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Single-family Treatment Station Tigre®

UNIFAM®

TECHNICAL MANUAL
TIGRE UNIFAM

TIGRE

Group TIGRE

A better world is being build

A BETTER TOMORROW FOR EVERYONE. THIS IS OUR BRAND IN THE WORLD.

Each of our actions or our products has a single goal: to build a better world for all.

Better for our professionals who, united and guided by solid values, create innovative solutions to transform reality and people's lives.

Better for our customers, who receive the technology and trust that only a market-leading brand for decades can offer.

And better for the planet, which has every drop of its most precious natural resource respected and preserved with all affection.

Today, we are an admired multinational worldwide, with 19 manufacturing units (9 in Brazil and 10 abroad), present in more than 40 countries. All this done by more than 5,000 dedicated and passionate employees.

These numbers fill us with pride, but what really inspires us is knowing that a better world is being build.

And if it depends on Tigre, he will be better and better for everyone.

Discover Tigre's **innovative and exclusive** technology for areas without sewage collection, far from ETEs. Complies with NBR 17076.

ACCESSIBILITY

Sewage treatment in any location without access to the network. Treatment capacity of up to 800l/day. Serves one or multiple families.

SUPERIOR ENVIRONMENTAL PERFORMANCE

Aerobic treatment with immobilized biomass, odorless. Ensures treated effluent with high efficiency in removing organic matter and nutrients.

ECONOMY

All treatment stages integrated, simplifying installation. Connection cost 60% lower than network construction.

SIMPLICITY IN USE

Easy to use and with low energy consumption. No sludge disposal.

UNIFAM®

The Unifam is made from recycled material, except for the biomedia.

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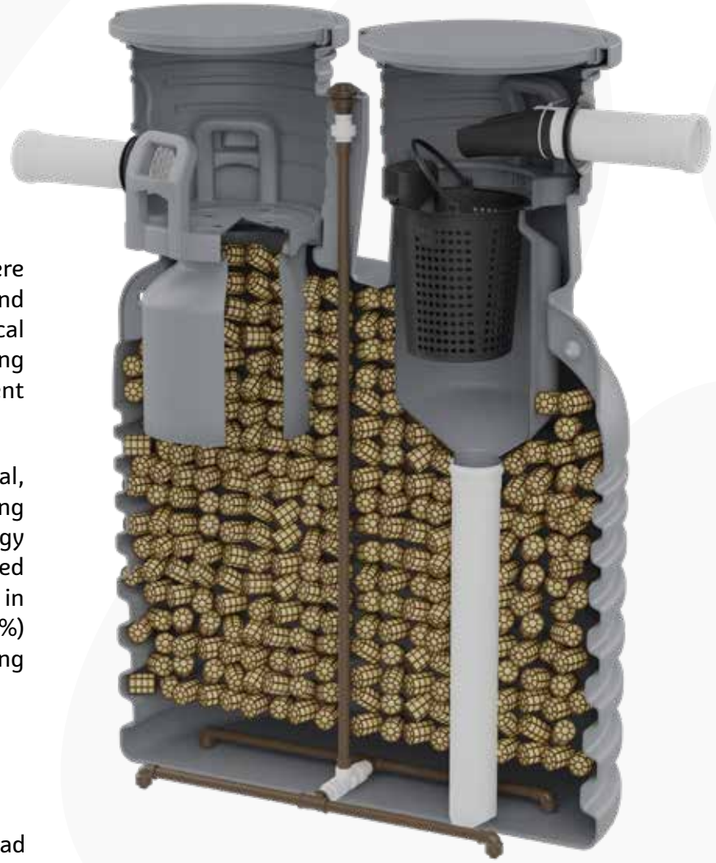
Summary

Unifam
Technical Manual

The function of Tigre Unifam is to treat sanitary sewage in a decentralized manner for applications where there is no sewage collection and treatment network.

The Unifam treatment station is applied in rural or urban areas where there is no sewage collection and treatment system due to the technical or economic infeasibility of installing collector networks and large treatment stations.

