TFT
DRY AIR SOLUTIONS

ADSORPTION DEHUMIDIFIERS

AIRDRY

AD 3000 ÷ 6500T E/V

ELECTRICAL / STEAM REGENERATION

TECHNICAL MANUAL

ISO 9001 BUREAU VERITAS Certification

Models	**AD3000 E/V** **AD3500 E/V** **AD4500T E/V** **AD4000 E/V** **AD5000 E/V** **AD6500T E/V**
Catalogue	**MTAD3050EV EN**
Emission	**09.18**

The machine instructions consist of the following documents:

- Declaration of conformity
- Technical manual
- Wiring diagrams

Index

1 Preliminary Information

No part of this publication may be reproduced, stored or transmitted in any form without the prior written permission of the Company.
The machine, to which these instructions refer, has been designed for the uses that will be presented in the appropriate paragraphs, compatibly with its performance characteristics. We exclude any contractual or extra-contractual liability of the Company for damages caused to persons, animals or things, by errors of installation, adjustment and maintenance or by improper use. Any use not expressly indicated in this manual is not permitted.
This documentation is for information purposes only and cannot be regarded as a contract with a third party.
The Company implements a policy of constant improvement and development of its products. It therefore reserves the right to make changes to specifications, fittings and documentation at any time, without prior notice and without any obligation to update what has already been delivered.

1.1 Purpose And Content Of The Manual

The purpose of these instructions is to provide essential information for the selection, installation, use and maintenance of the machine. They have been drawn up in conformity with the legislative provisions issued by the European Union and with the technical standards in force at the date of issue of the instructions themselves.
The instructions shall include indications to avoid reasonably foreseeable misuse.

1.2 Purpose And Content Of The Manual

The instructions must be placed in a suitable place, protected from dust and humidity and easily accessible to users and operators The instructions must always accompany the machine throughout its entire life cycle and must therefore be transferred to any subsequent user.
We recommend that you always check that the instructions are up to date with the latest revision available
Any updates sent to the customer must be kept in an annex to this manual.
The Company is available to provide any information regarding the use of its products

1.3 Using the Manual

The instructions are an integral part of the machine Users or operators must consult the instructions before each operation on the machine and at any time of uncertainty regarding the transport, handling, installation, maintenance, use and dismantling of the machine.
In order to draw the attention of operators and users to the operations to be carried out in safety, graphic symbols have been inserted in these instructions and are shown in the following paragraphs.

2 General safety information

- Anyone using the **AD** series dehumidifier must have this manual available and be aware of the safety information contained in it
- The information contained in this manual includes suggestions for optimal operating methods and procedures, which are not intended to replace personal responsibility and/or local safety regulations
- Only personnel with adequate knowledge of the dehumidifier should work on the dehumidifier and carry out maintenance work.
- Only personnel authorised to carry out electrical installations may carry out maintenance work on electrical components. Repairs to electrical components must be carried out by qualified personnel.
- The dehumidifier cannot be installed in areas where explosion protection devices are required
- The unit must not be splashed or submerged in water
- The unit must never be connected to a voltage or frequency other than that for which it was designed. Refer to the identification plate. Excessively high line voltage may result in electric shock and damage to the unit
- Do not insert your fingers or any other object into the air vents
- The power supply is constantly present in the unit's main switch.
- Electrically disconnect the dehumidifier from the main switch before opening each panel of the dehumidifier.
- Before performing any maintenance work, allow the dehumidifier to cool down at least 15 minutes after switching it off.
- After a power failure, the dehumidifier may restart automatically. Always turn off and lock the main power switch to the OFF position before performing any maintenance work.
- Dehumidifier panels should only be removed for maintenance purposes.
- The dehumidifier can only be installed to dehumidify air at atmospheric pressure.
- Do not leave the dehumidifier in operation without the filters on the air inlet
- Labels and signals must not be removed from the dehumidifier
- This manual must always be close to the dehumidifier and easily accessible.
- Checking and maintenance operations must be carried out in strict compliance with the instructions
- Always contact TFT for service and repair and use only original spare parts.
- Before carrying out any work that alters or modifies the dehumidifier, specific written authorisation must be obtained from TFT
- During operation and other work on the equipment, it is always the responsibility of individuals to evaluate: The safety of all persons involved, the safety of the unit and other property, environmental protection.

2.1 General safety regulations

Before starting any type of operation on the units, each operator must be fully familiar with the operation of the machine and its controls and have read and understood all the information contained in this manual

The removal and/or tampering with of any safety device is strictly prohibited.

Any ordinary or extraordinary maintenance operation must be carried out with the machine stationary, without power supply

Do not put your hands or introduce any screwdrivers, wrenches or other tools on the moving parts.

The machine operator and the maintenance technician must receive the training and instruction appropriate to their safety tasks.

Operators must be familiar with the personal protective equipment and accident prevention rules provided for by national and international laws and standards

2.2 Operation monitoring

The dehumidifier is controlled from the control panel located on the front of the unit, see section 18 "Control Description di Regolazione". The HMI (Human Machine Interface) is used to display values and parameters as well as to enter settings and commands into the control system The control is already set at the factory according to the accessories chosen, during the testing phase. For details of setup and configuration, please ask our technical department.

2.3 Fault signals

Problems are indicated by the red light on the control panel. The cause of the alarm will be shown on the display in the alarm page

2.4 Wrong power supply

If the power supply phase sequence is incorrect, or there is a power supply fault (phase failure), it is indicated by the white light on the control panel illuminating and the HMI remains off.

3 Warranty

- The warranty period is valid from the date on which the unit left the factory, unless otherwise specified in writing
- The warranty is limited to the replacement, free of charge, of parts or components proven to be defective as a result of defects in materials or workmanship
- All warranty claims must include proof that the fault has occurred within the warranty period and that the unit has been used in accordance with the specifications. All requests must specify the type of unit and the manufacturing number. This information is printed on the identification plate, see Unit marking section
- A condition of the warranty is that the unit is serviced and maintained throughout the warranty period by a qualified TFT or TFT approved technician Service and maintenance must be documented for the warranty to be valid.
- Always contact TFT for service and repair
- Operational failures may occur if the unit is insufficiently serviced, inadequately serviced or incorrectly maintained

4 Compliance with Directives

- The dehumidifier complies with the essential safety requirements of the Machinery Directive 2006/42/EC, the Electromagnetic Compatibility Directive EMC 2014/30/EU, the Directive LVD 2014/35/EU, the Directive 2014/29/EU on the approximation of the laws of the Member States relating to electrical equipment and the RoHS Directive 2011/65/EU
- The dehumidifier is produced by an ISO 9001:2015 certified organisation.

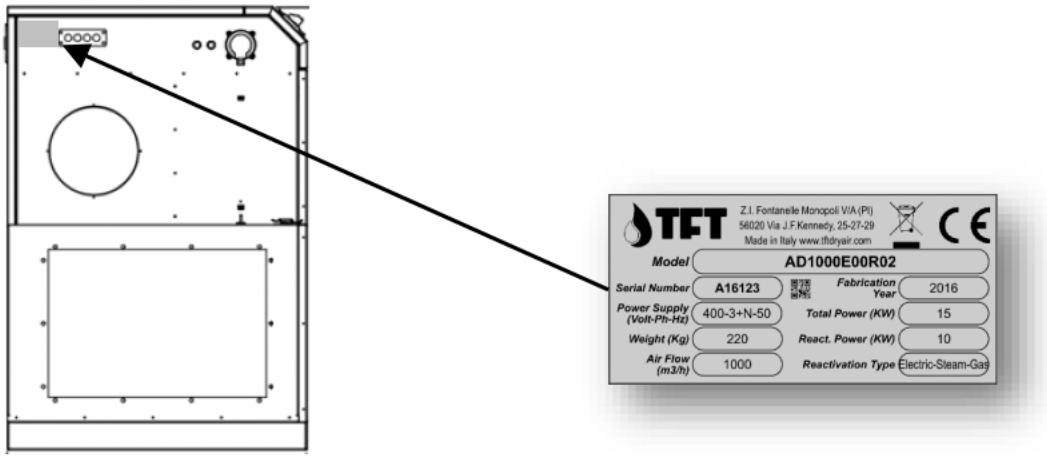
5 Copyright

- The contents of this manual are subject to change without notice.
- This manual contains information protected by copyright laws No part of this manual may be reproduced or transmitted without the written consent of TFT.

6 Unit marking

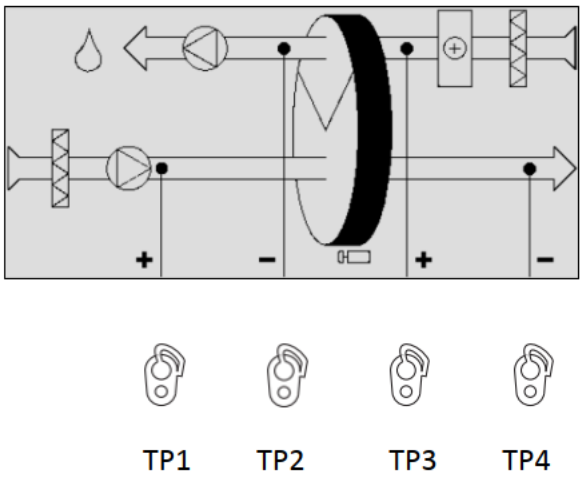
6.1 Identification plate

The unit's CE and identification mark is located on the side of the structure, near the power supply inlet, as shown in the figure below.



6.2 Pressure test points

The built-in pressure test points are used to measure the pressure drop in the components during the basic installation and inspection of the rotor condition. For details on air flow control, see the sections "Process air flow" and "Regeneration air flow"



TP1 = Process air inlet
TP2 = Wet air outlet
TP3 = Regeneration air inlet
TP4 = Dry air outlet
TP1-TP4 = Differential pressure of the process air
TP2-TP3 = Differential pressure of the regeneration air

7 Residual risks

The machine has been designed in such a way as to minimise risks to the safety of the persons who will interact with it. It was not technically possible to completely eliminate the causes of risk during the project Therefore, it is absolutely necessary to refer to the following instructions and symbols

PARTS CONSIDERED (if present)	RESIDUAL RISK	MODALITIES	WARNING
Heat exchange batteries	Small stab wounds	Contact and contact	Avoid contact, use protective gloves
Fans and fan grilles	Injuries	Inserting sharp objects through the grids while the fans are running	Do not insert any objects into the fan grilles
Internal unit and regeneration and by pass ducts with purging sector	Burns	Contact and contact	Avoid contact, use protective gloves
Internal unit: Electrical cables and metal parts	Electrocution of severe burns	Insulation defect of power cables, live metal parts	Adequate electrical protection of the supply lines; maximum care in making the connection to earth of the metal parts
Electrical regeneration: Heating elements	Electrocution of severe burns	Fire due to short circuit or overheating of the heating elements due to lack of regeneration air flow	Keep the regeneration air passage free and clean the filters, never disconnect the main switch from the power supply before the heating elements have been post-cooled
Steam regeneration: Heat exchange battery	Small sharp injuries and severe burns	Contact and contact	Avoid contact, use protective gloves
Gas regeneration: Burner in air vein	Small sharp injuries and severe burns	Contact, fire due to lack of regeneration air flow or excessive pressure of the feed gas	Avoid contact, use protective sleeves, keep the regeneration air flow free and clean the filters, adjust the feed gas pressure valve
External unit: Area around the unit	Intoxications severe burns	Fire due to short circuit or overheating of the supply line upstream of the unit's electrical cabinet	Cable cross section and power supply line protection system conforming to current standards

8 Safety symbols used

	**GENERIC DANGER** Strictly observe all the instructions on the side of the pictogram Failure to follow the instructions may lead to risk situations with possible damage to the health of the operator and the user in general.
	**ELECTRICAL HAZARD** Strictly observe all the instructions on the side of the pictogram The symbol indicates machine components or, in this manual, identifies actions that could generate electrical hazards.
	**MOVING PARTS** The symbol indicates moving machine components that could pose a risk.
	**HOT SURFACES** The symbol indicates machine components with a high surface temperature that could pose a risk.
	**SHARP SURFACES** The symbol indicates components or parts of the machine that could cause sharp injuries when touched.
	**PROHIBITION OF ACCESS TO THE ELECTRICAL SWITCHBOARD** The symbol indicates that access to the electrical panel or electrical parts is prohibited to personnel not specifically qualified to operate this type of equipment.
	**GROUNDING** The symbol identifies the point of the machine for grounding.
	**RECOVERABLE OR RECYCLABLE MATERIAL**

8.1 Graphic conventions used in the manual

	***Indicates operations that are hazardous to persons and/or to the proper functioning of the machine.***
	***Indicates operations not to be performed.***
	***Indicates important information that the operator must necessarily follow for the proper operation of the machine under safeguard conditions.***

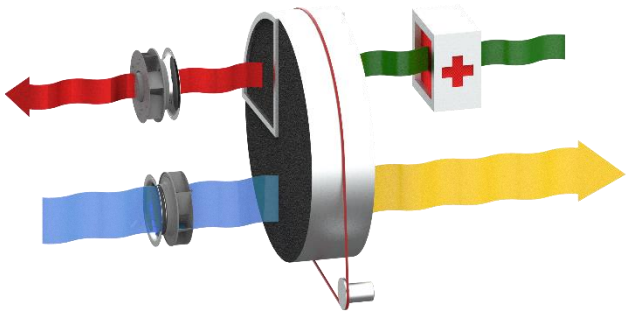
9 Applications

The **AD** dehumidifier is of the absorption type, with desiccant rotor and is designed to dehumidify air at atmospheric pressure. The dehumidifier can be used to dehumidify air at relative humidity up to 100% and temperature from -20°C to +40°C effectively in environments where low humidity is required

The applications are many and cover all the segments; some examples are listed below:

- Moisture control in production processes
- Drying of temperature-sensitive products
- Maintaining the correct level of humidity in storage warehouses
- Corrosion protection of plants and ferrous materials in general
- Humidity control in museums and libraries
- Drying of buildings after flooding and in the building industry
- Improved environmental conditions wherever there is excess moisture

10 Principle of operation



The dehumidifier works using two air flows; the main one is the air to be dehumidified, while a second flow - of lower flow rate - is used to regenerate the dehumidification rotor Two fans inside the dehumidifier create these two air flows that cross the rotor in opposite directions. The air to be dehumidified - also called "process air" - passes through the desiccant rotor impregnated with silica gel. Silica gel is a highly hygroscopic material that absorbs water vapour from the air
As it passes through the rotor, the air transfers its moisture content to the rotor. The dehumidified air is then sent to the production room or process to be dehumidified. The dehumidification process can take place between -20°C and +40°C During the process, the rotor rotates very slowly and is equipped with a drive system with a reduction gear and belt. The so-called "regeneration air" is used by the system to remove the absorbed moisture and take it outside: it is heated by a battery inside the dehumidifier, up to about +100°C and crosses the rotor in the opposite direction to the process air and subjects it to a reverse process, for which the rotor gives up its moisture content and is restored to its initial absorbing capacity The regeneration air is expelled warm and humid and must be sent outside the treated environment.

