HUMIDITY SOLUTIONS

USER MANUAL

REVERSED OSMOSIS UNIT:
LKF 1000
LKF 2000
LKF 3000

Humidity Solutions, 1140a Axis Centre, Cleeve Road, Leatherhead, KT22 7RD
HUMIDITY CONTROL MADE EASY | 01372 571200 | humiditysolutions.co.uk

ABOUT THIS DOCUMENTATION

Version designation: User manual LKF 1000-2000-3000 UK.doc

Series:	Reversed Osmosis system
Type:	LKF 1000 – LKF 2000 – LKF 3000

For further identification:
See the data on the product's nameplate.

THE SUPPLIER

The product is supplied by::

Humidity Solutions
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HUMIDITY SOLUTIONS

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HOW TO USE THIS DOCUMENTATION

This documentation is part of the product. Therefore, please keep this documentation in a safe place. It contains information that will also come in handy or be needed later, for example for repair and maintenance. It is recommended to keep a copy with the product and to store a copy, for example in the archives of your technical service. The manufacturer may be able to provide you with an additional copy. When the product is transferred, the documentation must be included.
The instructions in this documentation are categorized according to the type of user of the product. Chapter 2 specifies the requirements for the various users.
The following names are used:

User:	The collective name for everyone who works on or with the product.
Operator:	This is the daily user of the product. Chapters to consult: Introduction, Safety and Operating Instructions.
Installation and service staff:	Persons with training, experience and tools required for the work described. Chapters to consult: all
Safety Officer:	The person who is responsible for the working conditions in the user's company. If no one is designated for this, it will be the employer itself. Consultable Chapters: Safety and Specifications

The figures included in the text of this documentation are illustrative only. They are only intended as an aid to the text, e.g. to indicate the location and function of controls or components. Actual design and dimensions may vary.

SERVICE AND INFORMATION

For more information on the reverse osmosis please contact:

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WARRANTY AND LIABILITY

Unless otherwise agreed in writing, the following warranty conditions apply:
The manufacturer provides warranty to the first user for up to 12 months after delivery.
Defects must be reported to the manufacturer before the expiry of the warranty period.

- The warranty applies to defects that: occur during normal operation of the installation; caused by inadequate construction or materials;
  caused by faulty workmanship on the part of the manufacturer.
- The warranty is void in the event of defects occurring due to: normal wear and tear; improper or improper use; use of consumables other than those prescribed.
- In the event of any defects, the manufacturer shall: replace the parts.
  The manufacturer becomes the owner of the replaced parts; rectify the defects; opt for another replacement solution, if recovery is not reasonably possible.
  The customer must give the manufacturer the opportunity to rectify any defects.
- Third-party built-in parts are subject to the warranty terms and conditions of the respective supplier. The warranty period may also differ from what is indicated above.
- The manufacturer reserves the right to modify its machines/systems without prior warning.

Unless otherwise agreed in writing, the warranty and liability provisions as included in the "General Terms and Conditions of Delivery and Payment apply"[1]

We would like to draw attention to the following limitations of liability:
The manufacturer is **not liable** for unsafe situations, accidents and damages resulting from disregarding warnings or regulations as shown on the installation in this documentation, e.g.:

- Improper or improper use or maintenance;
- Use for applications or under conditions other than those specified in this manual;
- The use of parts other than those prescribed;
- Repairs without the manufacturer's permission;
- Modifications to the installation, including but not limited to:
  - Changes to the controls;
  - Welding, mechanical operations;
  - Extensions to the system or control system.

The manufacturer is also **not liable**:

- If the customer has not fulfilled all his obligations to the manufacturer (financial or otherwise);
- For consequential damage due to malfunctions or defects in the installation (e.g. damage to (to be processed) products, business interruption, delays, etc.).

1 INTRODUCTION

1.1 PURPOSE AND FUNCTION OF REVERSE OSMOSIS

The purification (desalination) of the water flow to a desired higher quality is done by reverse osmosis technique. In this process, water is forced through a membrane, leaving the salts behind and being discharged via the reject stream. Reverse osmosis is widely recognized as a clean, environmentally friendly method of desalination. Because of these advantages, this technique has been used in a wide range of versions for many years.

