Manual for chemical cleaning of:

Chillers, heat exchangers, boilers, and industrial process equipment

Cleaning with ScaleBreak

goodwaybenelux.com

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Descaling pump type: Goodway GDS-100



Goodway Benelux recommends using the following personal protection equipment when performing a chemical cleaning:



Acid-resistant gloves



Safety glasses and/ or full-face shields



Acid-resistant, protective clothing

1. Safety procedures before cleaning

1. **Isolation of the system**
   Make sure the system is pressureless and isolated from the entire system. Thereby ensuring the cleaning is only carried out on the specific system and not on any connected systems or piping.
2. **Check system integrity and damages**
   Make sure the system is free of damages which could cause leakages during cleaning. Always check integrity of couplings and valves before cleaning.
3. **Correct connection couplings**
   Make sure the system has the right connection couplings to connect the descaling pump to. Do not use couplings smaller than 1-1/2'', otherwise the flow will be restricted which leads to decreased cleaning results.
4. **Attach safety valves at the in- and outlets**
   Ensure valves are attached at the in- and outlet connections to close off liquid (over)flow, in case of a power outage.
5. **Set-up emergency response in case of leaks**
   Make sure there is a proper plan to collect liquids in case leakages form during cleaning. This can be done (for example) by using rubber collection mats in which the pump is placed.
6. **CO2 venting**
   Make sure CO2 gas escape and venting points are located throughout the system whenever scale deposits are being removed. (Check with Goodway Benelux product experts for more precise recommendation based on your specific situation.)
7. **Flushing and dumping preparations**
   Make sure to check how the used solution will be dumped on-site and make the necessary preparations. In most cases, we recommend using an IBC container to collect the used solution in and from there, neutralize, and then dump it.

2. Understanding descaling principles

1. **Cleaning-in-place (through circulation)**
   ScaleBreak descalers are designed primarily for cleaning by means of circulation, rather than submersion. For chillers, heat exchangers, boilers, and industrial process equipment, the descaler is circulated through the system for a set amount of time, thereby removing hard, water-formed deposits, such as calcium carbonate and rust deposits.

   Next to having the correct pump system in place, selecting the right descaler for the job is even more important. In chapter 3, you can find some more information about the ScaleBreak descalers. If unsure, please reach out to the service team of Goodway Benelux for recommendation and advice.

2. **Mixing ratios (descaler and water)**
   The mix ratio of descaling agent to water depends on the deposit type and amount present. Typically, the dilution range lies between 25-50%, with most jobs requiring between 30-35% dilution rate. For special materials, such as aluminum and galvanized steel, use ScaleBreak-MP specifically and do not exceed a mixture rate of 25%.

3. **Foaming reaction and CO2 production when descaling**
   During a descaling job - when scale deposits are dissolved - a natural reaction of CO2 production and foam creation will occur. By maintaining a set mixture rate and allowing sufficient time, this reaction can be kept under control by itself.

   For extreme cases, special defoamer solutions can be used to remove the foaming reaction. For CO2 buildup, it is important sufficient venting points are available. You can keep the tank cap of the GDS-pump open to release the produced CO2.

4. **Saturation of the descaler during cleaning**
   During the cleaning, the dissolved scaling will neutralize the acidic cleaning agent. Once neutralized far enough, the descaler will lose its effectiveness at removing more deposits. At this point, new (fresh) descaler should be added to keep the cleaning going. It's important to monitor this process during cleaning, which can be done by periodic (every 30 minutes) pH-sampling.

5. **Neutralization of the descaler after cleaning**
   After a cleaning, the solution that is left over might still be too acidic to discharge. In these cases, use sodium carbonate to further neutralize the solution. This must be performed in a separate container and not in the system that has just been cleaned.

   When adding sodium carbonate, the pH-level of the solution will be raised until it reaches a point where it may be discharged. Please note, heavy foaming can occur when the neutralization process is performed too quickly. (I.e., too much sodium carbonate dropped into the container at once.)

6. **Effects of temperature on ScaleBreak descalers**
   Cold temperatures can slow down the descaling process. ScaleBreak descalers rely on a chemical reaction that typically becomes about 50% slower for every 10 °C drop in temperature. In colder conditions, the solution can also become more viscous, which may reduce flow and increase the required circulation or dwell time.

   Normal water temperatures of around 12 – 15 °C are generally not a problem and ScaleBreak will still perform effectively. Heating is not always necessary, but increasing the temperature (ideally to 24 – 38 °C) can significantly speed up the cleaning process. Always ensure the temperature stays below the maximum pump system limit (50 °C).

   In summary: ScaleBreak descalers work in cold conditions but warming the solution can improve cleaning speed and efficiency, especially during winter operations.

3. ScaleBreak descaler compatibility with material

Selecting the correct descaler for a chemical cleaning of your system depends primarily on the materials that will come into contact with the descaler, along with the type of deposits that need to be removed. The table below shows which ScaleBreak descalers are compatible with each material commonly found in shell-and-tube heat exchangers, water-cooled chillers, plate heat exchangers, cooling towers, evaporative condensers, boilers, and other industrial process equipment. More than one descaler is usually compatible; the right choice depends on your system, deposits, and budget, so it is always a custom process. The summaries and notes below will help you choose, or reach out to us for a tailored recommendation.

Material	**ScaleBreak** (hydrochloric acid)	**ScaleBreak-MP** (citric acid)	**ScaleBreak-SS** (phosphoric acid)
Yellow metals (brass, admiralty brass, bronze, copper, copper-nickel 70/30, 90/10)	✓	✓	✓
Carbon steel, mild steel, cast iron	✓	✓	✓
Titanium	✓	✓	✓
Inconel, Hastelloy, Monel	✓	✓	✓
PVC and plastics	✓	✓	✓
Rubbers (NBR, EPDM, FPM/FKM), Viton, CSM, Hypalon, Neoprene	✓	✓	✓
PTFE (Teflon), Ceramic	✓	✓	✓
Stainless steel[1]	✗	✓	✓
Aluminum	✗	✓ max 25–30%	✓ max 30%
Galvanized steel	✗	✓ max 25–30%	✓ max 25–30%
Glass, Glass-lined equipment	✗	✓	✓

Material not listed - reach out to Goodway Benelux customer service by phone or e-mail: info@goodwaybenelux.nl or +31 183 216 170.

