Fields of use

Molecular biology Microbiology Electronics Optics Semiconductor Biochemistry Pharmaceuticals Chemistry Analytical methods **Ultrapure water**

Pure water

Series Ultra Clear

Technology at its highest level





Always one step ahead.

Economical ultrapure water technology -

Compact, functional design – the Basic Family

he Ultra Clear is an economically priced system that meets or exceeds the highest published standards for the production of ultrapure water. The Ultra Clear Basic produces purified water at 18.2 M Ω -cm with a TOC value < 5 ppb.

The system exceeds all water quality standards including: ASTM Type 1, NCCLS Type 1 and ISO 3696 Type 1.

The DI and multi-function deionization/adsorption cartridge modules and 0.2 micron final filter combine to produce the highest quality reagent grade water at an incredibly low price. Years of experience and technical "Know-How" have resulted in a system purification loop design capable of producing the highest quality water.

The Ultra Clear Basic models contain all the necessary components to produce ultrapure water for all of your laboratory applications. An integrated dual wavelength UV-oxidization chamber (185 nm and 254 nm) enables the system to produce water with TOC levels of < 5.0 ppb while also destroying bacteria. An ultrafiltration module is included which makes the unit capable of producing



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Ultra Clear Basic: AAS, routine analysis, standard buffer, GC

Ultra Clear Basic UV: HPLC, IC, GC, GC/MS

Ultra Clear Basic plus: Cell and tissue culture, pyrogen sensitive applications

Ultra Clear Basic UV plus: Cell and tissue culture, pyrogen sensitive applications, HPLC



Type Ultra Clear Basic		-	UV	plus	UV plus
Ultrapure water specific					
Output	l/min	1.8	1.8	1.8	1.8
Conductivity at 25° C	μS/cm	0.055	0.055	0.055	0.055
Resistivity at 25° C	Μ Ω- cm	18.2	18.2	18.2	18.2
тос	ppb	< 10	< 5	< 10	< 5
Bakteria	cfu/ml	< 1	< 1	<1	< 1
Endotoxins	EU/ml	-	-	< 0.002	< 0.002
Particles > 0.1 µm	per ml	< 1	<1	<1	< 1
Feed water specification					
Feed water pressure	bar	0-6	0-6	0-6	0-6
Feed conductivity	µS/cm	< 20	< 20	< 20	< 20
тос	ppb	< 50	< 50	< 50	< 50
Shipping weight	kg	24	25	25	26
Power supply	for all types 100 – 240 / 50 – 60				
Dimensions: H/W/D	mm	for all types 530 / 340 / 320			
Catalogue Number	2001-B	2002-В	2003-В	2004-B	



Sterile filter, 0,2 µm.



Sterile filter, 0,2 µm, with retention of endotoxin.

water with an endotoxin level of < 0.002 EU/ml.

The dispense flow rate is up to 1.8 LPM of ultrapure water. The high-resolution display indicates the water conductivity in μ S/cm or resistivity in M Ω -cm with the corresponding water temperature.

All operating data can be recorded via the integrated RS 232 interface connection.

A built-in automatic self-cleaning mechanism extends the life of the ultra-filter module.

Cartridge and filter changes are very simple and fast due to easy access to replacement parts.

A0.2 µm sterile filter membrane completes the purification loop.

The systems operate very quietly with < 40 dba noise output. A new 24 hour programmable control with time interval function extends pump and UV lamp service life. The space saving design makes it possible and easy to utilize the system as a wall mounted or bench top unit.

A charged membrane 0.2 µm sterile filter designed to reduce the endotoxin level from non-ultrafilter systems is available.



Flowsheet Ultra Clear Basic UV plus



Consumables

Item	Change frequency	Part No.
Deionization Module VMD for applications in the inorganic range	6 – 12 monthly	2050
Pretreatment Module DTO for applications that need low TOC	6 – 12 monthly	2094
Polishing Module ILT for inorganic applications	6 – 12 monthly	2092
Polishing Module MF III D for applications in the low TOC range	6 – 12 monthly	2051
Sterile filter 0.2 µm (pack of 3)	6 monthly	2064-3
Sterile filter 0.2 µm with retention of endotoxin (pack of 3)	2 – 6 monthly	2097
Disinfection kit (pack of 3)	-	2055
UV- Replacement bulb	12 monthly	2068
UF Membrane Preventor 5000	18 – 36 monthly	2058



The SG printer for easy data transfer. Can be used with all Ultra Clear systems. (part number: 2071)



Pure purity

TOC monitoring units with UV-radiation intensity measurement. Programmable volume control dispensing included.

utstanding performance: The Ultra Clear bench top system and the Ultra Clear Integra for space saving under-bench installation.

