at all to the jar test itself if the paddles are aligned or not.
- If there is a significant force on any of the paddles (by mixing a very viscous sample, jamming a paddle somehow, or any one of several other possibilities) they may well move relative to each other.
- As long as the mixer is still running smoothly and with no other issues, then there is almost certainly no problem. It is far better to have a little movements, than to build everything rock solid and then have something break, bend, or otherwise become damaged if there is some kind of overload such as a paddle jamming. This is almost like a kind of built-in safety valve.

4 PART IDENTIFICATION AND EQUIPMENT DESCRIPTION

4.1 Part identification

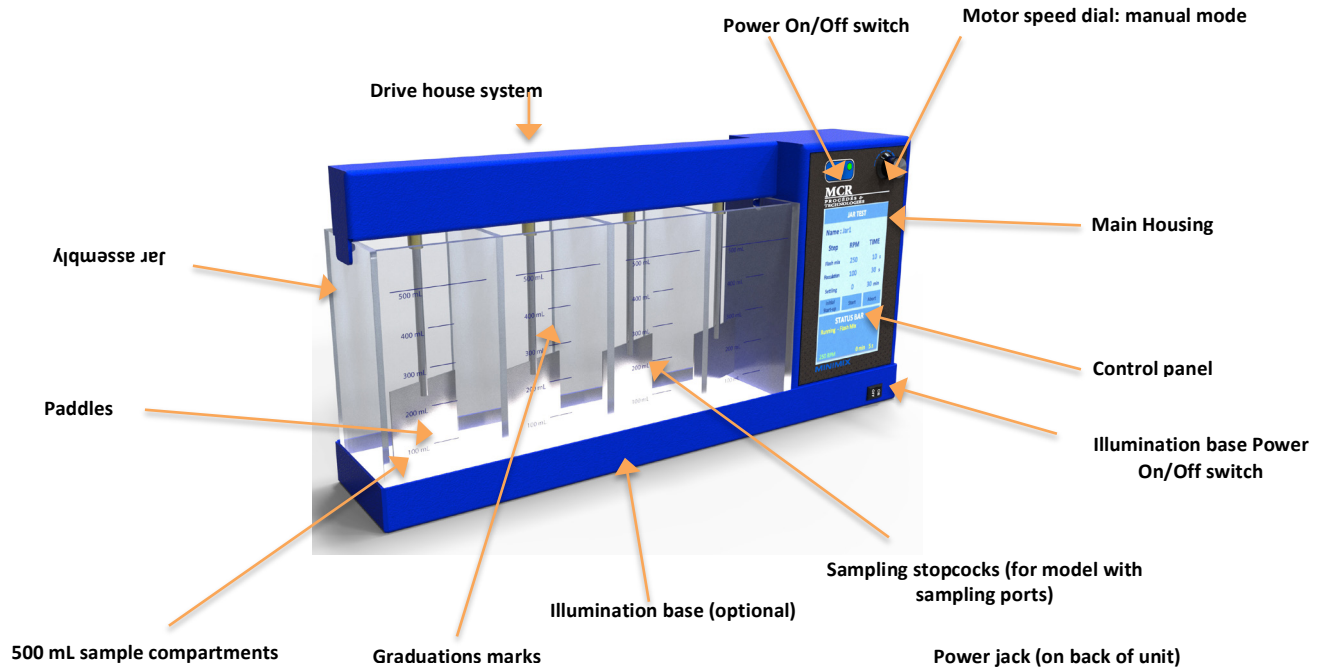


Figure 4.1 : Minimix main components

4.2 EQUIPMENT DESCRIPTION

The Minimix is constructed from the same high-quality materials used in our other systems - epoxy coated aluminum housings, stainless steel paddles and shafts, long-lasting nylon gears, lubricated oil-impregnated bronze bearings, and clear acrylic jar assembly.

Even if the Minimix has a high torque motor there is always a limit. Minimix was designed to run jar test on potable water, wastewaters, primary and secondary sludge and polymer preparation. While it may be possible to use it successfully for other purposes, it is not designed for use with samples that have characteristics significantly different from those of water. In particular, it should not be used with very thick sludge or highly viscous materials. Doing so could overload the drive system and damage mechanical or electrical components. Similarly, it should not be subjected to extremely harsh or corrosive environmental conditions, such as are sometimes found in industrial situations.

If your application differs, please contact us to see if you can use the Minimix; otherwise the warranty will not apply.

4.2.1 Main components

The figure 4.1 shows the main features of the Minimix system. The Minimix system consists of five main components:

1. The mixer unit;
2. The integrated four-jar sample assembly (sampling ports optional);
3. The control panel and power supply;
4. An illumination base (optional);
5. A padded carrying case for storing and transporting the equipment.

4.2.2 Mixer unit

The mixer unit is made up of two main parts:

Main housing

This enclosure contains:

1. The mixer drive motor;
2. Its coupling to the paddle drive shaft;
3. The speed control circuit board;
4. The power on/off switch;
5. The manual speed adjustment control.

The housing also has a power jack on the rear (for connection to a 12V DC power source). Access to the inside of the housing is by removing the screws holding the end panel on the right side of the housing.

