RiOs 30, RiOs 50, RiOs 100, RiOs 150 and RiOs 200 User Manual

Note

This User's Manual refers to an item called a 'TAG' Sensor. This version of your system may not include this 'TAG' Sensor. Please kindly disregard all references to this item while reviewing this User's Manual.

Notice

The information in this document is subject to change without notice and should not be construed as a commitment by Millipore Corporation. Millipore Corporation assumes no responsibility for any errors that might appear in this document. This manual is believed to be complete and accurate at the time of publication. In no event shall Millipore Corporation be liable for incidental or consequential damages in connection with or arising from the use of this manual.

We manufacture and sell water purification systems designed to produce pure or ultrapure water with specific characteristics (µS/cm, T, TOC, CFU/ml, Eu/ml) when it leaves the water purification system provided that the RiOs Systems are fed with water quality within specifications, and properly maintained as required by the supplier.

We do not warrant these systems for any specific applications. It is up to the end user to determine if the quality of the water produced by our systems matches his expectations, fits with norms/legal requirements and to bear responsibility resulting from the usage of the water.

REV. 0 – 03/04

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DECLARATION OF CONFORMITY
EUROPEAN UNION EC DIRECTIVES

| $C\,\epsilon$ | Directive 89/336/CEE |
| | Directive 73/23/CEE |
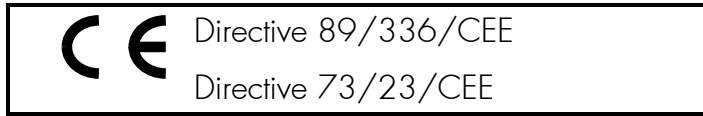
RiOs

♦ The RiOs System mentioned above is manufactured in Millipore SAS - 67120 Molsheim - FRANCE -facilities whose quality management system is approved by an accredited registering body to the ISO9001 Quality System Standards.

♦ We certify that these Lab RiOs Systems are designed and manufactured in application of the following European Council directives:

  - 89/336/CEE relating to Electromagnetic compatibility

  - 73/23/CEE relating to electrical equipment designed for use within certain voltage limits

♦ Standards to which conformity is declared as applicable are the following :

  - EN 61326-1: 1997: Electrical equipment for measurement, control and laboratory use – EMC requirements.

  - EN 61010-1: 2001: Safety requirements for electrical equipment for measurement, control, and laboratory use.

Guy REYMANN

Quality Assurance Manager

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Chapter 1   INTRODUCTION

1-1   USING THIS MANUAL

MATCHING THIS MANUAL WITH YOUR WATER PURIFICATION SYSTEM

This manual is intended for use with a Millipore RiOs 30, RiOs 50, RiOs 100, RiOs 150 or RiOs 200 Water Purification System.

This User Manual is a guide for use during the normal operation and maintenance of a RiOs 30, RiOs 50, RiOs 100, RiOs 150 or RiOs 200 Water Purification System. It is highly recommended to completely read this manual and to fully comprehend its contents before attempting normal operation or maintenance of the Water Purification System.

You can easily identify your type of Water Purification System if you do not see the Catalogue Number. The type of RiOs System is indicated above the Keypad on the front of the RiOs System Cabinet.

If this manual is not the correct one for your Water Purification System, then please contact Millipore.

INSTALLATION INFORMATION

⚠ ATTENTION	**IMPORTANT! INSTALLATION INSTRUCTIONS NOT INCLUDED. INSTALLATION OF THIS PRODUCT IS MEANT TO BE PERFORMED BY A QUALIFIED MILLIPORE SERVICE REPRESENTATIVE.**

⚠ ATTENTION	**The <u>Pre-Installation</u> and <u>Installation</u> Documentation for the RiOs Systems mentioned above are not found in this Manual. Contact Millipore if you would like to have this information.**

Appendix 2 contains a Pre Installation Checklist and Appendix 3 contains a Post Installation Checklist. These can be used to confirm that you received the necessary items for installation and also that the RiOs System was installed according to specifications.

HOW TO USE THE KEYPAD AND THE LCD

The Keypad and LCD are shown below. Press the Keypad Button lining up with the desired action. For example, if you wanted to go from STANDBY Mode to SETUP Mode, you would press the Keypad as shown below.
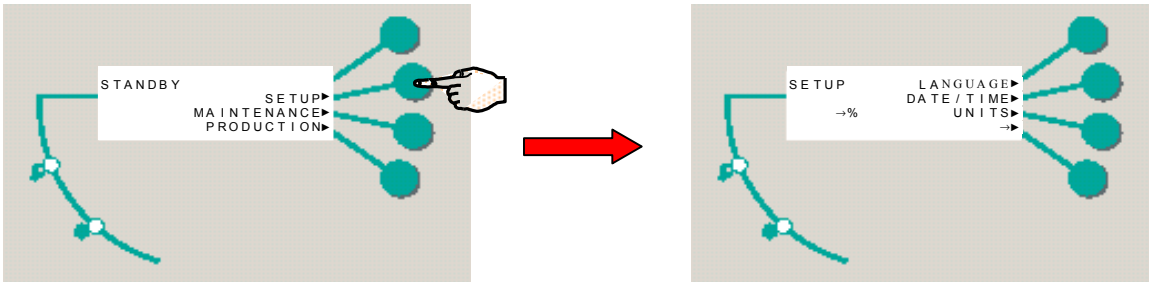
In this manual, pressing a Keypad Button would be shown like this.
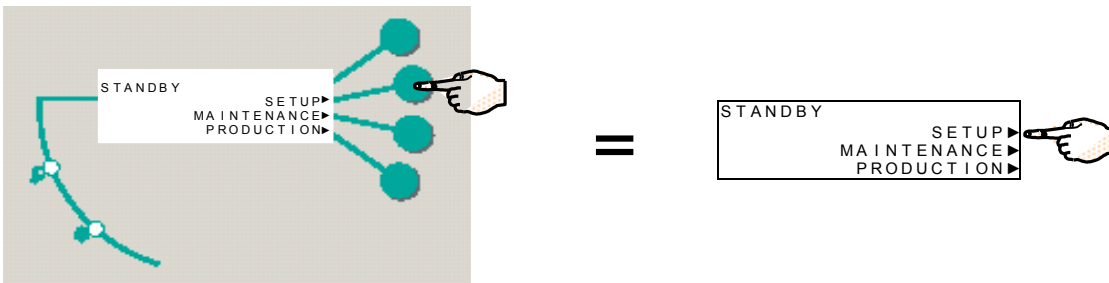
There are several symbols that are displayed on the Keypad. These symbols are explained below.

SYMBOL	WHAT IT MEANS
▶	PRESS AND RELEASE SYMBOL. Pressing the Keypad Button next to this symbol brings you immediately to the next LCD Screen.
▷	PRESS AND HOLD SYMBOL. Pressing the Keypad Button next to this symbol for 2-3 seconds brings you to the next LCD Screen.
→	Pressing the Keypad Button next to this symbol brings you to the next LCD Screen within the same software branch.
✕	Pressing the Keypad Button next to this symbol exits the currently viewed software branch. It brings you back to the Root Menu.
⇌	Pressing the Keypad Button next to this symbol toggles between various parameters being displayed.
+	Pressing the Keypad Button next to this symbol increases the value of the currently displayed parameter.
–	Pressing the Keypad Button next to this symbol decreases the value of the currently displayed parameter.

Some examples of various Keypad Button actions are shown below.

```
P R O D U C T I O N       ■ 4 0 %
R E J .     :     9 7 . 3 %
                    D A T A ▶
                  S T A N D B Y ▷
```

Pressing the Keypad Button next to STANDBY for a few seconds changes the LCD.

Pressing the Keypad Button next to DATA immediately changes the LCD.

```
P R O D U C T I O N       ■ 4 0 %
R E J .     :     9 7 . 3 %
                    D A T A ▶
                  S T A N D B Y ▷
```

```
R O   M E M B .   P E R F O R M .
F E E D       :     5 3 6 μ S   T C
P E R M E A T E :     8 . 9 μ S   T C
R E J .     :   9 7 . 3 %       → ▶
```

Pressing this Keypad Button (→) will scroll the LCD to the next LCD Screen containing DATA information. In this example, DATA is the Software Branch linked together with LCD Screens and the Keypad Arrow shown above.

```
D A T A   P R I N T
        C U R R E N T   V A L U E S
        3 0 D   H I S T O R Y
                    X ▶
```

```
P R O D U C T I O N       ■ 4 0 %
R E J .     :     9 7 . 3 %
                    D A T A ▶
                  S T A N D B Y ▷
```

Pressing this Keypad Button (X) will scroll the LCD to the ROOT Menu.

COMMONLY USED ABBREVIATIONS IN THIS MANUAL

Abbreviation	Full Text + Comments
μS/cm	microSiemens per centimeter
BSP, MBSP, FBSP	British Standard Thread, Male BSP, Female BSP
CFU/ml	Colony Forming Units per millilitre
FI	Fouling Index
GAZ	A type of thread (a metric thread)
i.e.	For Example
kPa	kiloPascals
L	Litre
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LPH	Litre Per Hour
LPM	Litre Per Minute
LSI	Langelier Saturation Index
mm	millimeter
MW	Molecular Weight
nm	nanometer
NPT	National Pipe Thread
NPTF	National Pipe Thread Female
NPTM	National Pipe Thread Male
OD	Outer Diameter
RO	Reverse Osmosis
TOC	Total Organic Carbon

1-2 CONVERSION FACTORS

To convert from	to	multiply by	example
Litres	US Gallon	0.258	1 L = 0.264 US Gal.
Litres	Imperial Gallon	0.215	1 L = 0.220 Imp. Gal.
mm	inches	0.03937	1 inch = 25.4 mm = 2.54 cm
mm	feet	0.0037	1 foot = 304.8 mm = 30.48 cm
kg	lb	2.2	1 kg = 2.2 lb
bar	psi	14.7	1 bar = 1 b= 14.7 psi
bar	kPa	100	1 bar = 100 kPa
°C	°F	$(1.8 * °C) + 32$	25 °C = 77 °F
LPM	US Gal. per minute	0.264	500 ml/min. = 0.500 LPM = 0.132 USG/min.

1-3 SAFETY INFORMATION

SAFETY STATEMENT

Your RiOs System should be operated according to the instructions in this manual. In particular, the hydraulic and electrical specifications should be followed and met. It is important to use this equipment as specified in this manual; using this equipment in a different manner may impair the safety precautions of the RiOs System.

⚠ HAZARD	**Do not open the RiOs System cabinet at any time.** Electrical and mechanical components inside the RiOs System could pose a hazard. A qualified Millipore Service Representative should perform any work that needs to be done while the RiOs System cabinet is opened.

SAFETY SYMBOLS

Symbol	**What it means**
⚠	This <u>HAZARD</u> symbol is used to refer to instructions in this manual that need to be done safely and carefully.
△	This <u>ATTENTION</u> symbol is used to refer to instructions in this manual that need to be done carefully.
☀ UV-C	This <u>UV RADIATION</u> sticker is used to refer to a position on the RiOs System Cabinet or inside of it where exposure to UV light is possible.
⚠	This <u>DANGER</u> sticker is used to refer to a position on the RiOs System Cabinet or inside of it that could be hazardous.
⏚	This <u>ELECTRICAL GROUND</u> sticker is used to refer to a position on the RiOs System Cabinet or inside where an electrical ground connection is made.
⚡	This <u>ELECTRICAL DANGER</u> sticker is used to refer to a position on the RiOs System Cabinet or inside where an electrical danger could exist.

1-4 CONTACTING MILLIPORE

TELEPHONE

See the Business Card(s) on the inside cover of your User's Manual Binder.

INTERNET AND EMAIL

The Email address shown below can be used to submit a question to Millipore via electronic mail. The Millipore Internet Site can be used to find addresses, telephone/fax numbers and other information.

Internet Site Address: www.millipore.com   **Email:** H2O@millipore.com

www.millipore.com/techservice

MANUFACTURING SITE

Millipore SAS

67120 Molsheim

FRANCE

Chapter 2   PRODUCT INFORMATION

2-1   RiOs PRODUCT WATER SPECIFICATIONS

PRODUCT WATER FLOW RATES

RiOs 50, 100, 150 AND 200 FLOW rates

A single RiOs RO Cartridge will make 50 LPH (between 7 °C and 30 °C). A Flow Controller will limit the RO Permeate on a single RO Cartridge to approximately 50 LPH.

RiOs 30 FLOW rates

A single RiOs 30 RO Cartridge will make 30 LPH (between 7 °C and 30 °C). A Flow Controller will limit the RO Permeate to approximately 30 LPH. A RiOs 30 uses a different type of RO Cartridge than the RO Cartridges used with RiOs 50, 100, 150 and 200 RiOs Systems.

RiOs SYSTEM	PRODUCT WATER FLOW RATE Nominal Flow 7 – 30 °C (See bottom 2 rows of this table)	NUMBER OF RO CARTRIDGES
RiOs 30	30 LPH	1
RiOs 50	50 LPH	1
RiOs 100	100 LPH	2
RiOs 150	150 LPH	3
RiOs 200	200 LPH	4
Water temperature < 25 °C and 10 bar operating pressure.		
Water temperature ≥ 25 °C and 7 bar operating pressure.		

PRODUCT WATER QUALITY

- Ionic % Rejection 95% - 99%
- Micro-Organisms < 10 CFU/ml
- Particle Rejection > 99%
- Organic Rejection > 99% (for MW > 200)

2-2   SYSTEM RECOVERY

WHAT IS RO RECOVERY?

An RO Cartridge has 1 feedwater inlet and 2 water streams exiting it. One exiting water stream is called the RO Permeate. The other is called the RO Reject.

The RO % Recovery is a comparison of the RO Permeate flow rate to the RO Feedwater flow rate. It can be thought of as how much water you 'recover' from the RO as a useful product.

It is calculated as:

% Recovery = [(Permeate flow rate / Feedwater flow rate] * 100%

Membrane % Recovery is defined as the recovery of a single RO Cartridge.

System % Recovery is defined as the amount of water produced relative to the amount going into the entire RiOs System.

In most cases, the Membrane and System Recovery values will not be the same number.

RiOs SYSTEM RECOVERY

A RiOs System can be operated with a System Recovery between 30% to 70%. This value will depend upon several factors including the chemical makeup of the Feedwater.

System Recovery is defined above. See "What is RO Recovery?"

The RiOs System Recovery is factory pre-set. If desired, the RiOs System Recovery can be modified. Contact Millipore for assistance.

A System Recovery set too low will waste water. A low recovery occurs when a lot of RO Reject Water is sent to drain relative to the RO Permeate flow rate (i.e. RO Recovery = 5%).

A System Recovery set too high can possibly cause the RO Cartridges to become clogged. A high recovery occurs when too little RO Reject Water is sent to drain relative to the RO Permeate flow rate (i.e. RO Recovery = 80%).

