Cotes dehumidifier	**C35E/C35D/C35C**
Manual number:	140712
Revision:	O.2

COTES ALL ROUND C35

How to install, set up, operate and service your Cotes dehumidifier

CONTENTS

SECTION 1 / GENERAL BACKGROUND

ABOUT THIS HANDBOOK

This is the installation and service handbook for your Cotes dehumidifier.

You should read the whole handbook before installing and/or starting the dehumidifier unit for the first time. It is important that you and your colleagues are familiar with the correct operating procedures and all precautionary safety measures, in order to avoid any damage to the surroundings, materials or installations, as well as to prevent any personal injury.

This handbook is mainly intended for use by technicians who install and operate this Cotes dehumidifier unit, who carry out preventive maintenance and who replace defective parts.

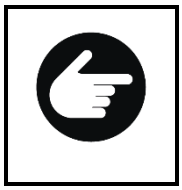
Anyone using Cotes dehumidifier units, or whose responsibilities include supervising their operation, will also benefit from reading this handbook and from consulting it as a practical help should the need arise.

Product number for this handbook

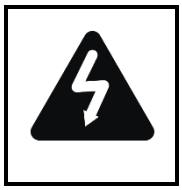
The product number of this particular service handbook is 140712.

This is the number you need to give us if you would like to order additional copies for your staff, colleagues or service personnel, or for technical staff from outside your company.

SYMBOLS USED IN THIS HANDBOOK



This tells you to perform a particular action



Important to note, because items in the dehumidifier can cause injury or affect people's health

You need to pay special attention to this

NOTE

It is each operator's responsibility to read and understand this manual and other information and to employ the correct operating and maintenance procedures.

ABOUT COTES

Cotes humidity management technology – cost-effective and energy-efficient

The moisture in the air all around us has surprising – and often costly – effects on the materials, structures and processes at the heart of virtually all business processes and industrial activity.

Cotes humidity management technologies enable you to control the levels of moisture in the air inside any building, installation or facility, using only a bare minimum of energy.

And effective control of the basic parameters for your operations is good business.

World leader

Cotes is one of the world's leading experts in the field of adsorption dehumidification, providing technology and expertise that enable companies to achieve better control of the humidity always present in the air.

Better management of the humidity in the air also makes it possible to improve and optimise a wide range of industrial processes, prevent damage and corrosion in many types of structures, and reduce energy consumption in all kinds of installations where air specifications are important.

Big benefits

Cotes dehumidification units provide exceptional advantages.

- Our know-how and experience make sure each customer gets the right equipment to tackle all the practical needs and operating priorities associated with the specific installation
- Our units are exceptionally reliable, and can withstand even harsh treatment unusually well
- They are very easy to maintain and service
- They only use a minimum of energy in order to achieve maximum effect.

We aim to provide our customers with the most technically effective and energy-efficient solution for the best price. This ensures the best possible return on investment, as well as peace of mind about having made the best decision.

SECTION 2 / THE DEHUMIDIFIER

ABOUT THE COTES C35 RANGE OF DEHUMIDIFIERS

The Cotes C35 range of dehumidifiers is designed and configured for a wide range of industrial uses. Prominent among these is humidity management in storage facilities and basement areas, in water works and in many kinds of process industry in which stable, well-controlled air conditions are crucial.

C35E units are specifically configured to minimise the overall energy consumption of the dehumidification process, whereas C35D units are configured to make sure the air flow is as dry as possible. C35C units are specially designed to operate inside cold storage facilities.

The dehumidifiers in the C35 range are designed for easy cleaning, with configuration options that include cooling/heating coils and/or a heat recovery module and a condensation module and additional filters, if needed.

Design priorities

The Cotes C35 range features an eye-catching modern industrial design appearance, along with exceptional reliability.

It is designed to ensure the unhindered passage of air through the unit, which reduces

- energy consumption
- pressure losses
- noise levels

All the components, ancillary equipment and features are optimised for better performance, exceptional service life and ease of maintenance.

Capacities

The Cotes C35 range currently features models with air volumes of between 405 m^3/hour and 1,000 m^3/hour.

At process air inlet conditions of 20°C and 60% relative humidity (%RH), the capacities (the amount of water which can be removed from the air) of these units are between 3.3 kg/hour and 5.6 kg/hour.

At process air inlet conditions from -25°C to -18°C and 95% relative humidity (%RH), the capacities (the amount of water which can be removed from the air) of these units are between 0.3 kg/hour and 0.9 kg/hour.

Configuration priorities

The Cotes C35 range is available with four different control configurations – Configuration-A, Configuration-B, Configuration-C and Configuration-D.

Control configuration-A is stripped down to a minimum of features and is therefore not equipped with a PLC screen interface.

Configuration-A/ BASIC PLR

The Configuration-A provides:

- High dehumidification capacity
- High energy efficiency
- Stainless steel cabinet
- Easy installation
- Low-noise running
- Low maintenance costs, reducing the overall operating cost
- Easy cleaning
- Hour counter, to keep track of how long the unit has been in operation
- Attachment of external humidity sensor (external humidify control and sensors are not included as standard, but are available for purchase from Cotes)
- Over-heating alarm
- Remote start/stop option
- External fault signal and operation signal

Configuration-B

In addition to the Configuration-A features, the Configuration-B provides:

- Attachment of one external humidity sensor
- 3.5-inch touch display
- Service indication, to keep track of any need for maintenance
- Hour counter, to keep track of how long the unit and components has been in operation
- Mechanical service alarm for rotor and filters
- Control of regeneration air fan, making installation easier
- Capacity control / modulating heat control
- Measuring and controlling dew point temperature
- Datalogging for keeping track of conditions in the space where the unit is installed
- Timer program
- Network connectivity (optional)
- Monitoring and control via smartphone app (optional)
- Monitoring and control by Cotes service centre (optional)

Configuration-C

In addition to the Configuration-B features, the Configuration-C provides:

- Control of process air fan, making installation easier
- Monitoring and control of air flows [m^3/hour]
- Energy-saving program, for situations where energy consumption is the prime consideration
- Low-noise program, for situations where silence is the prime consideration
- CUSTOM program, for situation where dehumidifier parameters needs to be controlled

Configuration-D

In addition to the Configuration-C features, the Configuration-D provides:

- Accurate control of humidity level, whether % relative humidity or specific humidity [g/kg]
- Continuous measurement of capacity
- Detailed energy-saving program, for situations where energy consumption is the prime consideration

Intended use of dehumidifier

The dehumidifier is designed for dehumidifying/conditioning atmospheric air only – filtered with at least a G4 filter. Unless specifically stated in the manual or in a separate agreement with Cotes or a Cotes dealer, this dehumidifier must not be used for the following purposes:

- Conditioning gases other than atmospheric air at ambient pressure
- Conditioning air contaminated with any chemical or other aggressive/corrosive elements including salt (sodium chloride)
- Conditioning explosive or flammable air – including using the dehumidifier in ATEX-classified zones.

The unit is intended for use in residential, commercial and industrial environments.

Operating conditions – standard models (E and D)

For the process and regeneration air inlet, the following operating conditions must be respected:

Relative humidity	0–100%
Temperature	0–40°C
Pressure	Ambient ± 100 Pa

It is only possible to deviate from these ranges if such deviations were specifically mentioned when the order was placed, and special considerations have been incorporated into the unit in order to deal with this.

Depending on configuration the actual sensor range may be limited to 5-100 %.

Operating conditions – Cold store models (C)

For the process and regeneration air inlet, the following operating conditions must be respected:

Relative humidity	0–100%
Temperature process	-25 - 0°C (can be used up to 40 C)
Temperature regeneration	-25 - 40°C
Pressure	Ambient ± 100 Pa

It is only possible to deviate from these ranges if such deviations were specifically mentioned when the order was placed, and special considerations have been incorporated into the unit in order to deal with this.

NOTE

Operating conditions for the air inlet flows must be respected.