Drive system housing

The basic structure consists of an aluminum housing with rear cover plate. It also contains bearings for the main drive shaft and a bearing for each of the four paddle shafts. The four paddle shafts are coupled to the main drive shaft by nylon miter gears.

The mixer unit is simply placed on top of jar assembly that was placed before on the illumination base. The mixer stay in place, and the whole assembly can be lifted and moved about if desired. There is no need to manipulate individual paddles.

4.2.3 Jar assembly

The jar assembly is constructed from clear acrylic sheet and contains four sample compartments with graduation marks at the 100-200-300-400-500 mL level.

As set of 4 dosing syringes of 1-3-5-10 mL is provided.

Sampling ports system (optional)

The jar assembly is supplied (optional) with the threaded adapters already in the sample ports on the front of the jar assembly. If not, insert them and tighten snugly (do not overtighten). These adapters are normally left permanently in position.

For subsurface sampling (mostly for potable water), each jar is supplied (optional) with:

1. a sampling stopcock which attaches to the threaded adapter;
2. a flexible sampling tube with connector;
3. a 50 mL beaker;
4. and a cap that can be used in place of the stopcock when subsurface sampling is not required.

Additional jar assemblies and fittings are available separately.

4.2.4 Control panel

The Minimix can be powered from any 12V DC supply, through a standard power jack on the rear of the unit. The input power jack on the Minimix is designed to accept a plug with a 2.1 mm inside diameter, 5.5 mm outside diameter, and 12 mm barrel length.

Normally, this power would be provided by the 12V DC plug-in wall transformer supplied with the system. This transformer is designed to operate with input AC power from 100 to 240 volts, 50 to 60 Hz. It comes with a Qualtek or equivalent power cord selected at the moment of the order to suit your outlet configuration (North America, Europe, the UK, and Australia). Most countries use one of these standard configurations, so the Minimix power supply can be used directly in nearly every country in the world without the need for adapters of any kind.

For those countries with different electrical outlet configurations, it will be necessary for the user to supply either a plug style adapter (you can see the Adaptec website for help), or a different transformer to suit local conditions. These are easily available nearly everywhere, at very low cost. Any new transformer to be used should have an output of 12 volts DC (unregulated) at 5,4A (a higher current rating would be OK but is not necessary). Be sure that the output plug has the center pin positive.

Controls for the Minimix can be as simple as they could be:

- A power on/off switch on front of the panel with a green light when on;

- A manual mixer speed adjustment control;
- A LCD with automatic control of the entire sequence (see complete details in Chapter 5)
 - o Jar test sequence (flash mix, flocculation and settling)
 - o Polymer preparation sequence (Dissolution and aging)
 - o Sequences are programmable and can be stored.
 - o For each step, motor rpm and time can be adjusted

4.2.5 Illumination base (optional)

Proper illumination is essential for visual observation of each jar test step of the samples being tested. The Minimix system incorporates a high-efficiency LED system for illumination of the base and samples. With an On\Off button on the front panel, the illumination base can be turned On or off when you want.

4.2.6 Carrying case

The Minimix is normally supplied in a rugged lightweight molded plastic carrying case. For those who are flying a lot and not interested in carrying a jar tester unit in the plane we recommend the airplane carrying case (in option) that is more robust than the base model.

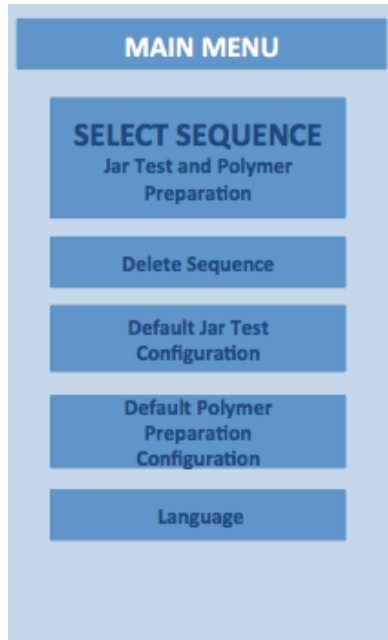
The case is padded to hold the mixer unit, jar assembly, illumination base and power supply with space left over for the other accessories (dosing syringes, sample containers, tubes). For chemicals, and unless they are dry solid products, we recommend carrying them separately to avoid risks that a spill will damage the Minimix.

The carrying case is similar in size to an ordinary briefcase, about 19" x 15,5" x 7,5". The carrying case with the Minimix and typical accessories weight less than 13,4 lbs (6,1 kg).

5 MINIMIX CONTROL PANEL OPERATION

5.1 Start Up

5.1.1 Powering the instrument

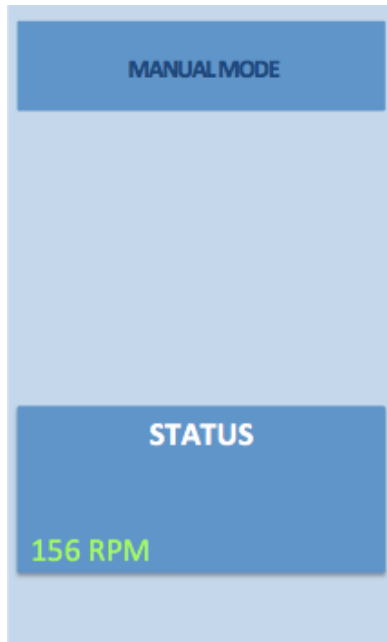


1. Plug the external power supply into an electrical outlet.
2. Press the On/Off switch for approximately one second to power on the instrument.
3. Press the On/Off Switch for 3 to 5 seconds to turn the instruments off.
4. When the instrument is turned ON, the **MAIN MENU** appears.

