

Operating instructions
Thermo Scientific Barnstead Smart2Pure 12
Water Purification System
with external tank

[] Art. no.: 50129888 (Standard)
[] Art. no.: 50129889 (UF)

[] Art. no.: 50129890 (UV)
[] Art. no.: 50129845 (UV/UF)



Serial no.:

These instructions are to be read prior to starting installation and start-up!

50129897; Status: 04.12 Rights to technical changes reserved



EC Declaration of Conformity

according to EC Machines Directive 2006/42/EG, Appendix II A

We herewith declare that the design and construction of the machine named below and the types of it that we have introduced into the market conform to the fundamental safety and health requirements of EC Directive 2006/42/EC.

This declaration loses its validity when changes which were not agreed to by us are made to the machine.

Manufacturer: Thermo Electron LED GmbH
Robert-Bosch-Straße 1
D-63505 Langenselbold
Germany

Description of the machine:

Function: Ultrapure water system

Types: Smart2Pure 12, Smart2Pure 12 UF,
Smart2Pure 12 UV, Smart2Pure 12 UV/UF,

Article nos.: 50129888, 50129889, 50129890, 50129845

We also declare that the product complies with the following applicable Guidelines/Directives:

Electromagnetic Compatibility Directive (2004/108/EG)

Harmonized standards applied:

DIN EN ISO 12100-1 Safety of machines, Part 1: Principles
DIN EN ISO 12100-2 Safety of machines, Part 2: Technical Guidelines
DIN EN ISO 14121-1 Safety of machines, Part 1: Risk Assessment
DIN EN 61326-1

Authorized person for documentation:

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Niederelbert, 1 April 2011

Detlef Opp, Technical documentation manager



Signature

Preface

Dear Sir or Madam,

With your decision for this ultrapure water system from the **Smart2Pure** series, you have selected a high-quality product.

Thank you for the confidence you have placed in us.

Before you start to install and operate this ultrapure water system, please carefully read the information on how it is to be properly installed and operated that is given in these operating instructions.

This is particularly important, as we, the manufacturer, cannot accept liability for any damage occurring as a result of improper operation of the system, or from use of it for other than the intended purpose.

Niederelbert, 15.04.2011

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2. Explanatory notes on the operating instructions



EU Mark of Conformity



CSA - admission



Important operating and/or maintenance instructions! Read the operating instructions with due care.

Risk of electric shock! Electrical work on the system is only to be carried out by qualified personnel.



General information! Particularly important notes are marked with this information sign.



Protective conductor connection

Connect the power supply to an electrical socket with a protective connection.

The information provided in these operating instructions is only valid for the system which has the serial number which is to be entered on the front page.



Please enter the serial number* of your Smart2Pure system in the space provided on the front page.

* Read the serial number of your ultrapure water system from the type plate.

For quick and correct service, please include the following information on all inquiries and replacement parts orders which relate to your system:

- The serial number
- The article number

3. Transport and packaging

Ultrapure water systems are carefully controlled and packed prior to dispatch, but damage could nevertheless still occur during transport.

3.1 Examination on receipt

- Check the completeness of delivery against the delivery note.



Is the packaging damaged?

- Inspect the system for damage.

3.2 Complaints

If damage has occurred to the system during transport:

- Immediately contact the post, railway or forwarding agent*.
- Keep the packaging and outer cardboard box for possible examinations and return shipment.

3.3 Packaging and return shipment

Whenever possible, use the original cardboard box and packaging material.

Should these no longer be available:

- Pack the system in packing film and a strong cardboard box
- Protect the system against damage from shock.



* **The time limit for complaints is 6 days (after receipt of the goods).
The right to claim for damages expires when this time has elapsed.**

4. Extent of delivery

The following Smart2Pure ultrapure water system versions, each with a performance of 12 L/h, are available:

50129888	Smart2Pure 12	(Standard system)
50129889	Smart2Pure 12 UF	(Standard system + Ultrafiltration module)
50129890	Smart2Pure 12 UV	(Standard system + UV-Photooxidation)
50129845	Smart2Pure 12 UV/UF	(Standard system + UV-Photooxidation + Ultrafiltration module)

(Please compare the article number of your wanted version with the article number given on the delivery note.)

1x Smart2Pure 12 (acc. to version)	Article no. 50129xxx
1x Pure water tank 30 or 60 litres	Article no. 06.50xx
and an assembly kit consisting of:	
Pretreatment cartridge	Article no. 09.2012
Filter cartridge	Article no. 09.1020
Sterile filter capsule, 0.2 µm	Article no. 09.1003
Feedwater connecting kit, R 3/4"	Article no. 25.0071
Connecting hose, o.d. 1/4", 6 m	Article no. 18.0137
Ball valve, dia. 1/4"	Article no. 15.0112
Tabletop power pack, 24 VDC	Article no. 50133713
Universal adapter	Article no. 21.1006
Universal holder	Article no. 21.1007
Connecting cord (rubber connector to nema plug connector)	Article no. 50132200
Connecting cord (rubber connector to british ST plug connector)	Article no. 50132203
Connecting cord (rubber connector to euro plug connector)	Article no. 50132215
Operating instructions	Article no. 50129897
Put in angle connector d1/4"	Article no. 14.0361
T-connector d1/4"	Article no. 14.0362

5. Safety precautions



Observe these safety precautions for your own safety!

- The Smart2Pure version that you have selected is a state-of-the-art ultrapure water system, the intended purpose of which is to purify tap water of drinking water quality.
- Please do not start to install and operate the system until you have read through the information that is given in these operating instructions.
- Please note that the use of the system for other than the intended purpose and/or improper operation of it release the manufacturer from all liability.
- Lifting and carrying the ultrapure water system, e.g. to the installation location, should be carried out by two people. To lift it, each takes hold of it under the base plate at two corners.
- The CE-mark is invalidated when constructional changes are made to the system or foreign products are installed in it.
- Protect the system from frost. The temperature at the installation area must be at least + 2°C.
- Observe all general rules and regulations that are valid at the installation location, including the relevant current accident prevention regulations.
- Feedwater pressure min. 1 bar and max. 6 bar. Should it be higher, then an additional pressure reducer must be installed.
- According to DIN EN 1717, water purification systems must be equipped with a device that safeguards the tap water against contamination.
- A suitable electric socket must be made available for the system (see Technical specifications).
- The installation area must have a drain at floor level with at least DN 50 pipe and which allows free run off.
- When the system is to be wall-mounted please check that the wall has sufficient load bearing capacity (see Technical specifications for the weight).

- The maximum operating temperature is 40°C.

- Proceed as follows during longer system standstills (e.g. long holidays) when neither a floor drain nor a water watcher is available,:
 - **Switch the system off (unplug the mains plug).**
 - **Close off the supply of water to the ultrapure water system.**Do not start the system up again with the water supply closed off, as the pump would then suffer damage. The manufacturer accepts no liability should this occur.

- When installing the ultrapure water system, ensure that there is sufficient working room around it for problem-free usage (e.g. filter replacement, connections etc.).

- The guarantee is valid for a period of 12 months!

- Never look directly at a switched-on UV-lamp, as the UV light would endanger your eyesight! The UV-lamp is only to be replaced by personnel from a authorised company.

6. Intended application

The continually increasing requirements that ultrapure water quality must fulfil, the ever stricter demands resulting from technological advances and increasingly lower detection limits in laboratories, together with the need for user-friendly systems and complete solutions, were the basis for the development of the novel Smart2Pure ultrapure water systems.

Smart2Pure systems have been specifically designed to produce sterile filtered ultrapure water that is free of particles, salts and organic compounds.

6.1 Application areas

- Analytical techniques in laboratories:

- HPLC (**H**igh **P**erformance **L**iquid **C**hromatography)
- IC (**I**on **C**hromatography)
- ICP (**I**nductive **C**oupled Argon **P**lasma)
- AAS (**A**tomic **A**bsorption **S**pectrophotometry)
- TOC-Analyse (**T**otal **O**rganic **C**arbon)
- etc.

- Reagent and solution preparation:

- Cell culture media
- Tissue culture media
- Make up water for reagents used in on-line analytical systems

- Water for high-purity rinsing in laboratories

7. Technical specifications

Demands made on the feedwater	
Source	Drinking water acc. to DIN 2000.
Blocking index (SDI)	max. < 3 for all versions. With higher values, a prefilter must be installed upstream.
Free chlorine concentration	< 0.1 mg/L
Manganese content	< 0.05 mg/L
Iron content	< 0.05 mg/L
pH-Range	4 - 11
Temperature	2 - 35 °C
Pressure	1 - 6 bar

Product water of quality ASTM I (dispensing valve)				
	Standard	UV	UF	UV/UF
Conductivity $\mu\text{S/cm}$	0.055	0.055	0.055	0.055
Resistance $\text{M}\Omega\text{cm}$ at 25°C	18.2	18.2	18.2	18.2
TOC ppb	5 - 10	1 - 5	5 - 10	1 - 5
Bacteria CFU/ml	< 1	< 1	< 1	< 1
Bacterial endotoxines EU/ml	--	--	< 0.005*	< 0.005*
Particles > 0,2 μm	< 1/ml	< 1/ml	< 1/ml	< 1/ml
Flow rate l/min	1.0	1.0	0.6	0.6
Typical amount withdrawn	up to 30 litres per day			

* Dependent on feedwater and disinfection

Product water of quality ASTM II				
	Standard	UV	UF	UV/UF
Conductivity $\mu\text{S/cm}$	0.067 - 0.1	0.067 - 0.1	0.067 - 0.1	0.067 - 0.1
Resistance $\text{M}\Omega\text{cm}$ at 25°C	10 - 15	10 - 15	10 - 15	10 - 15
Retention quota for bacteria and particles	Ø 99 %	Ø 99 %	Ø 99 %	Ø 99 %
Permeate performance L/h	12	12	12	12

Dimensions	
Height:	545 mm
Width:	305 mm
Depth:	300 mm
Weight:	
Smart2Pure 12 Standard	20 kg
Smart2Pure 12 UF	20 kg
Smart2Pure 12 UV	21 kg
Smart2Pure 12 UV/UF	21 kg

Airborne sound emission	
Sound-pressure level	49 db(A)

Water connections	
Feedwater	Hose, 1/4" o.d.
Concentrate	Hose, 1/4" o.d.
Tank water supply	Hose, 1/4" o.d.
Tank water return	Hose, 1/4" o.d.
Pure water	Hose, 1/4" o.d.
Dispensing valve outlet	Hose, 8 - 10 mm o.d.

