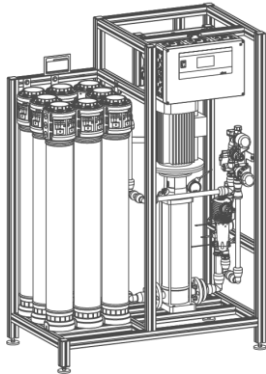
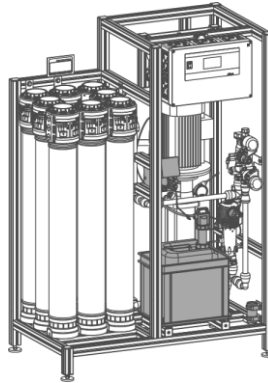


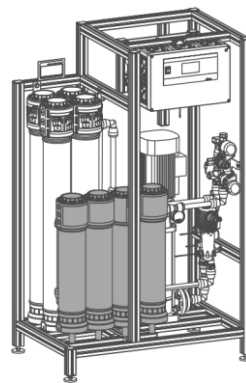
GENO-OSMO-X



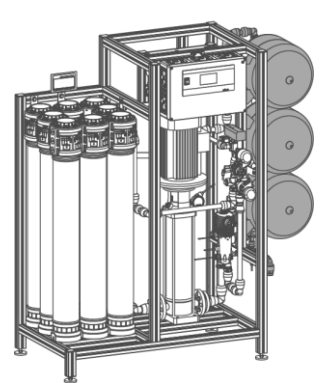
Antiscalant



AVRO



Online-Skid



Reverse osmosis systems GENO-OSMO-X

Intended use

The reverse osmosis system GENO-OSMO-X is designed for the demineralisation of water whose composition complies with the quality requirements of the German Drinking Water Ordinance (TrinkwV).

Application limits

Total hardness	< 0.1 °dH (0.18 °f, 0.018 mol/m³)
Option: Antiscalant	Not limited
Option: AVRO (without water analysis)	< 22 °dH (39.2 °f, 3.92 mol/m³)
Option: AVRO (with water analysis)	> 22 °dH or (sulphate > 250 mg/l)
Free chlorine	not detectable
Iron	< 0.10 mg/l
Manganese	< 0.05 mg/l
Silicate	< 15 mg/l
Chlorine dioxide	not detectable
Turbidity	< 1 NTU
Silt density index	< 3
pH-range	3 – 9

Option: Antiscalant

To protect the reverse osmosis membranes by adding hardness stabilising agents in order to prevent scaling.

Option: AVRO

To protect the reverse osmosis membranes by means of treatment modules installed in the system.

Option: Online skid

For online supply of connected consumers such as humidifiers, air-conditioning systems, etc.

Function

The GENO-OSMO-X system works according to the reverse osmosis principle.

The feed water is directed to the high-pressure pump via an automatic valve and a fine filter with pressure reducer.

A negative pressure switch protects the pump from running dry. The capacity of the high-pressure pump is controlled by a frequency converter in such a way that the permeate capacity is generated subject to the temperature. Via the controller, the permeate capacity can be reduced by up to 25 %.

From the high-pressure pump, the feed water is directed to the reverse osmosis membranes and divided into the partial flows permeate and concentrate. A partial flow of the concentrate is measured by a control valve and (automatically) returned to the feed water.

The remaining concentrate is directed to the drain via a control valve.

The permeate capacity is subject to the temperature and defined at 15 °C.

It decreases by up to 3 % per °C of the feed water temperature.

The permeate capacity is automatically controlled in relation to the temperature. Control via flow meters in the feed water, Feed and permeate. The recovery (concentrate-to-drain) as well as the concentrate recirculation are adapted to the modified permeate capacity.

Option: Antiscalant

Volume-based and dosing-monitored addition of hardness stabilising agents by means of a dosing pump. Depending on the system size, different Antiscalants are used.

Option: AVRO

Seed crystals are generated in the treatment modules. These seed crystals prevent the membranes from clogging.