2-3   SCHEMATIC OF MAIN COMPONENTS

SCHEMATIC OF A RIOS SYSTEM

The water flow through a RiOs Water Purification System is shown here in a flow diagram. A description of each item is in the next section.
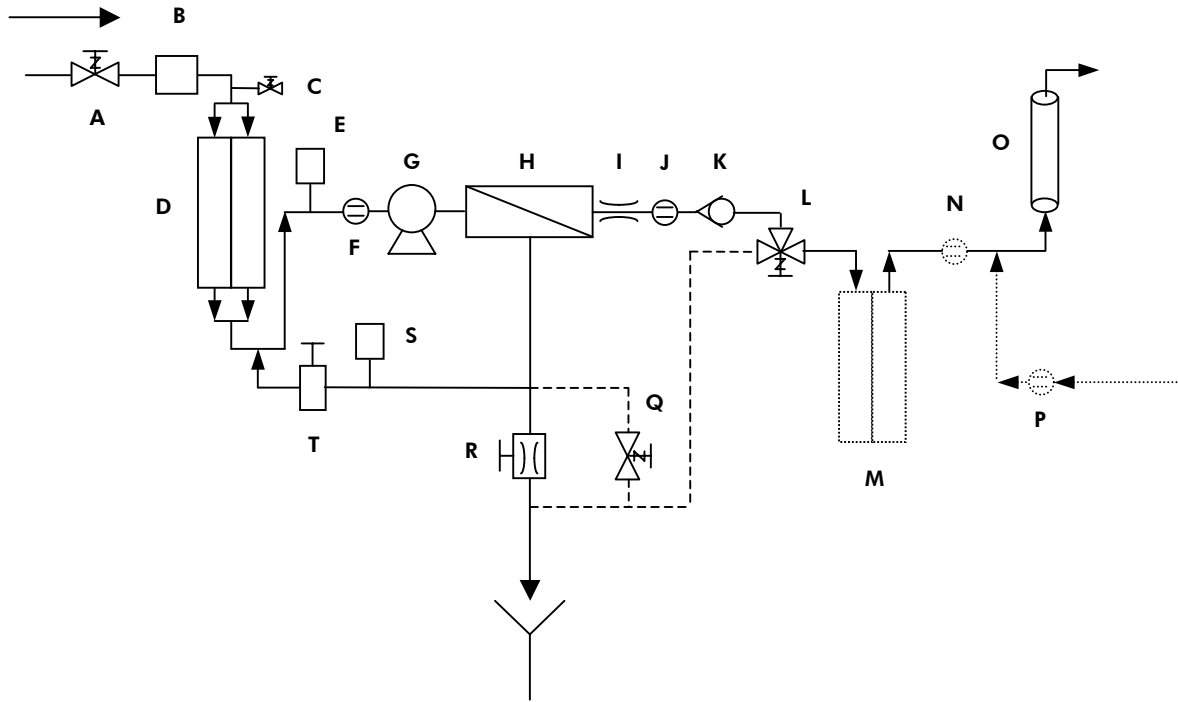
GUIDE TO SCHEMATIC

	Identification of lettered items in the flow schematic above		
Item	**Description**	**Item**	**Description**
A	Inlet Solenoid Valve	K	Permeate Check Valve
B	Flowmeter	L	RO Permeate Divert Solenoid Valve
C	Purge Valve	M	QGard TL1 Polishing Pack (Optional)
D	Progard TL System Pretreatment Pack	N	Resistivity Sensor (Optional)
E	Feedwater Pressure Switch	O	UV Lamp
F	Feedwater Conductivity Cell	P	Loop Resistivity Sensor (Optional)
G	RO Pump (Motor + Pumphead)	Q	RO Reject Solenoid Valve
H	RO Cartridge	R	RO Reject Control Device
I	Flow Controller	S	Pressure Sensor
J	Permeate Conductivity Cell	T	Back Pressure Regulator

RO Cartridge configuration for RiOs Systems

The RO Cartridge configuration for each type of RiOs Water Purification System is shown below.

RiOs 30 / RiOs 50

RiOs 100

RiOs 150

RiOs 200
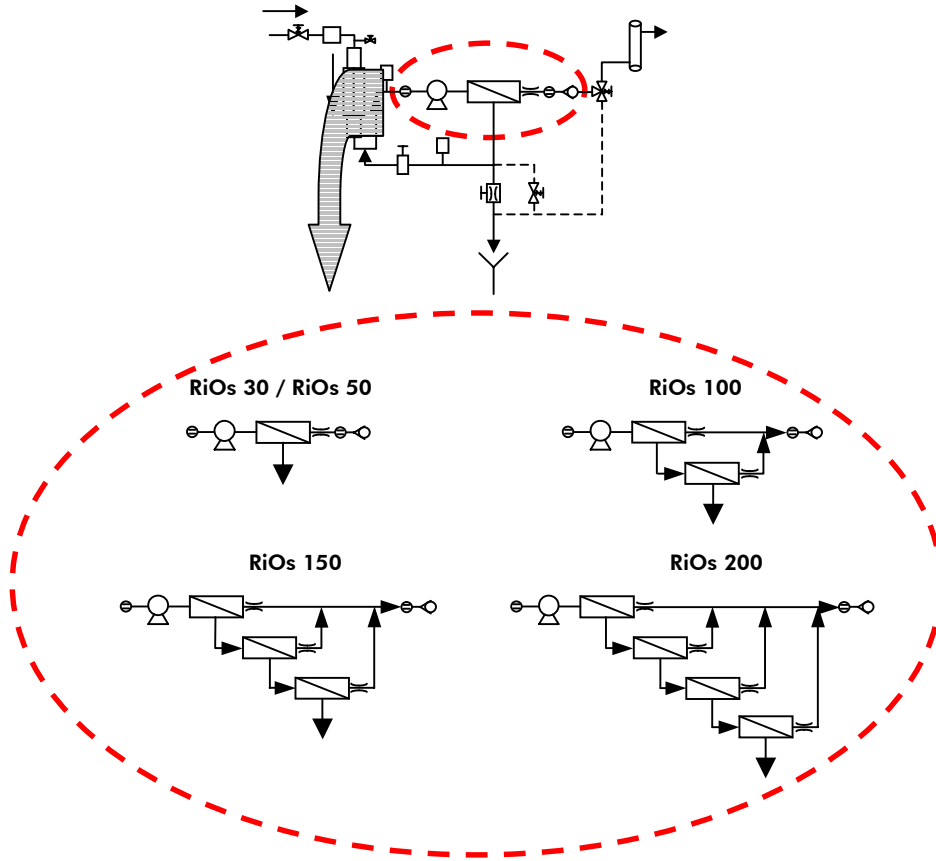
2-4   DESCRIPTION OF INPUT AND OUTPUT CONNECTIONS

This section describes the use of the various ports and other connection places on the front left side of the RiOs System Cabinet.

PORTS

PORT DRAIN 1

The DRAIN 1 Port is used to secure the 1/2 inch OD RO Reject Tubing. This port allows RO Reject Water to exit the RiOs System.

PORT FEED 2

The FEED 2 Port is used to secure the 1/2 inch OD Feedwater Tubing. This port allows Feedwater to enter the RiOs System.

PORT CONC. 3

This port is not used on a RiOs System.

PORT PRODUCT 4

The PRODUCT 4 Port is used to secure 8 mm OD Product Water Tubing. This port allows Product Water to exit the RiOs System.

PORT 5

Port 5 is used when a peripheral device is connected to the RiOs System. This port could be used to allow water to enter the RiOs System to the device inside.

PORT 6

Port 6 is used when a peripheral device is connected to the RiOs System. This port could be used to allow water to enter the RiOs System to the device inside.

PORT 7

Port 7 is used when a peripheral device is connected to the RiOs System. This port could be used to allow water to enter the RiOs System to the device inside.

TANK LEVEL AND RS 232

TANK LEVEL

A Male Stereo Jack from an Analogue Level Sensor can be plugged into the RiOs System here. The Supply Voltage coming from this connection to the Level Sensor is normally 5 VDC but can be set to 24 VDC.

RS 232

This connection allows a 9-pin Male RS 232 Cable to be plugged into the RiOs System. The Transmit and Receive voltages out or into this connection are 5 VDC when active.

GROMMETS

The grommets are not labelled with text on the front left side of the RiOs System Cabinet. The grommet is a rubber device that covers most of a hole drilled in the side of the cabinet.

GROMMET 1

The bottom grommet is designated as Grommet 1. The Electrical Cable going from the RiOs System to the externally located Inlet Solenoid Valve goes through this grommet. The voltage in this electrical cable is either 100, 120 or 230 VAC depending upon the voltage supplied to the RiOs System.

GROMMETS 2 THROUGH 7

These grommets are used to allow an electrical cable to go into or out of the RiOs System. The electrical cable(s) are used to control or to power peripheral devices. The voltage in any one of these electrical cables is dependent upon the device being used and the way that the device is interfaced with the RiOs System PC Board.

2-5   DESCRIPTION OF MAIN COMPONENTS

INLET SOLENOID VALVE

The Inlet Solenoid Valve is used to control the flow of feedwater into the RiOs System.

The Inlet Solenoid Valve is located outside of the RiOs System Cabinet. It receives 100, 120 or 230 VAC from the RiOs System via a 5 meter electrical cable. Typically, it is directly connected to a pipe carrying tap water.

FLOWMETER

A Flowmeter is installed inside every RiOs System. It measures the total feedwater coming into a RiOs System.

As a result of the Flowmeter, the RO Reject flow rate can be determined. This facilitates the manual setting of the RO Reject flow rate (a procedure sometimes done at installation and during the lifetime of the RiOs System).

PROGARD TL SYSTEM PRETREATMENT PACK

PURPOSE OF THE PROGARD TL SYSTEM RETREATMENT PACK

The Progard TL System Pretreatment Pack (called "Progard TL" for the remainder of this manual) is used to prevent mineral scaling, organic fouling and chlorine oxidation with the Reverse Osmosis (RO) Membranes. The Progard TL is a consumable device that needs to be periodically replaced during the maintenance of a RiOs System. The Progard TL is located on the left side of the front of the RiOs System cabinet.

It is possible to buy a type of Progard TL that has a chlorine sanitisation tablet inside. When this type of Progard TL is installed on a RiOs System, the chlorine sanitisation tablet will dissolve. This will sanitise the RO Cartridge located downstream of the Progard. The dissolved chlorine will leave the RiOs System via the drain and will never enter the Product Water Reservoir.

WHAT ARE THE DIFFERENT TYPES OF PROGARD PRETREATMENT PACKS?

There are 4 types of Progard TL Packs. The choice of a Progard TL is based upon 2 factors.

These factors are the Total Chlorine Level and the Fouling Index of the Feedwater. The type of Progard TL used is determined by the magnitude of these parameters. You will be able to choose between a Progard TL1 System Pretreatment Pack ("Progard TL1") or a Progard TL2 System Pretreatment Pack ("Progard TL2"). You can choose either of these with or without a chlorine sanitisation tablet inside.

WHICH TYPE OF PROGARD TL TO USE?

Please contact Millipore. An Applications Specialist will be able to determine the appropriate pretreatment for your RiOs System.

WHEN DO I CHANGE THE PROGARD TL?

The RiOs System will prompt you to change the Progard TL using a LCD Message. The RiOs System will indicate a message "EXCHANGE PT PACK IN 14 DAYS" when the projected Progard TL lifetime is 14 days. The RiOs System will indicate a message "EXCHANGE PT PACK OVERDUE: XXDAYS" if the Progard TL is not changed after 14 days.

The Progard TL is changed due to either the amount of time it has been used or from the amount of water that has passed through it. The RiOs System has the ability to measure the total volume of Feedwater passed through it. It also measures the amount of time that elapsed since the Progard TL was exchanged.

Using these 2 parameters, the RiOs System will be able to project a lifetime for the Progard TL. This lifetime is updated frequently by the RiOs System. The RiOs System will display "N/A" for the Progard TL lifetime during the first 7 days that the Progard TL was installed. After this, you will be able to see projected lifetime for the Progard TL.

PROGARD TL1 OR TL2 SYSTEM PRETREATMENT PACK CATALOGUE NUMBER

See Section 6-1 ("Ordering Information").

PREPAK L1 PRE-SYSTEM PRETREATMENT PAK

PURPOSE OF THE PREPAK L1 PRE-SYSTEM PRETREATMENT PAK

A PrePak L1 Pre-System Pretreatment Pak is used with either a Progard TL1 or a Progard TL2 Pretreatment Pak. A PrePak L1 Pre-System Pretreatment Pak is used when a Progard L alone is not sufficient.

There is one version of the PrePak L1 Pre-System Pretreatment Pak (called "PrePak" in the remainder of this manual).

A PrePak is not included with the RiOs System and needs to be ordered separately.

WHAT IS NEEDED FOR A PREPAK?

A PrePak is mounted on a Pack Holder outside of the RiOs System. The Pack Holder is typically located between the Inlet Solenoid Valve and the RiOs System Cabinet. The Pack Holder is not included with the RiOs System and needs to be ordered separately.

The instructions for mounting the Pack Holder are inside its shipping box. The instructions for mounting it are not inside this manual. Contact Millipore for these instructions if you would like to see them before obtaining the Pack Holder.

WHEN DO I CHANGE THE PREPAK?

It is recommended to change the PrePak when the Progard TL is changed. See "When do I change the Progard TL?" (the section above) for more information.

PREPAK CATALOGUE NUMBER AND PACK HOLDER CATALOGUE NUMBER

See Sections 6-1 and 6-2.

PURGE VALVE

The Purge Valve is used whenever the Progard TL is removed from the front of the RiOs System.

The Purge Valve is opened during a "Pack Change" Mode. When it is open, air will flow through it. The entering air allows any water in the Progard TL to flow into the RiOs System and then to drain. This allows a wetted Progard TL to be emptied of water. This prevents water from flowing out of the Progard TL when it is removed from the RiOs System.

FEEDWATER PRESSURE SWITCH

The Feedwater Pressure Switch is a sensor that detects if there is not sufficient water pressure after the Progard TL. When the water pressure after the Progard TL is < 0.3 bar for ~ 10 seconds, the RiOs System will report a LOW FEED PRESSURE Alarm. This alarm closes the Inlet Solenoid Valve and the RiOs System will shut down.

The Feedwater Pressure Switch is used to determine if the Progard TL is clogged or if the supply of feedwater is turned off.

FEEDWATER AND PERMEATE CONDUCTIVITY CELLS

A Conductivity Cell is a sensor used to measure the electrical conductance of water. The electrical conductivity (electrical conductance per unit length) is directly related to the amount of ions in the water. Higher conductivity values indicate a higher ion content in the water passing through the sensor.

The Feedwater Conductivity Cell is located after the Progard TL and before the RO Cartridge(s). The Permeate Conductivity Cell is located after the RO Cartridge(s).

A comparison between the Feedwater and Permeate Conductivity Cell measurements is done while the RiOs System is operating. This information is used to calculate the RO % Rejection. This indicates the relative percentage of ions removed from the Feedwater ("rejected by the RO").

RO PUMP (MOTOR + PUMPHEAD)

The RO Pump consists of a Motor and a Pumphead. The RO Pump is used to increase the flow rate of water into the RO Cartridge(s). The RO Pump in turn becomes a way of pressuring the Feedwater to the RO Cartridge(s).

- Water temperature ≥ 25 °C   Operate at 7 bar
- Water temperature < 25 °C   Operate at 10 bar

RO CARTRIDGE(S)

Each RO Cartridge removes (rejects) a large percentage of ions from the tap water. In addition, each RO Cartridge removes a large percentage of bacteria and organic material. The RO Cartridge(s) is connected so that there is a single waste stream (RO Reject Stream) that is directed to a sink or a drain. The RO Reject Stream is a single piece of tubing exiting from one of the side ports of the RiOs System Cabinet. All ions, bacteria and organic material removed by the RO are directed to the RO Reject Stream.

A RiOs 50 has 1 RO Cartridge. A RiOs 100 has 2 RO Cartridges. A RiOs 150 has 3 RO Cartridges. A RiOs 200 has 4 RO Cartridges.

A RiOs 30 has 1 RO Cartridge. The RiOs 30 RO Cartridge has a lower flow rate than the RiOs 50 RO Cartridge.

FLOW CONTROLLER

The Flow Controller limits the RO Permeate flow rate to ~ 50 LPH. The exception to this is a RiOs 30 RO Cartridge. Its Flow Controller limits the RO Permeate flow rate to ~ 30 LPH.

RO PERMEATE DIVERT SOLENOID VALVE

The RO Permeate Divert Solenoid Valve is used to divert the RO Permeate Water to drain when the RiOs System is in RINSING Mode and during R.O. RINSE Mode.

PRESSURE SENSOR

The Pressure Sensor is used to measure the water pressure near the Back Pressure Regulator. The measured water pressure is displayed on the LCD.

Back Pressure Regulator

The Back Pressure Regulator is used to adjust the RO Pump Pressure. It also adjusts the amount of water in the RO Reject Water Stream being sent back to the RO Pump Inlet.

RO Reject Control Device

The RO Reject Control Device is used to control the RO Reject Water to the drain. As an example, suppose the RO Reject Water to drain is 120 LPH with a RiOs 50 System. Now suppose someone wants to lower the RO Reject Water to drain to 80 LPH. The RO Reject Control Device can be adjusted until the RO Reject Flow water is 80 LPH.

The use of the RO Reject Control Device allows the RiOs System Recovery to be adjusted.

RO Reject Solenoid Valve

The RO Reject Solenoid Valve is normally closed. For example, during PRODUCTION Mode (when the RiOs System is filling a Reservoir), the RO Reject Solenoid Valve is closed.

The RO Reject Solenoid Valve is opened during other software modes such as FLUSH Mode. When it is open, the feedwater side of the RO Cartridge will get swept clean of accumulated impurities. When the RO Reject Solenoid Valve closes, the RO Reject Water is sent through the RO Reject Control Device.

UV Lamp

What does the UV Lamp do?

The UV Lamp is powered during PRODUCTION Mode. It emits UV light at 254 nm (Germicidal action) using approximately 10 W of electrical power. The UV Lamp is used to kill bacteria.

