ADSORPTION DEHUMIDIFIER WITH CONDENSER L4 ES

USER MANUAL



CorroVenta®

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User instructions L4 ES

Area of use

L4 ES is an adsorption dehumidifier with air-cooled condenser, developed and designed for construction dehumidification and for drying water damage and is very practical for use in situations where it is difficult to extract wet air from a normal adsorption dehumidifier.

Using the adsorption principle, L4 ES also works at low temperatures and by condensing in the air-cooled condenser, the room is supplied with up to 400 W of extra heat.

Via the control panel, the user of L4 ES can optimise the operation for the intended job, set the capacity and volume, control the fan as well as use integrated or external sensors for temperature and relative humidity to achieve the desired effect in combination with the lowest possible energy consumption. L4 ES can also be used in networks and is prepared for remote monitoring and remote control. Furthermore, it has a built-in pump, integrated hose and cable wind, as well as flexible support feet that protect floor surfaces and at the same time allow stackability. Its robust design gives a long service life.

In addition to room drying, L4 ES can also be used together with turbines for drying layered constructions, both suction and pressure drying.

Properties:

• Energy efficient	• Service-friendly
• High capacity level	• Digital interface with network function
• Robust	• Very quiet
• Low weight	• Energy and time meter – resettable work counter
• Easy to transport	• Stackable
• Ergonomic	• Very compact

Delivery check

L4 ES is supplied with the following parts in the package:

Dehumidifier L4 ES	1 x
Extra process air filter in addition to the one in the dehumidifier	2 x
Manual	1 x

Manufacture directive

The machines in the L4 ES series are CE approved.

Limitation of Liability

- Incorrect installation and/or incorrect use can cause property damage as well as injury.
- The manufacturer assumes no liability for property damage or injury incurred as a result of failing to follow these instructions, the machine being used for purposes other than those intended or failure to observe these warnings. Such damage, injury or liability is not covered by the product warranty.
- The product warranty does not cover consumable parts or normal wear.
- The purchaser is responsible for checking the product upon delivery and before use to ensure it is in good condition. The product warranty does not cover damages resulting from the use of defective products.
- Changes or modifications to the machine must not be performed without written permission from Corroventa Avfuktning AB.
- The product, technical data and/or installation and operating instructions are subject to change without notice.
- These user instructions contain information protected by applicable intellectual property laws. No part of these user instructions may be reproduced, stored in a retrieval system or transmitted to third parties in any form or by any means without the prior written consent of Corroventa Avfuktning AB.

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Safety information

The equipment can be used by children over 8 years old and people with reduced physical, sensory or mental capabilities, or by people who lack of experience or knowledge, on the condition that they have received guidance or information on how to use the equipment safely and understand the risks that may occur.
Children must not be allowed to play with the equipment. Cleaning and maintenance must not be carried out by children without the supervision of an adult. Electrical installations carried out in connection with the installation of L4 ES must be done by a qualified electrician in accordance with local and national regulations.

In addition, the following warnings and instructions must be read and followed:

1. The dehumidifier is only intended for indoor use.
2. The dehumidifier must not be powered on before installation is completed in accordance with this manual.
3. The dehumidifier must not be covered because this may lead to overheating and fire.
4. The dehumidifier must not be used as a worktable, trestle or stool.
5. The dehumidifier is not intended to be stood or climbed on.
6. Never operate the dehumidifier without installing the filter, as this may damage the dehumidifier. Ensure that the filter is clean. If it is blocked, the machine may overheat.
7. Do not allow the dehumidifier to draw in alkaline chemicals or organic substances with a high boiling point, such as oil, grease, solvents, boracol or similar. These can damage the rotor.
8. The dehumidifier may not be used in areas where it can produce explosive gases.
9. Do not insert objects into the intake or exhaust as this could damage the dehumidifier and injure people.
10. Place the dehumidifier on a firm and flat surface so that it cannot overturn.
11. Keep children, animals and bystanders away from the workplace.
12. Contact the supplier if the dehumidifier is damaged or if the plug or the electrical cable are damaged. Do not make any repairs yourself if you have not undergone the supplier's training.
13. Do not damage the electrical cable. The cable must not run through water or over sharp edges.
14. Never carry or drag the dehumidifier by the cable.
15. Using electrical equipment in very damp or wet conditions can be dangerous. Do not operate the dehumidifier if it is standing in water.
16. The dehumidifier may only be connected to a grounded socket with voltage according to the rating plate.
17. It is recommended to use an earth-fault breaker to minimise the risk of electric shock.
18. Water must not encounter the dehumidifier's electrical components. If it does, ensure that they are dried thoroughly before the dehumidifier is used again.
19. Never open the dehumidifier for cleaning or service without first ensuring that the dehumidifier is disconnected from power.
20. Repairs and maintenance of the dehumidifier's electrical system must be performed by a qualified electrician.

21. The dehumidifier must not be used with accessories other than those described in this manual or approved by Corroventa Avfuktning AB.

Contact the supplier of this dehumidifier for further advice on the safety and use of the product.

Relative humidity and its impact on materials

All air contains a greater or lesser degree of moisture. We can't see it with the naked eye until it appears in the form of small water drops against a cold metal or glass surface for example. However, before it is visible, moisture is already causing problems by affecting materials and manufacturing processes, causing corrosion and growth of micro-organisms.

Air moisture is measured and usually given in relative humidity (% RH). It is a measurement of how much water vapour the air contains over how much it can hold in total at a given temperature and pressure. The higher the temperature, the more water the air can hold, but it is the relative humidity that is calculated and must be controlled to prevent corrosion or mould growth.

At 100% RH the air is saturated, and the moisture falls in the form of small water droplets. Steel corrodes at 60% RH and at 70% RH there is a risk of mould. A rule of thumb is that 50% RH is a good climate for most materials.

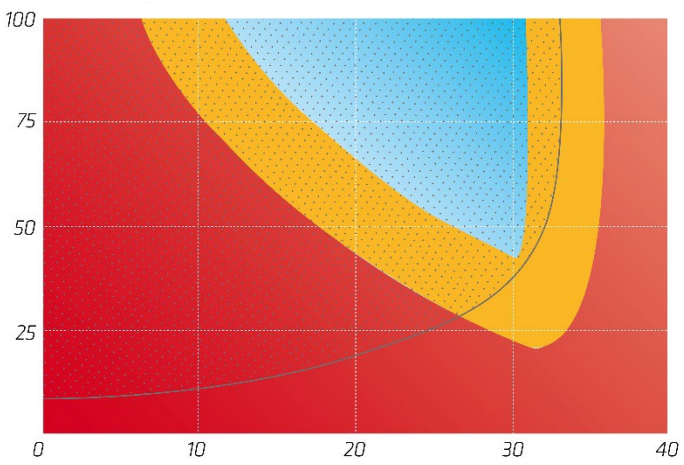
How to select dehumidification technology for a given situation

The adsorption principle has the advantage of not having the same temperature dependence as condensing dehumidification. Adsorption also works way below freezing, whilst condensing drier capacity decreases sharply with decreasing temperature, which is illustrated in the graph below to the left.