Option: Online skid

Via a pressure sensor, the supply pressure of the permeate can be set to up to 4 bar at the control unit. For an optimum permeate quality, an initial discharge of permeate can be set.

Design

- High-quality system rack made of anodised aluminium to house all system components
- Levelling feet to compensate for uneven floors
- Ultra-low-pressure reverse osmosis membrane(s), installed in pressure pipe made of high-strength PE
- Pipework between pump and reverse osmosis membrane made of high-pressure resistant PE pipes and PP compression fittings
- High-pressure centrifugal pump made of stainless steel 1.4401
- Fine filter incl. pressure reducer, completely mounted in system inlet
- Power distribution with main switch and automatic circuit breakers as central feed

Fittings

- Three-part hydro block made of red brass, chemically nickel-plated, featuring pressure gauges, adjusting and solenoid valves as well as sampling valves
- Flow meters integrated in the hydro blocks raw water, concentrate and permeate.
- The permeate hydro block features a conductivity measuring cell (temperature-compensated)
- Ventilation device for installation on the concentrate pipe provided by client on site
- Sample valves for feed water and permeate

Control unit

- Touch screen (4.3") to indicate the operating state as well as the system values and single fault signals
- Voltage-free contacts to relay pre-warnings and safety shut-down
- Digital input for priority permeate production at times when electricity tariffs are low (smart metering)
- Fully automatic monitoring and controlling of the system parameter "permeate flow"
- Quality control of permeate via conductivity measurement (4–20 mA) – indicated and monitored by the control unit
- Data logging on integrated SD card
- RTU Modbus included
- Possibility to interconnect systems installed upstream or downstream (water softener, dosing system, permeate tank, pressure booster) and to operate them by remote control
- Voltage-free collective fault signal for transfer to central control station/DDC systems provided by client on site
- Control of recovery, concentrate recirculation and permeate capacity via the pump frequency (subject to the water temperature and the inlet pressure)

Option: Antiscalant

- Step motor pump with suction lance incl. pre-alarm, empty signal, pressure maintaining system, injection valve