How often do I change the UV Lamp?

It is recommended to change the UV Lamp every 5000 hours of operation. A timer is incremented every minute the UV Lamp is powered. The RiOs System displays the number of days before the UV Lamp needs replacement. This can be viewed in the DATA portion of the software.

When the projected lifetime reaches 14 Days, the LCD Message "EXCHANGE UV LAMP IN 14 DAYS" is displayed. This message is displayed until the UV Lamp is replaced and the software timer is reset.

When the UV lifetime reaches 0 Days, the LCD Message "EXCHANGE UV LAMP OVERDUE: 0 DAYS" is displayed. This message is displayed until the UV Lamp is replaced and the software timer is reset.

UV Lamp Catalogue Number

See Section 6-1.

2-6   DESCRIPTION OF OPTIONAL COMPONENTS

QGARD TL1 POLISHING PAK (OPTIONAL)

PURPOSE OF THE QGARD TL1 POLISHING PAK

A QGard TL1 Polishing Pack can be added to a RiOs System. The purpose of a polishing pack is to deionise the RO Permeate.

HOW CAN THE RIOS SYSTEM BE MADE TO USE A QGARD TL1 POLISHING PAK?

⚠ ATTENTION	**It is not possible to install a QGard TL onto a RiOs System unless a Polisher Upgrade Kit has been added. This kit is not factory installed.**

The Polisher Upgrade Kit allows a QGard Pack Adapter and a Resistivity Sensor to be added to a RiOs System. When the Polisher Upgrade Kit is installed, a QGard TL1 Polisher Pak can be installed and used. The software can then be reconfigured to include the display of the Product Water Resistivity measured by the Resistivity Sensor.

See Section 6-2 for information about ordering the Polisher Kit (catalogue name RiOs/Elix-L Q-Gard TL Kit).

WHAT ARE THE DIFFERENT TYPES OF QGARD TL1 POLISHING PACKS?

There is only one type of QGard TL Pak. See Section 6-1 for information about ordering it.

WHEN DO I CHANGE THE QGARD TL?

An LCD Message "EXCH. QGARD TL: PRODUCT < SETPOINT" is shown to indicate that the QGard TL Pack should be replaced.

This message is shown when the resistivity measured after the QGard is less than the Resistivity Setpoint.   The Resistivity Setpoint can be seen using the LCD. This message is not shown after a specific number of days. A timer is not used for the QGard TL Pack lifetime.

RESISTIVITY SENSOR (OPTIONAL)

The Resistivity Sensor is used to measure the electrical resistivity of the QGard Product Water. The resistivity and the water temperature are shown on the LCD during PRODUCTION Mode.

The Resistivity Sensor is not factory installed.   It is included in the Polisher Upgrade Kit (see above for more information).

LOOP RESISTIVITY SENSOR (OPTIONAL)

Another Resistivity Sensor can be added to a RiOs System as an accessory. It can be used to measure the resistivity of water in a distribution loop. For example, suppose a RiOs 100 has the Polisher Upgrade Kit added. The deionised Product Water is sent to an SDS 350 (a 350 L Storage Reservoir sold by Millipore). The SDS has a pump that sends pressurised water into a distribution loop. A sampling port is used to send some water from the distribution loop to a resistivity cell. The measured resistivity is shown on the LCD as the SDS Resistivity.

The Loop Resistivity Sensor is not factory installed in the RiOs System. It is available in an upgrade kit. The Resistivity Sensor is then installed inside the RiOs System. Water from the distribution loop goes to the sensor. It then goes out of the RiOs System back to the SDS.

2-7   TECHNICAL SPECIFICATIONS

DIMENSIONS

SYSTEM HEIGHT, WIDTH AND DEPTH

The height, width and depth of a RiOs System are shown here:

44,1 cm

66,2 cm

73,3 cm

5,0 cm

21,4 cm
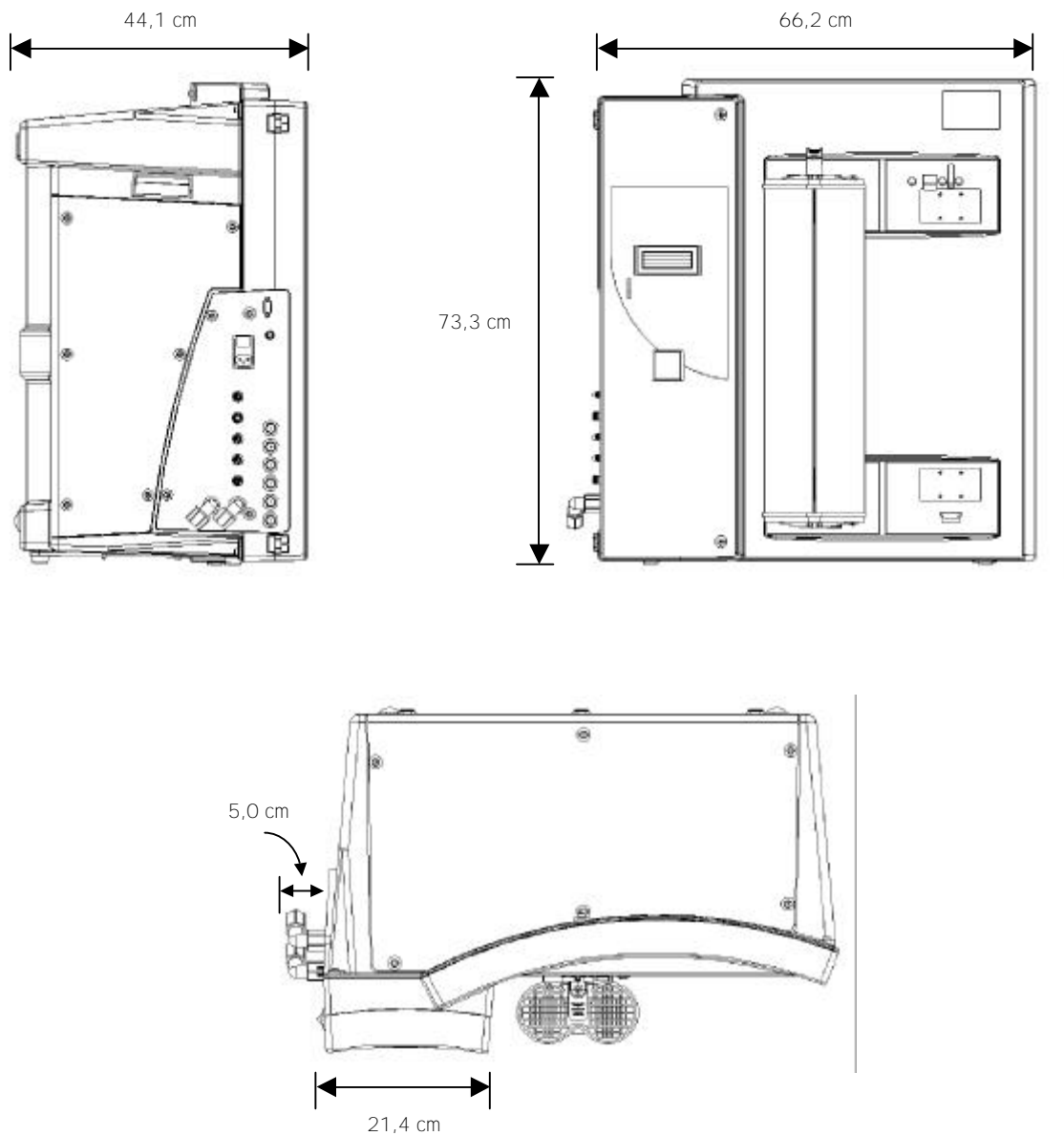
SHIPPING CONTAINER

- Height: 96 cm
- Width: 82 cm
- Depth: 82 cm

WEIGHT

SYSTEM	RiOs 30	RiOs 50	RiOs 100	RiOs 150	RiOs 200
Operating Weight	36 kg	36 kg	39 kg	42 kg	45 kg
Dry Weight	30 kg	30 kg	32 kg	34 kg	36 kg
Shipping Weight	52 kg	52 kg	54 kg	56 kg	58 kg

OPERATING WEIGHT

Operating Weight is defined as a system having a wetted Progard TL and all tubings, RO Cartridges full of water. If an accessory has been added to the RiOs System, then its weight would have to be added to the Operating Weight.

DRY WEIGHT

Dry Weight is defined as an unused system without its shipping container. It does not include the Progard TL or any accessories.

SHIPPING WEIGHT

Shipping Weight is defined as a dry system in its shipping container. It does not include the Progard TL or any accessories (i.e. an External Booster Pump).

PROGARD TL WETTED WEIGHT

A wetted Progard TL Pack, by itself, weighs 5 kg.

OPERATING PRESSURES

The Recommended Operating Pressures are shown below. An Operating Pressure is defined as the Post Pump Pressure during PRODUCTION Mode. This value is shown on the LCD in PRODUCTION (DATA) Mode.

- Water temperature ≥ 25 °C   Operate at 7 bar
- Water temperature < 25 °C   Operate at 10 bar

ENVIRONMENTAL

- Indoor Use Only
- Ambient Storage Temperature   Between 2 °C and 40 °C
- Altitude   Less than 3000 meters
- Installation Category   II
- Pollution Degree   2
- Relative Humidity   Max. 80% without condensation

ELECTRICAL

The electrical requirements for a RiOs System are:

- 100 VAC ± 10%, 50/60 Hz. 10 amp source, 10 amp T fuse used (Millipore Spare Part FTPF04803)

- 120 VAC ± 10%, 50/60 Hz. 10 amp source, 10 amp T fuse used (Millipore Spare Part FTPF04803)

- 230 VAC ± 10%, 50/60 Hz. 5 amp source, 10 amp T fuse used (Millipore Spare Part FTPF04803)

⚠️ The source of electrical power should be within 1 meter of the RiOs System. The source of electrical power must be earth grounded.

POWER USED AT EACH VOLTAGE

The power values shown below are typical when the RiOs System is in PRODUCTION Mode. The power values do not include any accessory devices being powered by the RiOs System (i.e. External Booster Pump powered by the RiOs System).

The RiOs System Catalogue Number is listed alongside the power value in the table below.

SYSTEM	RiOs 30	RiOs 50	RiOs 100	RiOs 150	RiOs 200
230 VAC	460 VA ZROS50030	460 VA ZROS50050	460 VA ZROS50100	460 VA ZROS50150	460 VA ZROS50200
120 VAC	480 VA ZROS60030	480 VA ZROS60050	480 VA ZROS60100	480 VA ZROS60150	480 VA ZROS60200
100 VAC – 50 Hz	460 VA ZROS70030	460 VA ZROS70050	460 VA ZROS70100	460 VA ZROS70150	460 VA ZROS70200
100 VAC – 60 Hz	460 VA ZROS80030	460 VA ZROS80050	460 VA ZROS80100	460 VA ZROS80150	460 VA ZROS80200

MATERIALS OF CONSTRUCTION FOR WETTED COMPONENTS

Please contact Millipore for a list of the materials of construction for wetted components.

NOISE LEVEL

A RiOs System has a maximum noise level of 70 dB at a distance of 1 meter away.

MEASUREMENT RANGES FOR CONDUCTIVITY, TEMPERATURE, PRESSURE AND FLOW

The RiOs System can display various parameters. The range of measurement of each parameter is written below.

- Feedwater Conductivity Measurement Range: 1 – 4626 µS/cm at 25 °C

- Permeate Conductivity Measurement Range: 0.06 – 194 µS/cm at 25 °C

- Temperature Measurement Range: 1 – 50 °C

- Pressure Measurement Range: 0 – 20 bar

- Flowmeter Measurement Range: 0 - 999 LPH

Chapter 3 USING THE RiOs SYSTEM

3-1 HOW THE RiOs NORMALLY DELIVERS PRODUCT WATER

SDS AND LOOPS

The Product Water from a RiOs System is normally delivered to a Storage Reservoir (called an SDS). The SDS usually has a Distribution Pump. The Distribution Pump is used to pressurise stored water and to send it through a network of pipes (a Loop). The Loop is used to deliver water to various applications such as a dishwasher, humidifiers and so forth. The water from the Loop that is not used is returned back the SDS.

AUTOMATIC METHOD

The RiOs System will enter PRODUCTION Mode automatically if it is connected to an SDS or similar type of storage reservoir.

```
PRODUCTION       ■40%          TANK  FULL       ■99%
REJ.   :  98.0%                REJ.    :  98.0%
              DATA ▶                         DATA ▶
          STANDBY ▷                      STANDBY ▷
```
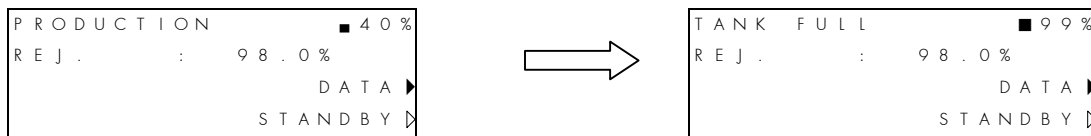
A parameter called the TANK LEVEL RESTART is used to go from TANK FULL Mode to PRODUCTION Mode. This parameter is factory set to 80%. When the RiOs System is in TANK FULL Mode and water is withdrawn from the Reservoir, then the RiOs will go to PRODUCTION Mode automatically when the Reservoir is 80% full.

```
TANK  FULL       ■99%          PRODUCTION       ■43%
REJ.    :  98.0%               REJ.    :  98.0%
              DATA ▶                         DATA ▶
          STANDBY ▷                      STANDBY ▷
```
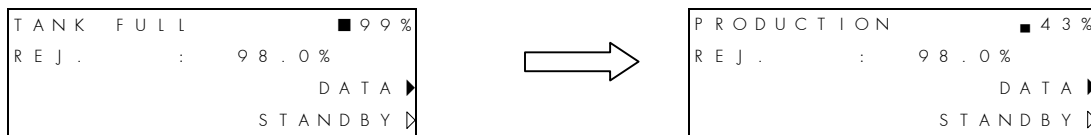
MANUAL METHOD

1. Start in STANDBY Mode.

2. Press the PRODUCTION Keypad Button for about 2 seconds.

```
STANDBY                        TESTING  FEED  PRESS.
          SETUP ▶                 PLEASE  WAIT . . .
    MAINTENANCE ▶
     PRODUCTION ▷
```
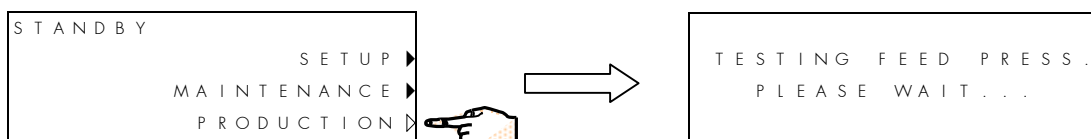
Press PRODUCTION for about   Lasts for about 16 seconds.
2 - 3 seconds.

3. The RiOs System will perform a Pressure Test for about 16 seconds. This tests the pressure reaching the RiOs System.

4. The RiOs System will go into RINSING Mode for a minimum of 1 minute. See Section 3-5 for an explanation about RINSING Mode.

5. When RINSING Mode is finished, the RiOs System will go into PRODUCTION Mode.

```
┌─────────────────────────┐          ┌─────────────────────────┐
│R I N S I N G      ■ 4 0 %│          │P R O D U C T I O N  ■ 4 0 %│
│R E J .    :   9 8 . 0 %  │   ⇨      │R E J .    :   9 8 . 0 %  │
│              D A T A  ▶  │          │              D A T A  ▶  │
│          S T A N D B Y ▷ │          │          S T A N D B Y ▷ │
└─────────────────────────┘          └─────────────────────────┘
```
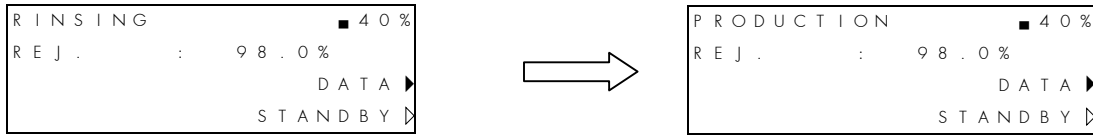
If a Polisher Upgrade Kit or a Loop
Resistivity Sensor has been added, then this
LCD will look different. See Section 3-2.

