

ULTRAPURE WATER SYSTEMS

Crystal E series

The Crystal E ultrapure systems are economy class, multi-purpose, water purification systems.

Crystal E ultrapure water systems are available in the following configurations:

- **Crystal E Trace System** (P/N CE-1001) produces water for inorganic trace analysis. This water is recommended for atomic absorption spectrometry (with graphite furnace atomizer), ICP-OES analysis, ICP-MS and other inorganic analytical methods.
- **Crystal E HPLC System** (P/N CE-1101) produces water with very low organic carbon content (TOC) to comply with the requirements of liquid chromatography methods. Crystal E HPLC water can also be used for some microbiological and molecular biology applications.
- **Crystal E Bio System** (P/N CE-1201) produces water with very low organic and RNase/DNase content, intended for molecular biology, including RNase-sensitive applications.



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All Crystal E systems produce two types of water: Ultrapure (ISO 3696 Grade 1) and Pure (ISO 3696 Grade 2). Ultrapure water produced by the Crystal E systems has resistivity 18.2 MegaOhm*cm (conductivity 0.055 μ S/cm). This exceeds requirements of all the relevant standards (ISO 3696 Grade 1, ASTM Type I, CLSI Type I). Purified water is collected in a storage tank. The recirculation system ensures a consistent quality of water, and a low level of organic carbon content (TOC). TOC is <2ppb for "HPLC" and "Bio" configurations; and 5-10 ppb for the "Trace" configuration.

The dispensing rate of high-quality, Ultrapure water is 2 L/min.

Pure water produced by Crystal E systems can be used for labware washing, wet chemistry methods, flame spectrophotometers, etc.. Pure water is dispensed directly from the storage tank. The dispensing flow rate of Pure water is 4 L/min.

All systems have a graphic LCD display that provides a clear water-quality readout. The display also provides information about the system status. This includes current resistivity and remaining pre-filter service life. The smart deionization (DI) module performance monitoring system provides a reduction in running costs. All cartridge and filter replacement can

Ordering Information

Model	Part number
Crystal E Trace	CE-1001
Crystal E HPLC	CE-1101
Crystal E Bio	CE-1201

be done by the operator and no tools are required. The Crystal E systems include important safety functions, such as:

- tank filling control
- tap water pressure control
- protection from a tank sensor failure