Option: AVRO

- Treatment modules

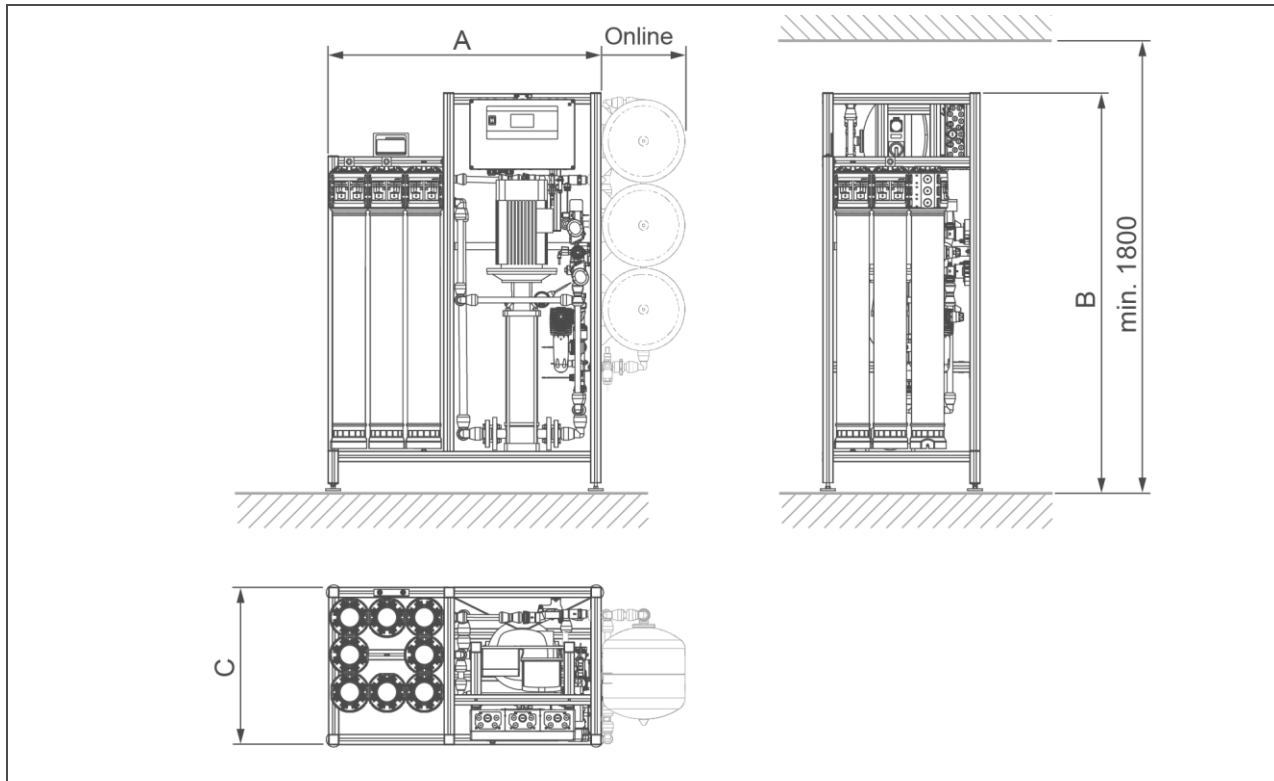
Option: Online skid

- Pressure sensor for supply pressure
- Diaphragm expansion tanks approved for drinking water, in permeate pipe

Scope of supply

- Reverse osmosis system GENO-OSMO-X mounted on a system rack – fully piped internally, wired, workshop-tested and preserved
- Operation manual
- Optionally equipped with:
 - Antiscalant dosing
 - AVRO modules
 - Online skid

Technical specifications I



GENO-OSMO-X									
Dimensions and weights		200	400	800	1200	1600	2200	3000	
A	System width	mm	900	900	900	1035	1035	1170	1170
B	System height	mm	1700	1700	1700	1700	1700	1700	1700
C	System depth	mm	675	675	675	675	675	675	675
Min. room/ installation height		mm	1800	1800	1800	1800	1800	1800	1800
Operating weight, approx.		kg	122	125	147	171	186	267	319

Connection data		200	400	800	1200	1600	2200	3000
Nominal connection diam. Feed water inlet	DN	25 (1" m. thread)	25 (1" m. thread)	25 (1" m. thread)	25 (1" m. thread)	25 (1" m. thread)	32 (1¼" m. thread)	32 (1¼" m. thread)
Nominal connection diam. Permeate outlet	DN	25 (1" male thread)						
Nominal connection diam. Concentrate discharge	DN	25 (1" male thread)						
Min. drain connection without optional AVRO unit	DN	50						
Min. drain connection with optional AVRO unit	DN	50	50	50	100	100	–	–
Power supply	V/Hz	230/400 / 50 – 60						
Phases		3/N/PE						
Max. feed		5.5 kW / C 20 A / 2.5 mm ² (depending on the expansion stage)						

Connection data		200	400	800	1200	1600	2200	3000
Protection/protection class		IP 54/⊕						
Power input at an unpressurised delivery of the permeate into a tank, at a switching frequency of the frequency converter of 8 kHz and a primary pressure in the feed water of 4 bar.								
Recovery 80 %	kW	0.53	0.87	0.94	1.4	1.74	2.10	2.30
Recovery 50 %	kW	0.53	0.88	0.94	1.30	1.60	–	–
Power input in case the permeate is directly delivered to the consumers at a supply pressure of 3.8 bar, at a switching frequency of the frequency converter of 8 kHz and a primary pressure in the feed water of 4 bar.								
Recovery 80 %	kW	0.86	1.44	1.6	2.00	2.31	2.30	2.80
Recovery 50 %	kW	0.81	1.2	1.41	1.90	2.11	–	–