An adsorption dehumidifier with air-cooled condenser like L4 ES, bridges these properties by working within a large area, including the primary area of the condensing drier. In other words, it is the best option for room drying at low temperatures, ideal for emergency damage and construction dehumidification.

As a general tip when choosing the technique for the relevant drying situation, it can be said that adsorption dehumidification is the primary choice for drying in unheated spaces or when material drying is required. The latter is justified by the adsorption dehumidifier producing dehumidifier air, i.e. provides a greater difference between the incoming and outgoing air's moisture content calculated in grams per cubic metre (ΔX), which can be seen using the graph to the right below and which is decisive for the rate of drying. Layered structures are dried by the machine being installed, with the turbine, for suction or pressure drying.

Relative humidity (% RH)



Temperature ◦C

The diagram shows the type of dehumidifier that works best in each climate.

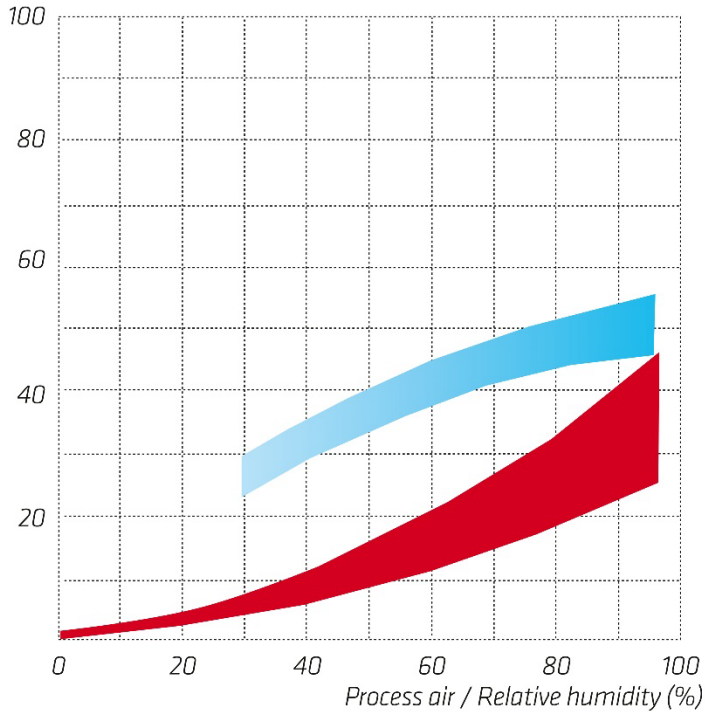
Adsorption dehumidifier *– superior performance in the red area. Also works in the yellow and blue area.*

Adsorption dehumidifier with condenser *– functions in the dotted area.*

Condensing dehumidifier *– superior technology in the blue area. Does not work in the red area.*

Transition zone

Dry air / Relative humidity (% RH)



Dry air quality at 20°C

Example of basic differences between selecting a condensing dehumidifier or an adsorption dehumidifier.

As the graph above shows, condensing drier are used in hot and humid spaces if room drying is required.

This is how the dehumidifier works

L4 ES is an adsorption dehumidifier with built-in air-cooled condenser through which cooled air from the surrounding area passes, driven by the process/cooled air fan.

The desiccant used in L4 ES is silica gel, which can be regenerated an almost unlimited number of times. Silica gel is a crystal with a lot of microscopic pores that make the total surface very large. A single gram has an active surface of 500 to 700 m^2. It is very powerful and can absorb a volume of water of up to 40% of its own weight. It is not water soluble and therefore cannot be washed away or diverted to the passing air.

Dehumidification process

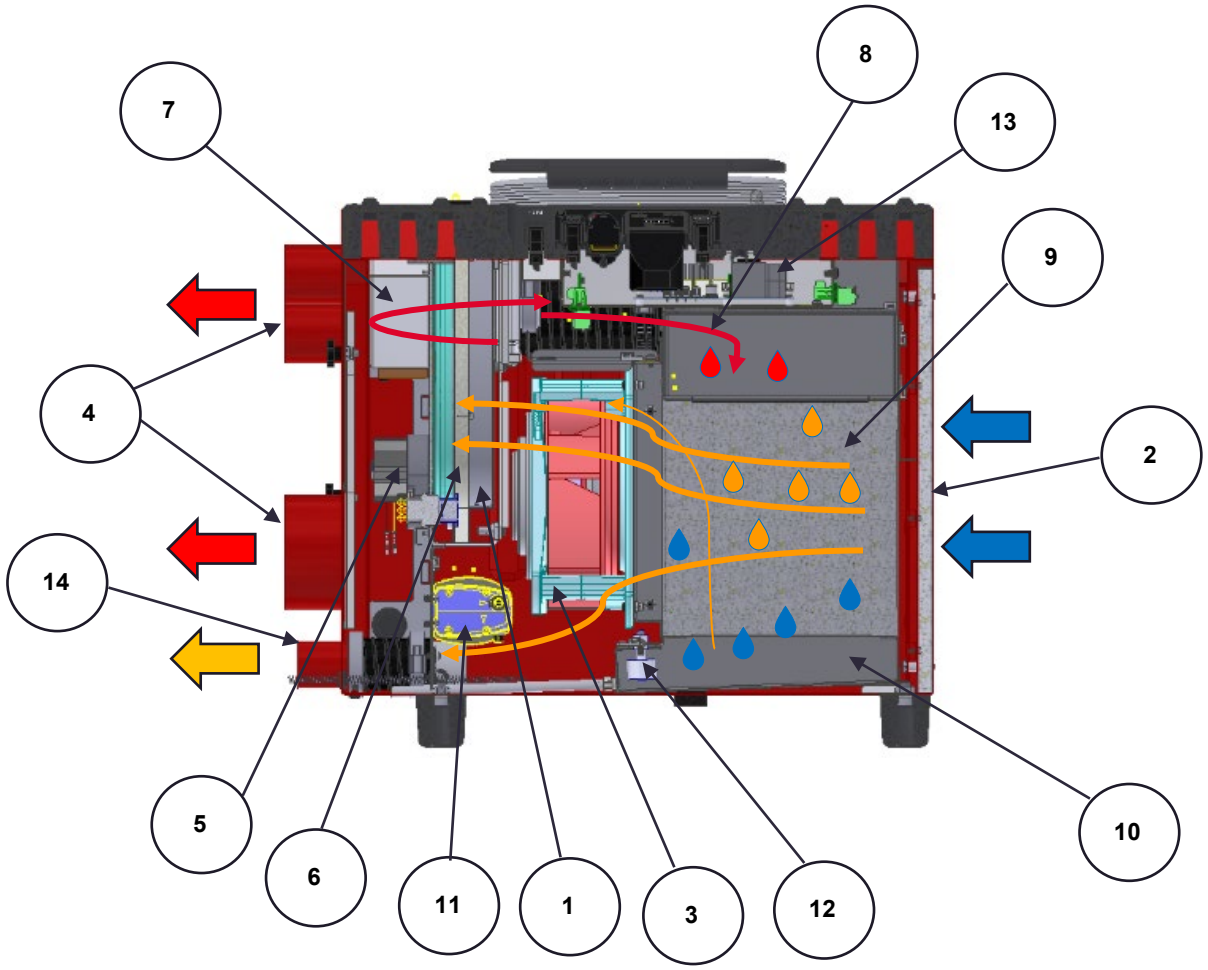
The desiccant is placed in a rotor (1). The air to be dried is sucked in through the inlet and passes a filter (2) by means of a process/cooling air fan (3).