Each Ultra Clear series is equipped with economical state-of-the-art purification technology.

System include: A deionization module, conductivity meter to measure pretreated water, a polishing module and $a 0.1 \mu m$ sterile filter in the recirculation loop.

Water quality with a resistivity of $18.2 \text{ M}\Omega$ -cm and a TOC-level < 1ppb far exceed all reagent water quality standards including: ASTM Type 1, NCCLS Type 1 and ISO 3696 Type 1.

All systems that include UV-oxidization, TOC monitoring and ultrafiltration to produce the highest possible water quality and guarantees the perfect water quality control. These units deliver RNase-, DNase- and DNA-free water.



Typical applications

Ultra Clear / Integra: AAS, routine analysis, standard buffer, GC

Ultra Clear / Integra UV and UV TM: HPLC, IC, GC, GC/MS, TOC analysis, ICP and ICP/MS

Ultra Clear / Integra plus: Cell and tissue culture, monoclonal antibody production, IVF, pyrogen sensitive applications

Ultra Clear /Integra UV plus and UV plus TM:

DNA sequencing, RNase- and DNase-free, DNA-free, PCR, IVF, 2-D-electrophoresis, critical cell and tissue culture, pyrogen sensitive applications



The Integra – a space-saving alternative For under-bench mounting.

A removable unit with a convenient dispenser.

Type* Ultra Clear		-	UV	plus	UV plus	UV TM	UV plus TM
Ultrapure water specific	ations						
Output	l/min	2	2	2	2	2	2
Conductivity at 25° C	μS/cm	0.055	0.055	0.055	0.055	0.055	0.055
Resistivity at 25° C	Μ Ω- cm	18.2	18.2	18.2	18.2	18.2	18.2
тос	ppb	5 – 10	< 1	5–10	< 1	< 1	< 1
DNase, RNase, DNA		-	-	-	free	-	free
Bakteria	cfu/ml	< 1	< 1	<1	< 1	< 1	< 1
Endotoxins	EU/ml	-	-	< 0.001	< 0.001	-	< 0.001
Particles > 0.1 µm	per ml	< 1	< 1	<1	< 1	< 1	< 1
Feed water specification	1						
Feed water pressure	bar	0.1 – 5	0.1 – 5	0.1 – 5	0.1 – 5	0.1 – 5	0.1 – 5
Feed conductivity	μS/cm	< 20	< 20	< 20	< 20	< 20	< 20
тос	ppb	< 50	< 50	< 50	< 50	< 50	< 50
Shipping weight Clear/Int	egra kg	24/26	25/27	25/27	26/28	26/28	26/28
Power supply V/Hz		for all types 100 – 240 / 50 – 60					
Dimensions: H/W/D mm				for all types 5	30/340/320		
Catalogue Number Ultra Clea Catalogue Number Integra	ar	2001 2005	2002 2006	2003 2007	2004 2008	2002-ТМ 2006-ТМ	2004-TM 2008-TM

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The technical specifications are the same for all Integra systems (only the Integra housing dimensions are slightly smaller).

Systems are also capable of producing purified water with bacterial endotoxin levels of < 0.001 EU/ml.

The dispense flow rate is up to 2 LPM of ultrapure water. The high resolution display indicates the water conductivity in μ S/cm or resistivity in M Ω -cm with the corresponding water temperature. Mount the system wherever space is a premium. If there is a need for a space saving under bench installation the Ultra Clear Integra is the right choice.

Cartridge changes are very simple and fast due to quick and easy access to the replacement parts.

SG utilizes a single UV-lamp for the oxidization of organic compounds and TOC-measurement. The energy emitted from the lamp is continuously monitored to account for declining radiation output during the lamp service life. The use of a single UV lamp results in much lower annual running cost compared to the competition. The brilliant design with compact dimensions makes it possible to use or mount the system where space is a premium.

A flexible remote dispenser enables the user to dispense water where it is needed. A built-in automatic self-cleaning mechanism extends the life of the ultrafilter module.

Pure water dispensing is made easy by simply activating the valve lever. A continuous flow of pure water is achieved by simply placing the draw-off lever in an upright position.

