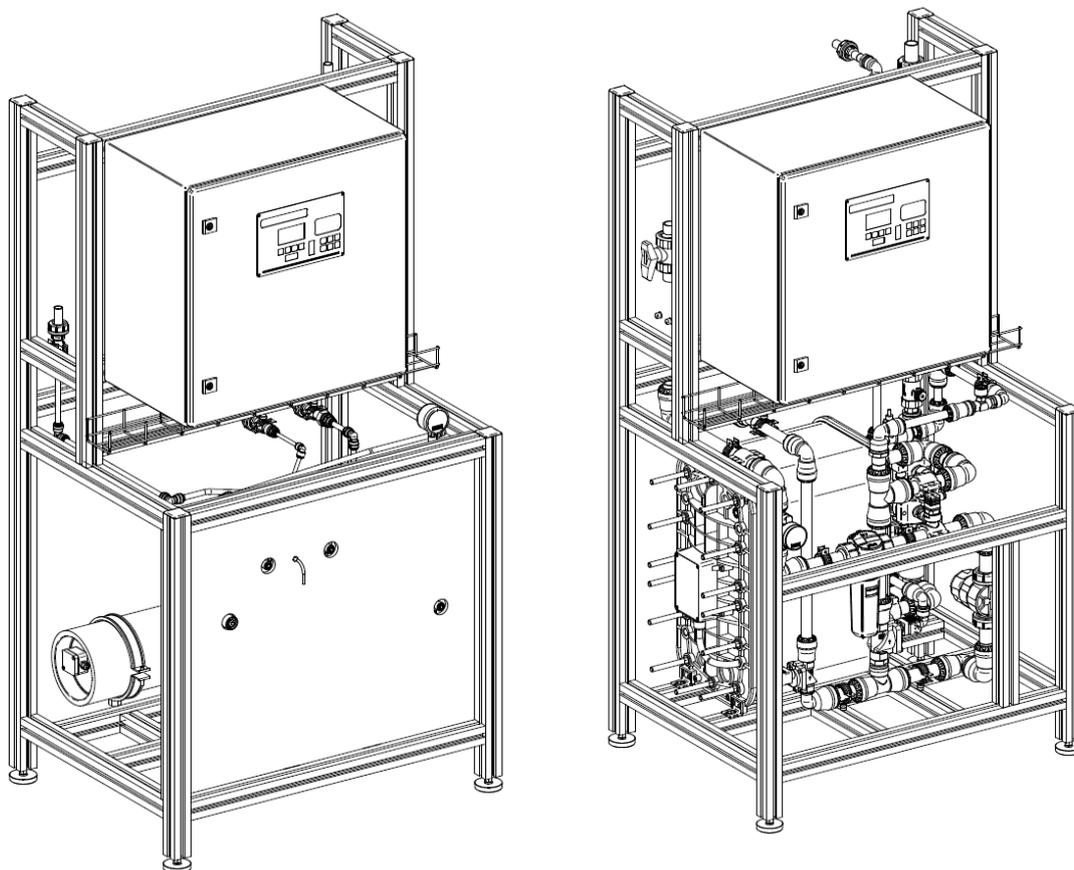


# Operation Manual Electrodeionisation System GENO-EDI-X with GENO-EDI-tronic



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Order no. 770 901-inter\_084

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in accordance with DIN EN ISO 9001,  
DIN EN ISO 14001 and SCC

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## EC Declaration of Conformity

We hereby declare that the system designated below meets the safety and health requirements of the applicable European guidelines in terms of its design, construction and manufacture.

This certificate will become invalid if the system is modified in a way not approved by us.

Manufacturer:	Grünbeck Wasseraufbereitung GmbH Josef-Grünbeck-Str. 1 89420 Hoehstaedt/Germany
Responsible for documentation:	Roland Rehberger
System designation:	Electrodeionisation system GENO-EDI-X
System size:	100, 180, 360, 720, 1100, 1450, 2000, 2700
System number:	Refer to type designation plate
Applicable directives:	Machinery Directive (2006/42/EC) EMC (2014/30/EU)
Applied harmonised standards, in particular:	EN ISO 12100:2011-03, EN 61000-6-2:2016-05 EN 61000-6-3:2011-09

Applied national standards  
and technical  
specifications,  
in particular:

Place / Date / Manufacturer's signature:	Höchstädt, 2020-03-06	p.p.a.	
			P. Höß

Function of signatory:	Head of Technical Systems and Equipment
------------------------	---

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## A General information

### 1 | Preface

Thank you for opting for a Grünbeck product. Backed by decades of experience in the area of water treatment, we provide solutions for all kind of processes.

All Grünbeck systems and devices are made of high-quality materials. This ensures trouble-free operation over many years, provided you treat your water treatment system with the required care. This operation manual assists you with important information. Therefore, please read the entire operation manual before installing, operating or maintaining the system.

Customer satisfaction is our prime objective and providing customers with qualified advice is crucial. If you have any questions concerning this device, possible extensions or general water and waste water treatment, our field service staff, as well as the experts at our headquarters in Hoechstädt, are available to help you.

**Advice and assistance** For advice and assistance please contact your local representative (refer to [www.gruenbeck.de](http://www.gruenbeck.de)).

In case of emergency, please get in touch with our service hot-line at +49 9074 41-333. We can connect you with the appropriate expert more quickly if you provide the required system data.

To ensure that this information is to hand at all times, please keep the precise equipment data to hand (refer to the type plate in chapter C-1).

---

### 2 | How to use this operation manual

This operation manual is intended for the operators of our systems. It is divided into several chapters (a letter is assigned to each of them) which are listed in the table of contents on page 2 in alphabetical order. Check for the corresponding chapter on page 1 in order to find the specific information you need.

The headers and page numbers with chapter information make it easier to find your way around in the operation manual.

### 3 | General safety information

#### 3.1 Symbols and notes

Important information in this operation manual is emphasised by symbols. Please pay particular attention to this information to ensure the hazard-free and safe handling of the system.



**Danger!** Failure to adhere to this information will cause serious or life-threatening injuries, extreme damage to property or inadmissible contamination of the drinking water.



**Warning!** Failure to adhere to this information may cause injuries, damage to property or contamination of the drinking water.



**Caution!** Failure to adhere to this information may result in damage to the system or other objects.



**Note:** This symbol emphasises information and tips that make your work easier.



Tasks with this symbol may only be performed by Grünbeck's technical service/authorised service company or by persons expressly authorised by Grünbeck.



Tasks with this symbol may only be performed by trained and qualified electrical experts according to the VDE guidelines or according to the guidelines of a similar local institution.



Tasks with this symbol may only be performed by water suppliers or approved installation companies. In Germany, the installation company must be registered in an installation directory of a water supplier as per §12(2) AVBWasserV (German Ordinance on General Conditions for the Supply of Water).

#### 3.2 Operating personnel

Only persons who have read and understood this operation manual are permitted to work with the system. Strictly observe the safety information.

#### 3.3 Designated application

The system may only be used for the purpose outlined in the product description (chapter C). The guidelines in this operation manual as well as the applicable local guidelines concerning drinking water protection, accident prevention and occupational safety must be observed.

In addition, intended use also implies that the system may only be operated when it is in proper working order. Any errors must be eliminated at once.

The GENO-EDI-X is exclusively designed for use in the industrial and commercial field.

### 3.4 Protection from water damage



**Warning!** In order to properly protect the installation site against water damage:

- A sufficiently dimensioned floor drain system must be available or
- a water stop device (refer to chapter C “Accessories”) must be installed.



**Warning!** Floor drains that discharge to a lifting system will not work in case of a power failure.

### 3.5 Description of specific dangers

Danger due to electrical energy! → Do not touch electrical parts with wet hands! Disconnect the system from the mains before starting work on electrical system components. Have qualified experts replace damaged cables immediately.

Danger due to mechanical energy! System components may be subject to overpressure. Danger of injury and damage to property due to escaping water and unexpected movement of system components. → Check pressure pipes regularly. Depressurise the system before starting repair or maintenance work on the system.

Hazardous to health due to contaminated drinking water! → The system shall be installed only by a specialist company. Strictly observe the operation manual! Ensure that there is sufficient flow; the relevant guidelines must be followed for commissioning after extended periods of standstill. Inspections and maintenance must be performed at the intervals specified!



**Note:** By concluding a maintenance contract, you ensure that all of the required tasks are performed on time. You may perform the interim inspections yourself.

## 4 | Shipping and storage



**Caution!** The system may be damaged by frost or high temperatures. In order to avoid damage of this kind:

Protect from frost during transportation and storage!  
Do not install or store the system next to objects which radiate a lot of heat.

The system may only be transported and stored in its original packing. Ensure that it is handled with care and placed the right side up (as indicated on the packaging).

---

## 5 | Disposal

- Comply with the applicable national regulations.
- 5.1 Packaging** Dispose of the packaging in an environmentally friendly manner.
- 5.2 Product**  If this symbol (crossed-out wheellie bin) is on the product, this product or its electrical and electronic components must not be disposed of as household waste.
-  Dispose of electrical and electronic products or components in an environmentally sound manner.
- If your product contains batteries or rechargeable batteries, dispose of them separately from your product.
- 
-  For more information on take-back and disposal, go to [www.gruenbeck.com](http://www.gruenbeck.com).
-

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## B Basic information

### 1 | Laws, regulations, standards

In the interest of good health, rules cannot be ignored when it comes to the processing of drinking water. This operation manual takes into consideration the current guidelines and stipulates information that you will need for the safe operation of your water treatment system.

Among other things, the set of rules stipulate that

- only approved specialist companies are permitted to make major modifications to water supply systems
- and that tests, inspections and maintenance on installed devices are to be performed at regular intervals.

### 2 | Water

As a result of dynamic substance and water cycles, increasingly polluting elements are being released into the natural environment. These are only partially and slowly broken down by natural effects. Consequently, these elements build up in the groundwater and surface water over the course of time. Removing them from natural water deposits again represents a particular challenge. Grünbeck faces this challenge with the aim of producing unpolluted drinking and industrial water.

---

### 3 | Functional principle of electrodeionisation

#### 3.1 Functional principle of electrodeionisation

**Function** The electrodeionisation represents a continuous, electrochemical membrane process that combines membrane technology and ion exchanger technology.

In this process, ion exchanger resin, ion-selective membranes and direct current are used to remove ions from the permeate of a reverse osmosis system.

The resulting diluate (ultra-pure water) has a residual conductivity of  $< 0.2 \mu\text{S/cm}$ . The residual conductivity depends on the quality of the feed water (permeate).

The advantage of this technology is the fact that the regeneration (by means of direct current) continuously takes place during operation and no chemicals (acids/bases) are required.

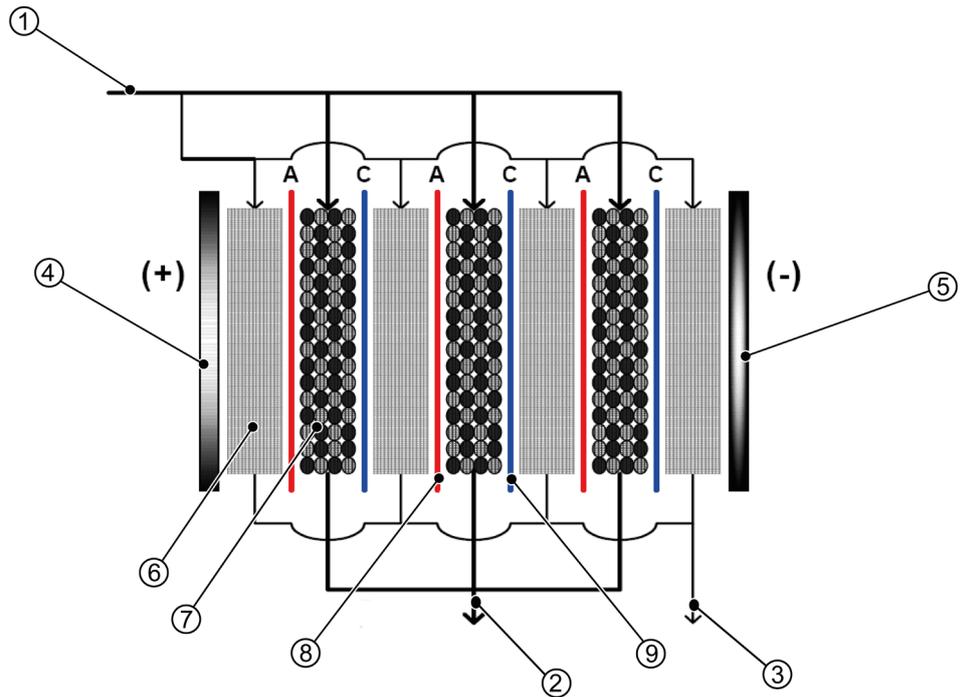
The core – the EDI module – consists of several chambers filled with layers of anion and cation exchanger resins. The chambers are separated from each other by anion and cation membranes.