✗ not compatible ✓ compatible

- [1] *When struvite or vivianite deposits are present on stainless steel (often found in wastewater-treatment environments), use ScaleBreak-SS only - it is the only descaler that removes these.*
- *Rust and iron-oxide deposits (Fe_2O_3): use any compatible descaler at a concentration of 50% or higher.*

Choosing the right descaler

All three (3) descalers share the same core job — dissolving scale, rust, and other water-formed deposits — but differ in their acid base, speed, cost, and the materials they can safely touch. In short: choose ScaleBreak for speed and cost on compatible materials; ScaleBreak-MP for broad compatibility, gentler cleaning, and maximum material safety; and ScaleBreak-SS for stainless steel, aluminum, or struvite and vivianite deposits.

1. **ScaleBreak — hydrochloric acid**
   ScaleBreak is the fastest-working and most cost-effective product in the range — roughly 25–30% faster than ScaleBreak-MP. It is the natural first choice wherever it is compatible, which covers most common materials: yellow metals, carbon and mild steel, cast iron, titanium, nickel alloys, PVC and plastics, most rubbers, ceramic, and PTFE. Its strong hydrochloric-acid base also makes it the most effective option for rust and iron-oxide deposits. The main thing to keep in mind is material compatibility: as a hydrochloric-acid-based descaler, ScaleBreak isn't suited to stainless steel, aluminum, galvanized steel, or glass and glass-lined equipment. For those materials, ScaleBreak-MP or ScaleBreak-SS is the right choice.



2. **ScaleBreak-MP — citric acid**
   ScaleBreak-MP is a citric-acid-based, multi-purpose descaler — the versatile all-rounder. It dissolves slightly more scale per liter than ScaleBreak and is safe on a wider range of materials, including stainless steel, aluminum (max 25–30%), galvanized steel (max 25–30%), and glass and glass-lined equipment, where ScaleBreak cannot be used. This forgiving nature makes it the natural choice for mixed-material systems — especially when the exact materials aren't known — as it is compatible with most metals, alloys, and other materials, though some may call for a specific dilution. It works more slowly than the other two, but its gentleness and broad compatibility make it dependable, and it is the recommended choice for galvanized steel.



3. **ScaleBreak-SS — phosphoric acid**
   ScaleBreak-SS is a phosphoric-acid-based descaler engineered specifically for cleaning stainless steel equipment. Its phosphoric-acid base is safe for prolonged contact with stainless steel and eliminates the long-term risk of hydrogen embrittlement, so it cleans powerfully without attacking the material. That makes it the first choice for stainless steel equipment, and it is also the only descaler in the range that removes struvite and vivianite deposits. Beyond stainless steel, it is one of the fastest-working products in the range — comparable to ScaleBreak and roughly 25–30% faster than ScaleBreak-MP — and can be used safely on nearly any material, making it a premium upgrade option across the board; it also performs well on aluminum. As the premium-priced option, it is usually reserved for the applications that need it.



Corrosion inhibitors
All three (3) ScaleBreak formulas are fortified with superior corrosion inhibitors, which protect the base metals of your equipment during cleaning. This keeps corrosion rates very low and makes each formula safe to use on its compatible materials.

Guidance by deposit and material

Rust and iron-oxide deposits
When rust must be removed, ScaleBreak is the most effective choice — its hydrochloric-acid base dissolves rust and iron-oxide deposits better than citric or phosphoric acid. For rust, use a concentration of 50% or higher. Where ScaleBreak cannot be used, ScaleBreak-MP or ScaleBreak-SS will also remove rust, likewise at a concentration of 50% or higher.

Stainless steel
For stainless steel, ScaleBreak-SS is the recommended first choice: it is specifically designed to remove scale, rust, and other water-formed deposits from stainless steel, and its phosphoric-acid base is the safest option for prolonged contact, avoiding the risk of hydrogen embrittlement. ScaleBreak-MP is a suitable alternative for cleaning stainless steel equipment. Regular ScaleBreak must never be used on stainless steel.

Struvite and vivianite
ScaleBreak-SS is the only descaler in the range that removes struvite and vivianite deposits. These hard, rock-like formations are a common problem in wastewater-treatment plants, where they restrict flow, damage equipment, and increase maintenance costs. ScaleBreak-SS is engineered to dissolve them safely in stainless-steel equipment, restoring flow and efficiency. Because every system is different, the cleaning method — static soaking, circulation, flow reversal, or a combination — should be selected based on the severity and location of the buildup. ScaleBreak-MP must not be used on these deposits.

Aluminum
For aluminum, ScaleBreak-SS is the preferred descaler, used at a maximum concentration of 30% to protect the material. ScaleBreak-MP is a suitable alternative, at a maximum concentration of 25–30%. Regular ScaleBreak must never be used on aluminum.

Galvanized steel
For galvanized steel — commonly found in cooling towers and evaporative condensers — ScaleBreak-MP is the recommended choice, at a maximum concentration of 25–30%. Alternatively, ScaleBreak-SS can also be used at a maximum concentration of 25–30%. Regular ScaleBreak is not suitable for galvanized steel.