Our new systems are available with special features such as: volume control dispensing, a,,24-hour-circulation" mode with extreme low sound level < 40dba and integrated RS 232 interface for data recording. Flexible remote dispenser hoses are available at various lengths.

Options

Item	Part No.
Dispenser hose extension	02194-2



Flowsheet Ultra Clear UV plus TM

Consumables

Item	Change frequency	Part No.
Deionization Module VMD for applications in the inorganic range	6 – 12 monthly	2050
Pretreatment Module DTO for applications that need low TOC	6 – 12 monthly	2094
Polishing Module MF III D for applications in the low TOC range	6 – 12 monthly	2051
Polishing Module ILT for inorganic applications	6 – 12 monthly	2092
Sterile filter 0.1 µm, 1000 cm ²	6 monthly	2052
Disinfection kit (pack of 3)	- / / /	2055
UV- Replacement bulb, only for systems without TM only for systems with TM	6 monthly 6 monthly	2068 2069
UF Membrane Preventor 5000	18–36 monthly	2058



The dispensing of ultrapure water can be so easy!

Ultrapure water for low volume applications

From tap to ultrapure water - simple, state of the art, cost effective

here are many ultrapure water applications around the world that only require small quantities of water per day. SG offers the perfect system for this requirement:

The new compact Basic TWF Series.

All units are designed for an average consumption of 5 liter per day.

The Basic TWF systems are directly connected to the tap water feed source. There is no need to use expensive RO/tank combinations for feed water. This enables you to lower your initial investment and reduce annual running cost. No complicated installation, ,,just plug it in" and you are ready to go.

Even the standard version of the Basic TWF provides you with excellent water quality. This system is capable of producing water of 18,2 M Ω -cm with <10 ppb TOC!

The Basic TWF UV incorporates a UV-oxidization chamber which is capable of producing TOC levels < 5 ppb.



Typical applications

Basic TWF: AAS, routine analysis,

standard buffer, GC Basic TWF UV:

HPLC, IC, GC, GC/MS

GC, GC/MS

Basic TWF UV plus: DNA sequencing, PCR, IVF, 2-D-electrophoresis, pyrogen sensitive applications, HPLC, IC,



Type Basic TWF		-	UV	UV plus
Ultrapure water specific				
Output	l/min	up to 1.8	up to 1.8	up to 1.8
Conductivity at 25° C	μS/cm	0.055	0.055	0.055
Resistivity at 25° C	Μ Ω- cm	18.2	18.2	18.2
ТОС	ppb	< 15	< 5	< 5
Bakteria	cfu/ml	< 1	< 1	<1
Endotoxins	EU/ml	-	-	< 0.002
Particles > 0.1 µm	per ml	< 1	<1	<1
Feed water specification	ı ,	1.6	1.6	1.6
Feed water pressure	bar	1-6	1-6	1-6
Feed conductivity	μS/cm	< 500	< 500	< 500
ТОС	ppb	< 1000	< 1000	< 1000
Shipping weight	kg	25	26	27
Power supply	for all types 100 – 240 / 50 – 60			
Dimensions: H/W/D	for all	<i>types</i> 530/34	0/320	
Catalogue Number		2001-TWF	2002-TWF	2004-TWF



The Basic TWF UV plus version incorporates an ultrafilter capable of producing 18,2 M Ω -cm, < 5 ppb TOC and < 0,001 EU/ml.

The Pretreatment set

The low cost pretreatment cartridge set treats the tap water and removes chlorine and organic substances using special carbon and catalytic materials.

Mixed bed resin removes the majority of the contaminating ions.

This pretreated water enters the final cartridge which polishes the water to the final purity. Therefore the service life of the polishing cartidge is extended. This lowers the annual operation costs.



Sterile filter, 0,2 $\mu m,$ with retention of endotoxin.

pressure regulator Tap water min. 1.0 bar Check valve Pretreatment set Dispenser Conductivity measurement Booster pump **UF-Module** Sterile filter Conductivity measurement UV-Oxidator Jolenoid valve Polishing Module

Consumables

Flowsheet Basic TWF UV plus

Item	Change frequency	Part No.
Pretreatment Set	3 – 6 monthly	2090
Polishing Module MF III D for applications in the low TOC range	6 – 12 monthly	2051
Polishing Module ILT for inorganic applications	6 – 12 monthly	2092
Sterile filter 0.2 µm (pack of 3)	6 monthly	2064-3
Sterile filter 0.2 µm with retention of endotoxin (pack of 3)	2 – 6 monthly	2097
UV- Replacement bulb	12 monthly	2068
UF Membrane Preventor 5000	18 – 36 monthly	2058
Disinfection kit (pack of 3)	- //	2055

All values are to be understood as average and can vary.



