



Laboratory Equipment Manufacturer
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CRYO-20T Cryoscope User's manual



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MRC. 2.24

Cryo-20T Cryoscope User's manual

WARNINGS	7
SYMBOLS USED IN THIS MANUAL	7
FEATURES.....	8
MECHANICAL FEATURES	8
ELECTRICAL FEATURES	8
CLIMATIC FEATURES, STORAGE, PACKAGING AND USE.....	8
STARTER KIT	9
SAFETY DEVICES	9
EMERGENCY PUSHBUTTON.....	9
ELECTRICAL CONNECTION.....	10
INSTALLATION.....	10
MAIN MENU	14
A. Information/warning bar	14
B. Tool bar	14
C. Main Frame.....	14
KEYBOARD.....	18
A. Numeric Keyboard.....	18
B. Alphanumeric Keyboard	19
PASSWORD.....	20
ANALYSIS AND CALIBRATION	22
PREPARATION OF SAMPLES.....	22

STARTING ANALYSIS FRAME	22
ANALYSIS FRAME	23
SETTING THE NUMBER OF TEST TUBES.....	25
SETTING THE SAMPLES IDS	25
A. How to insert IDs manually	25
B. How to insert IDs with a barcode reader	25
SELECTING THE CALIBRATION CURVE	26
A. ISO Calibration	26
B. Lactose-Free Calibration	26
MODIFYING THE CALIBRATION POINTS (LACTOSE-FREE).....	26
ANALYSIS OF STANDARD / CALIBRATION LIQUIDS	27
ANALYSIS OF MILK SAMPLES	28
RAPID START.....	29
PREVENTIVE MEASURES FOR THE CALIBRATION PROCESS.....	29
CALIBRATION	30
CALIBRATION OF ISO CURVE	30
A. Standard Calibration by using -408.0 m°C	30
B. Standard Calibration by using -600.0 m°C	31
C. Check the calibration by using -512.0 m°C standard	32
CALIBRATION OF LACTOSE-FREE CURVE	33
A. Calibration by using the higher standard.....	33
B. Calibration by using the lower standard	34
C. Calibration check by using the check standard	34
LINEARITY ADJUSTMENT	35
HANDLING THE ARCHIVES	36
DOWNLOAD OF THE DATA ANALYSIS / ALARMS ON THE PEN DRIVE	36
A. Connecting the pen drive.....	37
B. Transferring the data on the pen drive	37
C. Downloading the alarm list on the pen drive	38

HOW TO DELETE THE ARCHIVES.....	38
A. How to delete the analysis list.....	38
B. How to delete the alarm list	39
CONNECTION OF THE CRYOSCOPE TO A PERSONAL COMPUTER.....	39
BARCODE READER	40
BARCODES	40
MENU	41
INFORMATION MENU	41
SETTING MENU	43
MILK SELECTION MENU	45
CALIBRATION THERMISTOR MENU.....	47
CRYOSCOPY LIST MENU.....	49
A. Analysis details.....	50
ALARM LIST MENU	52
A. Alarm detail	53
AGITATION MENU	54
ALARMS	55
ALARM WARNING AND CANCELLATION	55
ALARM LIST	57
COOLING LIQUID ERROR MESSAGE.....	58
“CHECK TEST TUBE” MESSAGE	59
STIRRER ADJUSTMENT	60
AGITATION.....	60
A. Check.....	60
B. Agitation Adjustments	61
FREEZING STROKE.....	61
A. Check.....	61
B. Freezing Stroke Adjustments.....	61
HOW TO PROTECT THE THERMISTOR.....	62

ORDINARY MAINTANANCE	63
CAROUSEL REMOVAL	63
EQUIPMENT CLEANING	64
CHECK AND SUBSTITUTION OF THE COOLING LIQUID	64
CHECK AND SUBSTITUTION OF THE FILTER	66
HOW TO CLEAN THE FILTER	67
DAILY MAINTENANCE	68
EXTRAORDINARY MAINTENANCE	69
TUBE BREAKAGE.....	69
HOW TO MOVE AND SHIP THE CRYOSCOPE	70
MOVING THE CRYOSCOPE	70
SHIPPING THE CRYOSCOPE	70
MAIN SPAREPARTS	72
COOLING BATH	72
HEAD	72
WELL	72
READING THERMISTOR	73
STIRRER	73
SPRING	73
PHOTOCELL	74
REAR PANEL	75
DRAIN	76
PRINTER	76
A. Printer connection.....	77
B. Paper feeding	78
C. Change the paper roll.....	78
ACCESSORIES, CONSUMABLES AND MAIN SPARE PARTS	79
A. Accessories	79
B. Consumables	80

C. Spare parts.....	80
WARRANTY	81
DISPOSAL.....	81
COOLING BATH FORM	82
DECLARATION OF CONFORMITY	83

WARNINGS



Carefully read this User Guide before using the equipment.



This manual is an integral part of the product and must be conserved for future consultations.

Here, you can find important information regarding safety of use and maintenance.

Read carefully the instructions contained in this manual before installation, use and before processing any operation of adjustment or maintenance.



This equipment has been designed and produced for the analysis of milk samples or derivatives, calibration standard solutions and check solutions for cryoscopy.



Every use that differs from the description above will be considered as "improper use" and will invalidate the warranty.



Even if this device is provided with protections, its use without following the described procedures could produce a wrong working and damages on the equipment.



The manufacturer is not liable for damages to people or things caused by improper use of the equipment and / or not respect of the laws, regulations and instructions described below.

SYMBOLS USED IN THIS MANUAL



Carefully read the instructions contained in the manual before using the equipment.



Every action performed on the equipment must comply with the indications described in the manual.



Suggestions and clarifications for a better functioning and a correct interpretation of the information contained in the manual.



Presence of danger: injuries may occur. Please follow the instructions contained in the related paragraph.



Presence of danger: electrical shock may occur. Please follow the instructions contained in the related paragraph.



**Crush hazard.
This symbol is located on the head of the equipment and warns the user about the risk of injury.**

FEATURES

MECHANICAL FEATURES

Features	Description
Dimensions (w x d x h)	285 x 485 x 360 mm
Weight	17.4 Kg

ELECTRICAL FEATURES

Features	Description
Electrical supply	115 /230 V ~ 50/60 Hz
Max. variation of the tension	±10% of the nominal tension
Transitory overload	II
Absorption	150 W
Safety fuses	2 x 2 A, 250 V

CLIMATIC FEATURES, STORAGE, PACKAGING AND USE

Features	Description
Use	Internal
Working temperatures	from 5° to 36°C
Relative humidity	max. 80% for temperatures up to 31°C, with a linear decrease up to 50% at a temperature of 40°C.
Pollution degree	2
IP protection grade	20
Grado di protezione IP	20

STARTER KIT

CRYO-20T is supplied with a Starter Kit containing

Code	Description	Quantity
08103	Filter for liquid	1
MLL67290	Spring	2
EP-50	Thermal printer	1
67219	Paper roll for printer	1
67233	Cable for printer (<i>Basic, Smart, Style, Touch</i>)	1
63215	Calibration Standard -0.408°C, 250 mL	1
63220	Check Standard -0.512°C, 250 mL	1
63225	Calibration Standard -0.600°C, 250 mL	1
67200	Cooling liquid, 250 mL	1
67205	Calibrated glass sample tubes, 12 pieces	2
67241	50-place tube holder	1

SAFETY DEVICES

EMERGENCY PUSHBUTTON



The equipment is provided with an emergency pushbutton that interrupts the electrical supply when a dangerous situation is occurring. In order to deactivate the safety device turn the pushbutton in the direction of the arrows as displayed in the picture.



ELECTRICAL CONNECTION

Avoid placing the equipment near heating sources or windows hit by sunlight.

Place the instrument far from the wall: in this way it would be easier to operate both on the main switch and on the socket.

The equipment works with 230 V ~ ±10% and a frequency of 50 Hz or with 115 V ~ ±10% and a frequency of 60 Hz.



According to the electrical safety regulations, check that a good earth connection is provided. The manufacturer is not liable in case of damage due to a lack of compliance of this norm.

INSTALLATION

1. Remove the equipment from its package.



Always hold the equipment by its sides and its lower part with the help of another person.

2. Place it on a perfectly horizontal bench to avoid vibrations or movements.
3. Check the tension selector located at the bottom: it must be in the correct position.



The arrow positioned on the selector has to indicate the local tension available. If the position is wrong, rotate the selector by means of a proper screwdriver.

Do not turn the cryoscope on if you are not sure that the selector is in its correct position as it may damage the whole functioning of the equipment and, as a consequence, a technical intervention would be necessary.



4. Connect the cable to the main socket positioned on the rear panel of the equipment.
5. Insert the plug in the electrical socket.



Before turning the equipment on, connect the printer as described in the paragraph "Printer".

6. Turn the cryoscope on by pressing the main switch positioned on the back.



7. If the equipment does not turn on, verify that the emergency pushbutton is not pressed. In this case deactivate it by turning it in the direction indicated on the head and try to turn it on again.



8. If the equipment does not turn on, check the integrity of the fuses and replace them if necessary. After this operation, connect the equipment to the electrical socket and turn it on.



Always turn the equipment off and disconnect it from the electrical socket before performing this operation.

9. Wait until the head has completely lifted up and draw the tube.





Pay attention not to hit the reading thermistor!

10. Turn the equipment off.

11. Fill the vessel positioned on the back of the equipment with cooling liquid until the maximum level indication is reached.





Check that the little pipe collects from the very bottom of the vessel and the waste tube is positioned over the “maximum level” indication. The wrong position of the pipes may generate errors during the analysis.

12. Turn the instrument on again: the cooling bath will be filled automatically.
13. Wait until the bath reaches the correct working temperature: the display will show the message CRYO READY.

CRYO READY



We suggest to wait at least 10 minutes before proceeding with the analysis in order to get the equipment stabilized.

14. Verify that the cryoscope is correctly calibrated by performing the analyses of 3 replicates of -512.0 m°C standard. See paragraph “Analysis”.
15. If the result differs for more than ±2.0 m°C in comparison to the nominal value of the standard, proceed with the calibration according to the paragraph “Calibration”.

E.g.:

Analysis -512.0 m°C		
	Case 1	Case 2
1	-514.0 m°C	-509.0 m°C
2	-512.0 m°C	-508.0 m°C
3	-512.0 m°C	-508.0 m°C
	OK	NO

The first reading may show wrong values, so do not consider the first sample reading.



1° Case	<p>Average = $(-512.0 + (-512.0))/2 = -512.0$</p> <p>Gap = Average - Expected value = $-512.0 - (-512.0) = 0.0$</p> <p>THE CALIBRATION IS NOT NECESSARY!!!</p>
2° Case	<p>Average = $(-508.0 + (-508.0))/2 = -508.0$</p> <p>Gap = Average - Expected value = $-508.0 - (-512.0) = 4.0$</p> <p>A NEW CALIBRATION IS NECESSARY!!!</p>

MAIN MENU

After turning the cryoscope on and after uploading the program, the equipment shows its main menu, which is divided into 3 different sections: the information/warning bar; the tool bar and the main frame.

A. Information/warning bar

The information/warning bar located on the higher part of the equipment shows the current alarms, the password activation/deactivation, the pen drive connection, the name of the customer, the model of the equipment, date and time.

B. Tool bar












The tool bar is located on the right side of the screen: there you can find all the buttons that allow the user to: enter the set functions; enter the memory that contains the analysis performed; enter the basic information of the equipment and the selection menu and enter the menu for setting the reference cryoscopy values. Also, it contains the calibration menu, the analysis starting menu and the buttons for the manual up and down movement of the head and the manual carousel movement.





C. Main Frame



The main frame shows the main settings and the working condition of the equipment.

By showing the data of the calibration curve and the type of milk selected, there is no need to enter each menu to check the main settings that are necessary to perform the analysis.







The working condition of the equipment indicates whether the cryoscope is ready to start the analysis or not (i.e. it may be necessary to wait that the cooling bath reaches the working temperature).

			MRC CRYO-20T	28 / 09 / 2018
				16 : 32 : 46
Cal.: ISO Type: Cow T. Bath				-88.8 °C
WAIT...				       

Frame Information/warning bar	   <div style="display: inline-block; text-align: center; margin-left: 20px;"> MRC CRYO-20T </div> <table border="1" style="float: right; border-collapse: collapse;"> <tr> <td style="padding: 2px;">28 / 09 / 2018</td> </tr> <tr> <td style="padding: 2px;">16 : 32 : 46</td> </tr> </table>	28 / 09 / 2018	16 : 32 : 46
28 / 09 / 2018			
16 : 32 : 46			
Button (Tool) bar			
Main Frame	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p>Cal.: ISO Type: Cow T. Bath</p> <p style="text-align: right;">-88.8 °C</p> <p style="text-align: center; color: yellow; font-weight: bold; font-size: 1.2em;">WAIT...</p> </div>		

Entry	Description
Alarm 	It appears when an alarm is activated. See paragraph "Alarms" to get more information.
Password 	Some parameters are password protected to avoid modifications by unauthorized personnel. See paragraph "Password" to get more information.