The feed water (permeate) flows into the EDI module and is divided into a diluate, concentrate and electrolyte water flow. Due to the direct voltage applied, the ions move from the diluate chambers filled with ion exchanger resin to the concentrate chambers that are also filled with ion exchanger resin. While the water in the diluate chambers is being fully demineralised, the direct current splits the water into hydrogen ions ( $\text{H}^+$ ) and hydroxide ions ( $\text{OH}^-$ ) by which in turn the ion exchanger resins are regenerated again.

A part (10 %) of the feed water volume (permeate) rinses the concentrate and the electrode chambers. The volume designated as concentrate (unpressurised) is then either directed to the drain or returned to the inlet of the reverse osmosis system to be fed again.

The electrodeionisation system GENO-EDI-X has a recovery of 90 - 95 %.

## 3.2 Components of the electrodeionisation module (EDI module)



- |   |  |   |  |
|---|--|---|--|
| ① | Feed water inlet (permeate)              | ② | Diluate outlet                               |
| ③ | Concentrate outlet                       | ④ | Anode (+)                                    |
| ⑤ | Cathode (-)                              | ⑥ | Concentrate chamber with ion exchanger resin |
| ⑦ | Diluate chamber with ion exchanger resin | ⑧ | Anion membrane (A)                           |
| ⑨ | Cation membrane (C)                      |   |  |

## C Product description (GENO-EDI-X)

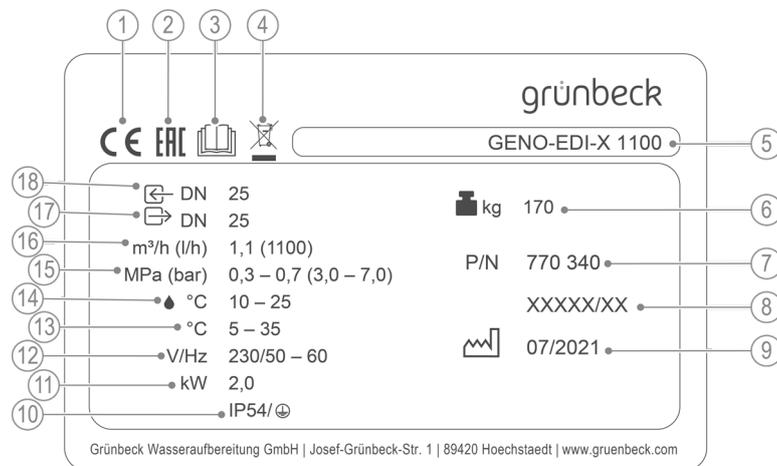
### 1 | Type designation plate

Please specify the data shown on the type designation plate of your GENO-EDI-X electrodeionisation system in order to speed up the processing of enquiries or orders. Please add the necessary information to the overview below to have it readily available whenever necessary.

**Electrodeionisation system GENO-EDI-X:**

**Serial number:**

**Order number:**



- |   |  |   |   |
|---|--|---|---|
| ① | CE mark  | ② | EAC mark  |
| ③ | Obey the operation manual                                  | ④ | Disposal information                                |
| ⑤ | Product designation  | ⑥ | Operating weight                                    |
| ⑦ | Order no.  | ⑧ | Project no.   |
| ⑨ | Manufacturing date   | ⑩ | Protection/Protection class                         |
| ⑪ | Connected load   | ⑫ | Power supply  |
| ⑬ | Ambient temperature  | ⑭ | Feed water temperature                              |
| ⑮ | Inlet flow pressure of feed water                          | ⑯ | Diluate capacity at feed water temperature of 15 °C |
| ⑰ | Nominal connection diameter of diluate/ concentrate outlet | ⑱ | Nominal connection diameter of feed water inlet     |

Fig. C-1: Type plate of electrodeionisation system GENO-EDI-X

## 2 | Flow chart design

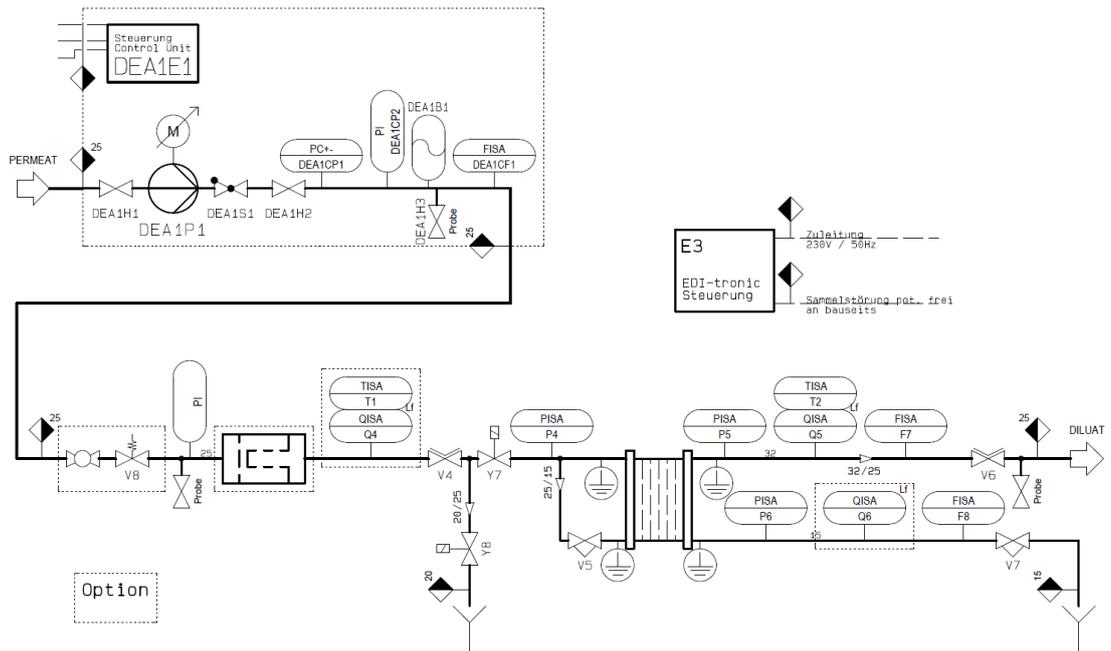


Fig. C-2: Flow chart of GENO-EDI-X

## 3 | Basic function of the electrodeionisation system GENO-EDI-X (without options)

The following sequence describes a standard circuit where a reverse osmosis system is installed upstream of the electrodeionisation system.

If the electrodeionisation system is in standby mode and ready for operation, the feed water rejection valve Y8 is open and the feed water valve Y7 is closed.

No voltage is present at the EDI module.

If the filling level in the diluate tank decreases, a request signal is transmitted to the controller of the electrodeionisation system by means of level control L4.

Then, the EDI controller sends a start signal to the control unit of the reverse osmosis system, which in turn starts operation and produces permeate to supply the electrodeionisation system.

In the electrodeionisation system, the feed water rejection valve Y8 initially discharges the generated permeate (feed water) to the drain for a limited time.

After the rejection time has elapsed, the feed water valve Y7 opens and the feed water rejection valve Y8 closes.

The permeate (feed water) flows into the EDI module which is supplied with voltage.

The diluate produced flows from the EDI module to the diluate tank installed downstream. The generated concentrate is directed to the sewage system.

The electrodeionisation system is now in operation and the EDI controller monitors the parameters below:

- Pressure of feed water (permeate)
- Pressure, flow volume, conductivity and temperature of the diluate
- Pressure and flow volume of concentrate
- Differential pressure of diluate/concentrate

Deviations from the operating setpoints lead to warning messages or to fault messages with standstill of the electrodeionisation system, depending on the pre-setting.

When, based on the make-up water feed, the filling level in the diluate tank reaches the switch-off level, level control L4 generates a stop signal and sends it to the control unit of the electrodeionisation system, which in turn switches off the voltage supply of the EDI module.

In addition, the feed water rejection valve Y8 opens, the feed water valve Y7 closes, and a stop signal is sent to the reverse osmosis system installed upstream.

The electrodeionisation system remains in standby mode until the next request is made.

\*Diluate = deionate, ultra-pure water

## 4 | Description of the components

①	V4	Adjusting valve Operating pressure <b>(OPTION)</b>	To restrict the feed water inlet (permeate) in case of excess capacity from on-site feed pumps. Not required for agreed-upon RO/EDI system combinations.
②	V5	Adjusting valve Concentrate volume	For the adjustment of the concentrate volume conducted to the drain. This value corresponds with 10% of the permeate feed value.
③	V6	Adjusting valve Diluate pressure	For the adjustment of the diluate counter-pressure.
④	V7	Adjusting valve Concentrate pressure	For the adjustment of the concentrate pressure to the diluate pressure.
⑤	V8	Pressure reducing valve Permeate <b>(OPTION)</b>	Reduces feed water pressures (permeate) that are too high and minimises pressure fluctuations Setting value: 3 – 4 bar
⑥	Pr-P	Sample valve of feed water (Permeate)	Possibilities of manual quality determination via sample valve.
⑦	Pr-D	Sample valve of diluate	Possibilities of manual quality determination via sample valve.
⑧	F7	Flow sensor of diluate	Registers the permeate quantity and sends pulses to the control electronics. Visual indication of the diluate quantity in the control electronics. If the minimum flow of the diluate is undershot, an error is emitted. → GENO-EDI-X system STOP
⑨	F8	Flow sensor Concentrate	Registers the concentrate volume and sends pulses to the control electronics. Visual indication of the concentrate volume in the control electronics. If the minimum flow of the concentrate is undershot, an error is emitted. → GENO-EDI-X system STOP
⑩	P4	Permeate pressure sensor (feed water)	When the set minimum permeate pressure is undershot, the GENO-EDI-X system STOP takes place with a time delay. Visual indication in the control electronics.
⑪	P5	Pressure sensor Diluate	Indicates the diluate pressure in the control electronics. P5 must be at least 0.2 bar higher than P6! The alarm signal takes place with a time delay when the concentrate pressure P6 is higher than/equal to the diluate pressure P5. → GENO-EDI-X system STOP
⑫	P6	Concentrate pressure sensor	Indicates the concentrate pressure in the control electronics. P5 must be at least 0.2 bar higher than P6! The alarm signal takes place with a time delay when the concentrate pressure P6 is higher than/equal to the diluate pressure P5. → GENO-EDI-X system STOP

