Denver
Softener

USER MANUAL

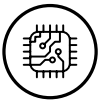
HOUSEHOLD
WATER SOFTENER

Denver
Softener

ÍNDICE **P**

USER MANUAL
HOUSEHOLD SOFTENER

0. MAIN SPECIFICATIONS

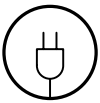


ELECTRONIC TIMER
ALLOWS TO CONTROL
ALL PARAMETERS

REGENERATIONS
DELAYED OR INMEDIATE
PROGRAMMING

MIXING VALVE
ALLOWS TO REGULATE THE
RESIDUAL HARDNESS

INTEGRATED BY-PASS
ALLOWS TO ISOLATE THE
SYSTEM FROM INSTALLATION



ELECTRONIC
ADAPTER
ELECTRONIC
ADAPTER

EASY TANK
SALT FILLING
SPECIAL FOR SOFTENER

MULTILINGUAL
TIMMER
ENGLISH/FRENCH/SPANISH

Conserve este manual, que incluye los apartados de libro de servicio y garantía, para poder proporcionarle un mejor servicio post-venta.

1. PRESENTATION

The water treatment equipment that you have bought is a softener of last generation with one of the most advanced control heads in the market.
Denver Water Softeners have quickly positioned themselves as an international model in terms of household water softening systems, both for its proven quality and smart design as for its easy and intuitive operation.

Your softener DENVER PLUS will provide you and your family the following advantages.

· ENERGY SAVINGS: Avoid the future incrustations in the pipes and connections.
· Great wellness sensation in the shower.
· Soft and smooth skin.
· Increases the life time of electronic devices and heating systems.
· ECONOMIC SAVINGS: Reduces the consumption of soaps, softeners and chemical products.
· Low cost of maintenance.
· Automatic function, your only concern is to add salt to the tank storage from time to time.

It is important that you keep and read this manual carefully before the installation and starting up of this equipment. If you have any doubt about the installation, use or maintenance of this equipment, please contact with the technical assistance service (T.A.S.) of your distributor.

1.1. SOFTENER SAFETY

Your safety and other's safety are very important. We have included safety messages in this manual and on your appliance.

This is the safety alert symbol.

This symbol alerts you to the potential hazards that can be risky for you and for others.
All safety messages will follow the safety alert symbol or either the word "DANGER" or "WARNING".

· **DANGER**: Severe or fatal risk if the following instructions are not immediately followed.

· **WARNING**: All safety messages provide information about the possible danger, how to reduce the risk of injury and what might happen if the instructions are not followed.

1.2. BEFORE STARTING

See **'Section 5'** before installing the water softener. Carefully follow the instructions for the installation (Warranty may be considered void, if the installation is faulty).

Please read the entire manual before undertaking installation. Then, collect all necessary materials and tools for the installation.

Check the plumbing installation.

All installations must be done according to the law in force in each region or country.

Please be careful when handling the water softener. Do not knock it over, let go of it or place it onto sharp objects.

Under no circumstances should the softener be installed outdoors, since it must be protected against sunlight and rough environmental conditions.

2. INTRODUCTION

The DENVER PLUS PLUS softeners equipments will avoid you all kind of problems caused by the hardness of the water and will reduce a lot the maintance requested by your electronical devices. They will have a longer life.

These systems come with a residual hardness regulator as standard, which allows selecting the appropriate hardness for your home.

Its user-friendly electronic programmer will allow you to put the system into operation in an easy and fast manner.

2.1. WHAT IS HARDNESS?

Hardness is the quantity of scaling salts present in water, which are mainly composed of low solubility salts of calcium and magnesium. The main salts causing hardness are listed below:

Calcium bicarbonate:	$Ca(CO3H)2$
Calcium chloride:	$CaCl2$
Calcium sulphate:	$CaSO4$
Magnesium bicarbonate:	$Mg(CO3H)2$
Magnesium chloride:	$MgCl2$
Magnesium sulphate:	$MgSO4$

These salts, due to their chemical properties, have a tendency to precipitate, producing scale on pipes and obstructing them as they accumulate.

In the same way, hardness has a high tendency to scale on the electrical resistors from heaters and to precipitate in heaters when temperature increases.

The combination of hard minerals and soap produces a soap curdling, wich reducest he cleansing properties of soap.

The precipitation of hard minerals build a layer on coo-

king utensils, connections and plumbing fixtures. It may even alter the taste of food.

Main problems:

· Precipitation on pipes, fixtures and appliances.
· Incrase of the energy consumption due to the generated isolation.
· Higher soap consumption
· Reduction of the electical appliances' service life and increase of the maintenance needed.

All these problems are greatly reduced when using a water **softening system**.

For the most part of Europe, hardness is indicater in French hydrometic degrees, but there are also other measuring units, according to each region.

Below are the most usual equivalences.

UNITS	*ppm of CaCO3*	*º French*
1 ppm of Calcium	2,5	0,25
1 ppm ofMagnesium	4,13	0,413
1 ppm de CaCO3	1	0,1
1º French (ºHF)	10	1
1º German (ºd)	17,8	1,78
1º Englisch (ºe)	14,3	1,43
1 mmol/L	100	10
1 mval/L=eq/L	50	5

2.2. HOW DOES YOUR SYSTEM WORK?

Water softening is carried out by means of an ion exchange process. On this purpose, the system uses resins with the chemical capacity of capturing Calcium (Ca) and Magnesium (Mg) ions and removing them from water.

When Calcium and Magnesium ions are captured by the resin, two Sodium (Na) ions are released which, due to its chemical properties, produce salts with a higher solubility , thus avoiding all hardness-related problems.

Therefore, when water gets softened, its sodium level increases.

Further information on this procedure can be found in **'Section 2.8'**.

Ion exchange resins:

They are synthetic compounds, usually with a spherical shape, able to capture certain chemical substances present in water, which then exchange for other substances. Water softening uses strong cation resins, which are composed of styrene copolymers and divinylbenzene with a sulphur base.

The exchange resin charge is located inside the vessel of the softener, attending an important part of volume of the same (between 60 and 75% depending on the model). It is compulsory that one part of the vessel remains free to allow a correct regeneration of the resin bed.

During the treatment process the water gets through the multiway valve by the entrance connection, flows to the upper part of the softener through the distributor producing this way an ionic exchange inside the resin bed.

The treated water is collected by the distributor and driven through the inner tube through the vessel till the multiway valve. It is sent with the out connection till the main water pipe for consumption. In this point the system has a counter for treated water to be contabilized.

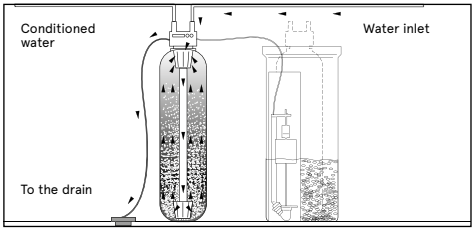
2.3 REGENERATION OF THE SYSTEM

The quantity of calcium and magnesium ions that the resin may retain is limited; therefore, the water volume a water softener can treat is limited as well. The system must periodically carry out a process known as regeneration, which allows the resin to recharge with sodium ions, so it can continue softening water.