11 Product description

The adsorption dehumidifier has been designed to meet the requirements of the IP54 degree of protection of the IEC standard.

11.1 Structure

The structure of the dehumidifier is made of galvanized steel painted outside (standard equipment) or stainless steel (optional equipment) with sandwich panels The top panel can be removed for maintenance of electrical components and all internal mechanical parts. Connections to the dehumidifier can be made with standard spiral channels (connections for round spiral channels are optional)

11.2 Rotor

The dehumidifier has a rotor made of desiccant material The rotor has an alveolar structure made of heat-resistant corrugated sheets containing the silica gel desiccant material, which creates a high number of axial fluid threads and at the same time a high absorption area in a small volume. The rotor is constructed to withstand saturated air without being damaged, so it can be coupled with a pre-cooling coil. Furthermore, the rotor is not damaged if the process or regeneration fan stops due to a fault during operation. The rotor is non-combustible and non-flammable.

11.2.1 Trasmission system

A belt drive system controls the movement of the rotor. The belt carries out its traction action on the outer edge of the rotor and is driven by a pulley on the gear motor. A special device maintains the correct tension of the belt to prevent slippage of the belt itself The correct direction of rotation and transmission can be checked by opening the front panel.

11.2.2 Bearings

The rotor is equipped with ball bearings The rotor shaft is made of steel

11.3 Filters

The dehumidifier has two separate G4 filters: one on the process air inlet and the other on the regeneration air inlet (high temperature filter). On request, filters with different efficiency can be installed

11.4 Fans for process and regeneration air

The fans are directly coupled to a single-phase and/or three-phase motor of class IP55, ISO F, Class B They are accessible for maintenance by removing the inspectionpanel. The fans can be controlled by a frequency converter to control the rotation speed. The default process fan control is set to fixed speed, but can be configured at variable speed and controlled by an external signal, or by a pressure or air speed sensor for flow rate regulation.

11.4.1 Limitations with frequency converter

The dehumidifier complies with the emission limits for residential, commercial and light industrial environments with the exception of the emission limits for harmonics (EN 61000-3-12). Since it exceeds the limits for harmonics, the equipment should not be used in residential, commercial and light industrial environments without taking appropriate measures in the electrical installation, such as supplying the equipment with a dedicated transformer connected to the high or medium voltage grid.

11.5 Bleeding and energy recovery

Bleeding and energy recovery are energy-saving solutions that recycle heat from the rotor or from the heat recovery of the expelled moist air. They reduce the energy required for the regeneration air heating coil

Low dew point bleeding is used to allow very low dew points A marginal part of the dry air flow is mixed with the regeneration inlet air, making the drying of the rotor more efficient.

11.6 Pre heating battery for regeneration air

The pre-heating battery is an additional battery with the aim of reducing energy costs. It is generally installed at the regeneration air inlet and consists of a heat exchanger (finned coil) and a control valve with a proportional actuator. It can use both steam and water, coming from the centralized system.

During normal operation, this battery works like the main battery, where an electric heating battery begins to operate if the heat supplied becomes insufficient or if greater dehumidification capacity is required.

The hot water control valve is assembled in the company and supplied already connected to the unit, while the steam control valve and the actuator are delivered separately and must be assembled on site

11.7 Batteria di riscaldamento aria di rigenerazione

11.7.1 Electrical

The electric regeneration battery has steel elements, connected in a star and divided into 2.3 or more groups for step regulation with sequential insertion to have a power modulation. On request, a continuous modulation with PWM power control can be used to increase the efficiency of the dehumidifier field and save energy.

11.7.2 Steam

The steam regeneration battery is built with stainless steel tubes and aluminium fins, and includes a 2-way valve (supplied as an option) with modulating servomotor, to ensure greater efficiency of the dehumidifier's output, acting on the steam flow rate The battery complies with the Pressure Vessels Directive (PED)

11.7.3 Hot water

The hot water coil is built with copper pipes and aluminium fins and has a 3-way valve (supplied as an option) with modulating servomotor, to ensure greater efficiency in the performance of the dehumidifier, acting on the water flow rate. The battery complies with the Pressure Vessels Directive (PED)

If there is a risk that temperatures will drop causing frost, a sensor should be installed and connected according to the wiring diagram. The sensor checks if the temperature is below the safety threshold, opening the valve completely to circulate the hot water inside the exchanger If the temperature continues to fall, an alarm will be displayed and the dehumidifier will stop.

If there is a risk that the temperature will drop causing frost, add antifreeze agents to the water to prevent damage to the heat exchanger

11.8 Electrical panel

The electrical cabinet is located at the top of the unit structure The control panel, selectors and alarm indicators are located on the front panel of the unit.

11.9 Possibility of operation

The operation switch on the front panel of the dehumidifier allows the following operation modes:

0	Dehumidifier off, in OFF position
LOC	Dehumidifier with local start/stop ("LOC"=ON, "0"=OFF)
REM	Dehumidifier with start/stop from remote control
	Dehumidifier in manual operation (100% regeneration power), humidistat control, humidity probe or external signal "excluded"
	Dehumidifier in automatic operation (Regeneration power dependent on humidity control), controlled humidistat, humidity probe or external "active" signal

When the dehumidifier is turned off, allow at least 15 minutes to elapse before entering the dehumidifier.

12 Installation

GENERAL WARNINGS AND USE OF SYMBOLS

Before carrying out any type of operation, each operator must be fully familiar with the operation of the machine and its controls and have read and understood all the information contained in this manual.

All operations carried out on the machine must be carried out by qualified personnel in accordance with the national legislation in force in the country of destination.

The installation and maintenance of the machine must be carried out in accordance with the national or local regulations in force

Do not approach or insert any objects into the moving parts

WORKERS' GREETINGS AND SAFETY

The operator's workplace must be kept clean, tidy and free of objects that may restrict free movement. The workplace must be adequately illuminated for the planned operations. Insufficient or excessive lighting can pose risks.

Make sure that the working rooms are always well ventilated and that the extraction systems are always functional, in excellent condition and in compliance with the legal requirements.

PERSONAL PROTECTIVE EQUIPMENT

Operators who install and maintain the machine must wear the personal protective equipment required by law listed below.

Protective footwear

Eye protection.

Protective gloves

Respiratory protection.

Hearing protection

12.1 Safety and security

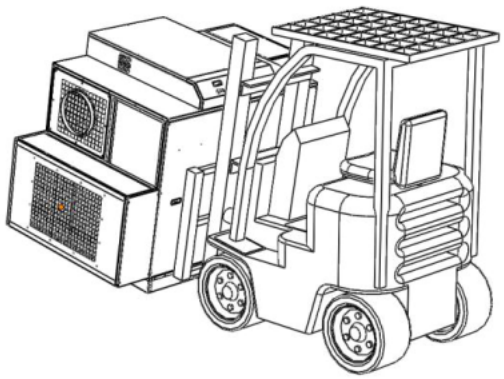
WARNING! To prevent injury or damage to the dehumidifier, always use approved lifting equipment

WARNING! Do not climb on the dehumidifier or place objects on it.

WARNING! Installation, adjustments, maintenance and any repairs must only be carried out by qualified personnel who are informed of the risks associated with work on equipment powered by high-voltage current and at high temperatures.

12.2 Lifting and Handling

When unloading and positioning the unit, great care must be taken to avoid sudden or violent manoeuvres to protect the internal components Units can be handled by forklift/palletizer or bridge crane, taking care not to damage the side and top panels of the unit. In the case of handling by forklift, place a safety spacer between the structure of the unit and the forks of the lift, to avoid damage to the panelling When handling with a bridge crane, it is recommended to use a suitable harness as a precautionary measure to prevent damage to the structure and its internal components. The unit must always be kept horizontal during these operations.



WARNING! All transfers of the dehumidifier must be carried out with great caution in view of the risk of overturning the dehumidifier. All panel doors must be closed during transport.

12.3 Reception and Inspection

During installation or when working on the unit, the rules in this manual must be strictly observed, the instructions on the unit must be observed and all necessary precautions must be taken Failure to observe the above rules can lead to dangerous situations. Upon receipt of the unit, check its integrity: the machine has left the factory in perfect condition; any damage must be immediately reported to the carrier and noted on the Delivery Sheet before finishing it The Company must be informed, within 8 days, of the extent of the damage. The customer must complete a written report in the event of significant damage.

Before accepting the delivery, please check:

- That the machine has not been damaged during transport;
- That the material delivered corresponds to that indicated in the transport document

In case of damage or abnormalities:

- Note the damage immediately on the Delivery Sheet;
- Inform the supplier within 8 days of receipt of the extent of the damage. Reports received after this deadline are not valid;
- In the event of significant damage, please complete a written report.

12.4 Storage

If it is necessary to store the unit, leave it packed in a closed place. If for any reason the machine has already been unpacked, follow these instructions to prevent damage, corrosion and/or deterioration:

- Reuse packaging material to ensure unit protection;
- Protect the dehumidifier from dust, frost, rain or aggressive agents;
- Make sure that all openings are well sealed or sealed;
- Never use steam or other cleaners to clean the unit that could damage it;
- Remove any keys needed to access the control panel and entrust them to the site manager;

12.5 Unpacking

The packaging may be dangerous for the operators.

It is recommended to leave the units packed during handling and to remove the packaging only at the time of installation The packaging of the unit must be removed with care to avoid possible damage to the machine. The materials used for the packaging may be of a different nature (wood, cardboard, nylon, etc.).

Packaging materials should be stored separately and handed over for disposal or possible recycling to the appropriate companies for this purpose, thus reducing the environmental impact.

12.6 Disposal

The unit must be disposed of in accordance with the applicable standards and legal requirements Get in touch with local authorities.
The rotor material is non-combustible and must be disposed of as a glass-fibre material If the rotor has been exposed to chemicals that are hazardous to the environment, the associated risk must be assessed Chemicals can accumulate in the rotor material. Take the necessary precautions in accordance with the applicable rules and regulations

If disassembly of the rotor is required, wear a CE marked visor suitable for the purpose, selected and applied in accordance with the applicable safety standards, to protect against dust

Respiratory protection.

12.7 Installation and location requirements

The **AD** series dehumidifier is designed to be installed in a room, must be installed in a horizontal position and preferably locked to the ground.
For maintenance, replacement of filters, etc., leave an access space of 1500mm. On the inspectable side of the dehumidifier

It is important that the location chosen for the installation of the dehumidifier meets the requirements, in order to ensure optimal and trouble-free operation

When carrying out maintenance and service work, it is important that the relevant minimum space requirements are met.

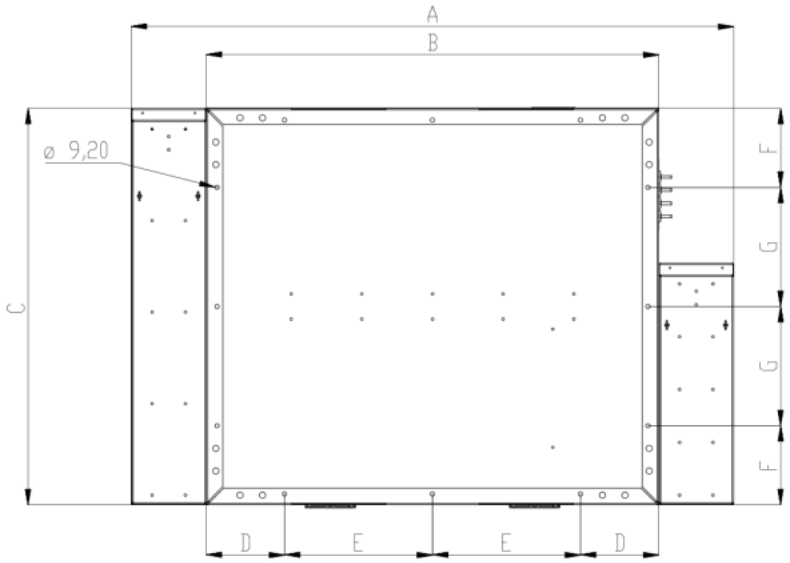
The dehumidifier is designed to be installed indoors only. Avoid installing the dehumidifier in a humid environment, where there is a risk of water entering the unit, or in a very dusty environment. If in doubt, please contact TFT

If there is a need to reduce the dehumidifier vibration, contact TFT for instructions. Refer to EN1299+A1:2008

12.8 Positioning on the ground

The dehumidifier must be installed on a flat surface or platform, with a nominal ground load capacity capable of supporting the weight of the machine. If the maximum ground load weight is not exceeded, no special foundation is required

Once the dehumidifier has been installed, it must be checked that it is at the end If local regulations require the unit to be permanently fastened, the fastening holes can be used to bolt the unit to the ground



MODEL	AD	3000	3500	4500T	4000	5000	6500T
A	mm	1500	1500	1500	1895	1895	1895
B	mm	1130	1130	1130	1475	1475	1475
C	mm	1020	1020	1020	1115	1115	1115
D	mm	165	165	165	166	166	166
E	mm	399	399	399	568	568	568
F	mm	168	168	168	168	168	168
G	mm	339	339	339	387	387	387

12.9 Connecting the ducts

The dehumidifier can be installed inside or outside the room to be dehumidified. If placed internally, the regeneration air must be ducted and brought out of the room to be dehumidified, and it is also advisable to move the supply away from the process air intake

12.9.1 General warnings

Process and regeneration air connections are designed in accordance with ISO 13351. Rectangular duct connections contain inserts to secure M8 screws.