Production output of each pretreatment set using different feed water: 1 = 500 µS/cm, 2 = 400 µS/cm, 3 = 200 µS/cm.

Pretreatment set replacement at a quality of 2 $\mu\text{S/cm}.$

Direct purity – Tap Water Feed

Deionized and ultrapure water obtainable from a single system

he Ultra Clear TWF system is equipped with all the necessary components to produce reagent grade water directly from municipal tap water. The built-in reverse osmosis system has a recovery rate of > 30% to conserve water.

The downstream deionization module polishes the RO product water prior to delivery to the storage tank. Water going to storage has a quality of $< 2\mu$ S/cm.

The ultrapure TWF system has a dispense rate of up to 1.8 LPM with a

Feed water specification	all types
Feed water pressure	0–5 bar
Feed conductivity	< 1000 µS/cm
Colloid index SDI	< 3
Free Chlorine	< 0.5 mg/l
Fe	< 0.1 mg/l

water quality of 18.2 M Ω -cm and a TOC-level of < 1 ppb!

The system exceeds all reagent grade water quality standards including; ASTM Type 1, NCCLS Type 1 and ISO Type 1.

TWF models are available to fulfil all of your ultrapure water needs. Options



Pure water specification	all types
Product rate into the tank	10 l/h *
Conductivity	< 2 µS/cm**

* 20 l/h upon request.

** Limiting value ajustable.

Typical applications

Ultra Clear TWF: AAS, routine analysis, standard buffer, GC

Ultra Clear TWF UV and UV TM: HPLC, IC, GC, GC/MS, TOC analysis, ICP and ICP/MS

Ultra Clear TWF plus: Cell and tissue culture, monoclonal antibody production, IVF, pyrogen sensitive applications

Ultra Clear TWF UV plus and UV plus TM:

DNA sequencing, RNase- and DNase-free, DNA-free, PCR, IVF, 2-D-electrophoresis, critical cell and tissue culture, pyrogen sensitive applications



include: ultrafiltration, UV-oxidization and TOC-monitoring with intensity measurement for any application.

Pretreatment, reverse osmosis module, deionization cartridge, storage tank, UV-oxidization chamber, polisher, ultrafilter and sterile filter are all integra-

Type Ultra Clear TWF		-	UV	plus	UV plus	UV TM	UV plus TM
Ultrapure water specific	ations						
Output	l/min	1.8	1.8	1.8	1.8	1.8	1.8
Conductivity at 25° C	μS/cm	0.055	0.055	0.055	0.055	0.055	0.055
Resistivity at 25° C	Μ Ω- cm	18.2	18.2	18.2	18.2	18.2	18.2
тос	ppb	5 – 10	<1	5 – 10	< 1	< 1	< 1
DNase, RNase, DNA		-	-	-	free	-	free
Bakteria	cfu/ml	<1	<1	<1	< 1	< 1	< 1
Endotoxins	EU/ml	-	-	< 0.001	< 0.001	-	< 0.001
Particles > 0.1 µm	per ml	<1	<1	<1	< 1	< 1	< 1
Shipping weight 301/601	/801 kg	41/44/56	42/45/57	42/45/57	44/47/57	43/46/58	44/47/59
Power supply	V/Hz		f	or all types 100	0-240/50-6	50	
Dimensions: H/W/D	mm	30 l tank: 5	530/560/320	– 60 l tank: 530)/900/320-8	80 tank: 1340	/ 340 / 510
Catalogue Number with 30 l tank Catalogue Number with 60 l tank Catalogue Number with 80 l tank		2001-D 2001-D/60 2001-D/80	2002-D 2002-D/60 2002-D/80	2003-D 2003-D/60 2003-D/80	2004-D 2004-D/60 2004-D/80	2002-TM-D 2002-TM-D/60 2002-TM-D/80	2004-TM-D 2004-TM-D/60 2004-TM-D/80

ted into one system. The system delivers ultrapure water which is RNase-, DNase- and DNA-free. Endotoxin content is extremely low at < 0.001 EU/ml.

SG has successfully created this compact system with all the required technical features to economically produce purified and ultrapure water. Other systems consisting of separate reverse osmosis unit, storage tank and polishing unit are typically expensive. We have proudly accomplished our goal of developing water purification systems with low running costs.