6. The RiOs System will stay in PRODUCTION Mode until TANK FULL Mode. TANK FULL Mode results when a level sensor device on a storage reservoir indicates that it is full. In this example, the reservoir water level went from 40% full to 100% full. The RO % Rejection shown in TANK FULL Mode is the last value measured in PRODUCTION Mode.

```
┌─────────────────────────┐          ┌─────────────────────────┐
│P R O D U C T I O N  ■ 4 0 %│        │T A N K   F U L L    ■ 9 9 %│
│R E J .    :   9 8 . 0 %  │   ⇨      │R E J .    :   9 8 . 0 %  │
│              D A T A  ▶  │          │              D A T A  ▶  │
│          S T A N D B Y ▷ │          │          S T A N D B Y ▷ │
└─────────────────────────┘          └─────────────────────────┘
```
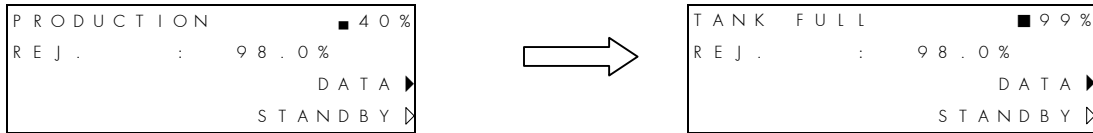
7. Press STANDBY to exit PRODUCTION Mode if you do not want to go to TANK FULL Mode.

ALARM MESSAGE DISPLAYED

1. Certain Alarm Messages, when activated, will cause PRODUCTION Mode to stop (i.e. LOW FEED PRESSURE Mode). See Section 5-1 for an explanation of the Alarm and Maintenance Messages.

```
┌─────────────────────────┐          ┌─────────────────────────────┐
│P R O D U C T I O N  ■ 4 0 %│        │S Y S T E M   S T O P P E D ■ 4 0 %│
│R E J .    :   9 8 . 0 %  │   ⇨      │⌜ - L O W   F E E D   P R E S S U R E ⌟│
│              D A T A  ▶  │          │              R E S U M E  ▶  │
│          S T A N D B Y ▷ │          │          S T A N D B Y ▷ │
└─────────────────────────┘          └─────────────────────────────┘
```
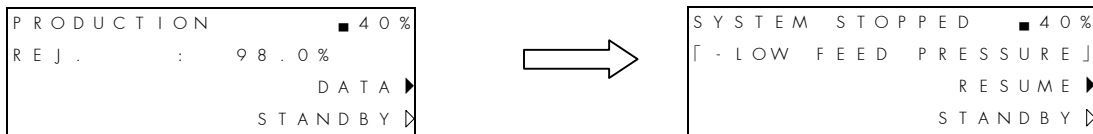
2. When the cause of the Alarm Stop Message has been corrected, press RESUME to go back to PRODUCTION Mode.

3-2 RiOs with a Polisher or Loop Resistivity Sensor added

There are a few additional LCD Messages shown when the QGard TL Pack is used or if a Loop Resistivity Sensor has been added.

1. PRODUCTION Mode for a **RiOs System without a Polisher Upgrade Kit** looks like:

```
R I N S I N G          ■ 4 0 %
R E J .      :    9 8 . 0 %
                   D A T A ▶
               S T A N D B Y ▷
```
⟹
```
P R O D U C T I O N    ■ 4 0 %
R E J .      :    9 8 . 0 %
                   D A T A ▶
               S T A N D B Y ▷
```
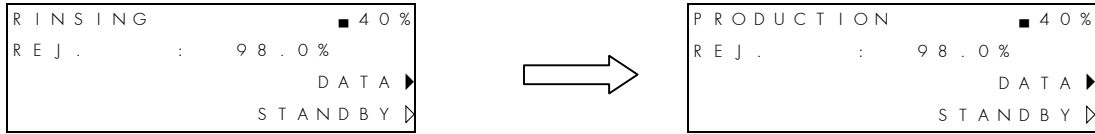
2. PRODUCTION Mode for a **RiOs System with a Polisher Upgrade Kit** looks like:

```
R I N S I N G          ■ 4 0 %
P R O D U C T :  1 3 . 2 M Ω  T C
                   D A T A ▶
               S T A N D B Y ▷
```
⟹
```
P R O D U C T I O N    ■ 4 0 %
P R O D U C T :  1 3 . 2 M Ω  T C
                   D A T A ▶
               S T A N D B Y ▷
```
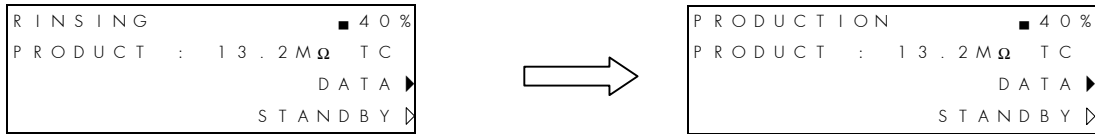
3. PRODUCTION Mode for a **RiOs System with a Loop Resistivity Sensor** looks like:

```
R I N S I N G          ■ 4 0 %
D I S T      :    3 . 2 M Ω  T C
                   D A T A ▶
               S T A N D B Y ▷
```
⟹
```
P R O D U C T I O N    ■ 4 0 %
D I S T      :    3 . 2 M Ω  T C
                   D A T A ▶
               S T A N D B Y ▷
```
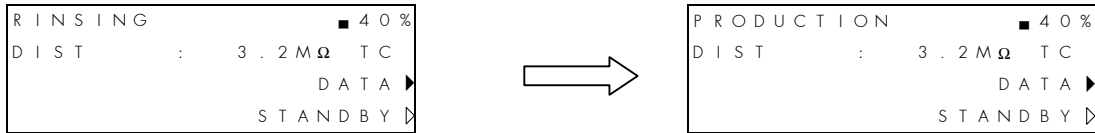
Summary	
PRODUCTION Mode with REJ. (%)	RiOs System with no Polisher and no Loop Resistivity Sensor
PRODUCTION Mode with PRODUCT (MΩ)	RiOs System with a QGard Polisher Upgrade Kit added. PRODUCT is the resistivity after the QGard Polisher.
PRODUCTION Mode with DIST (MΩ)	RiOs System with Loop Resistivity Cell. The measured resistivity from the Distribution Loop is the DIST value. Note that a Polisher must exist on the RiOs System in order to have deionised water in the Distribution Loop.

3-3   HOW TO VIEW THE RIOS SYSTEM PERFORMANCE

There are several parameters that can be seen using the DATA Button. These parameters are explained and shown below.

1. Start in PRODUCTION Mode. Press the DATA Keypad Button. If the RiOs System is **without a Polisher Upgrade Kit or without a Loop Resistivity Cell**, then the LCD will look like:

```
P R O D U C T I O N        ■ 4 0 %
R E J .       :    9 8 . 0 %
                      D A T A  ▶
                   S T A N D B Y  ▷
```

```
P R O D U C T    Q U A L I T Y

T E M P        :      1 2 ° C
                              →  ▶
```
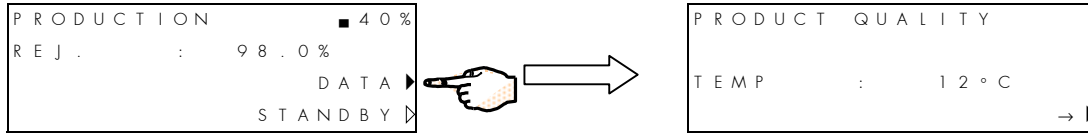
The RO Permeate Temperature is shown here.

2. Start in PRODUCTION Mode. Press the DATA Keypad Button. If the RiOs System is **with a Polisher Upgrade Kit**, then the LCD will look like:

```
P R O D U C T I O N        ■ 4 0 %
P R O D U C T  :  1 3 . 2 M Ω    T C
                      D A T A  ▶
                   S T A N D B Y  ▷
```

```
P R O D U C T    Q U A L I T Y
P R O D U C T  :  1 3 . 2 M Ω    T C
T E M P        :      1 5 ° C
                              →  ▶
```
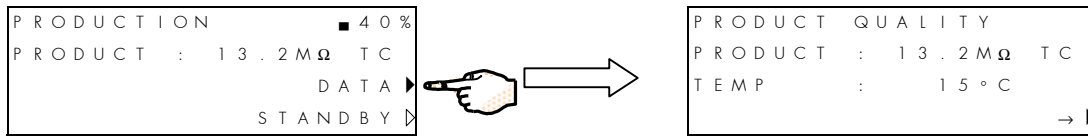
The post QGard TL Polisher resistivity is 13.2 MΩ.cm. The same water has a temp. of 15 °C.

3. Start in PRODUCTION Mode. Press the DATA Keypad Button. If the RiOs System is **with a Loop Resistivity Sensor**, then the LCD will look like:

```
P R O D U C T I O N        ■ 4 0 %
D I S T       :    3 . 2 M Ω    T C
                      D A T A  ▶
                   S T A N D B Y  ▷
```

```
P R O D U C T    Q U A L I T Y
D I S T       :      3 . 2 M Ω    T C
T E M P        :      1 0 ° C
                              →  ▶
```
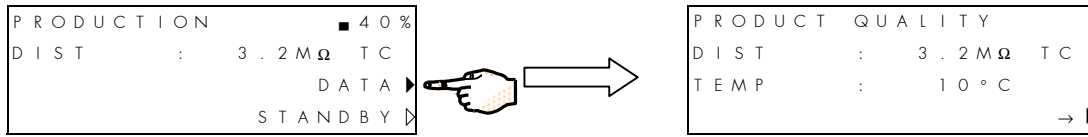
The Loop water has a resistivity of 3.2 MΩ.cm. The same water has a temp. of 10 °C.

4. When the Permeate Temperature is shown, press the Bottom Keypad Button to see the RO Cartridge performance.

```
P R O D U C T    Q U A L I T Y

T E M P        :      1 2 ° C
                              →  ▶
```

```
R O    M E M B .    P E R F O R M .
F E E D        :      5 3 6 μ S    T C
P E R M E A T E :    8 . 9 μ S    T C
R E J .        :    9 8 . 4 %      →  ▶
```
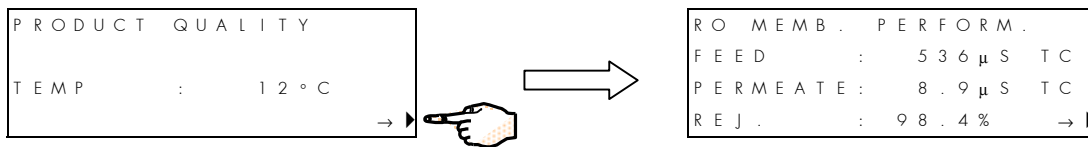
5. When the RO Cartridge performance is shown, press the Bottom Keypad Button to see the PRESSURE DATA.

```
R O    M E M B .    P E R F O R M .
F E E D        :      5 3 6 μ S    T C
P E R M E A T E :    8 . 9 μ S    T C
R E J .        :    9 8 . 4 %      →  ▶
```

```
P R E S S U R E    D A T A
R O           :    1 0 . 0    b a r
F E E D       :    2 . 1    b a r
                              →  ▶
```
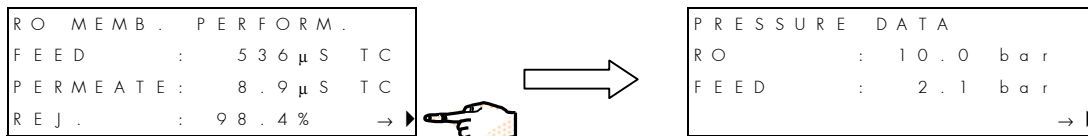
The RO Cartridge performance is shown here.

Feedwater pressure is 2.1 bar and the applied RO pressure is 10.0 bar.

6. Press the Bottom Keypad Button to see the FLOWMETER DATA.

```
P R E S S U R E   D A T A
R O           :   1 0 . 0   b a r
F E E D       :     2 . 1   b a r
                              →  ▶
```
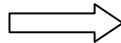
```
R O   F L O W   D A T A
P R E S S U R E :   1 0 . 0   b a r
F : 2 0 0   l / h   R E C :   5 0   %
                              →  ▶
```

The Feedwater flow rate is 200 LPH. In this example, a RiOs 100 was used and the calculated System Recovery is 50%.

7. Press the Bottom Keypad Button to see the CONSUMABLE TIMER.

```
R O   F L O W   D A T A
P R E S S U R E :   1 0 . 0   b a r
F : 2 0 0   l / h   R E C :   5 0   %
                              →  ▶
```
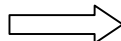
```
C O N S U M A B L E   T I M E R S   1
P R O G A R D   R T I M E   :     5 6 D
U V   L A M P   R T I M E   :   2 1 5 D
                              →  ▶
```

In this example the Progard TL needs to be replaced in 56 days and the RiOs System UV Lamp needs to be replaced in 215 days.

8. Press the Bottom Keypad Button to see the Setpoints.

```
C O N S U M A B L E   T I M E R S   1
P R O G A R D   R T I M E   :     5 6 D
U V   L A M P   R T I M E   :   2 1 5 D
                              →  ▶
```
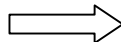
```
S E T P O I N T   D A T A
P E R M E A T E : 1 0 0 μ S   T C
P R O D U C T   :   1 0 M Ω   T C
D I S T         :     2 M Ω   T C   →  ▶
```

9. Press the Bottom Keypad Button to see DATA PRINT.

```
S E T P O I N T   D A T A
P E R M E A T E : 1 0 0 μ S   T C
P R O D U C T   :   1 0 M Ω   T C
D I S T         :     2 M Ω   T C   →  ▶
```
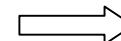
```
D A T A   P R I N T
          C U R R E N T   V A L U E S  ▶
                  3 0 D   H I S T O R Y  ▶
                                    X  ▶
```

10. Press the Bottom Keypad Button to return to PRODUCTION Mode.

```
D A T A   P R I N T
          C U R R E N T   V A L U E S  ▶
                  3 0 D   H I S T O R Y  ▶
                                    X  ▶
```
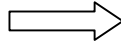
```
P R O D U C T I O N           ■ 4 5 %
R E J .         :     9 8 . 0 %
                              D A T A  ▶
                          S T A N D B Y  ▷
```

3-4 HOW TO VIEW SERIAL NUMBERS AND MAINTENANCE INFORMATION FROM THE LCD

SERIAL NUMBER FOUND ON THE RiOs SYSTEM CABINET

The Serial Number of the RiOs System can be found on the left side of the RiOs System Cabinet. A Serial Number sticker is placed just above the Feedwater Tubing Port.

SERIAL NUMBER AND OTHER INFORMATION FOUND WITH THE LCD

It is possible to view information about your RiOs System on the LCD. This information includes:

- RiOs System Catalogue Number

- RiOs System Serial Number

- RiOs System Installation Date

- RiOs System Software Version

- RiOs System Accumulative Production Time

- Progard TL Serial Number

- Progard TL Installation Date

- Progard TL Remaining Time

- UV Lamp Remaining Time

Follow the steps below to see the information listed above.

❏ Start in STANDBY Mode. Press MAINTENANCE.

```
STANDBY
┌ * TANK  EMPTY * ┘ SETUP  ▶
            MAINTENANCE  ▶
            PRODUCTION ▷
```
☞ ⟹
```
MAINTENANCE        DATA ▶
    EXCH  PROGARD  PACK ▷

                    → ▶
```

❏ Press the DATA Keypad Button.

```
MAINTENANCE        DATA ▶
    EXCH  PROGARD  PACK ▷

                    → ▶
```
☞ ⟹
```
RiOs  150
CAT.  NB  :  ZLXS51500
SER.  NB  :  F3NN1234A
                    → ▶
```
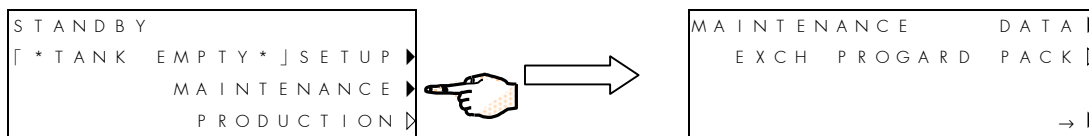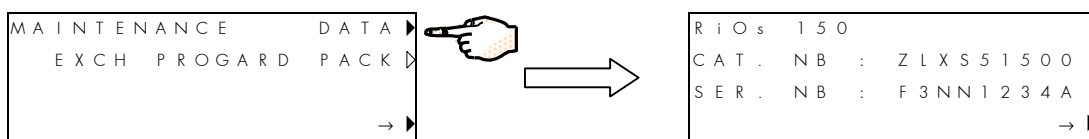
❏ The Catalogue Number for the RiOs System is shown. The Serial Number for the RiOs System is shown.