The dehumidifier has been designed for specific process air flows, which correspond to the dimensions of the installed fans

When installing the network of ducts to be connected to the dehumidifier, observe the following instructions:

- The length of the pipeline network must be kept to a minimum in order to limit pressure drops.
- Process air and dry air ducts must have the same diameter. The same applies to regeneration air and wet air ducts.
- For optimum performance, all rigid joints in process or regeneration air ducts must be air- and vapor-tight.
- The process air duct must be insulated to prevent condensation on the outside if the temperature inside the duct falls below the dew point of the ambient air.
- If there is a risk of temperatures below 0°C, the ducts must be insulated.
- The high moisture content of the exhaust air emitted by the dehumidifier may cause condensation to build up inside the ducts. By insulating the ducts, the amount of condensation is reduced.
- The horizontal humid air ducts must be installed with a slight slope (away from the dehumidifier) to facilitate the outflow of any condensation. Condensate drainage devices must be installed at the lowest points of the humid air outlet duct The humid air duct must be made of corrosion-resistant material (e.g. stainless steel, aluminium, plastic, etc.) and must withstand temperatures of up to 100°C.
- Be sure to leave adequate space for maintenance when designing and installing the ducts.
- The ducts must be designed to prevent rain or snow from entering the dehumidifier
- In order to reduce the transmission of vibrations and/or noise along rigid ducts, the installation of watertight flexible couplings and possible silencers is recommended
- Ducts mounted directly on the dehumidifier must be equipped with suitable supports to reduce the load and tension due to the weight and movement of the ducts themselves
- Manual calibration dampers must be installed on the process and regeneration air flows to maintain the unit's functional efficiency. For the unit to function efficiently, it is essential that the air flows are correct.
- The total pressure drop of the process and regeneration air ducts must not exceed the available pressure of the fans fitted to the dehumidifier.

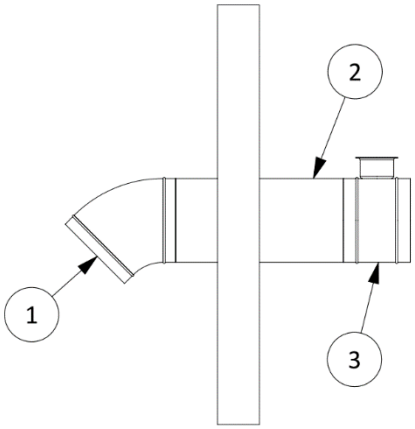
12.9.2 Specifications for the air inlet duct

The duct connecting the outside air to the inlet of the dehumidifier must be at a sufficient height above ground level to prevent the entry of slag and dust. The duct must be designed to prevent the ingress of rain or snow. The air intake must be protected from possible pollutants such as exhaust gases, steam or harmful emissions To prevent the entry of foreign bodies, animals, etc protect the channel inlet with a wire mesh of about 10mm at the outer end of the duct.

To avoid humid air blowing into the regeneration air duct, the regeneration air intake must be located at least 2 metres from the humid air outlet

In some installations the regeneration air can be drawn in from the room where the dehumidifier is installed and in this case no duct is necessary.

It is advisable to install a damper on the regeneration circuit to allow a correct calibration of the air flow rate.

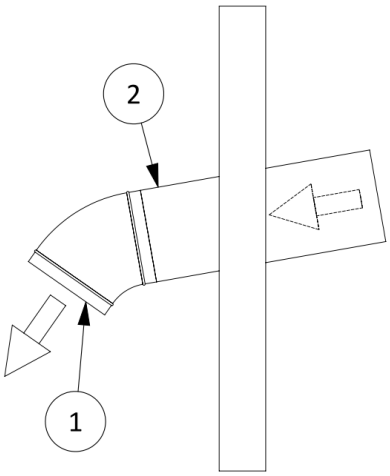


1. Wire mesh
2 Circular or rectangular duct
3. Control damper

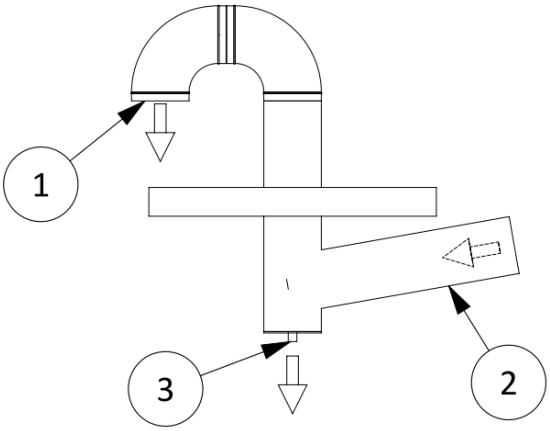
12.9.3 Specifications for the humid air outlet duct

The material for the humid air duct must resist corrosion and be able to withstand temperatures of up to 100°C Wet air ducts must always be insulated if there is a risk of condensation The high humidity of the air emitted by the dehumidifier may cause condensation to accumulate inside the ducts. This channel should be slightly sloped to prevent any condensation from returning to the inside of the dehumidifier. The slope of the duct must be at least 2 cm/m In addition, it is necessary to drill 5mm drainage holes at the lowest points of the duct to avoid water accumulation inside the duct. An adjustment damper can be installed to regulate the air flow Protect the channel outlet with a wire mesh with a mesh width of about 10mm at the outer end of the duct to prevent the entry of animals into the ducts of the dehumidifier.

Horizontal Expulsion



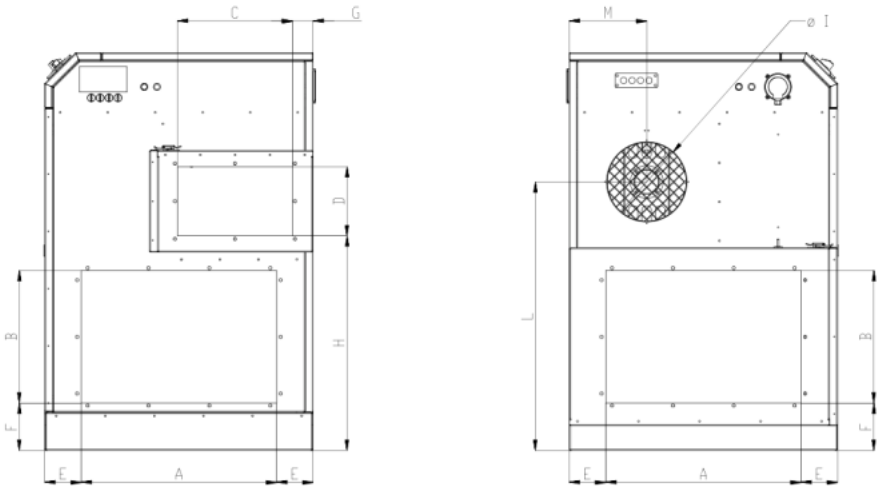
Vertical Expulsion



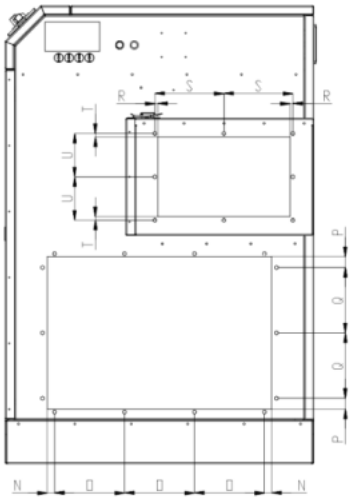
1 Wire mesh
2. Circular or rectangular duct with downward slope
3. Condensate drainage

12.9.4 Connection dimensions of the air intakes

Input/output connections



Flange connections



MODELLO	AD	3000	3500	4500T	4000	5000	6500T
A	mm	825	825	825	800	800	800
B	mm	504	504	504	518	518	518
C	mm	355	355	355	351	351	351
D	mm	287	287	287	415	415	415
E	mm	95	95	95	115	115	115
F	mm	149	149	149	149	149	149
G	mm	156	156	156	189	189	189
H	mm	761	761	761	806	806	806
I	mm	Ø280	Ø280	Ø280	Ø315	Ø315	Ø315
L	mm	960	960	960	1025	1025	1025
M	mm	287	287	287	312	312	312
N	mm	20	20	20	20	20	20
O	mm	262	262	262	253	253	253
P	mm	30	30	30	30	30	30
Q	mm	222	222	222	229	229	229
R	mm	8	8	8	10	10	10
S	mm	185	185	185	185	185	185
T	mm	8	8	8	10	10	10
U	mm	151	151	151	218	218	218

12.10 Connections for pre- and post-cooling cold water coil

WARNING! Cold water supply lines must only be designed and built by qualified personnel and in accordance with local legal requirements.

WARNING! If there is a risk that temperatures will drop causing frost, a sensor should be installed, to be used with the battery for frost protection If there is a risk of freezing and the protective sensor is not installed, the battery may be severely damaged.

WARNING! If there is a risk that temperatures will drop causing frost, it is recommended to add ethylene/propylene glycol to the cold water to prevent damage to the battery. If glycol is added to the water, check with our technical department the performance of the battery

NOTES! The cold water battery is adapted to each supply. For installation and/or overall dimensions, refer to the specific drawing in its own right.

NOTES! Any additional control equipment required for compliance with local regulations is not included in the scope of delivery of the TFT.

12.11 Additional heating hot water coil connections

WARNING! The hot water supply lines must only be designed and built by qualified personnel and in accordance with the local legal regulations in force.

WARNING! If there is a risk that temperatures will drop causing frost, a sensor should be installed, to be used with the battery for frost protection If there is a risk of freezing and the protective sensor is not installed, the battery may be severely damaged.

WARNING! If there is a risk of temperatures falling and causing frost, it is recommended to install a damper on the inlet of the regeneration air, with automatic closure in case of low temperature, to protect the battery The damper is not included in the scope of delivery

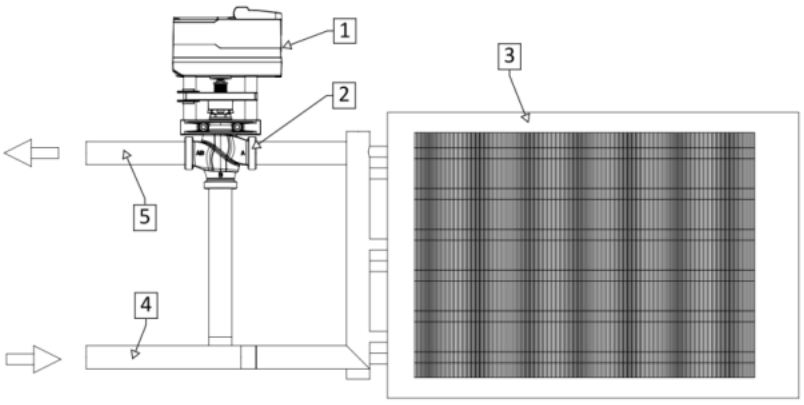
NOTES! The hot water battery is adapted to each supply. For installation and/or overall dimensions, refer to the specific drawing in its own right.

NOTES! Any additional control equipment required for compliance with local regulations is not included in the scope of delivery of the TFT

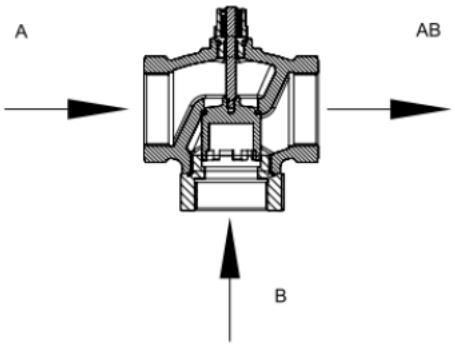
12.11.1 Installation.

The connections to the hot and/or cold water coil are located outside the unit. The shut-off valves are not included in the standard supply, but it is recommended to install them to facilitate maintenance and service.

Water coil connection



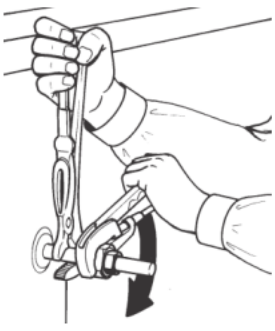
3-way valve

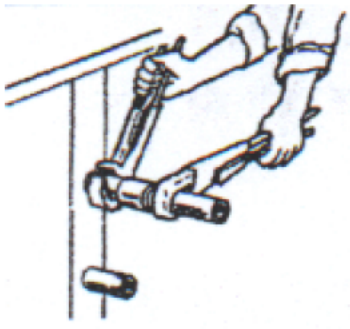


1. Valve actuator
2. 3-way valve body
3. Finned pack heat exchanger
4 Water inlet pipe
5. Water outlet pipe

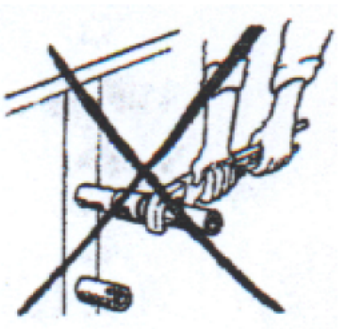
WARNING! Avoid overtightening the connections as this may damage the battery lines. The connection of the hydraulic connections requires a lot of accuracy By twisting the battery connections, it is easy to damage the copper pipes and the drain connections of the tanks.

Good



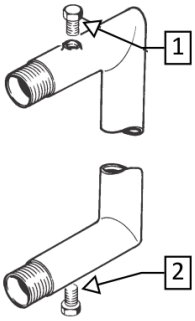


Wrong

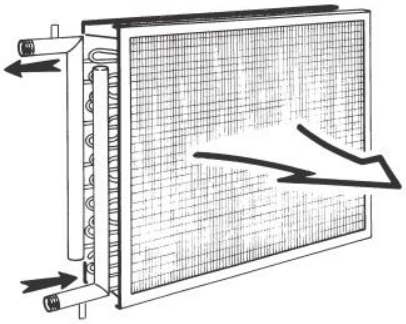


Assemble the air vent for each coils, which will obviously result in the highest part (see image below [1]), while in the lowest part it is necessary to provide a drain to be able to carry out any complete drainage (see image below [2]) It is advisable not to dimension the pipes of the circuit referring to the diameter of the connections of the battery, as these are dimensioned according to the construction requirements and in any case standardized

The circuit connections must not prevent the battery from being removed from the unit Do not discharge the weight of the connection pipes onto the battery connections: it is therefore advisable to make special brackets It is advisable to install a shut-off valve on the inlet and outlet of the fluid



The normal heat exchange of a water coil is countercurrent.