Electrical connections / external switched mode power supply	
Input voltage	AC 100 – 240 V, 50 – 60 Hz, 5 – 3.8 A
Output voltage	DC 24 V, 3.8 A
System connection	DC 24 V, 80 W
Serial interface	RS 232
Potential-free contact	max. 30V, 2A
Protection Class	Class II (external SMPS certified as Class I)

Ambient conditions (DIN EN 61010-1 (VDE 0411-1):2011-02)	
Usage	Indoor rooms
Height	Up to 2000 m
Temperature range	From 5° C to 40° C
Relative humidity	Maximum relative humidity 80 % at temperatures of up to 31° C, linearly decreasing to 50 % relative humidity at 40° C
Line-voltage variation	Not more than ± 10 % of the line voltage
Transient overvoltages	As usually occur in the supply network (overvoltage category II acc. to IEC 60364-4-443). <u>Note:</u> The rated level of transient overvoltage is the withstand impulse voltage acc. to overvoltage category II of IEC 60364-4-443
Ventilation requirements	There are no special requirements with regard to ventilation.
Degree of pollution	2

Materials of parts that contact water	
Pump head	Nylon with glass fibre
UV-Lamp	High-purity quartz
UV Housing	Stainless steel
Filter cartridge	PP
UF Housing	Polycarbonate
Raw water Solenoid valve	PA
Recirculation Solenoid valve	PA
Rinsing solenoid valve	PA
Pressure hold valve	Brass, chemically nickel-plated
Dispensing valve	POM
Conductivity measuring cell	PVC, stainless steel
Connectors	POM
Hoses	PE
Gaskets	EPDM
RO-Membrane	PA

8. How Smart2Pure functions

Raw water solenoid valve V1 is closed during Stand-by and standstills. This prevents raw water from flowing into the system when it is not in operation and so protects the external tank B1 from overflowing.

In normal operation, tap water having a maximum pressure of 6 bar flows into the system and is pumped by pressure booster pump P1 through the subsequent pretreatment F1 and reverse osmosis membrane F2. The latter retains all salts dissolved in the incoming water to the extent of the given retention quota and, because of the molecular size of the membrane pores, also bacteria, pyrogens and particles to Ø 99%.

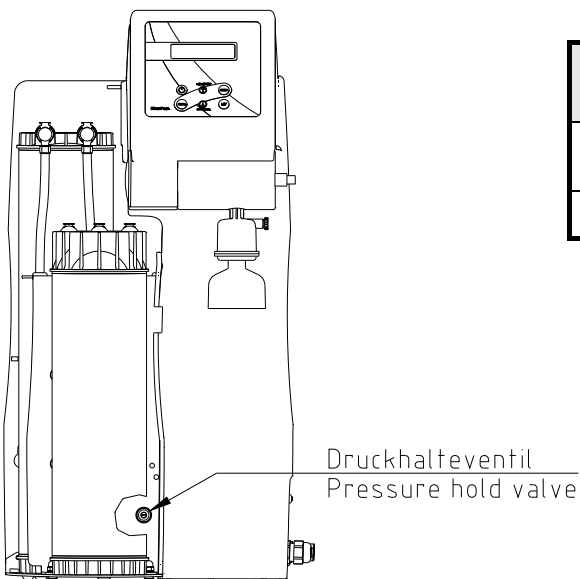
The permeate flows through the downstream purification stages, such as UV-photooxidation UV1, the 185 nm and 254 nm wavelengths of which reduce organic compounds (only with Smart2Pure versions UV and UV/UF), filter cartridge F3 and ultrafilter F6 with automatic rinsing (only with Smart2Pure versions UF and UV/UF) to the tank.

The retained water constituents are led away in the remaining concentrate. The special conductivity measuring probe QISA 300 (with temperature compensation) and temperature probe TIA 500 permanently monitor the conductivity and temperature of the ultrapure water and the values of these are shown in the display.

To ensure a constantly high water quality, the water in the storage tank is recirculated at regular intervals by recirculation pump P2. Float switch LS 100 monitors the water level inside the tank..

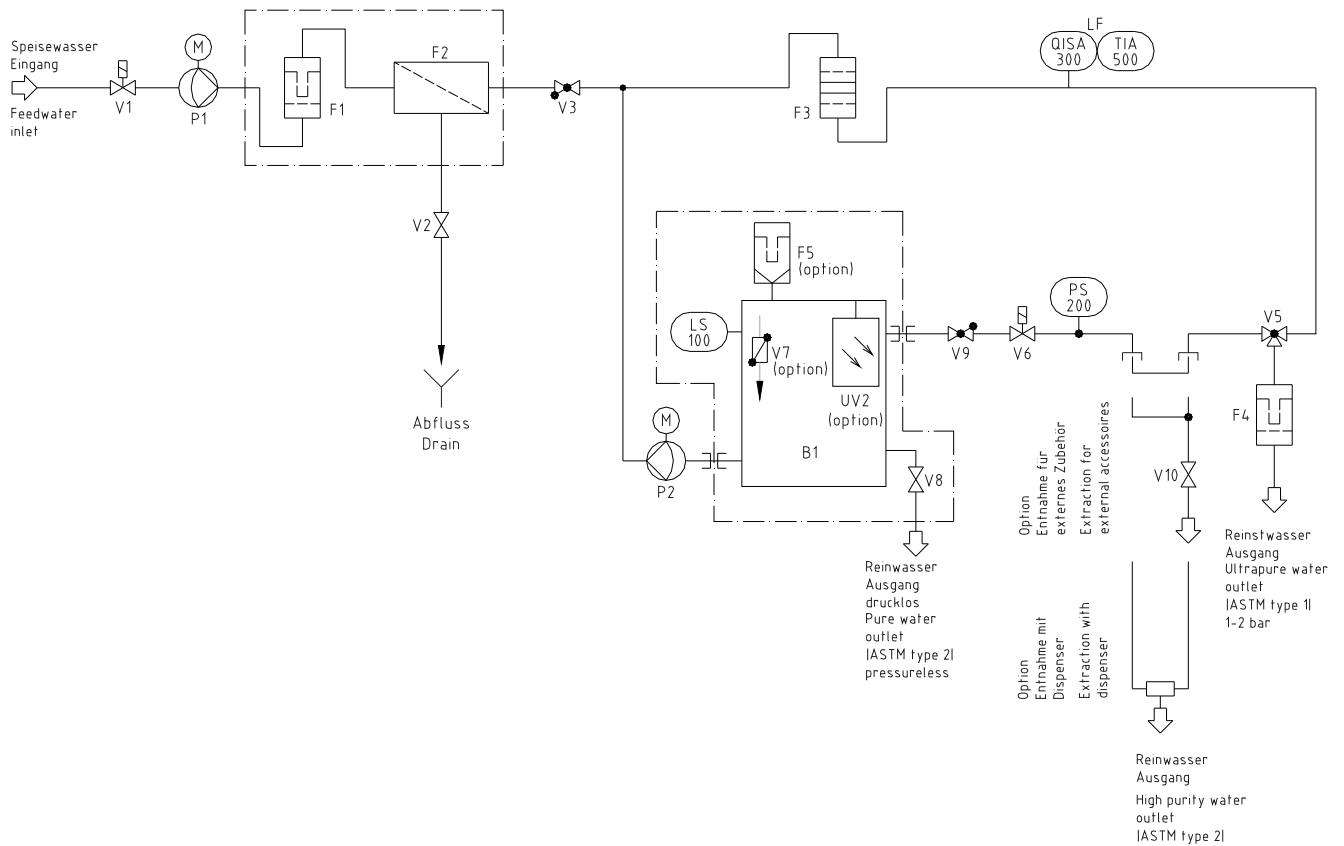


Pressure hold valve V2 is factory adjusted. A change in this adjustment could lead to damage to the reverse osmosis membrane. Fluctuations in the temperature and pressure of the feedwater make it necessary for the adjustment of the pressure hold valve, and of the concentrate flow that is linked to it, to be checked and re-adjusted at regular intervals by Service or service personnel from a authorised company.



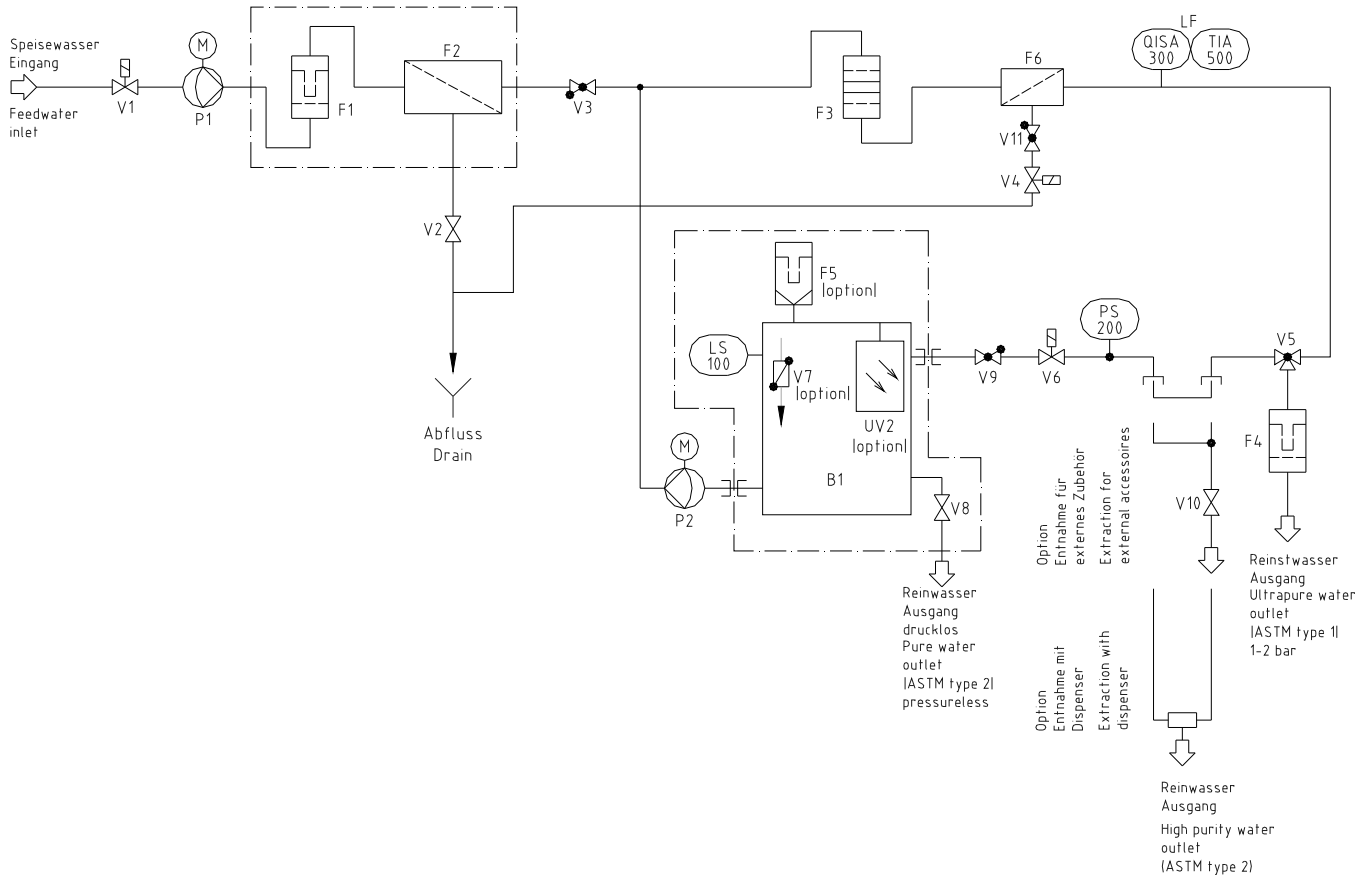
Concentrate flows for Smart2Pure 12 to be checked/adjusted every 3 months	
Permeate flow [L/h]	Concentrate flow [L/h]
12	60