The treatment is aerobic biological, with immobilized biomass, using exclusive and innovative technology that ensures the quality of treated sanitary sewage with high efficiency in organic matter removal (BOD > 90%) and nutrients, without generating excess sludge.



Capacity:

800 L/day and a maximum organic load of 0.28 kgBOD/day, capable of serving one or multiple families depending on water consumption and, consequently, wastewater generation, as shown in the table below.

It is possible to connect two or more UNIFAMs in parallel to serve a larger community. Contact the manufacturer for further instructions regarding parallel connection of the UNIFAM.

Water Consumption (liters/day)	Number of People	Maximum Capacity (liters/day)
50	16	800
80	10	
100	8	
160	5	

Installation

The installation of Unifam must be accompanied by the responsible technician of the work, following safety requirements and installation recommendations and procedures presented below.

1. Receipt

The responsible for the work should inspect the receipt of Unifam by checking the following items.

- Ensure that Unifam does not show visible damage to the reactor body such as perforations, deep scratches, and breaks.
- Verify if all items that make up Unifam are available.
  - 2 circular covers
  - 2 segments of sewage pipe DN100
  - 2 circular section sealing rings for the sewage pipe sleeves DN100
  - 2 U-shaped section sealing rings for the Unifam body
  - 1 perforated cap
  - 6 screws for cover fixing
  - 1 flexible rubber
  - 1 cleaning basket
  - 1 electronic control panel
  - 1 blower
  - 1 media retainer

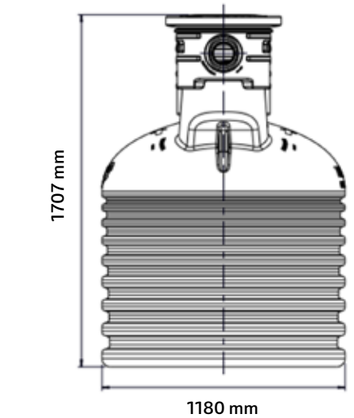
2. Handling

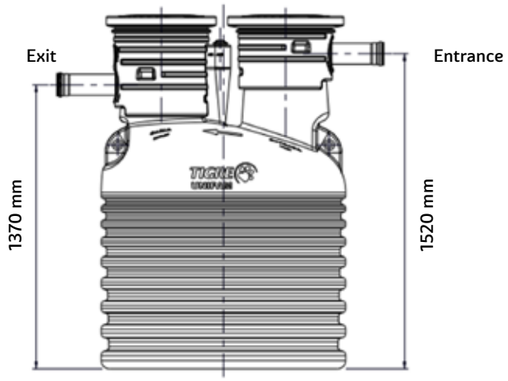
- Do not drop Unifam
- Do not roll Unifam
- Do not drag Unifam on rough surfaces
- Do not leave Unifam components exposed to weather and subject to damage and loss.

3. Selection of the installation location

For the installation of Unifam, the following requirements must be observed.

- Check the necessary area for the installation of Unifam. Basic dimensions of Unifam, see figure below:





- Ensure there are no municipal or state regulations determining rules for the location and installation of sewage treatment systems.
- Ensure that in the installation region of Unifam there are no tree roots that can damage the reactor body and the equipment and pipelines.

- Ensure that the installation is not in the interference zone of structures such as retaining walls, commercial buildings, etc.
- The soak pit should be positioned at least 3 meters away from Unifam.
- Do not install Unifam in regions subject to flooding.
- If it is necessary to install Unifam in areas subject to vehicle traffic, parking lots, or garages with traffic up to 12 tons, install Unifam at a minimum distance from the surface side of Unifam to the traffic load at least equal to the backfill depth.
- If it is not possible to follow the above distance, a concrete slab with an access cover for Unifam covers must be installed over Unifam. This slab must be designed by a qualified professional so that the traffic load is not transmitted to Unifam or the backfill but to the adjacent soil to the open trench for installation.
- Identify if there is no water, gas, sewage, or other pipeline that may prevent the installation of Unifam or suffer damage during trench opening.
- Install Unifam always above the maximum groundwater level.
- Ensure there is a grease trap installed between the building and Unifam.