❏ Press the 4th Keypad Button to access more information about the RiOs System.

```
RiOs  150
CAT.  NB  :  ZLXS51500
SER.  NB  :  F3NN1234A
                    → ▶
```
⟹ ☞
```
INST.DATE  :  01/09/03
SOFTWARE   :  V1.01-01
PRODUCTION:        16h
                    → ▶
```
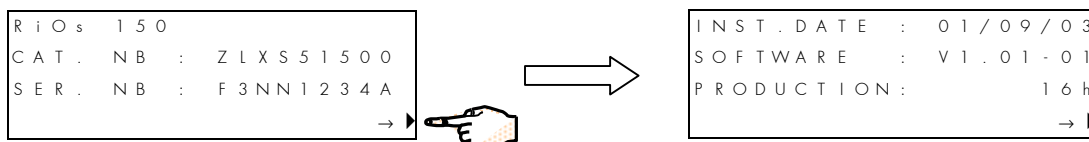
❏ The RiOs System Installation Date is shown. The Software Version is shown. The RiOs System Production Time is shown. This is the accumulated time that the RO Motor has been powered in order to make RO Permeate Water.

❑ Press the 4th Keypad Button to see information about the Progard TL.

```
I N S T . D A T E  :  0 1 / 0 9 / 0 3
S O F T W A R E    :  V 1 . 0 1 - 0 1
P R O D U C T I O N :        1 6 h
                          →  ▶
```

```
P R O G A R D      :
S E R .  N B    : F 3 N N 8 7 2 5 C
I N S T . D A T E : 0 3 / 0 9 / 0 3
R . T I M E     : N A        →  ▶
```
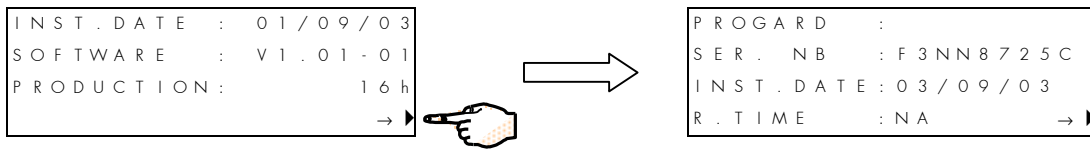
❑ The Progard Serial Number (SER. NB) is shown. The Installation Date (INST.DATE) is shown (d/m/year). The Progard TL Pack Remaining Time (R.TIME) is shown. If the R.TIME value is "NA" (not available), then the Progard TL has been installed within the last 7 days.

❑ Press the 4th Keypad Button to view information about the UV Lamp.

```
P R O G A R D      :
S E R .  N B    : F 3 N N 8 7 2 5 C
I N S T . D A T E : 0 3 / 0 9 / 0 3
R . T I M E     : N A        →  ▶
```

```
U V   L A M P   R T I M E  :      N A



                             X  ▶
```
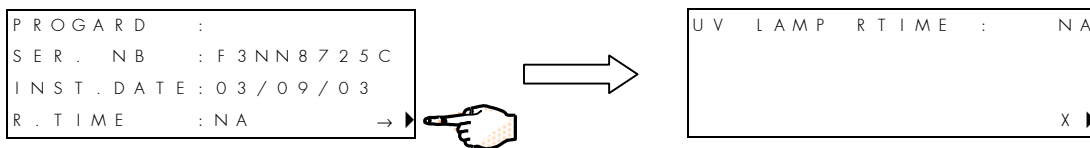
❑ The UV Lamp Running Time (RTIME value) is shown. The value shown is based upon the number of hours the UV Lamp has been powered. If the UV Lamp has been powered for less than 100 hours, then the value is shown as "NA" (Not Available).

❑ Follow the steps below to return to STANDBY Mode.

```
U V   L A M P   R T I M E  :      N A



                             X  ▶
```

```
M A I N T E N A N C E        D A T A ▶
    E X C H   P R O G A R D   P A C K ▷


                             →  ▶
```

```
M A I N T E N A N C E        D A T A ▶
    E X C H   P R O G A R D   P A C K ▷


                             →  ▶
```

```
M A I N T E N A N C E
                     p H   C L E A N ▷
                     C l 2   C L E A N ▷
                             →  ▶
```

```
M A I N T E N A N C E
                     p H   C L E A N ▷
                     C l 2   C L E A N ▷
                             →  ▶
```

```
M A I N T E N A N C E
                     R O   R I N S E ▷


                             X  ▶
```

```
M A I N T E N A N C E
                     R O   R I N S E ▷


                             X  ▶
```

```
S T A N D B Y
⌈ * T A N K   E M P T Y * ⌋ S E T U P ▶
                 M A I N T E N A N C E ▶
                 P R O D U C T I O N ▷
```
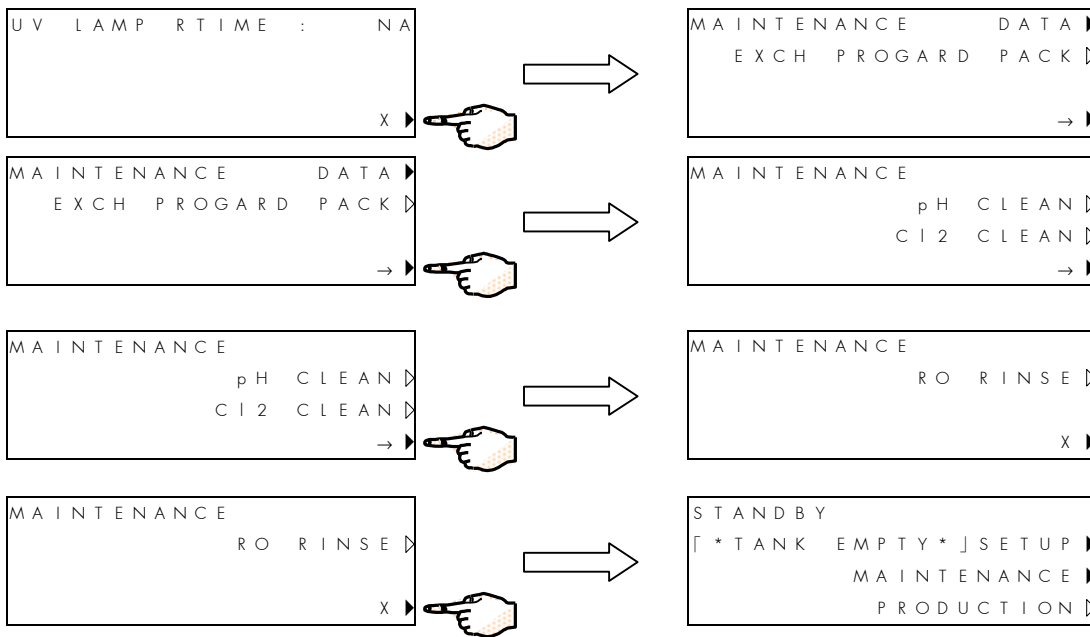
3-5   WHAT ARE THE DIFFERENT OPERATING MODES?

STANDBY MODE

```
STANDBY
                   SETUP  ▶
           MAINTENANCE  ▶
            PRODUCTION ◁
```

The RiOs System is not producing water. STANDBY Mode is used to enter other software modes such as MAINTENANCE, SETUP and PRODUCTION Mode.

PRODUCTION MODE

```
PRODUCTION         ■ 40 %
REJ.    :    98.0 %
                    DATA ▶
                 STANDBY ◁
```

The RiOs System is producing water. A storage reservoir is getting filled with water from the RiOs System. Pressing DATA in PRODUCTION Mode allows various operating parameters to be seen.

RINSING MODE

```
RINSING            ■ 40 %
REJ.    :    98.0 %
                    DATA ▶
                 STANDBY ◁
```

The RiOs System is diverting the RO Permeate to drain instead of sending it to a Storage Reservoir. RINSING Mode is used to insure that only high quality RO Permeate is sent to the Storage Reservoir.

RINSING Mode occurs for a few different reasons.

One reason is that the RiOs System is going into PRODUCTION Mode. RINSING Mode will occur automatically for one minute or more whenever entering PRODUCTION Mode.

The 2nd reason for RINSING Mode is that the RO % Rejection is 1% lower than the Memorised RO % Rejection Value. When 4 continuous minutes of PRODUCTION Mode have occurred, the RO % Rejection is "memorised". RINSING Mode will continue until the RO % Rejection is within 0.5% of the Memorised Value.

FLUSH MODE

```
RO  FLUSH
                   SETUP  ▶
           MAINTENANCE  ▶
                  CANCEL ◁
```

```
RO  FLUSH          ■ 99 %
REJ.    :    98.0 %
                    DATA ▶
                  CANCEL ◁
```

FLUSH Mode occurs when the Inlet Solenoid Valve and the RO Reject Solenoid Valve both are open. This allows Tap Water to enter and to sweep away any accumulated impurities on the Feedwater surface of the RO Cartridge.

FLUSH Mode occurs automatically every 6 hours for 5 minutes in either STANDBY Mode (1st LCD screen shown on the left) or in TANK FULL Mode (2nd LCD).

TANK FULL MODE

```
TANK  FULL         ■ 99 %
REJ.    :    98.0 %
                    DATA ▶
                 STANDBY ◁
```
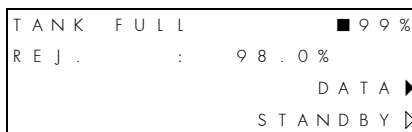
TANK FULL Mode occurs when a Storage Reservoir is full. A Level Sensor in the reservoir sends a signal to the RiOs System indicating that it is full. The RiOs System will stay in TANK FULL Mode until water is withdrawn from the reservoir (i.e. emptied about 20%). The RO % Rejection value measured upon entering TANK FULL Mode is displayed during TANK FULL Mode.

Chapter 4 MAINTENANCE

4-1 SCHEDULED MAINTENANCE TABLE

See the Maintenance Table below for the typical maintenance that needs to be performed on your RiOs System. The catalogue numbers and other ordering information are found in Section 6-1. Detailed information about the various consumable items can be found in Section 2-5.

Item or action	Maintenance Needed	When?	How to?
Clean RO Cartridges	Cleaning.	As necessary.	See Section 4-6.
Other Pretreatment	See Pretreatment Device Owner's Manual for this information.	See Pretreatment Device User Manual for this information.	See Pretreatment Device User Manual for this information.
PrePak L1 Pre-System Pretreatment Pack	Replacement.	Change when Progard TL1 or TL2 Pack is changed.	See information that came with the Pack.
Progard TL1 or TL2 System Pretreatment Pack	Replacement.	When prompted to by an LCD Message.	See Section 4-2.
QGard TL Polisher Pack	Replacement.	When prompted to by an LCD Message.	See Section 4-7.
RO Pump Pressure	Adjustment.	Water temp. < 25 °C, operate at 10 bar. Water temp. ≥ 25 °C, operate at 7 bar.	Contact Millipore. See Section 4-4.
Sanitise RO Cartridges	Sanitisation.	Automatically when the Progard TL1 or TL2 Pack is changed or as needed.	See Section 4-5.
UV Lamp	Replacement.	When prompted to by an LCD Message.	See Section 4-3.

4-2   HOW TO REPLACE THE PROGARD TL

<table>
<tr>
<td>⚠ ATTENTION</td>
<td>**Do not remove the Pack without following the following the software instructions shown below.**</td>
</tr>
</table>

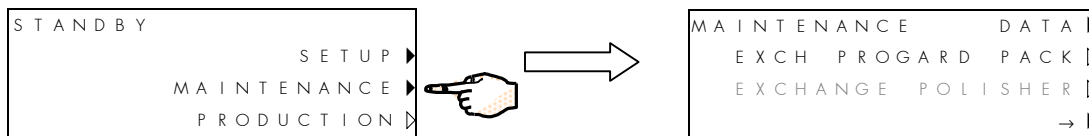### WHEN TO REPLACE THE PROGARD TL

A message, EXCH. PROGARD TL IN XX DAYS, will be shown when it is near the recommended time to exchange the Progard TL. This message is shown 14 days prior to the recommended replacement date. The LCD would show EXCH. PROGARD TL IN 14 DAYS. This message decrements a day at a time until the recommended replacement date.

If the Progard TL is not replaced on the recommended replacement date, then a message, PROGARD TL EXCH. OVERDUE: XX DAYS, is shown.

If the Progard TL is replaced using the MAINTENANCE Menu, then the messages explained above are erased from the LCD.

REMOVING THE USED PROGARD TL

❑ Place the RiOs System into STANDBY Mode. See Section 3-1 for more information if necessary.

❑ Press the MAINTENANCE Keypad Button.

```
STANDBY                             MAINTENANCE        DATA ▶
              SETUP ▶                EXCH PROGARD PACK ▷
        MAINTENANCE ▶                EXCHANGE POLISHER ▷
         PRODUCTION ▷                              → ▶
```

❑ Press the EXCH PROGARD PACK Keypad Button for a few seconds. The Progard TL (on the RiOs System) will automatically be purged of water. This helps to prevent water coming out of the ports of the Progard TL when it is removed from the RiOs System. It will purge for 12 seconds during which time the Pump will operate.

```
MAINTENANCE        DATA ▶                 PURGE
  EXCH PROGARD PACK ▷          PROGARD TL PACK
  EXCHANGE POLISHER ▷          PLEASE WAIT...
               → ▶                        CANCEL ▶
```
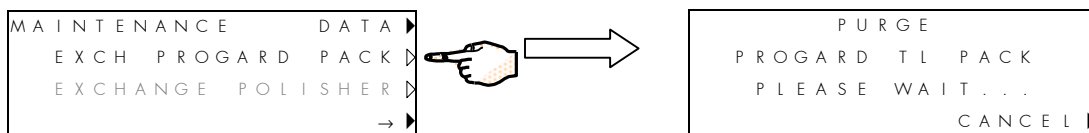
❑ When the Progard TL is purged of water, the LCD will tell you to replace it.

```
        PURGE                      PLEASE REMOVE
PROGARD TL PACK                  PROGARD TL PACK
PLEASE WAIT...
          CANCEL ▶                         CANCEL ▶
```
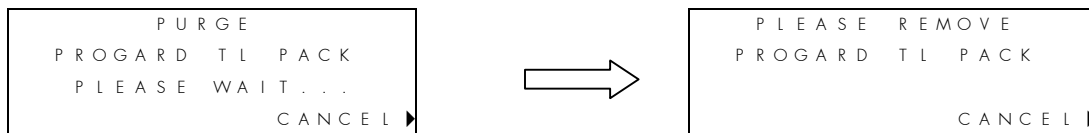
❑ Unlock the Pack by lifting up the clip that holds the Progard TL in place. Gently remove the Progard TL from the RiOs System.

INSTALLING THE NEW PROGARD TL

❑ Remove the new Progard TL from its shipping box. Verify the Millipore Catalogue Number by looking at the sticker on the side of the Progard TL. Remove the plastic covers on the 4 ports of the Progard TL Pack. Look inside the ports to locate the black rubber O-rings. Make sure these are pushed in so they are firmly in-place. Wet the Progard TL Pack O-rings with water.

❑ Look below the ports on the bottom of the Progard TL. Locate the TAG Sensor.

❑ After the used Progard TL is removed, install the new Progard TL with the TAG Sensor at the bottom. The RiOs System will automatically identify the type of Progard TL by accessing data contained on the Pack TAG. Normally the RiOs System will recognise and accept the information from the Progard TL.