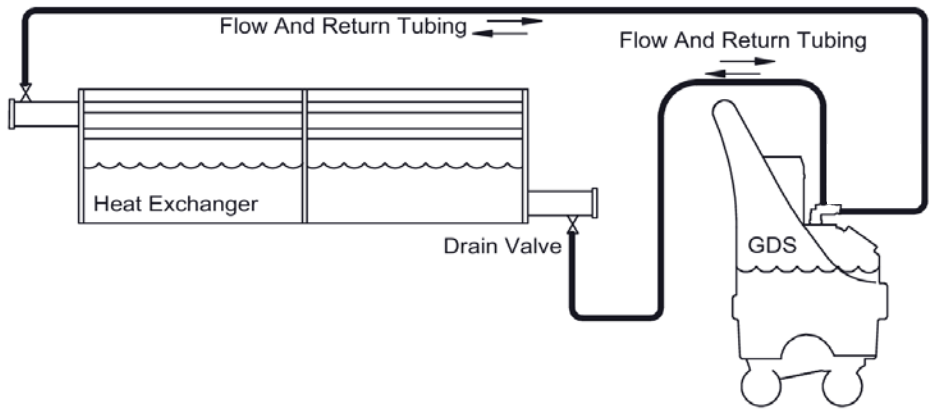
A note on pre-existing corrosion
ScaleBreak formulas have very low corrosion rates and are fortified with corrosion inhibitors that protect base metals during cleaning. In some cases, however, descaling can reveal pre-existing damage that was hidden beneath the deposits — most often under-deposit corrosion (UD) or microbiologically induced corrosion (MIC). This typically shows up as pitting, pinholes, roughened patches, or similar localized damage. It's important to understand that this corrosion was already there: it developed under the scale or biofilm over time and is simply exposed once the deposit is removed — it is not caused by the descaler.

This is most likely in systems that have gone a long time without cleaning, where scale and fouling have had years to build up and trap aggressive conditions against the metal underneath. The risk is higher where deposits are heavy, where there are stagnant or low-flow zones that let deposits and bacteria settle, and where warning signs are already visible beforehand — rust streaks or discoloration, slime or biofilm, pitting showing at accessible points, or a known history of poor or interrupted water treatment. Where these signs are present, it's wise to inspect the equipment before and after cleaning so any revealed corrosion can be assessed and repaired in good time. If you're unsure what to expect for your system, our product experts are happy to advise.

4. Operating instructions (step-by-step, divided in 4 categories)

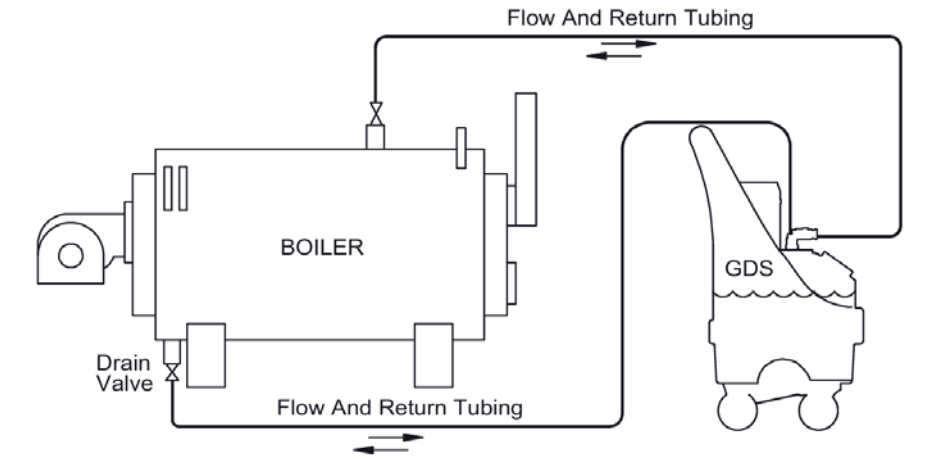
4.1 Setting up and connecting the descaling pump system

1. **Placement of pump system**
   Place the descaling pump system close to the installation which will be cleaned. Ideally, the pump is level to the equipment being cleaned. If the pump is significantly lower than the equipment being cleaned, some flow- and pressure loss may occur.
2. **Connecting the circulation- and water inlet hoses**
   Connect the water inlet hose to the GDS-pump. Also, connect the 2 circulation hoses to the system you are going to clean; always connect one hose to the bottom of the system and one to the top.
3. **Attaching safety valves at the in- and outlet**
   Connect valves to the in- and outlet connections to close off liquid (over)flow, in case of a power outage. Close off valves whenever the job location is left unmanned to prevent leakages due to overspilling. Especially important if the GDS pump is lower than the equipment being cleaned!



Schematic drawing on how to connect the GDS-pump to a shell-and-tube heat exchanger.

Always fill the system from the bottom, to ensure it is entirely filled and no air is left within.



Schematic drawing on how to connect the GDS-pump to a (mobile) boiler system.

Always fill the system from the bottom, to ensure it is entirely filled and no air is left within.

GDS-100 components:

1. Circulation hose connections (in- and outlet)
2. Tank cap
3. Fresh water inlet
4. Hose to system connection (1-1/2" camlock with valve)
5. Hose to pump connection (1-1/2" camlock with valve)
6. Y-strainer filter and sampling point
7. Dump valve
8. On/off switch
9. Pressure gauges (2x)
10. Variable flow valve (by-pass)
11. Valve for connecting an IBC-container
12. Valve for the 190-liter tank



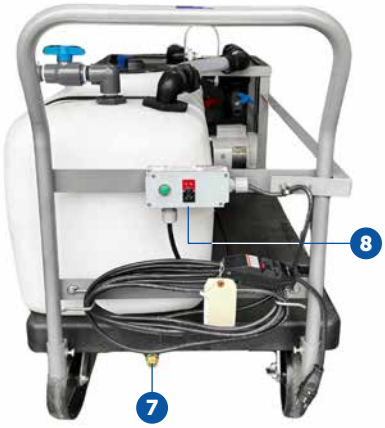
GDS-100 side view



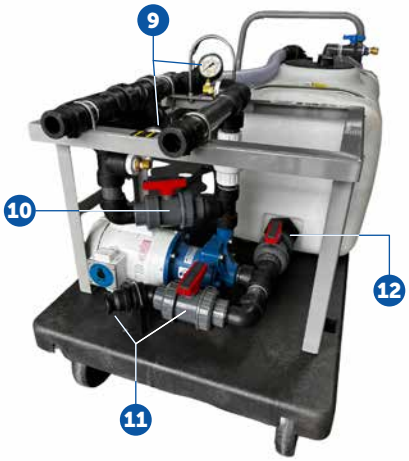
GDS-100 hose assembly



GDS-100 Y-strainer close-up



GDS-100 rear view



GDS-100 front view

4.2 Performing the cleaning process

1. **Filling the system with water**
   Activate the water inlet hose and fill the GDS-pump tank with water until the liquid level reaches the "max" level. Then activate the pump so that the water is pumped into the system. Once the liquid level reaches "min", turn off the pump and further fill the tank with water. Repeat this process until you reach step 2.