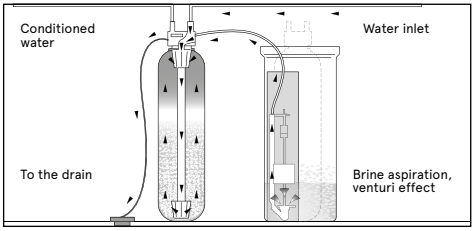
In DENVER PLUS PLUS systems the regeneration process starts automatically when the systems detects that the exchange capacity is going to finish, the timer incorporated in the system allows to configurate in a different way the starting of the regeneration, please see section 6.3 in order to get more information about how the programme works.

The regeneration of a softener system is made of different parts, each with a concrete finality

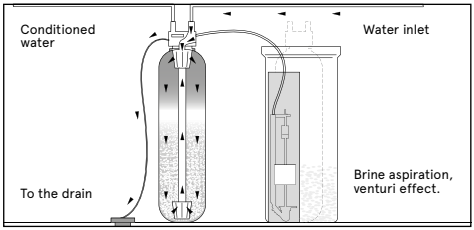
Backwashing:
The water gets into the vessel through an inferior collector, making a washing and a floffing of the resin bed and
allowing, this way, the following regeneration process.



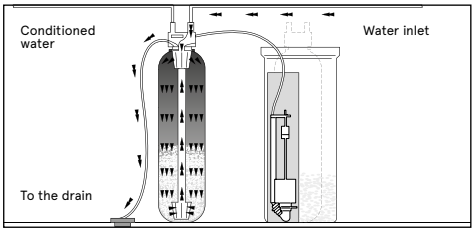
Brine aspiration:
Through an aspiration process for venturi effect the system suctions the brine liquid solution previously prepared for the regenerating tank. This salt solution is introduced into the softening vessel getting in contact with the ionic exchange resin and starting the regeneration.



Slow rinse:
It refers to the movement in the resin bed of the salt solution previosly aspirated, this way the contact of the salt with the resin is higher and the regeneration of the same is optimized.



Fast rinse:
The water flows through the resin bed making a final wash of the same and ensuring the total removing of the salt that can be inside the vessel.



Refilling the brine tank:
The volume of water goes automatically to the brine tank in order to prepare the necessary brine to be consumed in the next regeneration.This process is automatic, so normally it is not necessary to put more water in the brine tank (except during the starting up as shown in section 7.

! NOTE: During the regeneration process the systems allows the passage of the non treated water in order to ensure the disponibilty of the water to be consumed.

2.4 REGENERATION RATE AND CAPACITY.

The exchange capacity is the quantity of hardness that a certain resin volume can retain before getting exhausted. This value is usually expressed as ºHFxm3.

The higher the resin volume of the system is, the higher will be the quantity of hardness that can be retained before the resin gets exhausted.

Depending on the quantity of sodium chloride used to regenerate each liter of resin the capacity of exchange can differ.

2.5 WORK VOLUME

Water softeners using ion exchange must respect certain contact periods between water to be treated and resin, in order to ensure that the softening process is carried out properly.

For the DENVER+ equipment, please respect the minimum and maximum flow rates indicated in the Technical Characteristics section.

If the working ranges are outside the recommended ranges, the proper operation of the system will be affected (excessive loss of charge, hardness leakage, etc.)

2.6 HARDNESS LEAK

The ion exchange process on which water softening is based may be affected by different factors, which can reduce its efficiency and cause a certain level of hardness leakage.

High sodium concentration on water to be treated.

It may interfere in the exchange process.

Excessive flow rates

Since there is not enough contact time, some of the hardness may not be retained by the resin.

2.7 RESIDUAL HARDNESS

Depending on the final use of treated water, it may be necessary to obtain fully softened water or, on the contrary, it may be desirable to leave some residual hardness.

These systems have been designed to supply fully softened water, but the by-pass integrates a residual hardness mixer, which allows the regulation of the desired hardness degree in treated water (see **'Section 7'**).

! NOTE: For human consumption water, it is recommended to have a residual hardness between 5 and 8 ºHF if pipes are made of copper, and between 8 and 10 ºHF if they are made of iron (for the latter, it is also recommended to install a silicopolyphosphates filter afterwards).

2.8 SODIUM INCREASE

Most of the sodium we consume on a daily basis comes from food, specially processed food, since salt is an excellent preservative and is used as an additive in prepared products.

Sodium consumption through the water we drink is rather low when compared with that obtained from food.

! WARNING: As mentioned above, water softeners reduce the Calcium and Magnesium concentration in water by replacing it for Sodium. Thus, they increase the sodium level in water.

The maximum recommended sodium level in water for human consumption is of 200 ppm. Depending on the sodium concentration and the hardness of water to be treated, it is possible that softened water contains a higher concentration of sodium than that recommended.

Should this be the case, or if water is to be consumed by persons who must follow a low-sodium diet, it is recommended to install a household reverse osmosis system to drink the water.

The table below can be used as a guideline to know the increase on sodium concentration in treated water depending on feed water hardness:

INITIAL HARDNESS IN WATER (ºHF)	*SODIUM ADDED BY THE WATER SOFTENER (mgNa/litre)*
10	43
15	65
25	108
30	130
35	152
40	173
45	195
50	217
60	260

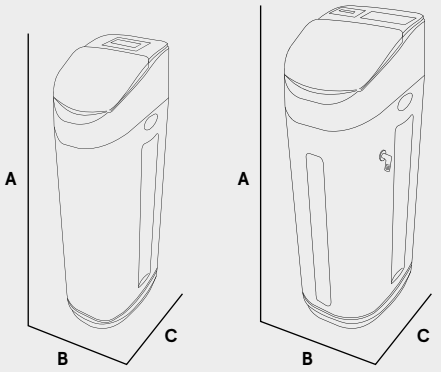
3. TECHNICAL SPECIFICATIONS

Model	**DENVER+ BLUE 7**
Code:	**960182**
Resin volume	7 liters
vessel	8x15
Working flow	0,3m³/h
Maximum flow	0,4m³/h
Maximum hardness	40ºHF
High efficiency configuration	
Salt/regeneration	0,4 Kg Sal
Exchange capacity	16ºHFxm³
Medium capacity configuration	
Salt/regeneration	0,6 Kg Sal
Exchange capacity	22ºHFxm³
High capacity configuration	
Salt/regeneration	0,8 Kg Sal
Exchange capacity	27ºHFxm³
Pressure rating	
Minimum flow	
Temperature range	
Pressure range	
Electrical connection:	
Rated electrical power	
Protection class	
Dimensions	
High A	546 mm
Width B	240 mm
Depth C	480 mm

DISTRIBUITED BY:
IONFILTER, WATERFILTER, PURICOM
Pol. Ind. L'Ametlla Park - c/Aiguafreda, 8
L'Ametlla del Vallès, Barcelona (España)
T. 902 305 310 - F. +34 936 934 329