5.1.2 Choosing the operating Mode

The Mimimix comes with two separate modes of operation: **Manual mode** or **Programmable mode**.

5.1.3 Manual mode

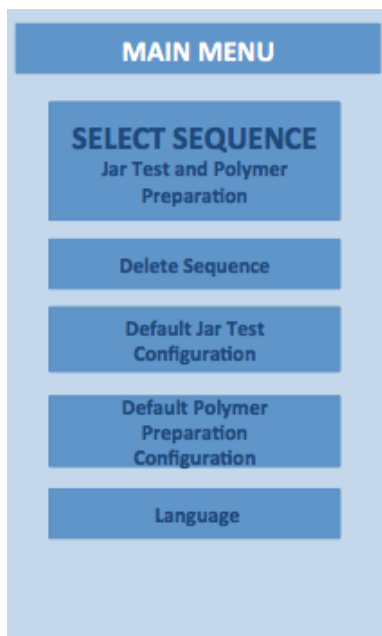


The **Manual mode** allows operating the mixing, regardless of the sequence of the basic programmed sequence (Flash mix, flocculation and settling). The user controls the speed and time that he wants to allow to each step of the test.

To enter in **Manual mode** you just have to turn the **Motor Speed Dial** button clockwise and the motor speed increases in RPM. The screen passed in **Manual mode** and indicates the speed of rotation of the motor.

In manual mode, the access to the **Programmable mode** is not possible. To pass to the **Programmable mode**, you must close the RPM completely of the motor by turning the knob counter clockwise and the Minimix automatically switched in **Programmable mode**.

5.1.4 Programmable mode



In **Programmable mode** the following actions are available from the **Main menu**:

- Select a Jar test or a Polymer preparation sequence;
- Delete a sequence;
- Change the basic settings of a Jar Test or Preparation polymer sequence;
- Choose language.

5.2 Standard Operations in programmable mode

5.2.1 Getting started

5.2.1.1 Tips for using the touch screen

The whole screen responds to touch. To choose an option, tap with a fingernail, fingertip, an eraser or a specialized stylus. Do not touch the screen with sharp objects, such as the tip of a ballpoint pen.

- Press buttons, words or icons to select them.

5.2.1.2 Language selection



The Minimix software includes two language options.

1. Select **Language** in the **Main menu**, the language available will appear.
2. Chose the language you want.
3. Then the instrument will return to the **Main menu** in the language you chose.

Once the language is selected, the instrument will power up in that language until a different language is selected.

5.2.1.3 Use of the alphanumeric keypad



This display is used to enter letters, numbers and symbols as needed when programming the instrument. Unavailable options are disabled (grayed out). The icons on the right and left of the screen are described in Table 1.






The central keypad changes to reflect the chosen entry mode. Press a key repeatedly until the desired character appears on the screen. Using the underscore on the YZ_ key can enter a space.

Press **Cancel** to cancel an entry, or press **OK** to confirm an entry.

Table 5.1 : Alphanumeric keypad

Icon / key	Description	Function
ABC/abc	Alphabetic	Toggles the character input mode between upper and lower case.
123	Numeric	For entering regular numbers.
CE	Clear Entry	Clear the entry.
<<<	Back	Deletes the current character and goes back one position.
>>>	Next	Navigates to the next space in an entry.

For the use of the alphanumerical keypad, say you want to assign to a sequence name "Quebec 01":

- To type the letter Q, is pressed twice on the button , then the Q is done,
- Let do the "u", to access the lowercase, Press on , then all the letters go in lowercase.
- Then continue entering the name with lowercase letters by pressing  3 times, then the 'u' is also done and so on for the letters.
- To enter numbers, press , the keyboard becomes digital. Press "01" and you want to return to the alphanumeric keypad and press on .

5.2.2 Instrument setup mode

The Minimix comes with default settings. These can be changed for the numbers the user wishes to use.

5.2.2.1 Setting the default Jar Test configuration

Step	RPM	TIME
Flash Mix	300	10 s
Flocculation	30	30 s
Settling	0	30 min

Main Menu Save Reset Default

1. Select **Default sequence Jar Test Configuration** in the **Main menu**.
2. The following screen will appear.
3. Use the alphanumeric keypad to enter for each **Step** – Flash mix, flocculation and setting - the **RPM** and the **TIME** as desired number.
4. Then after press **OK**.

The maximum RPM allowed is 320. If you try to select more than 320 RPM, the following message will appear.

MAXIMUM RPM IS 320

The minimum RPM allowed is 35. If you try to select less than 35 RPM, the following message will appear.

MINIMUM RPM IS 30

Step	RPM	TIME
Flash Mix		10 s
Flocculation	30	30 s
Settling	0	30 min

CANCEL OK

5. To save the new parameters press **Save**.
6. **SAVED values** will appear on the screen.

*Then, all sequences name as **Default**, will be re-initialized based on the new desired configuration setting.*

Once this configuration is done, the instrument will power up with the new data until a different configuration is enter.