⑬	Y7	Feed water valve Permeate	Always open during diluate production. Opens after an adjustable time interval (feed water rejection). (Option: Opens after feed water rejection if the conductivity measured by Q4 is < 20 µS/cm.) Locked in case of errors in the GENO-EDI-X system. Visual indication in the control electronics.
⑭	Y8	Feed water rejection valve Permeate	Is open for an adjustable time after start of EDI. (Option: Closes after start of EDI if the conductivity measured by Q4 is < 20 µS/cm.) Closes after feed water rejection. Visual indication in the control electronics.
⑮	Y9	Outlet solenoid valve Diluate <b>(OPTION)</b>	Opens after diluate rejection from Y10 if the conductivity limit value for diluate is undershot. Closes after GENO-EDI-X system STOP, locked in case of errors in the GENO-EDI-X system. Visual indication in the control electronics.
⑯	Y10	Outlet rejection valve Diluate <b>(OPTION)</b>	Opens after GENO-EDI-X system START and closes when the conductivity limit value for diluate is undershot. Visual indication in control electronics.
⑰	Q4	Conductivity measuring cell of permeate (feed water) <b>(OPTION)</b>	Indicates the quality of the feed water (permeate) in the control electronics. Enables quality-controlled feed water rejection. Y8 CLOSED and Y7 OPEN if the set conductivity limit value is undershot. Visual alarm signal in the control electronics when the set conductivity limit value is exceeded. → GENO-EDI-X system STOP.
⑱	Q5	Conductivity measuring cell of diluate	Indicates the quality of the diluate in the control electronics. Enables quality-controlled diluate rejection. Y10 CLOSED and Y9 OPEN if the set conductivity limit value is undershot. Visual alarm signal in the control electronics when the set conductivity limit value is exceeded. → GENO-EDI-X system STOP.
⑲	Q6	Conductivity measuring cell Concentrate <b>(OPTION)</b>	Indicates the quality of the concentrate in the control electronics.
⑳	T1	Permeate temperature sensor (feed water) <b>(OPTION)</b>	Indicates the temperature of the feed water (permeate) in the control electronics. → Y8 CLOSED and Y7 OPEN if the set temperature value is exceeded. Visual alarm signal in the control electronics when the set limit value is exceeded. → GENO-EDI-X system STOP.
㉑	T2	Diluate temperature sensor <b>(OPTION)</b>	Indicates the temperature of the diluate in the control electronics. → Y9 CLOSED and Y10 OPEN if the set temperature value is exceeded. Visual alarm signal in the control electronics when the set limit value is exceeded. → GENO-EDI-X system STOP.

②②	M8/ P8/ P9	Permeate feed pump (feed water) Frequency-controlled <b>(OPTION)</b>	Increases the feed pressure of the permeate (feed water). Permeate pump M8 START through min. pressure contact P8. Permeate pump M8 STOP through max. pressure contact P8. Alternatively, M8 is operated using pressure sensor P8 in a frequency-controlled manner. M8 release always provided in case of feed water valve Permeate Y7 OPEN. M8 is locked in case of min. pressure switch P9 (min. pressure). Visual alarm signal on the frequency converter and in the control electronics. ➔ GENO-EDI-X system STOP.
②③	L4	Level control system of diluate tank	Visual indication in the control electronics. L4a+ full signal, GENO-EDI-X system STOP L4b- request, GENO-EDI-X system START L4c- additional and emergency feed <b>(option)</b> L4d± empty signal, dry-run protection for PBS pump M6/M7, time-delayed release for PBS pump M6/M7 in case level is exceeded
②④	M6/ M7/ P7	Pressure booster system Diluate pressure switch <b>(OPTION)</b>	Visual indication in the control electronics. Actuated by the pre-selector (H-O-A) in the control electronics. Pressure switch with min. and max. pressure contact. In case of automatic operation: - M6/M7 ON via min. pressure contact of P7 - M6/M7 OFF via max. pressure contact of P7 - Time-controlled changeover operation of pumps M6/M7. M6/M7 re locked in case of dry-run protection L4d. Visual alarm signal in control electronics.

**5 | Technical specifications**

Table C-1: Technical specifications		GENO-EDI-X							
		100	180	360	720	1100	1450	2000	2700
<b>Connection data</b>									
Nominal connection diameter of feed water inlet pipe (screw connection)		DN 15			DN 25				
Nominal connection diameter of diluate outlet line (screw connection)		DN 15			DN 25				
Nominal connection diameter of concentrate outlet line (screw connection)		DN 15			DN 15				
Min. drain connection required		DN 50							
Connected load	kW/A/mm <sup>2</sup>	2.0 / 16 / 1.5							
Power supply	V/Hz	1x 230 / 50 – 60							
Protection type / Protection class		IP 54 / ⊕							
<b>Performance data</b>									
Feed water volume flow (nominal)	l/h	110	200	400	800	1200	1600	2200	3000
Diluate capacity at a feed water temperature 15°C and a recovery of approx. 90 % (nominal)	l/h	100	180	360	720	1100	1450	2000	2700
Concentrate volume flow at a recovery of approx. 90% (nominal)	l/h	10	20	40	80	100	150	200	300
Diluate capacity max.****	l/h	150	300	600	1000	1350	2100	2600	3750
Min. diluate flow*** required	l/h	62,5	125	250	550	550	1100	1100	1400
Min. required flow of concentrate***	l/h	10	20	40	40	40	65	65	85
Operating voltage	V-DC	≤ 106	≤ 213	≤ 426	≤ 67	≤ 67	≤ 120	≤ 120	≤ 160
Operating current	A	≤ 2.5	≤ 2.5	≤ 2.5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5
Max. volume flow of hydrogen gas	l/h	1,12			2,24				
Inlet flow pressure of permeate, min./max.	bar	2/5			3/7				
Outlet pressure of diluate, approx.	bar	0.5/1.5							
Max. operating pressure	bar	5			7				
Feed conductivity equivalent (FCE)**, max.	µS/cm	40							
Diluate conductivity*	µS/cm	< 0.2							
SiO <sub>2</sub> reduction		90 - 99							
Recovery***		90 - 93			90 - 95				
<b>Dimensions and weights</b>									
Dimensions (w x h x d)	mm	900 x 1700 x 675							
Min. room/installation height required	mm	2000							
Operating weight, approx.	kg	95	105	115	170	170	190	190	215
<b>Ambient data</b>									
Temperature of feed water, min./max.	°C	10/25							
Ambient temperature, min./max.	°C	5/35							
<b>Order no.</b>		<b>770 300</b>	<b>770 310</b>	<b>770 320</b>	<b>770 330</b>	<b>770 340</b>	<b>770 350</b>	<b>770 360</b>	<b>770 370</b>

\* Subject to the feed water quality

\*\* For calculation, refer to the formula under "Application limits"

\*\*\* These volume flows must be considered as the absolute minimum for the flow rates of the EDI module!

\*\*\*\* In case of maximum recoveries of 93 and/or 95 %, the following shall further apply with regard to the feed water specification:

CaCO<sub>3</sub> < 0.02 ppm and SiO<sub>2</sub> < 0.5 ppm

## 6 | Intended use

The electrodeionisation system GENO-EDI-X is designed for the further quality enhancement of permeate generated by a reverse osmosis system.

The most common areas of application for the diluate produced (ultra-pure water) are:

- Steam sterilisation
- Semi-conductor industry
- Generation of pure steam
- Laboratories

The system can be used only after a prior water analysis and corresponding pretreatment.

The continuous diluate output of the system is subject to the temperature and is defined at 15°C. The diluate outputs can fall (falling temperature) or rise (rising temperature) by up to 3 % for each °C the raw water temperature increases or decreases.

Only operate the system if all components are properly installed. Safety devices must NEVER be removed, bridged or otherwise tampered with.

Appropriate application of the device also implies that the information contained in this operation manual and all safety regulations applying at the installation site be observed. Furthermore, the maintenance and inspection intervals have to be observed.

### 6.1 | System shutdown

During decommissioning of the GENO-EDI-X system, the necessary measures must be decided upon together with Grünbeck's technical service.

## 7 | Application limits

Conductivity equivalent FCE*: (CO <sub>2</sub> included)	< 40 µS/cm
Range of pH value:	4 – 11
Cl <sub>2</sub> concentration:	< 0.02 ppm
Fe concentration:	< 0.01 ppm
Mn concentration:	< 0.01 ppm
Sulphide concentration:	< 0.01 ppm
Concentration of residual hardness (CaCO <sub>3</sub> ):	< 1.0 ppm ( <sup>^</sup> 0.056 °dH)
TOC concentration	< 0.5 ppm
Silicate concentration (SiO <sub>2</sub> ):	< 1.0 ppm
Water temperature:	10 – 25°C

\*FCE = permeate conductivity + (ppm CO<sub>2</sub> x 2.79)  
+ (ppm SiO<sub>2</sub> x 2.04)



**Note:** The diluate from GENO-EDI-X system is not drinking water!

\*For the determination of this value, the formulae in section E, chapter 1 must be used!

## 8 | Scope of supply

### 8.1 Standard equipment

Device that is ready for connection for the continuous, electrochemical, residual demineralisation of permeate originating from a reverse osmosis system, completely pre-assembled to an anodised aluminium system rack.

- Microprocessor controller with LCD graphic display (70 x 38 mm backlit) Flow chart of the electrodeionisation system with collection tank including level control, pressure booster system for diluate as well as indication of the flow, pressure and conductivity values of the electrodeionisation system.

Version: Membrane keyboard with 12 buttons and serial interface RS 232, system piping within the electrodeionisation system equipped with pressure sensors, adjusting and/or solenoid valves, as well as sampling fittings. Integrated flow sensors to monitor the volume flows diluate and concentrate. The switch cabinet features all power units as well as the control electronics. Quality assurance of diluate by means of temperature-compensated conductivity measurement with digital indication at the display of the control electronics Piping within the system completely made of high-pressure resistant PE plastic pipes.

- EDI module as the main core of process engineering.
- Installation and operation manual.

**8.2 Optional features**



**Note:** It is possible to retrofit existing systems with optional components. Please contact your local Grünbeck field service staff or Grünbeck's headquarters in Hoechstädt for more information.

<b>GENO-EDI-Profibus DP</b>	770 860
Module to provide system data	
<b>GENO-EDI voltage-free single fault signals for DDC/central building and control system</b>	770 855
Module for single fault signals (voltage-free) to control centre	
<b>Quality-controlled permeate rejection</b>	770 800
Rejection of feed permeate in the inlet to the electrodeionisation system (conductivity-controlled)	
<b>Analogue outputs (4-20 mA) for conductivity and diluate temperature</b>	770 810
Module for outputting measuring values to control centre	
<b>Quality-controlled diluate rejection</b>	
Rejection of diluate prior to filling the pure water tank (conductivity-controlled)	
For GENO-EDI-X 100 through 360	770 815
For GENO-EDI-X 720 through 2700	770 875
<b>Measuring of conductivity and temperature of EDI concentrate</b>	770 805
Module to measure the conductivity / temperature in the EDI concentrate (waste water) in the feed water	
For GENO-EDI-X 100 through 360	
For GENO-EDI-X 720 through 2700	770 870
<b>GENO membrane degassing system MEC 500-1 (single-stage)</b>	770 200
For removing CO <sub>2</sub> from the feed water (permeate) of the electrodeionisation system	
Flow volume of feed water: 0.1 – 0.7 m <sup>3</sup> /h	
Amount of stripping gas* required: 0.2 – 1.8 Nm <sup>3</sup> /h	
<b>GENO membrane degassing system MEC 500-2 (2-stage)</b>	770 205
For removing CO <sub>2</sub> from the feed water (permeate) of the electrodeionisation system	
Flow volume of feed water: 0.1 – 0.7 m <sup>3</sup> /h	
Amount of stripping gas* required: 0.4 – 3.6 Nm <sup>3</sup> /h	

<p><b>GENO membrane degassing system MEC 2200-1 (single-stage)</b> For removing CO<sub>2</sub> from the feed water (permeate) of the electrodeionisation system Flow volume of feed water: 0.5 – 3.41 m<sup>3</sup>/h Amount of stripping gas* required: 0.8 – 5.1 Nm<sup>3</sup>/h</p> <p><b>GENO membrane degassing system MEC 2200-2 (two-stage)</b> For removing CO<sub>2</sub> from the feed water (permeate) of the electrodeionisation system Flow volume of feed water: 0.5 – 3.41 m<sup>3</sup>/h Amount of stripping gas* required: 1.6 – 10.2 Nm<sup>3</sup>/h</p> <p><b>GENO membrane degassing system MEC 5000-1 (single-stage)</b> For removing CO<sub>2</sub> from the feed water (permeate) of the electrodeionisation system Flow volume of feed water: 1.0 – 5.0 m<sup>3</sup>/h Amount of stripping gas* required: 5.0 – 14.0 Nm<sup>3</sup>/h</p>	<p>770 210</p> <p>770 215</p> <p>770 250</p>
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\*Stripping gas = oil-free, compressed air

**Pure water tank for intermediate storage of the diluate flowing unpressurised from the GENO-EDI-X electrodeionisation systems**

**Tank version:**

All tanks are pre-assembled, with PVC overflow pipe as well as connections for the inlet, diluate and the suction line of the pressure booster system. Grey PE. Hand-hole with removable screw cap. Level probe for installation into the tank, electrically connected to GENO-EDI-tronic controller.