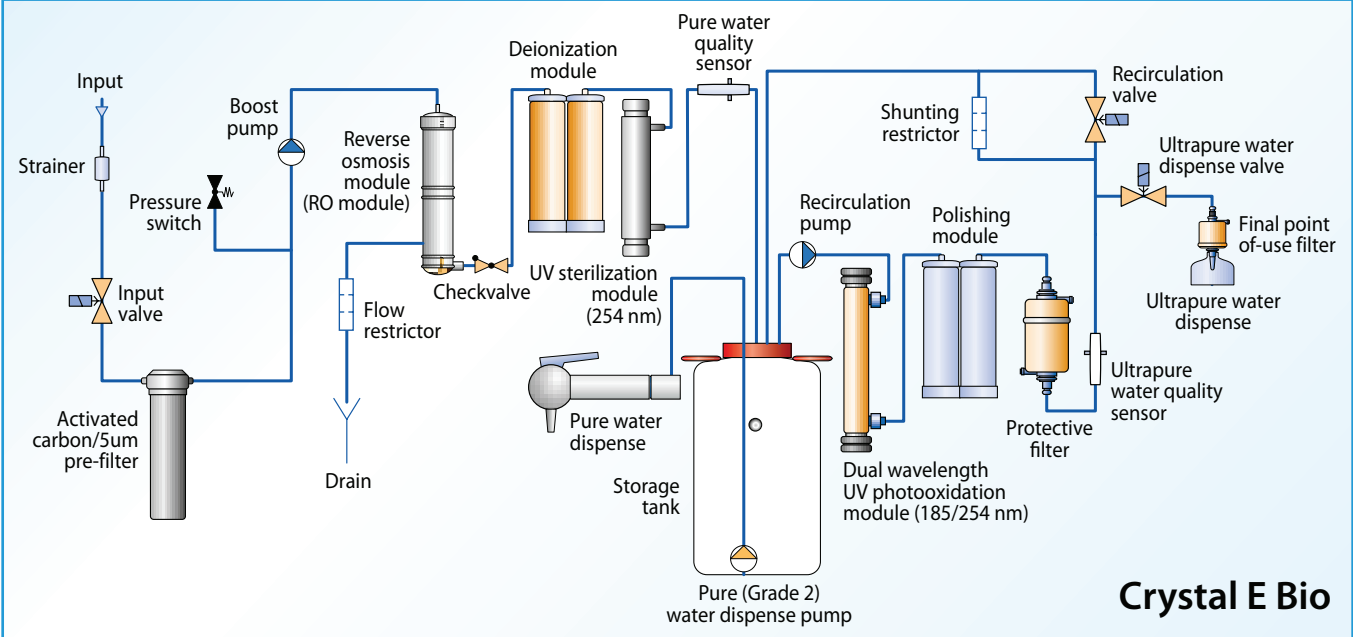
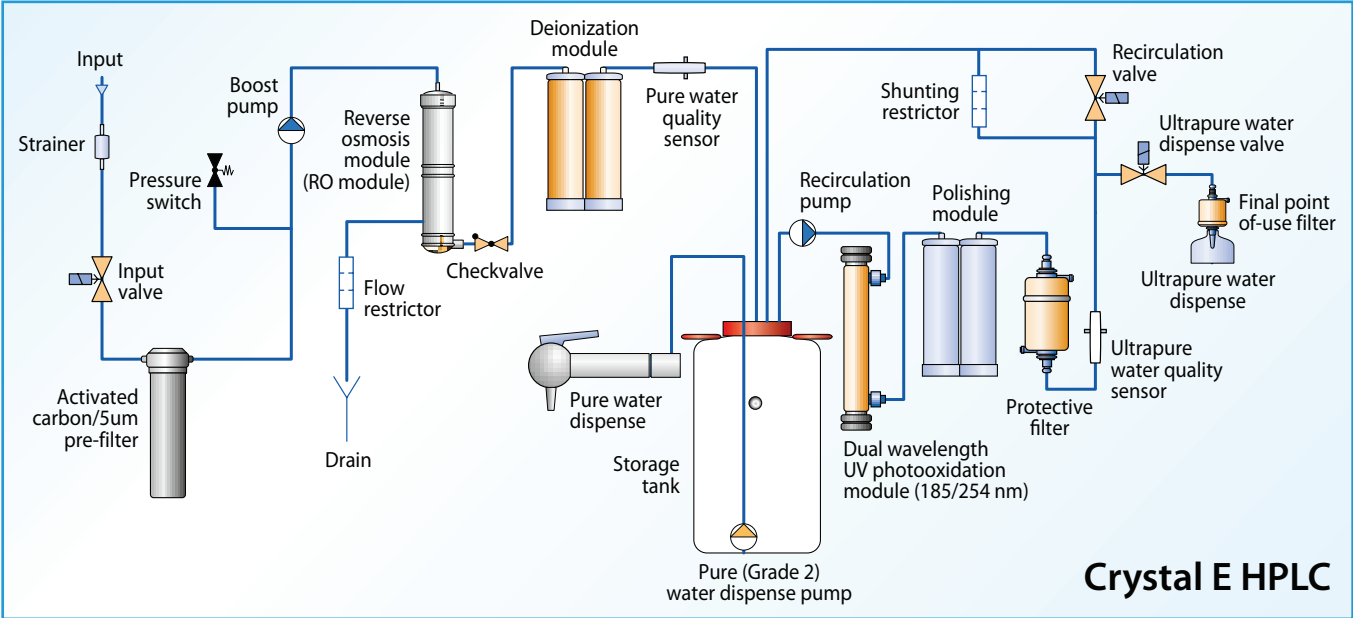
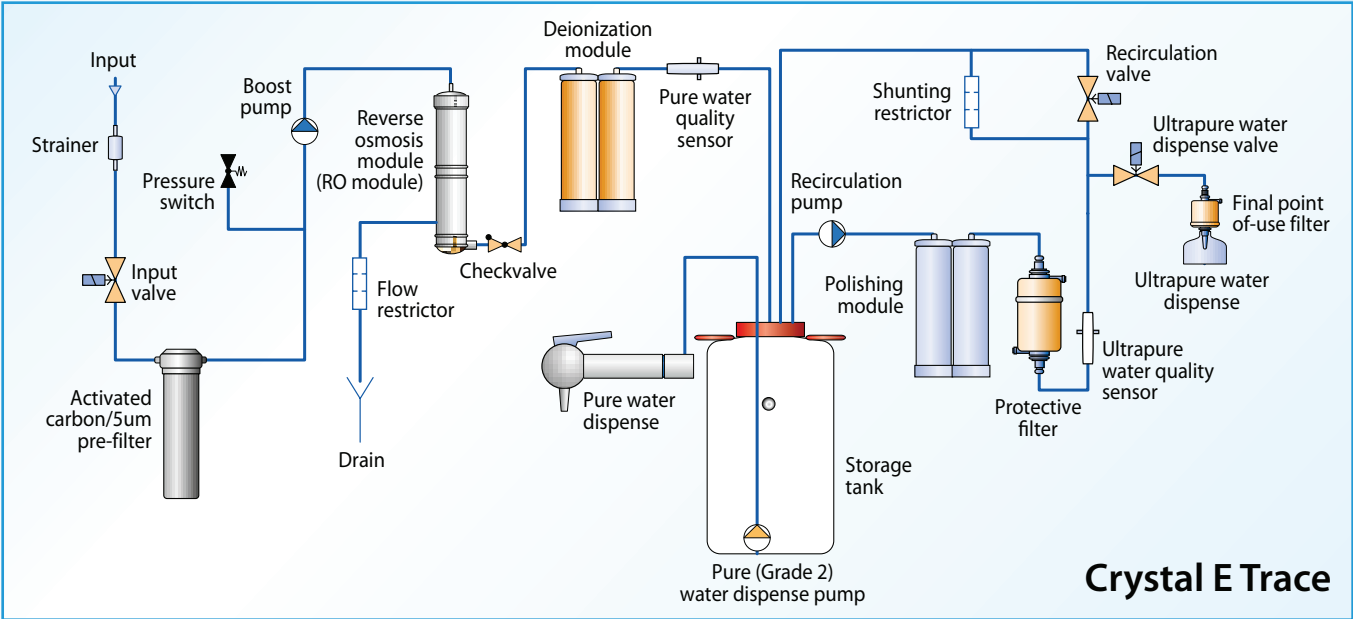
Running costs can be decreased even more by installing an 8L deionization module option (P/N 10101).