This compact installation has been specially developed for applications where desalinated water is required in small quantities. Well-known applications for osmosis water include: washing or rinsing materials to obtain a streak-free result. Think, for example, of glasswashers or cutlery washers in the catering industry.
Another application is the use of desalinated water for climate treatment installations / humidifiers.

1.2 ACCESSORIES

The following parts or tools, supplied separately, belong to each machine. Check that everything is there.

- This User Manual Documentation;
- An installation set, consisting of:
    - 1 pcs electrical connection cable with protective plug.
    - 2 pieces of plastic washing machine hose (length 1.5 m) with angled gland connection.
    - 1 piece sewer drain hose Ø 18 mm; with plastic gland connection.
    - 1 piece of funnel inlet combination for connection sewer drain with gravity.

2 SAFETY

2.1 INTRODUCTION

This product is designed and built to be safe to use and maintain. This applies to the application, conditions and regulations described in this documentation. Thus, reading this documentation and following the instructions are necessary for anyone working with or on this machine. In the case of professional use, it is the employer's responsibility to ensure that these instructions are known and complied with.

Additional safety measures may be prescribed by the company or country where the product is used. This concerns in particular the working conditions in the use phase. This documentation does **not** describe how to comply with this. However, the necessary information about the product is provided. If in doubt, consult your government or security officer.

In this documentation, a distinction is made between **normal use** (see "Operating-instructions") and **other work** (see "OTHer aCtivities") on the product. The reason for this is that, especially with a view to safety, the requirements for the service staff are different from those for the operators.

However, the simple maintenance work specified in the operating instructions can be carried out by the operators. Work that is not specified in the operating instructions may only be carried out by qualified personnel.

2.2 SAFETY RULES

The following general safety rules apply:

- Safety may be affected in the long run by use. Ensure adequate maintenance.
- Do not use the product if safety devices are damaged or malfunctioning. Make sure the product is repaired, before re-using the product.

Special safety rules are mentioned in the instructions for the work in question. Points of attention are mainly:

- Live parts (under voltage).

2.3 USERS

2.3.1 OPERATORS (LEVEL 1)

The product may only be operated by adults who are familiar with and follow the contents of the safety and operating instructions sections of this documentation.

- No special training is required.

2.3.2 SERVICE PERSONNEL (LEVEL 2)

Service personnel should be aware of the additional risks involved in the work they have to perform. In addition to the requirements mentioned in "Operators (Level 1" on page 7 it is therefore required:

- Education or knowledge at the level of Secondary Technical Education for the relevant field;
- Experience with servicing machines;
- Availability of the right tools (e.g. tools and measuring equipment).

2.3.3 SPECIALIZED SERVICE PERSONNEL (LEVEL 3)

Personnel employed by the manufacturer. In addition to the requirements mentioned in "Service Personnel" is therefore required:

- Extensive experience servicing this machine.

2.4 PERSONAL PROTECTIVE EQUIPMENT

No special personal protective equipment is required or recommended.

2.5 WARNINGS ON REVERSE OSMOSIS UNIT

The warnings affixed to reverse osmosis must remain clearly legible. The hazards involved are described in more detail in the installation, operation and maintenance instructions.

2.6 HAZARDOUS SUBSTANCES FOR HUMANS AND THE ENVIRONMENT

2.6.1 DISPOSAL OF THE PRODUCT

When the osmosis system is disposed of, the waste disposal regulations that apply at that time and at the relevant location must be observed.

Only commonly known materials are used in the product. At the time of manufacture, there were waste disposal facilities for this purpose and there were no known particular risks for the persons responsible for disposal.

2.7 CALAMITIES

There are no special regulations for emergencies.

3 OPERATING INSTRUCTIONS

Before operating the system, the information in the "Safety" section must be familiar.
This chapter is intended for operators as indicated in "Operators (Level 1" on page 7.
Work not specified in this chapter may only be carried out by service personnel (see "Service Personnel" on page 8).