TECHNICAL SERVICE:
+34 936 934 309
sat@ionfilter.com

DENVER+ BLUE 12	DENVER+ BLUE 18	DENVER+ SLIM 6	DENVER+ SLIM 12	DENVER+ SLIM 15	DENVER+ 12,5	DENVER+ 18	DENVER+ 20	DENVER+ 30
960183	**960184**	**762921**	**762926**	**762923**	**762916**	**762945**	**762918**	**762917**
12 liters	18 liters	6 liters	12 liters	15 liters	12,5 liters	18 liters	20 liters	30 liters
8x24 0,5m³/h 0,7m³/h 60°HF	8x35 0,8m³/h 1,2m³/h 90°HF	7x13 0,2m³/h 0,4m³/h 40°HF	7x22 0,5m³/h 0,7m³/h 60°HF	7x35 0,6m³/h 0,9m³/h 80°HF	10x17 0,5m³/h 0,8m³/h 60°HF	10x35 0,7m³/h 1,1m³/h 90°HF	9x26 0,8m³/h 1,2m³/h 90°HF	10x35 1,2m³/h 1,8m³/h 120°HF
0,7 Kg Sal 40°HFxm³	1,1 Kg Sal 57°HFxm³	0,4 Kg Sal 14°HFxm³	0,7 Kg Sal 40°HFxm³	0,9 Kg Sal 51°HFxm³	0,8 Kg Sal 40°HFxm³	1,1 Kg Sal 57°HFxm³	1,2 Kg Sal 76°HFxm³	1,8 Kg Sal 115°HFxm³
1,0 Kg Sal 49°HFxm³	2,2 Kg Sal 97°HFxm³	0,5 Kg Sal 19°HFxm³	1 Kg Sal 49°HFxm³	1,8 Kg Sal 75°HFxm³	1 Kg Sal 49°HFxm³	2,2 Kg Sal 97°HFxm³	2,4 Kg Sal 108°HFxm³	3,6 Kg Sal 170°HFxm³
1,4 Kg Sal 60°HFxm³	4,5 Kg Sal 117°HFxm³	0,7 Kg Sal 23°HFxm³	1,4 Kg Sal 60°HFxm³	2,4 Kg Sal 85°HFxm³	1,5 Kg Sal 60°HFxm³	4,5 Kg Sal 117°HFxm³	5,0 Kg Sal 130°HFxm³	7,5 Kg Sal 210°HFxm³
8 bar								
0,1 m³/h 4-35°C 2,5-8 bar								
220V/50Hz-24VAC 4W TIPO III								
775 mm 240 mm 480 mm	1056 mm 240 mm 480 mm	465 mm 200 mm 360 mm	700 mm 200 mm 360 mm	1025 mm 200 mm 360 mm	575 mm 333 mm 505 mm	1034 mm 333 mm 505 mm	810 mm 333 mm 505 mm	1034 mm 333 mm 505 mm



3.1. Volume of treated water according to inlet hardness

Appliance	DENVER+ SLIM 6	DENVER+ SLIM 12	DENVER+ SLIM 15	DENVER+ 12,5	DENVER+ 18	DENVER+ 20	DENVER+ 30
High efficiency:	14°HFxm^3	40°HFxm^3	51°HFxm^3	40°HFxm^3	57°HFxm^3	72°HFxm^3	115°HFxm^3
Feed hardness							
15	0,93	2,67	3,40	2,67	3,80	4,80	7,67
25	0,56	1,60	2,04	1,60	2,28	2,88	4,60
30	0,47	1,33	1,70	1,33	1,90	2,40	3,83
35	0,40	1,14	1,46	1,14	1,63	2,06	3,29
45	0,31	0,89	1,13	0,89	1,27	1,60	2,56
55	0,25	0,73	0,93	0,73	1,04	1,31	2,09
MEDIUM capacity:	19°HFxm^3	49°HFxm^3	75°HFxm^3	49°HFxm^3	97°HFxm^3	106°HFxm^3	170°HFxm^3
Feed hardness							
15	1,27	3,27	5,00	3,27	6,47	7,07	11,33
25	0,76	1,96	3,00	1,96	3,88	4,24	6,80
30	0,63	1,63	2,50	1,63	3,23	3,53	5,67
35	0,54	1,40	2,14	1,40	2,77	3,03	4,86
45	0,42	1,09	1,67	1,09	2,16	2,36	3,78
55	0,35	0,89	1,36	0,89	1,76	1,93	3,09
HIGH efficiency:	23°HFxm^3	60°HFxm^3	85°HFxm^3	60°HFxm^3	119°HFxm^3	130°HFxm^3	210°HFxm^3
Feed hardness							
15	1,53	4,00	5,67	4,00	7,93	8,67	14,00
25	0,92	2,40	3,40	2,40	4,76	5,20	8,40
30	0,77	2,00	2,83	2,00	3,97	4,33	7,00
35	0,66	1,71	2,43	1,71	3,40	3,71	6,00
45	0,51	1,33	1,89	1,33	2,64	2,89	4,67
55	0,42	1,09	1,55	1,09	2,16	2,36	3,82

Tipo de equipo	DENVER+ BLUE 7	DENVER+ BLUE 12	DENVER+ BLUE 18
High efficiency:	16°HFxm^3	40°HFxm^3	57°HFxm^3
Feed hardness			
15	1,09	2,67	3,80
25	0,65	1,60	2,28
30	0,54	1,33	1,90
35	0,47	1,14	1,63
45	0,36	0,89	1,27
55	0,30	0,73	1,04
MEDIUM capacity:	22°HFxm^3	49°HFxm^3	97°HFxm^3
Feed hardness			
15	1,48	3,27	6,47
25	0,89	1,96	3,88
30	0,74	1,63	3,23
35	0,63	1,40	2,77
45	0,49	1,09	2,16
55	0,40	0,89	1,76
HIGH efficiency:	27°HFxm^3	60°HFxm^3	117°HFxm^3
Feed hardness			
15	1,79	4,00	7,80
25	1,07	2,40	4,68
30	0,89	2,00	3,90
35	0,77	1,71	3,34
45	0,60	1,33	2,60
55	0,49	1,09	2,13

4. UNPACKAGING AND CONTENTS VERIFICATION

It is important that before installing and starting the system you check the box and conditions of the material received in order to ensure that the system has not been damaged during the transport

Any claim for damages during the transport must be detailed together with the delivery note or invoice to the distributor, mentioning the name of the carrier within a maximum period of 24 hours after the goods reception.

The DENVER PLUS softeners are provided completely ensambled and have the following parts:

· Volumetric DENVER PLUS valve 850 : Automatic and made of Noryl. With isolating by-pass and mixing screw of residual hardness.

· Vessel containing the resins, made in PRFV.

· Resin for the ionic exchange, cationic type, special for softening, provided inside the vessel.

· DENVER PLUS cabinet, made of plastic, with salt capacity for multiple regenerations.

· Brine system aspiration protected with plastic funnel.

· Packaging and protection, including a presurized air balloon to avoid the vessel movements.
· Please read carefully this manual before starting instalation.

! The air balloon has to me removed before proceeding the system installation.

The packaging material can be recycled and must be thrown away in the suitable recycling bins or to be delivered to the specific centre for the collection of waste material.

The machine that you have acquired has been designed and manufactured with high quality materials and components that can be recycled and reused. This product must not be thrown away into the usual urban rubbish bins. When you want to throw the machine away, it must be taken to a specific local centre for the collection of materials, stating that it contains ion exchange resin.