7. If you want to come back to the default parameter, just press the **Reset Default** button.
8. **RESTORING TO DEFAULT** will appear on the screen.

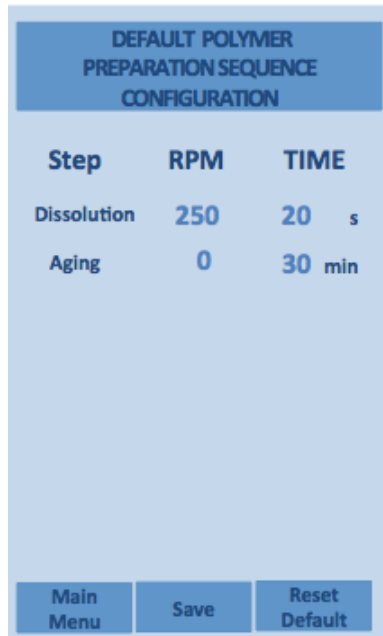
For each step, the default parameters are:

Flash Mix: 300 RPM 10 s.

Flocculation : 30 RPM 30 s.

Settling: 0 RPM 30 min.

5.2.2.2 Setting the default Polymer preparation configuration



1. Select **Default sequence Jar Test configuration** in the **Main menu**.
2. The following screen will appear.
3. Use the alphanumeric keypad to enter for each **Step** – Dissolution and Aging - the **RPM** and the **TIME** a desired number.
4. Then after press **OK**.
5. To save the new parameters press **Save**.
6. **SAVED values** will appear on the screen.

Once this configuration is done, the instrument will power up with the new data until a different configuration is enter.

7. If you want to come back to the default parameter, just press the **Reset Default** button.
8. **RESTORING TO DEFAULT** will appear on the screen.

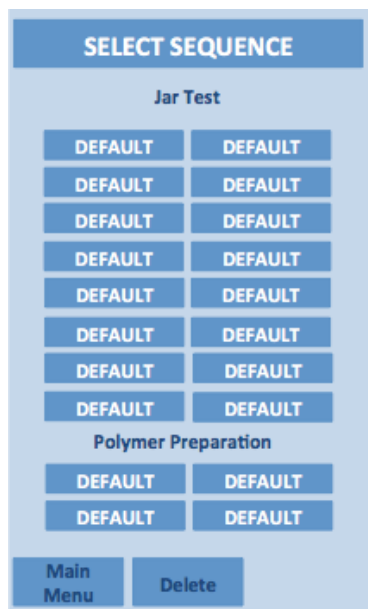
For each step, the default parameters are:

Dissolution: 180 RPM 60 s.
Aging: 0 RPM 30 min.

5.2.3 Running a Jar Test

The Minimix let you do 16 programmable Jar test sequences that you can access thought the **Select Sequence** from the **Main menu**.

5.2.3.1 Selecting a Stored Jar Test Sequence



1. From the **Main Menu**, press **Select Sequence – Jar Test and Polymer preparation** to view a list of the programmable sequences.
2. Select the sequence you wish to use by pressing the button.

*Buttons containing registration **Default**, etc. contains the basic parameters of the system.*

JAR TEST		
Name : DEFAULT		
Step	RPM	TIME
Flash mix	300	3 s
Flocculation	100	30 s
Settling	0	30 min
Initial Start up	Start	Abort
STATUS BAR		
If Parameters OK Press INITIAL STARTUP and wait		
Main Menu	Save	Select

From the window of a sequence you can also select a new sequence, by pressing **Select**. This is not possible when a sequence is running; the sequence must be interrupt before, by pressing **Abort**.

5.2.3.2 Running a sequence

JAR TEST		
Name : DEFAULT		
Step	RPM	TIME
Flash mix	300	3 s
Flocculation	100	30 s
Settling	0	30 min
Initial Start up	Start	Abort
STATUS BAR		
If Parameters OK Press INITIAL STARTUP and wait		
Main Menu	Save	Select

1. The selected sequence appears as beside.
2. Status Bar shows: **If parameters OK**
3. If yes, **Press INITIAL START UP and wait**
4. Otherwise, modify your parameters as indicated hereafter.

FLASH MIX RPM CONFIGURATION		
NAME :	DEFAULT	
Step	RPM	TIME
Flash Mix		10 s
Flocculation	30	30 s
Settling	0	30 min

7	8	9	CE
4	5	6	<<<
0	1	2	3

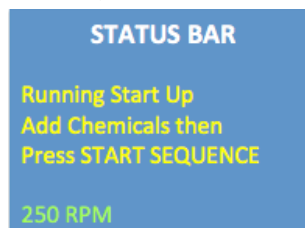
CANCEL

OK

- The operator can change the sequence. If he wants, for example, change the RPM of Flash mix from 300 RPM to to 250 RPM, he just have to touch the numbers of the RPM and a window will open with alphanumeric keys to change it.
- Once the value is changed, Press **OK**.

The first time a parameter is change from a default one, the Minimix will ask to save it as a new sequence (see section 5.2.4). If you do not want to immediately save it, press CANCEL, otherwise refer to section 5.2.4.