3.1 OPERATION OF THE REVERSED OSMOSIS LKF - UNIT

Front of the LKF RO unit

LCD display; permeate capacity reading,
Permeate quality in µS/cm
Error message (red)
Filter Capacity / Filter Exchange Status.

Dirt filter protective cover (can be removed)

Interchangeable CBF 5.0 Activated Carbon / Microfilter.

Rear of the LKF RO unit

1.Electrical connection + on/off switch

2. By-pass switch (water circulation supply)

3. Sewage drain connection

4. Outgoing permeate connection

5. Incoming water connection

Explanation:
The LKF unit is connected to the input and output by means of the supplied installation set with flexible hoses with couplings. The sewer drain hose is connected by means of the supplied hose + coupling.
By means of the built-in bypass control, the entire system can be shut off from the water supply via the switch (on the back of the device) and the outlet point can be connected directly to untreated water via the bypass valve.
Caution !
If the by-pass switch is switched on (bypass mode) the display does not work !

By means of a bypass switch at the rear of the LKF unit, the entire installation can be cut off from the water supply and the outlets can be connected to untreated water.

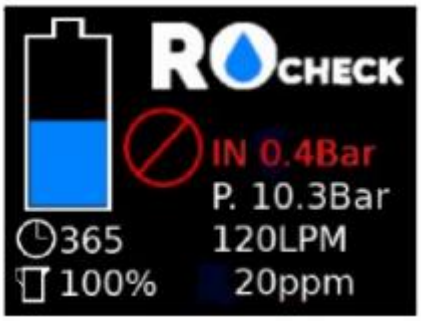
Symbol	Definition
01	Solenoid valve input (NC)
02	Solenoid valve bypass
F-01	Pre-filter CBF 5.0
PS 01	Pressure switch incoming water pressure
PI 01	Pressure sensor incoming water pressure
P 01	High Pressure Pump RO
PI 02	Pressure sensor before the membranes
M-01	RO membranes
03	Mixing valve concentrate / permeate
PS 02	Permeate pressure switch
FI-01	Flowsensor permeate
QI-01	Conductivity measuring cell
V-01	Permeate Vessel (optional)

The LKF unit is equipped with a pressure switch (PS-01) for the incoming feed water; if the supply pressure is too low, the LKF unit will be protected against the pump running dry and will signal an alarm. The reverse osmosis will then not turn on; only after the pre-pressure has been restored can the LKF unit be switched on again.
A pressure sensor (PS-02) is also present in the outlet of the permeate pipe. This pressure sensor indicates (if output pressure is <1.5 bar) when the RO unit will be started. At the start of the RO unit, the inlet valve opens, shortly afterwards the pump (P-01) starts. Untreated or softened water flows through the solenoid valve to the high-pressure pump. The input pressure switch measures the pressure of the feed water (it is set to 0.5 bar).
The high-pressure pump pumps the water through the reverse osmosis membranes. The working pressure for the diaphragms can be read in the display.
The pure water (permeate) leaves the appliance via the outgoing pipe (permeate connection). The concentrate containing the dissolved salts is discharged via the sewer connection. There is a possibility to influence the quality of the permeate by adding a small amount of salt-rich water. This mixing valve is closed as standard for the best possible permeate quality.
If the pressure measured in the outgoing pipe is measured at 2.5 bar, the pump will shut down first. After a minute, the internal solenoid valve will also close. In this minute, the membranes are rinsed with feed water to remove the concentrate above the membranes.

3.2 OPERATION OF THE REVERSE OSMOSIS MODEL LKF - UNIT

Reverse osmosis starts automatically when water is requested and switches off automatically when there is no more demand. After installation, the user only needs to open the water supply and switch the switch on the back of the appliance (see photo on page 9).

LCD display
The LCD display on front gives information about performance and service of the LKF unit.