In order to obtain more information about how to dispose of your equipment, contact the management of urban waste service or the establishment where you acquired the system.

The proper collection and treatment of the machines that can no longer be used contributes to the preservation of natural resources and also to avoiding potential public health risks.

5. WARNINGS

! The DENVER+ series water treatment systems ARE NOT WATER PURIFIERS. Its aim is to remove the hardness from water, leaving a softened and treated water which will prevent all problems associated with hard water.

! Should the water to be treated not come from a public water supply, that is, from an unknown source, a physical-chemical and bacterial analysis of the water shall be necessary, with the aim of ensuring its proper purification by applying the techniques and systems appropriate to each case, PRIOR TO THE INSTALLATION of the system.

5.1 REQUIREMENTS FOR THE PROPER WORKING OF THE SYSTEM

· Do not use hot water in the system (T>35ºC).

· The ambient temperature must be between 4 ºC and 45 ºC.

· The system should be installed in a dry environment, free of acid vapours. Otherwise, please ensure a proper ventilation.

· Water to be treated must be properly filtered, therefore, it is recommended to install a pre-filter to guarantee the removal of suspended particles, which may be swept along by inlet water.

! Failure to install an appropriate filter would result in particles obstructing the inner holes or injectors of the system, thus affecting its proper operation.

· A minimum pressure of 2.5 bars must be ensured. Should this minimum pressure not be available, a pressure system shall be installed.

· If inlet pressure is higher than 5.5 bars, a pressure regulator must be installed.

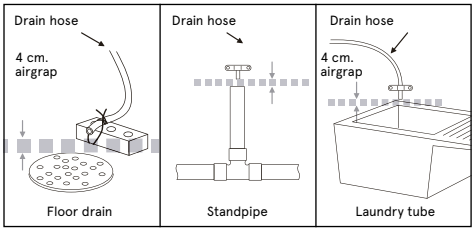
5.2 INSTALLATION

· If the water softener must treat all the water supply of your home, connect it to the general supply pipe before connecting the rest of the pipes, except for pipes supplying the outside. Taps located outside the house must supply hard water. Due to the sodium increase in softened water, it is not recommended to use it for watering, since it can negatively affect the growth of plants and vegetables.

· In the event of modifying the home/workplace in order to install the equipment in the planned location, it should be done following national guidelines for interior installations of water and electric supply.

· The installation location should have sufficient space for the machine itself, its accessories, connections and room for servicing and repair.
· The system should not be installed next to a heat source or where it receives a direct flow of hot air.

· The drain connection, where water from regeneration will be driven, must be underneath the installation if possible. Drain connection must always have a free outlet. The diameter of this connection must have a minimum size of 1". The maximum distance between the water softener and the drain intake cannot be higher than 6 m.



· Raising the drain intake above the water softener level is not recommended, since it can affect the brine suction and, thus, impair the regeneration process.

· In the event that this is deemed DENVER PLUS, it can be raised a maximum of 1.5 m, provided that the inlet pressure is higher than 4 bar.

· If the height is greater or there is not enough pressure, contact your distributor.

· Under no circumstances should the equipment be ins-talled outdoors.

· The environment where the equipment is to be installed should adhere to any appropriate hygiene and sanitation conditions.

· Avoid any external dripping liquids from pipes, wastewater, etc. onto the equipment.

· Should softened water be supplied to a hot water or vapour generator, it will be necessary to install a dependable check valve between the water softener and the generator, in order to prevent hot water from returning to the system and damaging it.

· The existing pipelines must not have deposits of either iron or lime. Replace all pipelines containing a great amount of iron or lime deposits. In the event that pipelines are blocked with iron, install a separate iron filter unit before the water softener.

· It is recommended to install some valves for sample taking both for treated and untreated water, as close as possible to the water softener.

· If there are quick-closing valves, it is recommended to install a device to prevent water hammers.

· The softener works only on 12 volt- 50hz electrical power supplied by a direct plug-in transformer included.
Please use the transformer and connect it to a floor of 220-240 V, 50Hz.

· At the same time you should be sure that the home installation is properly protected with a device like a switch or a fuse.

PRECAUTIONS:

1. Reading and review: Carefully read all procedures, guides and regulations before installing and using the DENVER PLUS water softening equipment.

2. Treatment of chemicals: Avoid the presence of flammable products or materials as a safety measure for preventing the risks of explosion and fire. Make sure to use the glue and the cleaning product for PVC in a well-ventilated area.

3. Eye protection: Wear safety goggles during the installation process to prevent any injury in your eyes, caused by the ejection of welding materials or metal and plastic chips.

4. Welding: Use adequate protective equipment to protect the exposed surfaces against the flame of the gun or an excessive temperature increase. Only use welding guns WITHOUT LEAD.

5. Grounding: When installing a plastic pipe between two metallic pipes, a grounding cable must be installed to prevent the interruption of grounding continuity.

6. Easy reach: Use a ladder for working at heights which are out of reach. If you must work at heights for a prolonged period of time, use adequate safety devices.

Note: We recommend that the installation is carried out by a qualified installer. Failure to install the equipment in accordance with this manual will render the warranty void.

· If daytime pressure is higher than 5.5 bars, night-time pressure may exceed the maximum. Please use a pressure-reducing valve if necessary (a pressure-reducing valve may reduce the flow).

· It is recommended to install a silicopolyphosphates filter in the system's outlet to protect the pipes from the corrosion of softened water.

Note: The warranty of the equipment does not cover any damages due to the freezing of the equipment. If you have questions about the DENVER PLUS water equipment or if you think that it is not working properly, contact your distributor.

5.3 SETTING UP AND MAINTENANCE

· The system must be periodically sanitised. See '**Section 8**' for further information.

· Maintenance should be carried out by qualified technicians who work under the appropriate hygienic conditions. (For further information contact the technical service of your distributor.)

6. SYSTEM INSTALLATION

DENVER PLUS installation process must be carried out by qualified technical people. Please follow the advises of section 5 and warnings of this manual.

! Taking into account that the system that you are going to install will improve the quality of the water that it is going to be consumed and that this is considered a food, all tools used for the assembling and installation should be clean and in no case can be contaminated nor impregnated of grease,oils or oxides. The job should be carried out with the proper attitude and hygienic conditions considering all necessary precautions with everything related to the materials that are going to be in contact with the treated/to be consumed water (Please contact your distributor for more information).

6.1 REQUIRED TOOLS AND PARTS

Before starting the installation, please make sure you have all necessary tools. Read and follow the instructions included in "**Section 6.2**"

Screwdriver
Pliers
Tape measure
Flexible hose of ½".