   Always fill the system from the bottom to the top, thereby ensuring the complete system is filled with liquid and no air is left within. Use the flow reverse handle to change flow direction if needed during the filling process. Remember, the direction the flow handle is pointing toward, is where the flow comes out.

2. **Confirming the system is filled**
   When water is returned into the pump, you know the entire system is now filled. Now, you can start the hydronic testing.

3. **Performing a hydronic test**
   Let the GDS-pump circulate the water through the system for a few minutes. Also, change the flow direction a few times. Check for any leakages and fix them, before adding descaler products. If no leakages are found, continue with the next steps.

4. **Bleeding off water and replacing with ScaleBreak descaler**
   Determine how much ScaleBreak is required and bleed off the excess amount of water by disconnecting the return hose from the pump and placing it into a drain.

   Once the excess water is removed, reconnect the return hose to the pump system. Then, add the descaler product into the GDS-pump tank and fill the system once again. The descaler will automatically mix with the water.

5. **Removing tank cap for CO2 release**
   During a descaling job, CO2 gasses will be produced. Make sure to keep the tank cap removed, so that CO2 buildup can be released.

6. **Cleaning the system, by means of circulation**
   Liquid descalers need time to remove deposits. The amount of time required depends on various factors but is usually within the 4-8 hours range. Allow sufficient time for the descaler to do its job correctly.

7. **Reversing the flow direction**
   During cleaning, it can be very beneficial to frequently reverse the flow direction. To do this, periodically swap the circulation hoses at the GDS-pump, see page 8 for more instructions. This is an effective way to flush out any solid matter, which often accumulates at the base of the system. By attacking scale from both sides, it is possible to clean segments which are completely obstructed.

   For heavily fouled systems, regularly reverse the flow every 2-3 minutes. For light to moderate fouling, reverse as needed, every 15-30 minutes or so.

8. **Monitoring the cleaning progress**
   During cleaning, it is important to monitor the effectiveness of ScaleBreak products. For scale deposits, you can perform a pH-sampling every 30 minutes to determine the course of the cleaning. If the pH-level is below 3, the descaler is still active. If it has risen above 3, it has lost most of its effect and will need to be replaced with fresh descaler. For rust deposits, a calcium spot test is recommended, as false pH-levels can mislead you.

9. **Adding fresh ScaleBreak product**
   Before adding fresh descaler into the pump, you will have to discharge some of the old solution. You can do this by disconnecting the return hose from the pump and placing it into a storage container. First, release the old solution and then, add new descaler into the GDS-pump tank.

10. **Finishing the cleaning**
    When the pH-value has not risen above 3, after 3 consecutive measurements spread out over at least 60 minutes, this indicates that the cleaning process is finished. You can start the flushing and dumping process to finish the cleaning. (For rust deposits, check descaler activity through a calcium spot test instead.)

Important:

- The flow direction can be changed by manually swapping the circulation hoses at the GDS-pump base.
- The temperature of the circulating solution may not exceed 50 degrees Celsius, otherwise it can damage internal components of the pump system.
- Only use Goodway ScaleBreak descalers. When using other liquid or solid descalers, harm can be done to the internal components, which does not fall under the warranty of the pump system.
- Always keep the pump upright, particularly in transit, to avoid any liquid penetrating the lower electric motor bearing, or the bearing may wear prematurely.
- ScaleBreak formulas have very minimal corrosion rates, however, the application of ScaleBreak may reveal pre-existing under deposit corrosion (UD) or microbiologically induced corrosion (MIC). These types of corrosion can present themselves in the form of pitting, pin holes or similar types of damage.

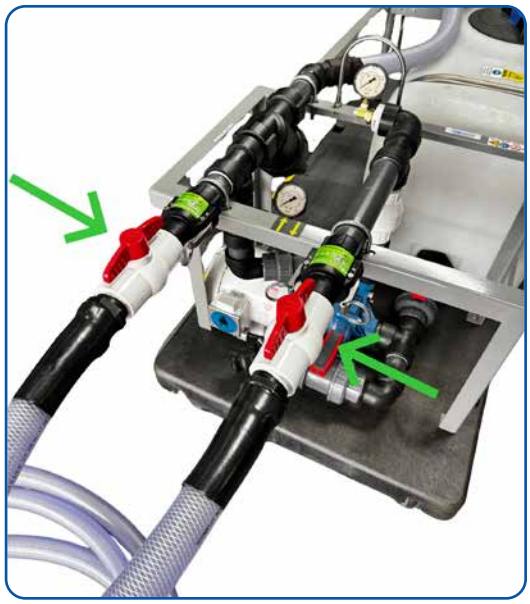
4.3 Flushing and dumping liquids

1. **Preparing the dumping container**
   Upon completion of the descaling process, the solution must be flushed from the system. The pH-value is typically still low and therefore should be neutralized before it can be responsibly discharged. The neutralization process must always be carried out in a separate storage medium (like an IBC-container) and not in the system that was just cleaned. A rapid pH ascent with a descaling product can allow the hard water deposits to fall back out of suspension and re-form within the application just cleaned.
2. **Configuring the fresh water flush setting**
   Disconnect the return hose from the GDS-pump and place it into a storage container. Attach a new water inlet hose to the GDS-pump with sufficient volume, thereby constantly providing the pump with fresh water.
3. **Flushing the system with water**
   Start flushing the system from the bottom to the top for 10-15 minutes and/ or until the return water is clear. During this process you ensure that all the residue and flushing water from the application is pumped into the neutralizing container, through the dump hose.