❑ Make sure the top and bottom ports of the new Progard TL are pushed in. After this, secure it in place by pushing down on the Pack Locking Handle.
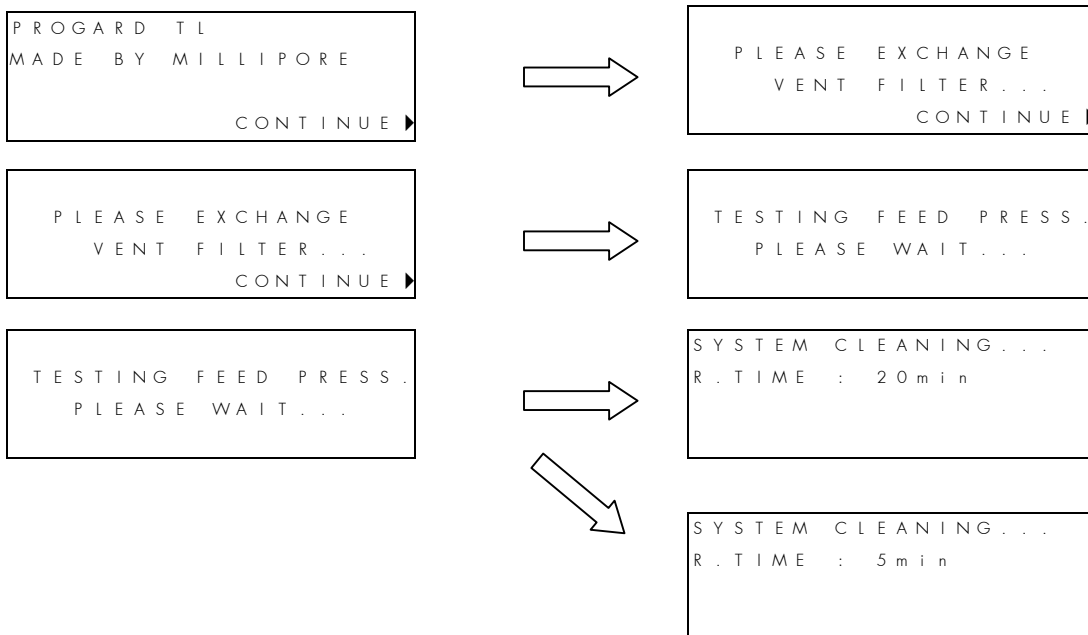
```
  P L E A S E   I N S E R T
        N E W . . .
  P R O G A R D   T L   P A C K
                  C A N C E L ▶
```
⟹
```
  P R O G A R D   T L
  M A D E   B Y   M I L L I P O R E

                C O N T I N U E ▶
```
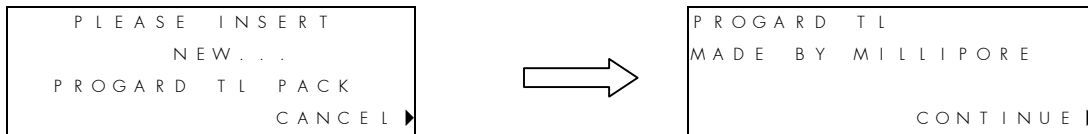
❑ The RiOs System will now rinse the new Progard TL. This is done to empty it of air and to hydrate the material inside.

❑ If you have a Storage Reservoir with a Vent Filter, then the LCD will remind you to change the Vent Filter at this time.

If the Progard TL does not have a chlorine tablet inside of it, then the RiOs System will go into SYSTEM CLEANING Mode for 5 minutes.

If the Progard TL does have a chlorine tablet inside of it, then the RiOs System will go into SYSTEM CLEANING Mode for 20 minutes.

❑ A DEPRESSURISATION Mode and a PRESSURE TEST Mode will occur for a few seconds prior to the 5 minute or 20 minute SYSTEM CLEANING Mode.

```
  P R O G A R D   T L
  M A D E   B Y   M I L L I P O R E

              C O N T I N U E ▶
```
⟹
```
  P L E A S E   E X C H A N G E
      V E N T   F I L T E R . . .
              C O N T I N U E ▶
```

```
  P L E A S E   E X C H A N G E
      V E N T   F I L T E R . . .
              C O N T I N U E ▶
```
⟹
```
  T E S T I N G   F E E D   P R E S S .
      P L E A S E   W A I T . . .
```

```
  T E S T I N G   F E E D   P R E S S .
      P L E A S E   W A I T . . .
```
⟹
```
  S Y S T E M   C L E A N I N G . . .
  R . T I M E   :   2 0 m i n
```

⟹
```
  S Y S T E M   C L E A N I N G . . .
  R . T I M E   :   5 m i n
```

The CANCEL Keypad Button is not shown if
the Progard TL is brand new and never used.

4-3　HOW TO REPLACE THE UV LAMP INSIDE THE RiOs SYSTEM

A message, EXCH. UV LAMP IN XX DAYS, will be shown when it is near the recommended time to exchange the UV Lamp. The message is shown 14 days prior to the recommended replacement date. The LCD would show EXCH. UV LAMP IN 14 DAYS.

It is highly recommended to have a Millipore Field Service Representative change the UV Lamp. The replacement of the UV Lamp involves removing the cover of the RiOs System. The instructions for replacing the UV Lamp are not included in this manual. The instructions are included with the replacement UV Lamp.

Contact Millipore for a copy of these instructions if you would like to see them before ordering a replacement UV Lamp.

If the UV LAMP is not replaced on the recommended replacement date, then a message, UV LAMP EXCH. OVERDUE: XX DAYS, is shown.

If the UV Lamp is replaced, then these messages will not be shown anymore.

4-4　HOW TO CHECK AND ADJUST THE PUMP PRESSURE

The pump pressure is normally adjusted if the water temperature changes significantly.

The pump pressure used at different temperatures is shown below.

- Water temperature ≥ 25 °C　　　Operate at 7 bar pump pressure.

- Water temperature < 25 °C　　　Operate at 10 bar pump pressure

It is recommended to have a Millipore Field Service Representative adjust the pump pressure. The adjustment of the pump pressure involves removing the cover of the RiOs System. The instructions for adjusting the pump pressure are not included in this manual.

Contact Millipore for a copy of these instructions if you would like to see them.

4-5 How to sanitise the RO Cartridge(s)

What is needed to sanitise the RO Cartridge(s)

It is possible to sanitise the RO Cartridges either:

- automatically when you replace the Progard TL1 or TL2, System Cl_2 autoClean Pretreatment Pack
- manually by introducing a chemical sanitant (chlorine tablet) into the RiOs System

The information provided below explains what is needed for either method.

Automatic Way of Sanitisation

Progard TL System Cl_2 Pretreatment Pack with Integrated Chlorine Tablet

The Progard TL System Cl_2 Pretreatment Pack includes a chlorine sanitisation tablet inside. When this type of Progard TL Pack is installed in a RiOs System, the chlorine sanitisation tablet will dissolve. This will sanitise the RO Cartridge located downstream of the Progard TL Pack. The dissolved chlorine will leave the RiOs System via the drain and will never enter the Product Water Reservoir.

How to Automatically Sanitise the RO cartridge(s)

The method used to automatically sanitise an RO Cartridge(s) is very easy. Follow the steps below.

1. A Progard TL1 or TL2 System Cl_2 autoClean Pretreatment Pack is needed. See Section 6-1 for Catalogue Numbers and Ordering Information.

2. Install the pack using the procedure shown in Section 4-2 "How To Replace the Progard TL Pack". The RO Cartridge(s) will automatically be sanitised.

Manual Way of Sanitisation

Cleaning Port Kit

The RiOs/Elix-L Cleaning Port Kit is used to introduce the Chemical Sanitant (as a dry tablet) into the RiOs System. The Cleaning Port, when installed, has a removable cap. This cap can be unscrewed and a Chemical Sanitant (Chlorine Tablet) can be placed inside. It is not possible to make a Chemical Sanitant in the liquid form and pour it into the RO Cartridge.

⚠ ATTENTION	**The Cleaning Port Kit is not supplied with the standard RiOs System. It is necessary to order a Cleaning Port Kit as a separate item. See Section 6-2.**

It is recommended to have a Millipore Field Service Representative install the Cleaning Port Kit. The installation of the Cleaning Port Kit involves removing the cover of the RiOs System. The instructions for installing the Cleaning Port Kit are not included in this manual. The instructions are included with the Kit.

Chlorine Sanitisation Tablets

It is necessary to use Chlorine Sanitisation Tablets as the RO Cartridge Sanitant.

The Millipore Catalogue Number for a container of 45 Chlorine Tablets is ZWCL01F50.

How often should the RO Cartridge(s) be manually sanitised?

Normally the Manual Sanitisation is not necessary if the Automatic Sanitisation is performed with the Progard TL autoClean Pack. However, the end user of the RiOs System may develop a protocol whereby the RiOs System is sanitised on a periodic basis (i.e. every 12 weeks). In this case, the instructions below would be followed for performing a manual sanitisation.

How to manually sanitise the RO Cartridge(s)

- ❑ Make sure you have a Chlorine Tablet (see information above).

- ❑ Make sure the RiOs System has a Cleaning Port installed. It is installed as an accessory device and is not factory installed.

- ❑ Place the RiOs System into STANDBY Mode.

- ❑ Locate the Cleaning Port Cap on the top of the RiOs System. It is located towards the back top end of the RiOs System cabinet.

- ❑ Unscrew the Cleaning Port Cap. Place the Chlorine Tablet into the Cleaning Port. Screw the cap back on.

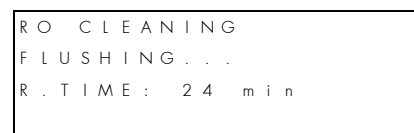| ⚠ ATTENTION	**Make sure the Cleaning Port Cap is tightened after putting in the Chlorine Tablet. Additionally, make sure that the RO Reject Tubing is in a sink or drain. Make sure it is fastened securely in place.**
⚠ HAZARD	**The Chlorine Table will form a strong chemical solution when mixed with water. This solution can be dangerous for your eyes and your skin. Wear Eye Safety Glasses. Use Laboratory Gloves and other appropriate safety equipment.**

- ❑ Press MAINTENANCE.

```
STANDBY                          MAINTENANCE      DATA ▶
          SETUP ▶          ⇨     EXCH PROGARD PACK ▷
    MAINTENANCE ▶                EXCHANGE POLISHER ▷
     PRODUCTION ▷                              → ▶
```

- ❑ Press the Bottom Keypad Button.

```
MAINTENANCE      DATA ▶          MAINTENANCE
  EXCH PROGARD PACK ▷      ⇨              pH CLEAN ▷
  EXCHANGE POLISHER ▷                    Cl2 CLEAN ▷
                → ▶                            → ▶
```

- ❑ Press Cl2 CLEAN for a few seconds. The RiOs System will perform a Pressure Test for about 16 seconds.

```
MAINTENANCE
           pH CLEAN ▷      ⇨     TESTING FEED PRESS.
           Cl2 CLEAN ▷             PLEASE WAIT...
                → ▶
```

- ❑ The RiOs System will go to RO CLEANING Mode. It will flush for 20 minutes.

```
TESTING FEED PRESS.              RO CLEANING
  PLEASE WAIT...          ⇨      FLUSHING...
                                 R.TIME: 24 min
```

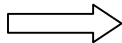❑ The RiOs System will go to RINSING Mode for 5 minutes.

```
RO  CLEANING
FLUSHING...
R.TIME:   5  min
```

⟹
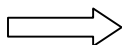
```
RO  CLEANING
RINSING...
R.TIME:  4  min
```
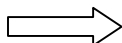
❑ The RiOs System will go to PRODUCTION Mode at the end of the Cl2 CLEAN Mode.

```
RO  CLEANING
RINSING...
R.TIME:   1  min
```

⟹
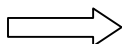
```
TESTING  FEED  PRESS.
     PLEASE  WAIT...
```

```
TESTING  FEED  PRESS.
     PLEASE  WAIT...
```

⟹

```
RINSING          ■40%
REJ.     :   98.0%
              DATA ▶
          STANDBY ▷
```

```
RINSING          ■40%
REJ.     :   98.0%
              DATA ▶
          STANDBY ▷
```

⟹

```
PRODUCTION       ■40%
REJ.     :   98.0%
              DATA ▶
          STANDBY ▷
```

You have finished sanitising the RO Cartridge(s).

4-6   HOW TO CLEAN THE RO CARTRIDGE(S)

WHAT IS NEEDED TO CLEAN THE RO CARTRIDGE(S)

CLEANING PORT KIT

The RiOs/Elix-L Cleaning Port Kit is used to introduce the chemical cleaner (as a pouch containing a dry chemical cleaner) into the RiOs System. The Cleaning Port Kit, when installed, has a removable cap. This cap can be unscrewed and a pouch can be placed inside. It is not possible to make a chemical cleaner in the liquid form and pour it into the RO Cartridge.

⚠ ATTENTION	**The Cleaning Port Kit is not supplied with the standard RiOs System. It is necessary to order a Cleaning Port Kit as a separate item. See Section 6-2.**

It is recommended to have a Millipore Field Service Representative install the Cleaning Port Kit. The installation of the Cleaning Port Kit involves removing the cover of the RiOs System. The instructions for installing the Cleaning Port Kit are not included in this manual. The instructions are included with the Cleaning Port Kit.

ROCLEAN A OR ROCLEAN B TABLETS

Millipore recommends RoClean A or RoClean B as the RO Cartridge cleaner.

RoClean A is an acidic cleaner. The Millipore Catalogue Number for RoClean A is ZWACID012 (10 pouches per box).

RoClean B is a base cleaner. The Millipore Catalogue Number for RoClean B is ZWBASE012 (10 pouches per box).

WHICH CLEANER TO USE, ROCLEAN A OR ROCLEAN B?

Contact Millipore for assistance is choosing the type of cleaner for your RiOs System.

- RoClean B is normally used when the Feedwater contains a high amount of silt and other organic matter.
- RoClean A is normally used when the Feedwater contains a high amount of hardness and alkalinity.

### HOW OFTEN SHOULD THE RO CARTRIDGE(S) BE CLEANED?

Millipore recommends that an RO Cartridge(s) be cleaned whenever:

- the RO % Rejection decreases 3% under standard operating conditions or
- the RO Product Water Flow Rate drops 10% under standard operating conditions

As an example, suppose a new RiOs 150 is operating at 97.5% RO % Rejection. The RiOs System is fed with feedwater from a large lake (surface water). Over the course of a few months, the RO % Rejection has dropped to 93%. In this case, the use of RoClean B is recommended.

HOW TO MANUALLY CLEAN THE RO CARTRIDGE(S)

❑ Make sure you have a RoClean A Pouch or a RoClean B Pouch (see information above).

❑ Make sure the RiOs System has a Cleaning Port Kit installed. It is installed as an accessory device. It does not come factory installed.

❑ Place the RiOs System into STANDBY Mode.

❑ Locate the Cleaning Port Cap on the top of the RiOs System. It is located towards the back top end of the RiOs System Cabinet.

❑ Unscrew the Cleaning Port Cap. Place the Cleaning Pouch into the Cleaning Port. Screw the Cleaning Port Cap back on.
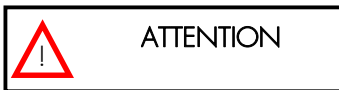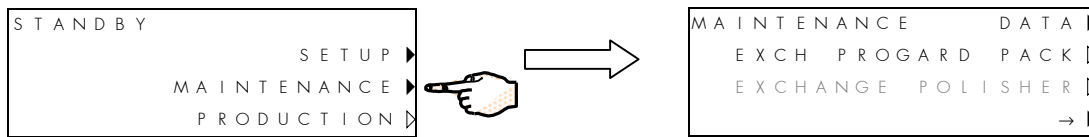
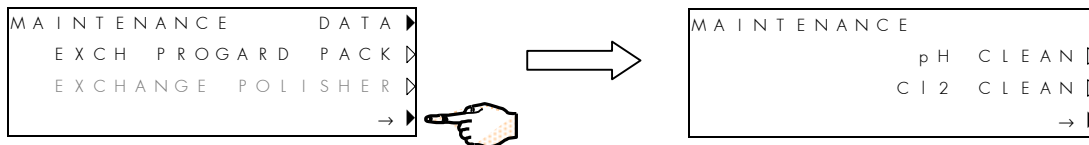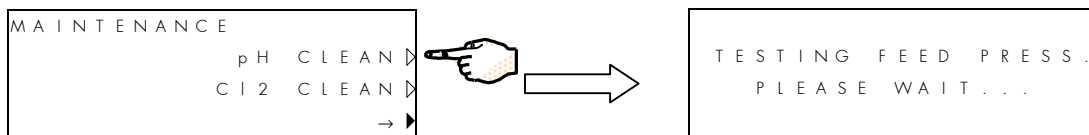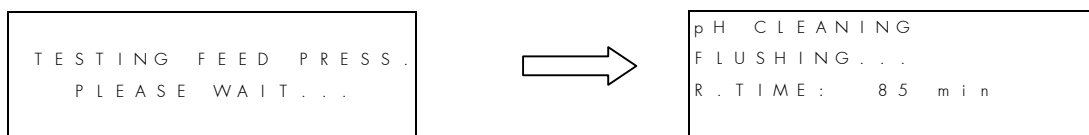| ⚠ ATTENTION	**Make sure the Cleaning Port Cap is tightened after putting in the Cleaning Pouch. Additionally, make sure that the RO Reject Tubing is in a sink or drain. Make sure it is fastened securely in place.**
⚠ HAZARD	**The Cleaning Pouch will form a strong chemical solution when mixed with water. This solution can be dangerous for your eyes and your skin. Wear Eye Safety Glasses and use Laboratory Gloves and other appropriate safety equipment.**