RO Check logo (Also concealed switch)

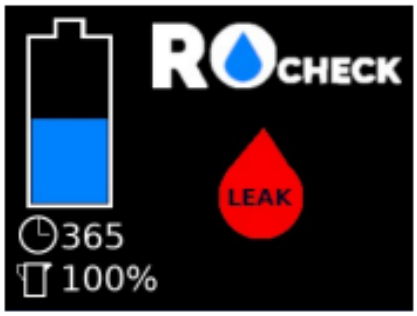
Input pressure LKF unit notification (low pre-pressure alarm)

P = Working pressure display in bar

Permeate capacity display LKF

Conductivity display permeate

The blue core on the left indicates how much water can still be filtered before filter change. Clock with number at the bottom left: number indicates the number of days remaining before the filter change. Water jug with percentage; indicates the percentage residual value of the pre-filter.



Press the logo for a few seconds to go to the next menu. Only needed when resetting the RO unit
After pressing, you will hear a beep.

If there is an internal leak, the drop will appear in the display as an alarm message of the water leak.

The settings of the display are already pre-programmed from the factory according to the usual units; So the resemblance of the units is as follows:

- Water pressure is displayed in BAR. (pre-pressure before RO and working pressure RO)
- Permeate production / capacity is shown in LPH (liters/hour)
- Filter change is set to 1 x every 6 months (display in remaining days)

4 OTHER ACTIVITIES

The work listed in this chapter may only be carried out by service personnel as described in "Service Personnel" on page 8.

4.1 GENERAL

Warning!
Always remove the plug from the wall outlet before using Reverse osmosis work carried out.

4.2 STORAGE

There are no special requirements for storage. A frost-free, cool and dry room is best suited.

After prolonged storage or downtime, reverse osmosis should be inspected by service personnel before commissioning.

Warning!
If reverse osmosis is carried out from a cold into a warm room temporary condensation may occur (including internally in the electrical parts). Switching on immediately can damage the reverse osmosis and hazard to the operator.
Allow the reverse osmosis to come up to temperature first.

4.3 INSTALLATION AND COMMISSIONING

The LKF reverse osmosis comes standard with a so-called emergency bypass. The bypass can be operated by means of the switch at the rear. By switching on the bypass, untreated water is allowed to pass through directly,
The maximum permissible water temperature is 25 °C. The maximum permissible inlet pressure is 4.0 bar. To protect against excessive input pressure, a pressure reducing valve can be installed in the inlet. We recommend setting the pressure reducing valve to a maximum water pressure of 4 bar.

4.3.1 INSTRUCTIONS FOR INSTALLING LKF UNITS

Place the LKF reverse osmosis in a dry place near a grounded socket and a sewer drain. Upon delivery, the water-side connection is protected against dust. Protective caps are attached to the feedwater inlet, permeate outlet and concentrate drain,

Before commissioning the installation, connect the flexible hoses to the connections as shown in the figure below:

Connect the installation electrically via the supplied plug cable, open the water supply and switch on the appliance. Check that there are no leaks.

Pressure surges (water hammer) can occur in the pipework (for example, when installing a dishwasher, washing machine, etc.). To dampen this, place in the pipe
Directly behind the reverse osmosis there is also a water hammer damper. If a pressure vessel is placed after the RO unit, this hydrophore tank also acts as a damping vessel.
We advise you to set up the equipment in such a way that damage caused by leaks is kept to a minimum.

Caution!

The warranty for leaks that occur on the supplied equipment will be void if the above precautions are not complied with.

4.3.2 CONDUCTIVITY

The LKF is equipped with a conductivity meter. The value of the conductivity can be adjusted by further screwing in or out of the blending valve.
The blending valve is closed as standard to ensure the best water quality.
The conductivity can be read on the display.