If using soldered copper pipe
Tubbing cutter
Propane torch
Misc.copper pipe fittings
Lead-free solder and flux
Emery cloth
Sandpaper or steel wool

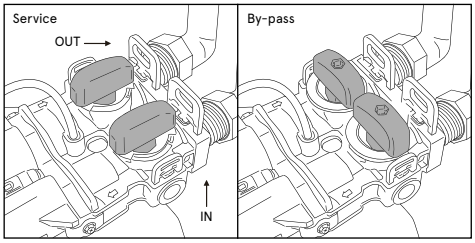
If using threaded pipe
Pipe cutter or hacksaw
Threading tool
Pipe joint compound
Misc.threaded pipe fittings

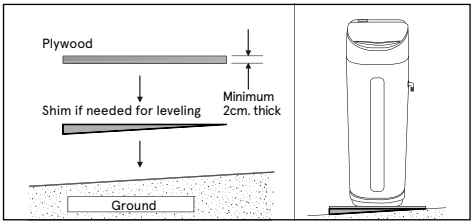
If using CPVC plastic
Pipe cutter
Hacksaw
Adjustable wrench
Glue for CPVC
Misc.CPVC pipe fittings

If using other
Other pipes and fittings suitable for potable water supply as required by manufacturer or local legislation.

6.2 INSTALLATION STEP BY STEP

1. The system should be always installed with the by-pass valve supplied. If desired it can be installed a by-pass with 3 valves. The bypass of DENVER PLUS systems has two positions.





RECOMMENDED INSTALLATION

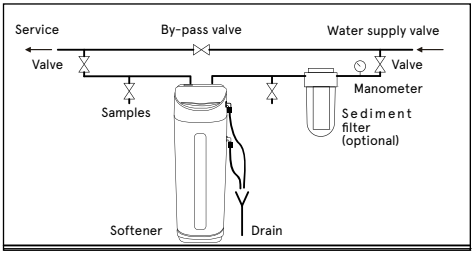
2. Close the main water supply valve, near the well pump or water meter.

3. Open all faucets to drain all water from the house pipes.

! NOTE: Be sure not to drain water from the water heater because it can be damaged

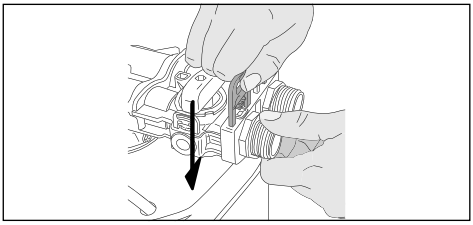
! "DANGER" Excesive weight hazard. At least two people are required to move and lift salt bags. Faillure to do so can result in back or other body parts injury.

4. Move the water softener into installation position. Set it on a level surface. If needed, place the water softener on a section of plywood, a minimum of 2 cm thick. Then, shim under the plywood to level the water softener. Please see picture below:



! IMPORTANT: Do not place shims directly under the salt storage tank.The weight of the tank, when full of water and salt, may cause the tank to fracture at the shim.

5. You will be supplied with a in and out noryl set of connections male 1".Be sure that the clips snap firmly into place so the bypass will not pull out.



6. You should measure,cut, and loosely assemble pipe and fittings from the main water pipe to the inlet and outlet ports of the water softener valve. Be sure to keep fittings fully together, and pipes squared and straight. Check that hard water supply goes to the water softener valve inlet side.
Display LCD

NOTE: Inlet and outlet are marked on the valve.Trace the water flow direction to be sure.

IMPORTANT: Be sure to fit, align and support all plumbing to prevent putting stress on the softener valve inlet and outlet.Undue stress from misaligned or unsupported plumbing may cause damage to the valve.

SOLDERED COPPER

1. Thoroughly clean and apply solder flux to all joints.
2. Make all solder connections.

NOTE: Do not solder with installation tubes attached to single valve bypass. Soldering heat will damage the valve.

IMPORTANT: When installing the copper tubes and ground clamp assembly to the single valve bypass, the ground clamp must be secured in place. If necessary tighten the screw.

THREADED PIPE

1. Apply pipe joint compound or Teflon taple to all male pipe threads.
2. Tighten all threaded joints and make all solder connections.

CPVC PLASTIC PIPE

1. Clean, prime and cement all joints, following the manufacturer's instructions.

NOTE: Do not solder with installation tubes attached to single valve bypass.Soldering heat will damage the valve.

OTHER
Follow the piping system manufacturer's instructions when using other pipe approved for potable water.

INSTALLING DRAIN HOSE
Measure, cut to needed length and connect the ½" drain line to the water softener valve drain fitting. Use a hose clamp to hold the hose in place.

NOTA: Run the green drain hose or copper tubing to the floor drain. Secure drain hose. This will prevent "whipping" during regenerations.

OVERFLOW INSTALLATION

Connect the storage tank overflow elbow installed in the system to a near floor drain point. This point should be no higher than the drain fitting on the salt storage tank.

NOTE: Drain hose should be installed in a proper way just to avoid that the water overflows and returns from the drain hose.

6.3. SMART SOFT CONTROLLER

Introduction

This system is equipped with a user-friendly automatic controller that allows to completely command the working of the softener.

SMART SOFT controllers supply important information about the working conditions of the system, but also they allow an easy and fast setting.

Also, they include premium options that increase system safety and efficiency, allowing us to offer one of the most advanced units in the market.

Main features:

Userfriendly programming

Mulilingual digital display

Hardness setting in ppm

Volumetric delayed regenerations, with day override. Immediate and time started regenerations available.

Fast regeneration: in case that the resin is saturated during the day, it allows to start a quick regeneration in order to partially recharge the resin.

Untreated water control: provides information about the amount of water supplied untreated.

LCD Display:

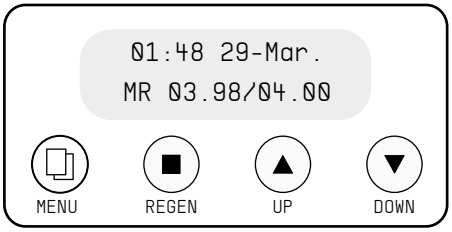
Shows information about the system. Depending on the situation of the system the information shown may vary:

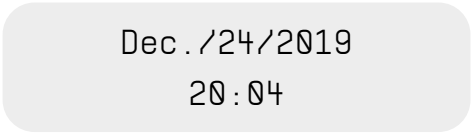
Service position: display will automatically alternate between the informations shown in the attached chart (6.5). Information only to visualize, not to modify.

Regeneration: while in this stage the display will shown the current stage of the regeneration and the remaining time until it ends. By pushing any key the current stage can be skipped.

Programing: while in this stage it showns the internal parameters and allows its modification.

Keyboard:





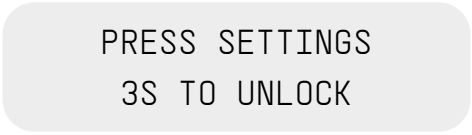
SET/ MENU REGEN UP DOWN

"SET/MENU": allows to access user programming (by pushing it for 3 seconds). Also it allows to modify the internal parameters.

"REGEN": by pressing this key it allows to start a regeneration(immediate or delayed). Inside programming, allows to modify the parameters.

"UP" and "DOWN": they allow to change the shown parameters in service position. Inside the programming, can be used to modify the selected parameters.

After a while without pressing any key the controller will be automatically blocked. Showing the following text in case that any key is pressed:



To unblock the display is only necessary to push the key "SET/MENU" for three seconds.

ATTENTION: There are different internal programming levels in the SMART SOFT controllers. Those levels are reserved only for technical service.

6.4. SYSTEM PROGRAMMING

The softener is supplied completely programmed from factory for domestic applications. That includes the following adjustments:

- Delayed (02:00) meter initiated regenerations
- Safety regenerations every 15 days.
- Fast regenerations enabled.
- In case of no water consumption, system will make a resin cleaning.
- System default language: Spanish.
- Hardness units: to be programmed in ppm CaCO3.