<p>USB</p> 	<p>It appears when a <i>pen drive</i> is connected to the equipment. See paragraph “Transferring the data on the pen drive” to get more information.</p>
<p>Customer</p> <p>MRC</p>	<p>It shows the name of the customer.</p>
<p>Model</p> <p>CRYO-20T</p>	<p>It shows the model of the cryoscope.</p>
<p>Date</p> <p>28 / 09 / 2018</p>	<p>It shows the current date.</p>
<p>Time</p> <p>16 : 32 : 46</p>	<p>It shows the current time.</p>
<p>Selected calibration</p> <p>Cal.: ISO</p>	<p>It shows the calibration selected by the operator.</p>
<p>Selected Milk (type of milk)</p> <p>Type: Cow</p>	<p>It shows the type of milk selected by the operator.</p>
<p>T. Bath</p> <p>T. Bath -88.8</p>	<p>It shows the current bath temperature. This message disappears after reaching the correct working temperature.</p>
<p>Working Condition</p> <p>WAIT...</p>	<p>It shows the current working condition.</p>
<p>Settings</p> 	<p>It enters the “Settings menu”.</p>

<p>Information</p> 	<p>It enters the "Information menu".</p>
<p>H2O Reference</p> 	<p>It allows the operator to set the reference value for the added water calculation.</p>
<p>Calibration</p> 	<p>It enters the calibration function.</p>
<p>Head Up</p> 	<p>It allows the operator to lift the head manually.</p>
<p>Head Down</p> 	<p>It allows the operator to lower the head manually.</p>
<p>Carousel</p> 	<p>It allows the operator to rotate the carousel manually.</p>
<p>Start Analysis</p> 	<p>It enters the "Start Analysis" menu.</p>

KEYBOARD



The operator may need to modify some functions and insert new values manually: in this case Cryo offers both numeric and alphanumeric keyboards

A. Numeric Keyboard

The equipment shows the numeric keyboard when the customer needs to insert a number.


	MRC CRYO-20T	28 / 09 / 2018
		16 : 32 : 46
HIGHER POINT		1 2 3
CURRENT VALUE - 408 m°C		4 5 6
-600.0 ←		7 8 9
Min. -3000 m°C		. 0 -
Max. 0 m°C		← CANC ESC

Entry	Description
Parameter Name HIGHER POINT	Name of the parameter to be modified.
Current value -408 m°C	Current value set in memory.
Inserted value -600.0	New inserted value.

Confirming key 	It confirms the inserted value.
Minimum value allowed - 3000 m°C	Minimum value allowed for the modification of parameter.
Maximum value allowed 0 m°C	Maximum value allowed for the modification of parameter.
Insert key 	It inserts the new value.

B. Alphanumeric Keyboard

The equipment shows the numeric keyboard when the customer needs to insert digits and numbers.




MRC
CRYO-20T

28 / 09 / 2018
16 : 32 : 46



SAMPLE ID

Standard

1	2	3	4	5	6	7	8	9	0
Q	W	E	R	T	Y	U	I	O	P
A	S	D	F	G	H	J	K	L	*
Z	X	C	V	B	N	M	.	-	←
↑									↵









Entry	Description
Parameter Name <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-top: 5px;">ID Sample</div>	Name of the parameter to be modified.
Current value <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-top: 5px;">Standard</div>	Inserted data.
Key <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-top: 5px;">2</div>	Insertion key.
Previous 	It goes back to the previous menu.
Home 	It goes to the homepage.

PASSWORD



The operator can protect the setting functions by a password

Please note that not all the Cryo functions are password-protected: some of them have free access (i.e. "Analysis" and "Calibration" functions), while others can be modified by authorized personnel only



You can recognize free or protected functions by means of the symbols  or  located in the Information/warning bar.

Entry	Description
Restriction ON 	This symbol indicates that the function is password protected.
Restriction OFF 	This symbol indicates that the function is not password protected.

In order to deactivate the restriction:

1. Press the symbol .
2. Insert the password by using the alphanumerical keyboard (see “Keyboard” paragraph).
3. After the confirmation the display will return to the previous frame and the symbol  will appear in the Information/warning bar.

In order to activate the restriction:

1. Press the symbol .
2. The display will show the symbol .



NOTE: The cryoscopes are always delivered with the standard password: “0”.

ANALYSIS AND CALIBRATION


PREPARATION OF SAMPLES












*The temperature of the samples to be analyzed must be between 15°C and 30°C
Do not analyze cool samples.
Analyze homogeneous samples only.*

STARTING ANALYSIS FRAME

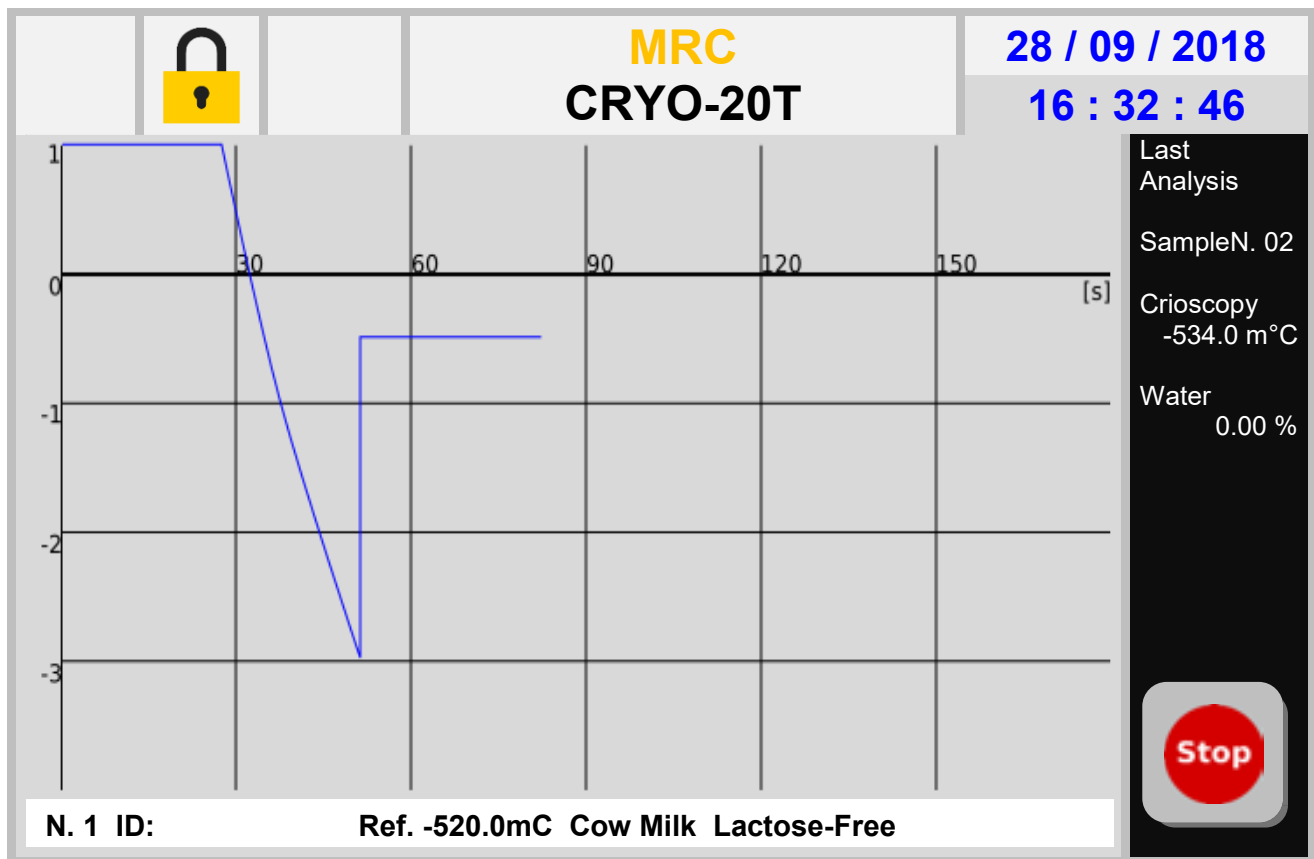


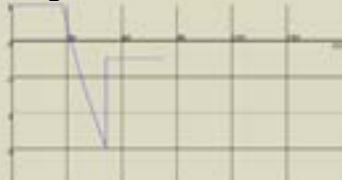

After pressing the  key the display shows the analysis frame where the operator can digit the samples IDs (see “How to insert ID samples” paragraph) and start the analysis by using “Milk” mode (see “Analysis of milk samples” paragraph) or “Standard” mode (see “Analysis of standard / calibration liquids” paragraph).

	MRC CRYO-20T	28 / 09 / 2018 16 : 32 : 46
ID Sample		
ID Sample N.01		
ID Sample N.02		
ID Sample N.03		
ID Sample N.04		
ID Sample N.05		
ID Sample N.06		
ID Sample N.07		

Entry	Description
Milk analysis 	It starts the milk analysis (see "Analysis of milk samples" paragraph).
Standard analysis 	It starts the standard liquid analysis (see "Analysis of standard solutions" paragraph).
Home 	It goes to the homepage.
ID Sample <input type="text" value="ID Sample N.XX"/>	If pressed, it allows the operator to digit the sample ID.

ANALYSIS FRAME





Entry	Description
<p>Diagram</p> 	<p>It shows the temperature diagram of the current analysis.</p>
<p>Stop</p> 	<p>It stops the current analysis.</p>
<p>Number</p> <p>N. 1</p>	<p>It shows the number of current analysis.</p>
<p>ID</p> <p>ID:</p>	<p>It shows the sample ID number related to the current analysis.</p>
<p>Reference</p> <p>Ref. -520.0mC</p>	<p>It shows the set reference value.</p>
<p>Type of milk</p> <p>Cow</p>	<p>It shows the type of milk set.</p>
<p>Calibration</p> <p>Lactose-Free</p>	<p>It shows the selected calibration curve.</p>
<p>Last analysis</p> <p>Last Analysis</p> <p>SampleN. 02</p> <p>Crioscopy -534.0 m°C</p> <p>Water 0.00 %</p>	<p>It shows the references of the last analysis performed.</p>

SETTING THE NUMBER OF TEST TUBES

In order to reduce the time it is possible to set the number of test tubes to be analyzed before starting the run.

To set the number of test tubes, proceed as follows:

1. Enter the menu by pressing the  key.
2. Select "Test tubes N." by pressing **Test tubes N.**
3. Type the number of test tubes by using the proper keyboard (see the "Numerical keyboard" paragraph).
4. Confirm the value by pressing .
5. After confirming the cryoscope saves the given value and exits from the keyboard frame.

SETTING THE SAMPLES IDS

. With Cryo it is possible to identify every sample to be analyzed


The IDs possibilities may vary according to the number of samples to be analyzed (see the "Setting the number of test tubes" paragraph). During the analysis every result will be automatically matched to its ID.

The ID frame appears automatically after pressing the  key.

The operator can insert the IDs manually or by using an optional barcode reader.

A. How to insert IDs manually

To insert the samples IDs manually, proceed as follows:

1. Press the key **ID Sample N.XX** from the analysis frame.
2. Digit the ID number by using the keyboard that appears on the display (see "Alphanumeric Keyboard" paragraph).
3. Confirm the value by pressing the  key.
4. After confirmation the equipment saves the value and exits from the digit frame.
5. After inserting the IDs the operator can perform the analysis with standard liquids (see "Analyze standard / calibration liquids") or milk samples (see "Analysis of milk samples").

B. How to insert IDs with a barcode reader

To insert the samples IDs by using the barcode reader, enter the analysis frame (see "Analysis frame" paragraph) and the **ID Sample N.01** will be automatically selected.

After reading the barcode, the ID will be confirmed and written in the selected box, then the equipment will scroll to the next ID.

SELECTING THE CALIBRATION CURVE

The equipment is provided with two calibration curves named **ISO** and **Lactose-Free**. The operator can select the calibration curve according to the kind of analysis to be performed by following these steps:

1. Press the  key from the main frame.
2. Press the  key




The upper writing changes according to the selected curve, as well as the colors of the standard bottles on the keys. The values under the keys change automatically, too.

A. ISO Calibration

According to the international standard regulation, the standard values for the **ISO** calibration curve are $-408.0\text{ m}^{\circ}\text{C}$ and $-600.0\text{ m}^{\circ}\text{C}$.

B. Lactose-Free Calibration

The **Lactose-Free** calibration curve needs two calibration points too, editable by the operator. The factory values are always $-408.0\text{ m}^{\circ}\text{C}$ and $-929.0\text{ m}^{\circ}\text{C}$.





When setting the **Lactose-Free** curve, this key  appears on the left upper side of the screen.

By using this key it is possible to modify the values (see “Modifying the calibration points (Lactose-Free)”).

MODIFYING THE CALIBRATION POINTS (LACTOSE-FREE)

When the **Lactose-Free** curve is selected, the operator can edit the calibration points by inserting the standard values available.

To modify these parameters proceed as follows:

1. Insert the password to enter the function.
2. Press the CAL  key.
3. Press the CAL  key to select the **Lactose-Free** curve.
4. Press the  key to open the menu for the modification of parameters.
5. Select the calibration standard to be modified by pressing on the touch screen.
6. Digit the new value by using the keyboard.
7. Confirm the value by pressing the  key located near the inserted value.

ANALYSIS OF STANDARD / CALIBRATION LIQUIDS



***The results obtained after performing the analysis under this mode do not take into consideration the set reference value, therefore the percentage of added water is not calculated.
The saved data will be shown in BLACK.***

1. Before analyzing the samples, gently clean the thermistor by using a dry and soft piece of paper.
2. Be sure that the tubes are completely dry and clean.



Do not use test tubes not recommended by the manufacturer.


3. Verify that the message “CRYO READY” appears on the display.


CRYO READY

4. Be sure that the selected calibration curve is the correct one for the analysis to be performed (see “Selecting the calibration curve”).
5. Check the selected number of test tubes: it must be equal or higher than the number of samples to be analyzed (see “Setting the number of test tubes”).
6. Pipet the desired quantity and dispense the liquid inside the test tubes.
7. Insert the tubes with the liquid inside the carousel.

8. Press the  key.

9. Insert the name of the samples, if necessary (see “Setting the samples IDs”).

10. After inserting each name, press the  key. The display will show the temperature diagram, the sample number and name and the selected calibration curve.