Technical specifications II

Performance data		200	400	800	1200	1600	2200	3000
Permeate capacity at								
Feed water temperature of 10 °C	l/h	170	340	680	1020	1360	1870	2550
Feed water temperature of 15 °C	l/h	200	400	800	1200	1600	2200	3000
Feed water temperature of 15 °C	m³/d	4.8	9.6	19.2	28.8	38.4	52.8	72.0
Inlet flow pressure of feed water	bar	2.5 – 4.0						
Min. outlet pressure of permeate	bar	0.5						
Max. outlet pressure of permeate	bar	4.0 (for option: Online)						
Nominal pressure	PN	16						
Salt rejection	%	95 – 99						
Max. total salt concentration in feed water as NaCl	ppm	1000						
Silt density index (SDI)		< 3						
Recovery (adjustable)	%	50 – 88					68 – 80	
Concentrate volume flow at a recovery of 80 % (15 °C)	l/h	50	100	200	300	400	550	750
Feed water volume flow at a recovery of 80 % (15 °C)	l/h	250	500	1000	1500	2000	2750	3750

General data		200	400	800	1200	1600	2200	3000
Feed water temperature	°C	10 – 30 ¹⁾						
Ambient temperature	°C	5 – 35						
Max. humidity of air (non-condensing)	%	70						
Order no.		750 200	750 210	750 220	750 230	750 240	750 250	750 260

¹⁾ In case of a feed water temperature of > 20 °C, the system must be designed separately.

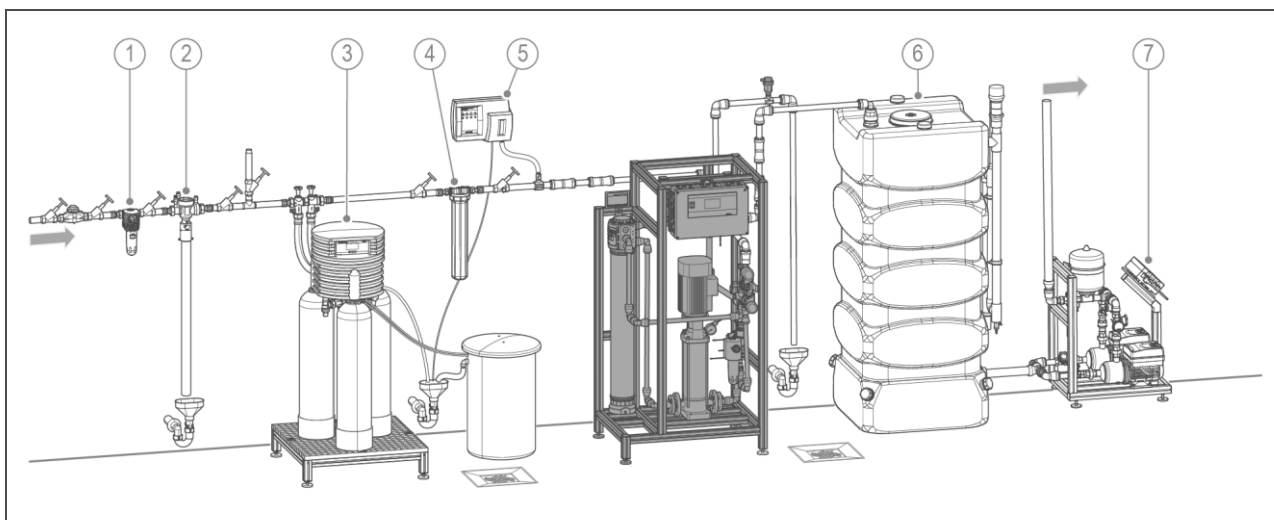
Optional versions

Option 1 Antiscalant without dosing agent		200	400	800	1200	1600	2200	3000
Operating weight, approx.	kg	137	140	162	186	201	282	334
Max. system recovery	%	75						
Order no.		750 346						

Option 2 AVRO module		200	400	800	1200	1600	2200	3000
Operating weight, approx.	kg	137	155	192	216	246	–	–
System recovery	%	50 - 75 (default setting 50 %)						
Order no.		750 341	750 342	750 343	750 344	750 345	–	–