8.1 Flow chart, Smart2Pure 12



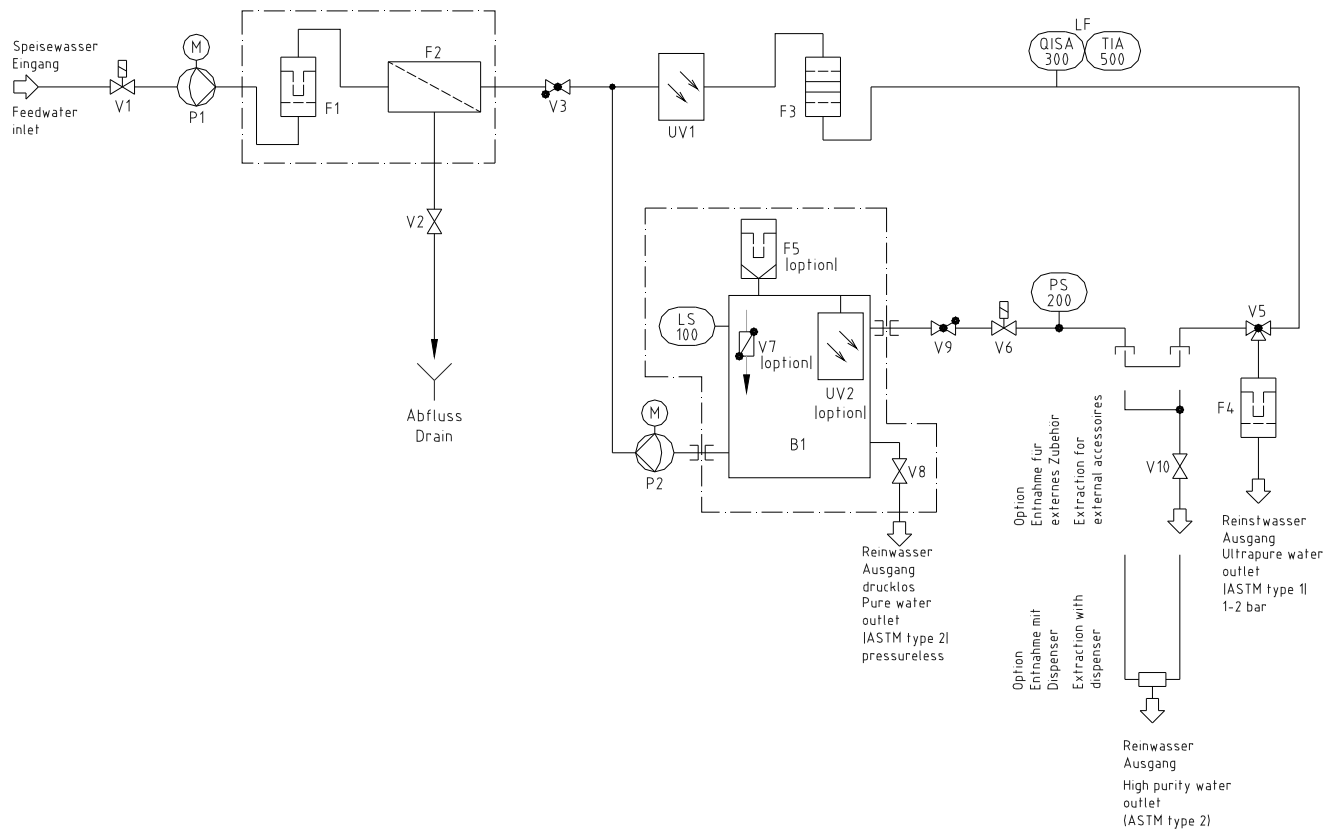
B1	Pure water tank
F1	Pretreatment cartridge
F2	Reverse osmosis membrane
F3	Filter cartridge
F4	Sterile filter
F5	Sterile vent filter (option)
LS 100	Float switch
P1	Pressure booster pump
P2	Recirculation pump
PS 200	Pressure switch
QISA 300	Ultrapure water conductivity measuring cell
TIA 500	Temperature probe
UV2	UV-Disinfection (option)
V1	Raw water solenoid valve
V2	Pressure hold valve
V3	Check valve
V5	Ultrapure water dispensing valve
V6	Recirculation solenoid valve
V7	Sterile overflow (option)
V8	Pure water dispensing valve
V9	Check valve
V10	Stop cock

8.2 Flow chart, Smart2Pure 12 UF



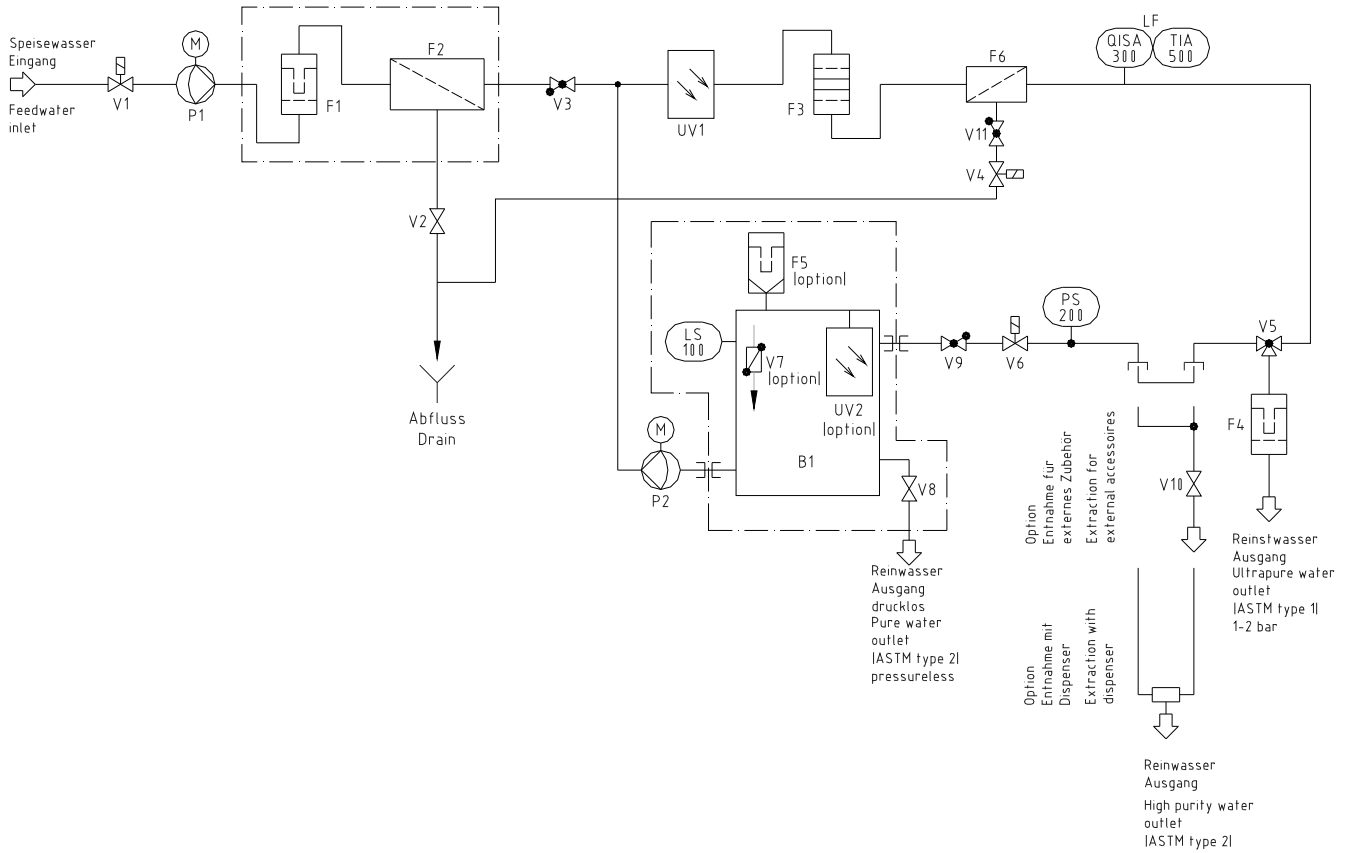
B1	Pure water tank
F1	Pretreatment cartridge
F2	Reverse osmosis membrane
F3	Filter cartridge
F4	Sterile filter
F5	Sterile vent filter (option)
F6	Ultrafiltration module
LS 100	Float switch
P1	Pressure booster pump
P2	Recirculation pump
PS 200	Pressure switch
QISA 300	Ultrapure water conductivity measuring cell
TIA 500	Temperature probe
UV2	UV-Disinfection (option)
V1	Raw water solenoid valve
V2	Pressure hold valve
V3	Check valve
V4	Rinsing solenoid valve
V5	Ultrapure water dispensing valve
V6	Recirculation solenoid valve
V7	Sterile overflow (option)
V8	Pure water dispensing valve
V9	Check valve
V10	Stop cock
V11	Check valve