It is possible to stop the analysis manually by pressing the  key located in the lower left corner of the frame.



***In case some positions are found to be empty (without test tubes), the equipment will rotate the carousel automatically up to the next position.
The empty hole is not considered and its value is not printed.***

11. After finishing the analysis of the samples, the display returns to the main frame, the carousel stops and the pump refills automatically.
12. Remove the test tubes from the carousel.



The results obtained from the analysis are stored in the internal memory of the cryoscope. The operator can consult these results by pressing the  key and press [Cryoscopy List](#).

ANALYSIS OF MILK SAMPLES



The results obtained after performing the analysis under this mode take into consideration the set reference value, therefore the percentage of added water is calculated.

The saved data will be shown in a different color, according to the result obtained:

*The results that are lower than the reference value are **GREEN**.
The results that are higher than the reference value are **RED**.*



1. Before analyzing the samples, gently clean the thermistor by using a dry and soft piece of paper.
2. Be sure that the tubes are completely dry and clean.




Do not use test tubes not recommended by the manufacturer.

3. Verify that the message “CRYO READY” appears on the display.

CRYO READY

4. Be sure that the selected calibration curve is the correct one for the analysis to be performed (see “Selecting the calibration curve”).
5. Check the selected number of test tubes: it must be equal or higher than the number of samples to be analyzed (see “Setting the number of test tubes”).
6. Pipet the desired quantity and dispense the liquid inside the test tubes.
7. Insert the tubes with the liquid inside the carousel.
8. Press the  key.
9. Insert the name of the samples, if necessary (see “Setting the samples IDs”).
10. After inserting each name, press the  key. The display will show the temperature diagram, the sample number and name and the selected calibration curve.


It is possible to stop the analysis manually by pressing the  key located in the lower left corner of the frame.



In case some positions are found to be empty (without test tubes), the equipment will rotate the carousel automatically up to the next position. The empty hole is not considered and its value is not printed.


11. After finishing the analysis of the samples, the display returns to the main frame, the carousel stops and the pump refills automatically.
12. Remove the test tubes from the carousel.



*The results obtained from the analysis are stored in the internal memory of the cryoscope. The operator can consult these results by pressing the  key and press **Cryoscopy List**.*

RAPID START

Whether there is no necessity to insert the sample IDs and there is no necessity to compare the results with the reference set values, the operator can start the analysis directly and save time. As the results obtained are not compared to the reference values, they will be shown and stored in **BLACK**.

To carry out the analysis under this mode press the  key for 2 seconds, then release it: the analysis starts automatically.

PREVENTIVE MEASURES FOR THE CALIBRATION PROCESS

1. Before performing the analysis with standard solution, turn the bottle upside down for a few times paying attention not to shake it excessively and avoiding the formation of bubbles. Do not perform the tests in case the bottle containing the standard liquid is filled less than $\frac{1}{4}$ of its total volume. Carefully clean the thermistor and the stirrer by sliding a soft and dry piece of paper from the top to the bottom.
2. Calibration process: in order to carry out a good calibration, read **3** replicates of each standard: the repeatability must be ± 2.0 m°C. The first reading may give wrong values, so it would be better not to consider the first result.
3. A new calibration process will be necessary in case there is a high variability of samples to be read, when a low reproducibility is seen, after replacing the reading thermistor or in case some errors during the calibration process occur.
4. After the calibration process it is possible to check its correctness by verifying the accuracy of the curve. Perform some analyses by using the check standard or calibration standards and verify the obtained values.

CALIBRATION

During the calibration process always check the repeatability of the values, not the read value. After confirming the calibration, the read value will be the same as the standard value.

E.g.:



Analysis -600.0 m°C		
	Case 1	Case 2
1	-605.0 m°C	-605.5 m°C
2	-605.5 m°C	-601.0 m°C
3	-604.5 m°C	-608.0 m°C
	OK	NO

Repeatability Case 1 = $(-604.5 - (-605.5))/2 = \pm 0.5$ OK

Repeatability Case 2 = $(-601.0 - (-608.0))/2 = \pm 3.5$ NO



In case the repeatability is higher than ± 2.0 m°C if compared to the standard value, check the amplitude of both agitation and freezing stroke. If the problem persists, contact your local MRC Distributor



It is possible to perform the calibration by using a different number of replicates for each standard (the number of replicates indicated in this manual must be intended as a minimum number).

CALIBRATION OF ISO CURVE


A. Standard Calibration by using -408.0 m°C


1. Carefully clean the mandrel, the thermistor and the stirrer with dry and soft paper.
2. Prepare **3** replicates of standard **-408.0 m°C** standard and pour the desired quantity of liquid inside the tube.
3. Be sure that the tubes are completely dry and clean.
4. Check that the message "CRYO READY" appears on the display.

CRYO READY

5. Be sure that the selected calibration curve is the correct one for the analysis to be performed (see "Selecting the calibration curve").
6. Check the selected number of test tubes: it must be equal or higher than the number of samples to be analyzed (see "Setting the test tubes number").
7. Insert the tubes with the liquid inside the carousel.





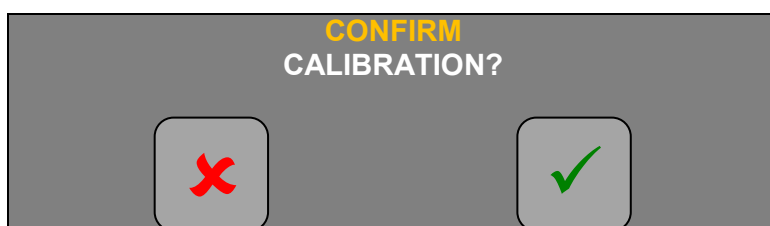
8. Press the  key.
9. Insert the name of samples, if necessary (see "Setting the samples IDs").



10. After inserting each name, press the  key.
11. Wait until the end of the analysis.
12. Verify the repeatability by checking the obtained results.





***If the repeatability value is not higher than ± 2.0 m°C it is possible to confirm the value; otherwise stop the calibration process and check both the agitation amplitude and freezing stroke instead.
If the problem persists, contact your local MRC Distributor***

13. Press the  key to confirm.
14. Press the  key.
15. The display shows the message:




16. Press  to confirm.
17. Press the  key to return to the main page.

B. Standard Calibration by using -600.0 m°C

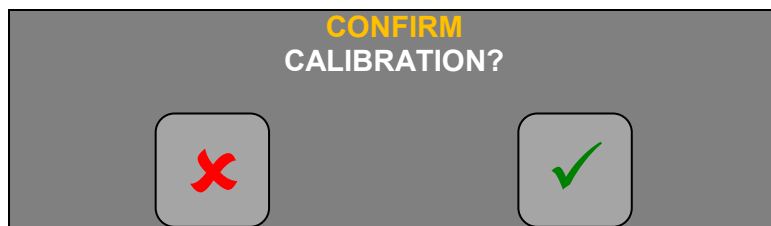
18. Carefully clean the mandrel, the thermistor and the stirrer with dry and soft paper.
19. Prepare **3** replicates of standard **-600.0 m°C** standard and pour the desired quantity of liquid inside the tube.
20. Be sure that the tubes are completely dry and clean.
21. Be sure that the selected calibration curve is the correct one for the analysis to be performed (see “Selecting the calibration curve”).
22. Check the selected number of test tubes: it must be equal or higher than the number of samples to be analyzed (see “Setting the test tubes number”).
23. Insert the tubes with the liquid inside the carousel.
24. Press the  key.
25. Insert the name of samples, if necessary (see “Setting the samples IDs”).
26. After inserting each name, press the  key.
27. Wait until the end of the analysis.
28. Verify the repeatability by checking the obtained results.





***If the repeatability value is not higher than ± 2.0 m°C you can confirm the value; otherwise stop the calibration process and check both the agitation amplitude and freezing stroke instead.
If the problem persists, contact your local MRC Distributor***

29. Press the  key to confirm the value.

30. Press the  key.
31. The display shows the message:




32. Press  to confirm.
33. Press the  key to return to the main page.
34. Verify the correctness of the calibration by following the instructions contained in the paragraph below (point C).


C. Check the calibration by using -512.0 m°C standard

Verify the correctness of the calibration by means of a further analysis of **5** replicates of standard **-512.0 m°C**.

Proceed as follows:

35. Carefully clean the mandrel, the thermistor and the stirrer with dry and soft paper.
36. Prepare **5** replicates of standard **-512.0 m°C** standard and pour the desired quantity of liquid inside the tube.
37. Be sure that the tubes are completely dry and clean.
38. Be sure that the selected calibration curve is the correct one for the analysis to be performed (see "Selecting the calibration curve").
39. Check the selected number of test tubes: it must be equal or higher than the number of samples to be analyzed (see "Setting the test tubes number").
40. Insert the tubes with the liquid inside the carousel.

41. Press the  key.
42. Insert the name of samples, if necessary (see "Setting the samples IDs").

43. After inserting each name, press the  key.
44. Wait until the end of the analysis.
45. Calculate the average value of the results obtained and verify its accuracy compared to the -512.0 m°C reference value.

- Whether the accuracy results to be ± 1.0 m°C you can proceed with the analysis of milk samples.

- Whether the accuracy results to be among ± 3.0 m°C and ± 1.0 m°C it is necessary to perform the linearization (see "Linearity adjustment").

- Whether the accuracy results to be out of the range of ± 3.0 m°C it is necessary to verify the quality and expiry date of the standard liquids and/or repeat the calibration process.

If you get wrong results after performing these remedial actions, contact your local MRC Distributor





CALIBRATION OF LACTOSE-FREE CURVE

A. Calibration by using the higher standard



1. Carefully clean the mandrel, the thermistor and the stirrer with dry and soft paper.
2. Prepare **3** replicates of the **higher standard solution** and pour the desired quantity of liquid inside the tube.
3. Be sure that the tubes are completely dry and clean.
4. Check that the message “CRYO READY” appears on the display.

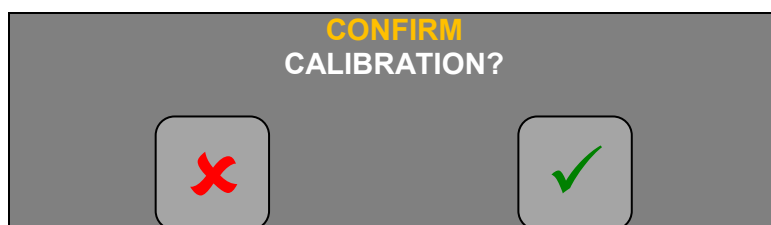
CRYO READY



5. Be sure that the selected calibration curve is the correct one for the analysis to be performed (see “Selecting the calibration curve”).
6. Check the selected number of test tubes: it must be equal or higher than the number of samples to be analyzed (see “Setting the test tubes number”).
7. Insert the tubes with the liquid inside the carousel.
8. Press the  key.
9. Insert the name of samples, if necessary (see “Setting the samples IDs”).
10. After inserting each name, press the  key.
11. Wait until the end of the analysis.
12. Verify the repeatability by checking the obtained results.





***If the repeatability value is not higher than ± 2.0 m°C you can confirm the value; otherwise stop the calibration process and check both the agitation amplitude and freezing stroke instead.
If the problem persists, contact your local MRC Distributor***

13. Press the  key to confirm the value.
14. Press the  key.
15. The display shows the message:





16. Press the  key to confirm.
17. Press the  key to go back to the homepage.

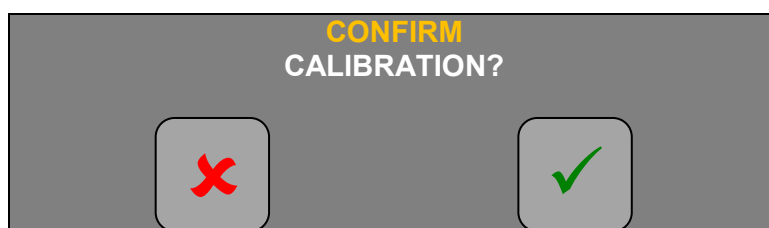
B. Calibration by using the lower standard



18. Carefully clean the mandrel, the thermistor and the stirrer with dry and soft paper.
19. Prepare **3** replicates of the **lower standard solution** and pour the desired quantity of liquid inside the tube.
20. Be sure that the tubes are completely dry and clean.
21. Be sure that the selected calibration curve is the correct one for the analysis to be performed (see “Selecting the calibration curve”).
22. Check the selected number of test tubes: it must be equal or higher than the number of samples to be analyzed (see “Setting the test tubes number”).
23. Insert the tubes with the liquid inside the carousel.
24. Press the  key.
25. Insert the name of samples, if necessary (see “Setting the samples IDs”).
26. After inserting each name, press the  key.
27. Wait until the end of the analysis.
28. Verify the repeatability by checking the obtained results.



***If the repeatability value is not higher than ± 2.0 m°C you can confirm the value; otherwise stop the calibration process and check both the agitation amplitude and freezing stroke instead.
If the problem persists, contact your local MRC Distributor***

29. Press the  key to confirm the value.
30. Press the  key.
31. The display shows the message:





32. Press the  to confirm.
33. Press the  key to go back to the homepage.
34. Verify the correctness of the calibration by following the instructions contained in the paragraph below (point C).

C. Calibration check by using the check standard

Verify the correctness of the calibration by means of a further analysis of **5** replicates of check standard.

Proceed as follows:

35. Carefully clean the mandrel, the thermistor and the stirrer with dry and soft paper.
36. Prepare **5** replicates of **check standard solution** and pour the desired quantity of liquid inside the tube.
37. Be sure that the tubes are completely dry and clean.
38. Be sure that the selected calibration curve is the correct one for the analysis to be performed (see “Selecting the calibration curve”).