Storage conditions

For storing the dehumidifier, the following conditions must be respected:

Relative humidity	0–90%
Temperature	-20°C to 50°C

It is only possible to deviate from these ranges if such deviations were specifically mentioned when the order was placed, and special considerations have been incorporated into the unit in order to deal with this.

NOTE

Storage conditions for the dehumidifier must be respected.

HOW IT WORKS

Two flows of air

The effect of Cotes adsorption dehumidifiers basically stems from the action of two flows of air.

The drying process (A to E)

The incoming moisture-laden flow of air (process air) (A) enters one side of the cabinet and gets filtered by a process air filter (B). The air then passes through a slowly turning rotor (C) whose inner surfaces are coated with desiccant silica crystals that attract the water molecules passing through.

When the moist air passes through the rotor, water molecules are adsorbed and lodge in the pores on the surface of the silica gel. This means the air leaves the rotor containing less moisture (humidity) than when it entered (E). And because the adsorption process releases energy to the air, the temperature increases during the process. The process air is controlled by a process air fan (D).

The regeneration process (F to J)

The second air flow (the regeneration air) (J) is filtered by a regeneration air filter (K), and heated by heating elements (I) to reduce its relative humidity. On its way through the rotor (H), this heat evaporates the moisture previously adsorbed by the silica crystals in the rotor. The resulting water vapour now leaves the dehumidifier in the outgoing regeneration air (F). The regeneration air is controlled by a regeneration air fan (G).

Fans

All units in the C35 range of adsorption dehumidifiers are fitted with two fans as standard.

For the Configuration-B, the speed of the regeneration air fan can be controlled.

For the Configuration-C and Configuration-D, the flows of process air and regeneration air can be controlled manually or automatically (standard).

Cotes adsorption dehumidifiers are always configured with a certain amount of “external pressure” to make sure that ducting does not cause a reduction in the amount of air.

For details about the fans fitted to this particular Cotes dehumidifier, see page 28.

Filters

All models of Cotes adsorption dehumidifiers are fitted with filters to remove undesirable particles or other pollutants from the incoming process and regeneration air.

Filters of the G4 class are fitted to Cotes C35 units as standard in order to filter the incoming process air.

The regeneration air filter is a high-temperature resistance filter, as an additional safety precaution should power loss occur during operation.

For details about the filters fitted to this particular Cotes dehumidifier, see page 28.

Heating units

Cotes C35 dehumidifiers are fitted with electrical heating units as standard, in order to control the temperature of the regeneration air entering the unit.

For details about heating units fitted to this particular Cotes dehumidifier, see page 28.

Post-heating units

Being able to control the exact specifications of the air leaving the dehumidifier enables you to extract maximum benefit from Cotes humidity management.

If it is important to keep the process air at a consistently high temperature, a post-heating unit can be fitted after the adsorption rotor, as optional equipment.

A post-heating unit is normally in combination with a post-cooling coil, in order to ensure 100% control of both relative humidity and temperature.

Post-heating units can be retrofitted to C35E/C35D dehumidifiers with the Configuration-B, Configuration-C and Configuration-D.

For details about any post-heating units fitted to this particular Cotes dehumidifier, please contact your Cotes dealer, or Cotes.

Pre-cooling units

Being able to control the exact specifications of the air entering the dehumidifier enables you to extract maximum benefit from Cotes humidity management.

Cotes C35E/C35D dehumidifiers can therefore be fitted with cooling units to reduce and/or control the temperature of the dry air entering and leaving the dehumidifier.

A cooling unit fitted before the adsorption rotor is particularly beneficial if the incoming process air is very warm and humid. In such cases, some of the water in the air condenses and the efficiency of the adsorption rotor increases. A cooling unit fitted before the adsorption rotor can also be an advantage if the outgoing process air has to be especially dry.

Pre-cooling units can be retrofitted to C35E/C35D dehumidifiers with the Configuration-B, Configuration-C and Configuration-D.

For details about any pre-cooling units fitted to this particular Cotes dehumidifier, please contact your Cotes dealer, or Cotes.

Post-cooling unit

Cotes C35E/C35D units can be fitted with post-cooling/heating units to maintain full control of the temperature of the dry air leaving the dehumidifier.

Post-cooling/heating units can be retrofitted to C35E/C35D dehumidifiers with the Configuration-B, Configuration-C and Configuration-D.

For details about any cooling units fitted to this particular Cotes dehumidifier, please contact your Cotes dealer, or Cotes.

Heat recovery unit (HR module)

Cotes adsorption dehumidifiers can be fitted with a heat exchanger to make sure that part of the thermal energy from the regeneration air leaving the unit is extracted, and reused for preheating the incoming regeneration air.

The heat exchanger is placed in an external box equipped with inlets and outlets for the incoming and outgoing regeneration air.

The heat recovery unit can save as much as 20–25% on energy consumption, but you have to install the appropriate ducting and damper for outgoing regeneration air.

For details about the heat recovery unit fitted to this particular Cotes dehumidifier, please contact your Cotes dealer, or Cotes.

Water condensation unit (LK module)

Cotes adsorption dehumidifiers can be fitted with water condensation units in order to condense some of the water from the regeneration air leaving the dehumidifier. This is beneficial when a regeneration air outlet is not a good idea or cannot be fitted.

When a water condensation unit is installed, the regeneration air forms a closed circuit, using ambient air passing through heat exchangers to cool the regeneration air to below condensation temperature.

For details about the water condensation unit fitted to this particular Cotes dehumidifier, please contact your Cotes dealer, or Cotes.

FEATURES AND BENEFITS

Highlighted features	How customers benefit
Appearance/cabinet	
Eye-catching industrial design appearance.	Visually attractive units that can be mounted in highly visible positions.
Inner surfaces made of stainless steel.	Easy cleaning saves on time and manpower. Helps keep hygiene standards high and visual appearance good.
Outer surfaces made of stainless steel, as standard.	Helps keep technical installations looking modern and attractive. Reinforces impression of quality.
Robust structure.	Longer service life. Better return on investment.
Equipment configurations inside the cabinet	
All fans are mounted inside the cabinet.	Can be mounted in a wider range of positions and structures, even where there is public access, etc.
Easy to mount additional insulation and noise suppression equipment.	Configurations individually customised to each project/installation.
Key components are standardised units easily available throughout the world.	Less downtime. Savings on maintenance and service work.
Most effective rotor currently available anywhere in the world.	Most humidity removed from the flow of air at lowest cost.