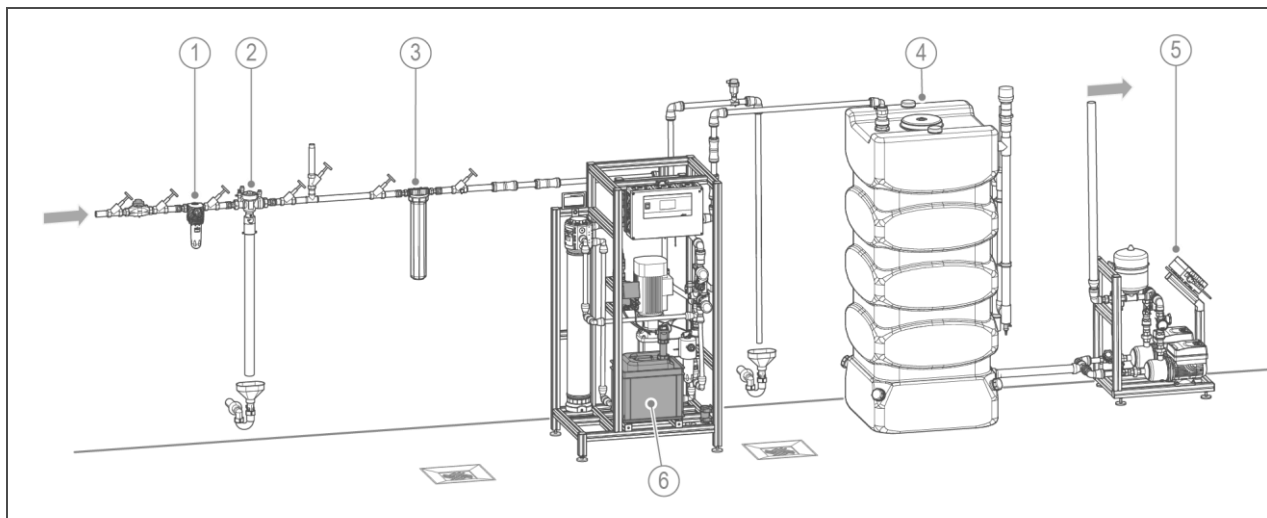
Option 3 Online skid		200	400	800	1200	1600	2200	3000
Operating weight, approx.	kg	147	165	187	241	256	332	384
A System width	mm	1280	1280	1280	1415	1415	1550	1550
Useful volume	l/h	1 x 33	1 x 33	1 x 33	2 x 33	2 x 33	3 x 33	3 x 33
Order no.		750 351	750 351	750 351	750 352	750 352	750 353	750 353

Installation example for GENO-OSMO-X



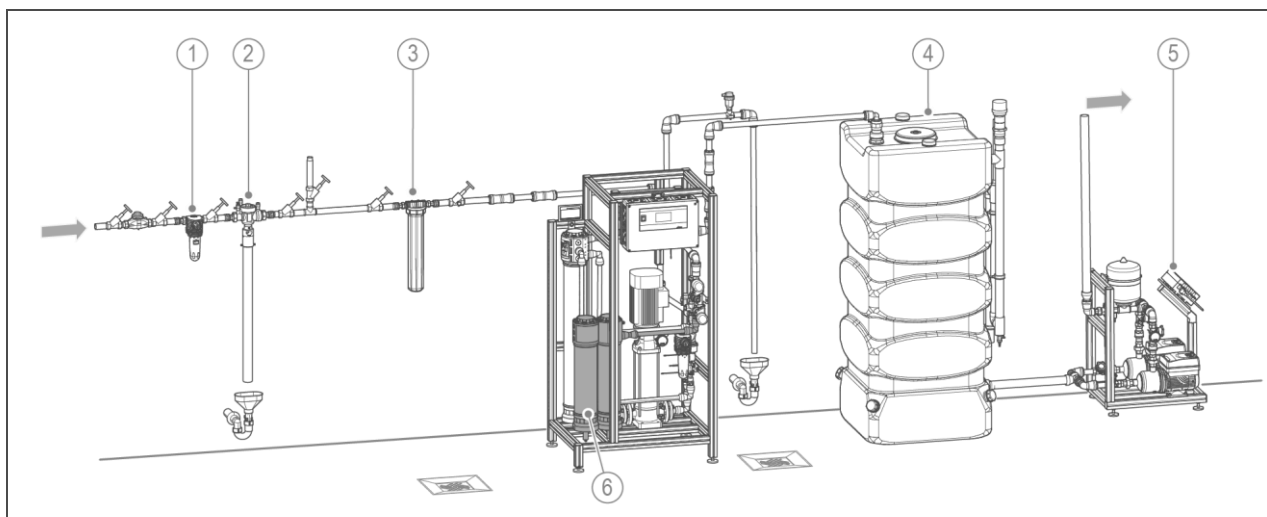
Item	Designation	Item	Designation
1	Drinking water filter (e.g. BOXER KDX)	2	System separator GENO-DK 2
3	Water softener Delta-p-I	4	Activated carbon filter AKF
5	Hardness monitoring device softwatch	6	Pure water tank GT-X with level probe and sterile air filter
7	Pressure booster system GENO FU-X 2/40-2 N		