39. Check the selected number of test tubes: it must be equal or higher than the number of samples to be analyzed (see “Setting the test tubes number”).
40. Insert the tubes with the liquid inside the carousel.
41. Press the  key.
42. Insert the name of samples, if necessary (see “Setting the samples IDs”).
43. After inserting each name, press the  key.
44. Wait until the end of the analysis.
45. Calculate the average value of the results obtained and verify its accuracy compared to the reference value (Check Standard Solution).

- Whether the accuracy results to be ± 1.0 m°C you can proceed with the analysis of milk samples.

- Whether the accuracy results to be among ± 3.0 m°C and ± 1.0 m°C it is necessary to perform the linearization (see “Linearity adjustment”).

- Whether the accuracy results to be out of the range of ± 3.0 m°C it is necessary to verify the quality and expiry date of the standard liquids and/or repeat the calibration process.

If you get wrong results after performing these remedial actions, contact your local MRC Distributor

LINEARITY ADJUSTMENT


The function of Linearity Adjustment is strictly bounded to the calibration of the equipment.


This function must be used after calibrating only, or whether clearly asked by the procedure.


In case the operator does not perform the Linearity Adjustment properly, the equipment may give inaccurate results.



It is possible to modify the linearity of the calibration curve to get more accurate results in case the analyses performed with the check standard differ of a maximum value of ± 3.0 m°C. Perform the calibration as indicated in the paragraphs “Calibration of Iso Curve” and “Calibration of Lactose-free Curve”. Verify that the difference of the results is between 1.0 m°C and 3.0 m°C, as indicated in the “C. Checking the calibration by using -512.0 m°C standard” or “C. Checking the calibration by using the check standard” paragraphs.

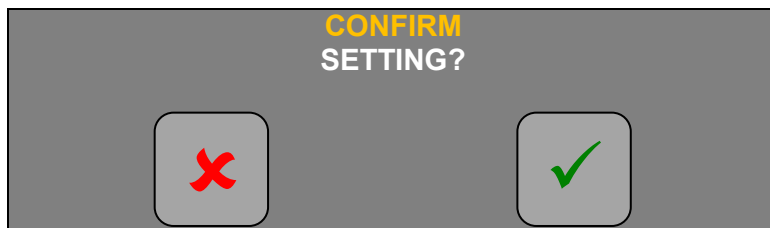
Then proceed as indicated below:



1. In case the password is activated, press the  key and insert the password (see “Password” paragraph).

2. From the homepage, press the  key.

3. Be sure that the selected calibration curve is the correct one, on the contrary press  and perform a new calibration before proceeding.

4. Press the  key.
5. Press the  key.
6. The display shows this message.



7. Press the  key to confirm.
8. Press the  key to return to the homepage.
9. Verify the new setting as indicated in the “C. Checking the calibration by using -512.0 m°C standard” or “C. Checking the calibration by using the check standard” paragraphs.

HANDLING THE ARCHIVES

DOWNLOAD OF THE DATA ANALYSIS / ALARMS ON THE PEN DRIVE

Cryo is equipped with a USB port, to which you can connect a *pen drive* and download the data of the analysis performed or the alarm list generated by the equipment

The data contained in the “Cryoscopy List” schedule (see “Cryoscopy List menu” paragraph) and downloaded on the *pen drive* are nominated “Analisi.csv”.

The data contained in the “Alarm List” schedule (see “Alarm List menu” paragraph) and downloaded on the *pen drive* are nominated “Allarmi.csv”.

The data transferred on the pen drive will be available in the memory of the equipment until the user erases them.



We recommend to download the analysis and error archives on the pen drive or on the computer periodically. Always save a copy to avoid accidental losses of data..

A. Connecting the pen drive




To download the data on the *pen drive*, connect it to the cryoscope by means of the **PEN DRIVE** port located on the right side of the cryoscope.

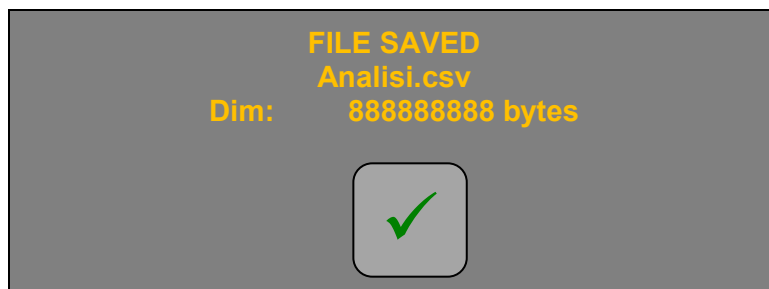



If the *pen drive* is connected properly, the symbol  appears on the Information/warning bar (see “Main Menu” paragraph).

B. Transferring the data on the pen drive

To download the analysis data from the cryoscope to the pen drive proceed as follows:

1. Verify that the pen drive is properly connected (see “Connecting the pen drive” paragraph).
2. In case the password is activated, press the  key and insert the password (see “Password” paragraph).
3. Press the  key from the Main Menu.
4. Press the **Cryoscopy List** case.
5. Press the  key to start the download.
6. When the download is completed, this message appears on the display:






7. Press the  to complete the operation and go back to the “Cryoscopy List” menu.
8. Remove the *pen drive*.

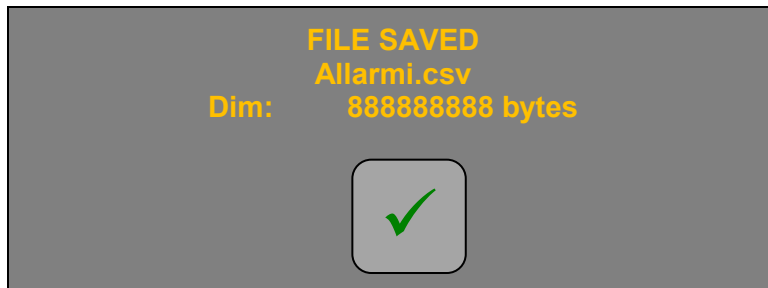



If the pen drive contains a file generated by a former download, this file will be overwritten.

C. Downloading the alarm list on the pen drive

To download the alarm list from the cryoscope to the pen drive proceed as follows:

1. Verify that the pen drive is properly connected (see “Connecting the pen drive” paragraph).
2. In case the password is activated, press the  key and insert the password (see “Password” paragraph).
3. Press the  key from the Main Menu.
4. Press the **Alarm List** case.
5. Press the  key to start the download.
6. When the download is completed, this message appears on the display:



7. Press the  to complete the operation and go back to the “Cryoscopy List” menu.
8. Remove the *pen drive*.



If the pen drive contains a file generated by a former download, this file will be overwritten.

HOW TO DELETE THE ARCHIVES




The data stored in the archives (analysis list and alarms) can be deleted from the cryoscope memory.



Before deleting the archives content check that all the data have been properly saved on the computer or on the pen drive.


A. How to delete the analysis list


To delete the analysis list proceed as follows:

1. In case the password is activated, press the  key and insert the password (see “Password” paragraph).
2. Press the  key from the Main Menu.
3. Press the **Cryoscopy List** case.
4. Press the  key to delete the data.

B. How to delete the alarm list

To delete the alarm list proceed as follows:

1. In case the password is activated, press the  key and insert the password (see "Password" paragraph).

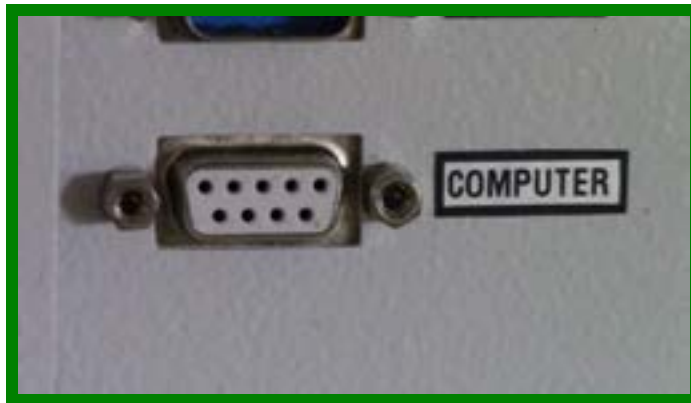
2. Press the  key from the Main Menu.

3. Press the **Alarm List** case.

4. Press the  key to delete the data.


CONNECTION OF THE CRYOSCOPE TO A PERSONAL COMPUTER

Cryo can be connected to a personal computer by using the **COMPUTER** port located on the rear, by means of a serial cable type RS232 or a USB-RS232 converter.



When the Cryo is properly connected to the *personal computer* it is possible to download the .data during the analysis or download the data of the analysis already performed



To get more information about the connection / download operation, refer to the cable installation manual, to the driver installation manual and to the "CryoSoft Touch" installation and user's manual.

BARCODE READER

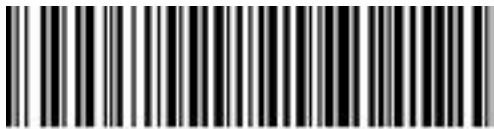
Cryo can be connected to a barcode reader by using the rear **SCANNER** port located on the



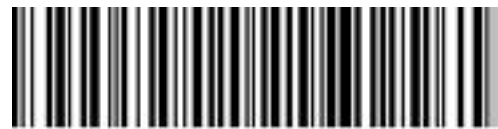
To get more information about the connection operation, refer to the reader installation manual.

BARCODES

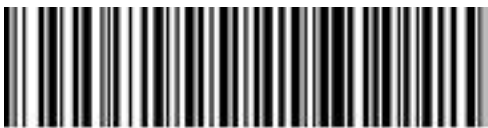
The equipment can scan barcodes of maximum 13 digits length. Herewith below there are 4 types of barcodes that can be used for the calibration standards and to verify the correct functioning or the correct setting of the reader.



STD408-63215



STD512-63220



STD600-63225









STD929-2105




MENU

Cryo is provided with different menus that allow the operator to: get access to the cryoscope information/setting; display/edit the reference type for the added water calculation; perform the calibration and adjustments

INFORMATION MENU

The menu contains the list of all the analysis performed, the list of alarms generated by the equipment and all the main information.

	MRC CRYO-20T	28 / 09 / 2018 16 : 32 : 46
	INFORMATION	
Cryoscopy List		
Alarm List		
Sensors Signal		
Serial Number	100	
Software Version	1.22	
Year of Manufacturing	2017	
Total nr. of analysis	3654	
		

Entry	Description
Cryoscopy List	It displays the complete list of the cryoscopies performed (see "Cryoscopy List" paragraph).
Alarm List	It displays the complete list of errors generated by the equipment. (see "Alarm List" paragraph).
Sensors Signal	<p>It shows the real time value for the sensors located inside the instrument.</p> <ul style="list-style-type: none"> - Bath Temperature: it displays the real cooling bath temperature. - Thermistor Temperature: it displays the real reading thermistor temperature. - Test Tube Photocell: it displays the status of the photocell reader (0-no tube detected; 1-tube detected). - High Limit Switch: it displays the status of the limit switch. If closed, it means that the head finds itself in the upper position (0-open; 1-closed). - Low Limit Switch: it displays the status of the limit switch. If open, it means that the head finds itself in the lower position (0-open; 1-closed).
Serial Number	It shows the serial number of the instrument.
Software Version	It shows the software version.
Year of Manufacturing	It shows the year of manufacturing.
Total nr. of analysis	It displays the total number of analysis performed by the instrument.
Total nr. of analysis after reset	It displays the total number of analysis performed by the instrument after the "Subst. Cooling Liquid" reset message (see "Cooling Liquid Error Message" paragraph).
Scroll 	It scrolls the entries.
Previous 	It returns to the previous menu.
Home 	It goes back to the Homepage.




SETTING MENU

This menu contains all the setting entries of every parameter.

	MRC CRYO-20T	28 / 09 / 2018
		16 : 32 : 46
	SETTINGS	
Language		
Test Tubes Nr.	20	
Unit Selection	Celsius	
Measure Method	Tempo	
H2O Formula	(Ris-Rif)*0.18	
Agitation		
Customer Name	MRC	



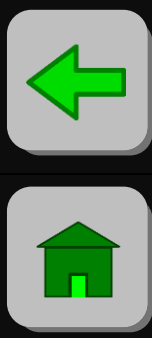


Entry	Description
Language	It selects the language to be used. Press the key according to the language you are going to select: <ul style="list-style-type: none"> - Italian - English - French - Spanish
Test Tubes Nr.	It modifies the test tubes number (see "Setting the test tubes number to be analyzed" paragraph).
Unit Selection	It sets the measurement scale used: <ul style="list-style-type: none"> - ° Celsius. - ° Hortvet.