The air then passes the drying rotor, after which the dehumidified air goes through the dry air outlet (4) to the area to be kept dry. The rotor has axially directed air ducts and consists of a highly active desiccant, silica gel, bonded in a ceramic structure. The axially directed air ducts in the rotor give laminar flow with minimal pressure drop.

The rotor rotates by means of a drive motor (5) and a drive belt (6). The moisture that is adsorbed in the rotor is driven out by a small portion of the process air being heated by the heater (7) and then passing a smaller part of the rotor, which is thus regenerated and cleaned by the countercurrent principle.

The wet air is removed via the outlet (8) and led to the air-cooled condenser (9), where it is cooled by air from the surroundings and then resupplied to the dehumidifier as part of the new process air. The condensation water in the condenser runs down into the bottom tray (10) and is removed via the built-in pump (11).

The bottom tray is equipped with overfill protection (12) that shuts off the machine if the condensation water is not removed. The control electronics (13) are located in the cover. L4 ES is also equipped with a cooling air connector (14). The cooling air ensures that the cooling air flow across the air-cooled condenser and connector connection makes it possible to connect a cooling air hose to route the cooling air away. If there is a need to create negative pressure during the drying process, this is an energy efficient way of routing the cooling air out. The cooling air flow/The cooling air connector must always be fully open.


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Product overview

The images below present L4 ES with all external parts and controls.



Process/cooling air inlet with filter





Installation

Place L4 ES on a flat and level surface, so that it cannot tip over causing damage to the machine or other property or injury to people.

L4 ES is very quick and easy to install, which makes it suitable as, for example an emergency machine that can quickly be on site after damage. It is positioned in the area to be dried in such a way that the best air circulation is obtained. The better the circulation of the air in the room, the better and faster the drying. The dehumidifier produces 400 m^3 of dry air per hour and because there should be a turnover of air between 1.5 and 2 times per hour, the machine is suitable for areas with a volume of up to 300 m^3.

Do not position the machine closer than 0.5 to 1.0 metres to a wall as this can unnecessarily obstruct the air flows. Hoses can be connected to the dry air connectors to dry multiple areas simultaneously or to distribute the dry air further.

If negative pressure is required in the area to be dried, a hose can be connected to the cooling air connector that is routed out of the area. This air is unheated, thus providing an energy efficient way of creating negative pressure. Ensure that the Cooling air from the cooling air connector is not blocked.

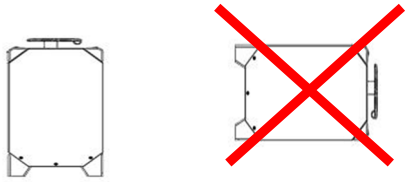
As with all dehumidification, it is important that L4 ES is used to ensure that the space to be dried is well enclosed and cordoned off. Any doors and windows to the space must be closed and if there are not any, use plastic sheeting or another temporary solution. If the space is very small, it is important to remember that the machine can produce up 1.7 KW of heat, which, depending on the situation, can quickly lead to a large increase in temperature and thus a decreasing capacity of the machine. Optimum machine performance is achieved between 0 and 25°C.

When drying wood or in other situations where there is a risk of drying occurring too quickly or at too low relative humidity, L4 ES can be used with the built-in hygrostat or with an external hygrostat, which is available as an accessory. Using the hygrostat, you set a threshold value for the relative humidity of the air at which the machine will switch off and stop dehumidification. If the humidity in the room rises again, the machine starts automatically.

The machine's condensation water hose is routed to a sewer, floor drain, sink, toilet or similar. The built-in pump can push the water up to five metres in height, which allows the drain to be higher than the machine.

Do not use the machine at temperatures below 0°C as the condensation water can then freeze and damage the built-in pump.

- Operating range humidity: 20-100% RH
- Operating range temperature: +0°C to +30°C
- The dehumidifier must reach ambient temperature before starting, if stored in cold conditions.



The machine must be transported upright and must always be upright during operation.

Installation in brief (also see page 10, Overview, controls and connections):

- Place the dehumidifier in the area that is to be dried in such a way that good air circulation is achieved.
- Do not position the machine closer to a wall than 0.5 to 1.0 metres, as this can unnecessarily obstruct the air flows.
- If needed, use hoses to the dry air connectors to distribute the air.
- Ensure that the dehumidifier is on firm and level ground so that it cannot tip over.
- Route the condensation water hose to a suitable drain. The pump module can achieve a rise of up to five metres. Ensure that the hose is not pinched and that it is clear, so that the water can flow unrestricted
- Connect the cable to 1-phase, 230 VAC electrical socket fused to 10A or maximum 16A. Since the machine is normally used in humid or wet areas, it is strongly recommended to use an earth fault breaker.
- Start the machine with the switch. When the display lights up and shows the first screen image after start-up, press Start or Resume.
- When drying wood, or in other situations where drying must not occur too quickly or to too low a relative humidity, drying should not occur continuously, control mode (MAN-manual position) should not be selected.
- Before leaving the dehumidifier, check, by looking into the dry air connectors, that the rotor is rotating, feel for air blowing out of both the dry air connectors and out of the cooling air connector and that the dry air feels warmer than the surroundings. Check the latter in the upper connectors closest to the heat cover on the rotor insert. Note that when using a hygrostat, the

setpoint value may need to be lowered for a while for dehumidification to start – otherwise the heater and rotor will not run, and the air will not be hot.

Regardless of the area of use, ensure that not all dry air connectors are closed at the same time and that the cooling air connectors are not blocked.



When the work is to be completed, in order to avoid spilling condensation water on the floor or in the transport vehicle, the remaining condensation water from the condenser should be pumped out. Leave the switch in the ON position and stop the machine by pressing the ”Stop” on the control panel. The machine then runs in a post cooling mode, the fan and pump continue to run for 120 seconds before the machine switches off. The machine can be tilted as illustrated advantageously.

The machine must be transported upright and must always be upright during operation.

Transportation

Secure the dehumidifier well when it is being transported.

If the machine toppled over during transportation, the machine must stand upright for at least 30 minutes prior to starting.

Storage

L4 ES can be stored stacked on top of each other as shown below, thus saving floor space. The machine must always be stored upright and in a frost-free area.





Drying methods

The following outlines the basics of different drying methods that can be applied to L4 ES and, in some cases, additional equipment from Corroventa's product range. The descriptions are only an overview, and in the event of any doubt about how any given situation should be handled please consult an experienced dehumidification technician.

General drying, room dehumidification

As with all dehumidification, regardless of type or model, it is important to ensure that the area to be dehumidified is well sealed so that the process is performed as fast and as energy efficiently as possible. Windows and doors to the area must be closed, and if there are not any, plastic or other temporary partitions must be used.