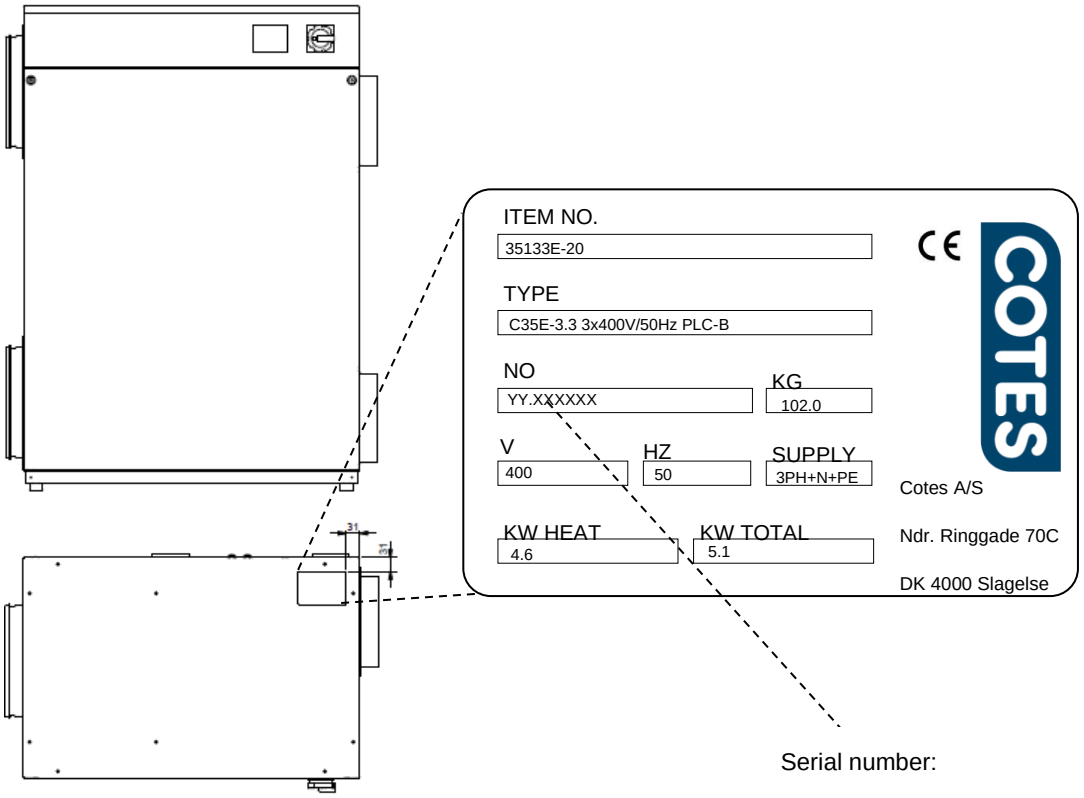
Highly durable rotor bushes.	Savings on maintenance and service work. Greater operating efficiency.
Air flow	
Available with frequency-controlled ventilator.	Savings on energy costs. Less noise
Access	
Large door that provide rapid, easy access.	Savings on maintenance and service work. Less downtime means greater operating efficiency.
Filters that are easy to get out, and quick to change.	Savings on maintenance and service work. Greater operating efficiency.
Connectivity	
Compatible with all standard electrical voltages and frequencies * 230V/400V * 50Hz/60Hz.	Savings on installation costs. More rapid commissioning.
Designed for compatibility with modern PLC and web-based control and warning systems.	Easy to control and monitor from virtually anywhere.
Modular design prepared for installation of control systems, heaters, cooling systems, hygrometers, sensors, etc.	Rational, cost-effective dehumidification installations. Maximum reliability.
Energy sources	
Thermal recovery installations can be fitted.	Savings on energy costs Improved environmental footprint.

SECTION 3 / TECHNICAL DETAILS

SERIAL NUMBER/IDENTIFICATION

This is the installation and service handbook for your Cotes dehumidifier.

The serial number/identification code for your particular model is located in the top of the dehumidifier (see drawing below).



Serial number:

Example:

18.12345

12345 = Serial number

18 = Year of production

SPECIFICATIONS

Please note that specifications and controls given in this handbook are in some situations approximate.

Table 1 Technical data C35E/C35D/C35C

Type		C35E					C35D		C35C	
	Model	3.3	3.8	4.5	5.1	5.6	3.2	4.5	0.5	0.9
Dry air, nominal**	m^3/hour	750	1000	1000	1000	1000	405	617	750	1000
Regeneration air, nominal*	m^3 /hour	135	135	168	202	233	135	202	96	129
External pressure, dry air (at nominal air flow)	Pa	210	210	210	210	210	210	210	210	210
External pressure, regeneration air (at nominal air flow)	Pa	300	300	300	300	250	300	300	300	300
Capacity at 20ºC, 60% relative humidity	kg /hour	3.3	3.8	4.5	5.1	5.6	3.2	4.5	-	
Capacity at -25ºC / -18ºC, 95% relative humidity	kg /hour	-							0.3 / 0.5	0.4 / 0.9

Electric heater, max.	kW	4.6	4.6	5.7	6.9	8.0	4.6	6.9	2.3	3.4
External duct heater, max.	kW	-							1.0	
Maximum fuse (3x230V)	A	10 (32)	10 (32)	16 (32)	16 (32)	16 (32)	10 (32)	16 (32)		
Minimum fuse (3x230V)	A	10 (20)	10 (20)	16 (25)	16 (25)	16 (32)	10 (20)	16 (32)	10 (32)	16 (32)
Nominal power consumption	kW	4.92	5.10	6.25	7.42	8.50	4.86	7.26	3.9	5.3
Maximum connected load	kW	5.10	5.40	6.50	7.70	8.80	5.10	7.70	3.9	5.3
Voltage (3x230V)	V	400 (3x230)								
Frequency	Hz	50								
Ground (3x230V)		3PH+N+PE (3PH+PE)								
Sound level with duct (ISO 11201)	dB(A)	53	59	59	59	59	53	53	53	59

* Adjustable in Configuration-B and fully controlled in Configuration-C and Configuration-D.

Also adjustable in Configuration-A with Reg Air Fan Kit installed.

** Fully controlled in Configuration-C and Configuration-D.

Table 2 Measurements

	Type	C35E					C35D		C35C	
	Model	3.3	3.8	4.5	5.1	5.6	3.2	4.5	0.5	0.9
L x W x H cabinet	mm	492.5 x 756 x 1091								
L x W x H total	mm	532 x 756 x 1091								
Weight	kg	102	110	110	110	110	110	110	102	110
Regeneration air outlet	mm	ø125								
Regeneration air inlet	mm	200x200 (ø200)								
Process air inlet	mm	350x260 (ø250)								
Process air outlet	mm	350x260 (ø250)								