- If Unifam is installed for use in an existing building, identify the installed depth of the rainwater or soak pit inlet pipeline. Otherwise, consult the hydraulic project of the work.
- Identify the soil quality in the region where Unifam will be installed. Perform the expansion test according to the guidance in item 4.
- Confirm if the electrical voltage of the residence is compatible with the control panel and blower voltages of Unifam.
- Identify the electrical point of the residence for electrical connection.
- Identify the location of the residence where the electronic panel will be installed. See how to install it in item 5.5.
- To protect Unifam's electrical and electronic equipment, it is necessary to install a SPD - Surge Protection Device as recommended by ABNT NBR 5410. The SPD protects the equipment against electrical discharges during a storm or power surges.

4.Excavation

4.1. Soil Expansion Test

Determine the expansive potential of the soil. A practical method to determine it is presented below:

a. Separate a small amount of soil and promote its dissociation until it becomes fine sand.
b. Remove moisture from the sample by placing it in the sun.
c. Place the fine sand in a transparent glass container (can be a cup) up to a height of 10cm.
d. Add water to the cup until the surface of the fine soil. Leave it for an hour.
e. Measure the final height of soil in the cup and compare it with the table below.

4.2. Minimum Excavation Diameter

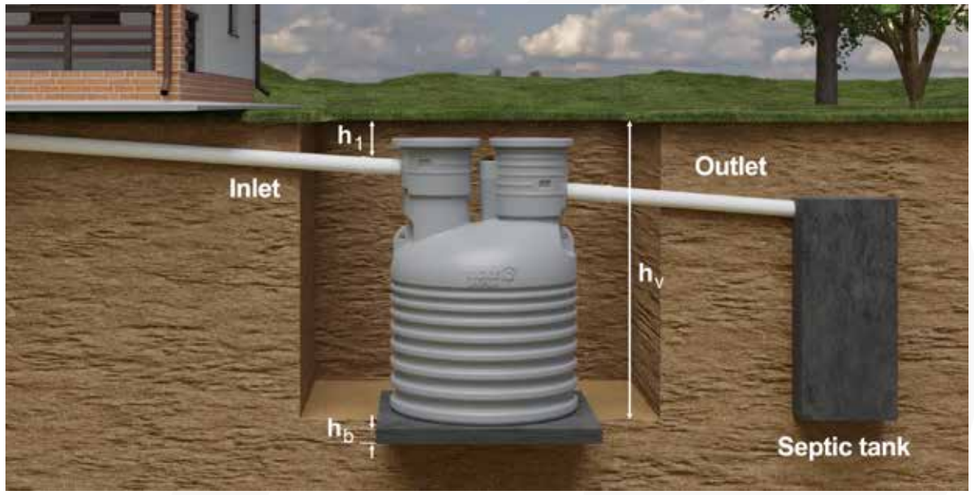
The minimum excavation diameter should be 1680mm. Follow the soil expansion table guidance to determine the minimum diameter according to the type of excavated soil.

4.3. Trench Excavation Depth

Excavate the depth as indicated in the trench dimensions figure (dimensions in millimeters).

% Free Expansion	Expansion Potential	Installation Procedure
< 10	None	Proceed with excavation with (DEmax + 0.5m). Fill with stabilized material.
10 a 25	Very Low	Proceed with excavation with (DEmax + 0.75m). Fill with stabilized material.
26 a 50	Low	Proceed with excavation with (DEmax + 1.25m). Fill with stabilized material.
51 a 100	Medium	Proceed with excavation with (DEmax + 1.75m). Fill with stabilized material.
> 100	High	Proceed with excavation with (DEmax + 2.25m). Fill with stabilized material.