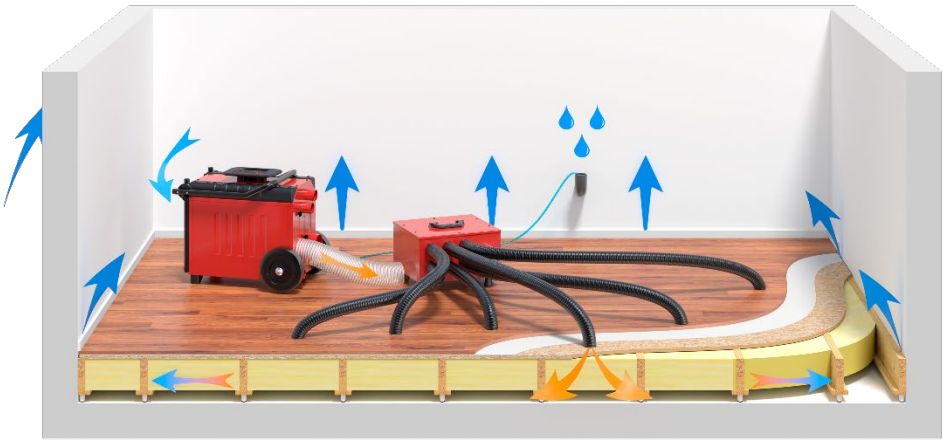
If the extent of the damage is limited. it is advisable to cover it with plastic and let the dry air flow in under the plastic via a hose. Leave openings at the edges where the air can exit. This makes the process faster and consumes less energy.



COVER LOCAL DAMAGE WITH PLASTIC WHEN DRYING TO INCREASE THE DRYING RATE AND REDUCE ENERGY CONSUMPTION.

Drying framed flooring and beams

For framed flooring and beams with easy-to-dry insulation, for example, glass wool, L4 ES can be used with a high-pressure fan such as HP2000 according to the schematic diagram below. Remember that the capacity of this fan far exceeds that of the dehumidifier and therefore allow the fan to "draw the bad air". The diagram below shows this by the dry air hose from the dehumidifier to the right not being connected directly to the fan, but placed next to it instead. In this way, the fan can draw enough air without drawing excess air through the dehumidifier affecting its function and efficiency.



DRYING BEAMS USING A FAN. NOTE THAT THE DEHUMIDIFIER TO THE RIGHT IS NOT DIRECTLY CONNECTED TO THE FAN. THE DRY AIR HOSE IS ONLY PLACED CLOSE TO THE FAN.

Suction drying

When suction drying layered structures, use L4 ES together with a turbine according to the schematic diagram below. Connect the turbine or turbines so that they draw air out of the layered structure via hose system, water separator and filter, and then evacuate the air via the hose out to the surroundings. Place the dehumidifier in the room and route its condensation water hose out of the room normally. In this way, the turbine will draw in dry air into the layered structure and this is how the method got its name.

Use of a water separator is crucial to prevent water being sucked into the turbine and damaging the motor.



SUCTION DRYING. THE DEHUMIDIFIER DRIES THE AIR IN THE SPACE AND THE TURBINES DRAW AIR OUT OF THE LAYERED STRUCTURE, RESULTING IN DRY AIR BEING DRAWN DOWN INTO IT.

Pressure drying

When pressure drying, use L4 ES together with a turbine according to the schematic diagram below. Pressure drying is two to four times faster than suction drying and is therefore the primary choice for a layered structure, if there are no obstructions.



PRESSURE DRYING. THE TURBINE IS FED WITH DRY AIR FROM THE DEHUMIDIFIER AND FORCES IT INTO THE LAYERED STRUCTURE.

During pressure drying, dry air is routed from L4 ES to a turbine and then forces this air into the layered structure. In this way, warm and dry is forced down into the structure, which achieves the material temperature and thus increases the rate of the drying process. Wet and cool air leaks into the room through the gaps between the floor and the wall or via drilled check holes and is then re-sucked into the dehumidifier as process air.

Before starting pressure drying, suction drying is required to evacuate all free-flowing water so that this is not forced into other parts of the structure.

Pressure drying may release fibres/particles from the layered structure into the indoor air and if this is a potential problem another method should be applied.

Using L4 ES, menus and operation

L4 ES has an easy-to-use user interface with a display and five buttons. The two larger buttons on each side of the display are used to select between different menus. These buttons are only intended for navigation and cannot be used to change the settings.

The three smaller buttons are used for selection and editing, and their functions are always presented as text at the bottom of the screen. On the upper menus, the left-hand button is called the HOME button. One push of this button takes you straight back to the standard view. In many of the views there is an Info button that presents information that can be useful for inexperienced users.

If the display's background lighting goes out after the preset time, the first button push only illuminates the display.

If no button is pushed for ten minutes, a keylock is activated. The machine then must be unlocked by pushing the two upper button simultaneously. This procedure is presented as text and as an image on the display.

Upper buttons to the left and right –	**Only menu navigation. Never change any settings.**
Home button	**Return to standard view.**
Info button	**Presents information.** **Electronic user instructions.**

SuperVision

Appears when the machine is connected to Supervision for remote monitoring and remote control.

Network status

”Master” or ”slave”

If the machine is connected to a local network this mode is indicated if the machine controls the network (Master), or if it is controlled by another machine and thus is Slave.

Capacity mode

Indicates the selected capacity mode, Max, Eco or ΔX.

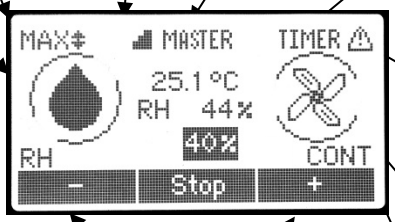
Timer

Indicates when the machine is set to timer mode.

Slave – indicates that the machine is being controlled by another machine.

Drying indicator

Moves when drying is in progress.



Control mode

Indicates how drying is controlled, if it is continuous (MAN = manual) or if it works to a preset setpoint for Relative Humidity (RH), Mixing ratio (X), or dew point (DP). It can also be controlled from an external hygrostat (HYG).

If an external sensor for relative humidity and temperature is used, E.RF, E.X or E.DP appears in this mode.

Alarms

The machine has detected a fault.

Fan indicator

Moves when the fan is running.

Setting setpoint

The left and right buttons below the screen are used to increase and decrease the setpoint that is shown against a black background.

Fan mode

Cont – continuous fan.
If this information does not appear, the fan only runs when drying is required.

Start view

When L4 ES starts up, two options appear for the user on the display:

Start: Starts the machine with standard settings, continuous operation with maximum capacity. Previous settings such as use of sensor control, timer etc.

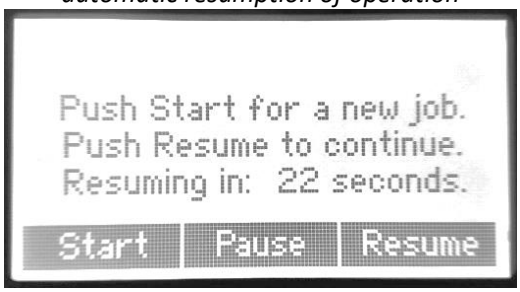
Resume: The machine resumes operation with the same settings that previously applied.

If the user did not press the stop button before the power was interrupted the last time the machine was used, the machine will automatically resume operation when the timer has counted down to zero.
The countdown can be stopped by pressing the Stop button, which then switches the machines to standby until it is started manually.