8.3 Flow chart, Smart2Pure 12 UV



- B1 Pure water tank
- F1 Pretreatment cartridge
- F2 Reverse osmosis membrane
- F3 Filter cartridge
- F4 Sterile filter
- F5 Sterile vent filter (option)
- LS 100 Float switch
- P1 Pressure booster pump
- P2 Recirculation pump
- PS 200 Pressure switch
- QISA 300 Ultrapure water conductivity measuring cell
- TIA 500 Temperature probe
- UV1 UV-Photooxidation
- UV2 UV-Disinfection (option)
- V1 Raw water solenoid valve
- V2 Pressure hold valve
- V3 Check valve
- V5 Ultrapure water dispensing valve
- V6 Recirculation solenoid valve
- V7 Sterile overflow (option)
- V8 Pure water dispensing valve
- V9 Check valve
- V10 Stop cock

8.4 Flow chart, Smart2Pure 12 UV/UF



- B1 Pure water tank
- F1 Pretreatment cartridge
- F2 Reverse osmosis membrane
- F3 Filter cartridge
- F4 Sterile filter
- F5 Sterile vent filter (Option)
- F6 Ultrafiltration module
- LS 100 Float switch
- P1 Pressure booster pump
- P2 Recirculation pump
- PS 200 Pressure switch
- QISA 300 Ultrapure water conductivity measuring cell
- TIA 500 Temperature probe
- UV1 UV-Photooxidation
- UV2 UV-Disinfection (option)
- V1 Raw water solenoid valve
- V2 Pressure hold valve
- V3 Check valve
- V4 Rinsing solenoid valve
- V5 Ultrapure water dispensing valve
- V6 Recirculation solenoid valve
- V7 Sterile overflow (option)
- V8 Pure water dispensing valve
- V9 Check valve
- V10 Stop cock
- V11 Check valve

9. Installation of the system

9.1 Installation location

Take the following requirements into consideration when choosing the installation area:

- Feedwater pressure at least 1 bar, at most 6 bar.



The feedwater pressure is not to exceed 6 bar. A pressure reducer must be installed if the pressure is higher.

- Minimum temperature + 2°C.
- Level standing surface.
- If the system is to be wall-mounted, the wall must be smooth. Please check the bearing capacity of the wall, it must be sufficiently loadable (see Technical specifications for the weight).
- DN 50 Floor drain.
- Free gravity flow to the drainage.
Should no floor drain be available, then a water watcher (article no.: 16.0129) must be used to protect against water damage!



Free gravity fall to drain must be ensured!

- An electric socket with protective conductor must be available for connection of the system to the voltage supply (see Technical specifications).

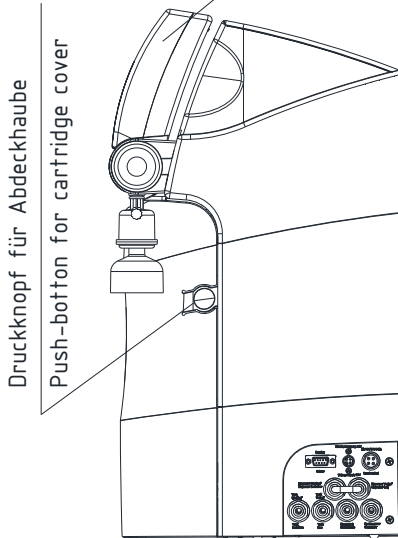


Position the system so that there is no difficulty in separating the device from the electric mains.

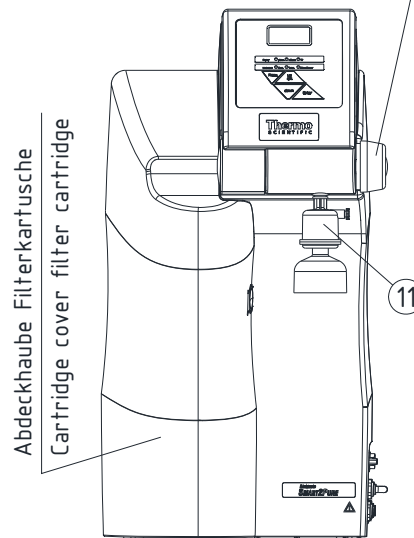
- There must be sufficient working space around the system (filter replacement etc.).
- The system must be easy to operate and check.
- An R 3/4" tap water connector is required.

9.2 Installation

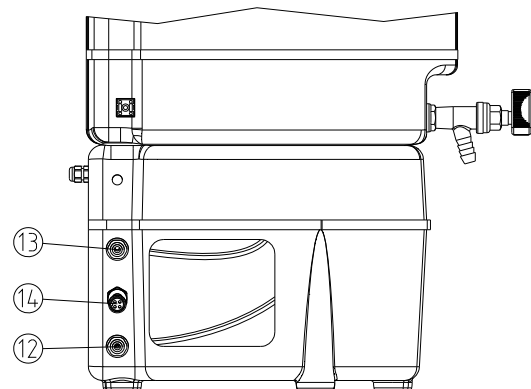
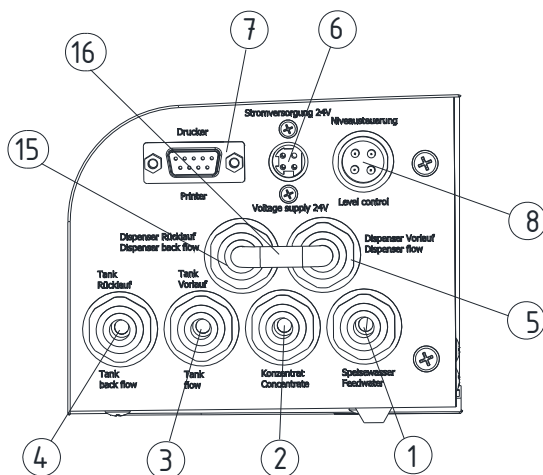
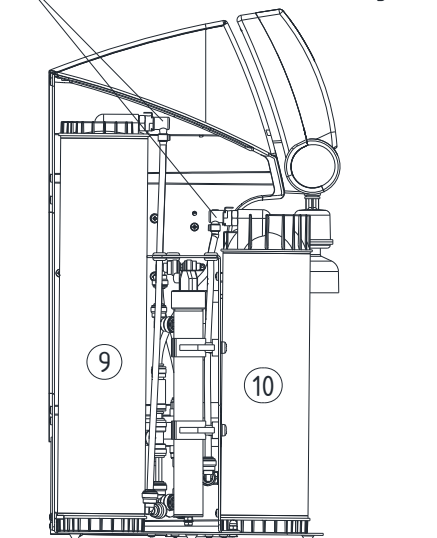
Schwenkbare Display
Swivel display



Drehknopf zur Reinstwasserentnahme
Rotary knob for Ultra pure water



Schnellverschlüsse Filterkartuschen
Quick connectors filter cartridges



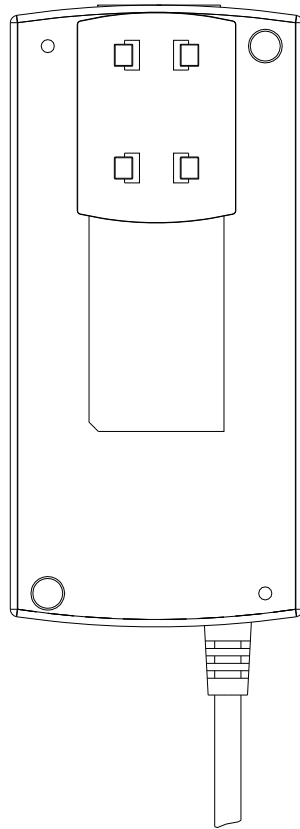
- 1) Feedwater connector hose, 1/4" od
- 2) Concentrate connector hose, 1/4" od
- 3) Tank water supply connector hose, 1/4" od
- 4) Tank water backflow connector hose, 1/4" od
- 5) Connector dispenser flow hose, 1/4" od
- 6) Connector for power supply, 4-pin, 24V DC
- 7) Connector for optional printer
- 8) Connector for level control, 4-pin
- 9) Filter cartridge
- 10) Pretreatment cartridge
- 11) Sterile filter
- 12) Tank water supply connector
- 13) Tank water return connector
- 14) Level control cable
- 15) Connector dispenser backflow hose AD 1/4"
- 16) Jumper hose AD 1/4"

Proceed as follows to set up your Smart2Pure ultrapure water system and put it into operation:

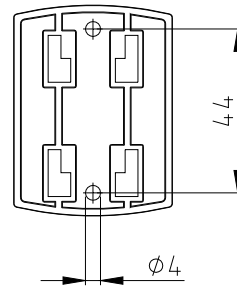
- Stand the system at the installation location or, for wall mounting, hang it to the wall using the wall holder that is available as accessory.
- Unlock the cartridge cover by pressing the push-button and take the cover off.
- Remove the stoppers from the standard supplied filter cartridge and pretreatment cartridge and keep the stoppers for return shipment.
- Fit the filter cartridge (9) in the free space at the back of the compartment and plug the 2 quick-connect couplings on the cartridge connectors so that they snap audibly into position.
- Now fit the pretreatment cartridge (10) in free place at the front of the compartment and plug the 3 quick-connect couplings on the cartridge connectors so that they snap audibly into position.
- Make connection now to the feedwater connector (1) using the R 3/4" feedwater connector kit that is standardly supplied. There is also a dirt sieve in the connector kit. Fit this in the threaded feedwater hose connector, then fit this connector to a water tap thread can be shut off.
- Use a 1/4" o.d. hose to make connection of the "Tank water supply" connector of the system (3) to the "Tank water supply" connector of the tank (12), then make a similar connection from the "Tank water return" connector of the system (4) to the "Tank water return" connector (13) of the tank.
CAUTION: Do not mix up the connectors!
- Plug the cable of the level control of the tank (14) in the corresponding 4-pin connector (8) of the system.
- If required, a 1/4" o.d. hose can be connected to the pure water connector (5) with the stop cock standardly supplied for withdrawal of ASTM Type 2 pure water.
- Use the 1/4" o.d. hose to make a free gravity fall connection from the "Concentrate" (2) connector of the system to a waste water drain.
- Connect the connecting cord of the standardly supplied tabletop power pack to the 4-pin socket (6) of the system.
- The system is now ready to use.
- Open the feedwater tap and check that all connections are leak-proof.
- Take the cartridge cover and put it back on, making sure that the lock on the right side of the cover locks in place.