Installation example for option: Antiscalant



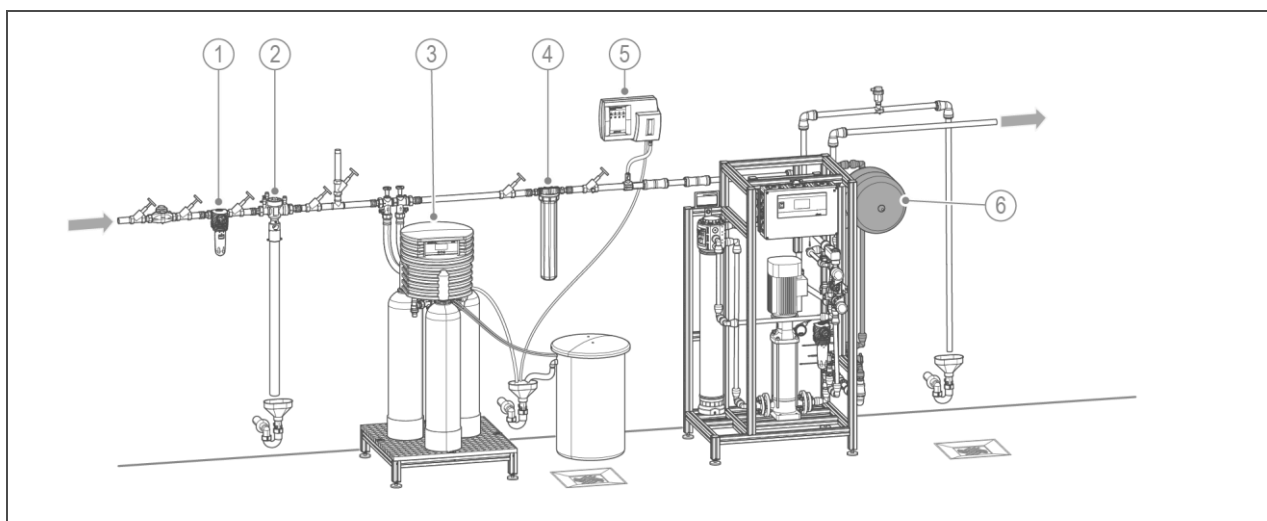
Item	Designation	Item	Designation
1	Drinking water filter (e.g. BOXER KDX)	2	System separator GENO-DK 2
3	Activated carbon filter AKF	4	Pure water tank GT-X with level probe and sterile air filter
5	Pressure booster system GENO FU-X 2/40-2 N	6	Antiscalant dosing

Installation example for option: AVRO



Item	Designation	Item	Designation
1	Drinking water filter (e.g. BOXER KDX)	2	System separator GENO-DK 2
3	Activated carbon filter AKF	4	Pure water tank GT-X with level probe and sterile air filter
5	Pressure booster system GENO FU-X 2/40-2 N	6	AVRO module