Measure Method	<p>It selects the measure method. The final result obtained will correspond to the chosen method:</p> <ul style="list-style-type: none"> - Plateau-ISO: the result obtained is the temperature read by the thermistor when the variation is lower than 0.5 m°C for 20 seconds. - Tempo: the result obtained is the temperature read after an established time starting from the freezing stroke.
H2O Formula	<p>It selects the formula for the calculation of added water.</p> <ul style="list-style-type: none"> - (Ris-Rif)*0.18 - ((Ris-Rif)/Rif)*100 <p>If the result obtained is lower than the reference value set, it means that the percentage of added water is always 0.00 %.</p>
Agitation	<p>It adjusts the frequency of the electrical wave that reaches the stirrer during its agitation step.</p> <p>By means of agitation it is possible to perform the Freezing Stroke Test. (see "Agitation Menu").</p>
Customer name	<p>By means of this function it is possible to modify the name of the customer set.</p>
Brightness	<p>It adjusts the brightness.</p>
Set Printing	<p>It prints the setting data.</p>
Reset liquid date	<p>It resets and edits the bath alarm settings (see "Cooling Liquid Error Message").</p>
Options	<p>It displays and edits the parameters of the external devices:</p> <ul style="list-style-type: none"> - Buzzer: it enables the acoustic device (On-enabled; Off-disabled). - Printer: it enables the printer connection (On-enabled; Off-disabled). - RTS Printer: it keeps in memory the data that need to be sent to the printer and sends them automatically when the printer is connected. After turning the equipment off the data are not transmitted anymore. (On-enabled; Off-disabled). - PC Download: it enables the download on the computer (On-enabled; Off-disabled). - Temp. Diagram: it displays the temperature detected in real time by the thermistor (access: disabled). - COM PC Port: it sets the COM serial port for the download of the obtained results on the computer. - COM Barcode Reader: it sets the COM serial port for the data receipt from the barcode reader.
Edit password	<p>It modifies the password set.</p>
Service	<p>It enters the Service menu.</p>

<p>Scroll</p> 	<p>It scrolls the menu entries.</p>
<p>Previous</p> 	<p>It returns to the previous menu.</p>
<p>Home</p> 	<p>It returns to the homepage.</p>

MILK SELECTION MENU



The Milk Selection Menu allows the user to change the kind of milk in order to select the reference value for the calculation of added water rapidly.

		<p>MRC CRYO-20T</p>	<p>28 / 09 / 2018</p>
		<p>16 : 32 : 46</p>	
<p> TYPE OF MILK</p>			
<p>Cow</p>	<p>✓</p>		
<p>Sheep</p>			
<p>Goat</p>			
<p>Buffalo</p>			
<p>Lactose-free</p>			
<p>Other</p>			
<p>Edit reference</p>			

Entry	Description
<p data-bbox="151 226 327 259"><i>Type of milk</i></p> <p data-bbox="151 300 371 600"> Cow Sheep Goat Buffalo Lactose-free Other </p>	<p data-bbox="560 226 919 259">Kind of milk to be selected.</p>
<p data-bbox="151 663 360 696"><i>Edit Reference</i></p> <p data-bbox="151 734 411 779">Edit Reference</p>	<p data-bbox="560 663 1179 696">It shows and modifies the reference values set.</p>
<p data-bbox="151 819 276 853"><i>Selected</i></p> <p data-bbox="151 891 212 947"></p>	<p data-bbox="560 819 1398 958"> This symbol indicates the kind of milk activated as reference value. The kind of milk is also indicated on the main page so that the user can see it easily before performing the analysis. </p>
<p data-bbox="151 999 236 1032"><i>Scroll</i></p> <p data-bbox="151 1059 352 1144">   </p>	<p data-bbox="560 999 911 1032">It scrolls the menu entries.</p>
<p data-bbox="151 1178 276 1211"><i>Previous</i></p> <p data-bbox="151 1245 256 1352">  </p>	<p data-bbox="560 1178 975 1211">It returns to the previous menu.</p>
<p data-bbox="151 1402 236 1435"><i>Home</i></p> <p data-bbox="151 1462 256 1563">  </p>	<p data-bbox="560 1402 919 1435">It returns to the homepage.</p>

CALIBRATION THERMISTOR MENU

The calibration menu selects the calibration curve, acquires the analysis, modifies the linearity of the calibration curve and resets the calibration.




Entry	Description
Selected curve Lactose-free	It displays the name of the selected curve.
Last analysis -410.0 m°C	It shows the value of the last analysis performed.
Confirm higher standard  Confirm standard -408.0 m°C 	It registers the value of the last analysis as calibration point.


<p>Confirm lower standard</p>  <p>Confirm standard -600.0 m°C</p> 	<p>It registers the value of the last analysis as calibration point.</p>
<p>Modify Linearity</p> 	<p>It modifies the linearity of the calibration curve (see “Linearity adjustment” paragraph).</p>
<p>Reset calibration</p> 	<p>It resets the calibration; then a new calibration is necessary (see “Calibration” paragraph).</p>
<p>Edit calibration points</p> 	<p>It modifies the calibration points. This function is available only when the Lactose-Free curve is activated (see “Modification of lactose-free calibration points” paragraph).</p>
<p>Select the calibration curve</p> 	<p>It selects the calibration curve (see “Selecting the calibration curve” paragraph).</p>
<p>Home</p> 	<p>It returns to the homepage.</p>


CRYOSCOPY LIST MENU


The “Cryoscopy list” menu contains a schedule showing all the results of the analysis performed since the last reset.


It is possible to transfer the data on the software (if installed on the computer), transfer them on the pen drive or cancel all the analysis performed.


				MRC CRYO-20T		28 / 09 / 2018		
						16 : 32 : 46		
CRYOSCOPY LIST							(0164/0158)	
# Curva	DATA	ID	N	ANALISI	%H2O Rif.			
0000164 ISO	01/08/18 15:04:12	STD512-63220	03	-513.0 [mC]	----- -----			
0000163 ISO	01/08/18 15:01:46	STD512-63220	02	-512.0 [mC]	----- -----			
0000162 ISO	01/08/18 14:59:20	STD512-63220	01	-511.5 [mC]	----- -----			
0000161 DELECT	01/08/18 14:56:54	STD512-63220	02	-512.0 [mC]	60.84 -850.0			
0000160 DELECT	01/08/18 14:54:32	STD512-63220	01	-512.0 [mC]	60.84 -850.0			
0000159 ISO	01/08/18 14:42:12	MRC MILK	03	-521.0 [mC]	0.00 -520.0			
0000158 ISO	01/08/18 14:39:59	MRC MILK	02	-512.0 [mC]	1.44 -520.0			






PC


USB





Entry	Description												
Analysis displayed <div style="border: 1px solid gray; padding: 2px; display: inline-block; background-color: #e0e0e0;">(0164/0158)</div>	It shows the number of analysis displayed on the screen.												
Analysis <table border="1" style="font-size: small; border-collapse: collapse;"> <tr> <td>0000164</td> <td>28/09/18</td> <td>STD512-63220</td> <td>05</td> <td>-513.0</td> <td>-----</td> </tr> <tr> <td>ISO</td> <td>15:04:12</td> <td></td> <td></td> <td>[mC]</td> <td>-----</td> </tr> </table>	0000164	28/09/18	STD512-63220	05	-513.0	-----	ISO	15:04:12			[mC]	-----	It displays the data related to the last analysis performed (see “Analysis detail” paragraph).
0000164	28/09/18	STD512-63220	05	-513.0	-----								
ISO	15:04:12			[mC]	-----								
PC 	It downloads the analysis results on the computer (if connected).												

<p>USB</p> 	<p>It downloads the analysis results on the <i>pen drive</i> (if connected).</p>
<p>Cancel</p> 	<p>It erases the archives of the analysis performed (see “How to delete the archives” paragraph).</p>
<p>Scroll</p> 	<p>It scrolls the analysis on different pages.</p>
<p>Home</p> 	<p>It returns to the homepage.</p>

A. Analysis details

All the results of the analysis are saved as follows:

# Curve	DATE	ID	N	ANALYSIS	%H2O Ref.
0000164 ISO	01/08/18 15:04:12	STD512-63220	03	-513.0 [mC]	----- -----



Entry	Description
<p>#</p> <input data-bbox="153 1462 323 1541" type="text" value="0000164"/>	<p>Number of the analysis performed (since installation).</p>
<p>Curve</p> <input data-bbox="153 1648 323 1727" type="text" value="ISO"/> <input data-bbox="153 1760 323 1839" type="text" value="DELACT"/>	<p>Calibration curve selected during the analysis.</p>
<p>Date</p> <input data-bbox="153 1939 323 2018" type="text" value="01/08/18
15:04:12"/>	<p>Date and time of the analysis performed.</p>


<p>ID</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">STD512-63220</div>	<p>ID number of the analysis (see “Setting the samples ID” paragraph).</p>
<p>N</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">03</div>	<p>ID number of the current analysis. It indicates the position on the carousel where the sample has been inserted.</p>
<p>Analysis</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">-513.0 [mC]</div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">-521.0 [mC]</div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">-512.0 [mC]</div>	<p>It indicates the result and the measurement unit According to the analysis mode selected the result will be:</p> <ul style="list-style-type: none"> - Standard: the result appears in BLACK (see “Analysis of standard / calibration liquids” paragraph). - Milk: the result appears RED or GREEN according to the reference set (see “Analysis of milk samples” paragraph).
<p>%H2O</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">-----</div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">0.00</div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">1.44</div>	<p>It shows the percentage of added water calculated according to the reference value set. The result will be displayed according to the selected mode:</p> <ul style="list-style-type: none"> - Standard: the analysis does not take into consideration any reference and there is no calculation of added water. The cell shows only dashes (see “Analysis of standard / calibration liquids” paragraph). - Milk: the analysis takes into consideration the reference value set and calculates the percentage of added water (see “Analysis of milk samples” paragraph).
<p>Ref.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">-----</div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">-520.0</div>	<p>The reference value will be indicated according to the reading mode.</p> <ul style="list-style-type: none"> - Standard: The cell shows only dashes (see “Analysis of standard / calibration liquids” paragraph). - Milk: The cell shows the reference set value ((see “Analysis of milk samples” paragraph).


ALARM LIST MENU


The “alarm list” consists of a schedule containing all the alarms generated by the equipment since the last reset.


It is possible to transfer the data on the software (if installed on the computer), transfer them on the pen drive or cancel all the analysis performed.



		MRC		28 / 09 / 2018	
		CRYO-20T		16 : 32 : 46	
ALARM LIST					(0029/0022)
#	DATE	Alarm			
0000153	01/08/18 10:18:23	PC Communication	 		
0000147	31/07/18 16:04:21	Stop			
0000012	26/07/18 17:21:00	Cryoscopy Timeout			
0000011	26/07/18 17:01:14	Test Tube Alarm			
0000011	26/07/18 17:01:14	Cryoscopy Timeout			
0000005	26/07/18 15:52:48	PC Communication			












Entry	Description			
<p>Messages displayed</p> <p>(0029/0022)</p>	<p>It shows the number of error messages displayed on the screen.</p>			
<p>Analysis</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">0000153</td> <td style="width: 20%;">28/09/18 10:18:23</td> <td style="width: 60%;">Comunicazione PC</td> </tr> </table>	0000153	28/09/18 10:18:23	Comunicazione PC	<p>It shows the details related to the message (see “Alarm details” paragraph).</p>
0000153	28/09/18 10:18:23	Comunicazione PC		
<p>PC</p> 	<p>It downloads the analysis results on the computer (if connected).</p>			
<p>USB</p> 	<p>It downloads the analysis results on the pen drive (if connected).</p>			

<p>Cancel</p> 	<p>It erases the archives of the alarms generated (see “How to delete the archives” paragraph).</p>
<p>Scroll</p> 	<p>It shows the error messages on different pages.</p>
<p>Home</p> 	<p>It returns to the homepage.</p>

A. Alarm detail









All the results of the analysis are saved as follows:



#	DATE	Alarm
0000153	01/08/18 10:18:23	PC communication





Entry	Description
<p>#</p> <div data-bbox="151 1209 327 1288" style="border: 1px solid black; padding: 2px;">0000153</div>	<p>Analysis ID number where the error occurred. In case the alarms are not strictly connected to the analysis (i.e. bath temperature too high), the ID number shown corresponds to the last analysis performed.</p>
<p>Date</p> <div data-bbox="151 1388 327 1467" style="border: 1px solid black; padding: 2px;">01/08/18 15:04:12</div>	<p>Date and time of the alarm generated.</p>
<p>Alarm</p> <div data-bbox="151 1568 383 1635" style="border: 1px solid black; padding: 2px;">PC Communication</div>	<p>It shows the name of the alarm generated (see “Alarm List” paragraph).</p>

AGITATION MENU

The agitation menu contains the agitation adjustment and the test key for the agitation test and freezing stroke test.

	MRC CRYO-20T	28 / 09 / 2018
		16 : 32 : 46
Agitation		
Agitation extent	47 %	   
		
		


Entry	Description
Parameter name Agitation extent	Name of the parameter.
Current value 47%	Current value set.
Agitation test 	By pressing this key the agitation is activated. Press it again to stop the test (see "Adjustments" paragraph).
Freezing stroke test 	By pressing this key the freezing stroke is activated. Press it again to stop the test (see "Adjustments" paragraph).

<p>Scroll</p>  	<p>It scrolls the menu entries (function disabled).</p>
<p>Previous</p> 	<p>It returns to the previous menu.</p>
<p>Home</p> 	<p>It returns to the homepage.</p>


ALARMS

In case of danger or malfunctioning the equipment generates alarms.

ALARM WARNING AND CANCELLATION


When an alarm is activated the display shows the icon  and makes an audible alarm signal too.








To erase the alarm, press the corresponding icon. When the warning frame opens, the alarm will be displayed.




To erase the alarm press the  key.




All the alarms generated by the equipment are saved in the internal memory.

It is possible to enter this memory by pressing the  key and on the [Alarm List](#) case.

		MRC CRYO-20T	28 / 09 / 2018 16 : 32 : 46
ACTIVE ALARMS			
Bath Alarm			  
			

Entry	Description
Alarm 	This symbol indicates that an alarm is activated.
Active Alarm Bath Alarm	It indicates the active alarm (see "Alarm List" paragraph).
Alarm Cancellation 	It cancels the current alarm.
Previous 	It returns to the previous menu.