   Once the liquid level reaches “min”, turn off the pump and further fill the tank with water, before continuing the flushing process.
4. **Reverse flushing for left over sediment**
   At the end of the flushing process, it is good to reverse the flow to flush out particulate/sediment that may have settled on the bottom of the application. Enter from the highest point of the system and exit at the lowest point.
5. **Emptying the GDS-pump tank**
   After the flushing process is completed, fully empty the GDS-pump tank so it can be prepared for dry storage. To do this, open the dump valve below the pump to drain all the remaining water.
6. **Neutralizing used solution**
   ScaleBreak neutralizer powder can be utilized to elevate the pH-value of the solution to the facility's acceptable release limits. Begin by slowly adding neutralizing powder to the dumping container. Allow the neutralizer to mix well within the liquid volume and measure the pH value again. If it did not reach a sufficient level, additional ScaleBreak neutralizer can be added until the desired pH value is achieved.
7. **Discharging solution after neutralization**
   When the pH value in the neutralizing container is in accordance with the local discharge limit, the liquid can be discharged in its entirety. ScaleBreak descaler products are biodegradable. However, it is mandatory to always work in accordance with local laws and regulations for discharging or disposing of liquids. It may therefore differ per location what needs to be done with the remaining liquid and whether it may be discharged or must be processed.

Practical information about neutralizing:

- Neutralizer powder (sodium carbonate) can create a heavy foaming reaction when it gets in contact with a low pH-value liquid. Therefore, slowly, and carefully add the powder into the neutralization container. Allow sufficient space to accommodate the foaming reaction.
- Approximately 1 kilogram of neutralizing powder is sufficient to raise the pH of 6,4 liters of pure ScaleBreak-MP to 5,5.



During the dumping process, place the return hose into a storage container. The outlet hose should remain connected to the GDS-100 and enter the system you are flushing from the bottom.

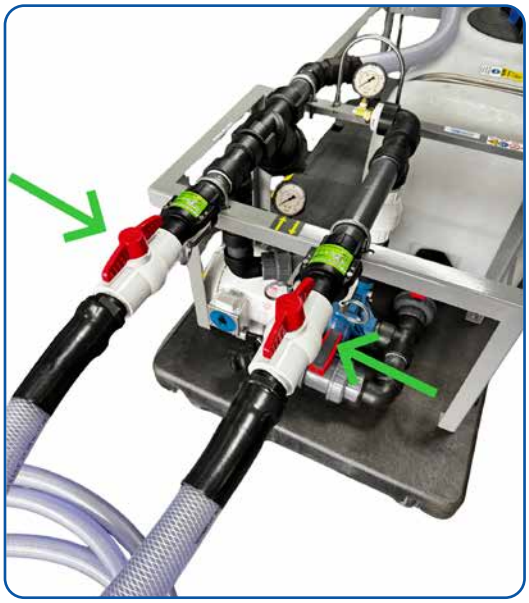
4.4 Special functions explained

Reversing the flow direction

During the descaling process, limescale dissolves and generates foam and gas, which can create a barrier that slows further scale removal. By frequently reversing the flow, this barrier will be discharged into the tank, thereby accelerating the descaling process. To do this, manually swap the circulation hoses at the GDS-pump base. Flow reversal is particularly effective for clearing blocked or fouled internal passages in plate heat exchangers and similar equipment. Intermittent flow reversal evacuates CO2 and foam, accelerates deposit breakdown, and improves overall cleaning efficiency.

How to reverse the flow direction

1. During cleaning, turn off the pump and close off all valves. Then, manually swap the 2 circulation hoses at the GDS-pump base. Use a small bucket to collect any small leaks. After both hoses are swapped, open the valves and turn on the pump again. The flow is now reversed.
2. Reverse the flow as many times as needed. Increase the frequency, based on the amount of fouling. In case of heavy fouling and/ or completely blocked segments, reverse the flow every 2-3 minutes until the fouling is removed. For light to moderate fouling, reverse as needed, every 15-30 minutes or so.



You can reverse the flow of the GDS-100 by manually switching the circulation hoses which are highlighted by the green arrows.

Flow regulation (by-pass) and isolating the tank to connect an IBC-container

- The GDS-100 has a variable flow function. To do this, turn the valve indicated at (1) to regulate the flow between 0-360 liters per minute. We recommend using the full flow for most, if not all cleanings.
- When you want to clean larger systems, it may be useful to draw the descaler from an IBC container instead of filling the GDS-100 tank with jerrycans. For this purpose, the tank can be temporarily isolated.
- To do this, close the valve shown at (2) and open the valve at (3). Connect the IBC container to the 1-1/2" camlock coupling at (3). Once the system is filled, turn the valves back to their original position and disconnect the IBC container. The cleaning process then takes place via the tank of the GDS-100.



Sampling and particulate collection with Y-strainer

- The GDS-100 is equipped with a Y-strainer for easy sampling and collection of large particulates. Turn the blue valve indicated at (4) to open the Y-strainer.



5. After-use maintenance and storage

Flushing system before storage

Before storing the GDS pump system, it is important to rinse the entire system with fresh water to avoid chemical damage. This process is automatically performed at the end of every cleaning when the system and GDS pump is flushed with fresh water. Please refer to the steps in chapter 4 (operating instructions). To summarize; run clean water through the pump and hoses. Ensure the system is completely drained when not in use.

Cleaning pump system from the outside

Make sure to wipe off any excess chemical that may have been leaked or spilled on the exterior parts of the pump system during the cleaning process.