<p><b>Basic clean water tank GT-X 1000 with sterile filter and level measuring probe</b> Net volume approx. 1000 litres L 860 / W 960 / total H 2200 mm<sup>1)</sup>.</p> <p><b>Additional tank GT 1000 with sterile filter</b> Net volume approx. 1000 litres L 860 / W 800 / total H 2200 mm<sup>1)</sup>.</p>	<p>712000 040000</p> <p>712000 060000</p>
--	---

<sup>1)</sup> Tank height including connecting pieces.

**For larger tanks, please inquire**

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



**Note:** A maximum of four supply tanks can be combined.

<b>CO<sub>2</sub> trap for pure water tank</b>	712 800
For the removal of free carbon dioxide from the tank's ventilating air.	
For larger CO <sub>2</sub> traps, please inquire	
<b>Pressure booster system</b>	730 790
<b>GENO-FU-X 2/40-1 NE</b>	
Compact, pressure-controlled pump aggregate consisting of a centrifugal pump completely made of stainless steel as well as an integrated pressure and flow meter for pump control and dry-run protection. Special version for the delivery of diluate.	
Delivery rate: Max. 1.2 - 4.4 m <sup>3</sup> /h	
Delivery head: max. 26.7 - 59.4 m	
Power supply: 230 V / 50 Hz	
Power consumption: 1.07 kW	
Connections: DN 25 / 1"	
Protection type: IP 55	
<b>Pressure booster system</b>	730 791
<b>GENO-FU-X 2/40-2 NE</b>	
Description as for single pressure booster system, however, with the possibility for time-load switch-over.	
For larger systems, please inquire	

### 8.3 Wearing parts

Seals and valves are subject to a certain wear and tear. Wearing parts are listed below.



**Note:** Although these parts are wearing parts, we grant a limited warranty period of 6 months. The same applies to electrical components.

Solenoid valves, adjusting valves (operating pressure, concentrate volume, concentrate pressure, diluate pressure), sample valves and water meters

## D Installation

### 1 | General installation information

The installation site must offer adequate space. For installation and service work, sufficient clearance (> 80 cm, > 20 cm from the wall) must be provided around the system. A foundation of a sufficient size and adequate load carrying capacity must be provided.

The required connections must be provided prior to the installation of the system. For dimensions and connection data, please refer to the table "Technical specifications".

The installation of an electrodeionisation system represents a major interference with the drinking water system. Therefore, only approved installation companies may install such systems.

Observe local installation guidelines and general regulations.

In order to achieve the feed water quality for the electrodeionisation system as per chapter C7, suitable pretreatment stages such as indicated in chapter D3/fig. D-1, for instance, must be provided.

A drain connection (at least DN 50) to discharge the concentrate must be available!

For the electrical connection, a feed line to the system must be provided on site according to the electric circuit diagram. This line must be dimensioned according to the system type.

The installation site must have a floor drain. If no floor drain is available, an adequate safety device needs to be installed.



**Warning!** Floor drains that discharge to a lifting system do not work in case of a power failure.



**Warning!** Leakage of hydrogen gas

- ⇒ Comply with the maximum volume flow of hydrogen gas (refer to Technical specifications).
- ⇒ Make sure that there is sufficient ventilation.

#### 1.1 Preliminary work

1. Safe unloading/placing of the system.
2. Unpacking of the system/system components.
3. Check of the system for any damage.
4. Erection of the electrodeionisation system.
5. Check of the mechanical and electrical connections; these connections might have to be retightened after transport.



**Note:** When installing systems with optional features, also observe any additional operation manuals.

## 2 | Water connection

Certain binding rules must always be observed when installing the electrodeionisation system. Additional recommendations are given in order to facilitate the handling of the system.

### **Mandatory regulations**

---



The installation of the electrodeionisation system may be performed by an approved installation company only.

- 
- Observe local installation guidelines and general regulations.
- 



**Note:** If the concentrate is directed to a lifting system, the delivery rate of the lifting system must be > 500 l/h.

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**Note:** If the waste water of the electrodeionisation system is directed to a lifting system, said lifting system must be dimensioned in a way that it can pump out the type-specific feed water volume (refer to table C-1/Technical specifications).

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**Warning!** At the installation site, you must ensure that the depressurised waste water can flow off to the drain without obstruction.

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**Warning!** The installation site must have an adequate exchange of air!

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### 3 | How to connect the system

- Remove the protective caps from system's feed water (= permeate), diluate and concentrate-to-drain connections
- Connect the feed water (= permeate).
- Connect the concentrate to drain according to DIN 1988.
- Establish the connection between diluate outlet and diluate tank.
- Mount CO<sub>2</sub> trap to vent the diluate tank

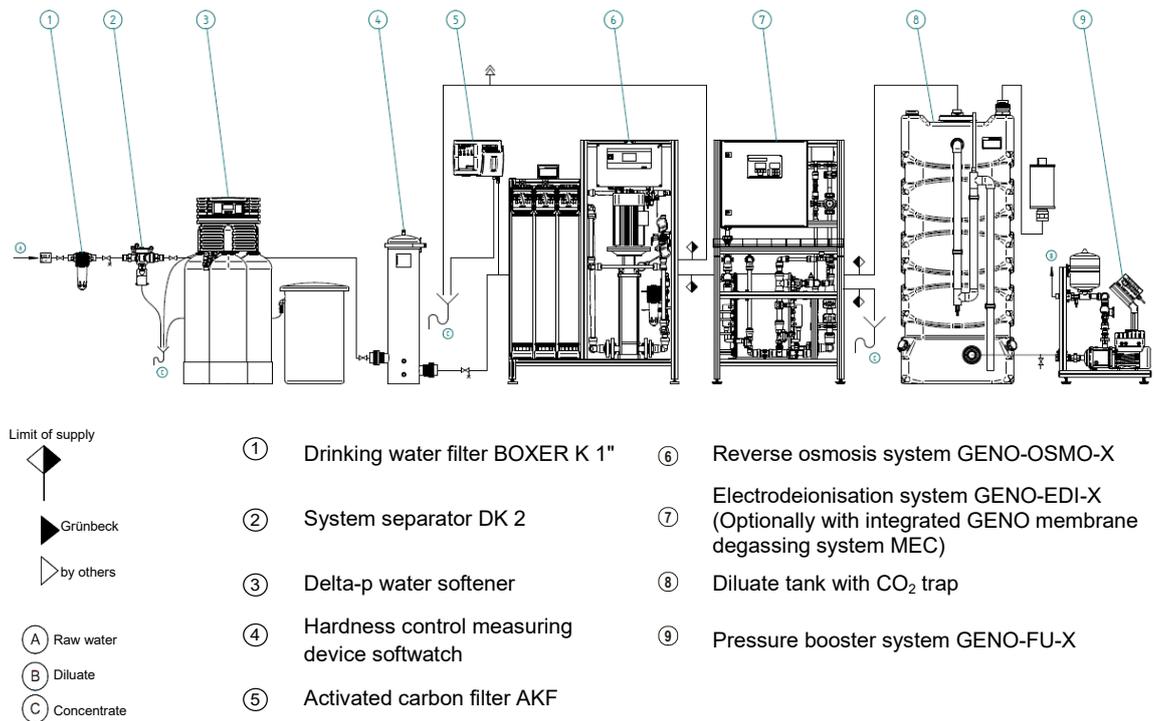


Fig. D-1: Installation drawing



**Note:** In the feed water (= permeate), concentrate and diluate pipes provided by others on site, separable connections must be present (e.g. screw connections) to be able to separate the pipes.



**Note:** The feed water (= permeate), diluate and concentrate pipes have to be made of corrosion-proof material.

## 4 | Electrical wiring



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**Note:** The pertinent electric circuit diagrams are located separately in the switch cabinet of the GENO-EDI-X system. The power feed line dimensions can be found there.

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1. For the electrical connection, a supply line to the system must be provided on site according to the electric circuit diagram. This line must be dimensioned according to the system type.
2. Wire the level control of the collection tank according to the electric circuit diagram.
3. Testing of the earth connections of the EDI module
  - ⇒ Each of the 4 connection pieces on the EDI module must be earthed!
4. Any connection of a collective fault signal must take place on site.

## E Commissioning



The work described below may only be performed by trained experts. For safety reasons, the commissioning must be performed by Grünbeck's trained and authorised technical customer service/authorised service company.

### 1 | General information

The GENO-EDI-X systems are factory-tested and pre-adjusted and have undergone a test run.

#### 1.1 Preliminary work

- Commission the upstream RO system, guarantee the permeate inlet to the GENO-EDI-X system. Establish drain connection.
- Check the tightening torque of the EDI modules (applies to GENO-EDI-X 720 / 1100 / 1450 / 2000 / 2700) Refer to chapter 1.2
- Ensure the electrical power supply and switch ON mains switch.
- Determining the required current value for the regeneration of the GENO-EDI-X system.

For this purpose, the following is required:

- a) CO<sub>2</sub> content in the feed water (permeate)
- b) SiO<sub>2</sub> content in the feed water (permeate)
- c) Total conductivity (conductivity of the feed water (permeate))
- d) Feed conductivity equivalent (FCE)

Calculation according to the following formula:

$$\text{FCE} = \text{conductivity} + (\text{ppm CO}_2 \times 2.79) + (\text{ppm SiO}_2 \times 2.04)$$

- e) The required current value for GENO-EDI-X 100 / 180 / 360 is then calculated as follows:

$$I = \frac{Q_h \times \text{FCE}}{K}$$

Diluate flow  $Q_h$  in **l/h**

Feed Conductivity Equivalent FCE in  $\mu\text{S/cm}$

EDI module index  $K = 3660$  for EDI-X 100

EDI module index  $K = 7320$  for EDI-X 180

EDI module index  $K = 14640$  for EDI-X 360

The required current value for GENO-EDI-X 720 / 1100 / 1450 / 2000 / 2700 is then calculated as follows:

$$I = \frac{1,31 \times Q_m \times \text{FCE}}{20 \times N}$$

Diluate flow  $Q_h$  in **l/min**

Feed Conductivity Equivalent FCE in  $\mu\text{S/cm}$

EDI module index  $N = 10$  for EDI-X 720 / 1100

EDI module index  $N = 18$  for EDI-X 1450 / 2000

EDI module index  $N = 24$  for EDI-X 2700

## 1.2 Tightening torque for EDI modules



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**Note:** The following only applies to the EDI modules of electrodeionisation systems GENO-EDI-X 720 / 1100 / 1450 / 2000 / 2700.