Capacities

Figure 1 C35E-3.3 capacity at 750 m³/hour

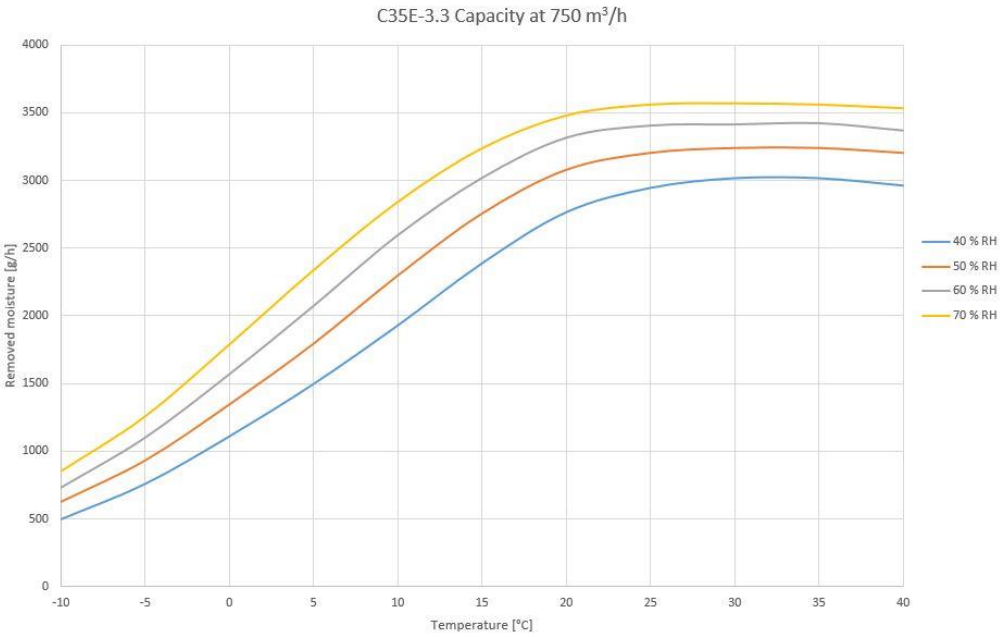


Figure 2 C35E-3.8 capacity at 1,000 m³/hour

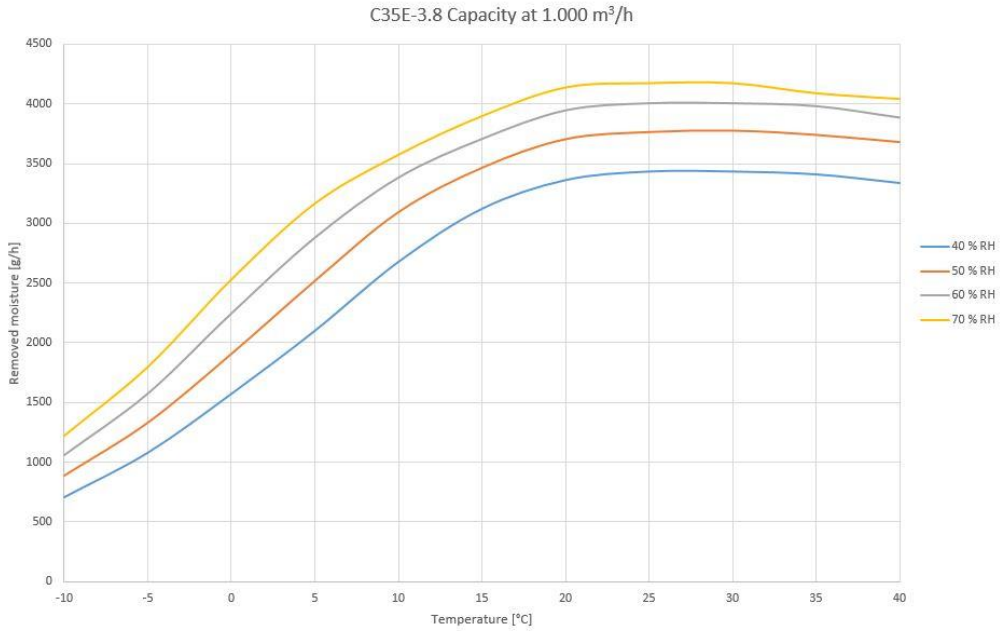


Figure 3 C35E-4.5 capacity at 1,000 m³/hour

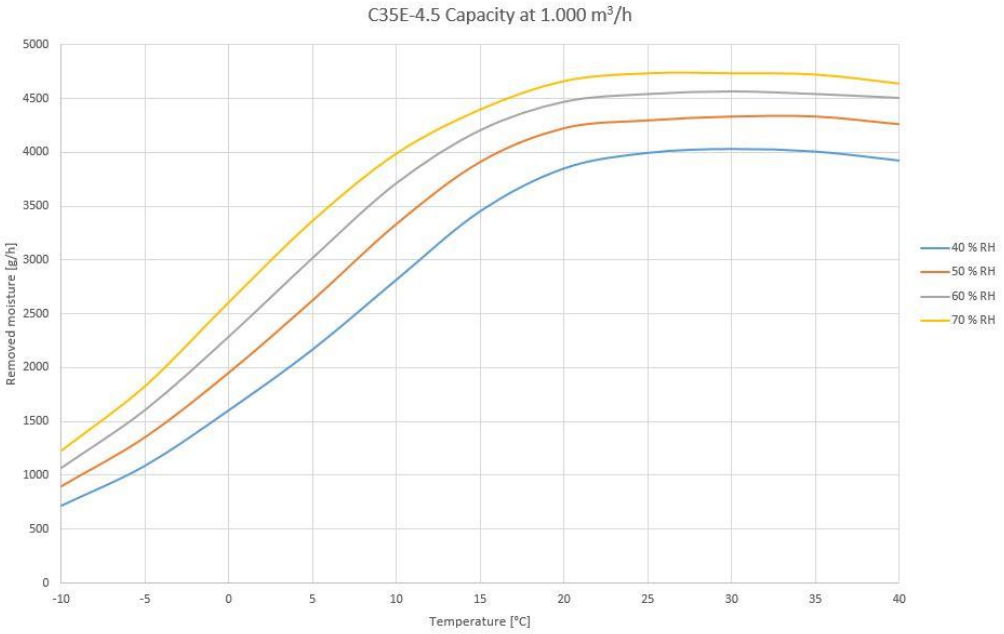


Figure 4 C35E-5.1 capacity at 1,000 m³/hour

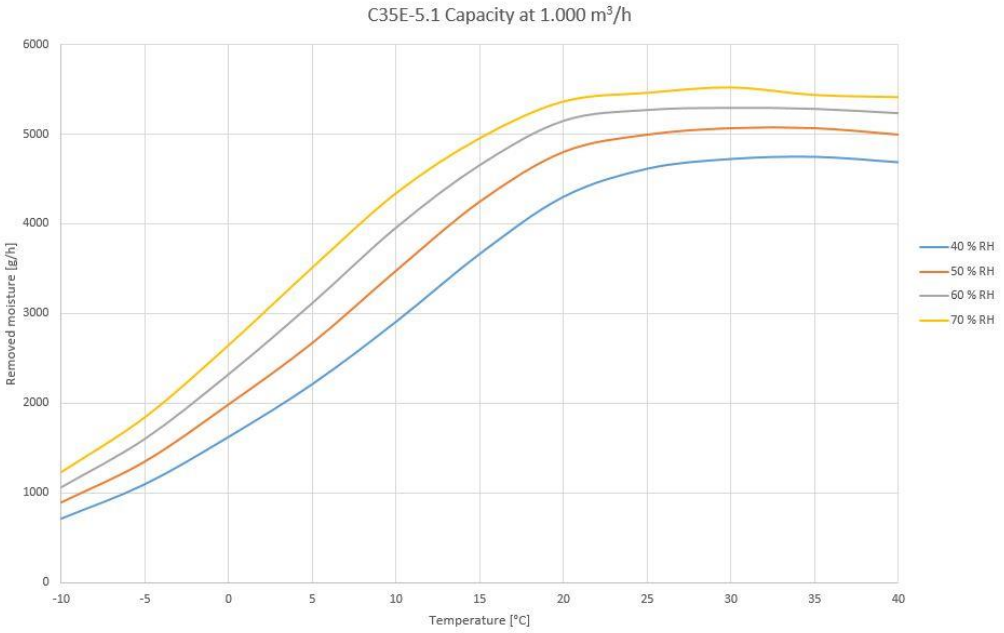


Figure 5 C35E-5.6 capacity at 1,000 m³/hour

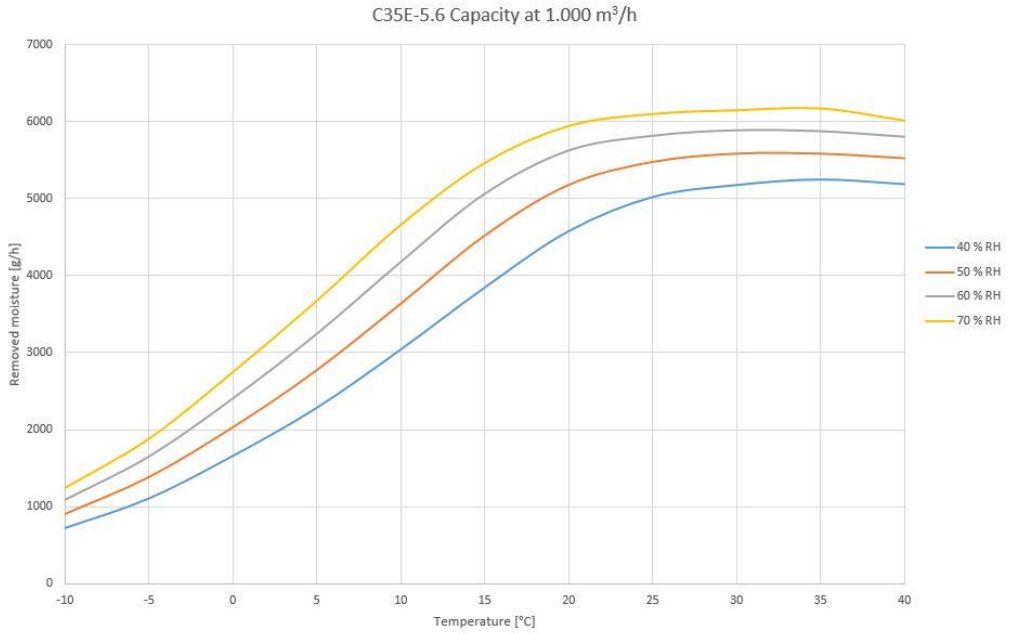


Figure 6 C35D-3.2 capacity at 405 m³/hour

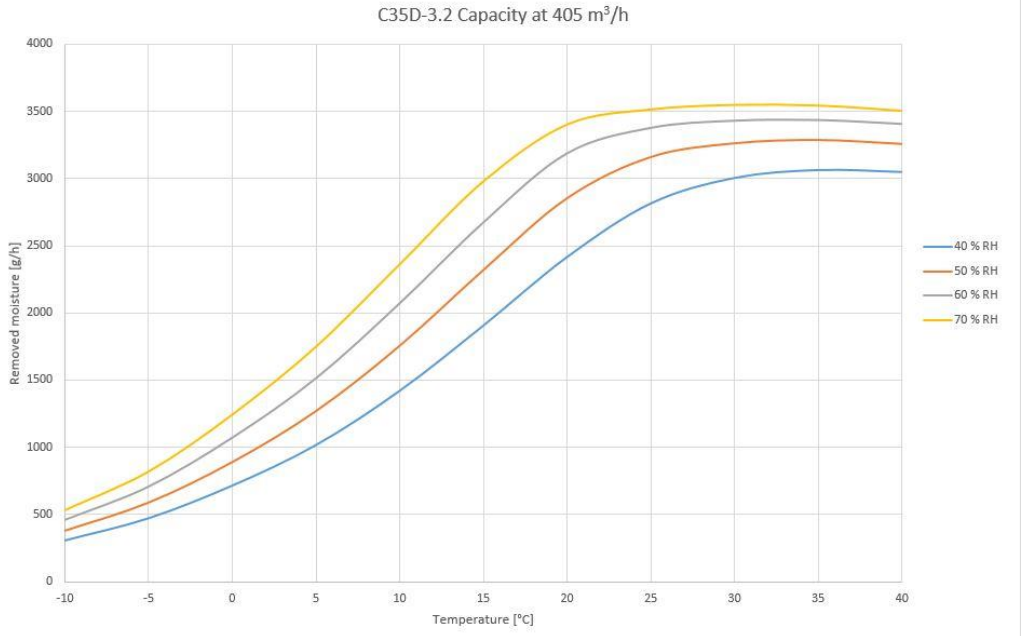