<p>Home</p> 	<p>It returns to the homepage.</p>
--	------------------------------------

ALARM LIST

Entry	Description
Head Motor Timeout	<p>The head is taking too much time to reach its upper / lower position. This alarm indicates that something is blocking the raise/fall of the head or that the motor is not working properly.</p>
Cryoscopy Timeout	<p>The equipment cannot reach the inducing crystallization temperature in duly time. This alarm can be caused by:</p> <ul style="list-style-type: none"> - The temperature of the sample is too high or too low. - The sample has been adulterated. - Loss of cooling liquid or the filter is too much dirty. - The agitation is too strong. - The cooling bath temperature is not correct. - The carousel did not rotate so that the equipment analyzed the same sample twice. - Inside the sample there are some particles that prevented to reach the inducing crystallization temperature in duly time.
Failed sample	<p>The equipment carried out the freezing stroke properly, but the temperature keeps lowering:</p> <ul style="list-style-type: none"> - Some liquid residuals on the plate may have contaminated the sample. - The freezing stroke is too weak to start the freezing process. - The sample contains some particles that prevented the freezing process.
Cooling Liquid	<p>After the analysis of 200 samples or after 93 working days the equipment generates an alarm (see "Cooling Liquid Error Message" paragraph).</p>
CRC Alarm	<p>The equipment generates this alarm when a problem occurs to the memory where the program has been saved.</p>
Printer	<p>This alarm indicates that a problem occurred during the communication with the printer. This alarm may be activated only if the option Activate RTS printer is active. In normal working conditions this function is unable, as well as the alarm.</p>
Broken/unstuck thermistor.	<p>This alarm is activated when:</p> <ul style="list-style-type: none"> - The reading thermistor is broken. - The reading thermistor is not connected. - The internal transmitting cable should be replaced.

Broken bath probe	The reading bath probe is: - Broken. - Damaged. - Disconnected.
PC communication	The equipment cannot communicate with the computer. This message appears only if the option Activate PC Download is active Check: - that the software CryoSoft Touch is enabled. - that there are no interruptions on the PC transmitting cable.
Bath Alarm	The equipment generates an alarm in case the cooling bath does not reach the correct temperature in 15 minutes after turning on; or in case the cooling bath reaches the correct temperature (-7.0°C) and then reaches a temperature of more than 3.0°C.



If the problem persists, contact your local MRC Distributor




COOLING LIQUID ERROR MESSAGE

After the analysis of 200 samples or after 93 working days the cooling liquid alarm is generated automatically.

In this case check the cooling liquid and the filter (see “Check and substitution of cooling liquid” paragraph and “Check and substitution of cooling liquid”) and replace them, if necessary.



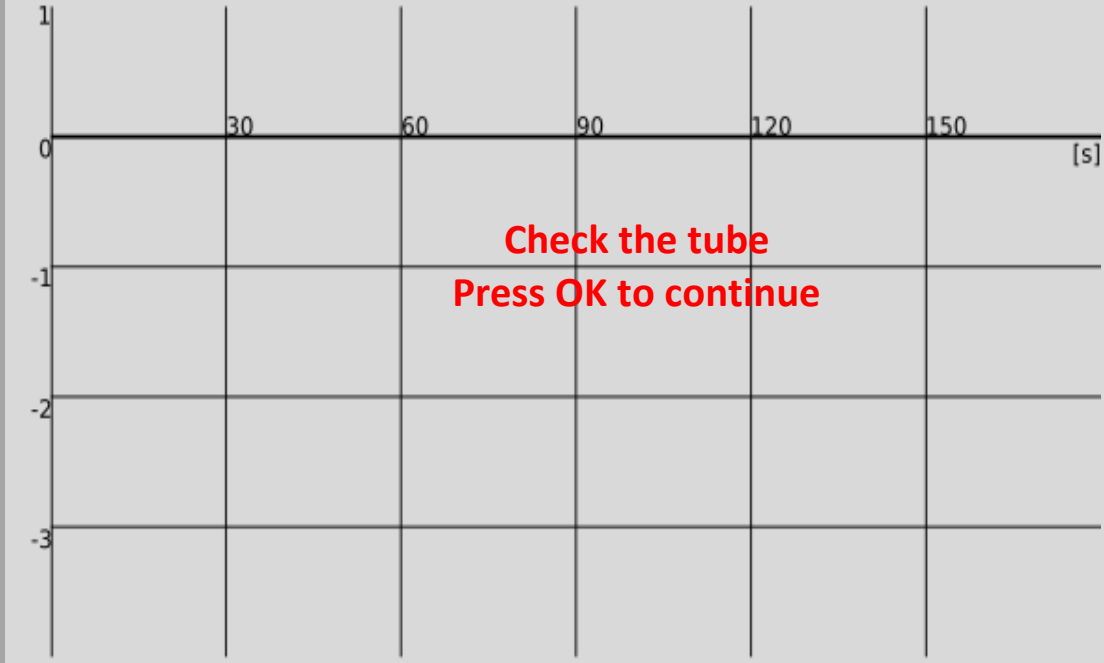


After these operations, reset the alarm **Cooling liquid** and the countdown will be restored.

To cancel this message and restore the countdown proceed as follows:

1. From the main frame, press the  key.
2. Scroll the menu by using the  key until the entry **Reset data liquid**.
3. Insert the password (see “Password” paragraph).
4. Press the entry **Reset data liquid**.
5. Enter the visualization alarm menu (see “Alarm Warning and Cancellation” paragraph).
6. Press the  key.

“CHECK TEST TUBE” MESSAGE


Whether a problem occurs at the end of an analysis, during the head rising, the system generates the following alarm:

		MRC				28 / 09 / 2018
		CRYO-20T				16 : 32 : 46
						Last Analysis
						Camp. N. 02
						Crioscopy -534.0 m°C
						Water 0.00 %
N. 1 ID:						
Ref. -520.0mC Cow Lactose-free						

This problem may be caused by:

1. The test tube is wrongly positioned at the end of the analysis.
2. The test tube is attached to the mandrel and comes out from the carousel.
3. The test tube broke during the analysis.

In case one of these problems occurs, contact your local MRC Distributor

Press  to erase the error message.

To solve the problem temporarily and finish the analysis, proceed as follows:

1. Move the test tube inside the carousel until it reaches the correct position.
2. Wait until the test tube frees itself from the mandrel, or remove it carefully. Place it inside the carousel again.
3. Turn the equipment off and proceed as described in the “Tube breakage” paragraph.



STIRRER ADJUSTMENT

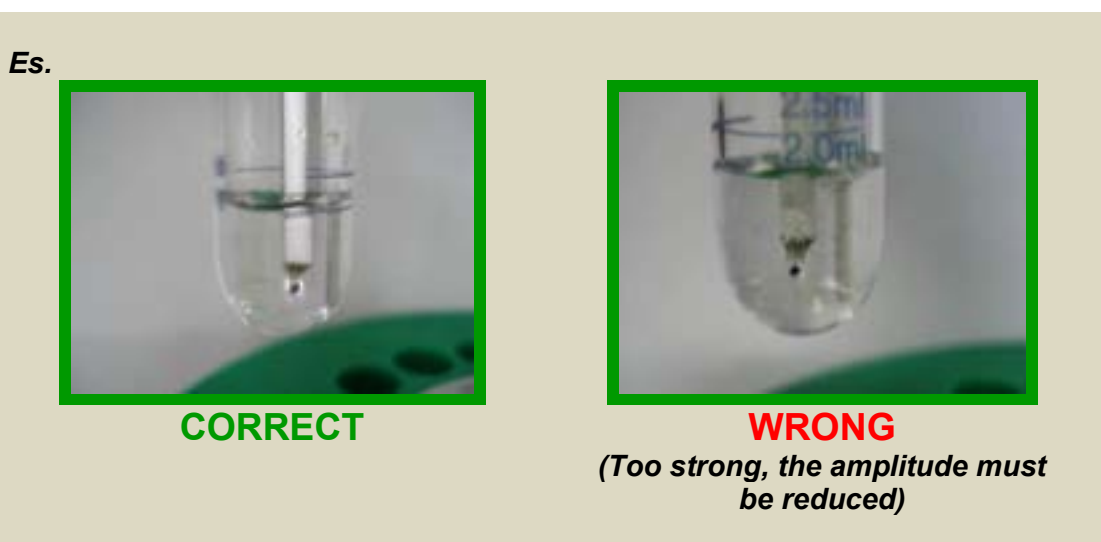
In case some problems of bad agitation adjustment or bad freezing stroke adjustment occur during the analysis, it is possible to test these parameters and make a further adjustment if necessary.

AGITATION

The liquid should be shaken energetically, but no bubbles must be formed during the agitation test process.

In case of formation of bubbles, reduce the agitation amplitude.

The correct stirrer agitation amplitude correspond to 2-3 mm when plunged into the liquid.



A. Check


To perform the test proceed as follows:


1. Fill a test tube with standard -512.0 m°C.

2. From the main frame press the  key.

3. Press the entry **Agitation**.

4. Insert the password (see "Password" paragraph).

5. Put the test tube under the mandrel as shown in the picture and press .

6. Press  again to stop the test.





Avoid the formation of bubbles during the test and verify that the liquid moves uniformly and constantly.

In case of formation of bubbles, reduce the agitation amplitude.

In case the agitation is too weak, increase the value.

B. Agitation Adjustments

In order to adjust the agitation amplitude proceed as follows:

1. From the main frame press the  key.
2. Press the entry **Agitation**.
3. Insert the password (see "Password" paragraph).
4. Press the entry **Agitation amplitude**.
5. Insert the value by using the numeric keyboard.
6. Confirm the value by pressing the  key, located near the inserted value.
7. Check the correctness of the adjustment again.

FREEZING STROKE




The freezing stroke must hit the test tube walls without breaking the tube and shake the liquid.

Es.



A. Check

To perform the test proceed as follows:

1. Fill a test tube with standard -512.0 m°C.
2. From the main frame press the  key.
3. Press the entry **Agitation**.
4. Insert the password (see "Password" paragraph).
5. Put the test tube under the mandrel as shown in the picture and press .
6. Press  again to stop the test.



Don't break the test tube during the test.

The correct adjustment does not generate bubbles on the bottom for the very first seconds, but a huge quantity of small bubbles in the middle and some bigger bubbles on the top.

After 2 seconds the number of bubbles is equally distributed and a new test with a new liquid is needed.

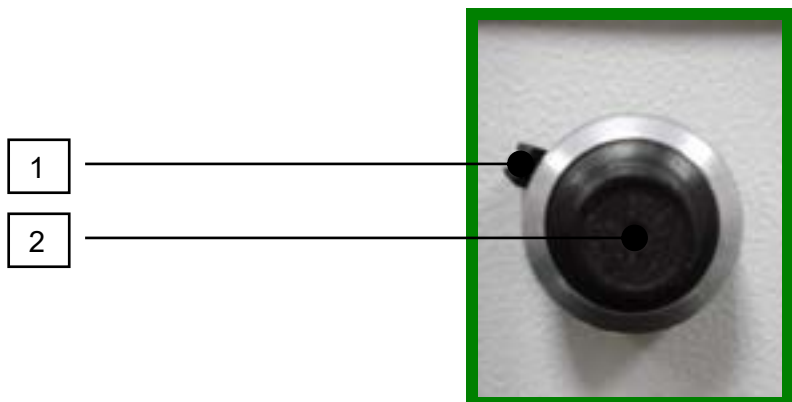
B. Freezing Stroke Adjustments

It is possible to perform an amplitude regulation of the stirrer (freezing stroke) by turning the trimmer located behind the instrument.



The adjustment is a technical operation and must be carried out only if the stirrer does not function properly.

1. Rotate the locking system anticlockwise.
2. Increase or decrease the stirrer strength by rotating in a clockwise or anticlockwise direction.
3. Lock the locking system.



No.	Description
1	Locking System
2	Trimmer

After the freezing stroke adjustment check its correctness by performing new tests.

HOW TO PROTECT THE THERMISTOR

Place an empty tube inside the bath in order to protect the thermistor when the instrument is not working; then lower the head by pressing the  key.



Do not lower the head down to its lowest position, but stop it when the mandrel is completely inserted in the tube



ORDINARY MAINTANANCE

CAROUSEL REMOVAL

Always remove the carousel before cleaning the equipment by following the instructions below:

1. Unscrew and remove the valve, which fixes the carousel to the equipment.
2. Remove the carousel.
3. Remove the plexiglass ring.



EQUIPMENT CLEANING



Before starting the cleaning process, always turn the equipment off and unplug it from the electrical connection.

Do not pour water on the equipment, but use a damp cloth instead.
Clean the equipment with a neutral detergent.
Do not use alcohol or aggressive detergents.

CHECK AND SUBSTITUTION OF THE COOLING LIQUID



Check the level and the clearness of the liquid every day.

Replace the cooling liquid if one of the following situations occurs:

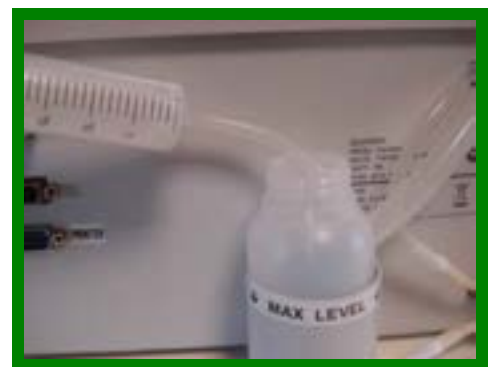
1. After a breakage of a tube containing milk inside the bath duct.
2. When the liquid becomes turbid.
3. When some deposits are present on the bottom of the liquid tank.
4. When the filter is dirty.

In order to replace the cooling liquid proceed as follows:

1. Turn the equipment off.
2. Empty the vessel that contains the cooling liquid located on the back of the instrument.
3. Remove the carousel.
4. Draw the remaining liquid from the cooling bath by using a syringe.
5. Turn the equipment on.
6. Wait around 60 seconds in order to complete the emptying of the automatic refilling system.
7. Draw the liquid from the duct again.
8. Clean the cooling liquid vessel.
9. Fill the vessel with new cooling liquid.