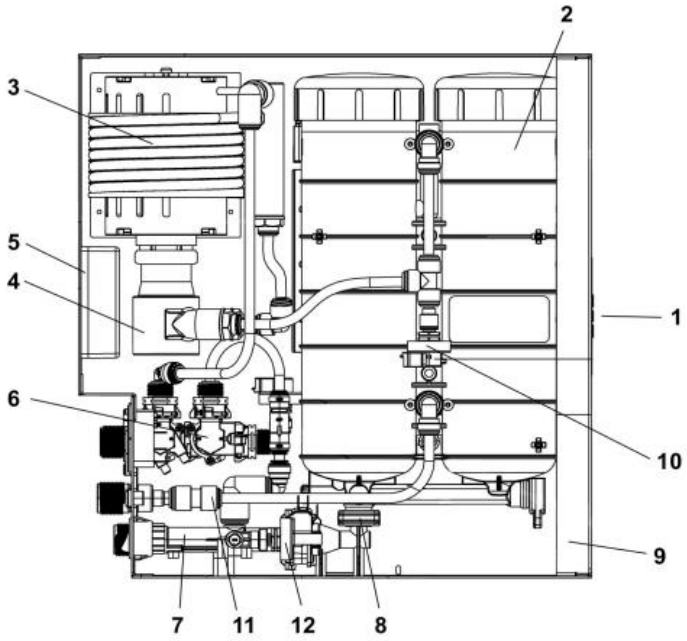
4.4 REPAIRS AND MAINTENANCE

4.4.1 MAINTENANCE WITH SERVICE SUBSCRIPTION

Periodic inspection of your equipment reduces the chances of interim repairs. That is why we have developed a service subscription that is specifically aimed at reverse osmosis devices. This subscription means that once or twice a year a thorough inspection takes place by a specialist. Of course, we keep meticulous internal records of the inspections car-ried out. Ask your appliance supplier about the possibilities.

4.4.2 REPAIRES / REPLACEMENT OF PARTS

During the warranty period, repairs may only be carried out under the direction of the manufacturer. All parts that are replaced must at least meet the specifications of the original parts.
After long-term use, the membranes are worn out, which reduces the water quality. This means that the membranes need to be replaced. In addition, the CBF 5.0 filter will have to be replaced periodically. Below an overview of the most important parts.



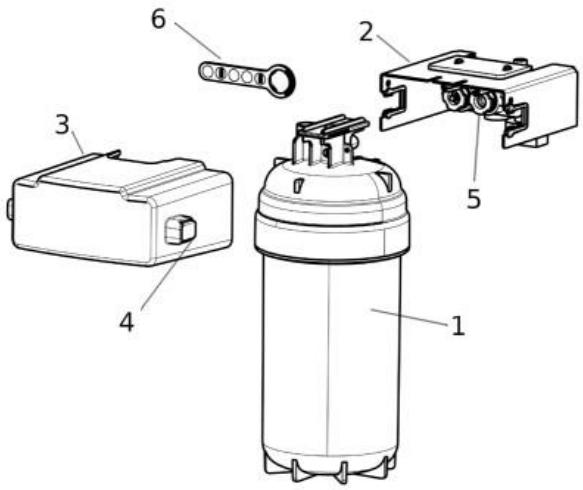
Item nr.	Description
1	TFT display incl. flat cablel
2	RO Membrane module 3012
3	Water cooled electromotor LKF 1000
3.1	Water cooled electromotor LKF 2000 / LKF 3000
4	RO pump LKF 1000
4.1	RO pump LKF 2000 / LKF 3000
5	LK/ LKF Control Module (CPU)
6	Double Solenoid valve supply
7.	Output Module
8.	Pressure Tube Mounting Clip
9.	Stainless Steel housing LKF
10.	Pressure sensor before membranes
11.	Pressure sensor behind membranes
12.	Pressure switch permeate
filter	CBF 5.0 pre-filter (not on image)

The LKF unit is equipped with CBF 5.0 pre-filter (this is a combined activated carbon filter with fine-filtration of 5.0 microns). For the proper functioning of the system, this filter must be replaced once every six months. The CBF 5.0 pre-filter has a limited lifespan and this is monitored in a double way by the LKF control:

1. By means of a built-in timer, which counts down the elapsed days to zero and notifies you for the filter change.
2. By means of a volume measurement of the incoming water and if the capacity is exceeded, it gives a signal for the filter change.

Changing the CBF 5.0 filter works as follows:

Switch off LKF unit via the electrical switch on the rear.