Normal start



Start after power cut – automatic resumption of operation



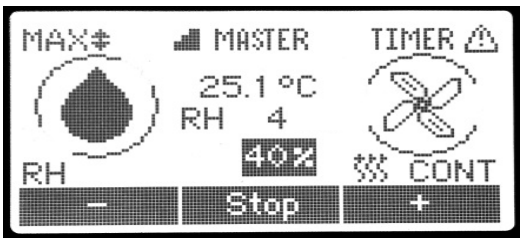
Standard view

L4 ES must usually be switched off using the “Stop” button below the display. The machine then switches to post cooling mode, the fan and pump run for 120 seconds before the machine switches off and excess condensation water is pumped out.

When the machine is running in a control mode instead of in manual mode, the setpoint (which is marked with black background in the middle of the screen) can be increased or decreased using the negative (-) and positive (+) buttons.

Standard view graphics.





Control mode

In control mode, it is determined whether drying should occur continuously (MAN - manual mode) or is only to be activated when necessary, on the basis of the ambient climate.

The selected control mode is displayed in the lower, left-hand corner in standard view.

Open the screen for selecting control mode by pressing the upper, right-hand button.

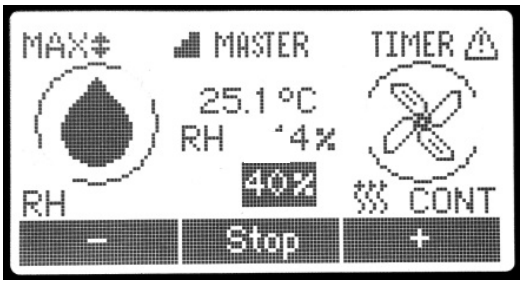
The following basic control modes are available:

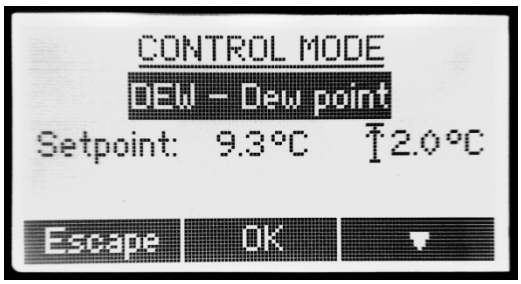
MAN	Manual, continuous drying.
RH	Dehumidification for selectable relative humidity (%).
X	Dehumidification for selectable mixing ratio (g/kg).
DP	Dehumidification for selectable dew point (°C).
HYG	Dehumidification is controlled by an external hygrostat that is connected to the machine.

Thanks to its network functions, you can also connect the machine to external temp. and RH sensors, and use their values to control operation, instead of the built-in sensor for relative humidity and temperature. The following modes for external sensors exist for this purpose:

E.RH	Dehumidification for selectable relative humidity (%) according to the input values from the external temp and RF sensor(s) that are connected to the machine.
E.X	Dehumidification for selectable mixing ratio (g/kg), according to the input values from the external sensor(s) that are connected to the machine.
E.DP	Dehumidification for selectable dew point (°C), according to the input values from the external sensor(s) that are connected to the machine.

The external control mode requires that the machine is network connected and connected to an external temp.







and RH sensor. If the machine is not already connected to the network, the machine asks whether to create a network.
If there are several sensors in the network and if the <All< option has been selected (instead of a single sensor, e.g. RHT61) the machine works on the "worst case scenario" and runs for as long as any of the sensors detects that the humidity is above the setpoint.
If the machine selects a mode other than MAN, the user will note that the setpoint can be set.

When the setpoint has been reached, drying stops automatically. If the humidity later rises above the setpoint again, drying resumes automatically.

Hysteresis

When one of control modes; RH, DP or X is selected, a symbol and a hysteresis value appears to the right of the display.
The symbol shows the setpoint value's position in the operation range as below.

↕ - centre

↓ - bottom

↑ - top

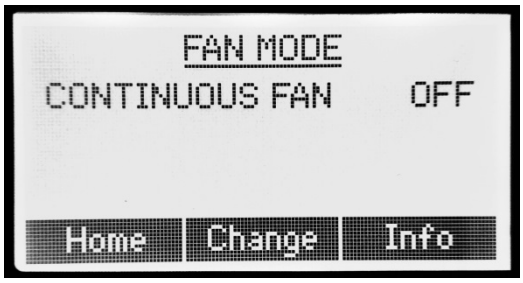


Fan mode

The fan mode determines whether the fan in the dehumidifier is to work continuously or only for as long as drying is required.

If continuous fan is selected, the word Cont appears in the lower right-hand corner in standard view.

For optimal drying effect, continuous fan operation should be used as far as is possible to keep the air moving.




MAX
25.3°C
RH 31%
MAN
CONT
Stop

Capacitymode

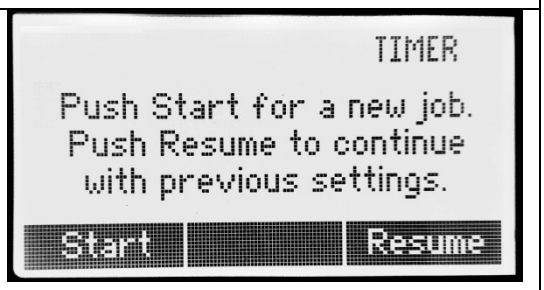
The drying capacity of L4 ES can be optimised for a given work task and situation with three different operating modes.
When setting MAX (maximum) the machine works to remove as much water as possible. If the machine's total power is not required, it can instead be set to ECO (eco-mode) where the energy consumption per litre of removed water is minimised.
For localised water damage where the dry air volume is not required, the machine can be set to one of its ΔX modes. In this mode, the machine produces a smaller amount of even drier air that further accelerates the drying process. The difference between ΔX1 and ΔX2 etc. is the dry air volume. ΔX1 has the smallest volume.
For use during pressure drying when the machine is connected as slave to a turbine in a local network, L4 ES also has a pressure drying mode (TRT) where it automatically adjusts the wet air flow so that the produced air is as dry as possible.

MAX	For maximum removal of water.
ECO	For minimal energy consumption per litre of removed water.
ΔX1, ΔX2...	For maximum ΔX, as dry air as possible. Reduced air amounts suitable for e.g. local, isolated water damage.
TRT	Pressure drying mode that can be used when the machine is connected to a network and connected as slave to a turbine.



Timer

L4 ES has an integrated timer function that allows the user to determine when the machine is to run. When the timer function is used, the word Timer appears in the standard view's upper, right-hand corner according to the graphic to the right.



Activate the timer by pressing the right-hand arrow button four times to open the timer menu.
Press Activate.



When the timer has been activated, the machine begins by prompting the user to check that the time and date have been set correctly. If they have been, press OK. If the time or date need changing, press Edit and adjust the values before continuing.



In the next step the user can set the time interval that the machine is to work within. The machine remembers the timer settings from the previous time it was used and shows its settings as the start values.
The Other time setting determines whether the machine, during the day's remaining hours, must be in standby mode or run at lower fan speed for minimal noise.



Network

Note! Install all system cables before the machines are started.