6. Safety instructions and precautions

Important safety instructions

- Read all instructions before using this descaling pump system.
- Make sure all (circulation) hoses are secure before starting the cleaning.
- Always check the pump system, hoses, fittings, etc. for damage, leaks, slices, or cuts before each use.
- Do not use with gasoline or any other flammable liquid. Do not operate in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. The system is not ATEX-certified.
- Make sure that there is adequate ventilation in the work area.
- Stay alert, watch what you are doing and use common sense when operating this pump system.
- Turn pump system off and relieve pressure in the hoses when done.
- Do not use while tired or under the influence of drugs, alcohol, or medication.
- Do not use the pump system if it does not operate properly or has been damaged. Do not try to service the unit yourself - call Goodway Benelux for assistance. Service must be performed only by qualified repair personnel. Service performed by unqualified personnel could result in a risk of injury and voids the warranty.
- Empty the pump system completely before lifting or transporting.
- Always turn pump system off after use.
- Do not spray the pump system with water or chemicals.
- Use only approved accessories and replacement parts.
- Always ensure front caster wheels are in locked position while the unit is in use.
- Drain tank and hoses of all liquids prior to short term and long-term storage of the pump system.
- **IMPORTANT:** Always connect valves to the in- and outlet connections to close off liquid (over)flow, in case of a power outage. Close off valves whenever the job location is left unmanned to prevent leakages due to overspilling.
- **IMPORTANT:** Do not use water with a temperature of more than 50°C (122°F).
- **IMPORTANT:** Never allow pump to run dry. Ensure the water level in the GDS unit is between the Max and Min lines marked on the tank, when measured on level ground. Failure to do so will damage the pump seals.
- **IMPORTANT:** Wear proper PPE, such as acid-resistant gloves, safety glasses and/ or full-face shields, and acid-resistant, protective clothing. Descaling chemicals may cause injuries to the eyes and skin. Protect yourself from direct skin contact with the chemicals and debris found in the descaling environment.

Chemical warnings

- **WARNING:** Don't assume chemical compatibility – if a chemical other than one of Goodway's family of ScaleBreak® descalers is used, you must ensure that the chemical will not damage the internal components (pump, plumbing, valves, etc) of the pump system. A full chemical compatibility check must be done first. Call Goodway Benelux to check compatibility before using any chemical other than one of Goodway's family of ScaleBreak® descalers in our GDS pump systems. When other chemicals are used, these may potentially damage the pump system and void the warranty.
- **WARNING:** Do not mix chemicals! Mixing incompatible chemicals may cause damage to the pump system, or may cause dangerous, life-threatening chemical reactions. Always flush the unit with water after use or before changing chemicals.

Electrical precautions

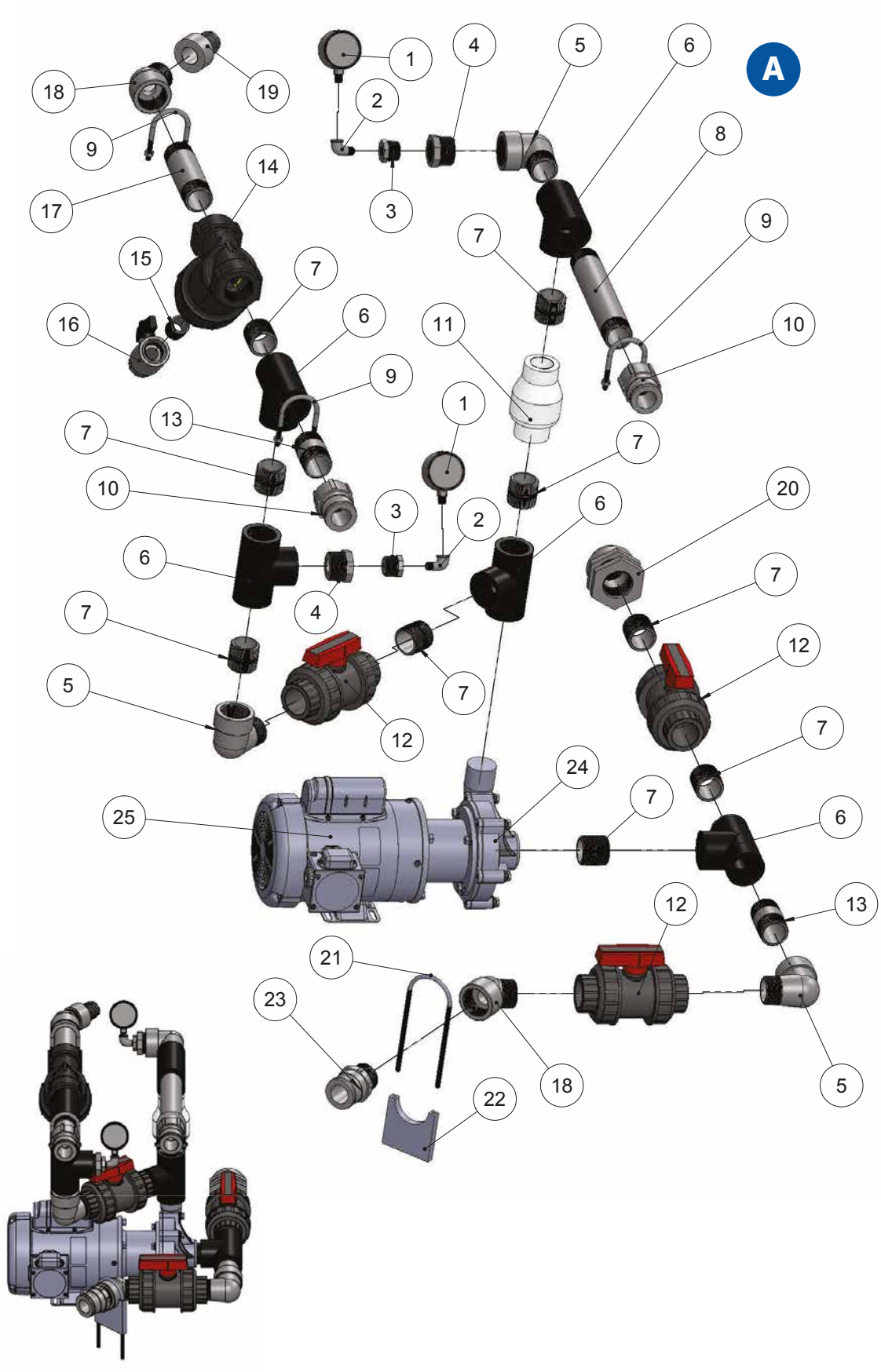
- Never expose the unit to rain or the elements. Store unit indoors in a cool, dry area.
- Make certain that the power source conforms to the requirements of the equipment.
- For proper protection, this product must be grounded. Always plug the power cord into a properly grounded receptacle. Improper connection of the equipment grounding conductor introduces risk of electrocution. Check with a qualified electrician or service personnel if you are in doubt as to whether an outlet is properly grounded.
- When unplugging the power cord, grasp the plug – not the cord.
- Unplug the power cord when servicing the unit or leaving the machine unattended.
- Do not pull on the power cord, close a door on the cord, or pull the cord around sharp corners. Keep the cord away from hot surfaces.
- Do not use the machine if it has a damaged cord or plug.
- **DANGER:** Never remove the grounding prong from the power cord plug or use an adapter that eliminates ground.
- **WARNING:** To reduce the risk of electrocution, keep all connections dry and off the ground. Do not handle the unit or electrical plug with wet hands.

