

INSTALLATION AND OPERATING MANUAL

This instruction manual applies to the manifold chambers XXS, XS, S, M, L, XL and XXL and special chambers of the brand HIRO.

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1 INTENDED USE

The manifold chamber is intended exclusively for the connection of geothermal systems and is designed for installation in the ground.

Intended use includes compliance with all instructions, specifications and safety instructions in this installation manual.

Use other than the intended use, unauthorised modifications to the product and improper installation or handling are not permitted. The manufacturer shall not be liable for damage resulting from improper use, unauthorised modifications or incorrect installation.

Before installation begins, the manifold chamber must be inspected for transport damage and any other damage. Damaged components must not be installed or put into operation.



The standard version is not permitted for use in areas with pressurised water. For such installation situations, the manufacturer must be consulted in advance. In this case, a separate version suitable for pressurised water must be selected.

2 STANDARDS AND GUIDELINES

The applicable legal and technical requirements must be observed during planning, transport, installation, operation, use and maintenance. These include in particular:

- the generally applicable accident prevention and safety regulations,
- the provisions of the competent professional associations or accident insurance institutions,
- the applicable laws, standards, guidelines and technical rules,
- the specifications of the local utility companies and authorities.

In particular, where applicable, regulations such as DIN 1054, DIN 4124, EN standards, DVGW regulations, VDE provisions, VDI 4640, SIA 384/6, ÖWAV guidelines and other project-specific regulations to be applied must be observed.

3 SAFETY INSTRUCTIONS

Work in chambers may only be carried out by qualified personnel and in compliance with the applicable occupational health and safety regulations and accident prevention regulations.

Before starting any work inside the chamber, a task-specific and workplace-specific risk assessment / hazard analysis must be carried out and documented. The manufacturer provides a template for this purpose. The template serves as an aid for the systematic identification of potential hazards and for defining suitable protective measures. Responsibility for the complete performance, evaluation and implementation of the required measures lies with the qualified personnel carrying out the work or with the commissioned company.

When entering chambers, sufficient ventilation must be ensured and possible oxygen deficiency, gas hazards or explosion hazards must be taken into account. Chambers must never be entered by only one person.

Work inside the chamber must always be carried out by at least two persons, with one person remaining outside the chamber to provide supervision and assistance.

Before entering the chamber, suitable safety measures must be taken to prevent falls as well as unauthorised access or traffic over the work area.

When working in areas of public traffic, the required traffic safety and barrier measures must also be provided in accordance with the applicable regulations.

After completion of the work inside the manifold chamber, the cover must be closed and secured against unauthorised opening.

After completion of the connection work, the cover and the cover frame must be cleaned before closing the chamber and then greased with technical petroleum jelly. This procedure is also recommended during maintenance work.

4 TRANSPORT AND STORAGE

Transport must be carried out in such a way that the geothermal manifold chambers and the manifold connections are not damaged and that the chambers are sufficiently secured against slipping, tipping and falling during transport.

Loading and unloading must be carried out without jerks or impacts. Suitable lifting equipment must be used. Where available, the designated transport lugs must be used. For spiral-wound pipe chambers, circumferential lifting straps must be used.

Protruding pipes, pipe sockets and manifold connections must not be used as handles, fastening points, transport handles or climbing aids. Damage to these components must be avoided at all costs.



When stored outdoors, it must be noted that the inside of the chamber can heat up considerably in strong sunlight. The enclosed air expands and can escape. During subsequent cooling, especially during the night, negative pressure may develop, which can lead to deformation of the chamber. The chamber cover must therefore not be sealed airtight during storage.



At low outside temperatures, especially in winter, the polyethylene chamber material may become more brittle. In this case, particular care must be taken to unload without impacts and to handle the chamber gently.