- Once all the parameters set, start the sequence by pressing **Initial Start Up**, then the mixing will begin.
- The Status Bar then shows the progression of the speed in RPM
- When the speed reaches the specified RPM for the Flash mix, the Status bar displays



This indicates that the device is ready to begin the sequence.

- Add quickly the chemicals to each cell.
- Then press **Start**, and the sequence starts.

JAR TEST

Name : Jar1

Step	RPM	TIME
Flash mix	250	10 s
Flocculation	100	30 s
Settling	0	30 min

Initial Start-up Start Abort

STATUS BAR
Running - Flash Mix

250 RPM 0 min 5 s

Main Menu Save Select

12. Status bar indicates where it is rendered in the sequence, Flash mix, Flocculation, settling, with the RPM and time. It is indicated for minute-second.

Between each step the Minimix makes a beeping sound.

JAR TEST

Name : Jar1

Step	RPM	TIME
Flash mix	250	10 s
Flocculation	100	30 s
Settling	0	30 min

Initial Start-up Start Abort

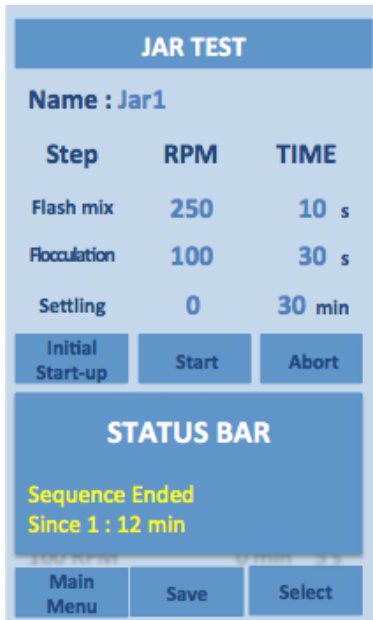
STATUS BAR
Running - Flocculation

100 RPM 0 min 5 s

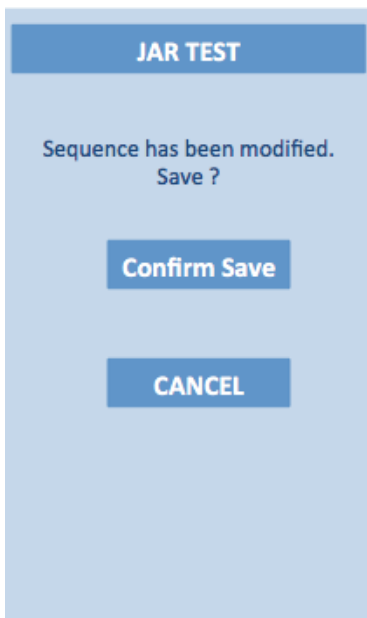
Main Menu Save Select

13. During the settling step the timer beep each 5 minutes.

14. At the end of the sequence, the buzzer beep three times to indicate that the sequence is completed.



15. The Status Bar show "Sequence ended". The RPM and the timer indicate zero.
16. A timer on the screen indicates since when the sequence is completed.



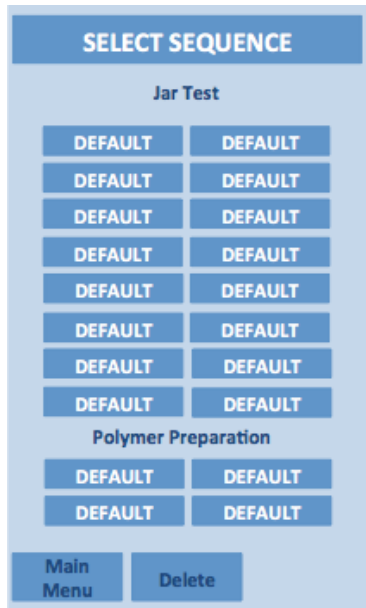
17. When the user presses **Main menu** or **Select sequence** and that a test value has been changed (Name, RPM or TIME) since the last **Save sequence**, a window asks the user if he wants to save before changing the menu.
18. If you press **Confirm Save**, **SAVING** will appear on the screen.
19. If you do not want to immediately save it, press **CANCEL**.

*While a sequence is running, the only button that is active is the **Abort** button that allows interrupting the current running sequence.*

5.2.4 Running a polymer preparation

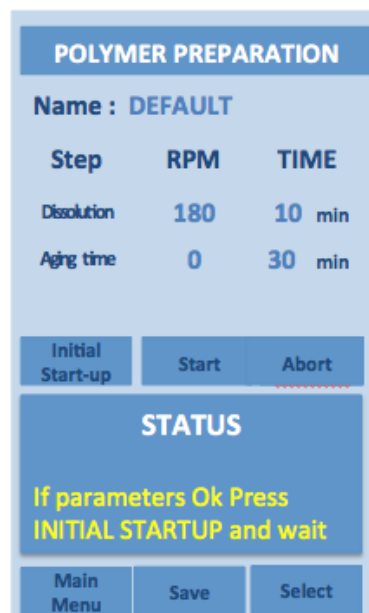
The Minimix allows you 4 programmable polymer preparation sequences that you can access through the **Select Sequence** menu.