L4 ES has network functions that enable local interaction between machines, for example pressure drying and use of external sensors for relative humidity and temperature control of the machine. The network functions also prepare the machine for a future SuperVision system that will allow remote monitoring and remote control of the machines via Internet.

A network is established by installing the machines in the intended way and connecting them to each other using system cables before they are started.
Open the network menu on the machine which is to be master, i.e. control the others.

Press Create and wait while the machine establishes the network. This can take up to one minute.

Once the network has been established, the display switches between the slave units in the network menu. These are indicated by type (e.g. L4 ES) and bus address (e.g. 101).

To change the settings for a slave unit, press Change and select the slave unit. The background lighting for the selected unit starts to flash to confirm that the unit has been selected.

Desired settings can also be made directly on the relevant machine.

Start the master machine when all desired settings have been made. The slaves start automatically within one minute. The machines are stopped in the same way. Press stop on the master machine and the slaves stop automatically shortly afterwards.

As the network is controlled by the master machine, a slave unit that is started manually is stopped when the master machine is in standby. In the same way, a slave unit that is stopped manually is restarted manually when the master machine is in operation.



Setup and maintenance menus

The setup and maintenance menus contain functions that are not needed for normal operations.

Date and time: Setting system date and system time: The format is YY:MM:DD / HH:MM.

Language: Language selection for the interface.

Menu system: The menu system is set to Advanced as standard with all functions visible and available. If it is set to Basic, the more advanced functions are removed from the menu system.



Keylock: Option to activate/deactivate the keylock:

RH hysteresis: Option to adjust the hysteresis settings for control mode RH. The setpoint's position in the operation interval and the hysteresis value can be set from here.

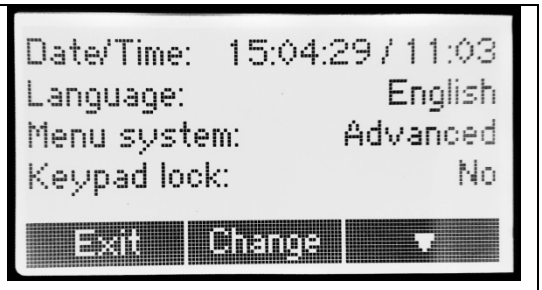
Dew point (DP) hysteresis: Option to adjust the hysteresis settings for control mode dew point (DP). The setpoint's position in the operation interval and the hysteresis value can be set from here.

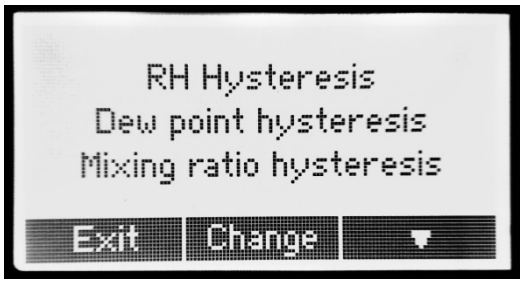
Mixing ratio (X) hysteresis: Option to adjust the hysteresis settings for control mode mixing ratio (X). The setpoint's position in the operation interval and the hysteresis value can be set from here.

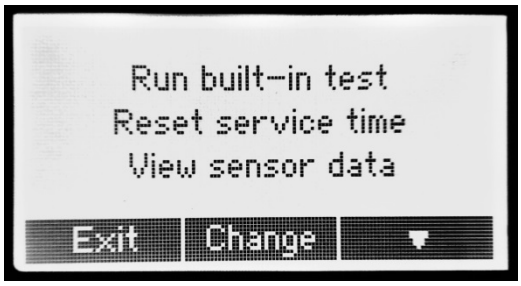
Run built-in test: A built-in self-test that is available to service technicians.

Reset service time: The machine is set to remind you about a service once a year. Once the service has been carried out, the service reminder can be reset using this function.

See sensor data: Function intended for service technicians.







Counters

This screen shows time and energy counters.
The resettable work counters are displayed at the top. The date when the counters were reset is displayed below. After the date, the number of hours that have passed since the last reset are indicated to enable a quick comparison.



Press Reset to reset the work counters. Confirm to reset the counters by pressing OK on the following screen.

The counters for energy and hours for the entire service life of the machine are displayed at the bottom. These counters cannot be reset.

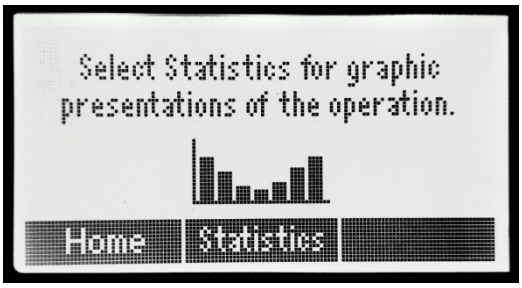


Statistics

Statistics are provided to assist the user's observation of the drying process and to enable the monitoring and follow-up of machine operation.
The following graphs appear below the statistics menu:

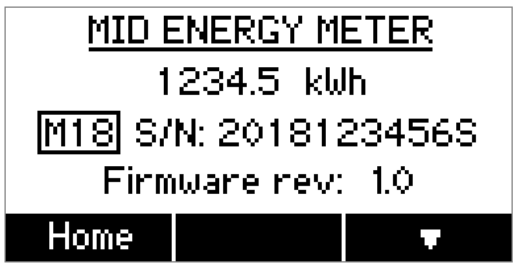
- Average relative humidity for the last twelve hours and the last 14 days.
- Average temperature for the last twelve hours and the last 14 days.
- Number of hours in drying mode for the last 14 days.
- Consumed energy in kWh for the last 14 days.

The last value, the bar at the far right in the respective graph, is the current hour or the current day.



MID Energy Meter

This menu presents the total, accumulated energy consumption.
For more information, please refer to chapter MID Energy Meter.



Alarms

Identified alarms are shown on this screen. As soon as an alarm is identified, a pop-up window also appears. Additionally, a warning symbol appears in the standard view's upper right corner, as long as the fault remains.

The user does not have to erase the alarms that are shown. As soon as the machine detects that the function has been reset, the alarm disappears automatically.



Control mode and hysteresis

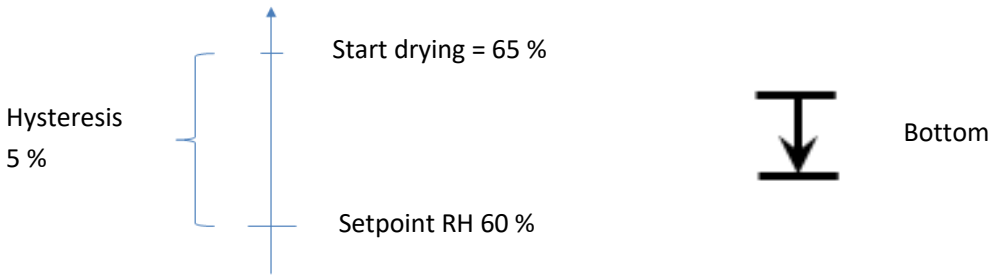
In addition to the normal, continuous drying operation, the operation of L4 ES can also be controlled via its built-in sensors for relative humidity and temperature as well as via its external hygrostat or external, networked sensor.