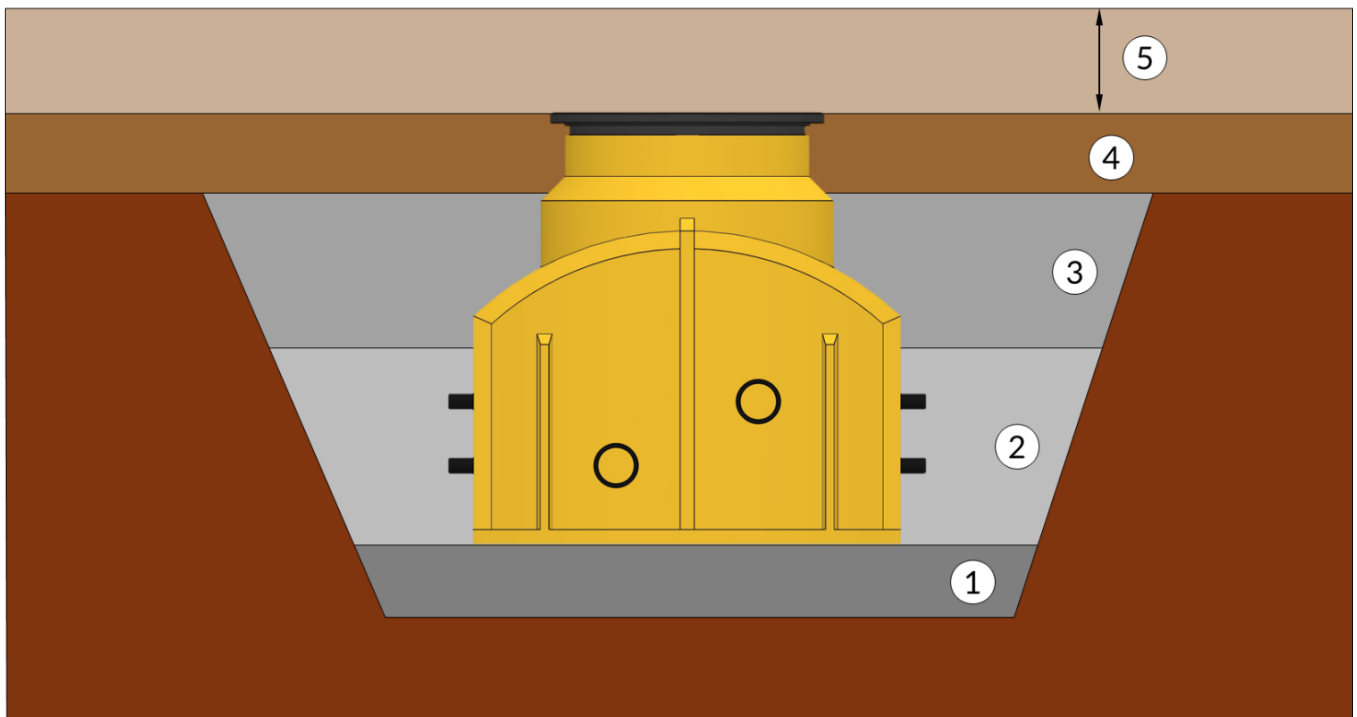
5 OPERATING TEMPERATURES AND OPERATING PRESSURE

The permissible operating temperature of the geothermal manifold chamber is -10 °C to +40 °C.

The maximum permissible operating pressure is 3 bar.

The permissible test pressure is 12 bar.

6 INSTALLATION



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| 1 | Blinding layer |
| 2. | Bedding and side backfilling |
| 3. | Backfilling above the pipes / chamber |
| 4. | Surface structure |
| 5. | Additional installation height for telescopic or heavy-duty covers |

6.1 SITE SELECTION AND EXCAVATION OF THE PIT

When selecting the site for the geothermal manifold chamber, sufficient distances from existing or planned trees must be maintained. The distance must at least correspond to the largest expected crown diameter in order to avoid impairment by roots.

The installation location must be selected so that no impermissible effects from foundation loads of buildings, superstructures or other structures occur. The required safety distances from buildings, structures and loaded traffic areas must be maintained in accordance with the applicable regulations, in particular DIN 4123.

The excavation pit must be constructed in accordance with the dimensions of the geothermal manifold chamber and taking into account the required working space. The installation dimensions, in particular the installation height, can be found in the data sheets and the respective technical drawings of the manifold chamber.

When using telescopic or heavy-duty covers, the corresponding installation heights must be observed. In these cases, a higher surface structure is generally required.

The working space must be dimensioned so that safe installation of the chamber and a stress-free connection of the circuit pipes are possible. The working space width must be at least 500 mm all around.

When excavating the pit, the applicable regulations for excavation safety, occupational health and safety and accident prevention must be observed. Slopes, shoring or other safety measures must be provided according to the local soil conditions, excavation depth and applicable regulations. When working in areas of public traffic, the required barrier and safety measures must also be observed.

The subsoil of the excavation pit must be sufficiently load-bearing, level and horizontal. The structural suitability of the subsoil must be checked before installation.



