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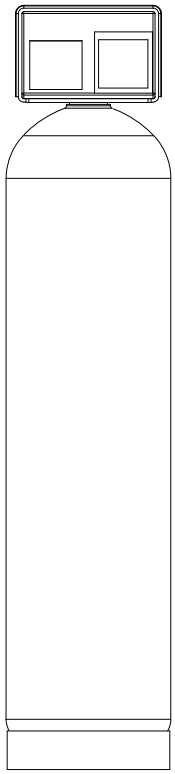
Operation manual for demanganisation system GENO-mat MN-Z



Edition September 2018
Order no. 105 153 048-inter

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Printed in Germany
Effective with the date of edition indicated on the cover sheet.
-Subject to modifications in line with technical advances-

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CE

EU Declaration of Conformity

This is to certify that the devices designated below meet the safety and health requirements of the applicable European guidelines in terms of design, construction and execution.

If the systems are modified in a way not approved by us, this certificate is void.

Manufacturer:	Grünbeck Wasseraufbereitung GmbH Josef-Grünbeck-Str. 1 89420 Höchstädt Germany
Responsible for documentation:	Markus Pöpperl
Description of the system:	Demanganisation system
Device type:	GENO-mat MN-Z
Serial no.:	Refer to type designation plate
Applicable Directives:	Low Voltage (2014/35/EU) EMC (2014/30/EU)
Applied harmonised standards, in particular:	DIN EN 61000-6-2:2006-03 DIN EN 61000-6-3:2011-09
Applied national standards and technical specifications, in particular:	DIN 19636-100:2008-02
Location, date and signature	Höchstädt, 26/07/2018 p.p.  M. Pöpperl Dipl.-Ing. (FH)
Function of signatory:	Head of Technical Product Design

A General information

1 | Preface

Thank you for choosing a Grünbeck product. Backed by decades of experience in the area of water treatment, we provide custom-made solutions for all kinds of processes.

Drinking water is classified as food and requires particular care. Therefore, always ensure the required hygiene in operating and maintaining systems involved in the drinking water ordinance. This also applies to the treatment of water for industrial use if repercussions for the drinking water cannot completely be excluded.

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. These operating instructions assists you with crucial information. Please read the entire operating instructions carefully before installing, operating or maintaining the system.

Customer satisfaction is our primary aim, and providing customers with skilled advice is crucial at Grünbeck. If you have any questions concerning the present product, possible extensions or general water and waste water treatment, our field staff, as well as the experts at our headquarters in Höchstädt, are available to help you.

Advice and assistance

For advice and assistance please contact your local representative (refer to www.gruenbeck.com). You can also get in touch with our service centre, which can be reached during business hours:

Phone: +49 9074 41-333

Fax: +49 9074 41-120

Email: service@gruenbeck.de

We can connect you with the appropriate expert more quickly if you provide the required system data. In order to have the required data handy at all times, please copy it from the type designation plate to the overview in chapter C-1.

2 | Notes on using the operation manual

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

The headers and page numbers with chapter information make it easier to find your way around these operating instructions.

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, safe and efficient handling of the system.

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

Warning! Failure to adhere to this information can cause injuries, damage to property or impurities in the drinking water.

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

Note: This symbol emphasises information and tips that facilitate your work.

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 a water company installation directory as per §12(2) AVBWasserV (German Ordinance on General Conditions for the Supply of Water).

3.2 Operating personnel

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

3.3 Intended use

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.

3.4 Protection from water damage

Warning! To properly protect the installation site from water damage:

a) a sufficient floor drain system must be available or

b) a water stop device (see 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 Indication of specific dangers

Danger due to electrical energy! → Do not touch electrical components 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 can be subject to overpressure. Risk of injuries and damage to property due to escaping water and unexpected movement of system parts. → 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 should be installed by a specialist company only. Strictly adhere to the operation manual! Ensure that there is sufficient flow, and observe the relevant guidelines when starting up the system after extended periods of standstill. Perform inspections and maintenance at the intervals specified!

Note: By concluding a maintenance contract, you ensure that all of the required tasks are performed on time. The intermediate inspections can be performed in-house.

4 | Shipping and storage

Caution! The system can 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 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 treated 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 sound manner.

5.2 Product

If this symbol (crossed out waste bin) is on the product, European Directive 2012/19/EU applies to this product. This means that this product and the electrical and electronic components must not be disposed of as household waste.

Find out about the local regulations on the separate collection of electrical and electronic products.

Use the collection points available to you for disposing of your product.

For information on collection points for your product, contact your municipality, the public waste management authority, an authorised body for the disposal of electrical and electronic products or your waste collection service.

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 regulations and stipulates information that you will need for the safe operation of your demanganisation system.

Among other things, the set of rules stipulates that:

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

2 | Intended use/area of application

The GENO-mat MN-Z demanganisation systems are designed for the reduction of iron and/or manganese. They are used for private water supply plants with maximum values of up to 3.0 mg/l of iron and 1.0 mg/l of manganese. If the systems are operated properly and handled according to the operation manual, pure water values as required by the German Drinking Water Ordinance (TrinkwV) can be achieved.

For an optimum reduction of iron and manganese, a pH value > 7.2 is required. A dosing system for oxidants has to be provided upstream of the demanganisation system.

However, should ammonium (> 0.1 mg/l) be detected in the raw water, an additional treatment step is required.

3 | Function

The demanganisation system GENO-mat MN-Z is operated with the natural, catalytic filter material Fermanit. A central control valve automatically controls the operating cycles filtration - backwash - and first filtrate.

3.1 Filters

The raw water flows into the filter tank via the raw water inlet and then, from top to bottom, through the catalytic filter material. By means of an oxidation process, dissolved iron and manganese salts are transformed into insoluble oxides and are deposited on the Fermanit material.

In this oxidation process, the Fermanit releases electrons to the iron and manganese until the supply is exhausted. The electrons have to be replaced continuously by dosing GENO-oxi plus (refer to product data sheet).

By dosing oxidants, the oxidation and precipitation of iron and manganese already takes place prior to their contact with the Fermanit material. Thanks to its catalytic properties a complete oxidation and due to the excellent filtration characteristics, an optimum filtration are achieved. The filtered pure water is then directed via the lower distributing nozzle and the riser pipe through the pure water outlet into the piping system.

3.2 Backwashing

During the backwash process, the filter bed is forcibly flushed from bottom to top and thus loosened up. Impurities retained during the filtration process are washed out via the drain outlet at the control valve. The demanganisation system must be backwashed every 6 days at the latest (for the setting refer to chapter F).

3.3 First filtrate

By an automatic switch-over of the central control valve, the filter bed will forcibly be flushed from top to bottom. This first filtrate is discharged to the drain and afterwards, the demanganisation system GNEO-mat MN-Z is ready for operation once again.