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- While transporting the EDI module and/or the electrodeionisation system, oscillations, shocks or vibrations cannot be prevented. This can cause the nuts on the threaded shafts to come loose and thus the two end panels of the EDI module are no longer clamped together sufficiently. When starting up the electrodeionisation system, this would then result in permanent, severe damage as soon as the pressure of the feed water hits the EDI module.
- For this reason, the torque of the nuts/threaded rods must be checked after each transport, before initial commissioning, during recommissioning and during each maintenance.
- Before tightening the nuts, make sure that the EDI module is pressure-relieved and completely drained. Failure to do so results in irreversible damage to the EDI module.
- Under no circumstances should the EDI module be opened! This will lead to the loss of any warranty claims and to irreversible damage.



Fig. E-1: EDI Module with 14 numbered threaded rods

Work is to be carried out exclusively with torques 20 Nm and 34 Nm using fig. E-1 for aid.

#### How to proceed:

- Tighten the threaded rod no. 1 with a torque of 20 Nm. To do so, apply a 19 mm open-end spanner to the cap nut on the side of the pipe connections (= cathode side) of the EDI module (for counter-holding).  
Tighten the hexagon nut on the opposite side (anode side) with 20 Nm using an extra-long 19 mm socket wrench and a torque wrench.
- Tighten the threaded rods no. 2 – 14 in the correct order using the same procedure as described above until all 14 threaded rods are tightened with a torque of 20 Nm.
- Tighten the threaded rods no. 1 – 14 with a torque of 34 Nm until all threaded rods are tightened with a torque of 34 Nm.



**Caution!** This operation must be carried out with great care. Over-tightening of the threaded rods must be avoided at all costs!

Exceeding the max. admissible torque results in irreversible damage to the EDI modules!

---

## 2 | START EDI-X system operation

- Switch on the GENO-EDI-X system on the control electronics using the “ON” button.
- Calibration of the flow sensors F7/F8 (gauging during production).
- Check of the flow values for diluate and concentrate.  
⇒ Readjustment on the adjusting valves V5, V6, V7.
- Check of the differential pressure between the diluate and concentrate (set point  $dp > 0.2$  bar and  $< 0.5$  bar); reregulation at V6 and V7 as required.
- Setting of the determined current value in the control electronics (refer to section “F” in chapter 4.4.2 “Main menu/parameters”).
- During the stable operation of the GENO-EDI-X system at constant values, the parameters must be entered in the log sheet. This should stop after about 2 operating hours.
- A stable operation for at least 12 h for the initial start-up must be targeted to run in the EDI module.



### Note:

The most important parameters for EDI adjustment are as follows:

1. Inlet pressure
  2. Differential pressure of diluate/concentrate
  3. Operating current/voltage
- 

### Switching off the GENO-EDI-X system

The GENO-EDI-X system is switched off in the control electronics using the “0-ON” button.

After a brief run-down time, the GENO-EDI-X comes to a stop.

## F Operation

### 1 | Introduction



**Note:** Instructions in bold are absolutely essential to ensure that work can continue. All other instructions can be ignored if the value shown on the display remains unchanged.



Settings in the technical service programming level may only be performed by Grünbeck's technical customer service/authorised service company or by persons expressly authorised by Grünbeck.



**Warning!** Incorrect settings may lead to hazardous operating conditions which cause injury, illness or damage to property.

The operation manual must be strictly adhered to! Only make the settings described there!

### 2 | Brief description of GENO-EDI-tronic

#### 2.1 Field of application

GENO-EDI-tronic constitutes the control electronics for all Grünbeck electrodeionisation systems GENO-EDI-X.

#### 2.2 Function

GENO-EDI-tronic controls the operation of the electrodeionisation system in connection with optional pressure booster systems. In the system menu, the individual components can be activated and are available as a flow chart on the display (→ visualisation system).

#### 2.3 Basic technical parameters – control panel

Table F-1: Basic technical parameters	Control panel
Membrane keyboard	with 12 buttons
Graphic display	with 128 x 64 pixels
	Dimensions: approx. 70 x 35 mm and backlight
Serial interface	RS-232
	Used for the connection of a PC (software update) and actuation of the EDI power supply unit
Interface	For the MK200 system bus for the actuation of the MK200 / MSR module and extensions
Supply voltage	10 VAC and 18 VAC, galvanically isolated

#### 2.4 Basic technical parameters – MK200 basic module

Table F-2: Basic technical parameters	MK200 basic module
Dimensions (w x h x d)	130 x 108 x 75 mm
Ambient conditions	Working temperature 0...50°C
	Storage temperature –20...85°C
	Relative humidity: maximum 95%
	10 VAC and 18 VAC, galvanically isolated
Noise immunity	according to EN 50082-2
Emissions	according to EN 50081-1

### 3 | Switch cabinet

The switch cabinet contains the terminals for all connecting line, the power supply unit for the EDI module, the control transformers for the voltage supply, the fuses and the protective motor switch and the MK200 module, which controls the system in conjunction with the control panel.



**Note:** The electric circuit diagram of the system can be found here.



Fig. F-1 Switch cabinet

## 4 | Operating the control unit

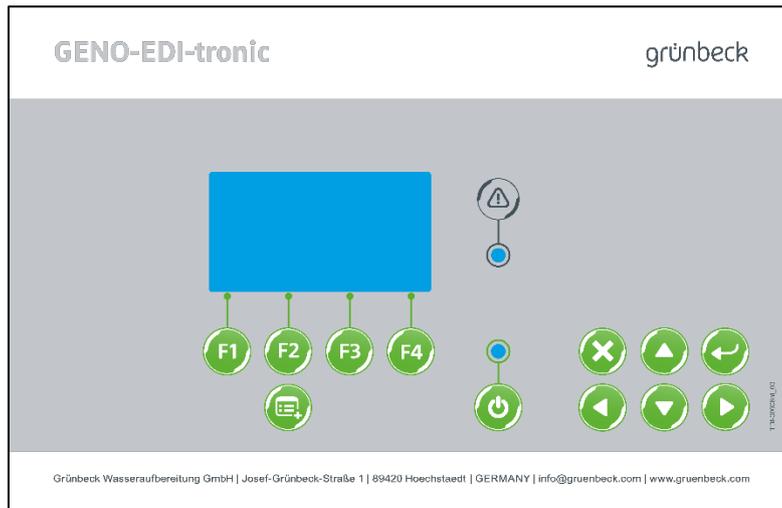


Fig. F-2: Control panel

-  F1 “Display” function in the respective menu
-  F2 “Entry” function in the respective menu
-  F3 Access to the “EDI System” menu
-  F4 Access to the “PB System” menu or Exit
-  Access to the system menu
-  Switch the EDI system on/off  
(green pilot LED lights up when ON)
-  Acknowledge the malfunction/leave an open entry field without saving
-  Enter
-   Move the cursor to the left / right
-   Edit the values entered or move the cursor up and down
-  The red pilot LED lights up when the control unit detects an error.

## 5 | Operating the control unit

The menu contains a few items that are not explained here. These include adjusting values for expansion modules. The documentation of these points is provided only together with these modules. In the basic version, the items have no function.

### 5.1 Basic information regarding the operation of the control unit

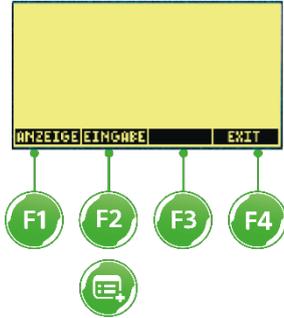


Fig. F-3: Menu access

Two screens are available in the system menu and in the submenu of the respective system components.

- On the "Display" screen, the parameters can be viewed, but not changed.
- In the "Entry" screen, all the parameters of the respective menu level can be edited if the relevant code is entered.



Fig. F-3a EDI code entry

Enter code: Move the cursor to the desired point using the buttons ◀ and ▶ and set the desired value using the buttons ▲ and ▼. Confirm the entry with the ⏹ button.

### 5.2 System menu

F1

This menu includes the adjusting value related to the entire system. The system menu is called by pressing the ⏹ button on any system display screen. On the next screen, the only choices still available are the display function (F1 button) and the entry function (F2 button). The F4 button takes you back to the previous display screen. If the entry mode was selected with the F2 button, the code for the desired level must be entered and this entry must be confirmed by pressing the ⏹ button.

The system menu is structured as below:

```
System menu
> Input Logic
  Output Logic
  I/O Configuration
  System Config.
  I/O Display
  Error Memory
  Basic Setting
```

The selection is made using the arrow buttons ▲ and ▼. The ⏹ button takes you to the selected submenu. The F4 button (Exit) takes you to the previous screen.

## 5.2.1 Overview of the inputs and outputs

Input	Function	Output	Function
1	P9 Low pressure switch for pre-feed pump	1	RO system release (option)
2	L4a switch-off level GENO-EDI-X system	2	Supply of power supply unit
3	L4b switch-on level GENO-EDI-X system	3	Solenoid valve Y11 Emergency feed
4	L4c emergency and additional feed	4	Collective fault
5	L4d dry-run protection PB pump (diluate)	5	PB pump M6 (diluate)
6	P8 pressure switch for permeate pump M8	6	PB pump M7 (diluate)
7	Error in permeate pre-feed pump M8	7	Solenoid valve Y7, inlet permeate
8	"Standby" signal of RO system (option)	8	Solenoid valve Y8, rejection permeate
9	P7 pressure switch of PB pump (diluate) for rotary current of PB pumps	9	Solenoid valve Y10, rejection diluate
10	Error in PB pump M6 P7 pressure switch for alternating current of PB pumps	10	Permeate pre-feed pump M8
11	Error in PB pump M7	11	Solenoid valve Y9, discharge diluate
12	Error in power supply unit 1 (option)		
13	Error in power supply unit 2 (option)		
14	Error in power supply unit 3 (option)		
15	Reserve		
16	Programmable input		

Table F-4: Overview of inputs and outputs

## 5.2.2 Input Logic

In this submenu, the logic of the digital inputs of the basic module can be inverted. This submenu has the following parameters:

Menu	Setting range	Basic setting	Level
<b>Input Logic</b>			
Input XX: (XX = 1...16)	Logic setting for digital inputs 1...16	0	
	0: Input is an NO contact		
	1: Input is an NC contact		

Table F-5: Input Logic

**5.2.3 I/O Configuration**

In this submenu, the universal inputs/outputs can be configured. This submenu has the following parameters:

Menu I/O Config.	Setting range	Basic setting	Level
E04:	Level L4c present	NO	
	NO: No function		
	YES: Input for level switch L4c		
E16:	Message text for input 16 Entry of up to 16 characters		
E16 function:	Function of input 16	FREE	
	FREE: No function		
	WARNING: Input leads to a warning		
	ERROR: Input leads to shut-down		
E16 delay:	Delay time for input 16 Setting range: 0...999 seconds	0 sec.	

Table F-6: Configuration

## 5.2.4 System Configuration

In this submenu, the existing system components can be defined. This submenu has the following parameters:

Menu System Config.	Setting range	Basic setting	Level
Language:	GERMAN ENGLISH	GERMAN	Code 0095
PB system present	Definition of pressure booster function NO: No pressure booster present YES: Pressure booster present	NO	
Signals module	Definition of the Signals module. NO: No Signals module present YES: Signals module present	NO	
Profibus module	Definition of the Profibus module <b>NO: No Profibus module present</b> YES: Profibus module present	NO	
Flow module	Definition of the Flow module NO: No Flow module present YES: Flow module present	NO	
System data printout	Start of the system data printout through the serial interface by entering "1". After the start, the value is automatically reset to "0".	0	

Table F-7: System Configuration

**5.2.5 I/O Display**

In this submenu, the current states of the inputs/outputs are displayed. This submenu has the following parameters:

Menu I/O Display	Setting range	Basic setting	Level
Inputs E16 – E01:	Input states of the individual inputs Input 16 left / Input 1 right 0: Input open 1: Input closed	-----	Code 0095
Outputs A11 – A01:	Output states of the individual inputs Output 11 left / Output 1 right 0: Output not active 1: Output active	-----	Code 0095

Table F-8: I/O Display

**5.2.6 Error Memory**

The error memory stores the last 16 messages whereby the last message always appears at the top (position 01). In addition to the position number and the message text, each line also includes the value of the operating hour meter at the point in time at which the message was created. In the top line next to the menu header, the current value of the operating hour meter can be read. The contents of the error memory can be deleted by pressing the F1 button when the service password is entered.