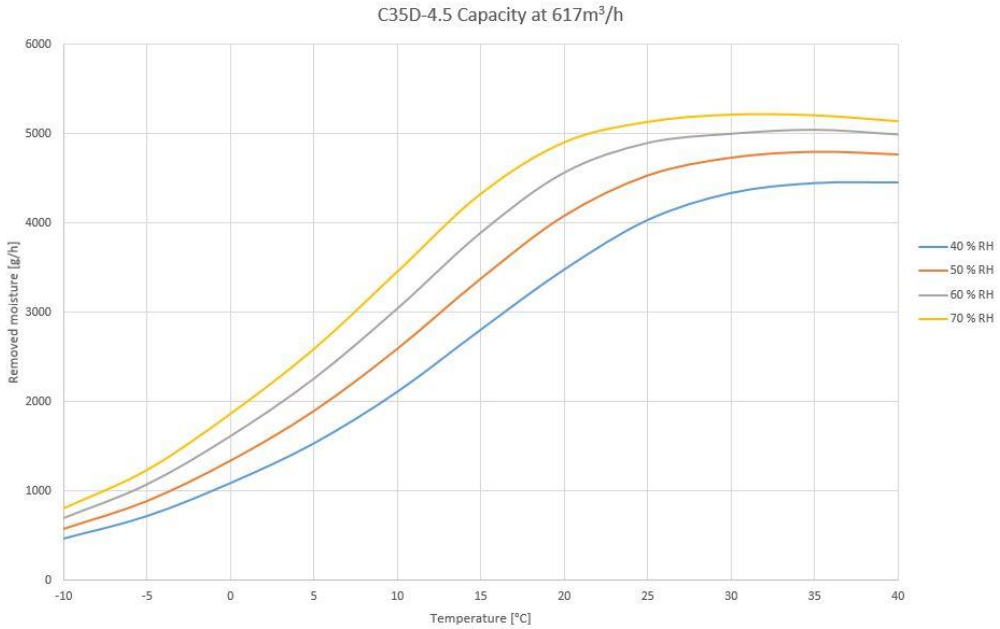


Figure 7 C35D-4.5 capacity at 617 m^3/hour



ASSEMBLIES AND COMPONENTS

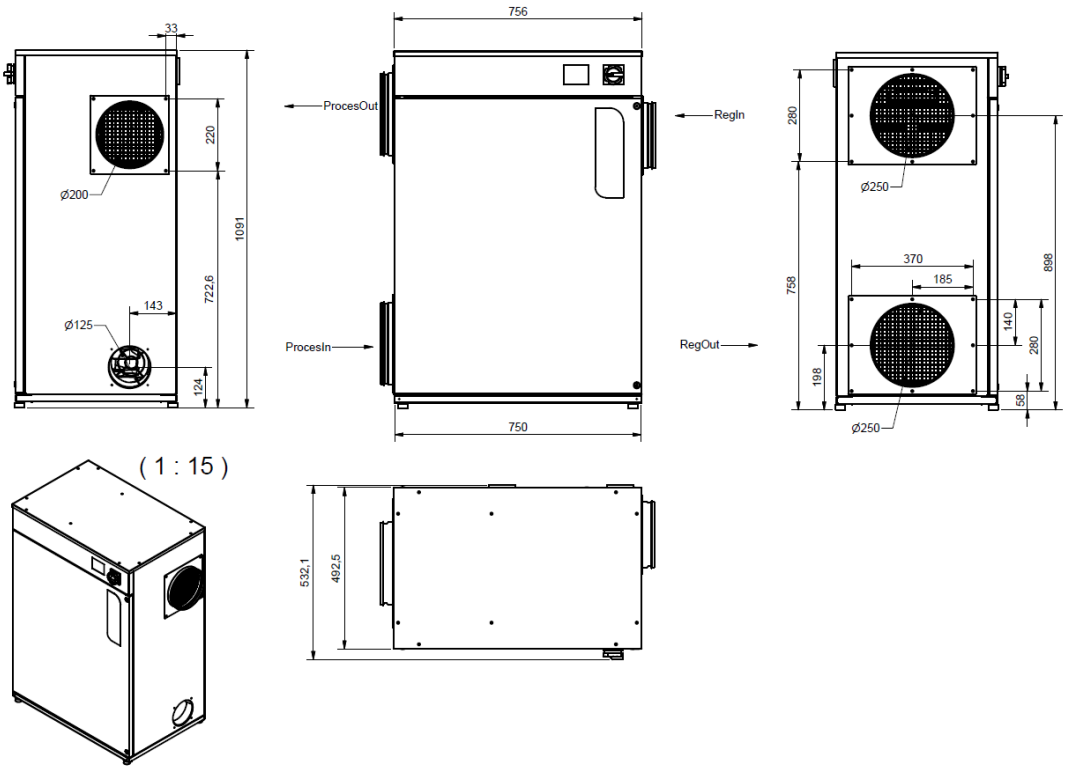
Customised to meet your needs

Cotes dehumidifier units are based on a modular design that enables our customers to select from a broad range of carefully selected components and assemblies, to meet specific installation and operating requirements.

Your Cotes C35 dehumidifier has been configured to meet the particular requirements of your installation.