Crystal E systems include:

- Boost pump
- Pre-filter
- RO module
- Deionization module
- Polishing module
- 25L storage tank with integrated Grade 2 dispensing pump
- Recirculation system
- Point-of-use Final Filter:
 - 0.22 μ m microfilter for Crystal E Trace and HPLC systems
 - ultrafilter for Crystal E Bio systems
- Photo-oxidation module for reduction of organics (for HPLC and Bio configurations)
- UV sterilization module (for the Bio configuration)



Flow diagrams



Components

Part	Accessory	Crystal E Trace	Crystal E HPLC	Crystal E Bio
10009	Pre-filter for chlorine and organics reduction	+	+	+
	Boost pump	+	+	+
	Reverse osmosis module	+	+	+
10310	Deionization module, standard	+	+	+
10101	High capacity deionization module, (replaces standard module)	option	option	option
10029	Polishing module	+	+	+
10105	Photo-oxidation module	–	+	+
10012	Point-of-use microfilter	+	+	–
10109	Point-of-use ultrafiltration module	–	–	+
10102	UV sterilization module	–	–	+

Applications

Application	Crystal E Trace	Crystal E HPLC	Crystal E Bio
Reagent preparation	●	●	●
Ion chromatography	●	●	●
ICP-MS	●	●	●
Atomic absorption	●	●	●
ICP-OES	●	●	●
HPLC	–	●	●
Gas chromatography	–	●	●
Total Organic Carbon	–	●	●
Flow cytometry	–	–	●
Cell and tissue culture	–	–	●
Molecular biology	–	–	●