9.3 Mounting the power pack (voltage supply)

Back view power supply



Universal adapter



Wall mount
with screws

- Whenever possible, mount the power pack on the wall to the left or right of the ultrapure water system where it is freely accessible.
- Stick the universal holder which is supplied in the assembly kit to the back of the power pack as shown in the above Figure.
- Stick the universal adapter to a smooth wall surface or screw it to the wall using the dowels and screws supplied in the assembly kit.
- When the universal holder and universal adapter have been fitted, hang the power pack in.
- Plug the connecting cable (appliance cable) in the power pack socket.
- Connect the power pack to the ultrapure water system (4-pin power supply connector, pos. 6).

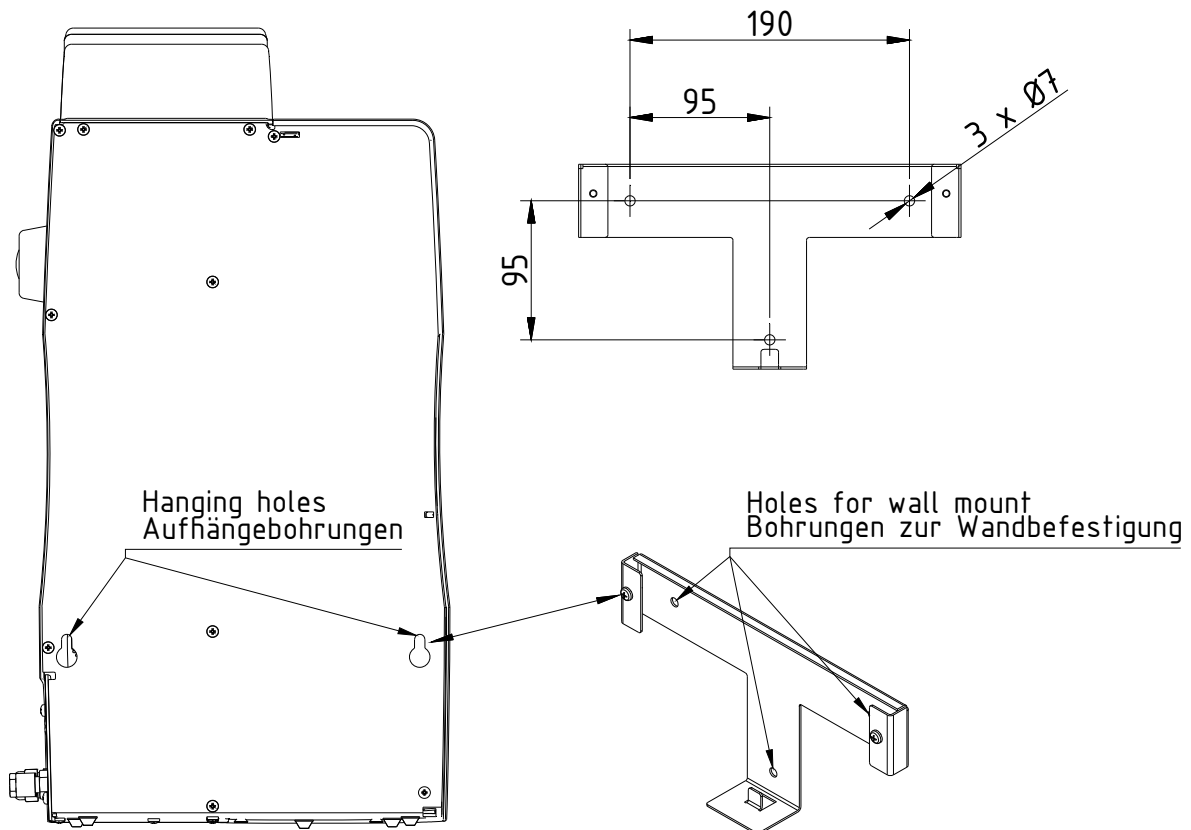
9.4 Wall mounting (option)

Please use the wall-mount (article number 09.2212) to mount the system on a wall. Fasten it to the wall by means of three screws.



The screws and dowels are supplied with the wall mount, are exclusively to fix the wall mount to a concrete wall or a solid masonry!

- Use the twist drill (8 mm or 5/16 inch) to make the three holes in the wall that required as shown in the diagram,
- Plug the nylon S8 dowels that are with supplied in the holes. Screw the 6 x 40 mm screws that are also with supplied in the dowels.
- Lift the Smart2Pure system (2 people are required for this) and hang the back side of it on the wall bracket.



10. Start-up



The system must have warmed up, or cooled down, to room temperature before start-up can be begun.



Check that all hose connections have been correctly made as described in the "Setting up" section.

Switch the system on by plugging the mains plug in a suitable electric socket.

After a brief self test the system begins the production of ultrapure water.

Wait until the first tank filling has been completed and discard the water that is in the tank. Subsequently check the concentrate flow and adjust this as described in the "How Smart2Pure functions" section.

Withdraw at least 1 litre of water before you screw the sterile filter (10) that is standardly supplied in the outlet of the dispensing valve.

Now set the wanted display mode, the limiting value for the conductivity as well as the limiting value for the temperature as described in the "System control" section.

11. Brief operating instructions

The purity of the water produced is shown at the front of the system, either in $\mu\text{S}/\text{cm}$ or in $\text{M}\Omega\text{cm}$. Ultrapure water can be withdrawn from the dispensing valve at the front of the system.

Menu:

With one press on the menu-key you reach the first submenu, where you can select from the following choice:

1. Display of the water quality only in $\mu\text{S}/\text{cm}$
2. Alternatively, the display can show the water quality in $\mu\text{S}/\text{cm}$ and the temperature alternately at 2 second intervals (dual measuring mode)
3. Display of the water quality in $\text{M}\Omega\text{cm}$ (mono measuring mode)
4. Alternatively, the display can show the water quality and the temperature alternately at 2 second intervals (dual measuring mode)

With two presses on the menu-key you reach the second menu, where you can set the limiting value for the conductivity of the ultrapure water (only in $\mu\text{S}/\text{cm}$)

With three presses on the menu-key you reach the third menu, where you can set the limiting value for the temperature.

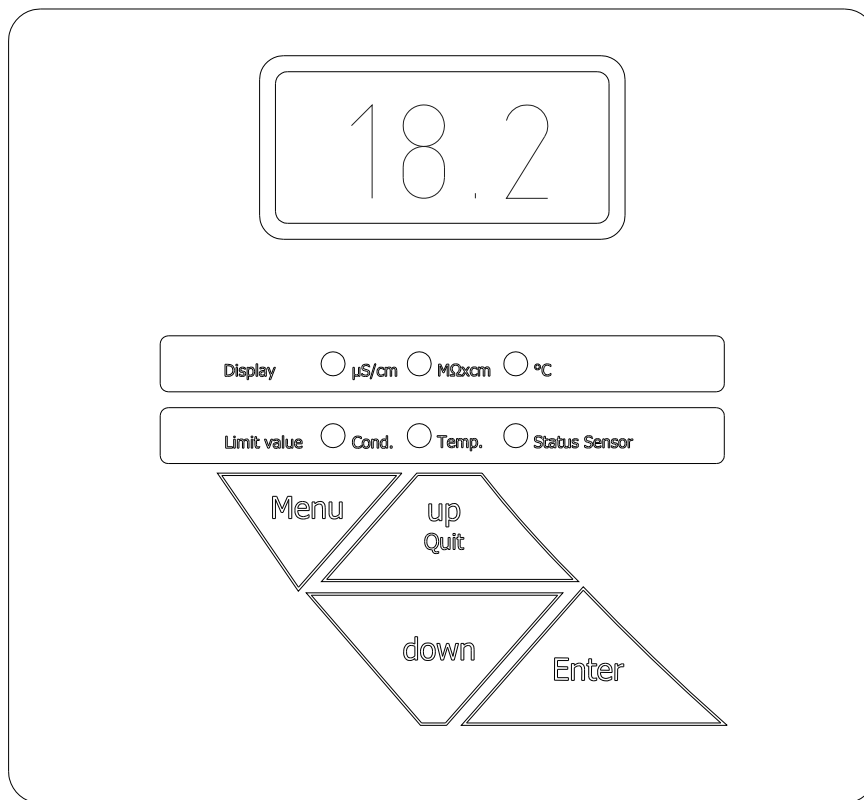
- The exceeding of a limiting value is signalled by a buzzer. The alarm signal can be switched off by a press on the quit/up button.

Leave your Smart2Pure ultrapure water system in operation even at weekends and during holiday times. Only then can the automatic recirculation effectively protect against increasing conductivity values in the storage tank.



Should your Smart2Pure ultrapure water system be out of operation for longer than 72 hours, then the ultrapure water inside the system will take up carbon dioxide and so cannot be immediately produce ultrapure water of $18.2 \text{ M}\Omega\text{cm}$ quality. To prevent this, the filter cartridge should be prematurely replaced, whereby the emptying of the storage tank is necessary so that fresh ultrapure water flows through the system.

12. Operating elements



After switching on, all segments of the 7-segment display are shown for 3 seconds. During this time, the complete measurement cycle is run through and tested.

In the basic setting the display shows the resistance in $M\Omega\text{cm}$. The display automatically scales in the range from 18.2 to 0.005 $M\Omega\text{cm}$.

The measurement mode that the measuring device is in is shown via the upper LED row, whereby the LED for the appropriate unit, $\mu\text{S/cm}$, $M\Omega\text{cm}$ or $^{\circ}\text{C}$, lights up green.

If a measurement range end value is exceeded ($>199 \mu\text{S/cm}$ or $>0.005 M\Omega\text{cm}$), then ± 200 appears in the display.