***Refill the tank paying attention not to exceed the indicated quantity.
After the replacement of the liquid, check the position of the waste tube as it must be located over the "maximum level" indication.***





CHECK AND SUBSTITUTION OF THE FILTER



Check the filter condition every day.

The filter cleaning is necessary when:

1. The message: "Subst. Cooling Liquid" appears on the display.
2. The filter is very dirty.



Replace the filter after having cleaned it up for a few times.

In order to replace the filter please proceed as follows:

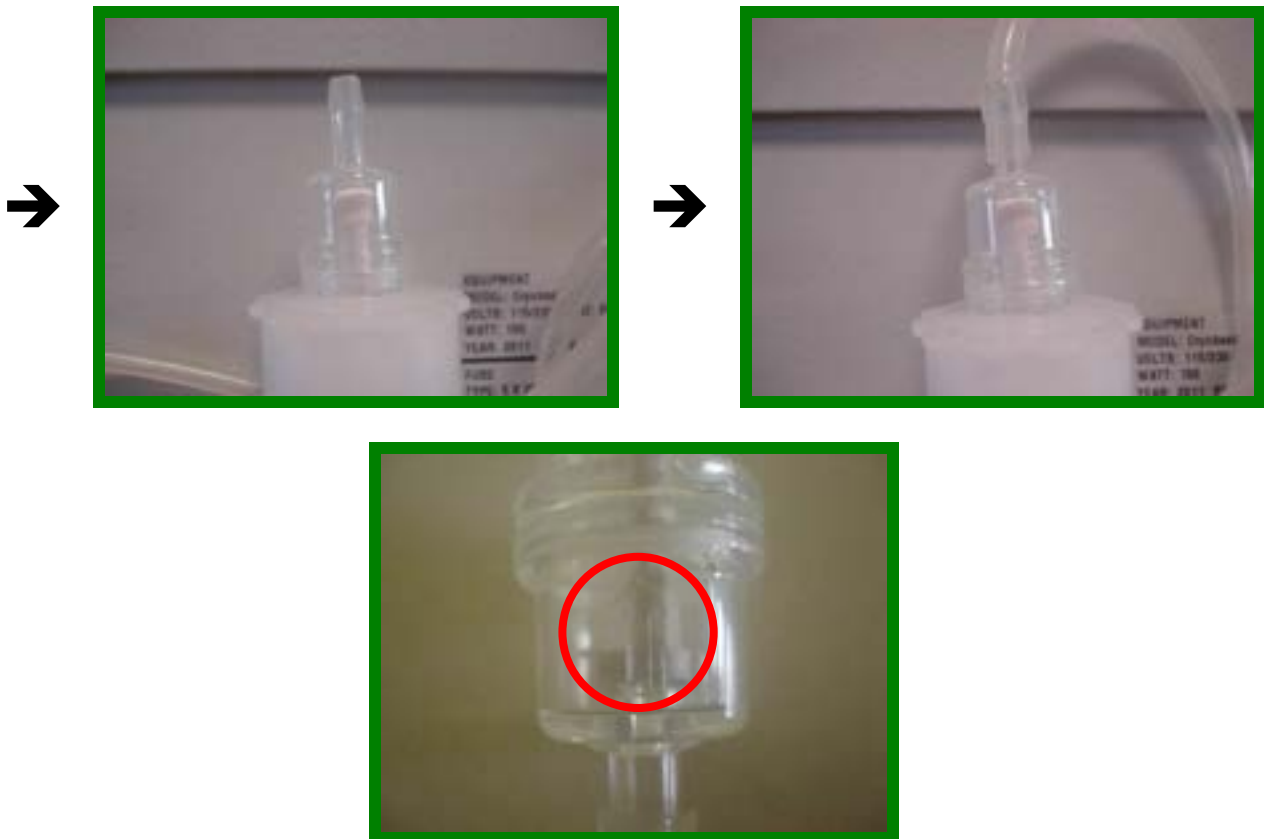
1. Disconnect the pipe that connects the filter to the aspiration pump.
2. Disconnect the filter from the inlet pipe.



Connect the filter paying attention to its direction: the arrow impressed on this element must point to the pipe that connects the filter to the aspiration pump.

3. Connect the filter to the inlet pipe.
4. Connect the new filter to the connection pipe of the aspiration pump.





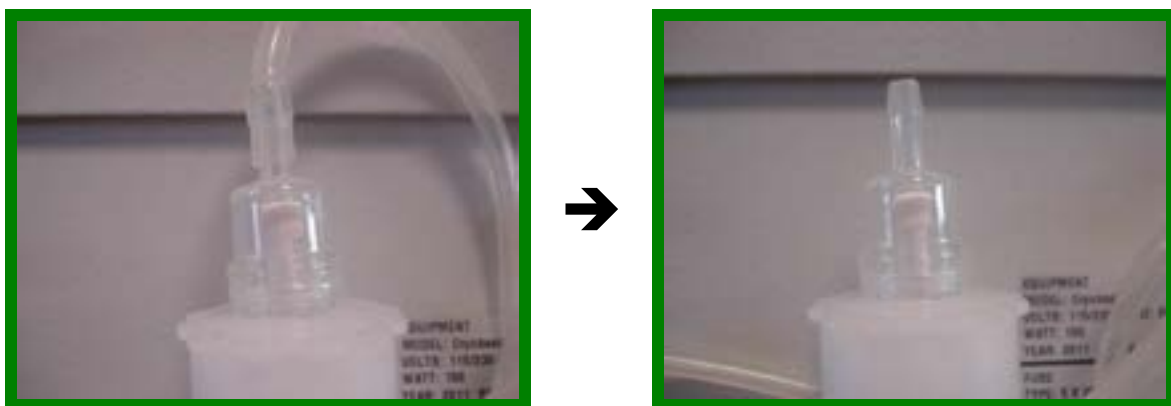
HOW TO CLEAN THE FILTER

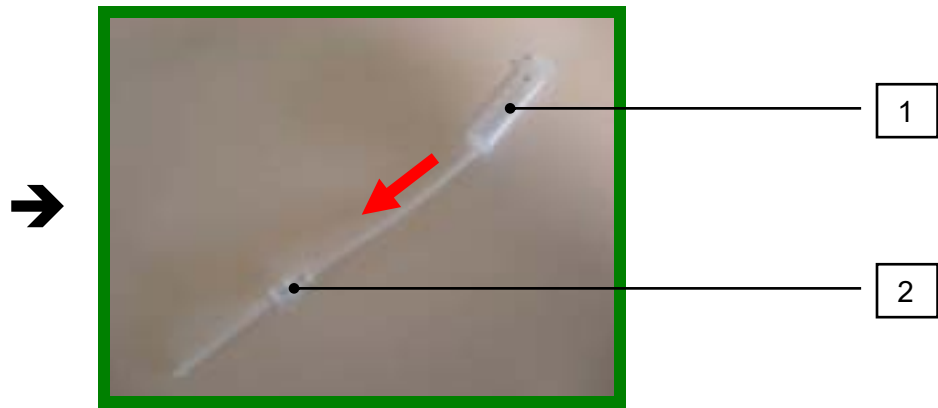
In order to clean the filter please proceed as follows:

1. Disconnect it from the pipe that connects it to the aspiration pump.
2. Let warm water flow through the filter in the opposite direction than the one indicated by the arrow.
3. Repeat this operation a few times.



4. Connect the filter paying attention to the direction. The arrow printed on it must point to the top.





No.	Description
1	Syringe
2	Filter



DAILY MAINTENANCE

1. Dry the wet parts thoroughly, absorbing all the cooling liquid (we recommend to remove the carousel for a better cleaning).
2. Carefully clean and dry the mandrel.
3. Check and restore the cooling liquid level, if necessary
4. Check and replace the filter, if necessary.
5. If any sediment appears in the cooling liquid, please replace it along with its filter (clean the bottle before filling it with the new cooling liquid).

EXTRAORDINARY MAINTENANCE



***We warmly suggest to subscribe a yearly maintenance agreement with our local Service Center for a complete cleaning operation to the heat exchangers and a general check of the good conditions of the electric and electronic parts.
In this way, you can prevent serious damages to the equipment.***



Every maintenance operation, which is not mentioned in this manual, must be carried out by qualified personnel who has been authorized by the manufacturer only.

TUBE BREAKAGE

In case the tube breaks inside the duct, proceed as follows:

1. Verify that the head is in its upper position.
2. Turn the equipment off.



3. ***Remove the carousel.***
4. ***Remove the spring by using tweezers, if necessary.***
5. ***Draw the liquid inside the well by using a syringe.***
6. ***Remove all the fragments by using tweezers, if necessary.***

7. Position the spring.
8. Position the carousel.
9. Turn the equipment on and wait until the bath reaches its working temperature. The display will show the message:

CRYO READY

10. The equipment is ready to perform the analysis.

HOW TO MOVE AND SHIP THE CRYOSCOPE

MOVING THE CRYOSCOPE




Every time you need to move the instrument in your laboratory, pay attention to keep it in horizontal position to avoid a liquid loss.

Always hold the equipment by its sides and its lower part with the help of another person.

SHIPPING THE CRYOSCOPE

In case you need to ship the equipment proceed as follows:

1. Turn the equipment off.
2. Empty the vessel containing the cooling liquid located on the back of the equipment.
3. Vacuum the liquid that remains inside the bath by means of a syringe.
4. Turn the equipment on.
5. Wait around 60 seconds in order to complete the emptying of the automatic refilling system.
6. Vacuum the liquid inside the bath again.
7. Place an empty tube inside the duct.
8. Lower the head by pressing the  key.



Do not lower the head down to its lowest position, but stop it when the mandrel is completely inserted in the tube.





CAUTION!

Should you send the equipment, the use of original MRC package or a strong box filled with styrofoam is mandatory. The use of a pallet would be strongly appreciated.

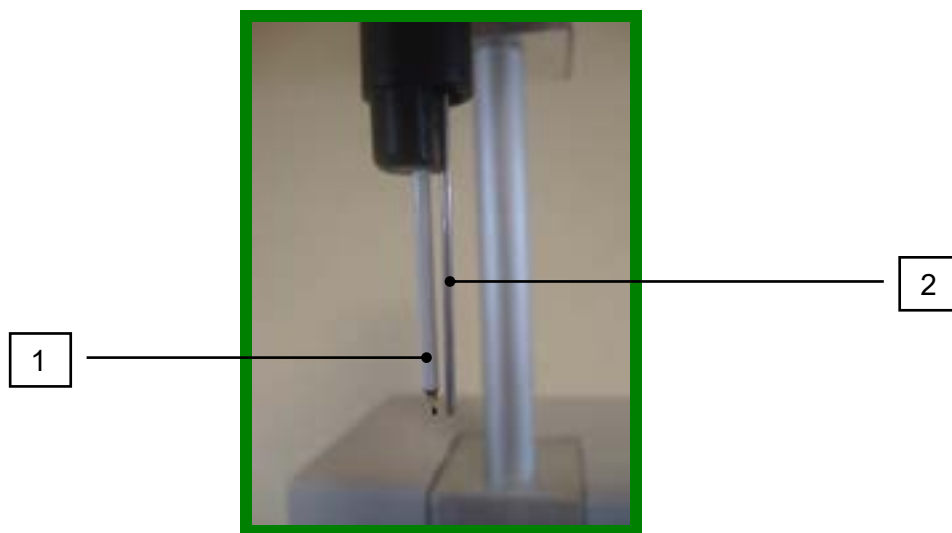
MAIN SPAREPARTS

COOLING BATH

The bath is cooled by means of Peltier cells at a temperature of $-7^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$.

HEAD

The head holds the sample-tube mandrel along with the reading thermistor and the stirrer.



No.	Description
1	Reading thermistor
2	Stirrer

WELL

The tube must be allocated inside the well.
When descending the mandrel, the tube will be pushed inside the duct.



READING THERMISTOR

This is the most fragile part of the equipment: protect the glass from hits or it may be damaged. It must be correctly positioned in order to keep the temperature sensor at the same precise distance from the walls and from the bottom of the test tube.

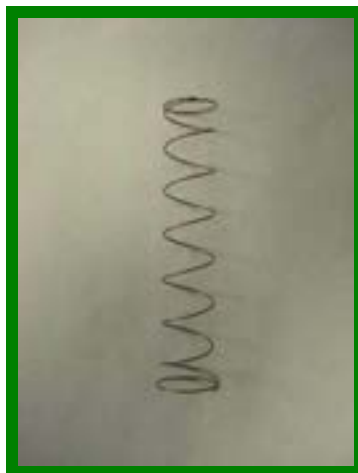


STIRRER

The stirrer must be positioned parallel to the thermistor holder keeping a distance of 1 mm. It must vibrate back and forth symmetrically in comparison to the thermistor axis.

SPRING

The spring is located inside the bath and it holds the sample tube during the analysis.





The spring must be positioned at the same level of the conduct.
If the spring is higher than the conduct, it can be dragged outside by the tubes.
If the spring position is too low, with relation to the conduct level, the tube could obstruct the rotation of the carousel plate.



If the spring is too long, it is possible to cut it by using a tool.
If the spring is too short, it is necessary to replace it.

PHOTOCELL

The photocell is located under the carousel and detects the presence of the tube; when starting the analysis it allows the head to go down.

It may give an error message when, at the end of the analysis, it does not detect the presence of the test tube (see "Check test tube message" paragraph).



REAR PANEL



No.	Description	No.	Description
1	Automatic refilling tube.	7	Cooling liquid tank.
2	Barcode reader serial port.	8	Exhaust tube.
3	Trimmer.	9	Main switch.
4	Filter.	10	Fuses compartment.
5	Printer serial port.	11	Supply socket.
6	Computer serial port.	12	Pump.