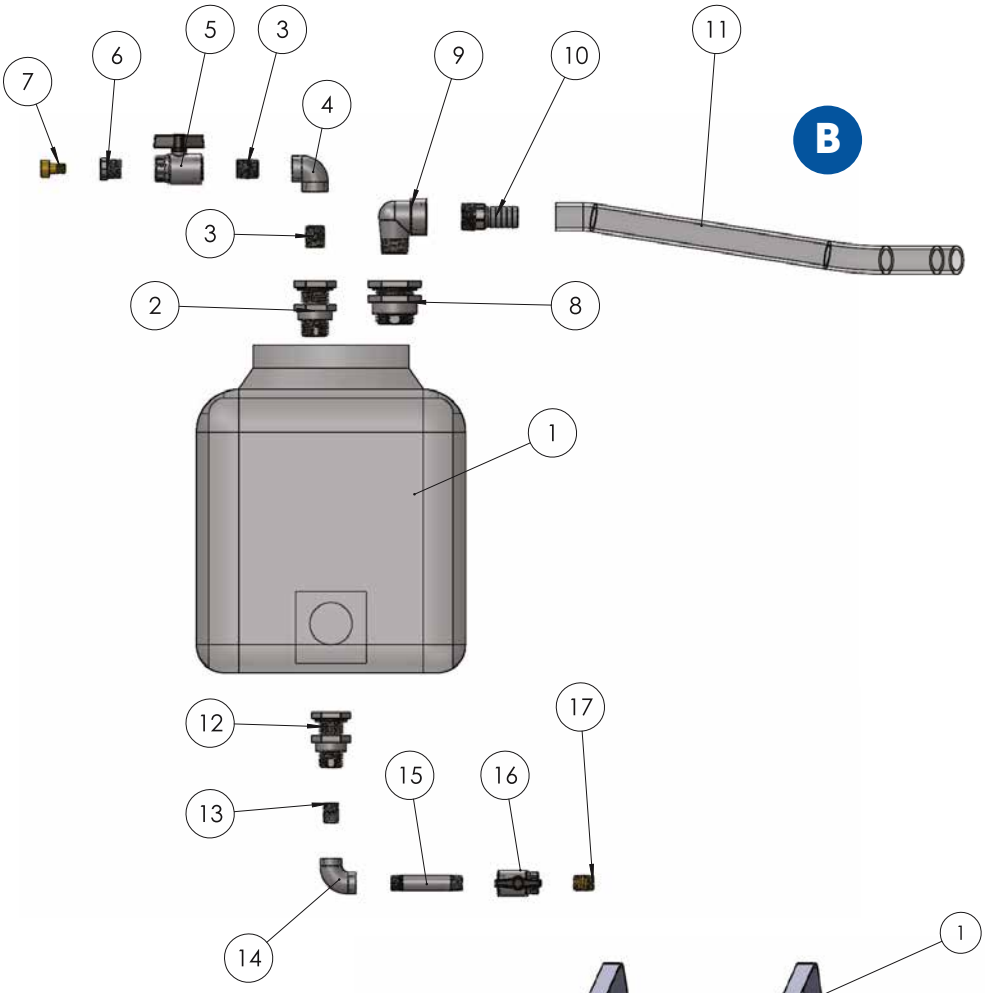
7. Troubleshooting

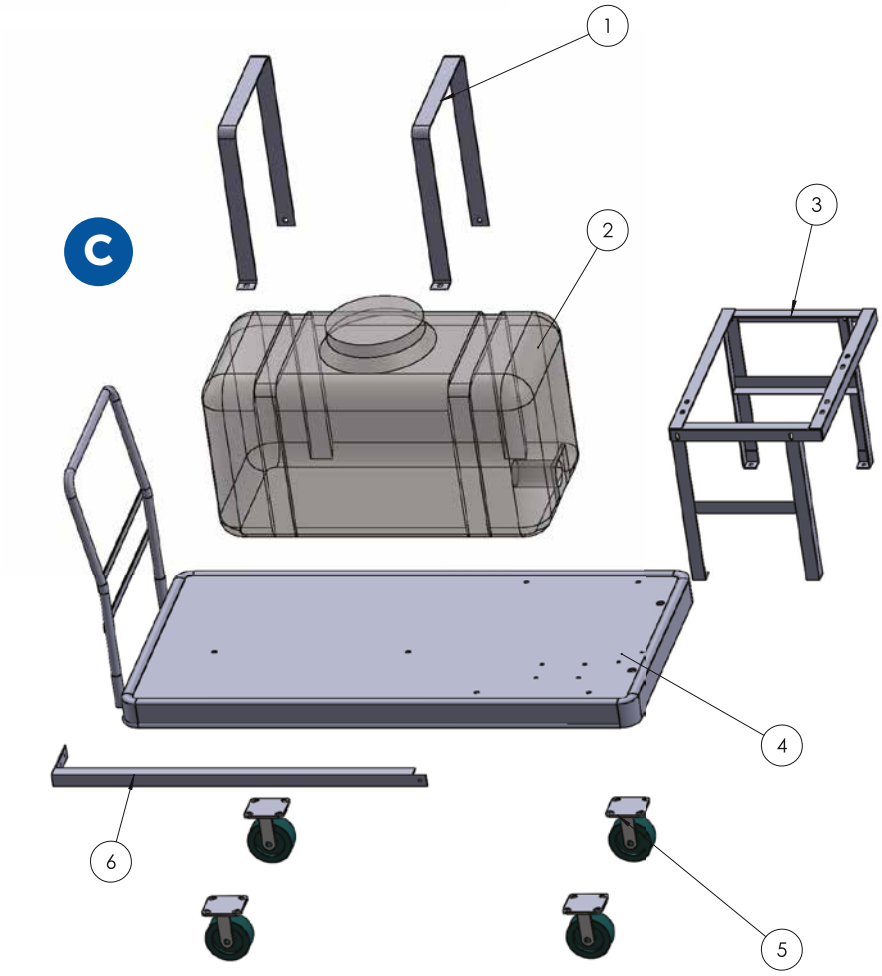
Problem	Probable cause	Remedy
Motor does not start.	• No power. • Bad connection. • Failed switch.	• Check for power at outlet. • Check for loose wire connections. • Replace.
Water does not circulate.	• (Some) valves may be closed. • Tank isolated. • Liquid level too low. • Flow regulation (by-pass) closed off completely.	• Check that all valves are open, both on the pump and on the system being cleaned. • Check if the valve at the tank connection is open or closed. • Ensure liquid level is above the 'min' line shown on the tank. • Check if the flow regulation (by-pass) valve is closed off.

Problem not listed - call Goodway Benelux customer service: +31 183 216 170

8. Parts list and exploded view




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A Motor, pump, and components

ITEM	PART NUMBER	DESCRIPTION
1	DS-146	Pressure Gauge, 0-60 PSI
2	891X	Elbow, Brass, 1/4" NPT, Street
3	8943-3	Bushing, 3/4" NPT x 1/4" NPT, Brass
4	DS-23	Bushing, 1.5" to 3/4" NPT, PVC
5	DS-30	Elbow, Street, 1.5" NPT, PVC
6	DS-22	Tee, 1.5" FNPT, PVC
7	DS-24	Nipple, 1.5" NPT, Short, PVC
8	DS-132	Nipple, 1.5" NPT, 10", PVC
9	DS-130	Ubolt, 2" ID, Stainless Steel
10	DS-133	Cam and Groove, Plug, 1.5" FNPT, PVC
11	DS-34	Check Valve, Flap, 1.5" NPT, PVC
12	DS-125	Ball Valve, Union, 1.5" NPT, PVC
13	DS-25	Nipple, 1.5" NPT, 3", PVC
14	DS-105	Y-Strainer, 1.5" NPT, 50 Mesh, PVC
15	DS-143	Nipple, 1" NPT, Short, PVC
16	DS-142	Ball Valve, 1" FNPT, PVC