12.12 Condensate drain connection

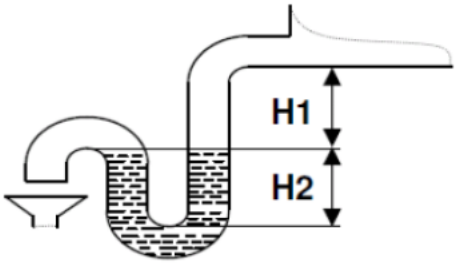
The condensate collection tanks in the sections with cold coils are equipped with a male threaded drain pipe. The tube protrudes on the side of the tank about 100mm. It must be ensured that the base is high enough to allow the installation of the condensate drain trap

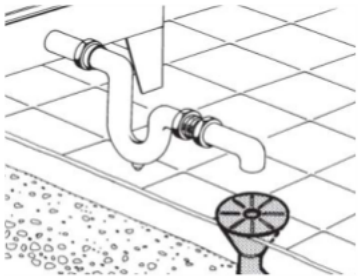
It is essential to equip the condensate drain with a siphon to prevent the fan from sucking up miasmas or bacteria from decomposing sewage, or otherwise and not allowing the correct drainage of the condensate.

The following requirements must be met for proper operation:

- Each drain must be connected to a siphon.
- Do not connect more than one exhaust pipe to a siphon.
- Water from the siphon trap must be discharged into a collector
- Fill the siphon trap with water before commissioning.
- The dimensions H1, H2 and H3 can be determined by the maximum depression (p) or the overpressure (p) in the unit element of the siphon trap;

Example of calculation for the siphon:





PRESSURE SIPHON	***SIPHON IN DEPRESSION***
H1 = 40mm (fixed value)	H1 = fan depression in mmH2O
H2 = fan pressure in mmH2O	H2 = (0,5 * H1) / H1

12.13 Steam connections

- *Check that the shut-off valves are installed and closed before connecting the steam heating battery to the steam source.*
- *The unit is delivered with the flange not mounted or otherwise not tightened on the battery. Before installing the various components and connecting the steam supply, flange must be fully tightened and sealed.*

WARNING! Steam hoses must be connected by qualified personnel in accordance with local regulations.

WARNING! The system shall be designed in such a way that the steam condensate is conveyed by gravity to an open condensate tank and a vacuum breaker valve is installed This is very important for the life of the steam heating battery. Any condensation remaining inside the heating coil will inevitably damage the unit the next time it is switched off.

WARNING! If there is a risk of the outdoor temperature falling below 0°C, it is recommended to install a safety damper on the regeneration air inlet, closing the air flow and stopping the unit The calibration damper is not included in the scope of delivery

12.13.1 Recommended installation.

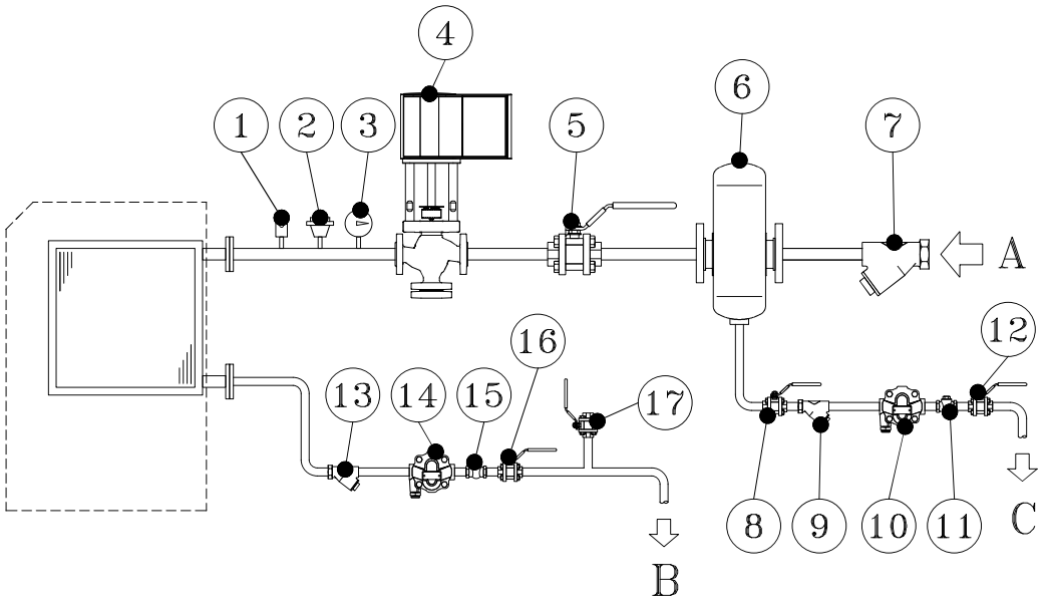
The following components must be installed as part of the steam source circuit to ensure proper operation of the system (see example figure below)

- A separator for removing contaminants and fluids from the incoming steam. The separator removes fluids that could have a harmful effect on the heat transfer surface and also cause erosion damage.
- A steam control valve is used to regulate the flow of steam through the heating coil. For all types of control valves, it is important that they open slowly to reduce the risk of hydraulic shocks, thermal effects and erosion that can damage the heat exchanger It is recommended to use a logarithmic steam control valve to slow down the opening action. The valve actuator must have an opening time of not less than 120 seconds.
- If a modulating steam control valve is used, note that the pressure drop in the valve affects the steam pressure to the heating coil and thus the temperature that can be reached. This must be taken into account when designing a control valve
- A vacuum breaker valve must be installed at the steam inlet to convey the condensate when the unit is stopped or used at low power
- The condensate drain must be of the floating type, preferably with an integral thermal degasser and dirt filter Thermostatic drainage cannot be used
- A non-return valve must be installed in the condensate return line to prevent condensate from entering the heating coil and any malfunction of the condensate system This measure is necessary when the condensate return line receives condensate from several drains with different pressures and temperatures and to prevent a return flow when the condensate level increases in the condensate tank.
- To compensate for thermal expansion, expansion curves must be present in the inlet and outlet pipes. All pipes must be decompressed individually in the vicinity of the dehumidifier to reduce the load on the steam heating coil.

- If there is a risk of freezing, a thermostat must be installed immediately after the heating battery in the direction of the airflow If the temperature drops below +7°C, the thermostat detects a risk of freezing and therefore stops the dehumidifier so that the reactivation air flow is interrupted and an alarm is triggered

In addition to the components listed above, we recommend installing the following components to facilitate operation and maintenance:

- A degasser for the escape of oxygen or other gases from the steam source.
- Shut-off valves.
- A pressure gauge for measuring the steam pressure in the heating battery
- A pressure-resistant thermometer for displaying the temperature of steam.
- A filter for contaminants.
- A shut-off valve downstream of the condensate drain This is to facilitate the installation of a pressure gauge, which would quickly indicate any back pressure in the condensate system in case of malfunctions



A. Steam distribution line
B. Condensation conveyed on return
C. Condensate drain to a safe site or conveyed to a collection manifold

1. Thermal degasser	2. Vacuum valve	3. Manometer
4 Modulation steam valve	5 Shut-off valve	6 Separator
7. “Y” Filter	8. Shut-off valve	9. “Y” Filter
10. Condensate drain (float)	11. Non-return valve	12. Shut-off valve
13. “Y” Filter	14. Condensate drain (float)	15. Non-return valve
16 Shut-off valve	17 Ball valve (to connect the pressure gauge)	

NOTES! All pipes must be supported to ensure minimum voltage at the connections.

NOTES! It is essential that the control valve does not open too quickly, even during the "on/off" control, as this could result in damage to the steam heating coil and other components

WARNING! When the steam control valve opens, there must be no condensation in the steam heating coil. When the unit is not operating, the pressure in the heating battery should not prevent the heating battery from draining

NOTES! In order to allow smooth drainage of the condensate, it is extremely important that the back pressure in the condensate return line is not too high and that the line is installed with a slight downward slope to the outlet of the steam heating coil, and therefore along the entire length to the open condensate tank. This facilitates the drainage of the condensate If this is not possible due to external factors, the risk of stalling must be minimised by installing a condensate pump or a component with the same function.

12.13.2 Information about the connection.

Please note the following when connecting a steam source to the dehumidifier.

- If a pressure gauge is installed on the steam pipe, its maximum reading value must be 1.5 times the maximum pressure of the line in which it is installed.
- It is recommended to install an additional shut-off valve after a condensate drain on the outlet of the heat exchanger to facilitate the installation of a pressure gauge. This pressure gauge is used to quickly indicate any back-pressure that may occur in the condensate system in the event of functional deviations during operation.

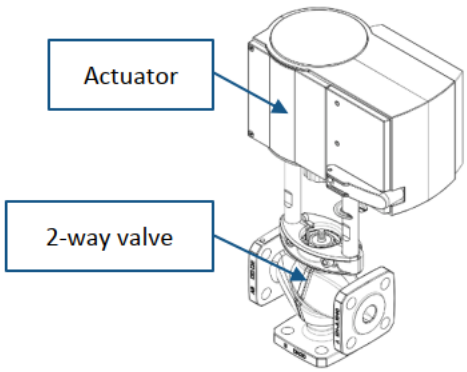
12.13.3 Settings and tests.

1 Check that the shut-off valves are closed
2. Connect the heating battery to the steam source.
3 Open the shut-off valves
4 Check that the correct pressure is indicated in the pressure gauge
5. Check that there are no leaks in the heating battery or in the connected pipes.
6. Check that the thermometer indicates a temperature suitable for the pressure in the pipe.

12.13.4 Steam valve supplied with the unit.

If the steam valve option is chosen at the time of ordering, the 2-way valve with proportional actuator and automatic closing even in the event of a power failure will be included in the scope of delivery.

The valve is supplied loose, also equipped with the connection flanges for the battery. The components are supplied with technical data sheets for both the valve and the actuator. Contact TFT for more information



12.14 Electrical Connections: Preliminary Safety Information

The electrical panel is located inside the unit in the upper part of the technical compartment where the various components of the refrigeration circuit are also located. To access the electrical cabinet, remove the top panel of the unit and the compressor compartment panel

The electrical connection must be made according to the electrical diagram attached to the unit and in compliance with local and international regulations.

Make sure that the power supply line of the unit is disconnected upstream of the unit. Make sure that the disconnecting device is locked or that a warning sign is attached to the operating handle to prevent operation.

Make sure that the power supply corresponds to the rated machine data (voltage, phases, frequency) given on the circuit diagram and on the nameplate attached to the unit

The power supply cables must be protected upstream against the effects of short circuit and overload by a suitable device in accordance with the standards and laws in force.

The cable cross section must be commensurate with the calibration of the upstream protection system and must take into account all the factors that can influenzare (temperature, type of insulation, length, etc.).

The power supply must comply with the above limits, otherwise the warranty will be immediately void

Make all ground connections required by applicable legislation and regulations

Before starting any operation, make sure that the power supply is disconnected.

12.15 Electrical Data

The following electrical data refer to the standard unit without accessories.
In all other cases, refer to the electrical data given in the attached wiring diagrams.

The supply voltage must not vary by more than ±10% of the nominal value and the phase imbalance must be less than 1% according to EN 60204. If these tolerances are not respected, please contact our technical department

Electrical data may change without notice. Therefore, always refer to the wiring diagram supplied with the unit

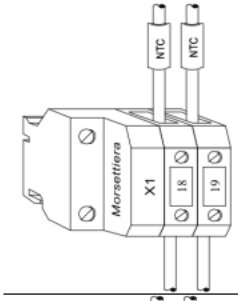
12.15.1 How to Connect the Power Supply

To power the AD units... open the upper panel for access to the electrical panel with the appropriate key; use the appropriate metal plate, suitably drilled for the installation of cable glands, for the passage and connection of the power cable to the terminal block or directly on the line disconnector present. After connection, carefully close the access panel to the electrical panel

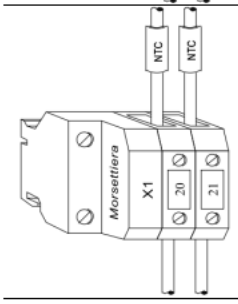
12.15.2 Electrical Diagrams:

See wiring diagrams attached to the unit.

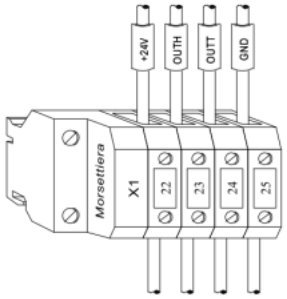
12.15.3 Electrical connections accessories



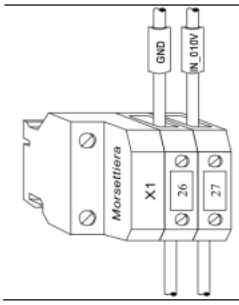
Pre-treatment temperature probe (ADKST1)
18 = NTC passive probe
19 = NTC passive probe



Post-treatment temperature probe (ADKST2)
20 = NTC passive probe
21 = NTC passive probe

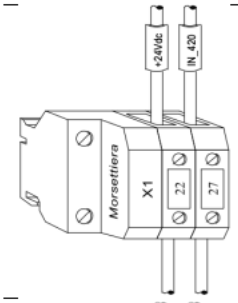


Connection of relative humidity and temperature probe (ADKH1)
22 = Power supply +24Vdc (V+)
23 = Signal input % relative humidity 4 20mA (Out2)
24 = Temperature signal input 4 20mA (Out1)
25 = GND reference (GND)



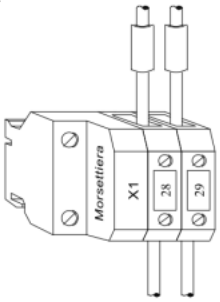
Process fan control signal connection (0...10Vdc)
26 = GND signal reference
27 = Signal input 0...10Vdc

(Configuration only available with ADKVFD x mounted option)



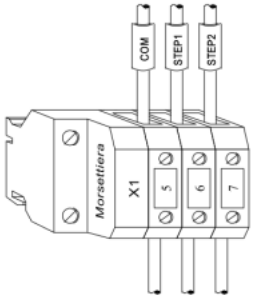
Process fan control signal connection (4...20mA)
22 = Power supply +24Vdc
27 = Signal input 4...20mA

Configuration only available with ADKVFD.x mounted option



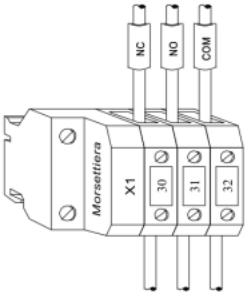
Remote on/off control
28 = Normally open contact for on/off unit
29 = Normally open contact for on/off unit

When the selector switch is in the "REMOTE" position, the voltage-free remote contact has the following function:
Closed = unit on
Open = unit switched off



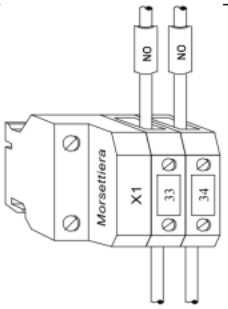
External humidistat for regeneration control
5 = Common (voltage-free contacts)
6 = Step 1 control regeneration (works at 50% of power)
7 = Step 2 control regeneration (works at 100% power)

If the control is with only one step, terminals 6 and 7 must be closed together.