3.4 Regeneration/disinfection

For operating and hygienic reasons, the demanganisation system must be regenerated every 6 months with GENO special granulate or GENO-oxi plus.

3.5 Control unit

The demanganisation system GENO-mat MN-Z is time-controlled via an electrical timer.

In order to properly use the automatic timer control, the time interval between two filter sequences (backwash interval in days) must be set.

C Product description

1 | Type designation plate

The type designation plate is located on the control head of the demanganisation system. In order to speed up the processing of your inquiries or orders, please specify the data shown on the type designation plate of your system when contacting Grünbeck. Please add the necessary information to the table below to have it readily available whenever necessary.

Demanganisation system	**GENO-mat MN-Z**
Serial number:	☐☐☐☐☐☐ / ☐
Order number:	☐☐☐ ☐☐☐

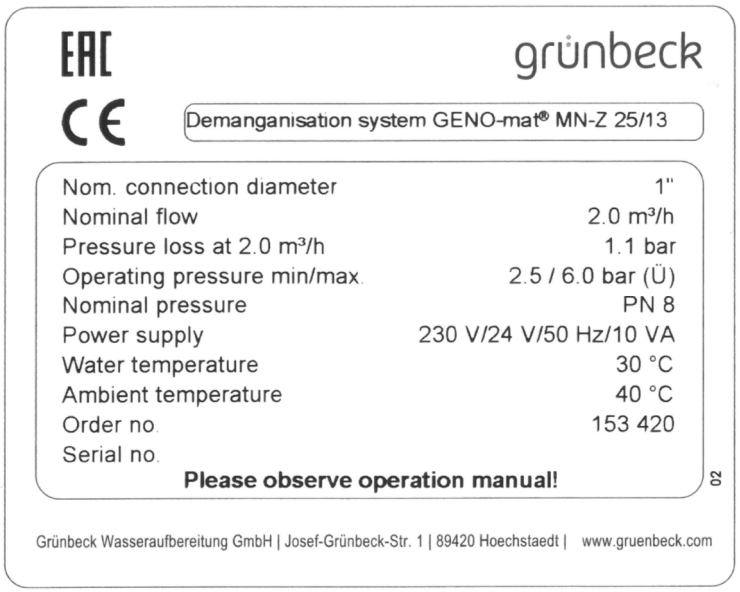


Fig. C-1: Type plate for demanganisation system GENO-mat MN-Z

2 | Technical specifications

The GeNO-mat MN-Z demanganisation system is a single system with integrated bypass for the supply of raw water during the backwash process. It is equipped with a timer control. The backwash is initiated after a set time interval.

All system data is summarised in table C-1. The data refers to the standard versions of the GeNO-mat MN-Z demanganisation system. Possible deviations in case of special versions are communicated separately, if applicable.

Caution! Electrically operated valves. In case of a power failure during the backwash, water may enter the drain. In the event of power failure, check the system and shut-off the water supply, if necessary.

Table C-1: Technical specifications		Demanganisation system GENO-mat MN-Z						
		20/10	25/13	30/14	40/17	40/18	50/19	60/20
Connection data								
Nominal connection diameter		DN 25 (1")			DN 40 (1½“)			
Min. drain connection		DN 50					DN 70	
Nominal flow rate (depending on the iron concentration)	[m³/h]	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Power supply	[V/Hz]	230/50						
Connected load	[VA]	10						
Protection type/protection class		IP 54/⏚						
Performance data								
Nominal pressure		PN 10						
Min./max. operating pressure	[bar]	2.5/6.0						
Pressure loss at nominal flow	[bar]	0.5	1.1	1.0	1.1	1.0	0.8	1.1
Dimensions and weights[1)]								
Total height	[mm]	1360	1620	1620	1900	1900	1870	2100
Exchanger tank ∅	[mm]	210	260	340	370	420	550	620
Regeneration tank ∅	[mm]	465					680	
Height of regeneration tank	[mm]	840					1010	
Connection height/raw water piping	[mm]	1160	1420	1420	1710	1710	1680	1910
Connection height/pure water piping	[mm]	1210	1470	1470	1735	1735	1705	1935
Distance to wall	[mm]	200	230	280	280	300	365	405
Depth of foundation	[mm]	400	450	500	500	550	600	650
Length of foundation	[mm]	1850	1950	2050	2050	2100	2250	2350
Operating weight (incl. water)	[kg]	76	135	213	311	361	642	947
Filling volume and consumption data[1)]								
Filter layer I, bottom, gravel 3.0 - 5.6	[kg]	10	10	25	25	25	50	50
Filter layer I, bottom, gravel 3.0 - 5.6	[l]	7	7	18	18	18	35	35
Filter layer I, bottom, gravel 3.0 - 5.6 (dimension a)	[mm]	860	1170	1100	1400	1430	1320	1570
Filter layer II, middle, GENO Fermanit	[kg]	25	50	50	100	125	200	325
Filter layer II, middle, GENO Fermanit	[l]	12.5	25	25	50	63	100	163
Filter layer II, middle, GENO Fermanit (dimension b)	[mm]	500	690	810	930	950	900	1020
Filter layer III, top, with quartz sand 0.4 – 0.8	[kg]	10	25	50	75	75	150	250
Filter layer III, top, with quartz sand 0.4 – 0.8	[l]	7	17	33	50	50	100	167
Filter layer III, top, with quartz sand 0.4 – 0.8 (dimension c)	[mm]	300	370	430	460	560	490	450
Free board	[l]	7	12	30	22	40	74	71
Amount of regeneration agent required								
Preparation amount	[l]	30[2)]	50[2)]	60[2)]	100[2)]	100[2)]	200[2)]	300[2)]
GENO special granulate	[g]	105	175	210	350	350	700	1050
GENO-oxi plus	[l]	5	9	11	17	17	35	53
Total waste water volume per regeneration (3 bar)	[m³]	1	1.3	1.7	2	2.7	3.4	5.4
Ambient data								
Duration of washing out (regeneration)	[min.]	30						
Duration of backwash	[min.]	10						
Backwash capacity	[m³/h]	1.6	2.3		3.4		5.7	
Max. water temperature	[°C]	30						
Max. ambient temperature	[°C]	40						
Order no.	**153 …**	**410**	**420**	**430**	**440**	**450**	**460**	**470**
Spare filter filling[3)]								
Order no.	**153 …**	**020**	**022**	**024**	**026**	**028**	**030**	**032**

1) All indications are approximate.
2) If the liquid product GENO-oxi plus is used, the GENO-oxi plus amount must be subtracted from the batch size.
3) all three filter layers