5.2.4.1 Selecting a Stored Polymer preparation Sequence



1. From the **Main Menu**, press **Select Sequence – Jar Test and Polymer preparation** to view a list of the programmable sequences.
2. Select the sequence you wish to use by pressing the button.

*Buttons containing registration **Default**, etc. contains the basic parameters of the system.*



*From the window of a running sequence you can also select a new sequence, by pressing **Select**. This is not possible when a sequence is running; the sequence must be interrupted before, by pressing **Abort**.*

5.2.4.2 Running a sequence

POLYMER PREPARATION

Name : DEFAULT

Step	RPM	TIME
Disolution	180	10 min
Aging time	0	30 min

Initial Start-up
Start
Abort

STATUS

If parameters Ok Press INITIAL STARTUP and wait

Main Menu
Save
Select

DISSOLUTION RPM CONFIGURATION

NAME : DEFAULT

Step	RPM	TIME
Dissolution		60 s
Aging	0	30 min

|

7	8	9	CE
4	5	6	<<<
0	1	2	3

CANCEL
OK

1. The sequence appears as beside.
2. Status Bar show: **If parameters OK Press INITIAL START UP and wait.**

3. The operator can change the sequence. If he wants, for example, change the RPM of Dissolution from 180 RPM to 180 RPM, he just have to touch the numbers of the RPM and a window will open with alphanumeric keys to change it.
4. Then Press **OK**.

The first time a parameter is change from a default one, the Minimix will ask to save it as a new sequence (see section 5.2.5). If you do not want to immediately save it, press CANCEL, otherwise refer to section 5.2.5.

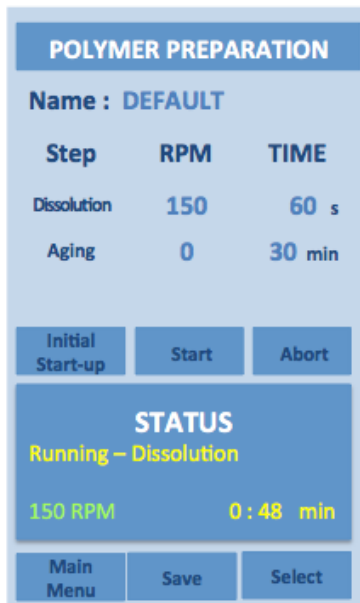
5. Once all the parameters set, start the sequence by pressing **Initial Start Up**, then the mixing will begin.
6. The Status Bar then shows the progression of the speed in RPM
7. When the speed reaches the specified RPM for the Flash mix, the Status bar displays

STATUS

Running Start Up
Add Chemicals then
Press START SEQUENCE

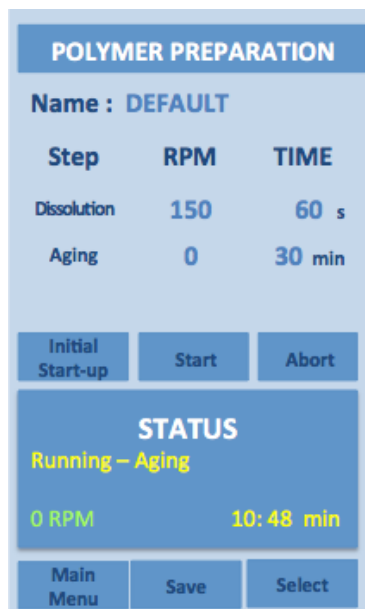
150 RPM

This indicates that the device is ready to begin the sequence.

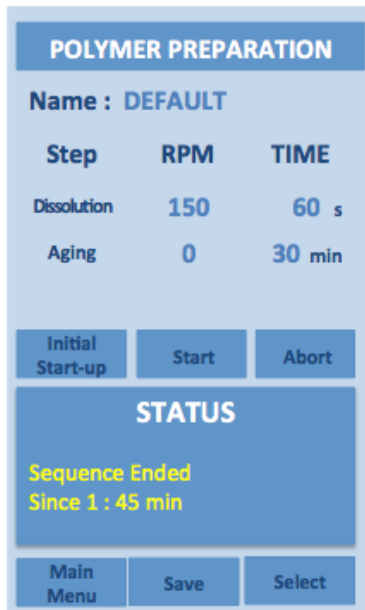


8. Add the chemicals to each cell.
9. Then press **Start**, and the sequence starts.
10. Status bar indicates where it is rendered in the sequence, Flash mix, Flocculation, settling, with the RPM and time. It is indicated for minute-second.

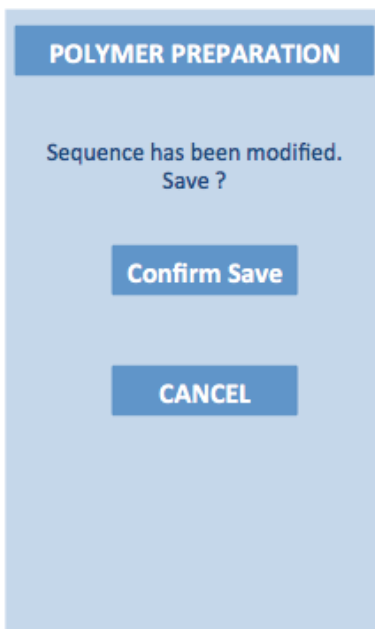
Between each step the Minimix makes a beeping sound.