An automatic flushing mechanism for the ultrafilter extends the service life.

Cartridge changes are very simple and fast due to quick and easy access to the replacement parts.

Other advantages include the possibility to draw pure water via a tap on the storage tank, as well as, connecting the system directly to an instrument or glass washer.

The unit can either be bench or wall mounted. A flexible dispenser enables the user to remotely dispense water wherever it is needed.

Pure water dispensing is made easy by simply activating the valve lever. A continuous flow of pure water is accom-



plished by simply placing the dispenser lever in an upright position.

Our new systems are available with special features such as: volume control dispensing, a ,,24hour-circulation" mode with an extreme low noise level of <40 dba and an integrated RS 232 interface for data recording. Variable length hoses for the remote dispenser are also available.



Flowsheet Ultra Clear TWF UV plus TM

Options

Item	Part No.
Bracket ET 30 for 30 l tank including screws and plugs	3317
Bracket ET 60 for 60 I tank including screws and plugs	3318
Dispenser hose extension	02194-2
Extra 80 I tank booster pump for washing machine feed (to be ordered together with the system)	3358-1

Consumables

Item	Change frequency	Part No.
Pretreatment Module AMB	6 – 12 monthly	2057
Deionization Module VMD	6 – 12 monthly	2050
Pretreatment Module DTO for applications that need low TOC	6 – 12 monthly	2094
Polishing Module MF III D for applications in the low TOC range	6 – 12 monthly	2051
Polishing Module ILT for inorganic applications	6 – 12 monthly	2092
Sterile filter 0.1 µm, 1000 cm ²	6 monthly	2052
Disinfection kit (pack of 3)	-	2055
UV- Replacement bulb, only for systems without TM only for systems with TM	6 monthly 6 monthly	2068 2069
RO-Membrane	2-3 years	03303
CO ₂ Trap CT1, Replacement Cartridge	yearly	3502
UV-Submersible replacement bulb UV-SL 1	yearly	2593-1
UF Membrane Preventor 5000	18–36 monthly	2058

Pure and ultrapure water from a single system – with tap water feed.

Ultrapure water production utilizing the El-Ion® technology

S imultaneous production of purified and ultrapure water: The Ultra Clear TWF/El-Ion[®] system is equipped with the necessary components to produce pretreated and ultrapure water directly from a municipal tap water source.

The reverse osmosis unit has a recovery rate of > 30 % to conserve water. The electro-deionization (EDI) stage purifies RO product water down to a quality range between 0.06 to 0.2μ S/cm. EDI product water can be drawn directly from the integrated storage tank.

Feed water specification	all types
Feed water pressure	0–5 bar
Feed conductivity	< 1000 µS/cm
Colloid index SDI	< 3
Free Chlorine	< 0.5 mg/l
Fe	< 0.1 mg/l

A polishing cartridge is provided that can obtain a water quality of $0.055 \,\mu$ S/cm (18,2 M Ω -cm) with a TOC-level of < 1 ppb. The system delivers ultrapure water that is RNase-, DNase- and DNA-



Pure water specification	all types		
Production rate to tank	10 l/h *		
Conductivity	< 0.2 µS/cm		
тос	< 30 ppb		

* 20 l/h upon request.

Typical applications

All types:

General chemistry, laboratory washing machines, water for autoclaves and environmental chambers

Ultra Clear TWF / El-Ion[®]: AAS, routine analysis, standard buffer, GC

Ultra Clear TWF UV and UV TM / El-Ion[®]: HPLC, IC, GC, GC/MS, TOC analysis, ICP and ICP/MS

Ultra Clear TWF plus / El-Ion[®]: Cell and tissue culture, monoclonal antibody production, IVF, pyrogen sensitive applications

Ultra Clear TWF UV plus and UV plus TM / El-Ion[®]: DNA Sequence, RNase- and DNase-free, DNA-free, PCR, IVF, 2-D-electrophoresis, critical cell and tissue culture, pyrogen sensitive applications