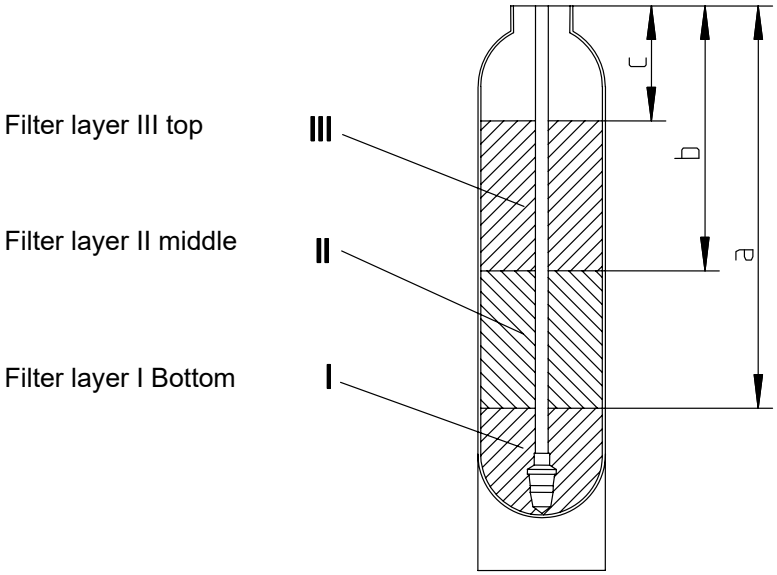


Fig. C-2: Filling of filter layers

3 | Intended use

The system is adjusted to the water demand to be expected at the installation site. It is not suitable for considerably differing performances. Do not exceed the peak flow under any circumstances.

The system may only be operated if all components are installed properly. Safety devices and equipment must NEVER be removed, bridged or tampered with.

Intended use of the device also implies that the information contained in this operation manual and all safety guidelines applying at the installation site be observed. Furthermore, the maintenance and inspection intervals must be respected.

4 | Scope of supply

4.1 Basic equipment

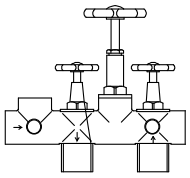
- Exchanger tank in double walled plastic housing.
- Filter materials (gravel, GENO Fermanit, quartz sand).
- Control valve made of red bronze with integrated timer control.
- Water test kit for manganese.
- Operation manual.

5 | Optional accessories

Note: It is possible to retrofit existing systems with optional components. Please contact your local Grünbeck representative or Grünbeck's headquarters in Höchstädt for more information.

PE tank 100 litre or 300 litre with litre scale and hand mixer to prepare the regeneration solution. The tank features an integrated suction device.

- Regeneration device 100 litres (FE/MN-Z 20/10 – FE/MN-Z 40/18) 153 094
- Regeneration device 300 litres (FE/MN-Z 50/19 – FE/MN-Z 60/20) 153 095



Mounting set 1:
For convenient hydraulic connection.
Compact valve block R 1" female thread, integrated bypass with shut-off valve, shut-off valves for hard and soft water, outlet for raw water (e.g. garden hose), 2 connection hoses

Mounting set R 1“ (up to type 30/14) 125 845

Complete dosing system consisting of dosing pump GP-2/40 (GP-6/40), water meter 1" (1½"), dosing point, opaque suction lance, dosing hose.

- Dosing system suitable for MN-Z 20/10 – MN-Z 30/14 Dosing system GENODOS DM-oxi 1" 163 420
- Dosing system suitable for MN-Z 40/17 – MN-Z 60/20 Dosing system GENODOS DM-oxi 1½" 163 430
- Overflow valve GENODOS DM-oxi 1",1½" 163 790

6 | Consumables

Only use genuine consumables in order to ensure the reliable operation of the system.

6.1 Oxidants for the regeneration/disinfection of demanganisation systems

GENO special granulate[1)] (1 kg)	170 016
GENO special granulate[1)] (5 kg)	170 017
GENO-oxi plus (20 kg/19.7 litres)	170 029

[1)] **Note:** Registration by the Federal Surveillance Authority for Opium according to the Controlled Substances and Precursors Act required.

6.2 Test device for manganese measuring range 0.0 mg/l - 0.8 mg/l and 1.0 mg/l - 10.0 mg/l

For the quantitative, colorimetric determination of dissolved manganese in the measuring range of 0.03 mg/l – 0.5 mg/l. Quick test kit consisting of:

2 test vials and comparison scale	170 124
2 reagent Mn -1 A	
1 reagent Mn - 2 A	
1 reagent Mn - 3 A	

6.3 Test kit for iron, measuring range 0.0 mg/l - 0.8 mg/l and 1.0 mg/l - 10.0 mg/l

For the quantitative, colorimetric determination of dissolved iron in the measuring range of 0.0 mg/l – 0.8 mg/l respectively 1.0 mg/l – 10 mg/l. Quick test kit consisting of:

1 test glass with 3 chambers and scale;	170 150
Test tablets (0.0 mg/l-0.8 mg/l) 30 tablets;	
Test tablets (0.1 mg/l-10 mg/l) 30 tablets;	

6.4 Spare filter filling, complete

Refer to table C-1 „Technical specifications“

6.5 Wearing parts

Seals and control pistons are subject to a certain wear and tear in the event of heavy duty. 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.

Seals, control piston, injector, actuator

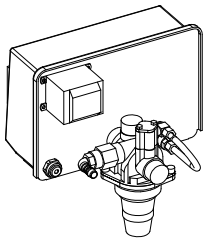


Fig. C-3: Control head
nominal connection diameter DN 25 (1")

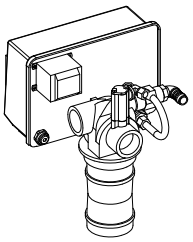


Fig. C4: Control head
Nominal connection diameter DN 40 (1½")

D Installation and operation

1 | General installation information

The installation site must offer adequate space. A foundation of a sufficient size and adequate load carrying capacity has to be provided. The required connections must be provided prior to the installation. For dimensions and connection data, please refer to table D-1.

Table D-1: Installation data	**Demanganisation system GENO-mat MN-Z**						
	20/10	**25/13**	**30/14**	**40/17**	**40/18**	**50/19**	**60/20**
Connection data							
Nominal connection diameter	DN 25 (1")			DN 40 (1½“)			
Min. drain connection	DN 50					DN 70	
Nominal flow rate (depending on the iron concentration) [m³/h]	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Power supply [V/Hz]	230/50						
Connected load [VA]	10						
Protection type/protection class	IP 54/⏚						
Dimensions and weights[1)]							
Total height [mm]	1360	1620	1620	1900	1900	1870	2100
Exchanger tank ∅ [mm]	210	260	340	370	420	550	620
Regeneration tank ∅ [mm]	465					680	
Height of regeneration tank [mm]	840					1010	
Connection height/raw water piping [mm]	1160	1420	1420	1710	1710	1680	1910
Connection height/pure water piping [mm]	1210	1470	1470	1735	1735	1705	1935
Distance to wall [mm]	200	230	280	280	300	365	405
Depth of foundation [mm]	400	450	500	500	550	600	650
Length of foundation [mm]	1850	1950	2050	2050	2100	2250	2350
Operating weight (incl. water) [kg]	76	135	213	311	361	642	947

[1)] All indications are approximate.