Consumables

Part number	Description	Replacement criteria	Comments
10009	Replacement pre-filter, Crystal E	Filter life counter is zero or the filter is clogged	
10310	Replacement deionization module	„DI Err“ message is shown, or water conductivity is consistently > 0.5 µS/cm	
10113	Replacement high-capacity deionization module	„DI Err“ message is shown, or water conductivity is consistently > 0.5 µS/cm	Systems with 10101 option only
10029	Replacement polishing module	Every 1–2 years, depending on operation	
10011	Replacement sterilization UV bulb	As required (on average every 3 years)	“Bio” systems only
10018	Replacement photo-oxidation UV bulb	As required (on average every 3 years)	“HPLC” and “Bio” systems only
10012	Replacement 0.22 µm dispense microfilter	Every 6–12 months	“Trace” and “HPLC” systems
10120	Replacement ultrafilter	Every 6–12 months	“Bio” systems only

Specifications

Purified water specifications	Crystal E Trace	Crystal E HPLC	Crystal E Bio
Grade 2 water resistivity	>10 MΩ x cm	>10 MΩ x cm	>10 MΩ x cm
Grade 2 water conductivity	<0.1 µS/cm	<0.1 µS/cm	<0.1 µS/cm
Grade 1 water resistivity	18.2 MΩ x cm	18.2 MΩ x cm	18.2 MΩ x cm
Grade 1 water conductivity	0.055 µS/cm	0.055 µS/cm	0.055 µS/cm
TOC	5 – 10 ppb	<2 ppb	<2 ppb
RNase	N/A	N/A	<0.01 ng/mL
DNase	N/A	N/A	<4 pg/µL
Bacteria	< 1 cfu/mL	< 1 cfu/mL	< 1 cfu/mL
Endotoxins	<0.15 EU/mL	<0.15 EU/mL	< 0.001 EU/mL
Particles > 0.22 µm	<1 per mL	<1 per mL	<1 per mL
Nominal flow, pure water (to storage tank)	10 L/h	10 L/h	10 L/h
Nominal dispense flow, ultrapure water	2 L/min	2 L/min	2 L/min
Nominal dispense flow, pure water	4 L/min	4 L/min	4 L/min
Deionization module life (standard module)	1 m³	1 m³	1 m³
Deionization module life (high capacity module)	3 m³	3 m³	3 m³
Recovery	>30 %	>30 %	>30 %
Dimensions (WxDxH), cm	40x35x55	40x35x55	40x35x55
Storage tank	25 L	25 L	25 L
Tank dimensions (WxDxH), cm	30x25x50	30x25x50	30x25x50
Feed water pressure	0.5 – 5 bar	0.5 – 5 bar	0.5 – 5 bar
Feed water conductivity	< 900 µS/cm	< 900 µS/cm	< 900 µS/cm



Crystal E Pure and RO series

Crystal E RO and Pure systems produce purified water of ISO 3696 Grade 3 (RO) and ISO 3696 Grade 2 (Pure). Pure and RO water have much lower production costs than ultrapure (Grade 1) water. Pure and RO water comply with the requirements of a variety of applications, including:

- Many inorganic methods of analysis (e. g. flame spectrophotometry)
- Wet chemistry methods
- Electrochemistry
- Labware washing, etc.

The Crystal E RO system reduces contamination in water by more than 98%. The conductivity of Crystal E RO purified water is typically less than 5 $\mu\text{S}/\text{cm}$ (dependent

upon feed water).

The Crystal E Pure system produces water that is essentially free from inorganic contamination, and low in TOC content. The conductivity of water produced by the Crystal E Pure system is less than 0.1 $\mu\text{S}/\text{cm}$. This exceeds the requirements for Grade 2 water according to ISO 3696.

Storage tanks of various sizes are available as an option for the Pure water system. The capacity of the tanks range from 10L to 300L. All tanks with a capacity of 25L or higher have integrated pumps for fast and convenient dispensing. The dispensing flow rate is 4 L/min. An integrated pump allows placement of the storage tank under a bench, if needed, to save space.

The Crystal E RO and Crystal E Pure have a graphic LCD display providing indication of water quality, system status, and remaining pre-filter life. The smart DI module performance monitoring system provides a reduction in system running costs. All cartridge and

filter replacement can be done by the operator without tools. The Crystal E provides important safety functions, including:

- tank filling control
- tap water pressure control
- protection from tank sensor failure.