Installation example for option: Online skid



Item	Designation	Item	Designation
1	Drinking water filter (e.g. BOXER KDX)	2	System separator GENO-DK 2
3	Water softener Delta-p-I	4	Activated carbon filter AKF
5	Hardness monitoring device softwatch	6	Online skid

Installation requirements

The following components must be installed upstream of the system:

- Drinking water filter and pressure reducer, if required
- Euro system separator
- Activated carbon filter, if required
- A water softener or
- Antiscalant dosing

In order to prevent scaling, it is possible to integrate the patented AVRO technology as an alternative process.

The required connections must be provided prior to the installation of the system.

The feed water inlet pipe and the permeate outlet pipe provided by the client on site must feature a provision to separate the pipes (e.g. a screw connection).

Accessories

Drinking water filter
BOXER KX 1" (80 µm)
Order no. 101 835
BOXER KDX 1"
with pressure reducer
Order no. 101 820

For prefiltration of undissolved impurities.
For larger filters, please inquire.

Euro system separator
GENO-DK 2, DN 15"
Order no. 132 510
GENO-DK 2, DN 20"
Order no. 132 520

To secure devices and systems according to DIN 1717, part 4.
For larger system separators, please inquire.

GENO-activated carbon filter
AKF 600
Order no. 109 160

To reduce the chlorine concentration contained in the water.

Only suitable for GENO-OSMO-X 400.

For other reverse osmosis system different activated carbon filters are required.
For larger activated carbon filters, please inquire.

Water softener

Delta-p-I
Order no. 185 200
GENO-mat duo WE-X 100
Order no. 186 100

To soften the feed water to < 0.1 °dH
For larger systems, please inquire

Hardness monitoring device soft-watch
Order no. 172600000000

For automatic monitoring of the water hardness via limit value indicator

Blending unit
Order no. 750 7xx

To set a certain quality of the blended water (residual conductivity/residual hardness) by blending the permeate originating from a reverse osmosis system with raw or soft water.

Emergency bypass
Order no. 750 75x

An emergency bypass of the reverse osmosis systems might become necessary if the permeate supply in the pure water tank is not sufficient due to peak withdrawals. By means of a level signal in the pure water tank, the solenoid valve with butterfly valve emergency bypass is opened and the water supply ensured.

Basic pure water tank
GT-X 1000 with sterile air filter and level probe
Order no. 712000040000
GT-X 1000 with level probe, sterile overflow not included
Order no. 712000030000

For intermediate storage of permeate flowing unpressurised from reverse osmosis systems.
Useful volume approx. 840 litres
For larger tanks, please inquire.

Additional tank
GT 1000 with sterile air filter
Order no. 712000060000

Useful volume approx. 840 litres

GT 1000 without sterile air filter
Order no. 712000050000

Add-on tank without level control and overflow loop, incl. 2 connecting lines, id = 36 mm.

A maximum of four supply tanks can be combined.

Pressure booster system
GENO-FU-X 2/40-1 N
Order no. 730 640

For low-noise water supply of small or medium-sized water distribution networks in buildings with raw water, softened water and partially demineralised water (permeate) originating from reverse osmosis systems.

GENO-FU-X 2/40-2 N
Order no. 730 641

Same as order no. 730 640, however, with option of time-load switch-over.

Options for control unit

Communication module
Profibus DP
Order no. 750 160

For connection to a Profibus DP "master"

Communication module
BACnet IP

Order no. 750 170

For connection to a BACnet IP "master"

Voltage-free signals
Order no. 750 180

For connection to a building/central control system

Analogue signals 4-20-mA
Order no. 750 185

For connection to a building/central control system

Contact

Grünbeck AG
Josef-Grünbeck-Str. 1
89420 Hoechstädt
GERMANY

☎ +49 9074 41-0

☎ +49 9074 41-100

info@gruenbeck.com
www.gruenbeck.com