When there is an interruption between the system and sensors, the red LED "Status Sens." lights up and, instead of a measured value, "---" is shown in the display. Should the connection to the temperature sensor be interrupted, then the buzzer is additionally triggered.

Quit-button:

The Quit/UP-button switched off the buzzer that sounds when a fault occurs. This acoustic message is then first active again when the limiting value is gone below. The fault message is also given out via the potential free contact.

13. System control

13.1 Menu

The menu consists of three sub-points: Switching to the dual mode together with selection of the measurement unit for the conductivity measurement, setting the limiting value for the conductivity and setting the limiting value for the temperature.

Mono / dual measurement mode:

Mono measurement mode: In this mode only the conductivity is displayed. The temperature can be read as long as the Enter-key is pressed .

Dual measurement mode: In this mode, temperature and conductivity are shown in 2-second alternation. The LED for the unit switches with the display.

A single press on the menu-key brings the measurement mode that has last been set to display. Use the up- or down-key to switch the permanent display of the conductivity and the alternating display of conductivity/temperature. The display shows "c" for conductivity or "ct" for conductivity/temperature.

Switching between the measurement units $\mu\text{S}/\text{cm}$ or $\text{M}\Omega\text{xcm}$ can also now be made here. The unit selected must be confirmed with Enter. The corresponding LED indicates which unit is operative.

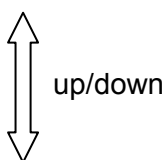
The following combinations are hereby possible:

ct / $\text{M}\Omega\text{xcm}$

c / $\text{M}\Omega\text{xcm}$

ct / $\mu\text{S}/\text{cm}$

c / $\mu\text{S}/\text{cm}$



13.2 Setting the limiting value for the conductivity

Setting range: 0.055 - 30 $\mu\text{S}/\text{cm}$

Basic setting: off

Important note: The limiting value can only be entered in $\mu\text{S}/\text{cm}$.

Two presses on the menu-key (the red "Cond." LED lights up) enable the limiting value for the conductivity to be set. Use the up- and down-keys to make the setting. The particular position that is to be changed can be selected with the Enter-key and is shown flashing in the display.

When the wanted value has been reached, be sure to confirm it with Enter.

Should a value of 30.1 $\mu\text{S}/\text{cm}$ be set, then the word OFF appears in the display and limiting value evaluation is switched off.

When the limiting value of the conductivity is exceeded (Limit value Conductivity), then the red "Cond." LED lights up and the exceeding is additionally signalled by a buzzer. The fault message can be given out via the optional printer.

3.3 Setting the limiting value for temperature

Setting range: 10 - 40°C

Basic setting: 35°C

Three presses on the menu-key (the red "Temp" LED lights up) enables the limiting value for the temperature to be set. Use the up- and down-keys to make the setting. The particular position that is to be changed can be selected with the Enter-key and is shown flashing in the display.

When the wanted value has been reached, be sure to confirm it with Enter.

Should a value of 41°C be set, then the word OFF appears in the display and limiting value evaluation is switched off.

When the limiting value of the temperature is exceeded (Limit value Temperature), then the red "Temp" LED lights up and the exceeding is additionally signalled by a buzzer. The fault message can be given out via the optional printer.

13.4 Communication

A printer can be connected to the RS 232 interface for the print out of measured values. The interface works at a transmission rate of 9600 bits/sec., 8 data bits, 1 stop bit and no parity.

The resistance in MΩxcm and the temperature in °C are given out at the serial interface separated by a comma. The conductivity is automatically scaled to three significant places. Output is made 1x per hour.

When the system is in operation, a press on the down-key triggers a measured value output at the serial interface.

Print out:

e.g.: 18.2 MΩxcm, 23.4 °C

The SUB-D socket has the following pin assignment: PIN 2: RXD
PIN 3: TXD
PIN 5: GND

14. Maintenance

Regular maintenance of your system ensures that the value of it is maintained. We recommend that you close a service contract with a Service company that is expressly authorized to carry out service. You then have the certainty of a high operational safety and reliability.

NOTE!

To ensure your system will work reliably for a long time, it must be checked, serviced and cared for at regular time intervals in accordance with these operating instructions!

For this reason, the operating instructions must be readily available to operating and maintenance staff at all times, and be carefully followed!

Any maintenance work which should become necessary during the validity of the guarantee is only to be carried out by a service professional which is expressly authorized to do such work.

The operating-staff assigned is committed to carry out the weekly checks.

During the agreed term of validity of the guarantee, the maintenance record sheet supplied in the operating instructions should be kept by entry of the weekly check results.

CAUTION!

The ultrafiltration membrane should be replaced every 2 years, or when a drop in performance is determined, for perfect functioning to be ensured.

Cleaning and disinfection of your system is performed for reasons of hygiene and has no effect on the technical condition of the system. The system must be cleaned and disinfected at least once yearly.



Control and maintenance work on electrical systems is only to be carried out when the system has been switched to a currentless condition at the mains and the switching has been secured against inadvertent switching back on. Such work is only to be performed by an appropriately trained, skilled electrician.

14.1 Maintenance intervals

Consumable materials are to be replaced at the intervals given in the following Table or when there is a drop in performance:

Material	Flow chart no.	Article no.	Interval*
Pretreatment cartridge	F1,F2	09.2003/09.2006	12 Months
Filter cartridge	F3	09.1020	12 Months
Sterilefiltercapsule	F4	09.1003	12 Months
Ultrafiltration membrane	F6	50133981	24 Months

*Please keep in mind that the life of your consumables is directly dependent on the quality of the feed water and the amount of water used daily. The interval is contingent on the feedwater quality so that a shorter one may be necessary.

14.2 Replacing the pretreatment cartridge

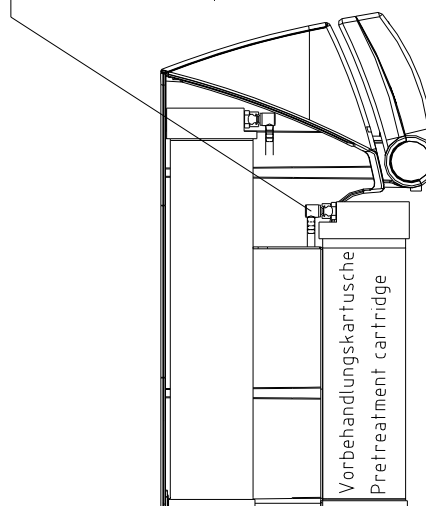


If a drop in the stated capacity is given because module blockage has resulted from operating the system with insufficient preconditioning, then the pretreatment cartridge must be replaced.

Proceed as follows to replace the pretreatment cartridge:

1. Empty the storage tank.
2. Separate the system from the mains by unplugging the mains plug.
3. Turn the supply of feedwater off.
4. Open the dispensing valve until water no longer flows out, then close it again.
5. Take off the cartridge cover.
6. Remove the three quick-connects from the pretreatment cartridge and close the connectors with the stoppers that have been saved.
7. Draw the spent pretreatment cartridge out from the guide and replace it with the new pretreatment cartridge.
8. Remove the stoppers from the new pretreatment cartridge and save them.
9. Fit the quick-connects on the pretreatment cartridge so that they audibly click into position.
10. Re-open the supply of feedwater.
11. Connect the system to the mains and check the connections for leakage.
12. Replace the cartridge cover.
13. Discard the first tank filling.

Schnellverschlüsse Vorbehandlungskartusche
Quick connectors pretreatment cartridge



14.3 Replacing the filter cartridge



The filter cartridge must be replaced as soon as the maximum limiting value for the ultrapure water that you have set is exceeded, The filter cartridge must also be replaced after disinfection of the system.

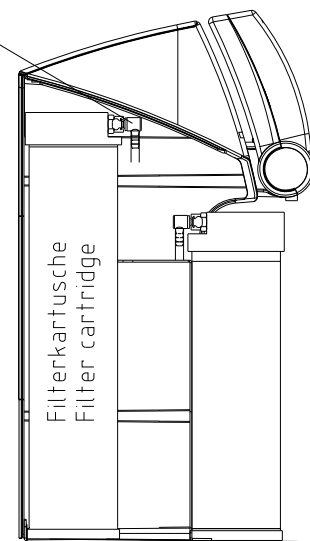
Proceed as follows to replace the filter cartridge:

1. Empty the storage tank.
2. Separate the system from the mains by unplugging the mains plug.
3. Turn the supply of feedwater off.
4. Open the dispensing valve until water no longer flows out, then close it again.
5. Take the cartridge cover off.
6. Remove the two quick-connects from the feedwater side and the ultrapure water side of the filter cartridge and close the connectors with the stoppers that have been saved.
7. Draw the spent filter cartridge out from the guide and replace it with the new filter cartridge.
8. Remove the stoppers from the new filter cartridge and save them.
9. Fit the quick-connects on the filter cartridge so that they audibly click into position.
10. Re-open the supply of feedwater.
11. Connect the system to the mains and check the connections for leakage.
12. Replace the cartridge cover.
13. Discard the first tank filling.



Only a filter cartridge of article number 09.1020 is to be used in this system, as this cartridge is specifically designed for this system. Use of any other cartridge invalidates the guarantee.

Schnellverschlüsse Filterkartusche
Quick connectors filter cartridge



14.4 Disinfection



Your system should be cleaned and disinfected at least once a year to eliminate any bacteria that are possibly in the system. We recommend that you carry out cleaning and disinfection shortly before the time that the filter cartridge is to be replaced.

Use cleaning solutions as follows:

MICRO-Chlor Granulate, 1 box, article no. 09.2202 (Europe only)

Cleaning Solution, 1 syringe, article no. CMX 25 (US-market only).



Please observe the information given in the safety data sheet supplied with Micro-Chlor disinfectant to avoid possible health hazards!

Proceed as follows to disinfect your system:

1. Disconnect the Smart2Pure from mains supply.
2. Open the lid of the storage tank, pour the contents of a box respectively a syringe of cleaning solution into the water-filled tank and then close the lid.
3. Connect the system with mains supply and let it run for 1 hour in normal operation to effective bacteria killing.
4. Discard two tank fillings of water.
5. Close the dispensing valve, disconnect the system from mains supply.
6. Change the filter cartridge as described in the Operating Instructions supplied with the system and if necessary the pre-treatment filter and the sterile filter.
7. Connect the system with mains supply.
8. Fill the tank completely once and discard the water produced from this tank filling.