Note**:** For the installation of systems with optional accessories (refer to Chapter C, item 5), also observe the operation manuals supplied with these components.

1.1 Water installation

It is imperative that you comply with certain regulations when installing the GENO-mat MN-Z demanganisation system. Additional recommendations are given in order to facilitate the handling of the system. The installation instructions described below are also illustrated in fig. D-2.

Mandatory regulations

The installation of the GeNO-mat MN-Z demanganisation system represents a major interference with the drinking water system. Therefore, only authorised experts may install such systems. In Germany, the installation company must be registered in a water company installation directory as per §12(2) AVBWasserV (German Ordinance on General Conditions for the Supply of Water).

- Observe local and general installation guidelines.
- Provide a drain connection to discharge the backwash water.
- The installation room must have a floor drain (DN 100). If no floor drain is available, a corresponding water stop device has to be installed.
- Observe the flow direction!

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

Recommendations

- Provide a sampling valve and a pressure gauge directly upstream and downstream of the GeNO-mat MN-Z demanganisation system (0 -10 bar). This simplifies the sampling for the regular determination of the iron concentration (functional check).

1.2 Electrical installation

A shock-proof plug is adequate for the electrical connection. However, it must comply with the specifications given in table D-1, may not be further than 1.20m away from the GeNO-mat MN-Z demanganisation system and must carry constant voltage (do not couple with light switch)!

2 | Preliminary work

1. Unpack all system components.
2. Check for completeness and undamaged condition.
3. Place the filter tank at the designated location.

Extract from Table D-1

Table D-2: Filling volumes[1)]		**Demanganisation system GENO-mat MN-Z**						
		20/10	**25/13**	**30/14**	**40/17**	**40/18**	**50/19**	**60/20**
Filling volumes and consumption data								
Bottom filter layer I, gravel 3.0 - 5.6	[kg]	10	10	25	25	25	50	50
Bottom filter layer I, gravel 3.0 - 5.6	[l]	7	7	18	18	18	35	35
Filter layer I, bottom, gravel 3.0 - 5.6 (dimension a)	[mm]	860	1170	1100	1400	1430	1320	1570
Filter layer II, middle, GENO Fermanit	[kg]	25	50	50	100	125	200	325
Filter layer II, middle, GENO Fermanit	[l]	12.5	25	25	50	63	100	163
Filter layer II, middle, GENO Fermanit (dimension b)	[mm]	500	690	810	930	950	900	1020
Filter layer III, top, with quartz sand 0.4 – 0.8	[kg]	10	25	50	75	75	150	250
Filter layer III, top, with quartz sand 0.4 – 0.8	[l]	7	17	33	50	50	100	167
Filter layer III, top, with quartz sand 0.4 – 0.8 (dimension c)	[mm]	300	370	430	460	560	490	450
Free board, approx.	[l]	7	12	30	22	40	74	71

[1)]All indications are approximate.

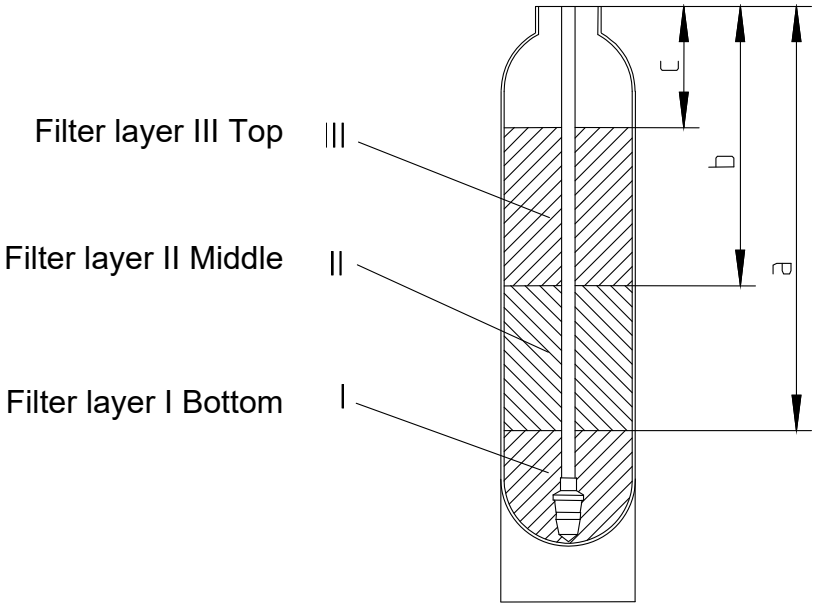
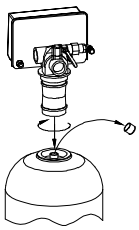


Fig. D-1: Filling of filter layers

Centre rising pipe,
Fill with filter material

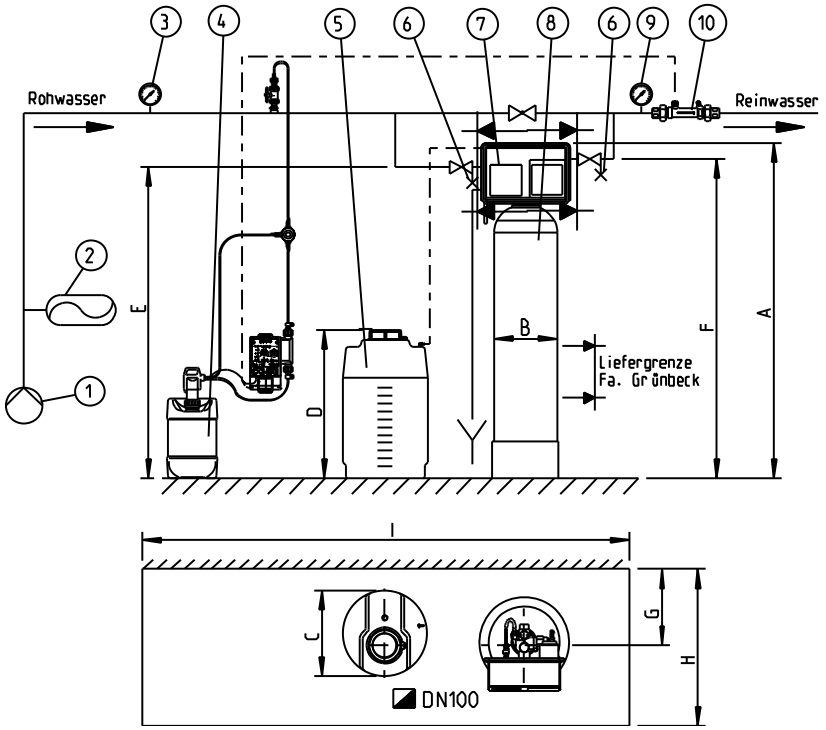


Remove the protective cap,
fix the control head in place.