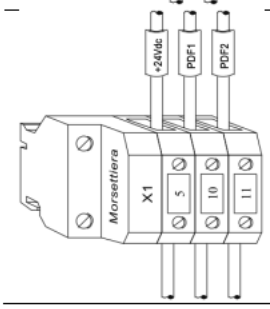
General alarm signalling
30 = Normally closed (no alarm closed, alarm open)
31 = Normally open (no alarm open, alarm closed)
32 = Common

(Voltage-free contact)



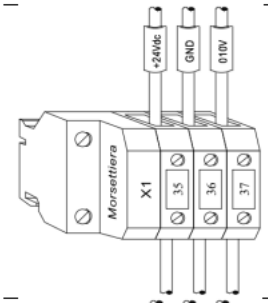
Signalling units in operation
Open = Unit not operating
Closed = Unit in operation

(Voltage-free contact)

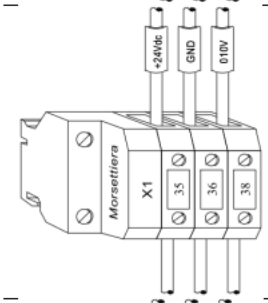


Check dirty process air filters and regeneration (if present)
5 = Power supply +24Vdc
10 = Check dirty process air filters (ADKALFP)
11 = Check dirty process air filters (ADKALFR)

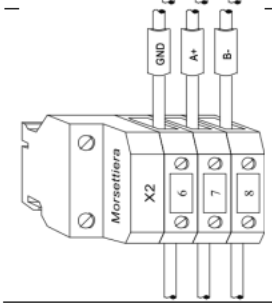
(Voltage-free contact)



Connection of 3-way pre-cooling valve actuator (if present)
35 = Power supply +24Vdc (G - 21 - 01)
36 = Power supply -0Vdc (G0 - 1 - MM)
37 = Control signal 0...10Vdc (Y - 3u - 03)

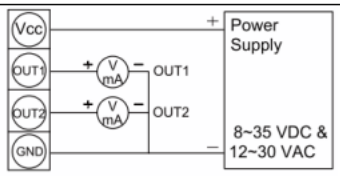


Connection of 3-way post-cooling valve actuator (if present)
35 = Power supply +24Vdc (G 21 01)
36 = Power supply -0Vdc (G0 - 1 - MM)
38 = Control signal 0. 10Vdc (Y 3u 03)



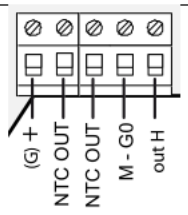
RS485 serial connection (MODBUS RTU BACNet)
6 = GND
7 = Signal A+
8 = Signal B-

12.15.4 Relative humidity probe connections



Connection of relative humidity probe (ADKH1)

Description:	*Probe:*	*Terminal block AD:*
P.Supply +24Vdc	+Vcc	22
Temperature	OUT1	24
RH%	OUT2	23
Reference	GND	25



Connection of humidity probe (ADKH2 – ADKH3)

Description:	*Probe:*	*Terminal block AD:*
P Supply +24Vdc	(G) +	22
Temperature	NTC OUT	20
Temperature	NTC OUT	21
RH%	Out H	23
Riference	M G0	25

Terminal block connections are subject to change without notice.
Therefore, always refer to the wiring diagram supplied with the unit

13 Starting

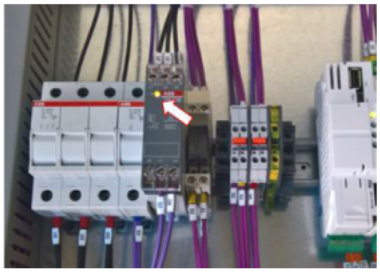
13.1 Preliminary checks

WARNING! The unit may only be commissioned and started up by TFT personnel.

WARNING! The power supply is constantly present in the unit's main switch Risk of electric shock.

For commissioning, perform the following checks in this order:

1. Make sure that the main switch electrically isolates the dehumidifier and that the disconnect switch is in the OFF position
2. Open the dehumidifier panels and make sure that there are no foreign bodies inside or in the electrical compartment.
3 Make sure that the flow dampers are completely open and that the pipes are free and clean from any objects.
4. Check for filters and make sure they are clean.
5 Make sure that the fan impellers can move freely
6. Ensure that the fuses are of the correct rating.
7. Connect the dehumidifier electrically to the mains through the main switch and switch the main switch to ON and check the presence of voltage on the terminals L, N or L1, L2, L3 of the dehumidifier
8. Verify the correct power supply phase sequence. If the "SERVICE" light is on and the touch-screen terminal is off, when the unit is powered up it indicates the wrong power connection and the phase sequence must be reversed The yellow LED on the phase control inside the electrical panel indicates the correct phase sequence (see image below).
9. Install the panels and check that the gaskets match.
10 The dehumidifier is now ready Start the dehumidifier and check the process and regeneration air flow rate. Check the flow rates on the respective air supply sides. If necessary, adjust the air flow by means of a damper installed on the dry and humid air supply, or adjust the frequency converter (if present, option ADKVFD.x).
11. If required, check the performance of the dehumidifier by measuring the quality of the dry air produced at the dehumidifier outlet and compare the values with those on page **Errore. Il segnalibro non è definito.**.



13.2 Air flow regulation

13.2.1 General information.

For optimum performance, process air and regeneration air flows must be properly adjusted to the nominal or design air flows You can set the air flows in the control system display without using the dampers, if there are frequency converters inside the electrical cabinet.
Contact the TFT for advice on installation and settings

NOTES! The software and drive settings are factory configured. The frequency control range is limited to correspond to an acceptable fan speed

WARNING! Rotation hazard - to prevent access to the fan rotors, the dehumidifier must only operate with connected wet and dry air ducts, or special safety devices such as protective grilles must be installed

WARNING! If the airflow is not adjusted correctly, the unit may malfunction
Damage to the unit due to incorrect airflow adjustment may void the unit's warranty.
Air flows should never be set above the rated air flows. If higher air flow rates are required, consult TFT

13.2.2 Process air flow.

Follow the instructions below to adjust the process air flow.

Fixed speed process air fan control via ΔP

1 Start the dehumidifier and run it at full capacity
2. Connect a differential pressure gauge between the process air inlet (+) and the process air outlet (-).
3 Compare the measured differential pressure with the factory calculated value
4. Adjust the process air flow control point in the control system using the frequency converter (if present) or the calibration damper so that the measured differential pressure value corresponds to the factory calculated value

Control of the process air fan at fixed speed by means of air flow rate

1. Start the dehumidifier and run it at full capacity.
2 Measure the air flow rate on a linear duct section using an anemometer
3. Compare the measured air flow rate with the nominal air flow rate.
4. Adjust the process air flow control point in the control system either by means of the frequency converter (if present) or by means of the calibration damper, so that the measured air flow value corresponds to the nominal value.

13.2.3 Regeneration air flow.

Follow the instructions below to adjust the regeneration airflow

1. Start the dehumidifier and run it at full capacity for at least 10-15 minutes to allow the regeneration air heater battery to reach its normal operating temperature
2 Measure and record the temperature in the regeneration air inlet socket
3. Read the regeneration air temperature on the control system display. The difference between the regeneration air temperature and the regeneration air inlet temperature must be approximately 95°C (with a tolerance threshold of ±5°C).
4. If the temperature difference exceeds the tolerance threshold of ±5°C, adjust the regeneration air fan setting in the control system, either via the frequency converter (if any) or via the calibration damper. Wait until the displayed temperature has stabilized after each adjustment.

13.3 Checking the regeneration air heating coil

13.3.1 Hot water coil.

1. Make sure that the shut-off valves are closed.
2. Connect the regeneration air heater battery to the water distribution system.
3 Open the valve for the water supply
4. Bleed all remaining air from the battery and piping system.
5 Check that water is circulating in the battery, and feel with one hand that the battery and pipes are warming evenly.
6. Check the function of the control valve (if any).

13.3.2 Steam coil.

1 Check that the shut-off valves are installed and closed
2. Connect the preheating battery of the regeneration air to the steam source.
3. Open the steam supply valves.
4 Read the pressure gauge and check that the steam supply pressure is correct
5. Visually inspect the connections of the pipes and the preheating coil for regeneration air and check that there are no leaks.
6 Read the steam temperature on the thermometer and make sure the temperature is correct for the line pressure.
7 Open the control valve manually, very slowly to test the condensate drain system

14 Maintenance

14.1 Safety and security

WARNING! Installation, adjustments, maintenance and any repairs must only be carried out by qualified personnel who are informed of the risks associated with work on equipment powered by high-voltage and high-temperature electricity

WARNING! The power supply is constantly present in the unit's main switch Risk of electric shock.

WARNING! After a power failure, the dehumidifier may restart automatically Always switch off and lock the main power switch before performing any maintenance work.

NOTE: For all maintenance and repair work:

- ***wait 15 minutes after switching off the dehumidifier before opening each service panel, in order to allow the regeneration battery to cool down***
- ***Disconnect the dehumidifier electrically using the main line switch.***
- ***Disconnect the power plug***

The maintenance intervals depend on the environment in which the dehumidifier is installed. Therefore, the periodicity with which to perform maintenance intervals may vary from one installation to another Incorrect maintenance may result in reduced performance.

14.2 Filters

The dehumidifier is equipped with two separate filters, one for process air and one for regeneration air. The filters are positioned at the inlets of the respective air flows before the air enters the dehumidifier. Intervals for cleaning or replacing filters will be determined by the amount of dust and particles in the air where the dehumidifier is installed.
We recommend that the filters be checked at least once a month.
The unit can be equipped with differential pressure gauges to check the pressure drop through the filters Do not leave the dehumidifier in operation without the filters: in this way the rotor can be damaged.

14.3 Rotor

The rotor does not require maintenance. However, it may be necessary to clean it very gently with compressed air. If the rotor is very dirty, it can be washed with water: before performing this operation, contact your local distributor as this is not a routine operation Check the bearings and rotor surface once a year.

14.4 Electric motors

The electric motors are equipped with ball bearings. No maintenance is required on the bearings. Check the engine and any noise once a year

14.5 Heating battery

It does not require maintenance, however, check at least twice a year for any mechanical damage and cleaning of the finned pack, verifying that the passage of air is not obstructed by dirt or other material

14.6 Rotor drive belt

Check at regular intervals that the belt is correctly tensioned This is kept under tension by the tensioning device and does not require adjustment during normal operation.

14.7 Gaskets

Check seals at regular intervals for damage or dust

14.8 Regular service and maintenance

TFT dehumidifiers are designed to operate continuously for long periods of time. To ensure that the dehumidifier functions as efficiently and economically as possible, regular maintenance and repair is required.
The duration of maintenance intervals is essentially determined by the conditions of the operating environment and the environment in which the unit is installed For example, if the process air contains a lot of dust, preventive maintenance should be carried out at shorter intervals. The same principle also applies if the dehumidifier is used intensively.
Service levels for a service and maintenance standard are described in the "Service options" section
The dehumidifier control system is equipped with a service indicator. During installation and commissioning, an estimate of the likely number of hours of service and support after or on the expected date of installation and commissioning This value is programmed by TFT personnel at initial unit start-up.

14.9 Service options

In addition to the drive configuration, four standard support options are available.
1. Configuration/Start.
2 General function check
3. Safety and temperature measures for capacity, temperature and humidity (including point 2).
4 Prevention of certain components after 3 years of operation (including point 3)
5 Preventive replacement of some components after 6 years of operation (including section 4)
NOTE: Always contact TFT for service and repair. If the unit is maintained incorrectly, inadequately, or incorrectly, malfunction may result
NOTE: Checking "1" commissioning by TFT or an authorized service center is required to validate the entire warranty.
TFT service technicians have special equipment and quick access to spare parts to help with all TFT products. All test equipment used by our staff to ensure the correct balance of the system has been carefully certified.

14.10 Warranty extension

If the customer enters into a service contract with TFT, TFT offers an extended warranty at standard conditions Detailed information is available on request

14.11 Indicator light for indication of need for assistance

The white "SERVICE" light, see image below, indicates one of the following situations:

- Replacement of the process air filter or regeneration air filter is required
- General control assistance is required.

The cause of the service alarm is shown on the display of the control system

14.12 Service and maintenance planning

Operating time in hours	0	4000	8000	12000	16000	20000	24000
Time spent in months	0	6	12	18	24	30	36
Air filter inspection, air filter replacement if necessary, function check	√	√	√	√	√	√	√
Preventive inspection, security checks	√		√		√		√
Capacity monitoring, rotor inspection	√		√		√		√
Replacing the regeneration safety thermostats (*)							√
Inspection of the electric battery / steam heating							√
Replacing the drive belt and the belt stop.							√
Replacing the rotor gearmotor							
Ventilation inspection (rotors, motors, bearings)			√		√		√
Verification of the functioning of the electrical cabinet and control system	√		√		√		√
Calibration of humidity control devices, sensors, valves, SSR	√		√		√		√
Calibration of temperature control equipment and sensors	√		√		√		√
Replacing the rotor seals							√

(*)Not required for units with regeneration air steam heating coil.