Before dispensing water from the system, let water run out for approx. 15 minutes. The system is then ready for use.

15. Waste disposal

When the packaging is no longer needed it can be disposed of as household waste.

Systems are in conformity with EEC Guideline 2002/95/EC

The system is not to be thrown away as household waste but must be properly disposed of. It can be returned to the manufacturer for safe disposal according to EEC Guideline 2002/96/EC. We therefore request our customers in Germany and other member States in the European Economic Area to contact our local service centre or our headquarters:

Thermo Electron LED GmbH
Stockland 3
D-56412 Niederelbert, Germany

WEEE-Reg.-no.: DE 12471402

In countries outside of the European Economic Area, please contact your local authorities or waste disposal company.

16. Trouble shooting

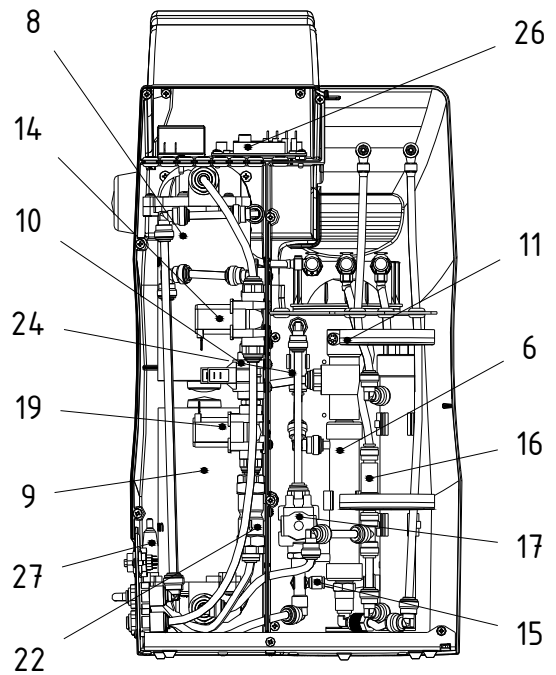
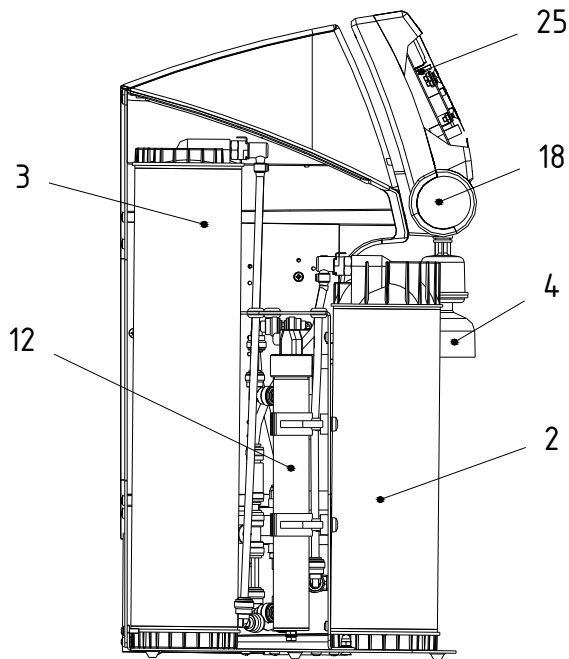
Fault	Cause	Remedy
System does not start	<ul style="list-style-type: none"> - No current - Power pack or system control defect 	<ul style="list-style-type: none"> - Supply current - Replace the power pack or system control
Water cannot be dispensed	<ul style="list-style-type: none"> - Feedwater supply is off - Feedwater and rinse water connectors are mixed up - Feedwater pressure < 1 bar 	<ul style="list-style-type: none"> - Open the feedwater tap - Reverse the connections - Increase feedwater pressure
Resistance < 18.2 MΩxcm	<ul style="list-style-type: none"> - The system has a UF-module (higher conductivity possible) - Air in the UF-module because of empty tank - Spent exchanger capacity 	<ul style="list-style-type: none"> - Wait until tank is filled again and a rinse is triggered - Insert new filter cartridge
System control no longer reacts but LED's light up	<ul style="list-style-type: none"> - Improper operation - Voltage fault 	<ul style="list-style-type: none"> - Unplug the mains plug for 5 seconds
Water leaks out	<ul style="list-style-type: none"> - Leaky hose connection - Feedwater pressure > 6 bar - Component defect (e.g. UV-quartz tube) 	<ul style="list-style-type: none"> - Check, seal hose connection - Install an upstream pressure reducer - Replace the component
Volume that can be dispensed is too small	<ul style="list-style-type: none"> - UF-Module blocked - Sterile filter blocked - Air in the sterile filter - Tank is not yet sufficiently filled 	<ul style="list-style-type: none"> - Replace the UF-module - Replace the sterile filter - Vent the sterile filter - Wait until the tank is full
Fault message: Red LED is lit up <i>"Limit value Cond."</i>	<ul style="list-style-type: none"> - Spent filter cartridge - Limiting value set too low - System has a UF-module (higher conductivity is possible) 	<ul style="list-style-type: none"> - Replace with new filter cartridge (art. no.: 09.1006) - Check, match the limiting value setting

<p>Fault message: Red LED is lit up <i>"Limit value Temp."</i></p>	<ul style="list-style-type: none"> - Temperature in the system is too high - Limiting value is set too low - Feedwater temperature too high 	<ul style="list-style-type: none"> - Reduce temperature by letting water flow out - Check, match the limiting value setting - Reduce the feedwater temperature
<p>Fault message: Red LED is lit up <i>"Status Sens."</i> The display shows "---"</p>	<ul style="list-style-type: none"> - Interruption in cable to the conductivity measuring cell - Measuring cell defect 	<ul style="list-style-type: none"> - Check the cable and the plug connection. - Replace the measuring cell
<p>Fault message: Red LED is lit up <i>"Status Sens."</i> The display shows "---", simultaneous acoustic message from the buzzer</p>	<ul style="list-style-type: none"> - Interruption in cable to the conductivity measuring cell. - Temperature sensor defect 	<ul style="list-style-type: none"> - Check the cable and the plug connection. - Replace the measuring cell

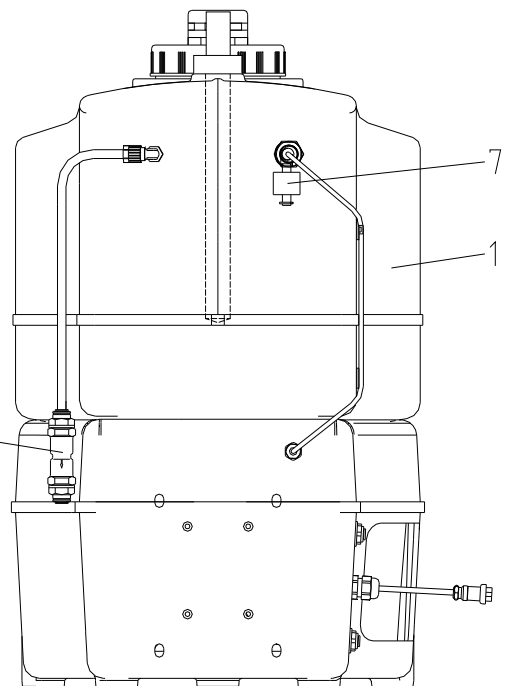
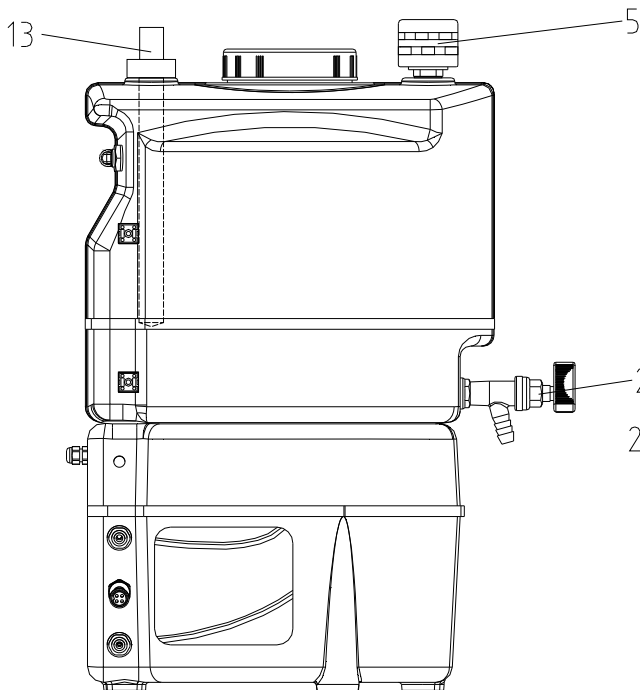
17. Replacement parts and consumable materials

Smart2Pure 12

Rückansicht ohne Filterkartusche
Back side without filter cartridge



Pure water tank



Pos.	R+I no.	Designation	Article no.
1	B1	Pure water tank, 30 litres Pure water tank, 60 litres	18.0114 18.0115
2	F1 F2	Pretreatment cartridge consisting of prefilter / hardness stabilizer and RO-membrane:	09.2012
3	F3	Filter cartridge	09.1020
4	F4	Sterile filter	09.1003
5	F5	Sterile vent filter (option)	06.5003
6	F6	Ultrafiltration module	50133981
7	LIS 100	Float switch	50133991
8	P1	Pressure booster pump	19.0050*
9	P2	Recirculation pump	19.0050*
10	PS 200	Pressure switch	50133982*
11	QISA 300 TIA 500	Ultrapure water conductivity measuring cell Temperature sensor	50133994
12	UV1	Replacement UV-lamp UV-Booster	09.1002 22.0088
13	UV2	Replacement UV-lamp (option) UV-booster	09.5002 22.0086
14	V1	Raw water solenoid valve	15.0062*
15	V2	Pressure hold valve	15.0113
16	V3	Check valve	15.0114
17	V4	Rinsing solenoid valve	15.0062*
18	V5	Ultrapure water dispensing valve	50133988
19	V6	Recirculation solenoid valve	15.0062*
20	V7	Sterile overflow (option)	15.0009
21	V8	Dispensing valve	14.0250
22	V9	Check valve	15.0019
23	V10	Cut-off valve	15.0112
24	V11	Check valve	15.0114
25		Board with display	16.0351
26		System control board	16.0337
27		Fuse holder for glas tube fuse 5 x 20mm Glas tube fuse 5 x 20mm, 3,15 A, slow fuse	50133979 50131758
28		Table top power pack (not shown)	50129629

* Consumables



We ask for your understanding that the guarantee that we give is invalidated when replacement parts, accessories or consumables from other manufacturers are used in connection with this system, as we have no influence on their appropriateness or their quality.