1. Fill filter tank up to 50 % with water.
2. Check whether the riser pipe is covered by a protective cap, plug on the protective cap, if necessary. The protective cap prevents material from entering the riser pipe.
3. Centre the filter tank in the rising pipe.
4. Fill the tank with filter material by using the funnel supplied with the system (refer to figure). Refer to Table D-2 for fill volumes.
5. Fill up the filter tank with water
6. Centre the riser pipe precisely.
7. Clean the filter tank’s screw thread and the sealing surface for the connection of the control valve from any filter material that might be clinging to them.
8. Remove the protective cap from the riser pipe.
9. Put the control valve from above onto the rising pipe and fasten it by turning it to the right.

3 | How to connect the system

1. Establish the water connection as described in the erection drawing (fig. D-2 (a) (b). Observe the guidelines and recommendations given in section 1.



① Pump (provided by others)
② Membrane expansion vessel (provided by others)
③ Pressure gauge inlet pressure (on site)
④ GENODOS DM-oxi dosing (option)
⑤ Regeneration tank for demanganisation (option)
⑥ Sampling valve (on site)
⑦ Control valve operating voltage
⑧ Demanganisation system GENO-mat MN-Z incl. filter material
⑨ Pressure gauge outlet pressure (on site)
⑩ Contact water meter (scope of supply, pos. 4)

Fig. D-2 (a) : Installation drawing for demanganisation system GENO-mat MN-Z

Dimensions in Fig. D-2 (a); Extract from table D-1			Demanganisation system GENO-mat MN-Z						
			20/10	25/13	30/14	40/17	40/18	50/19	60/20
Dimensions and weights[1)]									
A	Total height	[mm]	1360	1620	1620	1900	1900	1870	2100
B	Exchanger tank ∅	[mm]	210	260	340	370	420	550	620
C	Regeneration tank ∅	[mm]	465					680	
D	Height of regeneration tank	[mm]	840					1010	
E	Connection height/raw water piping	[mm]	1160	1420	1420	1710	1710	1680	1910
F	Connection height/pure water piping	[mm]	1210	1470	1470	1735	1735	1705	1935
G	Distance to wall	[mm]	200	230	280	280	300	365	405
H	Foundation depth	[mm]	400	450	500	500	550	600	650
I	Foundation length	[mm]	1850	1950	2050	2050	2100	2250	2350

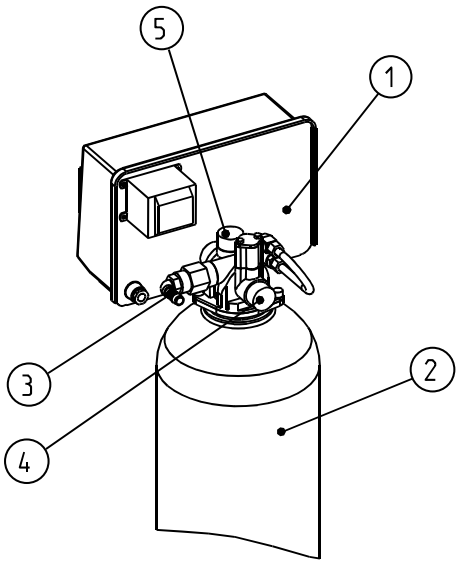
[1)]All indications are approximate.

Caution! Dirt and corrosion particles might damage the system (control valve). Flush the supply pipe prior to start-up.

2. Establish waste water connection as per DIN EN 1717. Shorten the rinsing water hose to the length required and direct it to the drain. Make sure that there is a free outlet (min. 20 mm) to the drain. Secure the hose with suitable means to prevent the hose from moving about (exiting regeneration water is pressurised).

Caution! Danger of damage and malfunction due to backflow of waste water. Therefore, do not bend the hose and do not lead it higher than the system height.

3. Connect the mains plug to the socket (cf. 1.2).
4. Water the system
   In order to prevent the filter material from being washed out, it must be watered for 24 hours.



① Control valve
② Filter tank
③ Drain connection
④ Raw water inlet
⑤ Raw water outlet

Fig. D-2 (b): Demanganisation system GENO-mat MN-Z, rear view

E Commissioning

The work described below may only be performed by trained experts. We recommend to have the start-up performed by Grünbeck's technical service/authorised service company.

Warning! Risk of bacterial growth due to stagnation! According to VDI 6023, filling the system with drinking water before normal operation commences is prohibited.

The demanganisation system GENO-mat MN-Z must therefore only first be connected to the drinking water system immediately prior to commissioning.

1 | How to start up the system

1. Open the valve on the raw water inlet.
2. Open the valve at the pure water outlet.
3. Perform a visual check. Ensure that no water leaks from the system at any point.
4. Rinse out fine particles
   The filter material contains a small amount of fine particles which must be flushed by means of a backwash prior to start-up. Initiate a manual regeneration
   (refer to chapter F, item 1.4).

Note: The backwash process must be repeated until the backwash water that flows to the drain in the process step "first filtrate" is clear.

5. Take a water sample at the sampling valve downstream of the unit.
6. Determine the manganese concentration using the water test kit.
7. Complete the cover sheet and column 1 in the operating log.

2 | Special treatment of the demanganisation system

As GENO-Fermanit is a natural product, it is not possible to rule out the presence of manganese compounds as MnO, MnO_2 or as Mn_2O_3. This means that during commissioning, it may occur that the manganese value is higher downstream of the system than in the inlet water. In this case, a special treatment should be performed.

The special treatment is performed using a kitchen salt solution (NaCl).

- Fill the regeneration unit (optional accessory, see chapter C, point 5) with saturated brine
  (For quantities, see Table E-1).
- Performing a special treatment
  (For procedure, see chapter G, point 3).

Then perform a regeneration process with GENO special granulate or
GENO-oxi plus (see chapter G, point 3.1).