High-Consumption Laboratories and Applications:

We offer the Crystal E20 Pure system for high Pure water consumption (30 L/day and more) applications. This includes a high capacity (8L) deionization module. The high capacity module provides a reduction in system running costs. It is also possible to order 8L module option (P/N 10101) for the Crystal E Pure system.

The Crystal E systems include:

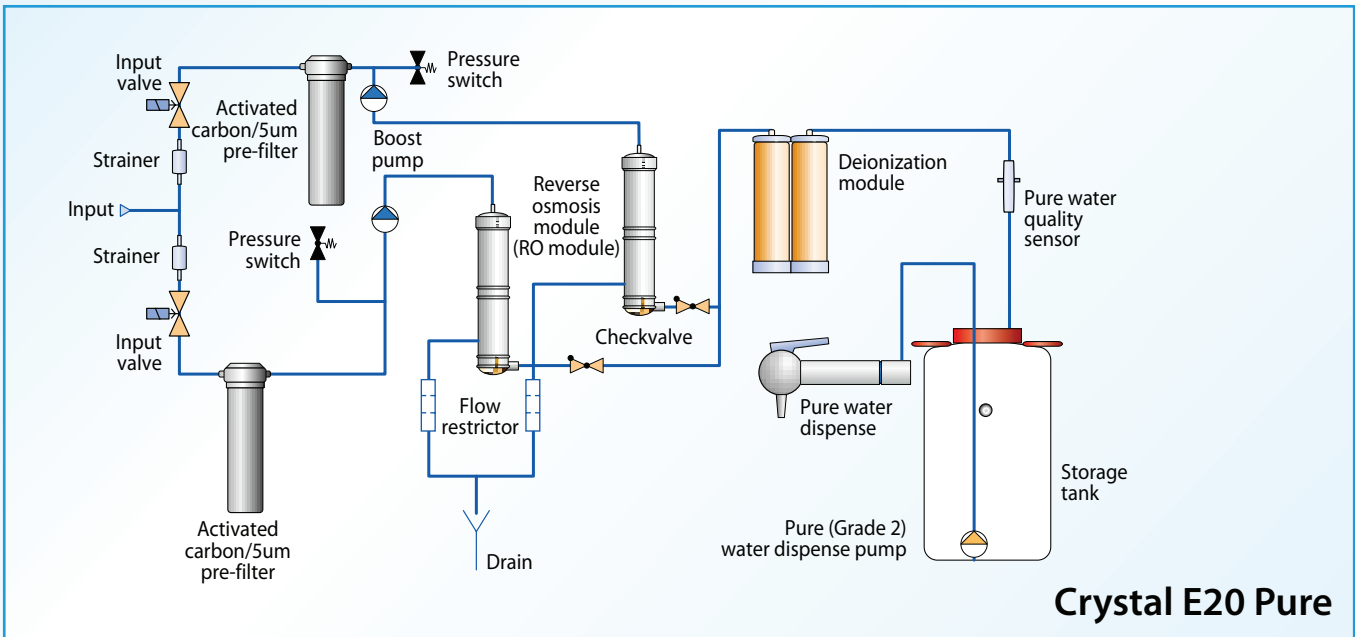
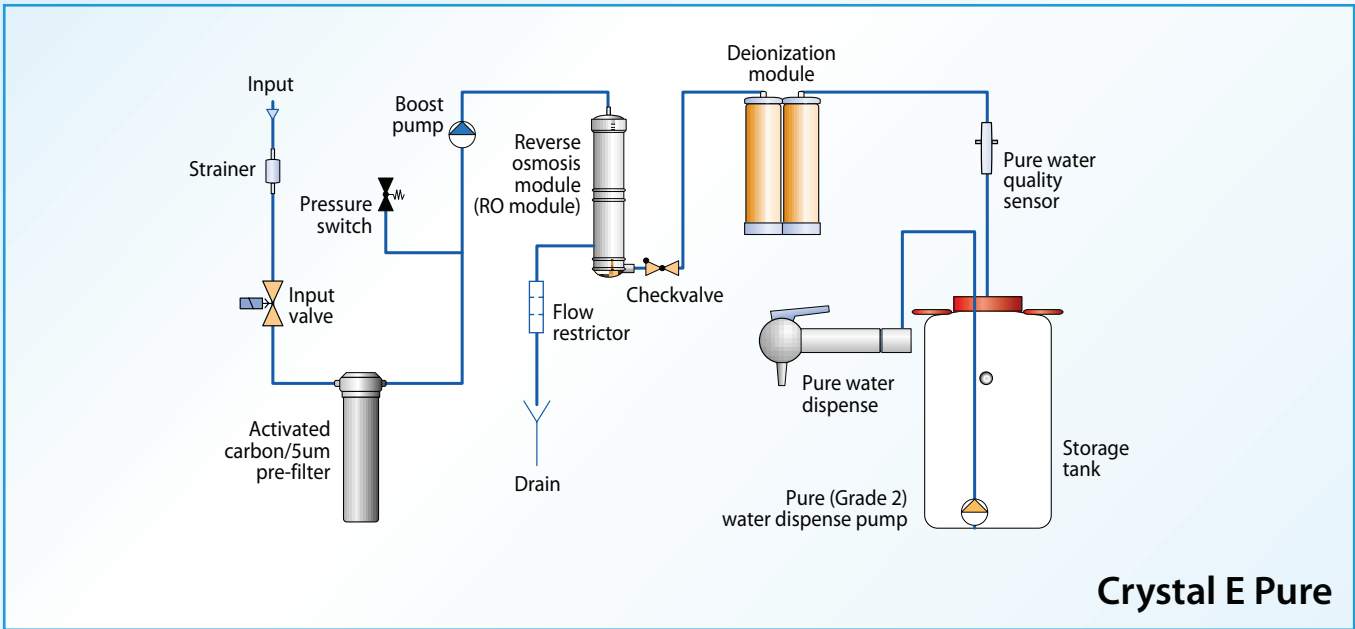
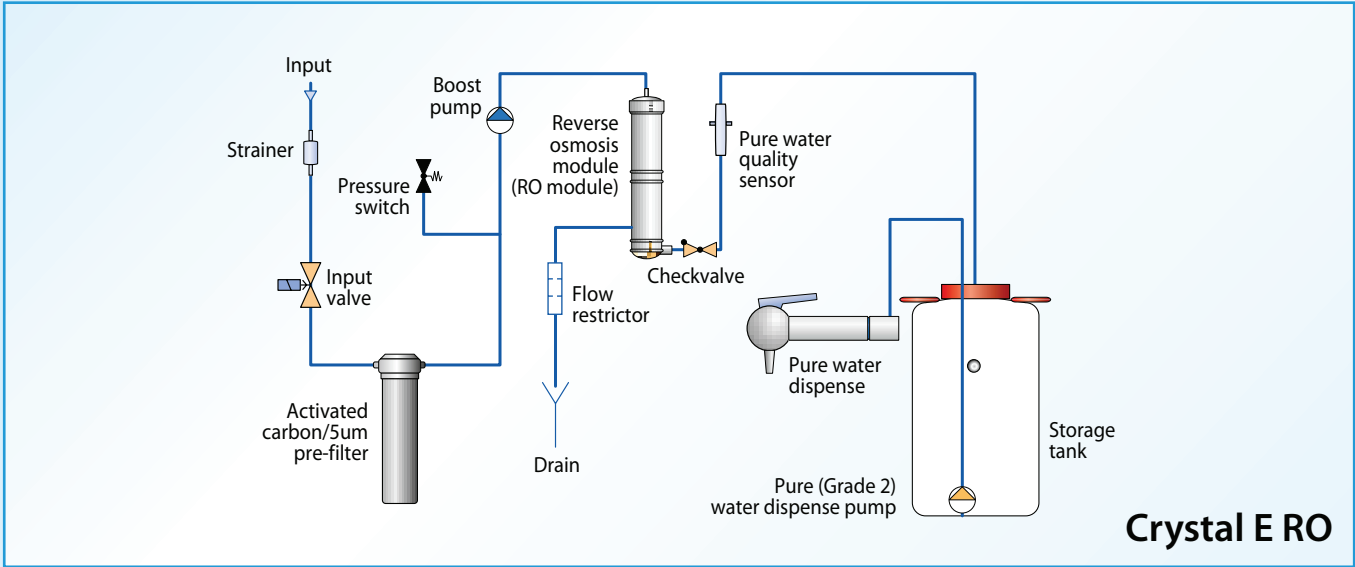
- Boost pump
- Pre-filter
- Reverse osmosis module
- Deionization module (for Pure systems only)

A UV-sterilization module is available as an option (P/N 10102).