NOTE: Always contact TFT for maintenance and repairs. If the machine is insufficiently serviced, inadequately serviced or incorrectly maintained, malfunctions may occur.

NOTE: TFT's installation/startup check is required to validate the entire warranty.

NOTE: The absorption rotor will not be replaced in advance, the capacity check will indicate the replacement of the rotor

WARNING! Rotor performance may vary depending on the type of use and the quality of the processor. Dirty air or the use of a very low dew point increases the loss of rotor capacity in less time Depending on the type of application, the rotor must be kept clean and maintained in a scheduled manner.

15 Troubleshooting

Before contacting the TFT, check the following troubleshooting list Locate the cause of the alarm and solve the problem if possible. The list provides valuable help in identifying faults that can often be solved without the intervention of specialized personnel.

NOTE: Alarm indications other than those indicated may occur In such cases, please contact the TFT service department.

Symptom	Possible cause	How to intervene
Dehumidifier does not start	Control circuit	Check fuses
	Control signal	Check the external start stop signal
	Micro-switch door inspection	Check that the front inspection door is securely closed
	Power supply phases	Check main fuses and phase sequence
	Fuses for malfunction control	Checking electrical components
The unit has stopped	There's been a power failure	Check that the unit is correctly powered
	A fuse and/or circuit breaker has tripped	Locate the cause of the fault and solve the problem. Reset the fuse and circuit breaker. If the fault occurs again, contact the TFT service
	The red alarm light on the control panel is lit.	The alarm type is shown in the alarm section of the display.
The unit is in AUTO mode and has stopped	Dehumidification is not required.	Check if the current humidity level is below the control point. Check operation by setting the control point below the actual humidity value and checking if the unit restarts. Check if the value indicated by the humidity sensor is correct.
The unit is in "REM" mode and has stopped	Remote start not connected	Check the jumper or contact on the remote start circuit.
Reduction of dehumidification capacity	Clogged filters	Clean or replace filters
	Blocked steam coil	Check the regeneration coil
	Steam valve does not open	Check the correct functioning of the valve
	Lack of steam flow rate	Check the operating pressure of the steam, the inlet valves, the condensate drain
	Reduced air flow rates	Check the dampers and/or frequency variators, if any
	Rotor stationary	Check the tension of the belt
	Indoor air leaks	Check the gaskets
	Insufficient regeneration temperature	Check the regeneration battery
	Air leakage	Check the gaskets and panels

Symptom	Possible cause	How to intervene
Main fuses blown or magneto-thermal blown	Fan malfunction	Check fans and motors
	Air flow too high	Check the flow rates and dampers
	Rotor stationary	Check gearmotor and belt
	Regeneration battery malfunction	Check the regeneration battery
White light on when the unit is operating	Maintenance hours threshold exceeded or air filters dirty process or regeneration	Assistance is required for the general inspection of the unit and/or the cleaning or replacement of the process and/or regeneration air filters
Rotor is stationary	Belt slippage	Check the tensioning
	Broken belt	Replace the belt
	Off-axis rotor	Check the position of the rotor on the central support
	Malfunctioning of the gearmotor	Replace the gearmotor
Low regeneration or process air flow rate	Clogged filters	Clean or replace filters
	Fan malfunction	Check the motor fans and impellers
	Electrical power supply phases	Check main fuses, supply voltage and phase sequence
	Blocked ducts	Check dampers and ducts

16 Technicalspecifications

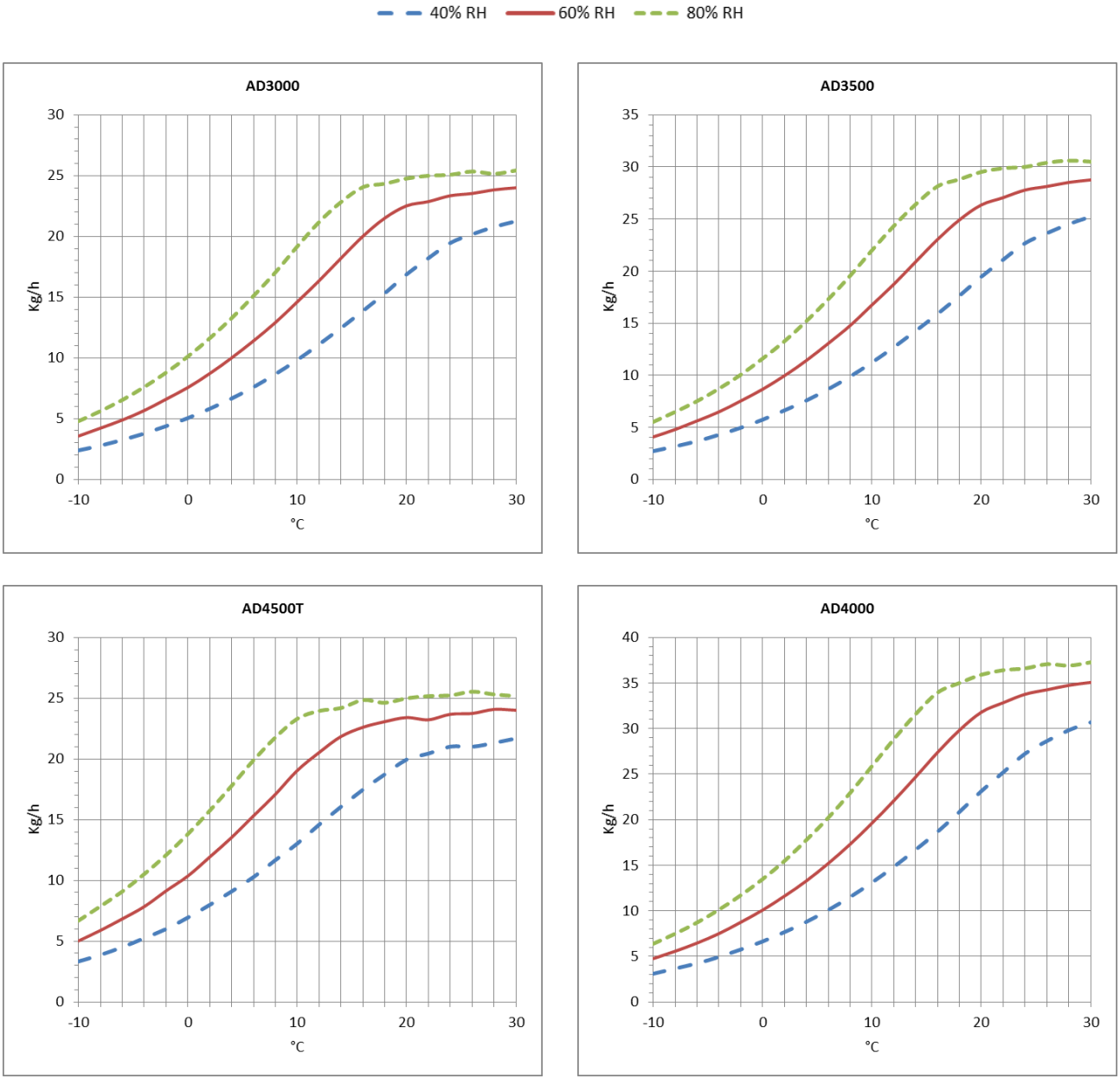
16.1 Technical data

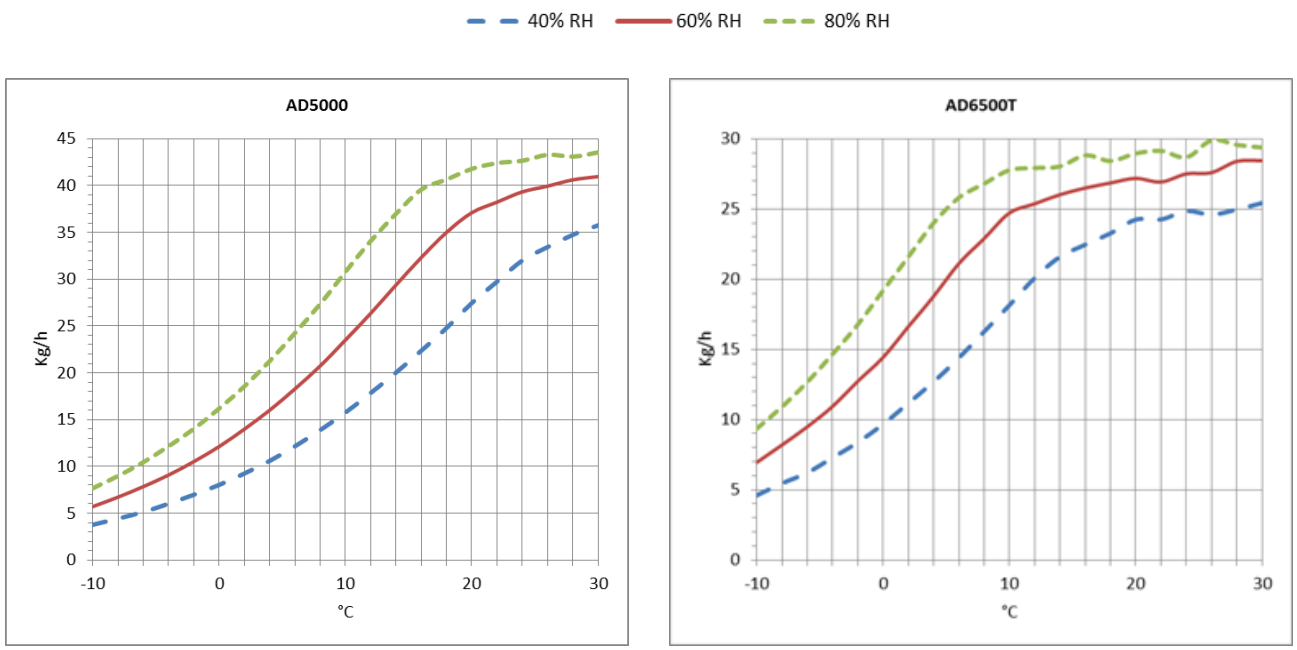
TECHNICAL DATA							
MODEL	AD	3000	3500	4500T	4000	5000	6500T
Performance							
Dehumidification capacity *	kg/h	23	27,3	21,1	31,7	37,2	27,1
Fans							
Process air flow rate	m^3/h	3000	3500	4500	4000	5000	6500
Usable static pressure	Pa	400	350	300	400	400	400
Fan rated power	kW	1,65	1,65	2,4	2,2	2,2	4,0
Regeneration air flow rate	m^3/h	900	1100	900	1350	1600	1100
Usable static pressure	Pa	200	300	300	400	350	400
Fan rated power	kW	0,49	0,72	0,72	0,75	1,1	0,75
Gearmotor							
Rated power	VA	11	11	11	11	11	11
Regeneration							
Type of regeneration		Electrical	Electrical	Electrical	Electrical	Electrical	Electrical
Installed power	kW	30,0	36,0	27,0	45,0	54,0	36,0
Type of regeneration		Steam	Steam	Steam	Steam	Steam	Steam
Heating output power	kW	31,1	37,9	31,1	46,6	55,2	37,9
Steam consumption at 6Bar(a)	kg/h	54	65	54	80	95	65
Temperature increase	°C	100	100	100	100	100	100
Technical characteristics							
Power supply	Volt/Ph/Hz	400/3/50	400/3/50 ±5%	400/3/50	400/3/50	400/3/50	400/3/50
Maximum power consumption	kW	32,3	38,5	30,3	48,1	57,5	40,9
Maximum absorption	A	46,7	55,8	43,7	69,5	83,1	60,8
Noise level							
Sound pressure **	dB (A)	68	68	69	70	72	73
Sound power **	dB (A)	96	96	97	98	100	101

(*) With inlet air at 20°C 60%.
(**) Sound pressure level calculated in a free field, 10 metres from the unit, directionality factor Q=2, according to ISO 9614.
(***) Standard electrical protection, water and dust resistant

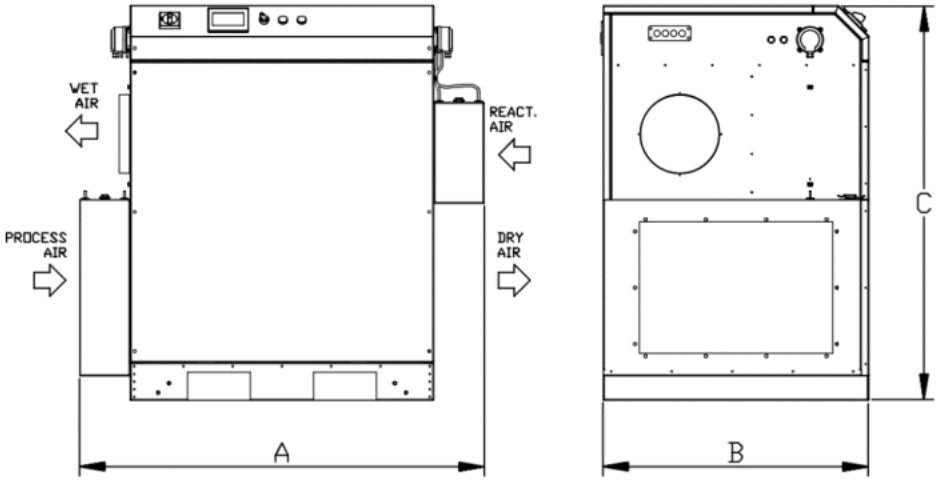
16.2 Performance diagrams

The diagrams are based on a nominal air flow with an outside air condition of 20°C 60%.
The horizontal axis represents the inlet temperature to the dehumidifier, the vertical axis the capacity of the dehumidifier Once the inlet temperature has been selected, it rises vertically until it reaches the relative humidity curve; from the intersection point, it moves horizontally to the left to see the performance of the dehumidifier.
Example: Inlet temperature 20°C, we cross the relative humidity curve by 60%, moving horizontally to the left we see the capacity.