Table E-1: Required brine volume		**Demanganisation system GENO-mat MN-Z**						
		20/10	**25/13**	**30/14**	**40/17**	**40/18**	**50/19**	**60/20**
Required brine volume	[l]	15	30	40	66	88	130	221

Caution! Special treatment only following consultation with the factory, or carried out by Grünbeck's technical service/authorised service company.

2.1 Continuous addition of GENO-oxi plus

Caution! The following instructions only apply when using the intended system components (see chapter C, point 5).
When using other system components (a different GENODOS pump or water meter), a special design is required (factory/sales department).

Installation in accordance with the installation drawing (see chapter D, point 3, fig. D-2).

Following commissioning of the demanganisation system, the continuous addition of GENO-oxi plus should be carried out initially for around 6 weeks. The stroke length of the GENODOS pump should be set to 80%. After the run-in time, the stroke length can be reduced each week by 10 % until manganese breaks through (but to a maximum of 30%). This means that the limit value has been reached. Finally, increase the stroke length for subsequent operation by 10%.

Stipulations:
Iron content: mg/l

Manganese content: mg/l

Determination of the iron/manganese equivalent.

Specific iron/manganese equivalent value (SEV):

$$\text{Fe - Mn equivalent}\left[\frac{mg}{l}\right] = \text{iron content}\left[\frac{mg}{l}\right] + 2\text{x manganese content}\left[\frac{mg}{l}\right]$$

(With deferrisaton system installed upstream, the iron content must not be taken into account)

Example
Iron content: 1.0 mg/l

Manganese content: 0.25 mg/l

$$\text{Fe - Mn equivalent } 1{,}0\left[\frac{mg}{l}\right] + 2\text{x manganese content} 0{,}25\left[\frac{mg}{l}\right] = 1{,}5\left[\frac{mg}{l}\right]$$

Table E-2: GENODOS pump setting

Dosing system GENODOS DM-oxi 1" GP-2/40 with WM 0.33 l/Imp.				Dosing system GENODOS DM-oxi 1½" GP-6/40 with WM 0.25 l/Imp.			
Fe/Mn equivalent	Dosing volume[2] [ml/m³]	Pump factor[1]	Pulse division position[1]	Fe/Mn equivalent	Dosing volume[2] [ml/m³]	Pump factor[1]	Pulse division position[1]
< 0.5	< 19	0.02	9	< 0.5	< 19	0.02	9
≥ 0.5	≥ 20	0.025	8	≥ 0.5	≥ 20	0.025	8
≥ 0.6	≥ 29	0.033	7	≥ 0.7	≥ 29	0.033	7
≥ 0.7	≥ 34	0.05	6	≥ 0.9	≥ 34	0.05	6
≥ 1.1	≥ 53	0.066	5	≥ 1.3	≥ 53	0.066	5
≥ 1.4	≥ 67	0.1	4	≥ 1.7	≥ 67	0.1	4
≥ 2.1	≥ 101	0.125	3	≥ 2.5	≥ 101	0.125	3
≥ 2.7	≥ 129	0.2	2	≥ 3.2	≥ 129	0.2	2
≥ 4.2	≥ 201	0.33	1				

[1] The description of the operation/setting of the GENODOS pump can be found in operation manual 118 940 (included with the GENODOSDM-oxi dosing system)!

[2] Corresponding to a 2% potassium permanganate solution.

Note: The calculated pump settings are guide values only and must be optimised on site. We work on the basis that the raw water is always free of ammonia and hydrogen sulphides!

F Operation

1 | How to operate the control unit

The control unit regulates the operating processes of the demanganisation system.

1.1 How to set the time

GENO-mat MN-Z demanganisation systems are factory-set so that the automatic backwash is started at 2am each day (during the night). Set the current time during commissioning or after a power failure.

1. Loosen the screw on the housing cover (top right).
2. Open the housing cover.
3. Press and hold the red button (fig. F-1, pos. 6).
4. Turn the 24 hour disk until the reference arrow (fig. F-1, pos. 2) points to the current time.
5. Release the red button (fig. F1, pos. 6).

Note: If the preset time for the backwash (2:00 am) is unfavourable for internal reasons, set a time which deviates from the current time on the 24 hour disk to adjust the starting time for the backwash.

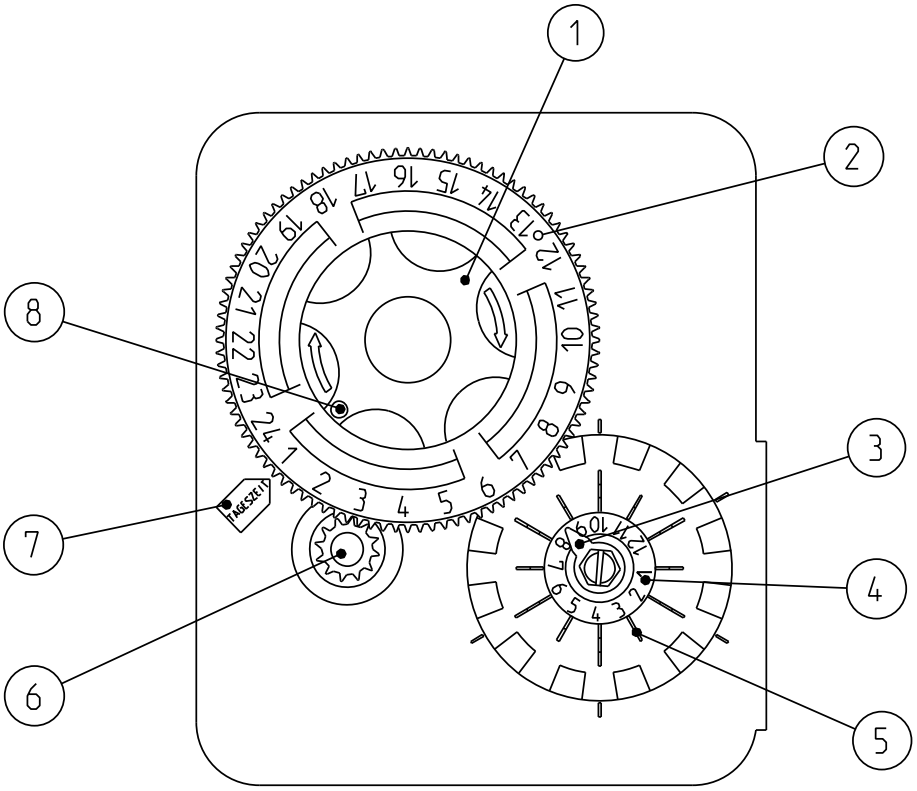
Example:
Desired starting time of the backwash: 22:00
→ Move clock forward 4 hours.

1.2 How to set the backwash interval

The maximum backwash interval is 12 days. Furthermore, an automatic backwash can be carried out after 6, 4, 3, 2 or 1 day(s) (factors of 12). Fig. F-1 indicates the setting for a backwash to be carried out every 2 days.