Dimensions

C35E/C35D/C35C dehumidifier



Spare parts

C35E/C35D/C35C dehumidifier

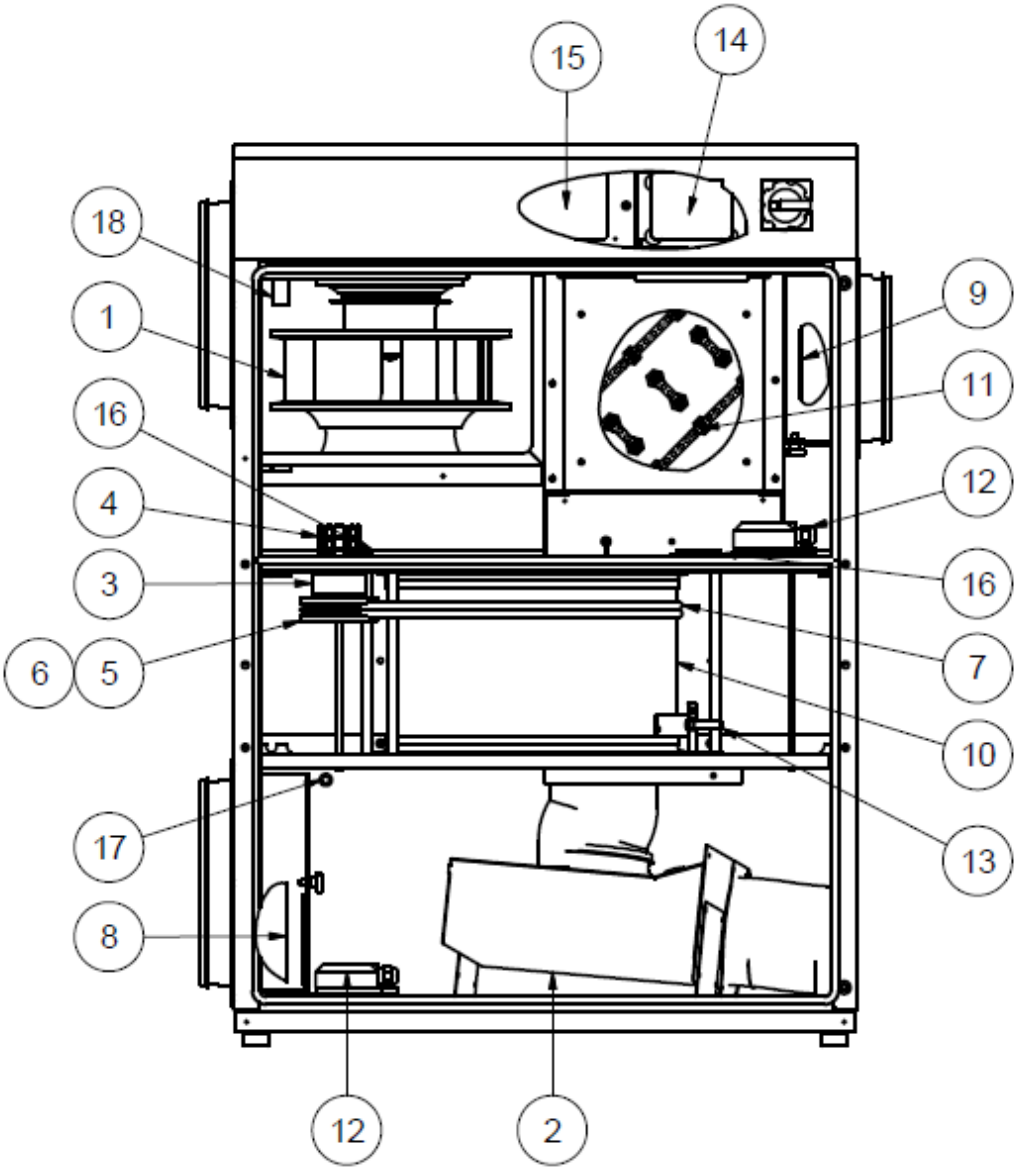


Table 3: Spare parts list C35E/C35D/C35C

Type		C35E					C35D		C35C	
Pos	Part	3.3	3.8	4.5	5.1	5.6	3.2	4.5	0.5	0.9
1	Process air fan	624828	801667	801667	801667	801667	624828	801667	624828	801667
2	Regeneration air fan in cabinet	624890	624890	624890	624890	624890	624890	624890	624890	624890
3	Gear	110414	110414	110414	110414	110414	110414	110414	110414	110414
4	Gear motor	110404	110404	110404	110404	110404	110404	110404	110404	110404
5	Pulley	645790	645790	645790	645790	645790	645790	645790	645790	645790
6	Taper bush	645741	645741	645741	645741	645741	645741	645741	645741	645741
7	Drive belt	645739	645739	645739	645739	645739	645739	645739	645739	645739
8	Process filter	130351	130351	130351	130351	130351	130351	130351	130351	130351
9	Regeneration air filter	130363	130363	130363	130363	130363	130363	130363	130350*	130350*
10	Rotor	124247	124246	124246	124246	124246	124246	124246	124247	124246

11	Heaters	111503 (6pcs)	111503 (6pcs)	111503 111504 (3+3pcs)	111504 (6pcs)	111506 (6pcs)	111503 (6pcs)	111504 (6pcs)	111503 (3pcs)	111504 (3pcs)
Configurations - B & C & D										
	Humidity sensor (not shown)	140639								
12	Pressure switch for filters	126843								
13	Rotor guard	111597								
14	PLC	140620								
Configurations - C & D										
15	I/O board	112086								
16	Pressure switch for rotor	140624								
Configuration - D										
17	Process air in sensor	140625								
18	Process air out sensor	140651								

* Mounted externally before the duct heating element.
See the “How to install a C35C dehumidifier (Cold store model)” section for more details.

SOUND LEVELS

Sound dampening and silencers

Please check the maximum sound level permitted for the particular installation you are working with, and select the sound dampening and silencers needed for the dry air outlet duct and the regeneration air outlet duct accordingly.

Sound levels for each particular dehumidifier can be found on page 19.

Measuring sound levels

Sound levels for Cotes dehumidifiers are measured in accordance with the provisions of the ISO11201 standard.

While the sound level is being measured, the dehumidifier is placed on the floor. Ducts for regeneration air and for incoming air/outgoing air are installed and led out of the measuring room.

The sound level is then measured 1 metre outside the front of the cabinet (outside the large cabinet cover), and 1.6 metres above the floor.

SECTION 4 / INSTALLATION

HOW TO INSTALL A C35 DEHUMIDIFIER

Removing the packaging

Cotes C35 dehumidifier units are delivered in a wooden box. Please dispose of this packaging responsibly, and recycle it if possible.

Handling

Cotes dehumidifiers are built to be very robust, so there is no need for special handling, apart from normal sensible care and attention.

Note the weight of the dehumidifier as specified on page 21. We recommend that you use a forklift to move the dehumidifier around and place it in position.

Where to mount this dehumidifier

Cotes adsorption dehumidifiers are designed for installation indoors.

The back of the dehumidifier should be placed against an outer wall to make it easier to install the regeneration air ducts.

The three other sides of the unit should have at least 1 metre of unobstructed access, for easy service and maintenance.

Where not to mount it

Unless it has been arranged with Cotes and special considerations have been made, the unit should not be placed outdoors.

The unit should not be placed inside an office or in other locations where the sound pressure level must be kept to a minimum.

NOTE

Dehumidifier must be placed indoors, and protected from rain and water.

Things to be careful about

Electrical work should only be carried out by an authorised electrician.

NOTE

Electrical work should only be carried out by an authorised electrician.

Connections needed – electrical

First, make sure that the main switch is OFF.

NOTE

Make sure power is switched off before installing and servicing.

Now the power circuit cable can be connected to the main switch of the dehumidifier.

NOTE

The electrical board may include circuits that can retain a charge even if the mains power is disconnected. Detailed information about these electrical circuits is provided in the electrical diagram on drawing no. 270.

Connections needed – ductwork

NOTE

To ensure low pressure drop and low sound pressure levels, please request assistance from a company that specialises in ductwork.

The ductwork for the process air should be selected with regard to the external pressure available from the process air fan and the space available for ducting. A 250mm-diameter duct is normally recommended for the process air flow.

When installed, the process air flow should be adjusted by means of a damper.