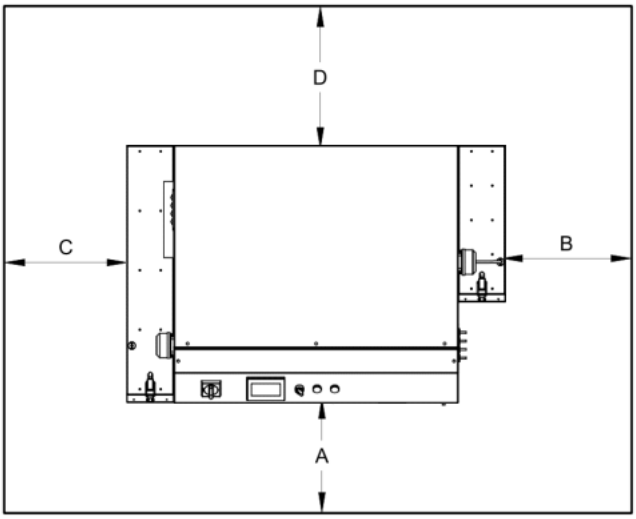

40% RH
60% RH
80% RH
AD5000
Kg/h
°C
AD6500T
Kg/h
°C

16.3 Dimensions



Model	AD	3000	3500	4500T	4000	5000	6500T
A	mm	1500	1500	1500	1895	1895	1895
B	mm	1020	1020	1020	1115	1115	1115
C	mm	1395	1395	1395	1500	1500	1500
Empty weight	Kg	350	360	360	490	530	545
Connections							
Process air inlet	mm	825 x 500	825 x 500	825 x 500	800 x 520	800 x 520	800 x 520
Dry air outlet	mm	825 x 500	825 x 500	825 x 500	800 x 520	800 x 520	800 x 520
Regeneration air inlet	mm	355 x 290	355 x 290	355 x 290	415 x 350	415 x 350	415 x 350
Wet air outlet	mm	Ø 280	Ø 280	Ø 280	Ø 315	Ø 315	Ø 315

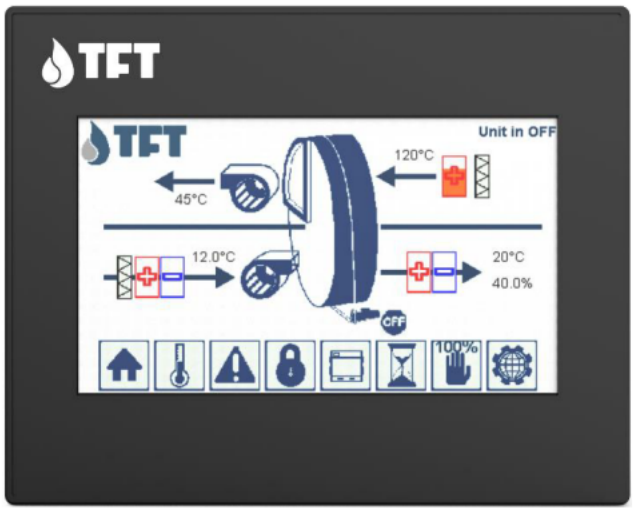
16.4 Respective Spaces For Installation



Modello	AD	3000	3500	4500T	4000	5000	6500T
A	mm	1800	1800	1800	1800	1800	1800
B	mm	500	500	500	500	500	500
C	mm	500	500	500	500	500	500
D	mm	300	300	300	300	300	300

Recommended clearance spaces for installation and normal maintenance.

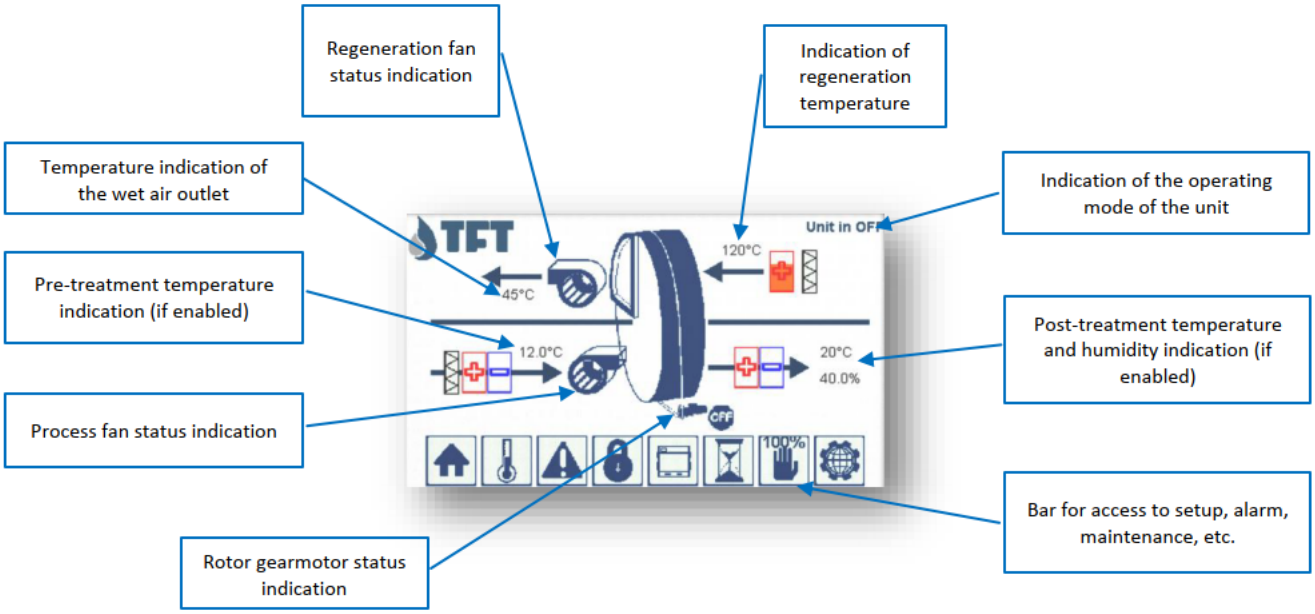
18 Control Description



FLUSH-MOUNTED TERMINAL

		Returns to the main page (Home page).
		Main set point settings (user).
		Display of active alarms and alarm history.
		Factory setting.
		Unit status by configuration
		Display of component operating hours (Service).
		Sets the regeneration control mode to manual [100%] or automatic [AUTO].
		Information about program and language change

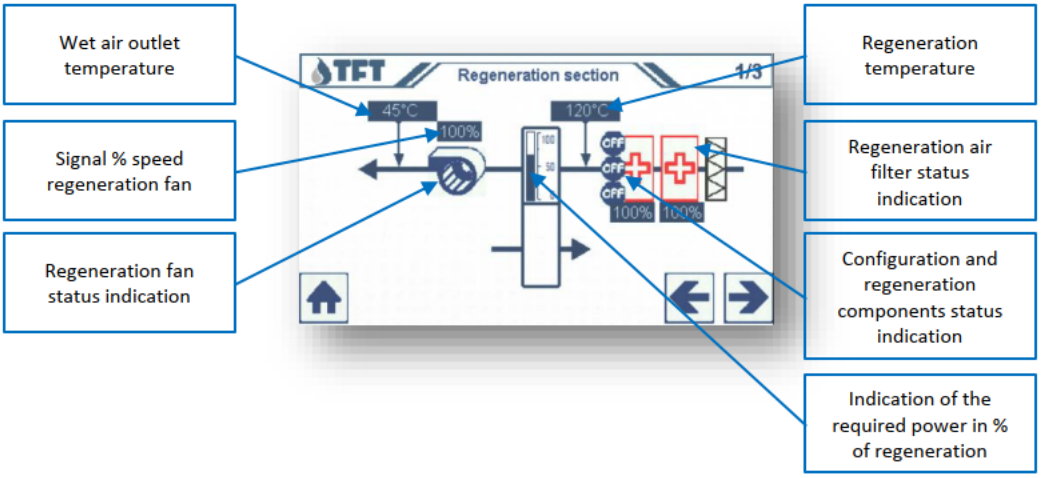
18.1 Description Display



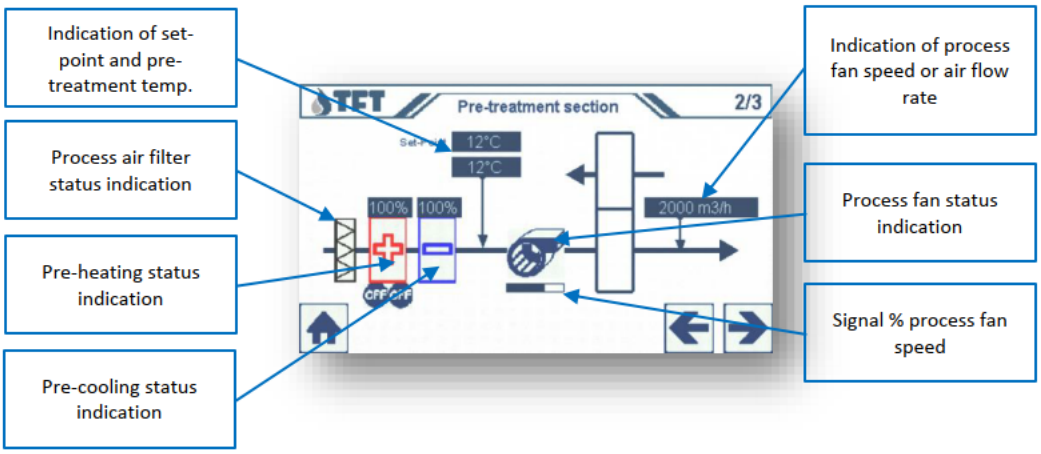
Press the "buttons" on the bottom bar to access the desired pages.

18.1.1 Unit status menu.

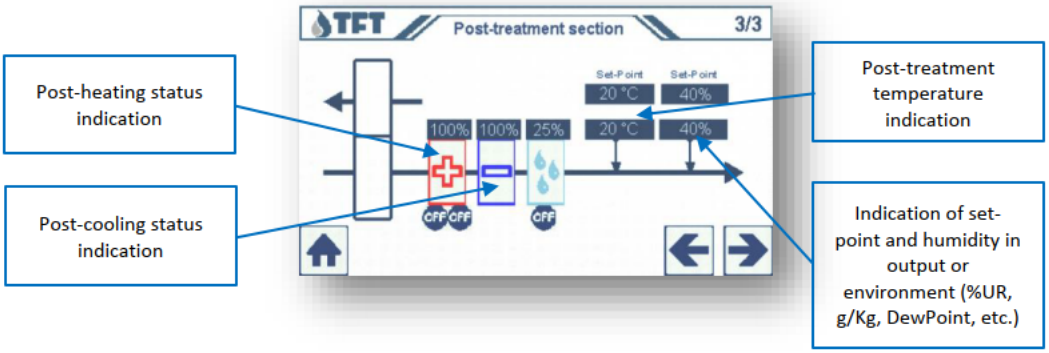
Regeneration:



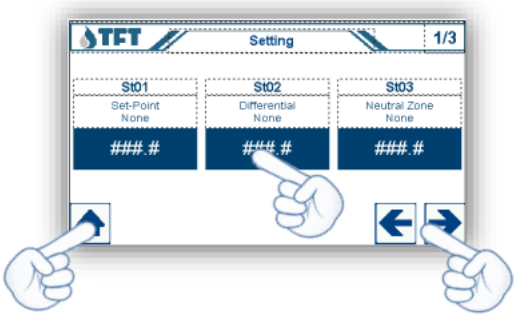
Air pre-treatment:

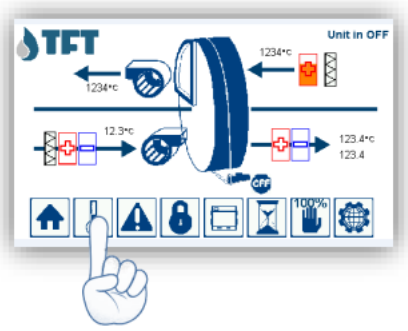


Air post-treatment:



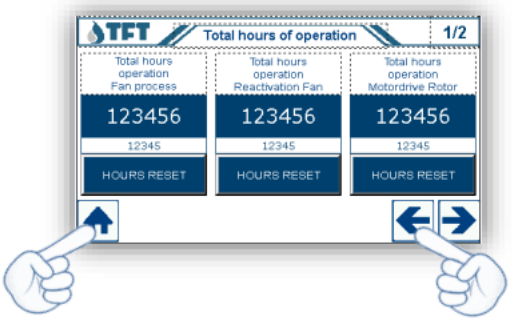
18.1.2 Set-Point Setup Menu.

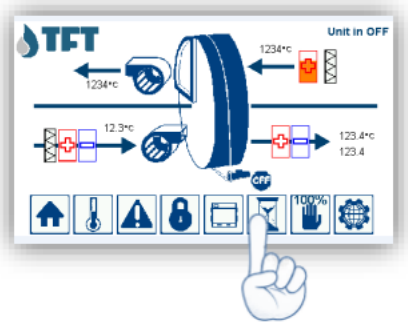




Scroll through the pages with the arrow keys , to view the various setting pages, and press the value you want to change above to change the setting To return to the main menu, press the key.

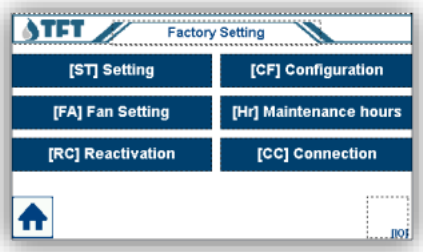
18.1.3 Total operating hours menu.

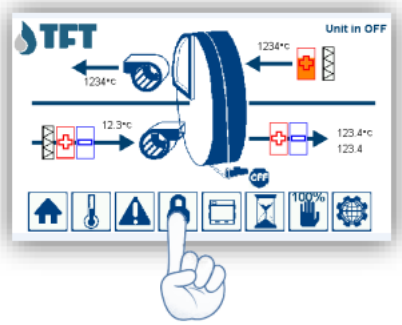


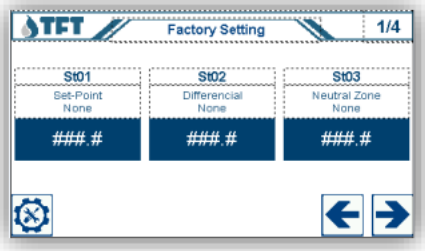


Scroll through the pages with the arrow keys , to view the various pages. To return to the main menu, press the key.