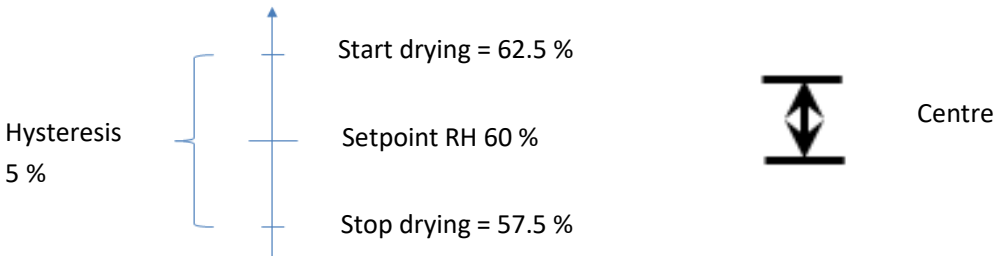
If a built-in or external electronic sensor is used, the machine uses a software-controlled hysteresis that stabilizes machine operation and prevents too many restarts.

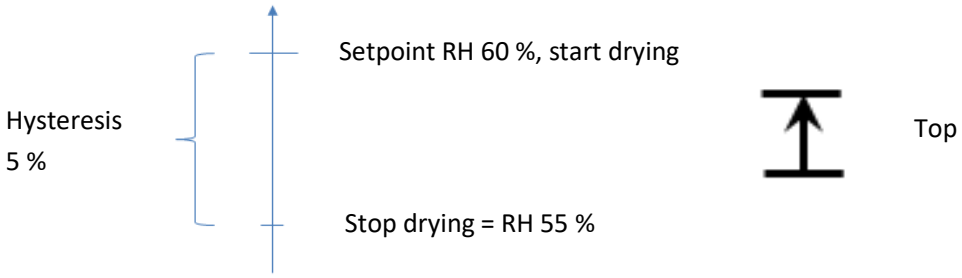
The table below shows the machine's standard settings. If changes are required, these can be made in the setup and maintenance menus.

Control mode	Hysteresis	Setpoint's position
RH	4 %	Bottom
Dew point	2°C	Top
Mixing ratio	0.5 g/kg	Bottom

The illustrations below describe the different hysteresis settings; bottom, center and top.







Alarms

If the machine detects a fault, corresponding information appears in a pop-up window. Additionally, a warning symbol appears in the standard view's upper right corner, if one or more problems remain.

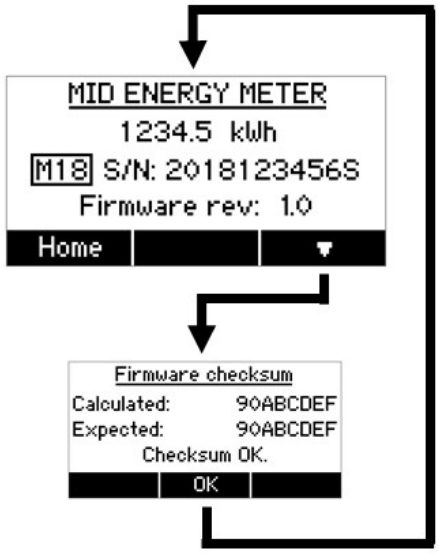
The following alarms can appear. Recommended corrective action is also given for each alarm.

Alarms	**Action/advice**
On or more slaves not responding	This alarm appears when the machine is used as master in a network that has lost contact with one or more of its slave machines. If this alarm appears, check all system cables and the power supply to all machines. When communication has been re-established, the alarm disappears automatically again.
Ambient temperature too high!	The machine has switched off all heaters due to too high ambient temperature (above 35 degrees Celsius). If continuous fan is selected, the fan continues to run. The machine resumes operation automatically if the temperature drops.
Fan control error	The fan speed deviates from the expected fan speed. If the alarm remains, contact a service technician.
No contact with internal control board	Internal fault. If the alarm remains, contact a service technician.
Internal sensor fault Temp and RH sensor	Internal fault. If the alarm appears after the machine has been disassembled, the fault may be because the sensor connection to the cover has not been installed correctly. If not, and if the alarm remains, contact a service technician.
External Temp and RF sensor fault	The machine has lost contact with the external temp and RH sensor(s). Check that the cables are correctly installed. When contact with the external

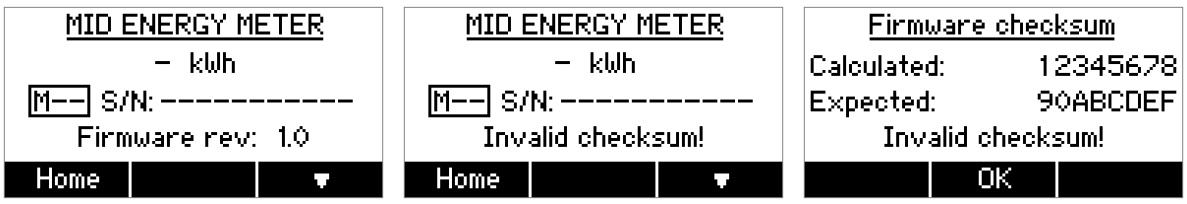
	sensors has been lost, the machine automatically returns to using the built-in temp and RF sensor.
The statistics cannot be saved to the memory	Internal fault. If the alarm remains, contact a service technician.
The event log cannot be saved to the memory	Internal fault. If the alarm remains, contact a service technician.
Water level	The bottom tray is filled with condensation water. Check that the condensation hose is not blocked. Check that the pump runs by holding the outlets on the condensation water hose and feel for a small pressure build up.

MID ENERGY METER MENU

Part of the main menu loop and accessible with either of the navigation keys, the MID Energy Meter menu presents the total, accumulated energy consumption. The affixing, M18 in the example below, as well as the serial number that follows is information on the built-in CEMP energy meter. The revision number given at the bottom row refers to the legally relevant firmware within the machine.



The integrity of the data presented with this menu is thoroughly checked and protected. One such important test is the calculation of a checksum to verify that the program memory has not been corrupted. The result of the latest calculation is always available with the Firmware checksum screen, accessed through the MID Energy Meter menu with the lower right button. If any of the tests fail and the machine concludes that the available energy meter data must not be trusted, the information is removed from the screen and replaced with dashes. If the problem detected has to do with the checksum calculation, the bottom row of the screen will say so.



Left: Data removed due to communication error
Centre: Data removed due to checksum error
Right: Appearance of Firmware checksum screen when error is detected.

Network functions

As a member of the new product family CTR ES, L4 ES can be included in a network together with other turbines and adsorption dehumidifiers with several functions, such as for example

- Relation – interaction between two or more turbines with a defined relationship between respective air flows.
- Optimised pressure drying, an operating method where the slave connected adsorption dehumidifier automatically adjusts to the turbine's airflow and thus produces as dry air as possible.
- Operation with common timer.
- Interaction with the future SuperVision system that enables remote monitoring and remote control of machine operation.

For network connected machines, no pre-configuration or other preparation is required. Once the machines have been installed, they can be connected easily using system cables. All that is then required is a single press of the Create button in the network menu on the machine that will be master. The master is the machine that is designated to control other machines. All machines can be used for this purpose. When operating modes Relation and Pressure drying are to be used, the master machine must be a turbine. For all other purposes, it does not matter which machine is master in the network.