1. Determination of the backwash interval.

- For hygienic reasons, a backwash should be carried out every 6 days (factory-setting).
- If the differential pressure of the filter is > 0.3 bar above normal after 6 days due to a higher concentration of dirt in the water, a backwash process should be initiated every 4 days or at even shorter intervals.
- The same applies in case of an early breakthrough of dirt particles.



① Backwash dial
② Hour dial
③ Reference arrow (red)
④ Day dial
⑤ Steel switching pin (in home position moved to centre point, in switch position moved outwards)
⑥ Button for time setting
⑦ Reference arrow for current time and operating state (black)
⑧ Reference point for operating state (white)

Fig. F-1: Control unit and operating elements "front view"

2. Push the switching pin (fig. F-1, pos. 5) outwards for the 1st day.
3. Set the other switching pins as required.
   On all days where the switching pins are pushed outwards, the backwash is initiated. In order to set, for example, a backwash interval of 3 days, the switching pins in positions 1, 4, 7 and 10 on the day disk must be pushed outwards (fig. F-1, pos. 4).

1.3 How to read the operating state

The current operating state may be read from the position of the reference point (fig. F-1, pos. 8) on the backwash wheel (fig. F-1, pos. 1).

The reference point (fig. F-1, pos. 8) lies opposite the reference arrow (fig. F-1, pos. 7).	Operating mode: pure water is available.

All other settings from the reference point (fig. F-1, pos. 8).	Backwash; the backwash wheel (fig. F-1, pos. 1) turns clockwise; the progress of the backwash can be read from the position of the reference point (fig. F-1, pos. 8).

The day disk (fig. F-1, pos. 4) turns counter-clockwise once in 12 days. The red reference arrow (fig. F-1, pos. 3) points to the position where a switching pin turned outwards initiates a backwash. In the operating mode, the distance between the reference arrow (fig. F-1, pos. 3) and the following switching pin which is turned outwards is an indication for the number of days until the next backwash.

1.4 How to initiate a manual backwash

Manual regeneration should be initiated if

- the differential pressure of the demanganisation system is more than 0.3 bar above normal before the timer control initiates the backwash.
- the systems are restarted after longer periods of standstill.
- maintenance or repair work has been carried out.

Irrespective of the set backwash interval and the time, the backwash can be initiated manually at any time.

1. Check the operating status.

Only in operating mode:

2. Turn backwash wheel (fig. F-1, pos. 1) to the right by one catch (note the click!).

The demanganisation system starts the backwash process, the backwash wheel (fig. F-1, pos. 1) slowly turns clockwise. After approx. 3 hours, the backwash is terminated and the white reference point (fig. F-1, pos. 8) is located opposite of the black reference arrow for the current time again (fig. F-1, pos. 7).

G Maintenance and care

1 | Basic information

To guarantee the reliable function of the GENO-mat MN-Z demanganisation systems over a long period of time, some maintenance work must be performed at regular intervals. This applies in particular to the backwash in the drinking water sector where the required measures are defined in the pertinent regulations and guidelines. All regulations and guidelines which apply at the installation site must be strictly adhered to.

DIN EN 806-5 stipulates:

- Inspection every 2 months
- Maintenance every 6 months
- The maintenance work has to be performed by the Grünbeck's technical service/authorised service company or by an authorised specialist company.
- An operation 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 operation log is attached to this operation manual.

2 | Inspection (functional check)

You may perform the regular inspections yourself.

Overview: Inspection work

- Determine inlet water (manganese, iron).
  (Water test kit)
- Determine pure water (manganese, iron).
  (Water test kit)
- Differential pressure of the system
- Check control unit settings:
  a) Time
  b) Test raw water hardness

Note: Minor deviations are normal and cannot be prevented technically. If you detect major deviations, please notify Grünbeck's technical service/authorised service company.

- Check the entire system for outward tightness.
- Check control valve to drain for tightness (in operating mode).

3 | Maintenance

Maintenance work on the GENO-mat MN-Z demanganisation systems may only be performed by Grünbeck's technical service/authorised service company or by an approved specialist.

An operation log must be kept for GeNO-mat MN-Z demanganisation systems. 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

- Read water pressure, flow pressure and if necessary, water meter reading.
- Determine iron and manganese concentrations.
- Check release of backwash.
- Check control valve for tightness, replace wearing seals if necessary, check the proper function of the drive motor of the control valve, clean injector and sieve.
- Regenerate and disinfect the system.
- Check the level of the filter material in the filter tank. Refill filter material, if required.

3.1 Regeneration/disinfection of GENO-mat MN-Z demanganisation systems

Note: We recommend to have the regeneration/disinfection performed by Grünbeck's authorised technical service/authorised service company.

3.1.1 Oxidant

Area of application:
Oxidizing agents are used for the regeneration and disinfection of deferrisation and demanganisation systems; they are also dosed upstream of deferrisation and demanganisation systems in order to completely oxidise iron II and manganese II compounds.

The dosing and the dosing volumes depend on the iron and manganese concentrations contained in the raw water.

You can use either our GENO special granulate[1)] or GENO-oxi plus (liquid).

3.1.2 Preparing the regeneration agent

- Fill the regeneration tank with filtered water (for respective quantities refer to Table G-1). We recommend installing a filling tap in the pure water pipe for this purpose.
- Pour the GENO special granulate[1)] or GENO-oxi plus into the tank and mix using the integrated hand mixer until the special granulate has dissolved completely.
- Install a suction hose between the regeneration tank and the ball valve at the control valve.

[1)] **Note:** Registration by the Federal Surveillance Authority for Opium according to the Controlled Substances and Precursors Act required.

Table G-1: Amount of regeneration agent required		**Demanganisation system GENO-mat MN-Z**						
		20/10	**25/13**	**30/14**	**40/17**	**40/18**	**50/19**	**60/20**
Preparation amount	[l]	30[2)]	50[2)]	60[2)]	100[2)]	100[2)]	200[2)]	300[2)]
GENO-oxi plus	[l]	5	9	11	17	17	35	53
GENO special granulate[1)]	[g]	105	175	210	350	350	700	1050

[2)] If the liquid product GENO-oxi plus is used, the GENO-oxi plus amount must be subtracted from the batch size.