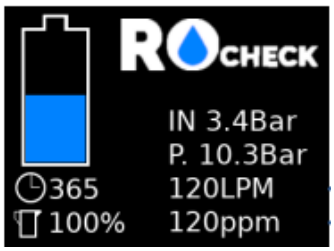


1. CBF 5.0 filter cartridge
2. Filterbracket to the LKF unit, in which the filter is locked.
3. The removable protective cover must be removed to change the filter.
4. Press the red button left and right and slide the protective cover horizontally towards you.
5. This is where the O-rings (sealing rings) are located.
6. Auxiliary wrench for replacing the O ring, which is located on the inside of the protective cover

- Pull the saturated CBF 5.0 filter horizontally towards you with two hands to remove the pre-filter from the LKF unit.
- Replace the supplied O rings using the auxiliary wrench (6)
- Insert the new filter into the guide and gently push it horizontally backwards into the O rings.
- Place the guard back on the LKF unit and slide it back until you hear the lock button click into position.
- Make a note of this filter change in your technical logbook and order a new one in time for the next filter change.

With this filter change, your LKF reverse osmosis system is simultaneously disinfected by the device. Only the original CBF 5.0 filters can be used for the change. In addition to the filter medium with activated carbon, the filter cartridge also contains a safe disinfectant with an optimal amount to perfectly disinfect the system.
The disinfectant is completely safe and only present in the filter in a low dose.
Put the LKF back into operation by means of the switch and allow the pure permeate to be produced again.
It is possible that the LKF temporarily gives a pre-pressure alarm due to the expulsion of air from the pre-filter. By switching the LKF off/on, the air is expelled and the pre-pressure alarm recovers within a short time.
The disinfectant effect of the new filter is only active for 10-15 minutes during the first permeate production after a filter change.

Image with Text, Font, Screen Recording, Number Auto-generated description
Press the RO Check logo for 3 seconds.
During pressing the button, you will hear a beep.



Then the display will move to the next screen

Press AP for 5 seconds and the filter capacity is restored back to the original value. During pressing, you will hear a beep.

4.4.3 PRACTICAL TURNS

Problem	Cause	Solution
Reverse osmosis does not work.	Electrical connection interrupted.	Check the electrical connection of the pilot valve.
	The by-pass switch is turned on, causing the display to turn off.	Convert by-pass switch to operation.,
	Water supply pressure is insufficient, causing a low water alarm to occur.	Restore water supply or replace the pre-filter if necessary.
Indiction CBF 5.0 filter needs to be replaced.	The maximum water volume/capacity has been reached. The maximum number of days between two changes has been exceeded.	Turn off the RO and replace the CBF 5.0 pre-filter as instructed. Write down the date of exchange on the filter sticker.

5 SPECIFICATIONS LKF 1000 LKF 2000 LKF 3000

Permeate capacity	140 liter/hour	280 liter/hour	440 liter/hour
Ambient temperature		5 - 35 °C	
Max. Water temperature		25°C	
Inlet water pressure		2 till 4 bar	
Required water supply	280 liter/hour	560 liter/hour	880 liter/hour
Output pressure permeate		Max 2,5 bar	
Water connections		¾" hose connections	
Electrical connection	230V, 50Hz 300 W	230V, 50Hz 500 W	230V, 50Hz 500 W

5.1 APLIED DIRECTIVES, STANDARDS AND GUIDELINES

This machine is UKCA and CE marked. This means that this machine complies with the applicable health and safety directives. The Declaration of Conformity specifies which directives and guidelines these are.

The standards applied are also indicated on the "Declaration of Conformity".

6 UKCA / CE- NAMEPLATE

Each reverse osmosis is equipped with a UKCA / CE name plate, which contains the following information:

	Omschrijving:	Details of this machine:
Type	Type-indication	LKF 1000 / 2000 / 3000
Serial nr.	Serial number	.....
Year of construction	Year	.....
Voltage	Required supply voltage	230 V, 50 Hz
Max. pressure	Maximum water pressure of the inlet	4,0 [bar]