18.1.4 Factory Settings and SuperUser menu.

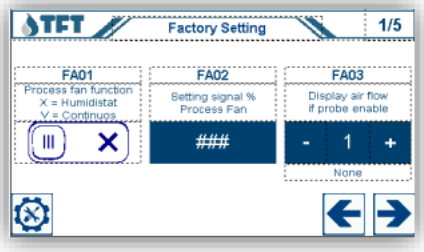






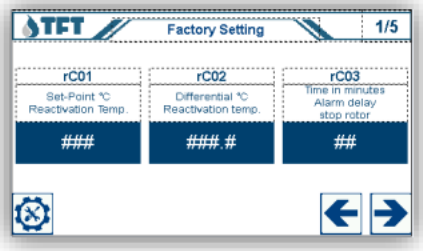
Setting "St" parameters (Set-point)

Scroll through the parameters with the arrow keys, to change the setting, press on the number to change, a keypad will appear to enter the desired value, confirm the value set with the [ENTER] key To return to the settings menu, press the key.



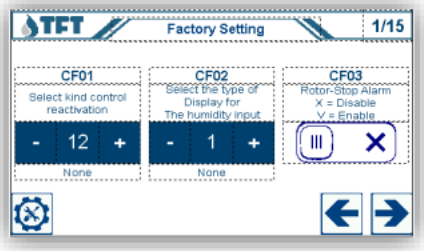
Setting of "FA" parameters (Fans)

Scroll through the parameters with the arrow keys, to change the setting, press on the number to change, a keypad will appear to enter the desired value, confirm the value set with the [ENTER] key. To return to the settings menu, press the key.



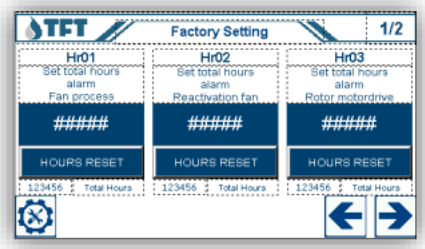
Setting "rC" parameters (Regeneration)

Scroll through the parameters with the arrow keys, to change the setting, press on the number to change, a keypad will appear to enter the desired value, confirm the value set with the [ENTER] key To return to the settings menu, press the key.



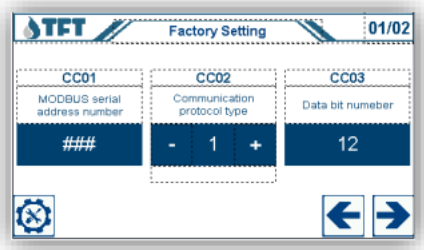
Setting "CF" parameters (Unit configuration)

Scroll through the parameters with the arrow keys, to change the setting, press on the number to change, a keypad will appear to enter the desired value, confirm the value set with the [ENTER] key. To return to the settings menu, press the key.



Setting "Hr" parameters (Service operating hours)

Scroll through the parameters with the arrow keys , to change the setting, press on the number to change, a keypad will appear to enter the desired value, confirm the value set with the [ENTER] key. To return to the settings menu, press the key .



Setting "CC" parameters (ModBus - TCP/IP communication)

Scroll through the parameters with the arrow keys , to change the setting, press on the number to change, a keypad will appear to enter the desired value, confirm the value set with the [ENTER] key To return to the settings menu, press the key .

PARAMETER TABLE "USER" AND "SUPERUSER"

Menu	Parameter	Description	Unit	Default Value	Set value
St--	St01	Set-point setting % relative humidity, absolute humidity, DewPoint (Function excluded with parameter CF05 = 0)	% g/Kg °C	20,0	
	St02	Differential % relative humidity, absolute humidity, DewPoint (the differential works all on one side, above the set-point for dehumidification and below for humidification)	% g/Kg °C	5,0	
	St03	Neutral zone % relative humidity, absolute humidity, DewPoint (the neutral zone works at the center of the set-point divided in half between above and below)	% g/Kg °C	0,0	
	St04	Setting set-point pre-treatment temperature (Function excluded with parameter CF08 = 0)	°C	10,0	
	St05	Pre-treatment temperature differential (the differential works all on one side, above the set-point for cooling and below for heating)	°C	2,0	
	St06	Neutral zone pre-treatment temperature (the neutral zone works at the center of the set-point divided in half between above and below)	°C	0,0	
	St08	Post-treatment temperature set-point setting (Function excluded with parameter CF09 = 0)	°C	200,0	
	St09	Post-treatment temperature differential (the differential works all on one side, above the set-point for cooling and below for heating)	°C	2,0	
	St10	Neutral zone post-treatment temperature (the neutral zone works at the center of the set-point divided in half between above and below)	°C	0,0	
	St11	Setting of PWM perdio time value for electrical post-heating with proportional control	sec	50	
FA--	FA01	Process fan operation: X = On/off fan from humidistat V = Fan always on	X/V	V	
	FA02	Process fan inverter signal control percentage value	%	85	
	FA04	Process air duct surface	m^2	0,1	
	FA05	Process air flow or speed (with sensor for flow control)	m/s m^3/h Kg/h	3000	
	FA12	Setting of unit installation altitude, to calculate air flow rate in Kg/h	m	0	
	FA15	Percentage value of regeneration fan inverter signal command	%	85	
rC--	rC01	Regeneration temperature set-point setting	°C	125,0	
	rC11	Setting of high temperature alarm threshold for humid air outlet	°C	70,0	
	rC12	Setting of automatic or manual reset of high temperature alarm for humid air outlet: X = Automatic alarm reset V = Manual alarm reset	X/V	V	
CF--	CF02	Setting value to be displayed on the main screen: 0 = No display 1 = Displays the value read by the relative humidity probe (%) 2 = Displays the value read by the DewPoint probe (°C) 3 = Displays the value read by the absolute humidity probe (g/Kg) 4 = Displays the value of the external proportional signal (%) 5 = Displays the value read by the relative humidity and temperature probe with the calculated value of the DewPoint (°C) 6 = Displays the value read by the relative humidity and temperature probe with the calculated value of absolute humidity (g/Kg)	Num.	0	
	CF04	Setting the type of input signal for the humidity probe: 0 = Signal 4...20mA 1 = Signal 0...10Vdc	Num	0	
	CF05	Setting type of humidity probe: 0 = None 1 = Relative humidity probe % 2 = DewPoint probe °C 3 = Absolute humidity probe g/Kg 4 = Proportional external signal 0-100%	Num.	0	
	CF06	Setting of the minimum value of the humidity probe signal (at the current value of 4mA or voltage 0Vdc)	Num.	0,0	

Menu	Parameter	Description	Unit	Default Value	Set value
	CF07	Setting of the maximum value of the humidity probe signal (at the current value of 20mA or 10Vdc voltage)	Num	100,0	
	CF09	Setting the type of temperature probe for post-treatment: 0 = None 1 = NTC passive probe 2 = Probe active signal 4...20mA or 0...10Vdc	Num	0	
	CF10	Setting of the minimum value of the after-treatment temperature probe signal (at the current value of 4mA or voltage 0Vdc)	Num.	-30,0	
	CF11	Setting of the maximum value of the after-treatment temperature probe signal (at the current value of 20mA or 10Vdc voltage)	Num.	70,0	
	CF12	Setting the type of input signal for the port-treatment temperature probe: 0 = Signal 4...20mA 1 = Signal 0. 10Vdc	Num.	0	
	CF46	Start/stop dehumidifier operation setting: 0 = Deactivated 1 = Start and stop from set time 2 = start and stop from the set time and according to the value of the humidity probe 3 = start and stop by set time and external humidistat	Num.	0	
	CF47	Setting OFF time for dehumidifier with active function (CF46>0)	Min	120	
	CF48	Setting time of ON dehumidifier with active function (CF46>0)	Min	60	
CC--	CC01	Number Unit address (RS485 Modbus RTU/BacNET)	Num	1	
	CC02	Protocol type ModBus RS485 (do not change only for future functions)	Num.	3	
	CC03	Number of transmission bits (ModBus)	Num.	8	
	CC04	Stop bits (ModBus)	Num	1	
	CC05	Type of parity (ModBus) 0 = Null 1 = Odd 2 = Even	Num	2	
	CC06	Transmission speed (ModBus) 0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 76800 5 = 115200	Num.	2	
	CC07	Setting the Ethernet address TCP/IP - BacNet	Num.	192.168.1.100	
	CC08	TCP/IP Ethernet Gateway Setting - BacNet	Num.	192.168.1.1	
	CC09	Setting up SubMask Ethernet TCP/IP - BacNet	Num	255 255 255.0	
	CC10	TCP/IP Ethernet port setting	Num.	502	
	CC11	BACNET transmission protocol ability (PLC restart required) X = BacNet disabled V = BacNet active	X/V	V	
	CC12	ID number ID for BacNet protocol	Num.	1	
	CC13	SubNet identification number for BacNet protocol	Num.	0	
	CC14	Setting the IP service address for BacNet BBMD	Num	0 0 0.0	
	CC15	TMO setting for BacNet BBMD	Num	60	
	CC16	Port Setting for BacNet BBMD	Num.	0	

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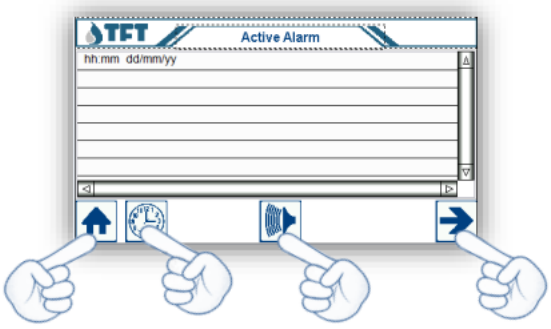
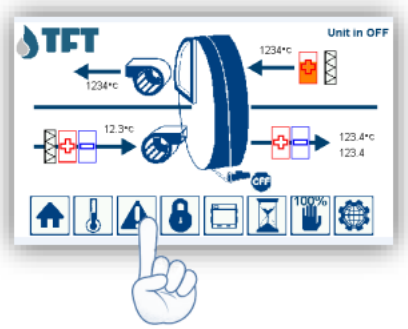
(*) For the modification to take effect, it is necessary to boot the instrument, switch off the power, wait a few seconds and switch on the power again.
(**) Password for USER setting = 1234, password for SUPERUSER setting = 6000, password for factory setting request to TFT

18.1.5 Alarms menu.





Scroll through the pages with the arrow keys , to view the various pages. Press the key to set the correct system date and time Press the key to reset the active alarms To return to the main menu, press the key

ALARMS TABLE

ITEM	Description	Action	Reset
Fan Process Fault	Process fan thermal alarm	Deactivating the unit	Manual
Fan Regeneration Fault	Thermal alarm regeneration fan	Deactivating the unit	Manual
Gearmotor fault	Wheel gearmotor thermal alarm	Deactivating the unit	Manual
Resistance failure Regen.	Thermal alarm for regeneration resistors or burner alarm	Deactivating regeneration	Manual
High temperature Regeneration	High regeneration temperature alarm from limit and/or safety thermostat	Deactivating regeneration	Manual
Rotor stationary	Rotor stop alarm	Deactivating regeneration	Manual
Fault Temperature Probe Regeneration	Temperature probe regeneration error, faulty or disconnected	Deactivating regeneration	Automatic
Humid Air Temp Probe Fault	Error of humid, faulty or disconnected air outlet temperature probe	Deactivating regeneration	Automatic
Probe fault Pre-treatment temperature	Pre-treatment, faulty or disconnected temperature probe error	Deactivation of pre-treatment	Automatic
Post-treatment Temperature Probe Fault	Post-treatment, faulty or disconnected temperature probe error	Deactivation of post-treatment	Automatic
Humidity Probe Fault	Humidity probe error, faulty or disconnected	Deactivating regeneration	Automatic
Fault Process air flow sensor	Error probe speed or air flow rate process fan, faulty or disconnected	No action	Automatic
High Temperature Humid Air Outlet	High temperature alarm for humid air outlet	Deactivating regeneration	Automatic
Fault Probe air flow regeneration	Error probe speed or air flow rate regeneration fan, faulty or disconnected	No action	Automatic
Remote signal fault Humidity Set	External set-point humidity signal error, missing or disconnected	No action	Automatic
Remote signal fault Temperature Set	External signal error set-point temperature after treatment, missing or disconnected	No action	Automatic
Pre-Heating Resistance Fault	Thermal alarm for pre-heating resistances (if present)	Deactivation of pre treatment	Manual
Post-Heating Resistance Fault	Post-heating resistor thermal alarm (if present)	Deactivation of post treatment	Manual
Humidifier fault	External humidifier general alarm (if present)	Deactivating humidification	Manual
ER01 configuration error	Configuration alarm: Pre-cooling/heating control has been enabled without enabling the pre-treatment temperature probe (parameters CF30, CF31, CF08).	No action	Automatic
ER02 configuration error	Configuration alarm: Post-cooling/heating control has been enabled without enabling the post-treatment temperature probe (parameters CF28, CF29, CF09).	No action	Automatic

ITEM	Description	Action	Reset
ER03 configuration error	Configuration alarm: Humidification control has been enabled without enabling the humidity probe (parameters CF32, CF05).	No action	Automatic
ER04 configuration error	Configuration alarm: The output 4...20mA has been enabled with the control of the PWM control for regeneration, this output must be configured 0 10V (parameters CF36, CF01)	No action	Automatic
ER05 configuration error			
ER06 configuration error	Configuration alarm: Dewpoint or absolute humidity control has been enabled without enabling the corresponding relative humidity and post-treatment probes (CF33, CF05, CF09).	No action	Automatic
ER07 configuration error	Configuration alarm: The air velocity or process air flow rate display has been enabled without enabling the air velocity probe (FA03, FA04, CF13)	No action	Automatic
ER08 configuration error	Configuration alarm: The display of the air flow rate in Kg/h has been enabled without having enabled the corresponding probes for air speed, temperature and humidity, or/and the various channel configuration parameters (FA03, FA04, CF13).	No action	Automatic

Notes:

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