❑ Press MAINTENANCE.

```
STANDBY                          MAINTENANCE      DATA ▶
            SETUP ▶               EXCH  PROGARD  PACK ▷
      MAINTENANCE ▶               EXCHANGE  POLISHER ▷
       PRODUCTION ▷                               → ▶
```

❑ Press the Bottom Keypad Button.

```
MAINTENANCE      DATA ▶          MAINTENANCE
 EXCH  PROGARD  PACK ▷                      pH  CLEAN ▷
 EXCHANGE  POLISHER ▷                      Cl2  CLEAN ▷
                → ▶                                → ▶
```

❑ Press pH CLEAN for a few seconds. The RiOs System will perform a Pressure Test for about 16 seconds.

```
MAINTENANCE
          pH  CLEAN ▷            TESTING  FEED  PRESS.
         Cl2  CLEAN ▷               PLEASE  WAIT . . .
                → ▶
```

❑ The RiOs System will go to FLUSHING Mode for about 1 minute.

```
                                 pH  CLEANING
TESTING  FEED  PRESS.            FLUSHING . . .
   PLEASE  WAIT . . .            R.TIME:   85  min
```

The RiOs System will go into SOAKING Mode for 60 minutes.

```
pH  CLEANING
FLUSHING...
R.TIME:  85  min
```
⇒
```
pH  CLEANING
SOAKING...
R.TIME:  84  min
```
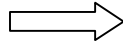
❑ The RiOs System will go to FLUSH Mode for 20 minutes. The RiOs System will perform a Depressurisation and a Pressure Test for a total of 10 seconds (LCDs not shown in the text below).

```
pH  CLEANING
SOAKING...
R.TIME:  26  min
```
⇒
```
pH  CLEANING
FLUSHING...
R.TIME:  25  min
```
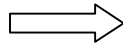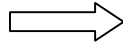
❑ The RiOs System will go to RINSING Mode for 5 minutes.

```
pH  CLEANING
FLUSHING...
R.TIME:   6  min
```
⇒
```
pH  CLEANING
RINSING...
R.TIME:   5  min
```

❑ The RiOs System will go to PRODUCTION Mode at the end of the pH CLEAN Mode.

```
pH  CLEANING
RINSING...
R.TIME:   1  min
```
⇒
```
TESTING  FEED  PRESS.
    PLEASE  WAIT...
```
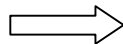
```
TESTING  FEED  PRESS.
    PLEASE  WAIT...
```
⇒
```
RINSING          ■40%
REJ.    :   98.0%
                 DATA ▶
              STANDBY ▷
```

```
RINSING          ■40%
REJ.    :   98.0%
                 DATA ▶
              STANDBY ▷
```
⇒
```
PRODUCTION       ■40%
REJ.    :   98.0%
                 DATA ▶
              STANDBY ▷
```
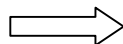
You have finished pH Cleaning the RO Cartridge(s).

4-7   HOW TO REPLACE THE QGARD TL1 POLISHER PACK

┌─────────────────────┐
│   ⚠ ATTENTION   │   **Do not remove the Pack without following the following the**
└─────────────────────┘   **software instructions shown below.**

WHEN TO REPLACE THE QGARD TL PACK

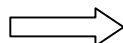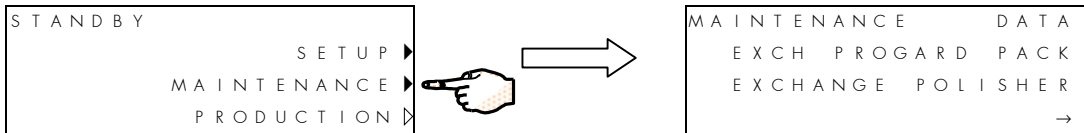A LCD Message "EXCH. QGARD TL: PRODUCT < SETPOINT" is shown to indicate that the QGard TL Pack should be replaced.
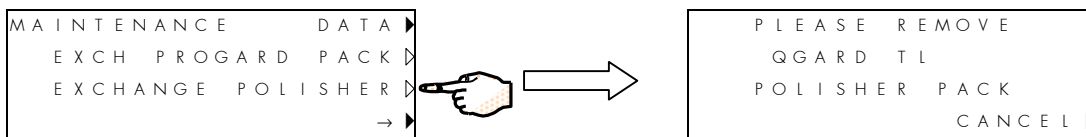
This message is shown when the resistivity measured after the QGard is less than the Resistivity Setpoint. This Setpoint is normally 10.0 MΩ.cm (@ 25 °C). This message is not shown after a specific number of days. A timer is not used for the QGard TL Pack lifetime.

REMOVING THE USED QGARD TL PACK

❑ Place the RiOs System into STANDBY Mode. See Section 3-1 for more information if necessary.

❑ Press the MAINTENANCE Keypad Button.

```
S T A N D B Y                              M A I N T E N A N C E       D A T A ▶
                    S E T U P ▶            E X C H   P R O G A R D   P A C K ▷
        M A I N T E N A N C E ▶            E X C H A N G E   P O L I S H E R ▷
        P R O D U C T I O N ▷                                          → ▶
```

❑ Press the EXCHANGE POLISHER Keypad Button for a few seconds.

```
M A I N T E N A N C E       D A T A ▶          P L E A S E   R E M O V E
    E X C H   P R O G A R D   P A C K ▷             Q G A R D   T L
    E X C H A N G E   P O L I S H E R ▷         P O L I S H E R   P A C K
                                → ▶                           C A N C E L ▶
```

❑ Unlock the Pack by lifting up the clip that holds the QGard TL Pack in place. Gently remove the QGard TL Pack from the RiOs System.

INSTALLING THE NEW QGARD TL PACK

❏ Remove the new QGard TL Pack from its shipping box. Verify the Millipore Catalogue Number by looking at the sticker on the side of the QGard TL Pack. Remove the plastic covers on the 4 2 ports of the QGard TL Pack. Look inside the ports to locate the black rubber O-rings. Make sure these are pushed in so they are firmly in-place. Wet the QGard TL Pack O-rings with water.

❏ Look below the ports on the top of the QGard TL Pack. Locate the TAG Sensor.

❏ After the used QGard TL Pack is removed, install the new QGard TL Pack with the TAG Sensor at the top. The RiOs System will automatically identify the QGard TL type by accessing data contained on the Pack TAG. Normally the RiOs System will recognise and accept the information from the QGard TL Pack.

❏ Make sure the ports of the new Pack are pushed in. After this, secure the Pack in place by pushing down on the Pack Locking Handle.

```
PLEASE  INSERT
NEW  QGARD.TL...
POLISHER  PACK
           CANCEL ▶
```

⟹

```
QGARD   TL
MADE  BY  MILLIPORE

           CONTINUE ▶
```
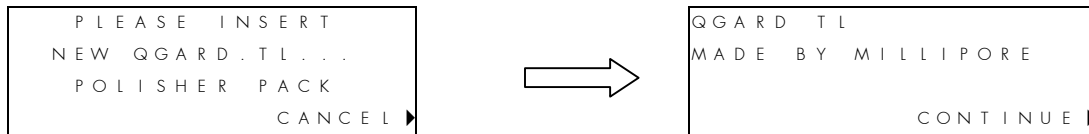
❏ Press CONTINUE to go back to PRODUCTION Mode.

⚠ ATTENTION   **The QGard TL Pack has a Sensor ("TAG") on it.   The QGard TL Pack has to be installed so that the Sensor is oriented at the top of the QGard.**

Chapter 5   TROUBLESHOOTING

5-1   MAINTENANCE, ALARM, ALARM STOP AND CUSTOM MESSAGES

TYPES OF MESSAGES

There are 4 types of LCD messages that can be displayed whenever there is a need to prompt the user about a problem or when maintenance is needed.

The 4 types of messages can be classified as:

- **Maintenance Message** – The Yellow LED is blinking while the message is displayed. The RiOs System continues to operate.

- **Alarm Message** – The Red LED is blinking while the message is displayed. The RiOs System continues to operate.

- **Alarm Stop Message** - The Red LED is blinking while the message is displayed. The RiOs System is stopped and will not go into PRODUCTION or RINSING Mode.

- **Customised Message** – Two customised messages can be added to the RiOs System by a Service Representative via a computer. These messages can be individually set-up to be displayed as a Maintenance Message, an Alarm Message or as an Alarm Stop Message. For example, one Customised Message could be set-up as a Maintenance Message and the 2nd Customised Message could be set-up as an Alarm Message.

  If a SDS Accessory is being used with a single pump, then only one Customised Message is available.

  If a SDS Accessory is being used with 2 pumps (duplexed pumps), then no Customised Messages are available.

  When a RiOs System is manufactured, there are no Customised Messages added during its manufacture.

HOW MESSAGES ARE DISPLAYED AND OTHER INFORMATION

1. The messages are only displayed during operating modes and in STANDBY Mode. For example, if you were using the SETUP Menu, then you would not see an Alarm Message displayed until you exited SETUP Mode.

2. Alarm Stop Messages will not be shown in PRESSURE TEST, DEPRESSURISATION, TANK FULL and STANDBY Modes.

3. Alarm Stop Messages can be removed by going to STANDBY Mode. However, the condition causing the message is not reset. Pressing RESUME (during an Alarm Stop Message) will tell the RiOs System to re-check all stop conditions. The RiOs System will go back to PRODUCTION Mode if the stop conditions are not found again.

4. If a water quality issue (for example, a Customised Message related to RO % Rejection) causes an Alarm Stop Message, then pressing RESUME will change the condition from Alarm Stop to Alarm for 2 hours. After 2 hours or if the RiOs System goes to TANK FULL or STANDBY Mode, the Alarm Stop condition will reappear.

5. Up to 5 messages can be displayed at one time.

6. If an Alarm or Alarm Stop Message is displayed, then any Maintenance Message(s) are not displayed.

7. The Alarm Stop Message(s) will not effect the operation of the SDS or ASM Accessories.

5-2   AN ALARM MESSAGE OR MAINTENANCE MESSAGE IS DISPLAYED

LCD MESSAGE	WHAT IT MEANS ▪ WHAT TO DO	ALARM, ALARM STOP OR MAINTENANCE MESSAGE?
% REJECTION < SETPOINT	The RO % Rejection is below the RO % Rejection Setpoint. ▪ Verify that the RO % Rejection Setpoint is 92%. Allow the RiOs System to operate for several minutes. This may raise the measured RO % Rejection.	Programmable – can be set to any type of message (Maintenance by Factory Default).
ACCESS CONFLICT	The information on the TAG Sensor was not read correctly. ▪ Replace the Progard or accept it.	
ASM UV LAMP EXCH. OVERDUE: XX DAYS	The UV Lamp in the ASM Accessory should have been changed XX days ago. ▪ The message will go away when a new ASM UV Lamp is installed and its software timer is reset.	Maintenance (Yellow LED).
BAD PROGARD TYPE	The wrong type of pack is being installed. ▪ Check the type of pack being installed. Contact Millipore for assistance.	
CANNOT ACCESS CONSUMABLE INFO	The information on the TAG Sensor was not read correctly. ▪ Replace the Progard or accept it.	Alarm (Red LED).
CHECK ASM UV LAMP	The UV Lamp in the ASM Accessory is not turning on. ▪ Contact Millipore.	Programmable – can be set to any type of message (Maintenance by Factory Default).
CHECK UV LAMP	The UV Lamp in the RiOs System is not turning on. ▪ Contact Millipore.	Programmable – can be set to any type of message (Maintenance by Factory Default).
CUSTOM ALARM 1	A customised alarm is displayed. ▪ Contact Millipore.	Programmable – can be set to any type of message.

LCD MESSAGE	WHAT IT MEANS ▪ WHAT TO DO	ALARM, ALARM STOP OR MAINTENANCE MESSAGE?
CUSTOM ALARM 2	A customised alarm is displayed. ▪ Contact Millipore.	Programmable – can be set to any type of message.
DIST PUMP 1 FAILURE or DIST PUMP 2 FAILURE	A signal has been sent to the RiOs System indicating that the one of the Distribution Pumps has stopped working. ▪ Contact Millipore for assistance.	Maintenance (Yellow LED).
DIST PUMP FAILURE	A signal has been sent to the RiOs System indicating that the Distribution Loop Pump has stopped working. 2 Distribution Loop Pumps have failed at the same time. ▪ Contact Millipore for assistance.	Alarm (Red LED).
DIST TEMPERATURE < 0 °C	The measured temperature is < 0 °C. ▪ Contact Millipore for assistance.	Programmable – can be set to any type of message (Maintenance by Factory Default).
DIST TEMPERATURE > 50 °C	The measured temperature is > 50 °C. ▪ Verify if the water is really this warm. Lower the Feedwater Temperature.	Programmable – can be set to any type of message (Maintenance by Factory Default).
DIST WATER CONDUCTIVITY < MINI	The measured resistivity of the Distribution Loop is too high (> 94.9 MΩ.cm). The displayed resistivity may not show any higher than 18.2 MΩ.cm (@ 25 °C). ▪ Keep the Loop operating for a few minutes to remove any air that could be trapped in the Resistivity sensor. ▪ Contact Millipore for assistance.	Programmable – can be set to any type of message (Maintenance by Factory Default).
DIST WATER QUALITY < SETPOINT	▪ The displayed Resistivity of the Distribution Loop Water is less than the Resistivity Setpoint.	Programmable – can be set to any type of message (Maintenance by Factory Default).

LCD MESSAGE	WHAT IT MEANS ▪ WHAT TO DO	ALARM, ALARM STOP OR MAINTENANCE MESSAGE?
EXCH. ASM UV LAMP IN XX DAYS	The UV Lamp in the ASM Accessory should be replaced in XX Days. ▪ The message will go away when a new ASM UV Lamp is installed and its software timer is reset.	Maintenance (Yellow LED).
EXCH. PROGARD TL IN 14 DAYS	The Progard TL Pack should be replaced in 14 Days. ▪ The message will go away when a new Progard TL Pack is installed.	Maintenance (Yellow LED).
EXCH. QGARD TL: PRODUCT < SETPOINT	The measured Resistivity of the Polisher Product Water is below the Resistivity Setpoint. Exchange the Polisher and Product Water Resistivity is > Resistivity Setpoint.	Programmable – can be set to any type of message (Maintenance by Factory Default).
EXCH. UV LAMP IN XX DAYS	The UV Lamp in the RiOs System should be replaced in XX Days. ▪ The message will go away when a new UV Lamp is installed and the software timer is reset.	Maintenance (Yellow LED).
FEED > MAXI	The Feedwater Conductivity is measured as > 4626 μS/cm (@ 25 °C). If the LOW TDS Option has been selected, then the Alarm Value is > 927 μS/cm. ▪ Contact Millipore for assistance.	Programmable – can be set to any type of message (Maintenance by Factory Default).
FEED < MINI	The Feedwater Conductivity is measured as < 5.2 μS/cm (@ 25 °C). If the LOW TDS Option has been selected, then the Alarm Value is < 1.0 μS/cm. ▪ Verify that the Feedwater is not already purified. Is the Feedwater Conductivity really this low? ▪ Contact Millipore for assistance.	Programmable – can be set to any type of message (Maintenance by Factory Default).

LCD MESSAGE	WHAT IT MEANS ▪ WHAT TO DO	ALARM, ALARM STOP OR MAINTENANCE MESSAGE?
HIGH PUMP PRESSURE	The RO Pump Pressure is > 13 bar. ▪ Set the RO Pump Pressure lower. Contact Millipore for assistance.	Maintenance (Yellow LED).
LOW FEED PRESSURE	The water pressure after the Progard TL Pack is < 0.3 bar. ▪ Verify that the Feedwater supply is turned on. Verify that the Progard TL Pack is not clogged (view the RO Reject Water in FLUSH Mode). This Alarm is automatically reset during FLUSH Mode if the water pressure problem is resolved.	Alarm Stop (Red LED and System Stopped).
LOW PUMP PRESSURE	The RO Pump pressure is < 6 bar. ▪ Set the pump pressure higher. Contact Millipore for assistance.	Maintenance (Yellow LED).
PERMEATE < MINI	The Permeate Conductivity is measured as < 0.22 μS/cm (@ 25 °C). If the LOW TDS Option has been selected, then the Alarm Value is < 0.06 μS/cm. ▪ Verify that the Feedwater is not already purified (Very low Feedwater Conductivity can lead to very low Permeate Conductivity values). ▪ Contact Millipore for assistance.	Programmable – can be set to any type of message (Maintenance by Factory Default).
PERMEATE > MAXI	The Permeate Conductivity is measured as > 194 μS/cm (@ 25 °C). If the LOW TDS Option has been selected, then the Alarm Value is > 58 μS/cm. ▪ Contact Millipore for assistance.	Programmable – can be set to any type of message (Maintenance by Factory Default).
PERMEATE > SET POINT	The Permeate Conductivity is above the Permeate Setpoint.	Programmable – can be set to any type of message (Maintenance by Factory Default).