Type Ultra Clear TWF / El	l-Ion [®]	-	UV	plus	UV plus	UV TM	UV plus TM
Ultrapure water specifications							
Output	l/min	up to 1.8	up to 1.8	up to 1.8	up to 1.8	up to 1.8	up to 1.8
Conductivity at 25° C	μS/cm	0.055	0.055	0.055	0.055	0.055	0.055
Resistivity at 25° C	Μ Ω- cm	18.2	18.2	18.2	18.2	18.2	18.2
тос	ppb	5 – 10	<1	5 – 10	<1	< 1	< 1
DNase, RNase, DNA		-	-	-	free	-	free
Bakteria	cfu/ml	<1	<1	<1	<1	< 1	< 1
Endotoxins	EU/ml	-	-	< 0.001	< 0.001	-	< 0.001
Particles > 0.1 µm	per ml	<1	<1	<1	< 1	< 1	< 1
Shipping weight 30 I /60 I	/80 kg	4 1/44/56 4 2/45/57 4 2/45/57 4 4/47/59 4 3/46/58 44/47/59					44/47/59
Power supply	V/Hz	for all types 100 – 240 / 50 – 60					
Dimensions: H/W/D	mm	30 tank: 535 / 560 / 320 – 60 tank: 535 / 900 / 320 – 80 tank: 1345 / 340 / 510					
Catalogue Number with 30 l	2002-E	2003-E	2004-E	2002-TM-E	2004-TM-E		
Catalogue Number with 60 l	2001-E/60	2002-E/60	2003-E/60	2004-E/60	2002-TM-E/60	2004-TM-E/60	
Catalogue Number with 80 l	tank	2001-E/80 2002-E/80 2003-E/80 2004-E/80 2002-TM-E/80 200				2004-TM-E/80	

free with a dispense rate up to 1.8 LPM!

The system water quality exceeds all reagent grade water quality standards including; ASTM Type 1, NCCLS Type 1 and ISO Type 1.

Various system options are available to fulfil all your lab needs. These options include: ultrafiltration module, UV-oxidization and TOC-monitoring that can be tailored for any laboratory application in a single system. A built-in automatic flush cycle extends the life of the ultrafilter and helps reduce operating cost.

SG has created this compact system with all the required technical features to economically produce purified and ultrapure water. Performance of the TWF/El-Ion[®] system equals that of larger multi-component purification systems that cost more to buy and operate. The TWF/El-Ion[®] does it all from one compact unit.

We have proudly accomplished our goal of developing new, compact and economical systems that produce two grades of reagent water.

The unit can either be bench or wall mounted. A flexible remote dispenser enables the user to dispense water wherever it is needed.

Our new systems are available with special features such as: volume control dispensing, UV- intensity measurement with TOC-monitoring. A programmable, ,,24-hour-circulation" mode with extreme low sound level (<40 dba) and integrated RS 232 interface for data recording are included. Various remote dispenser hose lengths are also available.



Flowsheet Ultra Clear TWF / El-Ion® UV plus TM

Options

Item	Part No.
Bracket ET 30 for 30 I tank including screws and plugs	3317
Bracket ET 60 for 60 I tank including screws and plugs	3318
Dispenser hose extension	02194-2
Extra 80 I tank booster pump for washing machine feed (to be ordered together with the system)	3358-1

Consumables

Item	Change frequency	Part No.
Pretreatment Module AMB	6 – 12 monthly	2057
Conditioning Module	ule Depends on inlet water hardness and used amount of water	
Polishing Module MF III D for applications in the low TOC range	6 – 12 monthly	2051
Polishing Module ILT for inorganic applications	6 – 12 monthly	2092
Sterile filter 0.1 µm, 1000 cm ²	6 monthly	2052
Disinfection kit (pack of 3)	- / -	2055
UV- Replacement bulb, only for systems without TM only for systems with TM	6 monthly 6 monthly	2068 2069
RO-Membrane	2-3 years	03303
CO ₂ Trap CT1, Replacement Cartridge	yearly	3502
UV-Submersible replacement bulb UV-SL 1	yearly	2593-1
UF Membrane Preventor 5000	18-36 monthly	2058
El-Ion [®] -cell 10 l/h	4 – 5 years	1803

System Components Embedded components of the SG-units

nly new, specially selected and certified materials are used for the treatment steps in the SG water systems.

High quality, virgin electronic grade ion exchange resins are used in SG water cartridges and systems. Resins and treatment media go through a rigorous R&D stage before approval for use to ensure high quality and zero leachable material that could interfere with water quality. Upon delivery, each resin must pass SG incoming quality control inspection tests. Materials are strictly stored and handled according to our standard operating procedure to prevent contamination.

Carefully selected activated carbon is used in the systems to produce pure water with extremely low organic contaminants. However, different types are available depending on the required water quality or application.