3.1.3 Timer settings

- For the regeneration/disinfection the corresponding regeneration tank and the appropriate regeneration agent are required (refer to 3.1 preparation of the regeneration agent).
- Flip the cover of the control valve to the side.
- Initiate a manual regeneration (see chapter F, point 1.4).
- Flip the timer to the right and wait for 10 minutes until limit switch 1 is free (fig. G-1, illustration 1) and the actuator of the control piston has stopped.
- Unplug mains plug.
- Open the ball valve on the back of the control valve and suck the regeneration agent from the connected regeneration tank.
- Close the ball valve again after the regeneration agent has been completely sucked off.
- Reconnect mains.
- Wait until limit switch 1 is pressed again (fig. G-1, illustration 2) and the actuator of the control piston has stopped.
- Unplug mains plug.
- Flush for at least 30 minutes in order to wash out all residues of the regeneration agent from the filter bed.
- Reconnect mains.
- The demanganisation system is ready for operation again when the limit switches 1 and 2 are free (fig. G-1, illustration 3).
- Screw cover back on.

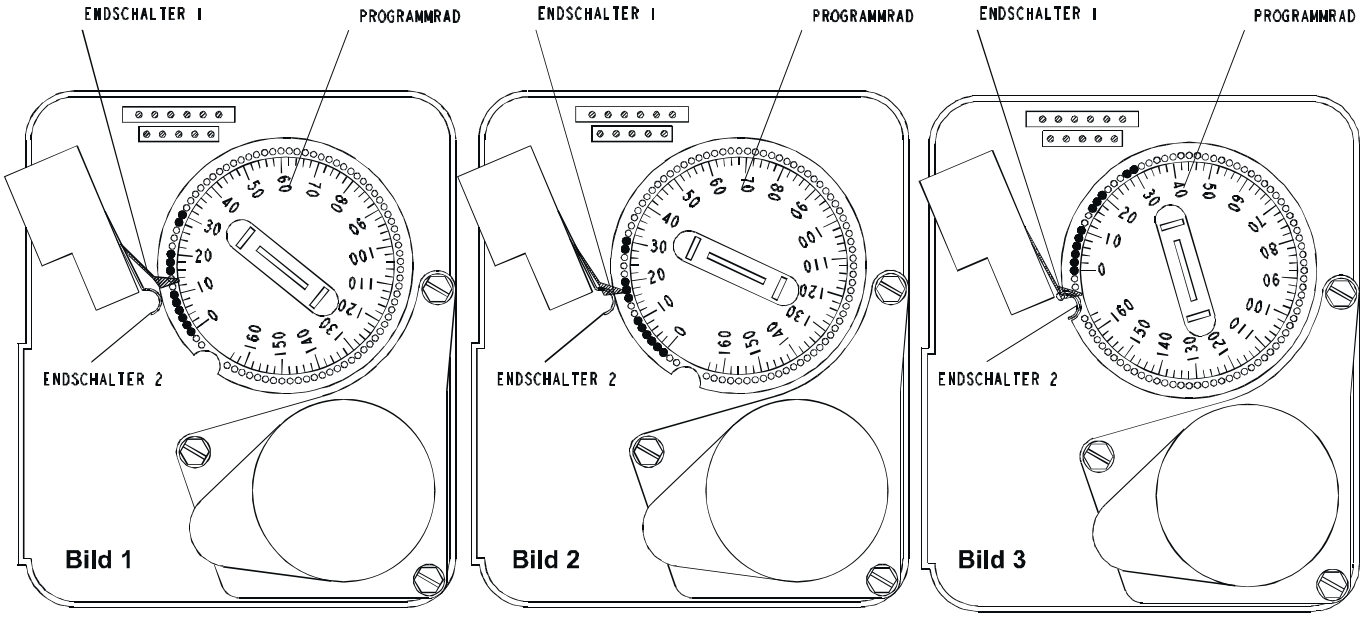


Fig. G-1: Rear of timer

3.2 Operation log

The operation log is located in chapter G, point 5 of this operation manual. When commissioning 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 check list whenever maintenance is performed. This document provides evidence of proper maintenance.

4 | Spare parts

You can order spare parts and consumables from your local Grünbeck representative (refer to www.gruenbeck.com).

5 | Operation log

Customer

Name: .....

Address: .....

.....

.....

Demanganisation system GENO-mat MN-Z

(Please check appropriate box)

Serial number ....

Installed by..... .....

Filter: Make/type ..... / .....

20/10	☐
25/13	☐
30/14	☐
40/17	☐
40/18	☐
50/19	☐
60/20	☐

Connection data:	Drain connection DIN EN 1717	☐	yes	☐	no
(Please check appropriate box)	Floor drain available	☐	yes	☐	no

Maintenance work on demanganisation system GENO-mat MN-Z Checklist			
Please enter measured values. Confirm checks with OK or enter repair work performed.			
Maintenance performed (date)	Start-up		
Measured values			
Water pressure [bar] upstream and downstream of the system			
Flow pressure [bar] upstream and downstream of the system			
Water meter reading [m³]			
Iron/manganese inlet (measured)			
Iron/manganese pure water (measured)			
Inspections and checks on control unit and control head			
Initiation of backwash checked			
Injector and sieve cleaned			
Control head checked for leaks			
Function of drive motor checked			
System "regeneration and disinfection"			
System treated with special granulate			
Connections, hose connections, seals			
Seals and hose connections checked			
Miscellaneous			
Remarks			
Customer service technician			
Company			
Work time certificate (no.)			
Signature			

Maintenance work on demanganisation system GENO-mat MN-Z Checklist			
Please enter measured values. Confirm checks with OK or enter repair work performed.			
Maintenance performed (date)			
Measured values			
Water pressure [bar] upstream and downstream of the system			
Flow pressure [bar] upstream and downstream of the system			
Water meter reading [m³]			
Iron/manganese inlet (measured)			
Iron/manganese pure water (measured)			
Inspections and checks on control unit and control head			
Initiation of backwash checked			
Injector and sieve cleaned			
Control head checked for leaks			
Function of drive motor checked			
System "regeneration and disinfection"			
System treated with special granulate			
Connections, hose connections, seals			
Seals and hose connections checked			
Miscellaneous			
Remarks			
Customer service technician			
Company			
Work time certificate (no.)			
Signature			

Maintenance work on demanganisation system GENO-mat MN-Z Checklist			
Please enter measured values. Confirm checks with OK or enter repair work performed.			
Maintenance performed (date)			
Measured values			
Water pressure [bar] upstream and downstream of the system			
Flow pressure [bar] upstream and downstream of the system			
Water meter reading [m³]			
Iron/manganese inlet (measured)			
Iron/manganese pure water (measured)			
Inspections and checks on control unit and control head			
Initiation of backwash checked			
Injector and sieve cleaned			
Control head checked for leaks			
Function of drive motor checked			
System "regeneration and disinfection"			
System treated with special granulate			
Connections, hose connections, seals			
Seals and hose connections checked			
Miscellaneous			
Remarks			
Customer service technician			
Company			
Work time certificate (no.)			
Signature			