DEmax = 1180mm (maximum external diameter of Unifam)



h_b = thickness of concrete base
h_1 = distance between surface and sewage inlet pipe's upper generatrix

Note: Sewage must flow from the residence into the Unifam's inflet and from the Unifam to the disposal area through the force of gravity.

The Unifam's minimum installation depth (hv) is equal to 1707mm + hb. In such cases h1 must be equal to 130mm.

If h1>=130mm, then hv = 1570mm + h1 + hb

Elbows or 45 degree bends or piping that is curved at a 45 degree angle must be exclusively used. 90 degree fittings must not be used.

4.4. Concrete base

A reinforced concrete base with minimum diameter and thickness of 1,200mm and 50mm, respectively, must be built. Ensure that the base is stable and level along a horizontal plane.

Whenever the bottom of the trench is made from material that does not offer minimum conditions for support, a technician must assess the need to install piles to prevent the equipment from moving after installation and during operation.

Excavations with a depth of more than 1.20 meters deep must be fitted with access ladders in strategic locations, allowing workers to exit the area in case of an emergency.

4.5. Trench's laterall walls

If the soil presents a medium or low resistance, trench's lateral walls must be coated with stucco netting with a thickness of 3 cm.

5. Installation of Unifam and accessories

- Unifam is almost fully assembled.
- Follow the instructions below for the installation of Unifam.

The installation of the inlet and outlet pipes should only be carried out when the backfill reaches half the trench depth, as well as with this same water level inside.

5.1. Unifam Installation in the Trench

5.1.1. Placing Unifam on the Concrete Base

- Before lowering Unifam into the trench, check if the concrete base is cured (if not pre-cast) and leveled. Its surface should be smooth and free of protruding material that could damage the product.
- With the base leveled, lower Unifam using ropes to assist. Pass the rope through the existing eyes on the body to ensure a safe condition during the process.

- Position Unifam in the center of the concrete base.
- After lowering Unifam into the trench, position it so that the inlet pipe from the residence sewage is aligned with the sewage inlet position in Unifam.
- Ensure the trench depth is adequate so that the connections are not strained.
- Ensure the treated sewage outlet pipe from Unifam is aligned with the treated sewage disposal pipe.

5.1.2. Backfill Material

- The backfill material, selected according to the soil expansion test, must be free of stones, boulders, pebbles, and sharp objects and must be screened to facilitate and ensure compaction. If the material is not adequate, medium sand should be used.
- Mix the screened soil with cement or the selected sand with cement in a 10:1 ratio.

5.1.3. Executing initial backfill

- The backfill of the lateral area of Unifam consists of filling the space between the trench wall and Unifam with the selected material, and to ensure no movement of Unifam, it should be filled with water simultaneously during the backfill process.
- The backfill should be done in successive layers of 15 cm, always keeping the water level equal to the lateral backfill level with light, manual, and uniform compaction.

- After each layer of backfill has been compacted, it must be sprayed with water to allow mixed cement to act on the earth or sand;

- The initial backfill must be executed until it reaches at a minimum half of the trench's height.

5.2. Connecting inlet and outlet pipes

Once the backfill has reached half of the trench's depth, use the procedure described below to install sewage outlet and inlet pipes.

- Install the sealing rings on the body of the Unifam, one at the inlet and another at the outlet of the treated sewage. The treated sewage may be infiltrated into the soil through a soak pit or infiltration trench, or it may be discharged directly into a stormwater gallery or water bodies, provided it is authorized and complies with applicable legislation.

- Use a pencil to mark the end of sewage pipe segments at a distance of at least 30mm from the end of the pipe and insert each of the Unifam's inlet and outlet segments using Tigre's lubricant paste in accordance with recommendations for the use of rubber gaskets.

- Install sewage pipe sealing rings in segment fitting housing channels and connect them to the Unifam's inlet piping. Next connect the sewage pipe that will carry treated sewage to a storm drain or septic tank.

- Install the perforated cap onto the outlet pipe segment after it has been inserted.

- Install flexible rubber component, ensuring that its tip is
- directed towards the inside of the basket.