Start-up settings:

Unblock the timer in case that is blocked, by pressing "SET/MENU" key for 3 seconds.

Push the "SET/MENU" key for 5 seconds in order to access the programming.

By using the "UP" and "DOWN" keys can be modified the programming parameters. By pressing the "SET/MENU" key the selected parameter will be confirmed and it will jump to the next one.

Basic programming

Access: Push "SET/MENU" for 5 seconds
Next parameter: "SET/MENU"

Parameter:	Details:
Time of day	0-24h
Year	20XX
Month	Jan-Dec
Day	01-31
Feed hardness	ppm
Inhabitants	1-9
Salt setting	High efficiency
Water origin	Municipal
Regeneration time	02:00
Load default	Don't touch

Comments on programming:

- Feed hardness: Its always recommended to apply a certain safety margin when setting the hardness in order to compensate hardness variations.

- Inhabitants: to program in case of domestic applications. In other cases adjust this value to 1.

- Salt setting: systems are supplied by default set at high efficiency. That's adequated for hardness levels up to 400 ppm. For higher hardness the salt setting should be modified:

Salt setting:	Maximum hardness (ppm)*
High efficiency	400
Standard	700
Iron & Manganese	1200

*Maximum hardness: maximum hardness level may vary depending on some parameters.

- Water origin: Well or municipal. Set according to feed water quality. If water comes from well is highly recommended to make a complete water analyse in order to check if other water treatments are required.

- Load default: DON'T MODIFY THIS VALUE. Any modification will affect to water softener internal setting, returning to factory setting. If that happens, please contact technical support in order to reset the unit.

How to start a regeneration:
- Delayed regeneration: While in service position, push

once the "REGEN" key. Display will show the following message:

PRESS SETTINGS
3S TO UNLOCK

By pushing in "REGEN" key its possible to alternate between ON and OFF options. By choosing ON, the system will start a regeneration at the preset hour (usually 02:00AM).

• Immediate regeneration and holiday mode: While in service position, push the "REGEN" key for three seconds until the display shows the following message:

REGENERATION
IMMEDIATE

With the "UP" and "DOWN" buttons it can be selected one of the following options. By pushing the "REGEN" button, the selection will be confirmed:

Immediate regeneration: System will start a complete regeneration.

Holiday mode: Once this option is chosen, the system will ask for the amount of days that it should remain in this mode. During this period the system will make small backwashing process instead of complete regenerations.

Cancel a regeneration:
Once the regeneration is started, it's possible to jump to the next stage, by pushing in any key.

6.5. INFORMATION SHOWN BY THE DISPLAY

While in service the system will shown different informations, that will alternate between the following ones:

Date (Month/Day/Year) and time of day

2019/02/06
12:30

Volume of water between regenerations and remaining voume until next regeneration

TOTAL 6892 L
REMAIN 6888 L

Inhabitants in the house and estimated water reserve

PEOPLE 4
RESERVE 300 L

Next regeneration estimation

NEXT REGEN.
10 DAYS

Last regeneration date:

LAST REGEN.
2019/01/25

Regenerations since start-up

TOTAL REGENS
0

Treated water since start-up

TOTAL TREATED
5 L

Over run total:

OVER RUN TOTAL
0 L

Current flow and peak flow:

CURRENT 0.0l/M
PEAK 99.9l/M

Day override setting:

DAY OVERRIDE
7 DAYS

Rinse override setting:

RINSE OVERRIDE
OFF

Delayed regeneration programmed:

DELAYED REGEN
OFF

Regeneration time:

REGEN. TIME
02:00

Refill time (calculated by the system):

REFILL TIME
7.9 MINUTES

Software setting

VALVE MODE
SOFTENER UF

7. START UP

7.1 HYDRAULIC START-UP

Prior to initiate the start-up of the system make sure that all previous steps regarding installation. Ensambling and programming have been correctly effected and according to the instructions of this manual and according to local regulations. To start up follow the following steps:

Do not put salt inside the system till the end of the start-up process. In order to avoid air pressure upon the softener and the plumbing system, follow the instructions in order.

1. Put the bypass valve in "bypass" position.

2. Open completely two cold and treated water faucets located after the water softener. Have it opened for some minutes in order to ensure that all the trapped air is removed from the system. Check also that there are no leaks in the installation.

3. Plug the programmer to the power supply using the transformer included in the system.

4. The program must be in service, otherwise please check 'Section 6.3'.

5. Press the "REGEN" button to access regeneration menu. An immediate regeneration must be chosen. After some seconds the unit will move to the Backwash position.

BACKWASHING

6. Slowly open the water inlet valve to allow the entrance of water inside the system. At this point, the inlet flow must be rather low, since in this position water will come in from the bottom of the bottle and flow upwards to the drain.
7. When water starts flowing continuously through the drain, fully open the water inlet of the system. At this point, the bottle will be full of water and so a higher flow will not produce any damage. Water going out to the drain may be a bit yellowish or brown. This is completely normal, since it is due to the preservatives of the resin.

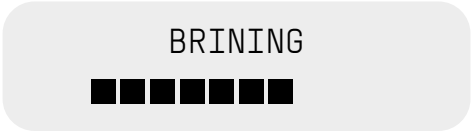
8. Please maintain this position (water flowing through the drain) until coloration disappears.

9. Close inlet valve for five minutes and all the air trapped with the resin will float to the upper part of the vessel.

10. Open inlet valve one more time for some minutes to ensure that all the air inside the vessel has been removed.

11. Cancel the current stage of the regeneration until refill stage. The brining tank will start refilling by itself. In this moment the system will end the regeneration started in point 6.

12. Start another regeneration. Wait until the system is placed in backwashing position nbr.6 and cancel this stage by pressing any key.



13. The softener will start to suction water from the tank (brining position). Check that the softener suctions water from the tank.

14. Cancel the remaining stages of the regeneration.

15. Put the by-pass in service position and check that the treated water has been correctly softened.

16. Fill the tank with salt.

17. The system is ready to work. Start-up process is finished.

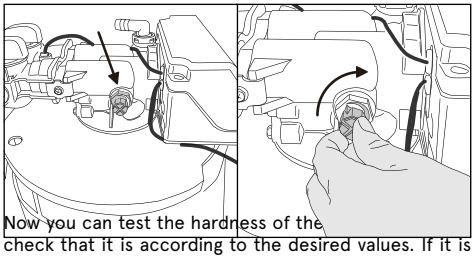
"WARNING" Excesive weight hazard at least two people are required to move and lift salt bags. Faillure to do so can result in back or other body parts injury.

7.2 REGULATION OF RESIDUAL HARDNESS

As stated out in **section 2.7.** it is recommended not to supply completely softened water to household installations.

DENVER PLUS systems have a residual hardness regulator that allows to adjust the hardness quantity in the treated water.

This works making a small test of non treated water with a completely softened water.
In order to modify the residual hardness, lightly open the regulating valve, as indicated in the images below.



Now you can test the hardness of the water and check that it is according to the desired values. If it is not like this adjust the regulator and check it again.