**5.2.7 Basic Setting**

Basic settings can be made in this submenu. This submenu has the following parameters:

Menu System Config.	Setting range	Basic setting	Level
Default values:	When "1" is entered, the system parameters and system-specific parameters are set to the basic setting values. After that, the value is automatically set to "0".	0	
Operating hours	When "1" is entered, the operating hour meter for the error memory is deleted. After that, the value is automatically set to "0".	0	

Table F-9: Basic setting

**5.3 Messages and signals**

**5.3.1 Errors**

Errors generally lead to the deactivation of at least part of the overall system.

Message text	Description
ERROR POWER FAILURE	This message appears in case of voltage recovery when the system has been switched on and the parameter "Restart: NO" has been set in the EDI system menu
ERROR LOW PRESS.	This message appears when the permeate pressure when the inlet valve is open is too low for the set time at least and the number of repetition attempts has been reached

ERROR MAX. PERM. COND.	This message appears when the conductivity of the permeate for the set time has been exceeded and the monitoring system is programmed for deactivation
ERROR MIN. PERM. COND.	This message appears when the conductivity of the permeate for the set time has not been reached and the monitoring system is programmed for deactivation
ERROR TEMP. PERMEATE	This message appears when the temperature of the permeate for the set time has been exceeded and the monitoring system is programmed for deactivation
ERROR MAX. PERM. PRESS.	This message appears when the pressure of the permeate is exceeded.
ERROR MIN. PERM. PRESS.	This message appears when the pressure of the permeate for the set time is not reached.
Message text	Description
ERROR ELEKTR. FLOW	This message appears when the flow volume of the electrolyte for the set time is too low
ERROR DILUATE FLOW	This message appears when the flow volume of the diluate for the set time is too low and the monitoring system is programmed for deactivation
ERROR MAX. DIL. COND.	This message appears when the conductivity of the diluate for the set time has been exceeded and the monitoring system is programmed for deactivation
ERROR F-PUMP M8	This message appears when the monitoring input for pump M8 is closed
ERROR CONCEN. PRESS.	This message appears when the concentrate pressure for the set time is too high. (Greater than the diluate pressure)
ERROR DIF.PR.P5/P6	This message appears when the diluate/ concentrate differential pressure for the set time is outside the limit and the monitoring system is programmed for deactivation
ERROR DIL. TEMP.	This message appears when the temperature of the diluate for the set time has been exceeded and the monitoring system is programmed for deactivation
ERROR CONCEN. FLOW	This message appears when the flow volume of the concentrate for the set time is too low and the monitoring system is programmed for deactivation
ERROR TLS M6/M7	This error appears when the corresponding level on the permeate tank is undershot
ERROR PB PUMP M6	This message appears when the monitoring input for pump M6 is closed (motor protection for rotary current pumps, pressure switch for alternating current pumps)
ERROR PB PUMP M7	This message appears when the monitoring input for pump M7 is closed.
ERROR LEVEL SWITCH	This message appears when the level switch reports an invalid level setting
ERROR SENS. LEVEL	This message appears when the measured value of the level sensor lies outside of a plausible range. (E.g., cable breakage)

ERROR SENS.TEMP.PERM	This message appears when the measured value of the temperature sensor/permeate lies outside of a plausible range. (E.g., cable breakage)
ERROR SENS.TEMP.DIL.	This message appears when the measured value of the temperature sensor/diluate lies outside of a plausible range. (E.g., cable breakage)
ERROR SENS.PRESS. PERM.	This message appears when the measured value of the pressure sensor/permeate lies outside of a plausible range. (E.g., cable breakage)
ERROR SENS.PRESS.DIL.	This message appears when the measured value of the pressure sensor/diluate lies outside of a plausible range. (E.g., cable breakage)
Message text	Description
ERROR SENS.PRESS. CONC.	This message appears when the measured value of the pressure sensor/concentrate lies outside of a plausible range. (E.g., cable breakage)
ERROR E16 (text can be edited)	This message appears when input 16 is programmed for errors and open for the set time at minimum
MSR-MODULE MISSING	This message appears when communication to the basic module fails
POW. SUP. UNIT 1 MISSING	This message appears when communication to the power supply unit (power supply of EDI module) fails

Table F-10: Errors

### 5.3.2 Warnings

Warnings are shown on the display and saved in the error memory. Non-acknowledged messages flash in the display.

Message text	Description
MAINTAIN EDI	This message appears when the maintenance interval has expired
WARNING LOW PRESS.	This message appears when the permeate pressure when the inlet valve Y7 is open is too low for the set time at least and the number of repetition attempts has not yet been reached
WARNING MAX. PERM. COND.	This message appears when the conductivity of the permeate for the set time has been exceeded and the monitoring system is not programmed for deactivation
WARNING MIN. PERM. COND.	This message appears when the conductivity of the permeate for the set time has been undershot and the monitoring system is not programmed for deactivation
WARNING TEMP. PERMEATE	This message appears when the temperature of the permeate for the set time has been exceeded and the monitoring system is not programmed for deactivation
WARNING FLOW DILUATE	This message appears when the flow volume of the diluate for the set time is too low and the monitoring system is not programmed for deactivation
WARNING MAX. DIL. COND.	This message appears when the conductivity of the diluate for the set time has been exceeded and the monitoring system is not programmed for deactivation
WARNING DIFF.PRESS. P5/P6	This message appears when the diluate/ concentrate pressure difference for the set time is outside the limit and the monitoring system is not programmed for deactivation

WARNING TEMP. DILUATE	This message appears when the temperature of the diluate for the set time has been exceeded and the monitoring system is not programmed for deactivation
WARNING CONCEN. FLOW	This message appears when the flow volume of the concentrate for the set time is too low and the monitoring system is not programmed for deactivation
WARNING E16 (text can be edited)	This message appears when input E16 is programmed for warnings and open for the set time at minimum

Table F-11: Warnings

### 5.4 Electrodeionisation (GENO-EDI-X system)

This menu includes the adjusting values related to the GENO-EDI-X system. The EDI main menu is called by pressing the F3 button on any visualisation system view. On the next screen, the only choices still available are the display function (F2 button) and the entry function (F1 button). The F4 button takes you back to the visualisation system of the EDI system.

If the entry mode was selected with the F3 button, the code for the desired level must be entered and this entry must be confirmed by pressing the  button.

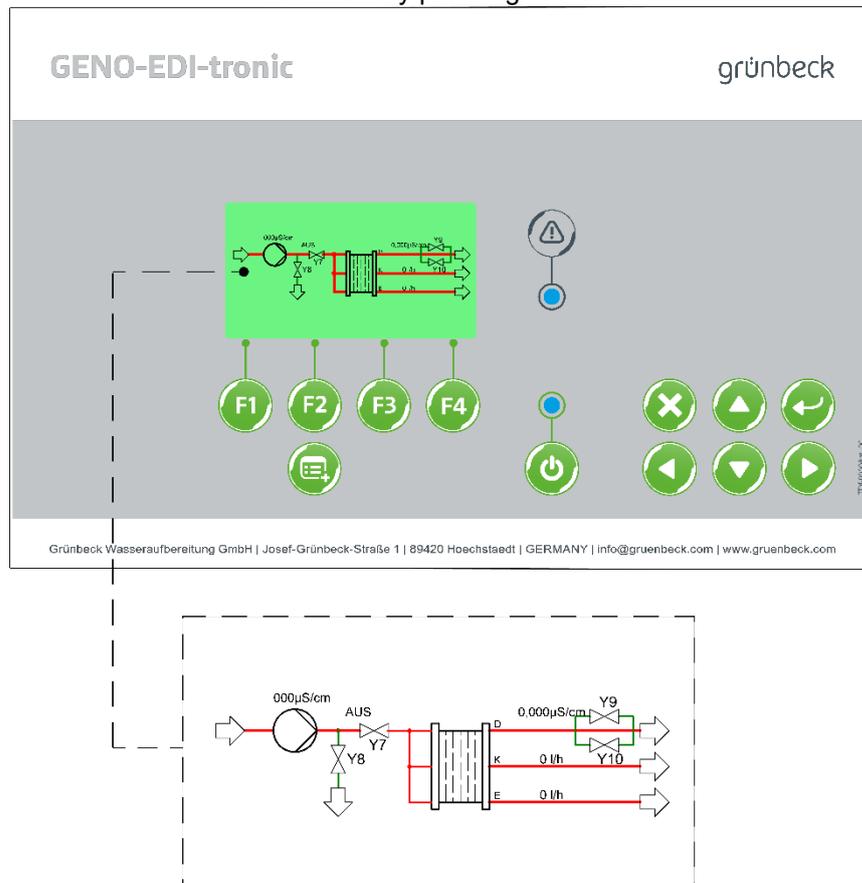


Fig. F-12: Visualisation system of the GENO-EDI-X system

The EDI main menu is structured as follows:

EDI menu
>User
Parameters
Times
Errors
Service Data
Reference Data
Basic Setting

The selection is made using the arrow buttons ▲ and ▼. The  button takes you to the selected submenu. The F4 button (Exit) takes you to the previous screen.

#### 5.4.1 User

This submenu contains the customer parameters. This submenu has the following parameters:

Menu	Setting range	Basic setting	Level
<b>EDI User</b>			
Operating mode:	OFF: The GENO-EDI-X system is not active MANUAL: The GENO-EDI-X system always runs when no error is present. AUTO: The GENO-EDI-X system runs depending on the level switch of the diluate tank.	OFF	Code 0095

Table F-13: Customer user level

#### 5.4.2 Parameters

This submenu contains the general parameters of the GENO-EDI-X system. This submenu has the following parameters:

Menu	Description	Basic setting	Level
<b>EDI System</b>			
EDI system:	STANDBY: The system is ready for operation LOCKED: The system is locked	LOCKED	
EDI control unit:	Determination of the actuation of the EDI system Level: Controlled via level switches PS: Controlled via pressure switches ANA: Controlled via analogue signals (4-20 mA) Profi: Controlled via Profibus	LEVEL	

Restart:	Restart after power failure NO: The system reports an error after a power failure YES: System acts as it did before power failure	YES
Voltage	Direct voltage for EDI module 0V – 300V	200V
Current	Working voltage for EDI module 0.0A – 5.0A	2.5A
M8 pres.	Permeate feed pump reset NO YES	NO
Forced op.	Forced operation NO: No forced operation takes place. YES: Forced operation takes place.	YES
Min. Run.Time:	Determination of minimum run time to trigger forced operation SINGLE: The run time restarts at the activation of the GENO-EDI-X system. SUM: The individual runtimes of the GENO-EDI-X system are cumulated.	SINGLE
Cond. disp. dil.:	Display of the conductivity measurement in: µS/cm megaohm	µs/cm
Flow Disp.Dil.:	Flow display of the diluate in the flow chart of the GENO-EDI-X system: - l/h: Display in litres per hour - m <sup>3</sup> /h: Display in m <sup>3</sup> per hour - NO: No display	l/h
Flow Disp.Conc.:	Flow display of the concentrate in the flow chart of the GENO-EDI-X system: - l/h: Display in litres per hour - m <sup>3</sup> /h: Display in m <sup>3</sup> per hour - NO: No display	l/h
Flow Disp.El. pres.	Flow display of the electrolyte in the flow chart of the GENO-EDI-X system: - l/h: Display in litres per hour - m <sup>3</sup> /h: Display in m <sup>3</sup> per hour - NO: No display	NO
Flow Disp.Elect.	Flow display of the electrolyte in the flow chart of the GENO-EDI-X system present: NO YES	NO