The chamber must not be installed or temporarily stored unsecured in excavations containing water. If the excavation is open, incoming water, for example as a result of heavy rain or thunderstorms, may cause the chamber to float. This can damage the chamber, connected pipes and adjacent components. During the construction phase, the chamber must therefore be secured against uplift. In addition, sufficient dewatering or drainage of the excavation pit must be ensured.

6.2 PIT BASE / BLINDING LAYER

The pit base must be prepared so that it is load-bearing and level. The blinding layer must be constructed with a thickness of approx. 10 to 15 cm using compactable, stone-free and non-cohesive material and must be compacted evenly. Suitable soils of groups G1/G2 according to EN 1610 or GW, SW, GE or SE according to DIN 18196 must be used for this purpose.

Alternatively, where the load-bearing capacity is insufficient, the groundwater level is high or the ground conditions are difficult, a blinding layer made of lean concrete may be constructed.

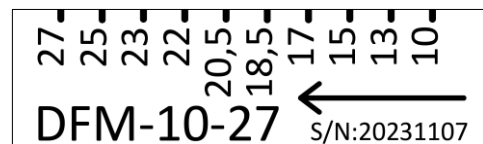
6.3 CONNECTION OF THE CIRCUIT AND HEAT PUMP PIPES

The circuit and heat pump pipes must be permanently connected to the sockets of the geothermal manifold chamber without stress. The connection must be made using suitable connection systems approved for the respective pipe material and application.

For welded connections, the specifications of DVS Guideline 2207 as well as the manufacturer's instructions for the fittings and welding equipment used must be observed. For mechanical connection systems, only approved systems may be used; installation must be carried out in accordance with the manufacturer's instructions.



When connecting the connection pipes, the specified flow direction must be observed. The flow direction is indicated by arrows both on the main manifold bars and on the flow meters of the brine circuits. The corresponding markings must be taken into account during installation.



Before backfilling, all connections must be checked for correct seating, tightness and stress-free installation.

6.4 BEDDING AND SIDE BACKFILLING

The bedding and the lateral backfilling in the area of the pipe zone must be carried out in layers using compactable, stone-free and non-cohesive material and must be carefully compacted. Suitable soils of groups G1/G2 according to EN 1610 or GW, SW, GE or SE according to DIN 18196 must be used for this purpose.

Compaction must be carried out evenly on both sides in order to avoid changes in position or deformation of the pipe/chamber.

6.5 BACKFILLING ABOVE THE PIPES / CHAMBER

The cover above the pipe or chamber must be constructed in layers using compactable and stone-free material and must be compacted evenly.

Coarse stones, construction debris and point loads must be avoided directly above the pipe crown or chamber. Compaction in the area of the pipe crown must be carried out with particular care.



Compaction in the area of the chamber and the connection pipes must be carried out in layers using suitable light compaction equipment or a hand tamper. The maximum layer height must not exceed 30 cm.



Direct loads on the upper part of the chamber and the connection pipes from heavy compaction equipment or construction vehicles must be avoided. Heavy compaction equipment may only be used once sufficient cover has been achieved.

6.6 SURFACE STRUCTURE

The surface structure must be constructed so that the forces that occur are safely absorbed and transferred into the subsoil. In the area of the chamber cover, a sufficiently load-bearing and frost-resistant substructure must be provided. Backfilling and base layers must be installed in layers and compacted in accordance with the applicable road construction and civil engineering regulations.

Our chamber covers are approved in accordance with EN 124 or ISO 15398 for the following areas of application:

A 35 (3,5t)	Areas that can be used exclusively by pedestrians and cyclists as well as private parking areas.
B 125 (12,5t)	Pedestrian zones and comparable areas, car parking areas or car parking decks.
D 400 (40t)	Carriageways of roads, including pedestrian streets, hard shoulders of roads and parking areas approved for all types of road vehicles.



The load transfer of the cover must be designed so that no impermissible loads are introduced into the plastic chamber. Direct load transfer to the chamber body is not permitted. Depending on the local installation situation, suitable concrete support rings, load distribution plates or comparable structural measures must be provided.



When using telescopic or heavy-duty covers, the corresponding installation heights must be observed. In these cases, a higher surface structure is generally required.

7 COMMISSIONING

Before commissioning, the correct installation of the chamber system must be checked. In particular, the following must be checked:

- proper bedding and compaction,
- correct connection of the connection pipes,
- tightness of all connections,
- professional seating of support rings and covers,

- complete backfilling and sufficient cover,
- damage to the chamber system.

Commissioning may only take place after the installation work has been fully completed.

