Reverse Osmosis System

AVRO 125 TS
AVRO 125 TL

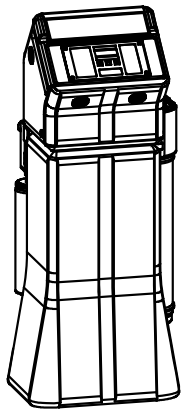


Fig. 1: Reverse osmosis system AVRO 125 TS/TL

Designated application

The reverse osmosis system AVRO 125 TS/TL is designed for the demineralisation of feed water whose composition meets the quality requirements of the TrinkwV (German Drinking Water Ordinance).

Process

The reverse osmosis system AVRO 125 TS/TL works according to the reverse osmosis principle. During the osmosis process, watery solutions of different concentrations are separated by a semi-permeable membrane2). Following the law of nature, the concentrations try to equalise. On the side of the higher initial concentration, the so called “osmotic pressure” is generated. During the reverse osmosis, this “osmotic pressure” is opposed by a higher pressure and as a consequence, the process is reversed. The particular advantage of the reverse osmosis technology compared to other water treatment technologies is the fact that – apart from the removal of dissolved salts – bacteria, germs, particles and dissolved organic matter are reduced as well.

Application limits

- < 22 °dH (39.2 °f, 3.92 mmol/l), no water analysis required
- Free chlorine, not detectable
- Iron < 0.10 mg/l
- Manganese < 0.05 mg/l
- Silicates < 15 mg/l
- Chlorine dioxide, not detectable
- Turbidity < 1 TE/F
- Colloid index < 3
- pH range 3 – 9

If the total hardness is > 22 °dH (39.2 °f, 3.92 mmol/l), or the sulphate concentration is > 250 mg/l, a water analysis is required.

☞ **Note:** The permeate resulting from the reverse osmosis system is not potable but requires additional treatment (blending, salting) in order to be used as drinking water.

Installation requirements

Generally, a drinking water filter as well as a system separator (DK) have to be installed upstream of the reverse osmosis system AVRO 125 TS/TL. If the feed water to be treated contains chlorine, it must pass through an optional activated carbon filter downstream of the softener.

Function

The water is directed to the inlet of the feed water section via the fine filter (filter element[2)]). Then, the water flows to the high pressure pump via the inlet solenoid valve which is followed by a pressure switch for minimum pressure. By means of a control valve, the pressure generated by the pump is reduced to the required operating pressure and the water is directed to the membrane. The membrane separates the water into the partial flows “permeate” and “concentrate”. A partial flow of the concentrate is returned to the feed water by means of a pressure-independent control orifice and thus ensures a steady flow over the membrane and increases the economic efficiency of the reverse osmosis system. At the same time, the concentrate volume flow is directed via an AVRO treatment module[2)] where - due to the applied direct current - seed crystals are formed at the cathode. These crystals are flushed out with the remaining concentrate so that the reverse osmosis membrane is protected against clogging. After each system switch-off (tank full) or in case of disturbances, retained particles are flushed from the membrane by means of the inlet solenoid valve and a solenoid valve which is connected in parallel to the control valve “concentrate”.

The hydraulic build-up of the system is designed to register the concentrate and permeate volumes by means of flow meters and to indicate the values at the controller. The system recovery may also be retrieved at the controller.

[1)] The permeate produced is directed to an opaque supply tank which features a level control with three switching contacts. In order to supply the consumers with permeate, a pressure booster as centrifugal pump made of high performance plastics, incl. pressure switch and membrane expansion vessel are integrated in the system.

Scope of delivery

Basic equipment

Free-standing housing made of opaque PE to receive all aggregates and control elements. The free-standing housing also serves as supply tank[1)].

Microprocessor controller with LCD display, voltage-free collective fault alarm and voltage-free signal contact (maintenance interval, various pre-alarms) installed in free-standing housing.

Sliding-vane rotary pump made of corrosion-proof brass with motor as high pressure pump to supply the membrane, including control valve for operating pressure and pressure gauge.

[1)] External pressure booster system as centrifugal pump with integrated pressure switch and membrane expansion vessel to supply consumers downstream.

Hydro module for the water supply within the membrane system. Integrated valves and measuring instruments for easy system adjustment.

Fine filter with integrated pressure reducer, preset to 2.5 bar.

Flow meter to measure the volume flows permeate and concentrate.

AVRO treatment module installed in a pressure pipe made of pressure-resistant PE.

Ultra-low pressure reverse osmosis membrane[2)], installed in a pressure pipe made of high-strength PE.

Operation manual.

[1)] only AVRO 125 TS

[2)] consumables

Optional accessories

☞ **Note:** Existing systems may be retrofitted with optional components. For additional information, please contact your local Grünbeck representative or the Grünbeck headquarters in Hoechstaedt.