ATENTION: The hardness regulator is supplied completely closed, so if you do not regulate it the softener will provide a totally softened water.

8. MAINTENANCE/SANITIZING

The DENVER PLUS softeners, being automatic, do not require a complex maintenance.
In order to ensure a correct working of the system it is enough to make the following checking from time to time as showed in the table below:

Testing	*Period*
Check the quantity of salt inside the tank:	Monthly
Check the feed hardness:	Monthly
Check the hardness of the treated water:	Monthly
Sanitizing:	Yearly
Incrustation level:	Yearly
Salt tank cleaning :	Yearly
Technical service revision:	Yearly

It is important not to make the sanitizing and the descaling treatment at the same time, because the chemical products can react in a dangerous way. You should alternate both processes as per indicated frequency.

SALT FILLING

Please revise the level of the salt inside the tank.. It should be mínimum: 1/3 of the tank. If the system runs out of salt before the refilling the softener will produce hard water. When finishing the checking please make sure that the cover is correctly closed.

NOTE: In humid areas it is best to keep the salt storage level lower and refill the tank more often.

RECOMMENDED SALT: Coarse salt tablets or balls with less than 1% of impurities.
NOT RECOMMENDED SALT: Rock salt, with impurities, block, granulated, table, ice melting, or for kitchen use.

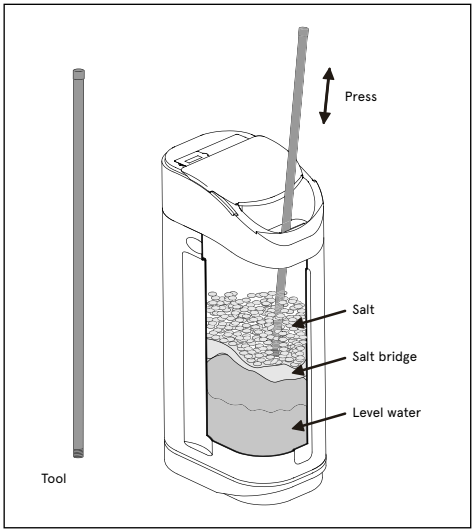
BREAKING A SALT BRIDGE

Sometimes, a hard crust or salt bridge is formed in the brine tank. It is usually caused by high humidity or the wrong kind of salt. When there is a salt bridge, and empty space forms between the water and the salt. Then the salt will not be dissolved in the water to make brine and without brine the resin bed does not regenerate and you will get hard water.

If the storage tank is full of salt, it is hard to tell if you have a salt bridge because salt is loose on top but the bridge is under it.

Take a tool or a broom handle, for instance, and hold it next to the water softener, measure the distance from the floor to the rim of the water softener. Then push the broom handle straight down into the salt. If you find a hard object, it is most likely a salt bridge.

Carefully push into the bridge in several places to break it.



"WARNING" Do not use any sharp or pointed objects as you may puncture the brine tank

SANITIZING:

Every year it is recommended to make an sanitizing process as follows:

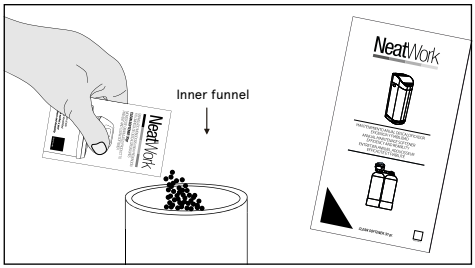
1. Open the covers of the salt tanks and put inside about 20 a 30 ml (2 or 3 caps) of Bacwater (652100.) inside the funnel. Close again.

2. Make sure that the bypass valves are working.

3. The disinfenction process will be done when the regeneration finishes and the disinfection solution has been extruded from the softener to the drain.

REMOVING INSCRUSTATION:

Once a year it is recommended to make a cleaning with Clean Softener (611000), a product specially designed for the cleaning of your softening system. This product, because of its special formulation, will clean the resin eliminating all kind of iron and other remaining metals that represent a contamination and at at the same time it will remove all possible incrustations in the inner passages of the valve.



NOTE: Follow carefully the instructions of the use of the product stated out on the label of the same.

The maintenance and sanitizing of the system should be carried out by a specialized technician qualified in hygienic conditions and following the specific indications of each product.

9. TROUBLESHOOTING GUIDE

PROBLEM	MAY CAUSE	SOLUTION
1. The timer doesn't work	1. The transformer is not connected. 2. Electric cable deffective. 3. No power. 4. Deffective transformer	1. Plug the transformer (power supply). 2. Replace the cable. 3. Revise the installation. 4. Replace the transformer.
2. The system regenerates at incorrect hours	Power cuts cut damage the timer programming.	Please use the manual to adjust the clock of the system.
3. Water leaks	Bad connections.	Revise/tight all connections.
4. Annoying noises / White water	Air inside the system.	Make a backwashing to eliminate the air
5. Excessive hardness of the water treated	1.Increase of hardness in inlet water. 2. Incorrect regeneration. 3. Damaged resin. 4. Lack of salt inside tank /salt bridge.	1. Check the hardness and revise timer. 2. Revise the timer. 3. Substitute the resin. 4. Fill the storage with salt /break the salt bridge
6. There is no brine aspiration	1. Not enough feed pressure. 2. Brine line blocked. 3. Blocked injectors. 4. Water inner leaks.	1. The minimum feed pressure should be of 2,5bar. 2. Clean the brine line. 3.Clean or replace the injector and the filter. 4.Revise piston, threads and separators.
7. The brine tank is oveflowing	1. Incorrect timing 2. Incorrect aspiration. 3. Flow to high.	1. Please contact the distributor. 2. Revise aspiration. 3. Revise back flow.
8. The hardness of the water is not going away	1. Fail of regeneration. 2. Not enough brine. 3. Incorrect aspiration.	1. Check for loss of power and correct. 2. Keep the brine tank full of salt. 3. Revise aspiration.
9. Backwashing flow too high or too low.	1. Incorrect backwashing regulator. 2. Blocked backwashing regulator.	1. .Put a proper regulator 2. Wash the backwashing regulator.
10.Non treated Water leakings during working	1. Incorrect regeneration. 2. Leaks in by-pass valve . 3. Tube o-ring damaged. 4. Incorrect regeneration cycle.	1. Make a regeneration checking that the salt amount is correct 2. Check the by-pass valve. 3. Replace the o-ring. 4. Reset the regeneration cycle
11. Resin escape from the system	1. Inner difusors damaged. 2. Damaged resin	1. Substitute damaged difusors 2. Substitute resin and revise installation
12. During working water is coming through the drain	1. O-ring and separators damaged. 2. Damaged piston. 3. Bad located piston.	1. Replace o-rings and separators. 2. Replace piston 3. Start the system again, repeat the process and if it does not work please contact your distributor.