7.1 FLUSHING, FILLING AND PRESSURE TEST

Before commissioning, the manifold system must be checked for correct installation and for firm seating of all screw connections, connections and connecting parts. Loose or stressed connections must be professionally retightened or corrected before commissioning.



The manifold may only be flushed and filled in the intended flow direction. All brine circuits must be flushed individually one after the other and completely vented.

Before the pressure test, manifold outlets that are not connected or not required must be sealed pressure-tight with suitable plugs or caps. In addition, the ball valve in the flow segment and the flow meter or ball valve in the return segment must be tightly closed.

A pressure and leak test of the system must then be carried out in accordance with the applicable standards, guidelines and project-specific specifications. The test may only be carried out with water or a suitable water-glycol mixture.

The permissible pressure limits must be observed. The maximum operating pressure is 3 bar; the maximum test pressure must not exceed 12 bar.

8 MAINTENANCE AND VISUAL INSPECTION

The geothermal manifold chamber must be visually inspected at regular intervals. The visual inspection by the operator serves exclusively to detect externally visible defects at an early stage and may only be carried out from outside the chamber. The operator is not permitted to enter or climb into the chamber.



The geothermal manifold chamber must not be entered by the operator. The visual inspection by the operator must be carried out exclusively from outside the chamber. Work inside the chamber or on technical components may only be carried out by qualified personnel after a prior hazard analysis.

8.1 VISUAL INSPECTION BY THE OPERATOR

The visual inspection must be carried out at least once a year and additionally after exceptional events such as heavy rain, flooding, frost, earthworks in the vicinity of the chamber or in the event of a noticeable pressure loss in the brine system.

Before opening the chamber, the following safety measures must be observed:

- The area around the chamber must be secured against unauthorised access, falls and tripping hazards.
- The chamber cover may only be opened if this can be done safely.
- When opening the chamber cover, attention must be paid to crushing and pinching points.
- The opened chamber cover must be secured against unintentional closing or slipping.
- The visual inspection may only be carried out from a safe standing position outside the chamber.
- The chamber must not be entered.
- No fittings, valves, screw connections or other components may be operated, loosened or adjusted.
- In the event of visible brine leakage, unusual odour, heavy contamination, damaged components or other abnormalities, the inspection must be stopped and qualified personnel must be notified.

As part of the visual inspection, the following points in particular must be checked, as far as they are visible without entering the chamber:

- condition of the chamber cover and frame
- proper seating of the cover
- visible damage, deformation or settlement in the area of the chamber
- water ingress, sludge, foreign bodies or root ingrowth
- visible moisture, dripping or indications of brine leakage
- visible damage to pipes, fittings or pipe penetrations
- legibility of the labelling of the individual brine circuits, if present and visible
- noticeable changes compared with previous inspections

Detected defects or abnormalities must be documented and immediately reported to qualified personnel.

8.2 MAINTENANCE BY QUALIFIED PERSONNEL

All work beyond the pure visual inspection may only be carried out by qualified personnel. This includes in particular:

- entering or climbing into the chamber
- cleaning the inside of the chamber
- operating, setting or changing valves and regulating fittings
- checking and readjusting flow rates
- inspection and repair of screw connections, pipe penetrations and fittings
- leak tests
- repair and replacement work
- work on pressurised or brine-carrying system components

Before work is started by qualified personnel, a workplace-specific and task-specific hazard analysis must be carried out. A hazard assessment template is available from the manufacturer. The hazard analysis must be completed, reviewed and made accessible to the persons carrying out the work before work begins.

The hazard analysis must take into account in particular the following hazards:

- risk of falling and tripping in the area of the chamber opening
- crushing and pinching hazards when opening and closing the chamber cover
- hazards caused by confined space conditions
- possible oxygen displacement or hazardous atmosphere in the chamber
- hazards caused by escaping brine or other operating media
- slip hazards caused by moisture, sludge or ice
- hazards caused by tools, auxiliary equipment and moving components
- ergonomic strain when lifting, opening or working in the chamber
- hazards caused by traffic, machinery or construction site operations in the surrounding area

Work may only begin once the required protective measures have been defined and implemented. These may include, in particular, barrier measures, securing the chamber opening, suitable personal protective equipment, sufficient ventilation, atmospheric testing, securing against unintentional closing of the cover and the presence of a second person.

The maintenance work carried out must be documented. The maintenance record should include at least the date, the person or company carrying out the work, the type of work, defects found, measures carried out and any recommended follow-up work.