Perm.Cond. pres.	Conductivity measurement in permeate inlet NO: Conductivity measurement not present YES: Conductivity measurement present	NO
E-Perm.Cond.	Limit value for the conductivity of permeate rejection: 5 – 40 $\mu\text{S}/\text{cm}$	20 $\mu\text{S}/\text{cm}$
E-Diluate Valve	Solenoid valve Y10 for diluate rejection NO: The valve is not present YES: The valve is present	NO
E-Dil.Cond.	Limit value for the conductivity of diluate rejection: 0.055 – 2.000 $\mu\text{S}/\text{cm}$	0.2 $\mu\text{S}/\text{cm}$
Conc.Cond. pres.	Conductivity measurement in concentrate NO: The conductivity measurement is not present YES: The conductivity measurement is present	NO
Press.Perm. pres.	Pressure measurement in permeate NO: Pressure measurement is not present YES: Pressure measurement is present	YES
Press.Dil. pres.	Pressure measurement in diluate NO: Pressure measurement is not present YES: Pressure measurement is present	YES
Press.Conc. pres.	Pressure measurement in concentrate NO: Pressure measurement is not present YES: Pressure measurement is present	YES
Abort Forced Op.:	Abort command for forced operation. When "1" is entered, any forced operation is interrupted. After that, the parameter is automatically reset to "0".	0

Table F-14: Parameters

**5.4.3 Times**

This submenu contains the time parameters of the GENO-EDI-X system. This submenu has the following parameters:

Menu	Setting range	Basic setting	Level
<b>EDI Times</b>			
Rinsing time:	EDI module rinsing time: Setting range: 0 – 999 seconds	5 sec.	
E-Perm. Time:	Latest time as of the EDI START after which the valve for the first permeate rejection is closed. (Required only if a first permeate valve is present) Setting range: 0..999 seconds	300 sec.	
Current delay:	Delay time for the activation of the regeneration current of the EDI module (after permeate rejection) Setting range: 0..999 seconds	5 sec.	
PS Lev. A Delay:	Delay time of the “A” level in case of control via pressure switch Setting range: 0..999 seconds	2 sec.	
PS Lev. B Delay:	Delay time of the “B” level in case of control via pressure switch Setting range: 0..999 seconds	2 sec.	
Max. idle time:	Maximum idle time; time window for the check of the system run time Setting range: 1..48 hours	36 hours	
Min. Run.Time:	Minimum run time within the window set under “Max. idle time: xx” Setting range: 1..48 hours	1 hour	
E-Diluate Time:	Latest time as of the “OPEN” permeate inlet valve after which the valve for the first diluate rejection is closed. (Required only if a first diluate valve is present) Setting range: 0..999 seconds	60 sec.	
Maint. int.:	Maintenance interval of the GENO-EDI-X system Setting range: 0..365 days	365 days	

Table F-15: Times

**5.4.4 Errors**

This submenu contains the parameters for the errors of the GENO-EDI-X system. This submenu has the following parameters:

<b>Menu</b>	<b>Setting range</b>	<b>Basic setting</b>	<b>Level</b>
<b>EDI Errors</b>			
Err.M8 delay:	Delay time for a malfunction in the permeate pump M8 Setting range: 0..999 seconds	5 sec.	
Max. Dil. Cond.:	Limit value for the conductivity of diluate Setting range: 0.055 – 2.000 $\mu\text{S/cm}$	0.5 $\mu\text{S/cm}$	
Max. Dil. Cond. Deact.:	Deactivation in case diluate conductivity is too high NO: Dil. Cond. Warning YES: Dil. Cond. Error	YES	
Max. Dil. Cond. Del.:	Delay time for monitoring the diluate conductivity Setting range: 0..999 seconds	60 sec.	
Max. Perm. Cond.:	Limit value for the conductivity of permeate Setting range: 5 – 40 $\mu\text{S/cm}$	20 $\mu\text{S/cm}$	
Max. Perm. Cond. Deact:	Deactivation in case permeate conductivity is too high NO: Max. Perm. Cond. Warning YES: Max. Perm. Cond. Error	YES	
Max. Perm. Cond. Del.:	Delay time for monitoring the maximum permeate conductivity Setting range: 0..999 seconds	60 sec.	
Min. Perm. Cond. Deact:	Deactivation in case permeate conductivity is too low NO: Min. Perm. Cond. Warning YES: Min. Perm. Cond. Error	NO	
Min. Perm. Cond. Del:	Delay time for monitoring the minimum permeate conductivity Setting range: 0...999 seconds	180 sec	
Max. Perm. Temp.:	Limit value for the permeate temperature Setting range: 0 - 40°C	25°C	
Perm. Temp. Deact.:	Deactivation in case permeate temperature is too high NO: Warning Perm. Temp. YES: Error Perm. Temp.	YES	
Perm. Temp. Del.:	Delay time for monitoring the maximum permeate temperature Setting range: 0..999 seconds	60 sec.	

Error P9 delay:	Delay time for the low pressure switch – monitoring of the inlet Setting range: 0..10 seconds	5 sec.
P9 repet.:	Number of repetition attempts for the low pressure monitoring of the inlet Setting range: 0..99	3
P9 waiting time:	Time between the repetition attempts for the low pressure monitoring of the inlet Setting range: 0..999 seconds	60 sec.
Min. El. Flow:	Minimum electrolyte flow Setting range: 10 -100 l/h	15 l/h
El. Flow Del.:	Delay time for monitoring the minimum electrolyte flow Setting range: 0 - 15 minutes	5 min.
Min. Dil. Flow:	Minimum diluate flow Setting range: 0 - 20000 l/h	63 l/h
Dil. Flow Deact.:	Deactivation in case diluate flow is too low NO: Warning Min. Dil. Flow YES: Error Min. Dil. Flow	YES
Dil.Flow Del.:	Delay time for monitoring the minimum diluate flow Setting range: 0 - 999 seconds	20 sec.
Min. Perm. Press.:	Minimum permeate inlet pressure Setting range: 0.0 – 6.0 bar(g)	1.5 bar(g)
Max. Perm. Press.:	Maximum permeate inlet pressure Setting range: 0.0 – 6.0 bar(g)	5.0 bar
Perm. Press. Del.:	Delay time for monitoring the minimum permeate inlet pressure Setting range: 0 – 999 seconds	20 sec.
Conc. Press. Del.:	Delay time for monitoring the minimum concentrate pressure Setting range: 0 – 999 seconds	20 sec.
Dif.Press.D-C:	Differential pressure range diluate/concentrate (diluate > concentrate) Setting range: 0.1 – 1.0 bar (Minimum differential pressure of 0.2 bar fixed)	0.5 bar
Dif.Press.D-C Deact.:	Deactivation in case differential pressure between diluate and concentrate is too low NO: Warning Min. Dil. Flow YES: Error Min. Dil. Flow	YES
Dif.Press.D-C Del.:	Delay time for monitoring the minimum differential pressure between the diluate and concentrate Setting range: 0 – 999 seconds	20 sec.
Max. Dil. Temp.:	Limit value for the diluate temperature Setting range: 0 - 40°C	25°C
Dil. Temp. Deact.:	Deactivation in case diluate temperature is too high NO: Warning Dil. Temp. YES: Error Dil. Temp.	YES

Dil. Temp. Del.:	Delay time for monitoring the maximum diluate temperature Setting range: 0..999 seconds	60 sec.
Min. Conc. Flow:	Minimum concentrate flow Setting range: 0 - 2000 l/h	10 l/h
Conc. Flow Deact.:	Deactivation in case concentrate flow is too low NO: Warning Min. Conc. Flow YES: Error Min. Conc. Flow	YES
Conc. Flow Del.:	Delay time for monitoring the minimum concentrate flow Setting range: 0 - 999 seconds	20 sec.

Table F-16: Errors

**5.4.5 Service Data**

This submenu contains the parameters for the service information of the GENO-EDI-X system. These parameters can only be displayed and not changed. This submenu has the following parameters:

Menu	Description	Basic setting	Level
<b>RO Service</b>			
Oper. Hour M8:	Operating hours of the permeate feed pump M8	0 h	Code 0095
Diluate sum:	Sum of diluate volume in m <sup>3</sup> /h	0 m <sup>3</sup>	Code 0095
Conc. sum:	Sum of concentrate volume in m <sup>3</sup> /h	0 m <sup>3</sup>	Code 0095
Electrolyte sum:	Sum of electrolyte volume in m <sup>3</sup> /h	0 m <sup>3</sup>	Code 0095

Table F-17: Service data

**5.4.6 Reference Data**

This submenu contains the parameters for calibrating the water meters and conductivity. This submenu has the following parameters:



**Note:** These values must be entered during production!

Menu	Description	Basic setting	Level
<b>RO Reference</b>			
Diluate Ref.:	Reference data for the diluate water meter. The externally determined, current flow through the water meter is entered here. Setting range: 0..20000 l/h	1000 l/h	
Conc. Ref.:	Reference data for the concentrate water meter. The externally determined, current flow through the water meter is entered here. Setting range: 0..2000 l/h	100 l/h	
Elect. Ref.:	Reference data for the electrolyte water meter. The externally determined, current flow through the water meter is entered here. Setting range: 0..100 l/h	100 l/h	

Dil. Cond. Ref.:	Reference data for diluate conductivity. The externally determined, current value for conductivity is entered here. Setting range: 0..2.000 µS/cm	1.0 µS/cm
Dil. Cond. Comp.:	Temperature determination for the temperature compensation of the diluate conductivity DEMAND: The temperature is entered AUTOM.: The temperature is determined by the sensor	DEMAND
Dil. Cond. Temp. Coeff.	Temperature coefficient for the temperature compensation of the diluate conductivity Setting range: 0.3..3.0%/K	2.3%/K
Dil. Cond. Temp.:	Temperature in case of "Dil. Cond. Comp.: DEMAND" Setting range: 0..100°C	25°C
Perm. Cond. Ref.:	Reference data for permeate conductivity. The externally determined, current value for conductivity is entered here Setting range: 0..100 µS/cm	30 µS/cm
Perm. Cond. Comp.:	Temperature determination for the temperature compensation of the permeate conductivity Demand: The temperature is entered Autom.: The temperature is determined by the sensor	DEMAND
Perm. Cond. Temp. Coeff.:	Temperature coefficient for the temperature compensation of the permeate conductivity Setting range: 0.3..3.0%/K	2.5%/K
Perm. Cond. Temp.:	Temperature in case of "Perm. Cond. Comp.: DEMAND" Setting range: 0..99°C	25°C
Conc. Cond. Ref.:	Reference data for concentrate conductivity. The externally determined, current value for conductivity is entered here Setting range: 0..500 µS/cm	300 µS/cm

Table F-18: Reference Data

### 5.4.7 Basic Setting

This submenu contains the parameters for the basic settings of the GENO-EDI-X system. This submenu has the following parameters:

Menu	Description	Basic setting	Level
EDI Basic Setting	Default values: When "1" is entered, the setting parameters are reset to the basic setting values. After execution, the entry is reset to "0".	0	

Maint. int.:	When "1" is entered, the maintenance interval is reset. After execution, the entry is reset to "0".	0	
Operating hours:	When "1" is entered, the operating hours M8 are reset. After execution, the entry is reset to "0".	0	Grünbeck
Sums Water Meter:	When "1" is entered, the water meter sums are reset. After execution, the entry is reset to "0".	0	Grünbeck

Table F-19: Basic setting

### 5.5 Pressure booster (PB system) if activated in system menu

This menu includes the adjusting values related to the pressure booster. The PB main menu is called by pressing the F4 button on the visualisation system of the PB system. On the next screen, the only choices still available are the display function (F1 button) and the entry function (F2 button). The F4 button takes you back to the display screen of the PB system. If the entry mode was selected with the F2 button, the code for the desired level must be entered, and this entry must be confirmed by pressing the  button.