10. WARRANTY

· The distributor guarantees the equipment for a period of two years for issues with conformity that is detected during this period, pursuant to RD 1/2007 of 16 November (Consolidated text of the General Law for the Defense of Consumers and Users). The warranty includes the reparation and substitution of defective pieces by authorised personal by the Distributor or the Official Technical Assistance Service (SAT), where it was installed or in a workshop. The warranty includes all labor and transportation costs that may arise.
· The distributor is excluded from this warranty if the parts are damaged due to natural wear and tear, lack of maintenance, blows or other lacks of conformity that are the result of the inappropropiate use of the equipment or inappropriate according to the conditions and operational limits indicated by the manufacturer of the product. Also, the warranty is no longer valid if the equipment has been poorly handled or used, or if they have been repaired or modified by personnel that does not work for the distributor or official.
· The distributor will respond for any non-compliance in the equipment if it relates to the origin, identity or suitability of the products, in accordance with their nature and purpose. Taking into account the characteristics of the equipment, if the warranty is to cover any lack of conformity, compliance with the technical installation and operation conditions of this warranty sheet is essential; as is a copy of the invoice or purchase ticket. If these conditions are not fulfilled, it may lead to the invalidation of the warranty, taking into account the equipment's purpose and the conditions and operating limits in which it must operate.
· The distributor guarantees that the equipment installed is suitable in particular for the improvement of the quality of the water to be treated, based on the characteristics of the equipment and all applicable laws.
· The installer and/or distributor guarantees the correct installation and implementation of the equipment as indicated by the manufacturer and applicable law and will also respond for any lack of conformity that may result from the incorrect application, instalment or implementation of the equipment.

The system has been installed and works correctly for the client:

* Previous treatment to the system:

* Inlet system hardness (ºF):

* Inlet water hardness (ºF):

* Residual harness(ºF):

* Inlet system pressure (bar):

***Results of Installation and start-up:**

Correct:

Other:

The owner of the equipment has been informed adequately and clearly of the use, manipulation and maintenance that the equipment requires to guarantee its correct operation and the quality of the water produced. For this, we offer you a maintenance contract.

***Maintenance contract reference:**

ACCEPTS the maintenance contract ○

DOES NOT ACCEPT the maintenance contract ○

If you need information, or if you need to communicate any damages, maintenance requests or request the intervention of a technician, first read the operational, detection and problem shooting sections of this manual and get in touch with the distributor or the company that sold your equipment.

COMPANY OR AUTHORIZED INSTALLER:

COMPANY OR AUTHORIZED INSTALLER, DATA, SIGNATURE:

NOTE FOR THE COMPANY AND/OR THE AUTHORISED TECHNICIAN/INSTALLER:The data marked with * must be filled by the installing technician and transcribed in the COMMISSIONING AND INSTALLATION REGISTRATION SHEET.

11. INSTALLATION REGISTRATION SHEET

NOTES FOR THE TECHNICIAN/INSTALLER: Read this Manual carefully. If you have any doubts, get in touch with the Technical Assistance Service (T.A.S) of your distributor. The data market with * must be filled by the installing technical and transcribed in the WARRANTY SHEET. This sheet must be preserved by the installer/distributor and may be required by the distributor for the purpose of improving after-sale and customer service. The technician that performs the installation and set-up of the equipment must be in possession of the appropriate skills.

DATA OVER THE APPLICATION OF THE SYSTEM:

Source of water to be treated:

- PUBLIC SUPPLY NETWORK
- OTHER

* Previous treatment to the system:

* Inlet system hardness (ºF):

* Inlet water hardness (ºF):

* Residual harness(ºF):

* Inlet system pressure (bar):

INSTALLATION CHECK-LIST:

Pre-filter installation:		Fittings installation:	
Isolation bypass installation:		Pressurized system tightening:	
Overflow system installation:		Inlet hardness measurement:	
Proper drain istallation:		System programming:	
Start-up according to protocol:		Outlet hardness measurement:	
Brine intaje / tank filling confirmation:		Residual hardness adjustment:	

COMENTARIOS

* Results of installation and set-up:

- CORRECT (system installed and working correctly. Water produced can be used).
- OTHER:

INDENTIFICATION OF THE AUTHORIZED TECHNICIAN:

COMPANY OR AUTHORIZED INSTALLER, DATA, SIGNATURE:

CONFIRMATION:

I have been clearly informed of the use, manipulation and maintenance that the installed equipment requires and I have been offered a maintenance contract and informed of how to contact Customer Service if I need information, if I need to notify any damages or malfunctioning, request a maintenance service or request the intervention of a technician.

Comments:

***Maintenance contract reference:**

- ACCEPTS the maintenance contract
- DOES NOT ACCEPT the maintenance contract

Model/Ref.:

Owner:

Adress:

Phone:

Location:

City: ZIP:

SYSTEM WARRANTY FOR THE DISTRIBUTOR:

Will bear the responsability only and exclusively the substitution of the parts in case of non-conformity. The reparation of the equipment and the expenses that this will entail (labor, transportation costs, displacements, etc), will be the responsability of the distributor, in accordance with what is outlined in the general conditions of sale, which will not be transferable to the manufacturer.

12. MAINTENANCE SERVICE

DATE	SERVICE TYPE	NAME, SIGNATURE AND TECHNICIAN STAMP	
	◯ START-UP		
	◯ FULL MAINTENANCE	TECHNICIAN	
	◯ PREPARATION	STAMP	ORDINARY
	◯ HYGIENISATION		EXTRAORDINARY
	◯ OTHER		WARRANTY
	◯ FULL MAINTENANCE	TECHNICIAN	
	◯ PREPARATION	STAMP	ORDINARY
	◯ HYGIENISATION		EXTRAORDINARY
	◯ OTHER		WARRANTY
	◯ FULL MAINTENANCE	TECHNICIAN	
	◯ PREPARATION	STAMP	ORDINARY
	◯ HYGIENISATION		EXTRAORDINARY
	◯ OTHER		WARRANTY
	◯ FULL MAINTENANCE	TECHNICIAN	
	◯ PREPARATION	STAMP	ORDINARY
	◯ HYGIENISATION		EXTRAORDINARY
	◯ OTHER		WARRANTY
	◯ FULL MAINTENANCE	TECHNICIAN	
	◯ PREPARATION	STAMP	ORDINARY
	◯ HYGIENISATION		EXTRAORDINARY
	◯ OTHER		WARRANTY

12. MAINTENANCE SERVICE

DATE	SERVICE TYPE	NAME, SIGNATURE AND TECHNICIAN STAMP	
	◯ START-UP		
	◯ FULL MAINTENANCE ◯ PREPARATION ◯ HYGIENISATION ◯ OTHER	TECHNICIAN STAMP	ORDINARY EXTRAORDINARY WARRANTY
	◯ FULL MAINTENANCE ◯ PREPARATION ◯ HYGIENISATION ◯ OTHER	TECHNICIAN STAMP	ORDINARY EXTRAORDINARY WARRANTY
	◯ FULL MAINTENANCE ◯ PREPARATION ◯ HYGIENISATION ◯ OTHER	TECHNICIAN STAMP	ORDINARY EXTRAORDINARY WARRANTY
	◯ FULL MAINTENANCE ◯ PREPARATION ◯ HYGIENISATION ◯ OTHER	TECHNICIAN STAMP	ORDINARY EXTRAORDINARY WARRANTY
	◯ FULL MAINTENANCE ◯ PREPARATION ◯ HYGIENISATION ◯ OTHER	TECHNICIAN STAMP	ORDINARY EXTRAORDINARY WARRANTY

13. NOTES

MU/DENVER+/2019