5.3. Installing aeration blower

1. The aeration blower must always be connected at an elevation higher than that of the Unifam.
2. Never install the blower in an area subject to flooding.
3. Attempt to use a maximum of 3 junctions during installation.
4. Installations that generate a siphon within the system must never be used.
5. The aeration blower may be installed using weldable DE25.

Aeration blower electrical data
Input voltage - 220/240V
Frequency - 60 hz
Rated power - 65W

Note: The aeration blower must be installed in an area protected from the effects of weather and include at least two open phases to allow air to circulate.

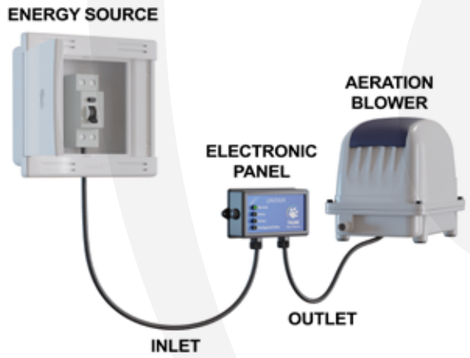
5.4. Assembling aeration piping

- The aeration blower's piping must always be installed at an elevation below the blower;
- Use 90° and 45° bends rather than 90° and 45° elbows when installing piping. This procedure will help to avoid

- tensioning and reduce any drops in pressure;
- For the installation of the blower, a weldable DE25 pipe may be used.
- Install aeration piping at the site shown in the opposite figure, using adhesive to connect the pipe

5.5. Electronic panel installation

- Electronic panels must be installed in an areas protected from the effects of weather.
- Panels must remain dry and preferably be installed in an area with a low level of humidity.
- Preference must be given to sites that are easily connected to the local power grid.
- Panels must also preferably be installed in areas in which audible alarms will be heard in the event of an unwanted shutdown.
- The following figure presents a panel wiring diagram.



5.6. Aeration system tests

- Switch the aeration blower on in "party" mode and check for air leaks in the line and whether air bubbles are forming on the surface of the water inside the Unifam.
- Test the aeration system and the panel

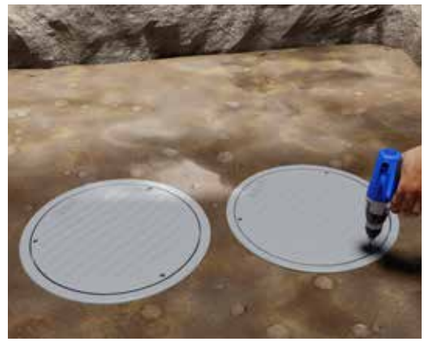
5.7. Completing backfill

- After installing sewer inlet and outlet piping, the aeration blower, and testing the aeration system, fill the Unifam with water up to the level of the outlet and continue installing the backfill using the procedure described in in 5.1.3.
- If the Unifam has been installed according to the minimum installation depth complete the backfill up to the cover, which will coincide with the ground's surface.
- If the Unifam has been installed at a depth greater than the established minimum, a Unifam cover must be designed consisting of a a concrete slab fitted with an access cover. The slab and cover must be sized by a professional to ensure that the load of earth positioned above the Unifam is not transmitted to the ground adjacent to the trench opened for the installation purposes.
- Another possible solution that may be applied at depths in which height h1 is greater than 130mm involves the use of extenders available in Tigre's product portfolio at the inlet and outlet, which offers conditions allowing the height to be adjusted to the surface.

5.8. Installation and fastening of Unifam covers

- After completing connections and the backfill, install inlet and outlet covers on the Unifam;
- Markings must be engraved in the inlet and outlet cover as they differ in diameter;
- Fasten each cover with 3 screws.

OBS.: Do not allow persons to stand or walk over the Unifam's covers in order to prevent injury.



6.Start-up Operation

For start-up operation, keep the system in "Party" mode for 30 days; this is the microorganism growth period. After, switch to "Normal" mode.