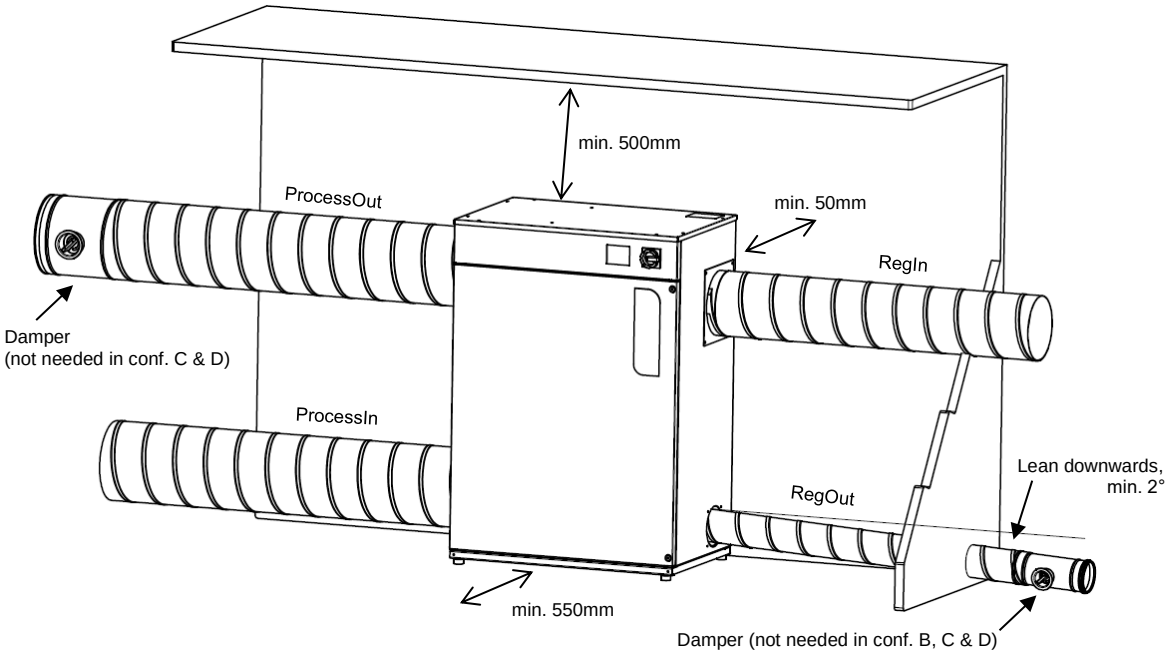
In Configuration-C and Configuration-D, the process air fan is equipped with a frequency converter, which makes dampers on the process air side unnecessary.

The regeneration air should be led to and taken from the outdoors.

The ductwork for the regeneration air should be selected with regard to the external pressure available from the regeneration air fan and the space available for ducting. A 200mm-diameter duct is normally recommended for the regeneration air flow.

The regeneration air outlet should be made to drain downwards towards the outlet, to allow any condensate to run out. If a reduction is needed at the regeneration air outlet, the reducer must be eccentric enabling condensation being led out throughout the ductwork.

There must be at least 500mm unrestricted access above the dehumidifier for easy access.



If this draining downwards is not possible, drill a ø6mm hole in the lowest part of the duct, so that any accumulated water can drain away.

NOTE

The regeneration air outlet should be made to drain downwards towards the outlet for draining.

If this is not possible, drill a ø6mm hole in the lowest part of the duct, so that any accumulated water can drain away.

A damper for adjusting the regeneration air flow must be installed on the outlet in order to adjust the regeneration air flow. If not, the regeneration air flow will – in most cases – be too high, making it impossible to reach the desired temperature for the regeneration air and thus making the unit less efficient. Use a standardised tool for measuring the velocity according to specifications.

In Configuration-B, Configuration-C and Configuration-D, the regeneration air fans are equipped with frequency converters, which makes dampers on the regeneration air side unnecessary. In Configuration-C and Configuration-D, the flow of process and regeneration air will adjust automatically.

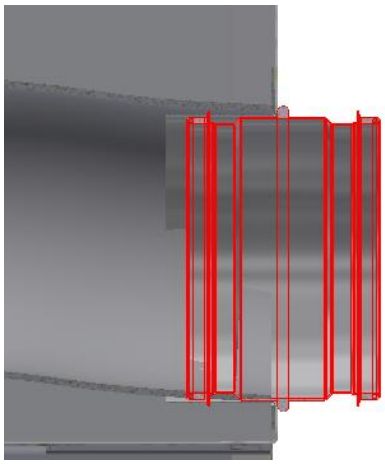
The regeneration air inlet and outlet must be placed with sufficient distance to each other to avoid rebreathing. If possible, Cotes recommends placing the regeneration inlet and outlet on each side of a corner – or some similar location – to reduce the risk further. If nothing is done to prevent the regeneration air from "short-circuiting", a capacity loss is possible and the risk of condensation inside the regeneration circuit will increase dramatically. Cotes recommends extending the inlet ductwork (rather than the outlet) to keep the risk of condensation in the outlet to a minimum.

NOTE

To avoid capacity losses and condensation issues, the regeneration air inlet and outlet must be placed with sufficient distance to each other.

Installation of regeneration outlet connector

In order to mount ducting for the regeneration outlet or to connect HR/LK module to the dehumidifier, you have to mount the double male connector shipped together with the dehumidifier. The connector has to be put into the outlet until you feel the resistance from the middle bulge. The position of connector should be even and with no gaps all around the outlet.



You may put a silicone on the outside of the connector before placing it into the outlet to secure its position inside. This is a requirement if an LK or HR module is paired with the dehumidifier.

Safety precautions

Dehumidifiers in the C35 range weigh approximately 102–115 kg and should therefore only be moved using a forklift or similar equipment

Any work in the electrical box should only be carried out by authorised electricians.

Any duct connections to and from the dehumidifier should only be carried out by authorised plumbers.

ADDITIONAL INFORMATION FOR C35C DEHUMIDIFIERS (COLD STORE MODEL)

Where to mount this dehumidifier

Cotes C35C adsorption dehumidifiers are specially designed for installation inside cold storage facilities.

Where <u>not</u> to mount it

The unit must not be installed outside the cold storage space unless this has been arranged with Cotes and special adjustments have been made to the unit.

Connections needed – electrical

First, make sure that the 1kW external heater is connected to 230V/50Hz and the external control current is connected to the electrical board, as described in the electrical diagram on page 300 for the C35C cold storage model. The external heater pre-heats the regeneration air before it enters the C35C dehumidifier.

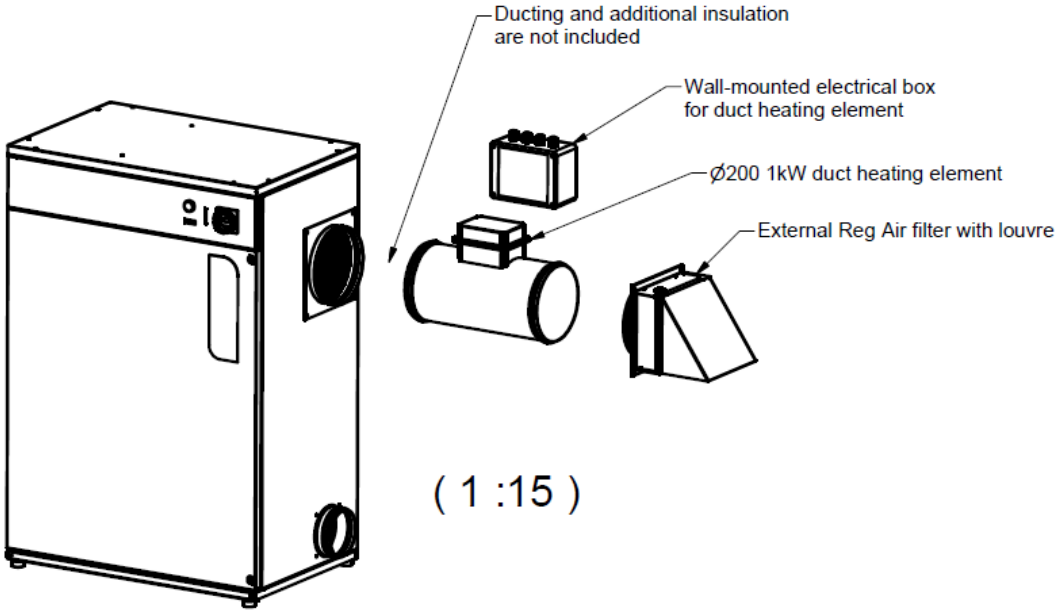
The C35C electrical cabinet has a small built-in fan heater to protect all the electrical components from the cold storage temperatures. The fan heater operates for 30 minutes before the dehumidifier starts, as a safety precaution when the main switch is on.