18. Accessories

Designation	Article no.
Disinfection agent, MICRO-Chlor (pack of 12 cans, Europe only)	09.2202
Cleaning Solution, 1 syringe (US-market only)	CMX25
Printer	09.2207
Wall holder	09.2212
Accessorie dispenser	50138220
Qualification manual IQ, OQ	IOQDOCE50133911

The address to contact when your system requires service:

Overview of Thermo Scientific International Sales Organization

Postal address USA:

Thermo Scientific
 275 Aiken Road
 Asheville, NC 28804
 USA

Enquiries from USA/Canada

Sales: +1 866 984 3766
 Service: +1 800 438 4851

Enquiries from Latin America

Sales: +1 866 984 3766
 Service: +1 866 984 3766

Enquiries from Asia

China

Sales: +86 10 8419 3588
 Service: Toll free 8008105118
 Support Mobile 4006505118 or +86 10 8419 3588

India

Sales: +91 22 6716 2200
 Service: Toll free 1 800 22 8374 or +91 22 6716 2200

Japan

Sales: +81 45 453 9220
 Service: +81 45 453 9224

Enquiries from the Rest of Asia/Australia/New Zealand

Sales: +852 2885 4613
 Service: +65 6872 9720

Enquiries from Countries not listed / Rest of EMEA

Sales: +49 6184 90 6940 or +33 2 2803 2000
 Service: +49 6184 90 6940

Enquiries from Europe

Austria

Sales: +43 1 801 40 0
 Service: +43 1 801 40 0

Belgium**Sales:** +32 53 73 4241**Service:** +32 53 73 4241**Finland/Nordic/Baltic countries****Sales:** +358 9 329 100**Service:** +358 9 329 100**France****Sales:** +33 2 2803 2180**Service:** +33 825 800 119**Germany:****Postal Address Germany:**

Thermo Electron LED GmbH

Robert-Bosch-Straße 1

D - 63505 Langenselbold

Phone**Sales:** Toll free 0800 1 536 376

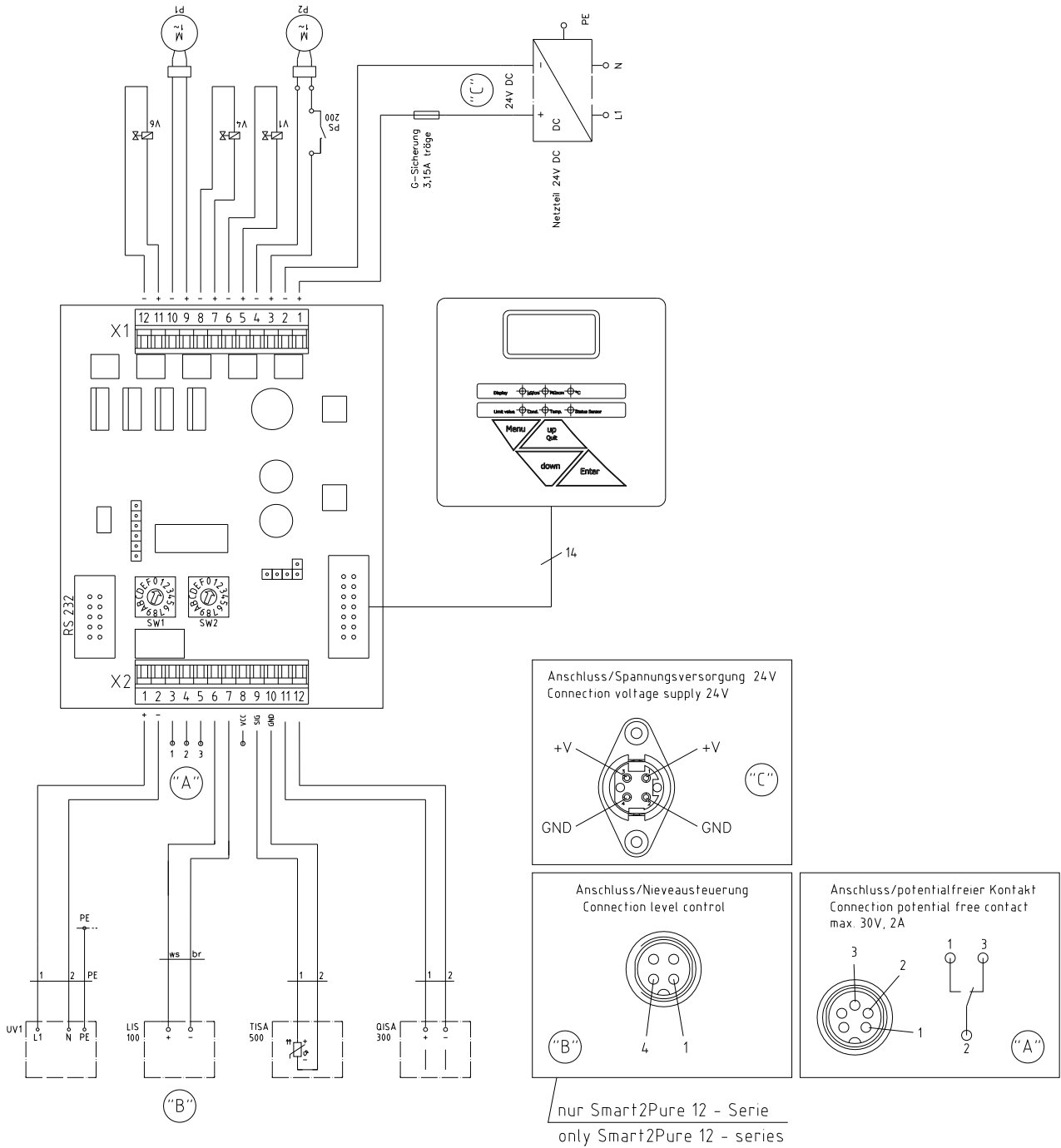
or +49 6184 90 6940

Service: Toll free 0800 1 112110

or +49 6184 90 6940

E-Mail: info.labequipment.de@thermoftsher.com**Italy****Sales:** +39 02 95059 341**Service:** +39 02 95059 250**Netherlands****Sales:** +31 76 579 5555**Service:** +31 76 579 5639**Russia/CIS****Sales:** +7 812 703 4215**Service:** +7 812 703 4215**Spain/Portugal****Sales:** +34 93 223 0918**Service:** +34 93 223 0918**Switzerland****Sales:** +41 44 454 1212**Service:** +41 44 454 1212**UK/Ireland****Service:** +44 870 609 9203**Sales:** +44 870 609 9203

19. Terminal assignment



X 1	1, 2	Spannungsversorgung 24V
	3,4	Rezirkulationspumpe (P2), Druckschalter (PS200)
	5,6	Rohwasser-Magnetventil (V1)
	7,8	Spülmagnetventil (V4)
	9,10	Druckerhöhungspumpe (P1)
	11,12	Rezirkulations-Magnetventil (V6)
X 2	1,2	UV-Fotooxidation (UV1)
	3	Pot. freier Kontakt
	4	Pot. freier Kontakt
	5	Pot. freier Kontakt
	6,7	Niveau Kontakt (LIS100)
	8 (VCC)	
	9 (SIG)	Temperatursensor (TISA500)
10 (GND)	Temperatursensor (TISA500)	
11,12	Leitfähigkeitsmesszelle Reinstwasser (QISA300)	

X 1	1, 2	Power supply 24V
	3,4	Recirculation pump (P2), Pressure switch (PS200)
	5,6	Rawwater solenoid valve (V1)
	7,8	Rinsing solenoid valve (V4)
	9,10	Booster pump (P1)
	11,12	Recirculation solenoid valve (V6)
X 2	1,2	UV-fotooxidation (UV1)
	3	Pot. free contact
	4	Pot. free contact
	5	Pot. free contact
	6,7	Level contact (LIS100)
	8 (VCC)	
	9 (SIG)	Temperature sensor (TISA500)
10 (GND)	Temperature sensor (TISA500)	
11,12	Conductivity measuring cell (QISA300)	

20. Maintenance record

(Please keep this carefully updated, as correct keeping of this maintenance record is a condition of the guarantee)

Customer address:

Location:

Type of system:

Serial no.:

Year made:

Date	Resistance, ultrapure water [MΩxcm]	Temperature, ultrapure water [°C]	Flow rate of ultrapure water ASTM Type I [L/min]	Resistance, permeate [MΩxcm]	Flow rate of permeate [L/h]	Flow rate of concentrate [L/h]

Pretreatment cartridge replaced yes/no	Filter cartridge replaced yes/no	Cleaning, disinfection yes/no	Remarks	Signature

Each false entry is considered to be a falsification of documents.

The following points are to be observed to assure the quality of the system:

- 1x weekly, record measured values
- 1x yearly, replace the pretreatment cartridge
- 1x yearly, replace the filter cartridge

Contact Information Thermo Scientific

North America:

USA/Canada +1 866 984 3766 (866-9-THERMO)

Europe:

Austria +43 1 801 40 0, Belgium +32 53 73 42 41, France +33 2 2803 2180,

Germany national toll free 08001-536 376,

Germany international +49 6184 90 6940, Italy +39 02 95059 448,

Netherlands +31 76 579 55 55, Nordic/Baltic/CIS countries +358 9 329 10200,

Russia +7 812 703 42 15, Spain/Portugal +34 93 223 09 18,

Switzerland +41 44 454 12 12, UK/Ireland +44 870 609 9203

Asia:

Australia +61 39757 4300, China +86 21 6865 4588 or +86 10 8419 3588,

India toll free 1800 22 8374, India +91 22 6716 2200,

Japan +81 45 453 9220, New Zealand +64 9 980 6700,

Other Asian countries +852 2885 4613

Countries not listed: +49 6184 90 6940