Specifications

Purified water specifications	Crystal E RO	Crystal E20 Pure	Crystal E Pure
Purified water resistivity		>10 M Ω x cm	>10 M Ω x cm
Purified water conductivity	<5 $\mu\text{S}/\text{cm}$	<0.1 $\mu\text{S}/\text{cm}$	<0.1 $\mu\text{S}/\text{cm}$
Particles > 0.22 μm	<1 per mL	<1 per mL	<1 per mL
Nominal flow, pure water (to storage tank)	10 L/h	20 L/h	10 L/h
Dispense flow, pure water	4 L/min	4 L/min	4 L/min
Deionization module life (standard module)	N/A	N/A	1 m ³
Deionization module life (high capacity module)	N/A	3 m ³	3 m ³ (optional)
Recovery	>30 %	>30 %	>30 %
Dimensions (WxDxH), cm	40x35x55	40x50x55	40x35x55
Storage tank (option)	25 L – 300 L	25 L – 300 L	25 L – 300 L
25L tank dimensions (WxDxH), cm	30x25x50	30x25x50	30x25x50
Feed water pressure	0.5 – 5 bar	0.5 – 5 bar	0.5 – 5 bar
Feed water conductivity	< 900 $\mu\text{S}/\text{cm}$	< 900 $\mu\text{S}/\text{cm}$	< 900 $\mu\text{S}/\text{cm}$

Flow diagrams



Applications

Application	Crystal E RO	Crystal E Pure
Glassware rinsing	●	●
Laboratory washers	●	●
Autoclaves	●	●
Electrochemistry	–	●
Flame AAS	–	●
Wet chemistry	–	●
Spectrophotometry	–	●
Buffer and media preparation	–	●

Components

Part number	Accessory	Crystal E RO	Crystal E20 Pure	Crystal E Pure
10009	Pre-filter for chlorine and organics reduction	+	–	+
10039	Pre-filter set for chlorine and organics reduction	–	+	–
	Boost pump	+	+	+
	Reverse osmosis module	+	+	+
10310	Deionization module, standard	–	–	+
10101	High capacity deionization module, (replaces standard module)	–	+	option
10201	Point-of-use microfiltration module for Pure systems	–	option	option
10102	UV sterilization module	–	option	option

Storage tanks

Part number	Accessory	Crystal E RO	Crystal E20 Pure	Crystal E Pure
11000	Storage tank "Basic" w/dispense pump, 25L	option	option	option
10007	Storage tank "Comfort" w/dispense pump, 60L	option	option	option
10004	Storage tank "Economy" w/dispense pump, 50L	option	option	option
11014	Storage tank "Tiny", 10L	option	option	option
10027	Storage tank "Comfort" w/dispense pump, 100L	option	option	option
10026	Storage tank "Comfort" w/dispense pump, 200L	option	option	option
10025	Storage tank "Comfort" w/dispense pump, 300L	option	option	option

Ordering Information

Model	Part number
Crystal E Pure	CE-1005
Crystal E RO	CE-1245
Crystal E20 Pure	C20-1001HC

Consumables

Part number	Description	Replacement criteria	Comments
10009	Replacement pre-filter, Crystal E RO, Pure	Filter life counter is zero or the filter is clogged	
10039	Replacement pre-filter set, Crystal E20 Pure	Filter life counter is zero or the filter is clogged	
10310	Replacement deionization module	„DI Err“ message is shown, or water conductivity is consistently > 0.5 µS/cm	“Pure” systems only
10113	Replacement high-capacity deionization module	„DI Err“ message is shown, or water conductivity is consistently > 0.5 µS/cm	Only “E20 Pure” or systems with 10101 option
10011	Replacement sterilization UV bulb	As required (on average every 3 years)	Only systems with 10102 option
10012	Replacement 0.22 µm dispense filter	Every 6–12 months	Only systems with 10201 option