All activated carbon materials undergo a complete cleaning process prior application to remove particles and impurities.

This involves an acid wash followed by rinsing the carbon with ultrapure water.

All wetted parts within the SG Water systems are specially selected and tested to ensure purity. Tests are performed to determine there are no extractable metals or TOC released from the water contact parts.

The purification modules are accurately designed to ensure complete wetting of the activated carbon to remove entrained air and purge the systems.

Mixed bed resin modules must have the correct moisture content and fill level to ensure quality and operating capacity. Rapid filling of the modules is



Acid washed specially selected, carbon and electronics grade mixed bed resin material combined in one polishing module. Module used to remove organic contaminants (especially low TOC-level) and produce water at 0.055 μ S/cm.

Polishing module ILT

For inorganic application. Consist of electronics grade mixed bed resin material. b/CIII.

Art.: 2092

El. El

El-Ion[®] cell

Electro-deionization process module for pure water production $<\!0.2\,\mu\text{S/cm}.$

Reverse-Osmosis module

Art.: 03303

High performance TFC (thin-film-composite) membrane with a salt retention rate of up to 98%. Retention rate for dissolved organic compounds, particles and colloids and bacteria can exceed 99 %.

UV-oxidization chamber

UV light energy at 185 nm creates ozone. The 254 nm wavelengths energy reacts with the ozone and produces hydroxyl radicals (OH). These radicals oxidize the organic material in the water to carbon dioxide, water and some by-products like hydrogen peroxide. These by-products are then removed by the activated carbon material and electronics grade mixed bed resin. A TOC-level of < 1 ppb can be achieved. The amount of oxidized material reflects the removal of organic material. This confirms the design concept by providing the TOC-monitoring device inside the water treatment system. Oxidization and TOC-measurement are achieved by a single UV lamp. The intensity of the lamp in the TM-systems can be monitored.

UV-lamp

Art.: 2068 / 2069

UV-lamp no. 2068 is utilized in systems without TM-measurement. UV-lamp no. 2069 is utilized in systems with TM-measurement



Ultrafiltration module

Art.: 2058

SG ultrafiltration module ,, Preventor 5000^{+ .} Consists of hollow fiber membranes that produce water quality having an endotoxin-level of $<0.001\,EU/ml$, furthermore RNase-, DNase- and DNA-free.



Sterile filter 0.1 µm

Art.: 2052

Art.: 2064-3

Art.: 2097

Art.: 2055

Filter with 0.1 μm pore size and 1000 cm² surface area. The cartridge filter operates inline to eliminate dead volume and prevent bacterial contamination. Filter provides low back pressure and long service life.



Sterile filter 0.2 µm

Filter with 0.2 μ m pore size (pack of 3).

Sterile filter 0.2 µm Filter with 0.2 µm pore size and enables Endotoxin

Filter with 0.2 μm pore size and enables Endotoxin retention (pack of 3).



Disinfection-kit

Highly effective disinfection solvent, selected designed for SG-systems (pack of 3).

essential to prevent excess air contact and avoid the uptake of carbon dioxide. An environment free of organic contaminants during the cartridge filling process plays a vital role in producing ultrapure water. Modules are sealed with airtight end caps to prevent drying and are shrink-wrapped to prevent contamination.

The storage of modules is limited and items should be used within one year. Modules should be stored in a cool, dry location (< 20 °C) away from light.

Freshly produced replacement modules can always be obtained from SG.

Hint: It is best to rotate stock based on a first in first out method to ensure older stock is used first.



High grade materials are a vital aspect for highest quality. From left to right: Activated carbon, anions-, mixed bed- and cationexchange resins.



Pre-purification modules AMB and VMD, Polishing module MFIIID and Conditioning module.

Ultra pure water, basic information

SG-Disinfection

An aqueous solution consisting of sodium hypochlorite and a trace of hydrogen peroxide with ozone is used to disinfect systems.

The solvent has an extremely high biocide effect on all microbes found in water such as, bacteria, fungus (yeast) and algae. Material also provides the advantage of decomposing Bio-films. The concentration used is classified as nontoxic, non-corrosive and not harmful to the skin.



SG disinfection kit.



Easy handling of the SG disinfection kit.