DRAIN



The drain is located on the left part of the equipment **DRAIN** and its purpose is to drain the exceeding liquid which is present on the plate.
The drain is a safety device and can be useful if the customer does not clean the equipment properly, according to the cleaning procedure described in the manual

PRINTER



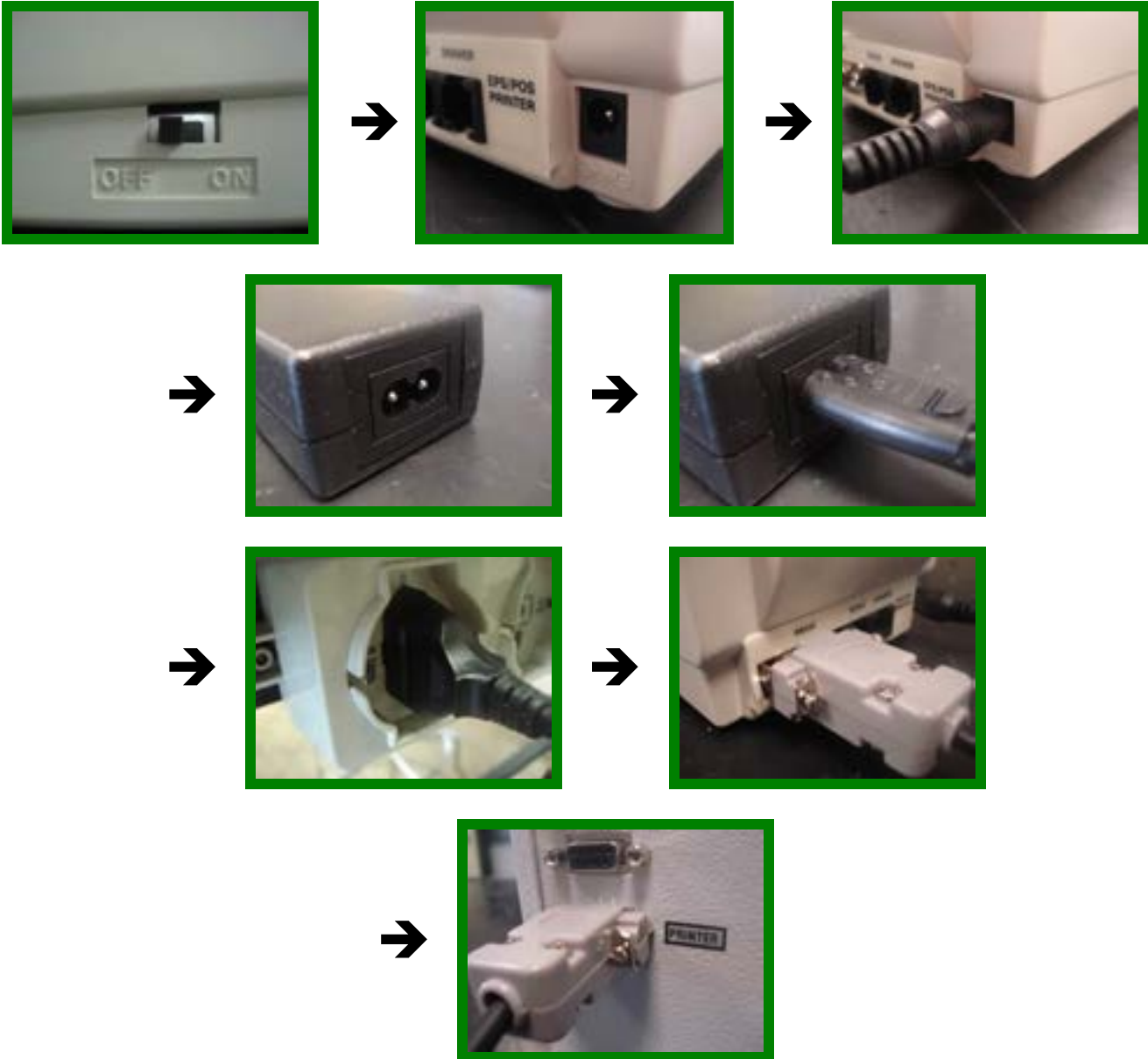
N. !	Temp. mC !	%H2O !	Rif.
1 !	-521.0 !	0.00 !	-520.0
2 !	-520.5 !	0.00 !	-520.0
3 !	-522.0 !	0.00 !	-520.0
4 !	-521.0 !	0.00 !	-520.0
5 !	-521.0 !	0.00 !	-520.0
6 !	-522.0 !	0.00 !	-520.0
7 !	-520.0 !	0.00 !	-520.0
8 !	-520.5 !	0.00 !	-520.0
9 !	-522.5 !	0.00 !	-520.0
10 !	-521.0 !	0.00 !	-520.0
11 !	STOP !	XXX.XX !	XXXXX

Entry	Description
Date <input type="text" value="24/07/18"/>	It indicates the date of the analysis performed.
Time <input type="text" value="11 : 01 : 15"/>	It indicates the time of the analysis performed.
Serial Nr. <input type="text" value="N. SERIE 888888888"/>	It indicates the serial number of the equipment.
ID Sample <input type="text" value="ID: 88888888888888"/>	It indicates the ID number of the sample.
Calibration Curve <input type="text" value="ISO"/>	It indicates the calibration curve used during the analysis.
Analysis Nr. <input type="text" value="1"/>	It indicates the number of the analysis.
Temp. mC <input type="text" value="-521.0"/>	It indicates the freezing point of the sample.
%H2O <input type="text" value="0.00"/>	It indicates the percentage of added water contained in the sample.
Rif. <input type="text" value="-520.0"/>	It indicates the reference value for the calculation of added water.


A. Printer connection

In order to connect the printer to the cryoscope, please proceed as follows:

1. Take off the printer and the cables from the box.
2. Verify that the main switch is in the **OFF** position.
3. Connect the power cable to the printer.
4. Connect the AC – DC adapter to the electrical socket by using the proper cable.
5. Verify that the main switch of the cryoscope is in the “**O**” position.
6. Connect the printer to the cryoscope by using the proper cable.
7. Turn the printer on.
8. Turn the cryoscope on.



B. Paper feeding

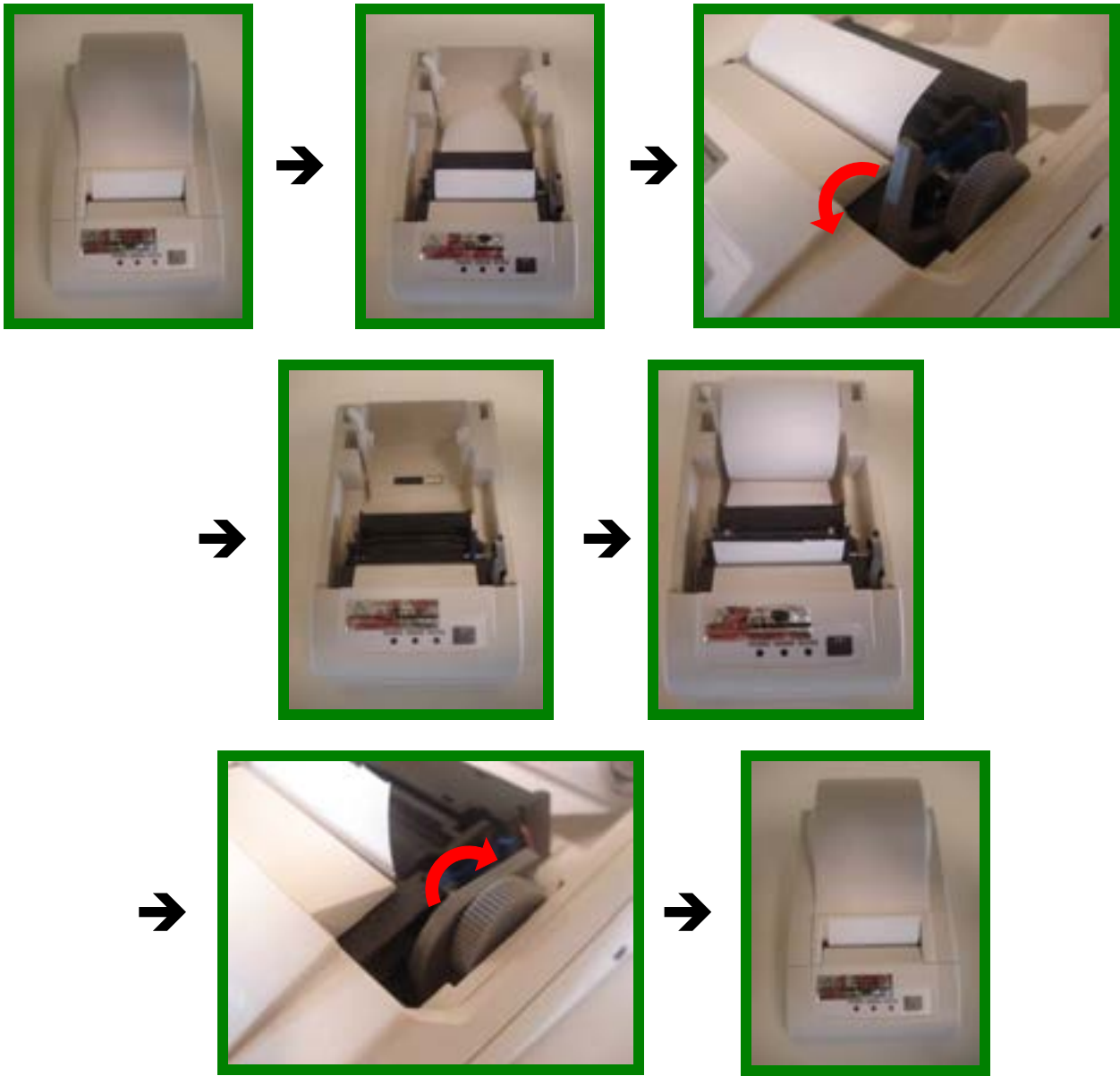
In order to scroll the paper, press the  key located on the right side of the front panel of the printer.

C. Change the paper roll

In order to change the paper roll proceed as follows:

1. Open the plastic cover.
2. Lift the printing head by using the proper lever.
3. Remove residuals of the old roll.
4. Place the new roll in the holder, by positioning the beginning part towards the front of the printer.
5. Roll the paper under the cylinder.
6. Lower the printing head by using the proper lever.
7. Close the lid.

8. Turn the printer on and press the  key until the paper comes out from the split.



ACCESSORIES, CONSUMABLES AND MAIN SPARE PARTS

A. Accessories

Code	Description	Quantity
NPX2-10000	Automatic pipette, 1 - 10 mL volume	1
BMT2-X	Tips for automatic pipette, 200 pcs.	1
67241	Tube holder in stainless steel, 50 places	1
67251	24-place ABS plastic tube holder	1

B. Consumables

Code	Description	Quantity
67219	Paper roll for thermal printer	1
63215	Calibration standard for cryoscopy -0.408°C, 250 mL	1
63220	Check standard for cryoscopy -0.512°C, 250 mL	1
63225	Calibration standard for cryoscopy -0.600°C, 250 mL	1
STD2105	Calibration standard for Lactose-free function -0.929°C, 125 mL	1
67200	Cooling liquid, 250 mL	1
67210	Cooling liquid, 1 liter	1
67205	Calibrated glass samples tubes for cryoscopy, 12 pcs	1

C. Spare parts



We recommend to keep the following spare parts in your stock.

Code	Description	Quantity
08103	Filter for liquid	1
MLL67290	Spring	1
9052101006	Stirrer	1
67248	Reading Thermistor	1



MRC reserves the right to review and modify this document without any notice. Please note that any variation will not affect the respect of the directives.



The images used in this manual must be considered as examples and may differ from the reality.

WARRANTY



The warranty period lasts 12 months starting from the date stated on the Packing List and it covers manufacturing faults only.

It does not cover: malfunctionings, damages or faults appeared after the warranty terms or resulting from an improper use of the equipment; from negligence or carelessness; from wrong installation or wrong maintenance; from technical assistance carried out by unauthorized personnel; from transport or corrosion damages; from the use of consumables (tubes, cooling liquid, calibration and check standards) not supplied by MRC or not original replacement parts.

Warranty will be instantly invalidated in the event that the serial number of the product is found to be modified or cancelled.

Warranty does not cover damages originated by overvoltages caused by the electrical net, where the equipment is connected to.

N.B.: WARRANTY DOES NOT INCLUDE THE READING THERMISTOR

DISPOSAL



The symbol of the crossed garbage collector indicates that the product at the end of its useful life should be collected separately from normal garbage. The user will give the equipment to specialized centers for collection of electronic and electrotechnical garbage according to rules and laws.

The proper collection of the disused equipment, the recycling, treatment and disposal contribute to avoid possible negative effects on the environment and human health and encourages the recycling of the materials that compose the equipment.

COOLING BATH FORM

Assembling date:

Testing date

Serial number:

Testing surveyor

Notes

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NOTE: this form is an essential part of the bath and must always be kept with it. If returned for any damage without this form, the repairs and the replacement under warranty conditions will not be possible. In this case the manufacturer reserves the right to apply the warranty conditions or not.

MRC's Technician

DECLARATION OF CONFORMITY

Product name: **CRYO-20T**

Type of product: **Cryoscope**

Manufacturer: **MRC Ltd**

Address: **3, Hagavish st. Israel 58817 , mrc@mrclab.com**

The above-mentioned equipment is in compliance with the EU harmonized standards

**UE/2014/35
UE/2014/30
2011/65/UE**

By using the following harmonized norms:

**EN 61010-1
EN 50366+A1
EN 61326-1**