The settings can be changed directly on the machine that is connected as a slave to another unit, and not only via the master machine. If the user selects to make necessary changes via the master machine, the display flashes on the selected slave machine for as long as the changes are being made. Thus avoiding confusion in that the machine can be easily identified.

Connecting machines to a network

Carry out the following when connecting machines to a network, e.g. in order to use the dehumidifier's pressure drying operation:

1. If the machines are connected, switch them off. Then connect the machines to each other using system cables. The two connectors on the machines have the same function, so it does not matter which of them is used. If SuperVision is to be used, it can be connected to any machine.
2. Start the machines.
3. Select which machine is to be master. During pressure drying, the master machine must be the turbine, which is used to force dry air into the construction.
   If the units are used in a network with the single purpose of monitoring and remotely controlling them via SuperVision, it does not matter which machine is master.

4. Open the network menu as shown below using the right arrow button on the selected master machine.



   (If the menu is not found, the Basic menu system has been activated on the machine. Change this by opening the setup and maintenance menus and set the menu system to Advanced.)
5. Press <Create> in the network menu and wait whilst the machine establishes the network.
6. Once the network has been created, the display switches between the different slaves at the top of the screen. If SuperVision has been connected, the text SuperVision appears at the bottom of the screen. It can take up to one minute for the text to appear.

When the above steps have been followed, all slave machines are controlled by the master. This means that all slave machines start and stop together with the master. They work with the same settings as they had before being connected in the network. If the settings need changing, press Change and then select the slave to be changed via the master. It is also possible to make the necessary changes on the machine itself. Whilst the slave machine is being changed, via the master, the slave machine's background lighting flashes so that the user can see which machine is selected.

Maintenance and service

Service reminder

The machine is set to remind you about a service once a year. The reminder is given in the form of an alarm, but does not affect the operation of the machine. The service reminder function is reset in the setup and maintenance menus.



Filter replacement

The dehumidifier filter should be replaced regularly, preferably between each work assignment in order to maintain energy efficiency and to avoid overheating. If the air filter is extremely dirty it must be replaced more often.

1. Disconnect the power from the dehumidifier.
2. Pull out the dirty filter from the machine and slide in the new one.
3. Reconnect the power to the dehumidifier.



Accessories and consumables

The following parts are available as accessories and consumables for L4 ES:

Article number	Designation
9901100	EXT. Hygrostat, HR1-5 (used together with Adapter cable 1002816)
1002816	Adapter cable, EXT. Hygrostat
1002817	EXT. Temp and RH sensor, series ES
1004010	Process air filter
1002749	System cable, 0.5 m
1002748	System cable, 5.0 m

Fault tracing

Fault symptom	Probable cause	Actions
Premises not dehumidified/low capacity.	Depending on the situation, the cause of the problem could be incorrect installation, e.g. because of obstructed condensation water hose, clogged filter, incorrect settings on the machine or machine fault.	Perform fault tracing as follows until the problem has been identified: Check the installation - check that the condensation water hose is not obstructed, that the dry air damper is in the correct position and that the hose used on the dry air side is not trapped or clogged. Ensure that the air flow is correct. If the air flow is weak, check the process air filter and replace if necessary. Check the machine settings as follows. Start by checking that the water symbol on the left-hand side of the display screen moves as an indication that dehumidification is in operation. If it does not move, check the control mode in the lower, left-hand corner of the display. For continuous drying, MAN must be indicated for manual operating mode. If an external hygrostat is connected and used (operating mode HYG), check the hygrostat's setting. If control mode RH, dew point (DP) or mixing ratio (X) is used, check the setpoint value which is marked in the middle of the

		display and adjust if necessary. Check that the water symbol starts to move. If the control mode and its settings were not the problem, continue by checking the capacity mode that is shown at the upper right-hand corner in standard view. For maximum water removal, the text ”MAX” appears. ECO mode minimizes the energy consumption per litre removed water and the ΔX operating modes are used for drying local, isolated water damage for example. If necessary, change operating mode by opening the menu for capacity mode using the right-hand arrow button. Follow the instructions for adjusting the wet air volume.
The rotor rotates anti-clockwise (seen through the dry air outlet) or not at all.	Fault with rotor motor or motor capacitor.	Contact the dealer for repair.
No air flow, low air flow	The dry air dampers are closed The machine has been set to standby. The dehumidifier has been set to a control mode other than manual (MAN), the continuous fan functions are switched off and the surrounding humidity is so low that the machine has switched to standby.	Adjust the position of the Dry air dampers. Press Start to start the machine with the standard settings or press Resume to start with the previous settings. Check the control mode in the lower left-hand corner of the display. For continuous operation, MAN (for manual operating mode) should be indicated. Check the setpoint value if another operating mode is being used. For continuous fan operation, use the right-hand arrow button to open the menu for fan mode and activate continuous fan operation.

	The machine is controlled by a timer and is currently in standby mode.	Adjust the hygrostat's setpoint value if appropriate.

Technical data

L4 ES HP

Dry air volume Max/ECO (m^3/h)	**380/300**
Cooling air volume Max/ECO (m^3/h)	**100/60**
Drying capacity at 20°C, 60% Max/Low (l/24 hrs.)	***12/9***
Max. Capacity (l/24 hrs.)	***23***
Ø dry air outlet (mm)	***2 x 100, 2 x 50***
Sound level, Max/ECO dBA (3 m)	***approx. 50-58****
Voltage	**230 VAC/50 Hz**
Rated power Max/ ECO (W)	***1300/1000***
Height x width x length (mm)	***495 x 295 x 550***
Weight, kg	***23.5***

**Sound level varies depending on the installation.*

L4 ES HP W

Dry air volume Max/ECO (m^3/h)	**380/300**
Cooling air volume Max/ECO (m^3/h)	**100/60**
Drying capacity at 20°C, 60% Max/Low (l/24 hrs.)	***12/9***
Max. Capacity (l/24 hrs.)	***23***
Ø dry air outlet (mm)	***2 x 100, 2 x 50***
Sound level, Max/ECO dBA (3 m)	***approx. 50-58****
Voltage	**230 VAC/50 Hz**
Rated power Max/ ECO (W)	***1300/1000***
Height x width x length (mm)	***495 x 440 x 620***
Weight, kg	***30***

**Sound level varies depending on the installation.*

CEMP Energy Metering Data

NOTE: The below data, temperatures and current levels etc., relate to the built-in energy metering function, the CEMP, alone and not to the complete machine.
The CEMP declaration of conformity is available at www.corroventa.com/mid-certificate/.

Accuracy class	**Class B**
Rated Operating Conditions	
Voltage	**230VAC**
Frequency	**50Hz**
Power factor	**0.5ind. to 0.8cap.**
Current	
I st	**0.02A**
I min	**0.25A**
I tr	**0.5A**
I ref	**5A**
I max	**45A**
Operating temperature	**-25°C to + 55°C**
Climate	**Non-condensing**
Environment/position	**Closed location**
Electromagnetic environment class	**E2**
Mechanical environment class	**M2**
Max capacity of energy register	**9 999 999,9 kWh**
Notified body	**0402**