Note: *during the first few weeks of operation, in which there is an insufficient level of biomass at the site, it is normal that foam will form. If the formation foam is too intense, set operation to Normal mode until foaming before returning to "Party" mode and completing the 30-day start-up period.*

6.1. System regulation

The electronic panel has the following indications and adjustments:

- **Normal:** In normal mode, the system operates under normal conditions, i.e., one hour on, one hour off.
- **Party:** This mode should be selected when there are more people in the house than usual. Party mode operates 24 hours on. Normal mode should be re-established after the event and no later than 48 hours after it was activated. ***Nota:*** *This event should be sporadic and limited to one night or a weekend. More than that, the system will not be able to maintain the same treatment efficiency. In this mode, aeration is constant and intense, to increase capacity, but it will consume more energy.*
- **Vacation:** This mode should be selected in case of periods when the house will be unoccupied. Vacation mode operates 1 hour on and 4 hours off. It is recommended to leave it for a maximum period of one week. ***Nota:*** *In this mode, aeration is not constant. Aeration is introduced only enough to keep the biomass alive, saving energy. Long periods without sewage feed can drastically reduce the biomass, harming the system. In this case, consult Tigre's technical support for better guidance.*
- **Off/Failure:** If this mode is selected manually, it will turn off the system. Use only in emergencies or for small maintenance. Switch to normal mode afterward. If the alarm triggers automatically, it indicates a system failure. In this case, contact Tigre's technical support.

7. Treatment System

- With innovative and exclusive technology, Unifam is an aerobic biological treatment with immobilized biomass, with high efficiency in removing organic matter and nutrients, without generating excess sludge, ensuring the quality of the treated sewage, complying with current Brazilian legislation (Resolution Conama – 430-2011) and environmental requirements of ABNT NBR 13969:1997 and NBR 7229:1993 standards.
- Unifam's treatment capacity is up to 800l/day, which corresponds to up to 5 people in a residence, and can increase its capacity for more people or residences if combined.
- It consists of two stages:
  - Solid screening.
  - Aeration and degradation of organic and nitrogenous matter.

7.1. Solid Screening

- At the system entrance, the sewage passes through a basket (cleaning basket) with circular openings of 10mm in diameter to retain coarse solids that can impair treatment performance.

7.2. Aeration

- After passing through the cleaning basket, the sewage enters the aeration chamber filled with porous biomedia that house the biomass internally.
- The biomass is responsible for the degradation of organic and nitrogenous matter.
- Air is supplied by a blower and diffused inside the aeration chamber through coarse bubble diffusers.
- After this stage, the treated sewage is directed for environmental disposal.

8. Maintenance

The system requires two types of maintenance:

- **User maintenance**
  - Maintenance on the strainer basket installed at the Unifam's inlet as shown in 8.1.
- **Maintenance performed by person responsible for the system:**
  - Cleaning of strainer basket at the Unifam's inlet.
  - Assessment of odors and visual check of liquids in aeration chambers.
  - Verification of operation of the aeration blower and maintenance, if required, according to item 8.3.
  - Removal of excess sludge, if required, as shown in item 8.2.
  - Cleaning of parts of the system in general.
  - - Taking samples of treated sewage for analysis.

8.1. Cleaning Basket Maintenance

- The solids contained in the basket must be disposed of in organic waste.
- Use disposable gloves to clean the basket. The basket should be cleaned periodically depending on the solids content in the sewage.
- Materials such as sanitary pads, condoms, diapers, cigarette butts, razor blades, or other solid materials like fruit peels and food scraps considered as waste should not be flushed down the toilet. This causes pipe clogging and requires more frequent basket cleaning.
- Following this procedure, we recommend monthly inspection and cleaning of the basket.

ATTENTION: After the maintenance process has been implemented in the cleaning basket, it must be returned to its original position. Never operate the Unifam without the cleaning basket installed.