Connection kit for AVRO 125 TS/TL
2 flexible connection hoses DN 15
L = 600 mm) for feed water and permeate, 1 drain hose for concentrate
Order no. 752 830

Connection block for AVRO 125 TS/TL
Connection block (installation length 190 mm – 1“ male thread) chemically nickel-plated with two shut-off valves for installation in the pipe.
Order no. 752 840

Conductivity measurement for AVRO 125 TS/TL
Circuit board to be plugged onto the controller. Indication at the display with limit value and delay, incl. connection line and conductivity measuring cell, installed in the combi-cap pressure pipe.
Order no. 752 820

Solenoid valve for forced withdrawal for AVRO 125 TS/TL
Solenoid valve adaptable at permeate outlet of hydro module for forced withdrawal from AVRO 125 TS/TL tank in case of longer periods of standstill. Electronically triggered by the controller of AVRO 125 TS/TL.
Order no. 752 810

Blending unit for AVRO 125 TS/TL
Control unit adaptable at hydraulic unit of AVRO 125 TS/TL, consisting of: G ¾ connection for feed water, solenoid valve, needle valve, flow sensor to indicate total blending water at the AVRO 125 TS/TL controller, possible connection for blending water in permeate tank of AVRO 125 TS/TL or tank provided by others on site.
Order no. 752 800

Fine filter BOXER K
Cartridge filter for pre-filtration
Order no. 101 205

Euro-system separator GENO-DK 2 Mini
To protect the drinking water from devices and systems that might endanger the drinking water according to DIN 1988 part 4 (DIN EN 1717).
GENO-DK 2 Mini
Order no. 133 100

GENO-activated carbon filter AKF 300
To reduce the chlorine concentration in the water
Order no. 109 150

Additional options

Safety device protectliQ:A20
Safety device for protection against water damage in one and two-family homes.
-For additional types, please inquire-.
Order no. 126 400

Pure water tank for the intermediate storage of unpressurised permeate from GENO reverse osmosis systems
Tank features:
All tanks are pre-assembled, featuring PVC overflow pipe as well as connections for permeate inlet and suction pipe of pressure booster system. Grey PE. Hand hole with removable screw cap and level control system with GENO-Multi Niveau (switching level).

Basic pure water tank RT „sterile“ complete
Net volume approx. 850 l / l 780 / w 990 / total height 2000 mm*.
Order no. 712 400

Additional tank RT for basic pure water tank
Net volume approx. 850 l / l 780 / w 780 / total height 2100 mm*.
Order no. 712 405

Basic pure water tank RT „standard“ Net volume approx. 850 l / l 780 / w 1000/ total height 2050 mm.**
Order no. 712 410

* **Tank height, incl. connecting pieces For larger tanks, please inquire.**

** **Without sterile overflow as siphon – overflow as down-pipe.**

Additional tank without level control and overflow loop, incl. 2 connection lines id = 36 mm.

☞ **Note:** As a maximum, a supply battery consisting of 4 tanks may be realised.

Pressure booster system GENO FU 2/40-1 N 10
Compact, pressure-dependant, speed-controlled pump aggregate, consisting of a centrifugal pump, completely made of stainless steel, as well as a built-in pressure and contact water meter. Control electronics with power switching, back-lit graphic display. Operating switch, operating log via SD card, voltage-free signal/fault signal contact, non-return valve, shut-off valve for each pump (on suction and pressure side), membrane expansion vessel with forced flow.

Delivery rate:	max. 1.2 – 4.2 m³/h
Delivery height	max. 18.2 – 45.6 m
Power supply:	230 V / 50 Hz
Power input	1 kW
Connections:	DN 25 / DN 32
Protection:	IP 55

Order no. 730 640

Pressure booster system GENO FU X2/40-2 N
Description see single pressure booster above, however, featuring the possibility for time – load switchover as well as cascade switchover
Order no. 730 515

General installation instructions

The installation site must offer adequate space. A foundation of sufficient size and load carrying capacity must be provided. The required connections must be provided prior to the installation. For a summary of dimensions and connection data, please refer to the table “Technical Specifications”. The installation of a reverse osmosis system represents a major interference with the drinking water installation and therefore may only be performed by an authorised expert.

Please observe local installation directives and general guidelines

Install a drinking water filter, e.g. BOXER K, upstream of the system.

Install a system separator upstream of the system.

Install an activated carbon filter upstream of the system.

Provide a drain connection (at least DN 50) to discharge the concentrate.

For the power supply, others on site must provide an electrical supply line to the system according to the wiring diagram. This line must be dimensioned according to the system type.