LCD MESSAGE	WHAT IT MEANS ▪ WHAT TO DO	ALARM, ALARM STOP OR MAINTENANCE MESSAGE?
PRODUCT CONDUCTIVITY < MINI	The measured resistivity from the Polisher is too high (> 94.9 MΩ.cm). The displayed resistivity may not show any higher than 18.2 MΩ.cm. at 25 °C. ▪ Keep the RiOs System in PRODUCTION Mode for a few minutes to remove any air that could be trapped in the Resistivity Sensor. ▪ Contact Millipore for assistance.	Programmable – can be set to any type of message (Maintenance by Factory Default).
PROGARD TAG VOID OR TEST KEY ERROR	A test was not performed correctly by information in the TAG Sensor of the Progard TL. ▪ Replace the Progard TL Pack.	Maintenance (Yellow LED).
PROGARD TL EXCH. OVERDUE: XX DAYS	The Progard TL should have been changed XX days ago. ▪ The message will go away when a new Progard TL is installed.	Maintenance (Yellow LED).
PROGARD TL PACK EXHAUSTED	The Progard TL Pack is used up. This is indicated by the TAG Sensor. ▪ Replace the Progard TL pack or accept the used up Progard until a new one is available.	Maintenance (Yellow LED).
PROGARD TL PACK NOT IN PLACE	The Progard TL is not installed correctly or it has been removed. ▪ Verify that the Progard TL is installed with its "TAG" at the bottom (see "How to replace the Progard TL Pack").	Alarm Stop (Red LED and System Stopped).
PROGARD TL PACK TYPE ERROR	The type of Progard TL has not been identified when it was installed. ▪ Check the Catalogue Number of the Progard TL using its label. Replace if necessary.	Alarm (Red LED).
PROGARD TL PACK UNKNOWN	A pack has been detected but the information in the TAG Sensor is not valid (Trademark not valid). The RiOs System does not recognise the Pack being installed. ▪ Press "ACCEPT PROGARD" to continue.	Maintenance (Yellow LED).

LCD MESSAGE	WHAT IT MEANS ▪ WHAT TO DO	ALARM, ALARM STOP OR MAINTENANCE MESSAGE?
QGARD TAG VOID OR TEST KEY ERROR	A test was not performed correctly by information in the TAG Sensor of the QGard TL Polisher. ▪ Replace the QGard TL Polisher.	Maintenance (Yellow LED).
QGARD TL POLISHER NOT IN PLACE	The QGard TL Polisher is not installed correctly or it has been removed. ▪ Verify that the QGard TL Polisher is installed with its "TAG" Sensor at the top.	Alarm Stop (Red LED and System Stopped).
QGARD TL POLISHER TYPE ERROR	The type of QGard TL Polisher Cartridge has not been identified when it was installed. ▪ Check the Catalogue Number of the pack using its label. Replace if necessary.	Alarm (Red LED).
QGARD TL POLISHER UNKNOWN	The QGard Polisher has not been recognised by the RiOs System. ▪ Verify that the correct QGard Pack is being installed.	Maintenance (Yellow LED).
QUALIFICATION CONTRACT REQUESTED	A Millipore Service Representative validated the RiOs System. A requalification of the validation is needed.	Maintenance (Yellow LED).
REJ. FLOW < SET POINT	The RO Reject Flow to the drain is less than a predetermined value. Tested in PRODUCTION Mode and RINSING Mode. ▪ Increase the RO Reject Water flow to the drain. ▪ Contact Millipore for assistance.	Alarm (Red LED).

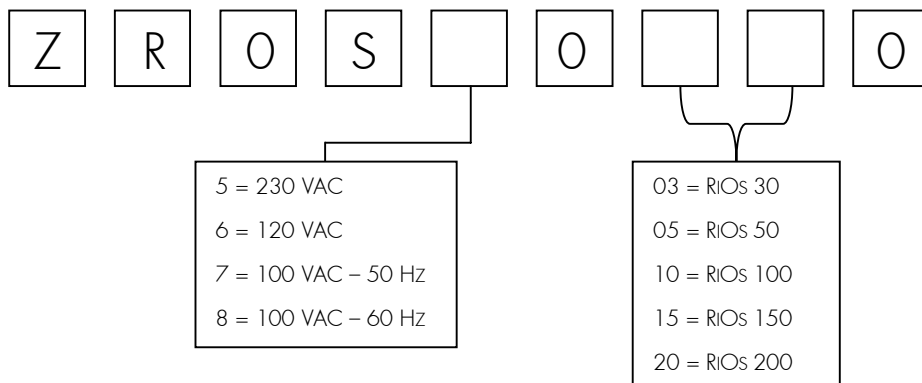| LCD MESSAGE	WHAT IT MEANS ▪ WHAT TO DO	ALARM, ALARM STOP OR MAINTENANCE MESSAGE?
SERVICE CONTRACT REQUESTED	The RiOs System is being maintained with a Service Contract. A timer has indicated that a Service Contract visit is due.	Maintenance (Yellow LED).
SYSTEM TEMPERATURE < 0 °C	The measured temperature is < 0 °C. ▪ Contact Millipore for assistance.	Programmable – can be set to any type of message (Maintenance by Factory Default).
SYSTEM TEMPERATURE > 50 °C	The measured temperature is > 50 °C. ▪ Verify if the water is really this warm. Lower the Feedwater Temperature.	Programmable – can be set to any type of message (Maintenance by Factory Default).
TANK EMPTY	A SDS (a specific type of reservoir) is empty of water. ▪ Verify that the reservoir is empty and is now filling up. Verify that the Level Sensor from the SDS is connected to the RiOs System. This message will disappear when the water level is 10% full in the SDS.	Alarm (Red LED).
TOO HIGH PUMP PRESSURE	The RO Pump pressure is > 14 bar for > 3 seconds. ▪ Set the pump pressure lower. Contact Millipore for assistance.	Alarm Stop (Red LED and System Stopped).
UV LAMP EXCH. OVERDUE: XX DAYS	The UV Lamp in the RiOs System should have been changed XX days ago. ▪ The message will go away when a new UV Lamp is installed and the UV Lamp software timer is reset.	Maintenance (Yellow LED).
WATER DETECTED	A Water Sensor (an accessory connected to the RiOs System) has detected water. The RiOs System stops operating and the Inlet Solenoid Valve closes. ▪ Clean up the spilled water and press RESUME on the Keypad to go back to PRODUCTION Mode.	Alarm Stop (Red LED and System Stopped).

Chapter 6 ORDERING INFORMATION

6-1 CATALOGUE NUMBERS FOR CONSUMABLES

Consumable Item	Catalogue Number	Comments
Progard TL1 System Pretreatment Pak	PROGTLOS1	1/box
Progard TL1 System Cl$_2$ autoClean Pretreatment Pak	PROGTLCS1	1/box
Progard TL2 System Pretreatment Pak	PROGTLOS2	1/box
Progard TL2 System Cl$_2$ autoClean Pretreatment Pak	PROGTLCS2	1/box
PrePak L1 Pre-System Pretreatment Pak	PRPKOLOS1	1/box; requires Pack Holder (see Accessories below)
UV Lamp	ZLXUVLPL1	1/box (used for replacement UV Lamp for a RiOs System or ASM)
QGard TL1 Polishing Pak	QGARDTL01	1/box (used only with a RiOs System having the Polishing Option added)

6-2 CATALOGUE NUMBERS FOR ACCESSORIES

Accessory	Catalogue Number	Comments
RiOs/Elix-L Syst. Wall Bracket	ZLX0WMBKT	Wall Mounting Bracket for RiOs System
Wall Bracket PrePak L	WBPRPKL01	Wall Mounting Bracket for external PrePak L
Water Sensor RiOs/Elix-L	TANKLK001	Water Sensor that connects to RiOs System
Water Sensor with cable	TANKLK002	Used to add a 2nd Water Sensor.
RiOs/Elix-L Cleaning Port Kit	ZR00CLNKT	Used to add a Cleaning Port to the RiOs System.
RiOs/Elix-L Q-Gard TL Kit	ZLXQGRDKT	Kit allows a RiOs System to use a Polisher to deionise the Product Water.
RiOs/Elix-L Resistivity Sensor Kit	ZLX0RESKT	Kit allows the measurement of resistivity in a loop and to be reported on the RiOs System LCD.
Flow Meter Kit RiOs/Elix-L	ZLXFL0WKT	Kit allows an extra Flow Meter to be added to a RiOs System.
System Mounting Cart	ZAFSCART1	Cart which can be used to hold the RiOs System.

6-3   CATALOGUE NUMBERS FOR ALL RIOS SYSTEMS

| Z | R | O | S | | O | | | O |

```
5 = 230 VAC
6 = 120 VAC
7 = 100 VAC – 50 Hz
8 = 100 VAC – 60 Hz
```

```
03 = RiOs 30
05 = RiOs 50
10 = RiOs 100
15 = RiOs 150
20 = RiOs 200
```

Chapter 7 APPENDIXES

APPENDIX 1 HOW TO CHANGE THE MAIN POWER FUSE

Follow the steps below to replace the main Power Fuse.

Place the RiOs into STANDBY mode.

1. Turn off the Power Switch. It is located on the back of the cabinet just above the location where the Power Cord is plugged into the RiOs System.

2. Unplug the Power Cord from the RiOs System.

3. Obtain the correct replacement fuse. There is a spare fuse located in the fuse holder. See Step 4.

It is very important to use the correctly sized replacement fuse. Failure to use the correct replacement fuse could result in system damage or an electrical fire.

System Voltage	Main Power Fuse Size
100 VAC ± 10%	10 Amp. T, 5 mm x 20 mm Millipore Spare Part Number FTPF04803
120 VAC ± 10%	10 Amp. T, 5 mm x 20 mm Millipore Spare Part Number FTPF04803
230 VAC ± 10%	10 Amp. T, 5 mm x 20 mm Millipore Spare Part Number FTPF04803

4. Use a small flathead screwdriver to open the Fuse Holder. This is located immediately above the point where the Power Cord plugs in.

5. Remove the entire fuse holder. Replace the blown fuse (you can check the fuse for electrical continuity with an Ohmmeter).

6. Place the Fuse Holder back into the RiOs System. Put the Power Cord back in. Turn on the Power Switch.

7. The LCD will show the type of system, the RiOs System serial number and software version for a few seconds. Wait about 10 seconds for this to go away.

8. Place the RiOs System into PRODUCTION Mode or whatever mode it was previously in.

⚠ ATTENTION	**CONTACT MILLIPORE IF THE MAIN POWER FUSE BLOWS AGAIN.**

APPENDIX 2   PRE INSTALLATION - WHAT'S INSIDE THE SHIPPING BOX

Please use this Appendix to confirm that all items were shipped to you and are accounted for. Use the checklist below and account for each item prior to having a Millipore Service Representative install your system. Use the illustrations should you need help in identifying the various items.

Check the box ☐ if the item is present.

Contact Millipore if an item is missing.

Do you have?

- ☐   RiOs System
- ☐   Progard TL1 or TL2 System Pretreatment Pack (not included inside the RiOs System box)
- ☐   Electrical Power Cord
- ☐   Inlet Solenoid Valve with electrical cable attached to the RiOs System
- ☐   User Manual ("How To Use the RiOs System") in paper format; 5 languages.
- ☐   User Manual in CD Format (complete User Manual)

Inside the Accessories Bag:

  - ☐   2 lengths of 1/2 inch OD Black PE Tubing; each length is 5 meters long
  - ☐   8 mm OD Black Tubing; 5 meter length
  - ☐   Tubing Guide for 8 mm Tubing (allows tubing to be bent 90°)
  - ☐   Gasket (used with the Inlet Solenoid Valve Pipe connection)
  - ☐   System Identification Plastic Card

Other items (i.e. accessories or peripheral devices). Fill in the item description.

- ☐   _____
- ☐   _____
- ☐   _____
- ☐   _____
- ☐   _____
- ☐   _____

Observed by

Name:_____

Signature:_____

Date:_____

Verified by

Name:_____

Signature:_____

Date:_____

APPENDIX 3   POST INSTALLATION CHECKLIST

WHAT IS THE POST INSTALLATION CHECKLIST?

It is highly recommended that a Millipore Service Representative installs the RiOs System. The Pre Installation Manual and the Installation Manual are not found in this User's Manual.

Place a check in the box next to the item or items as they were done during the installation of a RiOs 30, RiOs 50, RiOs 100, RiOs 150 or RiOs 200 Water Purification System.

Some "Comments" areas are provided throughout the Post Installation Checklist. These can be used to document any comments. As an example, a comment could be made and recorded pertaining to the fact that the Drain was 3 meters away from the RiOs System. The comment could be written such that you indicate your knowledge of this and that you are willing to go outside a specification in order to complete the installation.

POST INSTALLATION CHECKLIST

❑   Was Appendix 2 in this manual read and reviewed (accounting for items in the Shipping Box)?

❑   Was the Inlet Solenoid Valve water flow direction identified (is the water flowing in the correct direction through the Inlet Solenoid Valve)?

❑   Were the specifications for the Feedwater minimum pressure and minimum flowrate met?

❑   Were the specifications for the electrical supply and electrical connections (distance to source, earth grounded) met (see the Pre Installation document for these specifications)?

❑   Was the RO Reject Tubing kept to a maximum length of 2.5 meters?

❑   Was the Progard TL Pack installed such that:

   ❑   it is located on front left side of the RiOs System?

   ❑   it was installed according to the directions given in Section 2-4 in the Installation Manual?

❑   Did the RiOs System go through either a 5 minute SYSTEM CLEANING (Progard TL without chlorine tablet inside) or a 20 minute SYSTEM CLEANING (Progard TL with a chlorine tablet inside)?

❑   Was the RO RINSE done according to the directions given in Section 2-6 in the Installation Manual? Was the RO RINSE completed?

❑   Was the pump pressure checked during PRODUCTION Mode (checked against operating temperature – see Section 2-5 in the Installation Manual)? Was the pump pressure adjusted if necessary?

❑   Was the RO Reject flow to the drain measured?

❑   Was the RiOs System Recovery checked using the DATA information in PRODUCTION Mode?

❑   Was the RiOs System Recovery changed if necessary according to Section 2-5 in the Installation Manual?

❑   Were the Date and Time set for the RiOs System?

❑   Were the units of Pressure changed if necessary?

❑   Were the Storage Reservoir Units changed if necessary?

❑   Were the Conductivity or Resistivity values checked in PRODUCTION Mode for Temperature Compensation or Non Temperature Compensation (according to the user requirements)?

COMMENTS:_____

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Observed by

Name:_____

Signature:_____

Date:_____

Verified by

Name:_____

Signature:_____

Date:_____

APPENDIX 4   FEEDWATER REQUIREMENTS

FEEDWATER FLOWRATE REQUIRED

The source of feedwater should deliver ≥ 5 LPM at a minimum pressure of 2 bar.

FEEDWATER PRESSURE REQUIRED

Maximum Feedwater pressure: ≤ 6 bar at ≥ 5 LPM (use a Pressure Regulator if necessary)

Minimum Feedwater Pressure: ≥ 2 bar at ≥ 5 LPM (use a Booster Pump if necessary)

FEEDWATER PIPING CONNECTION REQUIRED

The Feedwater should be supplied in a pipe that terminates in a 1/2 inch Male GAZ connection. This is the type of connection needed for the Inlet Solenoid Valve.

A 1/2 inch NPTM or 1/2 inch BSP connection can also be used.

FEEDWATER CHEMISTRY REQUIRED

- Potable Mains (Tap) Water
- Calcium < 300 ppm (as $CaCO_3$) when System Recovery is > 50%
- Maximum LSI = +0.3

Fouling Index – Contact Millipore

- Conductivity < 2000 µS/cm (@ 25°C)
- pH 4 – 10
- Total Chlorine Level – Contact Millipore

FEEDWATER TEMPERATURE REQUIRED

Between 5 °C and 35 °C