17	DS-26	Nipple, 1.5" NPT, 6", PVC
18	6220-6	Elbow, 45 Degrees, 1.5" NPT, PVC
19	DS-107	1.5" Barb x 1.5" FNPT, PVC
20	DS-05-3	Bulkhead, 1.5" NPT, PVC
21	DS-122	Ubolt, 1/4"-20, Stainless Steel
22	DS-123	Support, Ubolt
23	DS-21	Cam and Groove, Plug, 1.5" MNPT, PVC
24	DS-103	Pump, 96 GPM, 51' Head, 56F
25	DS-104	Motor, 1HP, 115V/230V, 56F
26	DS-29	Elbow, 90 Degrees, 1.5" NPT, FxF, PVC
27	DS-131	Nipple, 1.5" NPT, 8" Length, PVC
28	DS-132	Nipple, 1.5" NPT, 10" Length, PVC
--	DS-108-ASSM	Hose, Interbraided, Smooth Bore PVC, 1.5" ID, Assembly

B Tank assembly

ITEM	PART NUMBER	DESCRIPTION
1	DS-100	Tank, 50 Gallons, With Machined Holes
2	DS-100-2	Bulkhead, 1" NPT, PVC
3	DS-143	Nipple, 1" NPT, Short, PVC
4	DS-145	Elbow, 1" FNPT, PVC
5	DS-142	Ball Valve, 1" FNPT, PVC
6	DS-144	Bushing, 1" NPT x 3/8" NPT, PVC
7	930-1	3/4" GHF x 3/8" MNPT, Brass
8	DS-05-3	Bulkhead, 1.5" NPT, PVC
9	DS-30	Elbow, Street, 1.5" NPT, PVC
10	6220-3-1	Barb, 1.5" Hose x 1.5" MNPT, PVC
11	DS-109	Hose, Smooth Bore, 1.5" ID, PVC
12	DS-134	Bulkhead, 3/4" NPT, PVC
13	DS-135	Nipple, 3/4" NPT, Short, PVC
14	DS-136	Elbow, 3/4" FNPT, PVC
15	DS-138	Nipple, 3/4" NPT, 5" Length, PVC
16	DS-137	Ball Valve, 3/4" FNPT, PVC
17	DDV-675-1	Adapter, 3/4" MNPT x 3/4" GHM, Brass

C Cart assembly

ITEM	PART NUMBER	DESCRIPTION
1	DS-121	Straps, Tank, Stainless Steel (1/2"-12 Bolts, 1" or 3.75")
2	DS-100	Tank, 50 Gallons, With Machined Holes
3	DS-120	Plumbing Support (5/16"-18 Bolts, 3.75")
4	DS-102	Cart, 30" x 60"
5	DS-101	Casters, Set of 4, Locking
6	DS-149	Support, Hoses