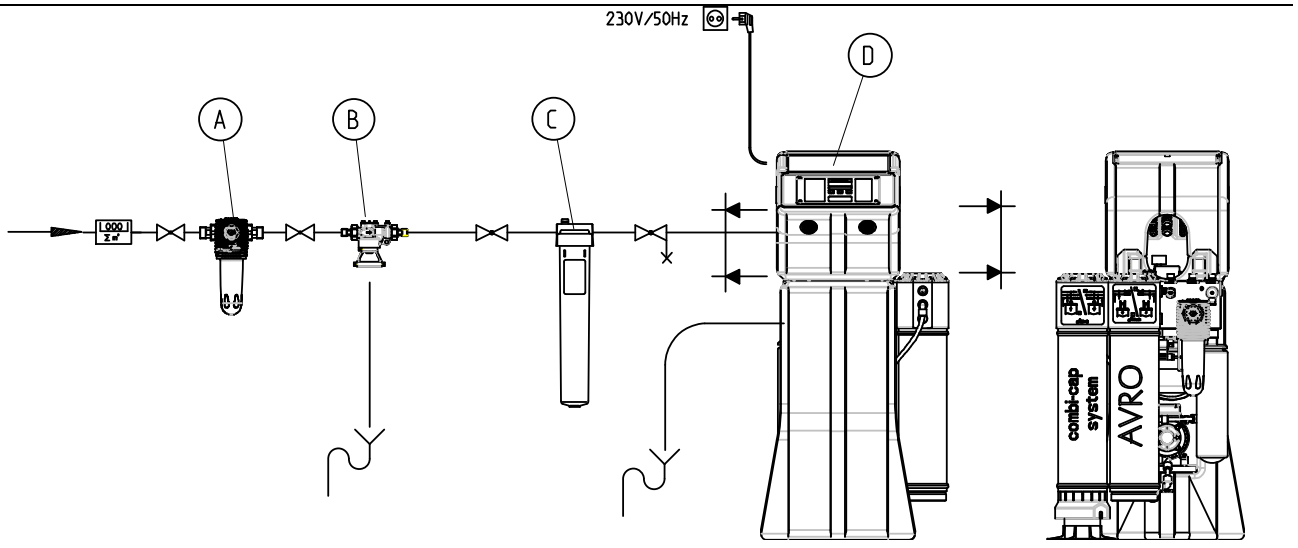
The installation site must have a floor drain. If there is no floor drain, an appropriate safety stop device must be installed.

Floor drains leading towards a lifting system do not work in case of a power failure.

Technical specifications		Reverse osmosis system	
		AVRO 125 TS	**AVRO 125 TL**
Connection data			
Nominal connection diameter for feed water inlet		½“ (DN 15) male thread	
Nominal connection diameter for permeate outlet		½“ (DN 15) male thread	
Nominal connection diameter for concentrate outlet		½“ (DN 15) male thread	
Required drain connection min.		DN 50	
Connected electrical load, approx.	[kW]	0.85	0.5
Power supply	[V/Hz]	230 / 50	
Protection/protection class		IP 54/ ⏚	
Performance data			
Permeate volume at a feed water temperature of 10° C / 15 °C	[l/h]	105/125	
Electrical pump capacity at operating pressure	[kW]	0.37	
Daily permeate volume (max. 24 h) approx. max./min.	[m³/d]	2.5/3.0	
Inlet flow pressure of feed water, min.	[bar]	2.5	
Permeate supply, approx.	[l]	38	-
Pump characteristics of pressure booster system	[l/h/bar]	300 / 3.5 – 1200 / 1.0	-
Nominal pressure		PN 16	
Salt rejection		95 – 99 %	
Total salt concentration in feed water as NaCl max.	[ppm]	1000	
Concentrate volume flow (at 15 °C)	[l/h]	125[1)]	
Feed water volume flow (fresh water 15 °C) at a recovery rate of 50 %, max.	[l/h]	250	
Recovery	[%]	50[1)]	
Dimensions and weights			
Dimensions w x d x h	[mm]	600 x 600 x 1130	
Empty weight, approx.	[kg]	45	38
Operating weight, approx.	[kg]	85	40
Ambient data			
Feed water temperature, min./max.	[°C]	10/30[2)]	
Ambient temperature, min./max.	[°C]	5/35	
Order no.		**752 105**	**752 115**

1) Following a water analysis, the technical customer service can set a higher recovery.

2) For a feed water temperature > 20 °C a separate configuration of the system is required.



Ⓐ BOXER-KD
Ⓑ Euro-system separator DK-2 Mini
Ⓒ Activated carbon filter AKF
Ⓓ AVRO 125 TS/TL

Fig. 2: Installation drawing

☞ Note: In the concentrate and permeate pipe provided by others on site, a feature for the separation of the pipe must be available (e. g. screw connection).