11. At the end of the sequence, the buzzer beep three times to indicate that the sequence is completed.



12. The Status Bar show "**Sequence ended.**" The RPM and the timer indicate zero.
13. A timer on the screen indicates since when the sequence is completed.



14. When the user presses **Main menu** or **Select sequence** and that a test value has been changed (Name, RPM or TIME) since the last **Save sequence**, a window asks the user if he wants to save before changing the menu.
15. If you press **Confirm Save**, **SAVING** will appear on the screen.
16. If you do not want to immediately save it, press **CANCEL**.

*While a sequence is running, the only button that is active is the **Abort** button that allows interrupting the current running sequence.*

5.2.5 Saving a sequence

Step	RPM	TIME
Flash Mix	250	10 s
Flocculation	30	30 s
Settling	0	30 min

To save the sequence that just ended:

1. Press **Save**, the following screen will appear,

This window will also appear each times that the Minimix asks to save a sequence just being modified.

2. Using the alphanumeric key enter the name of the sequence as describe at section 5.2.1.3,
3. Press **OK**. The name will appear in the top of the sequence.

5.2.6 Aborting a sequence

Step	RPM	TIME
Flash mix	300	3 s
Flocculation	100	30 s
Settling	0	30 min

While a sequence is running, if need to interrupt a sequence:

1. Press **Abort**, the following screen will appear,
2. Then the mixing stop.

The Minimix is then ready to restart the sequence. The system keeps the previous requested settings. For example, if a flash mix of 250 RPM for 10 secs was set instead of basic setting at 300 RPM for 3 seconds, it will be maintained. If the operator had selected a sequence, witch already been modified then it will keep this sequence.

5.2.7 Back to main menu

At any time you can reach the **Main menu** by pressing **Main Menu**.

6 JAR TEST PROCEDURE

6.1 General

The basic objective of the jar testing procedure is to simulate, as far as is practical, the processes that are being, or might be, used in a full-scale treatment plant. Because there are fundamental differences between batch and continuous flow processes, the jar test does have its limitations. Nevertheless, it can prove very useful as a simple, rapid, and economical means of evaluating how well proposed water treatment processes can be expected to work, and in determining certain process parameters such as chemical dosages and reaction times.

Of course, each situation will be unique, with its own circumstances and objectives. Therefore, only a simplified, general test procedure can be given; this must be modified as required by the specific situation.

6.2 Material

- Minimix and accessories
- Bucket;
- Paddle.
- Thermometer.

6.3 Reagents

- Reagents to test.

6.4 Sampling and storage

6.4.1 Sampling

- Take a grab or composite sample. Be sure that the sample will be taken in zone where it will be representative of the process you want to simulate.

6.4.2 Storage

- The test should be done as soon as possible after sampling.
- No storage possible without affecting the results.

6.5 Suggested basic jar test procedure

1. Sample water or the liquid to be subjected to the test.
2. Fill the jars to the 500 mL mark with the water being tested.
3. Place the jar assembly over the illumination base;
4. Then put the mixer in position on top of the jar assembly. The whole assembly can now be lifted and moved about as desired.
5. For each of the test stations being used, fill syringes with the appropriate amount of stock chemical (such as alum coagulant and/or polymer).
6. Start the automatic sequence as presented in Chapter 5, or use the manual mode.
7. For the automatic sequence (see Chapter 5)
 - a. Choose:
 - i. Motor speed and duration of Flash mix
 - ii. Motor speed and duration of the flocculation
 - iii. Settling time
 - b. Start the sequence
 - c. Inject the chemicals into the jars.
 - i. It should be easily possible to dose all jars within one or two seconds of each other.
Inject chemicals
 - d. Let the sequence unfold automatically.
8. For the manual mode sequence
 - a. Choose:
 - i. Motor speed and duration of Flash mix
 - ii. Motor speed and duration of the flocculation
 - iii. Settling time
 - b. Start the mixer motor and set it to the desired speed on the control panel dial; usually 300 rpm for the flash mix stage.
 - i. Note: For simulation of the short, high-intensity “flash mixing” often used in coagulant addition, the mixer speed should be reduced after a time corresponding as closely as possible to the actual mixing time that would be used in a full-scale plant. In many cases, this would be almost immediately after coagulant addition.
 - c. Inject the chemicals into the jars.
 - i. It should be easily possible to dose all jars within one or two seconds of each other.
 - d. Set the mixer speed to provide the mixing intensity desired for the flocculation stage at the low speeds (30 to 100 rpm) where most jar testing work is carried out.
 - e. After completion of the flocculation stage, allow the contents of the jars to settle for the desired periods.
9. Carry out visual observations for each step (floc formation speed, floc size, etc.)
10. At the end of the settling period, process to sampling of the supernatant and laboratory analysis as desired.

6.6 Interferences

- Variations in suspension temperature, sampling and agitation methods, and time between sampling and start of the determination significantly affect the results;
- Avoid sun exposure during the test.

6.7 Recommendations

- Stir the initial sample to be sure it is representative.

6.8 Safety

- Use laboratory gloves;
- Wash your hands after testing is ended.