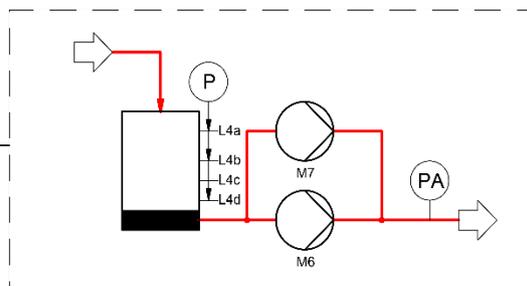
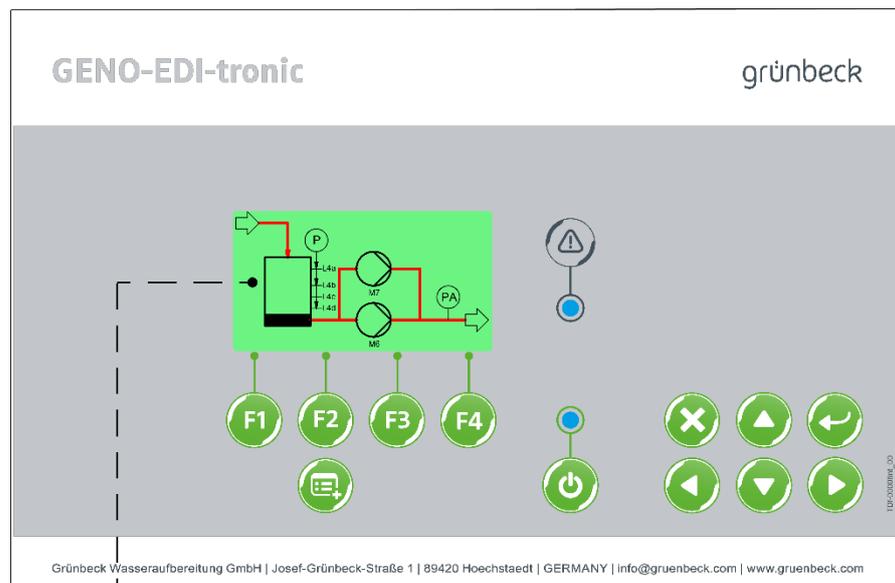


Fig. F-20: Visualisation system of the PB system

The PB main menu is structured as follows:

```
Menu Pressure Booster
>User
  Parameters
  Errors
  Service Data
  Basic Setting
```

The selection is made using the arrow buttons  and . The  button takes you to the selected submenu. The F4 button (Exit) takes you to the previous screen.

**5.5.1 User**

This submenu contains the customer parameters. This submenu has the following parameters:

Menu PB User	Setting range	Basic setting	Level
Operating mode:	OFF: The PB system is not active MANUAL: The pressure booster pump is always running if the system is on and no error is present. AUTO: The pressure booster pump runs depending on the pertinent pressure switch.	OFF	Code 0095

Table F-21: Operator

**5.5.2 Parameters**

This submenu contains the general parameters of the PB system. This submenu has the following parameters:

Menu PB Parameters	Description	Basic setting	Level
PB control unit	Determination of the actuation of the PB control unit PS: Controlled via pressure switches Profi: Controlled via Profibus	PS	
TLS M6/M7:	Delay time after response of the dry-run protection Setting range: 0..999 seconds	5 sec.	
P7 delay:	Delay time of the pressure switch of the PB pumps Setting range: 0..30 seconds	10 sec.	
No. of PB pumps:	Number of existing PB pumps Setting range: 0..2	0	
M6/M7 switch-over	Switch-over time in case of 2 PB pumps (GLW) Setting range: 1..99 h	6 h	
Overlap M6/M7	Overlap time for parallel operation of the 2 PB pumps during pump switch-over Setting range: 0..99 seconds	30 sec.	
Filling level stop:	Filling level in %; EDI system stop Setting range: 0..100 %	95 %	
Filling level start:	Filling level in %; EDI system start Setting range: 0..100%	60%	
Fill. lev. Emerg. feed	Filling level in %; EDI system emergency feed Setting range: 0..100%	40%	
Filling level TLS:	Filling level in %; PB system stop	20%	

Table F-22: Parameters

**5.5.3 Errors**

This submenu contains the parameters for the errors of the PB system. This submenu has the following parameters:

Menu PB Errors	Setting range	Basic setting	Level
M6/M7 prot. mot. sw.:	Pressure booster pumps with protective motor switch NO: No protective motor switch → alternating current pump(s) YES: Protective motor switch present → rotary current pump(s)	YES	
Err.M6.M7 Del.:	Delay time in case of an error in the pressure booster pumps during pressure monitoring Setting range: 0...999 seconds	30 sec.	

Table F-23: Errors

**5.5.4 Service Data**

This submenu contains the parameters for the service information of the PB system. These parameters can only be displayed and not changed. This submenu has the following parameters:

Menu PB Service	Description	Basic setting	Level
Oper. Hour M6:	Operating hours of the pressure booster pump M6	0 h	Code 0095
Oper. Hour M7:	Operating hours of the pressure booster pump M7	0 h	Code 0095

Table F-24: Service data

**5.5.5 Basic Setting**

This submenu contains the parameters for the basic settings of the PB system. This submenu has the following parameters:

Menu PB Basic Setting	Description	Basic setting	Level
Default values:	When "1" is entered, the setting parameters of the PB system are reset to the basic setting values. After execution, the entry is reset to "0".	0	
Operating hours:	When "1" is entered, the operating hours M6/M7 are reset. After execution, the entry is reset to "0".	0	Grünbeck

Table F-25: Basic setting

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## G Troubleshooting

### 1 | Basic information

Even carefully designed and manufactured technical systems that are operated properly may experience malfunctions. Table G-1 provides an overview of possible problems that may occur during the operation of the systems and indicates the causes and their elimination.

The systems are equipped with an error detection and reporting system.

If an error message is displayed:

1. Press the "DEBUG" button (= acknowledge malfunction).
2. Watch the display.  
If the message reappears, compare it with table G-1.
3. If necessary, notify Grünbeck's technical customer service.



**Note:** The technical customer service definitely must be notified in case of malfunctions that cannot be remedied with the information given in table G-1! When contacting the technical customer service, please indicate the system designation, order number and the error message displayed.

---

## 2| Troubleshooting

Table G-1: Errors		
This is what you observe	This is the cause	This is what to do
Inlet pressure P4 too high	Permeate supply flow Malfunction	Check the RO system or permeate feed pump.
Flow capacity of the GENO-EDI-X system too low	<ul style="list-style-type: none"> <li>Water temperature too low</li> <li>Incorrect setting of adjusting valve V4, V5, V6, V7</li> <li>EDI module clogged</li> </ul>	<ul style="list-style-type: none"> <li>Check of temperature</li> <li>Readjust adjusting valve V4, V5, V6, V7</li> <li>Clean EDI module</li> </ul>
Diluate conductivity too high	<ul style="list-style-type: none"> <li>CO<sub>2</sub> value in inlet too high</li> <li>Flow F7 in diluate too high</li> <li>Scaling</li> <li>Bacterial growth</li> <li>Change in the feed water value</li> <li>The concentrate pressure P6 is higher than the diluate pressure P5</li> </ul>	<ul style="list-style-type: none"> <li>Check RO system/NaOH dosing or membrane degassing</li> <li>Readjust adjusting valve V6</li> <li>Clean EDI module</li> <li>Clean EDI module</li> <li>Readjust operating current/voltage</li> <li>Setting of the pressure difference: Diluate P5 &gt; P6 concentrate (0.2 – 0.5 bar)</li> </ul>
Diluate temperature T2 too high	Temperature of RO system permeate and/or inlet water too high	Check temperature of RO system permeate and/or inlet water
Concentrate flow F8 too low	<ul style="list-style-type: none"> <li>Incorrect setting of adjusting valves V5, V7</li> <li>Scaling</li> </ul>	<ul style="list-style-type: none"> <li>Readjust adjusting valves V5, V7</li> <li>Clean EDI module</li> </ul>
Concentrate flow F8 too high	Incorrect setting of adjusting valves V5, V7	Readjust adjusting valves V5, V7
Concentrate pressure P6 too high	<ul style="list-style-type: none"> <li>Incorrect setting of adjusting valves V6, V7</li> <li>Scaling</li> </ul>	<ul style="list-style-type: none"> <li>Readjust adjusting valves V6, V7</li> <li>Clean EDI module</li> </ul>
Differential pressure of diluate/concentrate too high	Incorrect setting of adjusting valves V6, V7	Readjust adjusting valves V6, V7 Max. differential pressure 0.5 bar

## H Maintenance

### 1 | Basic information

In order to guarantee the reliable function of the systems over a long period of time, some maintenance work has to be performed at regular intervals. All regulations and guidelines which apply at the installation site must be strictly adhered to.

- A daily check of the quality and the system volume flows must be performed.
- The log sheets must be filled out daily on warranty grounds. Conclusions regarding any problems/damage can also be derived from these documents.
- Maintenance has to be performed by Grünbeck's technical service/authorised service company or by a specialised company. Maintenance is subject to the load, but at the latest has to be performed once a year.
- An operation log and the corresponding test log must be kept in order to document the maintenance work performed.



**Note:** By concluding a maintenance contract you ensure that all maintenance work will be performed in due time.

The maintenance work performed must be documented in the checklist, refer to appendix "Operation log".

### 2 | Inspection (functional check)

You may perform the daily inspections yourself.

Please refer to the following overview for the tasks to be performed within the scope of an inspection.

**Overview: Inspection work**

- Determine the feed water quality (inlet); check any pretreatment.
- Check the diluate quality.
- Check the diluate flow volume.
- Check the concentrate flow volume.
- Check the current and voltage values.
- Check the pressures and differential pressure (diluate/concentrate).



**Note:** Minor deviations are normal and cannot be prevented technically. In case of considerable deviations from the standard, notify Grünbeck's technical customer service.

- Check the seal tightness of the system.
- Check the electrical connections on the EDI module.
- Check the earthing connections on the EDI module (4 pieces).

### 3 | Maintenance



According to DIN 1988 part 8 / A 12, maintenance work at the systems may only be performed by Grünbeck's technical service/authorised service company or an approved specialist company.

For this kind of systems, an operation log - a checklist has to be kept. In this operation log, the customer service technician records all maintenance and repair work performed. In case of malfunctions, this log helps to identify possible sources of error. In addition, the log documents the proper system maintenance.

**Make sure that all maintenance work is recorded in the operation log.**

#### Overview: Maintenance work

- Check the switching function of the solenoid valves.
- Check the flow volumes and recalibrate the water meters.
- Check the state and seal tightness of the entire system.
- Mechanical and/or electrical functional and performance test of all aggregates (valves, EDI module).
- Check of the electrical connections
  - ➔ Retighten screw connections if necessary.
- For GENO-EDI-X 720 / 1100 / 1450 / 2000 / 2700 applies: Check the torques on the threaded rods of the EDI module.
  - ➔ Retighten the nuts of the threaded rods, if necessary. Refer to chapter E-1.2
- Check the setting parameters (current, voltage, pressure).
- Check the feed values for changes in regard to the following:
  1. The original values after initial start-up
  2. The design basis
- Prepare a written maintenance report on the state and function of the system and the maintenance work performed, including evaluation and assessment of the operating values and water analysis results.

#### 3.1 Operation log

When starting up the system, make sure to record all data on the cover sheet of the operation log and fill in the first column of the checklist.

The customer service technician will fill in a column of the checklist whenever maintenance is performed. This document provides evidence of proper maintenance.