8.2. Sludge Removal Procedure

Note: *the sludge removal procedure is implemented whenever required or during in emergencies or cases involving system overload.*

- Sludge removal must be carried out by specialized companies with environmental licenses, in compliance with applicable legislation, using appropriate materials and equipment to prevent direct contact between sewage and sludge with the operator or user. Change the electronic panel to off mode.
- Open the access cover of Unifam's inlet.
- Remove and clean the cleaning basket.
- Insert the vacuum suction hose and remove the sludge.
- After completing sludge removal, fill Unifam with water.

- Reinstall the cleaning basket, ensuring the flexible rubber is directed towards the basket's interior.
- Reinstall the inlet cover, fixing it with the screws provided.

8.3. Blower maintenance procedure

1. Remove screw and protective cover from filter.
2. After removing the cover and before removing the filter, remove any dirt that is visible in the area surrounding the.
3. Remove filter and wash it under running water with movement.
4. Dry the filter with a piece of cloth or paper.
5. Leave filter in the sun to dry.
6. Reinstall filter in its original position.
7. Install the filter's protective cover and securely fasten with screw.

Attention

Items that must not be disposed of into the sewer

- Grease must not enter sewage piping. For this reason, a grease trap must be used.
- When using cleaning products such as bleach and disinfectants, apply doses recommended by the manufacturer to avoid negatively affect bacteria colonies.
- Garbage must be disposed of in the appropriate bins. Disposing of garbage in the toilet may clog drain pipes. Tampons, diapers, cigarette butts, condoms, razor blades or waste of any kind must not be dispose of in the toilet. Do not dispose of coffee grounds, leftover food, fruit and vegetable peelings, oil and any other type of waste in the kitchen sink.

Warranty Term

Congratulations, you have just purchased a high-quality and high-technology product, demonstrating your interest in high standards of quality, functionality, and safety with this decision.

The manufacturer guarantees the device and accessories identified on the invoice and/or Delivery Term against any manufacturing defect for 5 (five) years for mechanical and hydraulic components and 1 (one) year for electrical and electronic components, within these periods, including the 90 (ninety) days legally required, which will be counted from the date of delivery, based on the Delivery Receipt on the invoice.

This warranty term is valid with the presentation of the itemized invoice, which must include the product code and/or description, being the manufacturer's responsibility restricted only to parts and components of its manufacture.

The manufacturer reserves the right to repair or replace defective products at its convenience, not authorizing any person or entity to assume any other responsibility regarding the warranty of its products beyond those explicitly stated here.

Continuously committed to technological improvement, the manufacturer may alter the general, technical, and aesthetic characteristics of its products without prior notice, without affecting the terms of this warranty according to current legislation.

The warranty will be applicable upon strict observance by the customer in the instruction manual delivered with the product, complying with the installation, maintenance, and preservation conditions of the product.

Once the warranty is activated, it will cover the free replacement within the specified period of the product, as indicated above, of parts, components, and accessories presenting manufacturing defects, in addition to the labor used in the respective service. The services mentioned in this certificate will be provided free of charge at the premises where the product is installed or any other location indicated by the manufacturer.

Performing a service or part replacement under warranty does not cause an extension or restart of the warranty period, and the manufacturer does not authorize any person or company to assume any other responsibility for the warranty of this product.

This warranty is only valid with the presentation of the invoice in case of a complaint.

Once the warranty period has expired, all manufacturer's responsibility for the validity of the terms stipulated in this certificate will cease.

The warranty does not cover:

This warranty will completely lose its validity if any of the following situations occur:

- Natural wear or irregular use.
- Product use in disagreement with the instructions in the instruction manual.
- If the product is repaired or adjusted by unauthorized persons by the manufacturer.
- If the product is connected to a different electrical current than recommended in the instruction manual.
- If the defect presented is caused by the consumer, third parties not related to the manufacturer, by accidents, or due to product misuse.

In case of any abnormality with the product, contact the manufacturer immediately at the following addresses and phone numbers:

Email:

Customer Channel:

Phones:

Keep the invoice and this warranty certificate.

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UNIFAM®

The right solution where the network does not reach.


TIGRE