Conversion table Resistivity / Conductivity and TDS (Total Dissolved Substances)

Resistivity (M Ω - cm)	Conductivity (µS/cm)	TDS in (ppm) CaCO ₃
18,18	0,0550	0,000
18,00	0,0556	0,000
17,00	0,0588	0,001
16,00	0,0625	0,003
15,00	0,0667	0,005
14,00	0,0714	0,006
13,00	0,0769	0,009
12,00	0,0833	0,011
11,00	0,0909	0,014
10,00	0,100	0,017
9,00	0,111	0,022
8,00	0,125	0,027
7,00	0,143	0,034
6,00	0,167	0,043
5,00	0,20	0,056
4,00	0,25	0,076
3,00	0,33	0,108
2,00	0,50	0,173
1,00	1,0	0,367
0,50	2,0	0,756
0,20	5,0	1,921
0,10	10,0	3,863
0,05	20,0	7,748
0,02	50,0	19,401
0,01	100,0	38,824

Info TOC

The Total Organic Carbon (TOC) content in water is expressed as the sum of the carbon (associated with organic material) contained in the water or waste water analysis. The organic content of the water is based on the sum of all organic compounds present and only provides a generic measure of total carbon. Specific compounds are not identified. The TOC is measured in ppb (parts per billion) and is determined automatically.

The method efficiently destroys organic compounds in

water using an ultraviolet chamber and lamp capable of producing radiation at 185 and 254 nm wavelengths. The byproduct of CO₂ alters the conductivity of the water. The conductivity shift between inlet and outlet of the oxidization chamber is used to measure the TOC-level of the water. SG ultrapure water systems having the TOC-monitoring capability are also equipped with a UV-intensity control mechanism. The user can obtain a quick indication of the performance of the UV-lamp in % via the system display.

Pure and ultrapure water

- 1. The storage of ultrapure water without a recirculation loop should be avoided in order to minimize excess contamination caused by material leaching and bacterial growth.
- 2. High quality pure and ultrapure water can only be maintained if the produced water is constantly being recirculated via different purification stages including the sterile filter.
- A tank for storing pure water should always be equipped with a sterile vent filter, activated carbon unit, a CO₂ trap and a submersible UVlamp. A constant high water quality level can only be maintained by implementation of these components.
- 4. A regular disinfection procedure diminishes the formation of Biofilms. The SG-disinfection should be done on a regular basis.

- 5. To prevent the growth of algae: Tanks used for storing water should be made of opaque material or be placed in a cabinet to prevent exposure to light. Avoid direct sun light.
- The recommended materials of construction to prevent leaching are: polyethylene (PE), polypropylene (PP) and polyvinyldiene fluoride (PVDF; Teflon). When using stainless 1.4401 (304L,316L) grade or higher should be used.
- 7. Purifying modules should be replaced on a regular basis in order to maintain high quality water and to minimize possible contamination of bacteria.
- 8. Non recirculation periods or dead zones or dead-legs should always be avoided in all pure water systems. However, if non recirculation periods occurs, the first 0.3 to 3 litres of water after an initial start should be discharged. This precaution is especially vital for critical applications such as the HPLC or ICP/ms.
- In order to guarantee best water quality and operation of the SG-Water systems, the systems should undergo a regularly scheduled preventative maintenance and service procedure. An agreement for this service can be arranged with SG Water.
- Drainage tubing from any water treatment device should contain an air gap to prevent contamination. Maintain at least a 5-cm gap between the end of the tube and the drain.

Water Quality Standards

ISO 3696 Water Specifications



High-grade ultrapure water serves also as a protection for valuable HPLC-columns.

	Type I	Type II	Type III
Resistivity (megohm-cm compensated to 25°C)	10.0	1.0	0.25
TOC (ppb)	N.A.	80	400
Absorbance at 254 nm l cm optical path (A.U.)	< 0.001	< 0.01	N.S.
Silica (mg/l)	< 0.01	< 0.02	< 1
Dry residue after evaporating on heating at 110°C	N.A.	< 1.0	< 2.0

ASTM Standard Specification for Reagent Water

	Туре	<mark>μS/cm</mark> (max.)	MΩ-cm (min.)	ΤΟϹ μg/l (max.)	Na μg/l (max.)	<mark>Cl</mark> μg/l (max.)	Total Silica μg/l (max.)	Bac. growth cfu/ml (max.)	Endotoxin EU/ml (max.)
	I	0.055	18	50	1	1	3		
-	IA	0.055	18	50	1	1	3	10/1000	0.03
-	I B	0.055	18	50	1	1	3	10/100	0.25
-	IC	0.055	18	50	1	1	3	10/10	0.25

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