7 MAINTENANCE

7.1 General

The Minimix requires very little maintenance, other than cleaning and occasional minor lubrication.

7.2 Cleaning

The unit should be cleaned up immediately after each run, particularly the jars. If solids such as floc are allowed to dry out on component surfaces, they may be much more difficult to remove later.

Always clean with a non-abrasive cleaner for plastics with a brush having soft bristles. Avoid using brushes with hard bristles that could scratch the inside of the plastic surfaces.

Rinse with clean water, or wipe down with a damp cloth, as appropriate. Do not use organic solvents such as acetone or alcohol, which may damage plastic surfaces or paint finishes.

7.3 Lubrication

All bearings in the Minimix are oil-impregnated bronze, and should require lubrication only very occasionally. If the mixer seems rough or noisy, a small amount of light oil can be applied to the paddle shaft bearings.

7.4 Tools

No special tools are needed for operation and maintenance of the Minimix.

8 WARRANTY

What we cover:

MCR warrants its instruments and accessories to be free from defects in materials and workmanship under normal use and service for a period of 12 months from the date of shipment from MCR. If you experience any problems with our products, just phone, fax, email, or write and we will make every effort to resolve the matter to your satisfaction.

If your instrument becomes defective within one year of purchase, MCR will repair or replace your instrument free of charge, including surface shipping costs.

What we do not cover:

MCR is not responsible for replacing parts damaged by accident or neglect. Your instrument must be installed and operated according to instructions in the User's Manual. Damage from corrosion is not covered. Damage caused by customer modification of the instrument or used with visous liquid is not covered. This warranty covers only MCR products and is not extended to equipment used with our products.

Shipping: Although our instruments are built to withstand hard use, we cannot be responsible for damage incurred during shipment. Therefore, to avoid both cosmetic and structural damage if the instrument is shipped in the future, we recommend that you save the original packing material in which we shipped the instrument.

Obtaining Service: Please contact us for repair service. Never ship an instrument to us without prior telephone or written contact. Often the problem is a relatively simple one that you can solve yourself with our direction.

If it is determined by MCR that the instrument should be returned for repair, a Return Materials Authorization (RMA) number will be assigned and a fixed repair price quoted for out of warranty repairs.

If you are within North America pack the instrument well; insure it; write the RMA number on the outside of the shipping carton and ship it back to us. If the instrument is under warranty, we will repair or replace the unit and pay for roundtrip shipment. If the instrument is not under warranty shipping costs, both ways are your responsibility.

If you are outside North America, you are welcome to send the instrument for a free repair within the limits of the warranty. You will be responsible to pay for shipment to us, duties and documentation costs outside North America. We will pay for return shipment. If it is not under warranty, you will be responsible to pay for roundtrip shipping, duties and documentation costs outside North America.

9 SPECIFICATIONS

Items	Minimix
Basic features	
Number of stations	4
Sample volume	500 mL
Sample container (jar) volume	615 mL
Mixer speed range	30 to 300 rpm
Electrical supply (to mixer unit)	12V DC
Maximum current draw	5,0 amp
Dimensions	
Mixer/jar units, assembled	400 x 197 x 91 mm (15,75 x 7,75 x 3.6 in.)
Carrying case	425 x 305 x 108 mm (16,75 x 12.0 x 4,25 in.)
Shipping carton	500 x 180 x 390 mm (20 x 7 x 16 in.)
Weights	
Mixing unit+ illumination base	3.0 kg (6,6 lb)
Jar module with fittings	0.7 kg (1.6 lb)
Wall transformer and jar accessories	0.5 kg (1,1 lb)
Carrying case	1.4 kg (3.0 lb)
Total for equipment and carrying case	5,6 kg (12,3 lb)
Total shipping weight with carton	5.8 kg (13 lb)
Materials of construction	
Mixer unit	Aluminum and PVC, with epoxy paint coating
Paddles and shafts	Stainless steel 304
Paddle system bearings	Oil-impregnated bronze
Paddle system gears	Nylon
Sample jars	Clear acrylic
Carrying case	Molded polyethylene

10 SPARE PARTS

The following spare parts are available from MCR:

- Jar assembly with graduated scale;
- Transformer 12V;
- 304 SS paddles
- Airplane carrying case

11 TROUBLESHOOTING

Table 11.1: Troubleshooting guide

Problem	Verification	Solution
Motor not running	<ol style="list-style-type: none"> 1. The power cord is plugged in; 2. The transformer's power voltage is between 100-240 VAC and 50-60 Hz 3. The motor supply voltage is 12VDC 4. The On / OFF is in the On position 	<p>If after checking the points # 1 to # 4 the motor still does not rotate then contact us.</p>
Water leakage at the base	<ol style="list-style-type: none"> 1. Identify the location of the water leak at the base. 	<ol style="list-style-type: none"> 1. If you don't want to buy a new jar assembly <ol style="list-style-type: none"> a. Allow to acrylic jar to dry b. Repair acrylic with methylene chloride or a transparent silicone for bathtub.

12 TECHNICAL ASSISTANCE

If you have any questions about the use of this product, please contact us at:

MCR Procédés & Technologies

Phone : (418) 650-9154 (Alain Durocher)

Fax : (418) 650-6604

e-mail : adurocher@mcrpt.com