NOTE

The C35C dehumidifier has a built-in fan heater in order to protect the electrical components. A 30-minute timer is activated when the main switch is turned on.

Connections needed – ductwork

The regeneration air must be led to and taken from the outdoors. The ductwork must always be insulated from and to the cold storage. Such insulation is not included when purchasing a C35C dehumidifier.



NOTE

The regeneration air inlet and outlet ductwork must be insulated at all times within the cold store. Furthermore, the external heater, filter frame and electrical box must be installed according to specifications.

A damper for adjusting the regeneration air flow must be installed on the outlet in order to adjust the regeneration air flow. If not, the regeneration air flow will – in most cases – be too high, making it impossible to reach the desired temperature for the regeneration air and thus making the unit less efficient. Use a standardised tool for measuring the velocity according to specifications.

HOW TO COMMISSION THIS DEHUMIDIFIER

NOTE

Only trained/authorised electricians are allowed to carry out any work required in the electrical box of this Cotes dehumidifier.

When the cover of the electrical box is open, the power supply must be switched off at the mains switch.

Procedure

a) Check the electrical installation before starting the dehumidifier, switch on the mains switch.

- Check the voltage between the terminals L1, L2, L3 (= 400V or 230V for 3 x 230V dehumidifiers)
- Check one of the phases and Neutral (= 230V)
- Is the ground cable connected, and of the correct specifications?
- Is any hygrometer (if fitted) correctly connected?

b) To check the connected duct system

- Is the recommended damper installed in the regeneration air outlet duct (Configuration-A only)
- Is the recommended damper installed in the process air outlet duct (Configuration-A and Configuration-B only)
- Do the regeneration air outlet ducts drain away from the dehumidifier, to make sure that any condensed water flows away?
- If the regeneration air outlet does not drain away from the dehumidifier, check whether there is a 6mm-diameter hole drilled in the lowest part of the duct, so that any accumulated water can drain away.

c) Suggested damper positions/air flow settings at commissioning

Dampers/settings should be set in the following positions.

- Configuration-A:
    - Damper at process air outlet: Fully open.
    - Damper at regeneration air outlet: Fully open.
- Configuration-B:
    - Damper at process air outlet: Fully open.
    - Regeneration air fan speed 80%
- Configuration-C and Configuration-D:
    - Process air fan automatically adjusts to pre-set air flow (no damper needed)
    - Regeneration air fan automatically adjusts to pre-set air flow (no damper needed)

d) If the dehumidifier starts up as described above, then go to e)

If the dehumidifier does not start, you should check the humidity set point (Configuration-B, Configuration-C and Configuration-D only). If set point is higher than measured by the humidity sensor, the dehumidifier will not start (unless the “Always On” program has been chosen – see below).

e) Once the dehumidifier is operating, you should adjust the air flows

NOTE

The nominal figures are based on operation at 20°C. If the air temperature differentiates significantly from this, the flow rate should be corrected for another density.

For example, if the air flow rate is measured in the regeneration outlet, the volumetric flow rate of air must be 10–15% higher than the nominal value, due to the lower density of warm air.

If a Cotes HR or LK module is installed, go to SECTION 7 / Condensation or heat recovery unit.

Configuration-A

- Adjust the regeneration air until the incoming air flow matches the nominal values given under SECTION 3 / TECHNICAL DETAILS > Specifications. Check the air flows using a suitable instrument (pitot pipe/thermo-anemometer or similar) in the duct.
- Check the temperature after the heating elements. The temperature in the regeneration box is shown on the LCD display inside the electrical box. Make sure your C35 unit is fully heated before taking the readings.
- The temperature increase should be approximately +95°C, and must not exceed 125°C. In cases where it is hard to access the regeneration flow, the temperature increase alone can be used to adjust the flow rate. Be aware that the maximum temperature will occur when outdoor temperatures are highest. If exceptionally high ambient temperatures are expected (>30°C), the aim should be a temperature increase of less than 95°C. The temperature increase can be reduced by increasing the regeneration flow rate. The temperature must be kept lower than 125°C to avoid causing damage to the switch that regulates the heater. If this temperature is too high, please consult Cotes or your local dealer.

Configuration-B

- Adjust the regeneration air fan speed on the PLC until the incoming air flow matches the nominal value given under SECTION 3 / TECHNICAL DETAILS > Specifications. Check the air flows using a suitable instrument (pitot pipe/thermo-anemometer or similar) in the duct.
- Check the temperature after the heating elements. The temperature in the regeneration system is shown on the PLC display at the front of the dehumidifier. Make sure your C35 unit is fully heated before taking the readings.

- The temperature increase should be approximately +95°C, and must not exceed 125°C. In cases where it is hard to access the regeneration flow, the temperature increase alone can be used to adjust the flow rate. Be aware that the maximum temperature will occur when outdoor temperatures are highest. If exceptionally high ambient temperatures are expected (>30°C), the aim should be a temperature increase of less than 95°C. The temperature increase can be reduced by increasing the regeneration flow rate. If this temperature is too high, please consult Cotes or your local dealer.

Configuration-C and Configuration-D:

- In the Configuration-C and Configuration-D, the dehumidifier is self-adjusting, and adjusts according to default air flows.

SECTION 5 / OPERATION

HOW TO OPERATE WITH BASIC-PLR BASED DEHUMIDIFIER

Configuration-Basic PLR is designed for maximum dehumidification, and the standard setting is that it is kept running at all times. This configuration is kept as simple as possible, which is why there is no dehumidification management installed.

STARTING THE DEHUMIDIFIER

Rotate main switch to power on dehumidifier. After a short period, the dehumidifier is ready to operate. When the main switch is on, the integrated LED strip displays a single green diode at the lower end of the strip.

To turn the dehumidifier on, press the button on the left of the main switch. Press the button again to turn the dehumidifier off.

When the dehumidifier is operating, the entire LED strip is green.

HOUR COUNTER

Mechanical hour counter located on the front of the machine counts time, which machine is dehumidifying.

ALARM

The LED strip in the front of the panel turns red if an alarm occurs.

Detailed information about the causes of alarms is displayed on the HMI display.
All possible alarms are listed in Troubleshooting table on page 55.

EXTERNAL HUMIDITY MANAGEMENT

You can purchase an external humidity hygrostat to manage when the dehumidifier is operating or not. Contact Cotes or your Cotes dealer for more information.

HMI PANEL

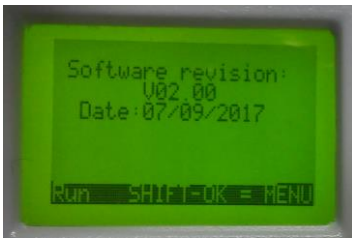
HMI panel is mounted into main PLR module inside electrical cabinet.

During normal operation, the main screen will be on. name of machine family is showed in first row. Second row shows current temperature in regeneration air channel. If constant process flow is active information will show in third row. Machines designed to work in cold environment will have additional information in forth row indicating it.

Other information can be accessed from the main menu. Basic PLC versions register the hours that the regeneration air fan, process air fan and rotor have been in operation. These times are shown while pressing the “OK” button. To access information about software revisions, press the left and right arrows at the same time, when the dehumidifier unit is not running.

Main screen

Service time screen



Software version screen

CONSTANT PROCESS FLOW FEATURE

Cotes dehumidifiers provide a constant process air flow (CPF) mode. This means the process fan is always on, regardless of humidity levels.

To activate this constant process air flow mode, you stop the dehumidifier with the start/stop button on the front panel, then press the “0” and “3” buttons at the same time. To turn off this constant process air flow mode, press the “0” and “4” buttons at the same time.

DATE/TIME SETTINGS

To change current date or time follow the steps below.

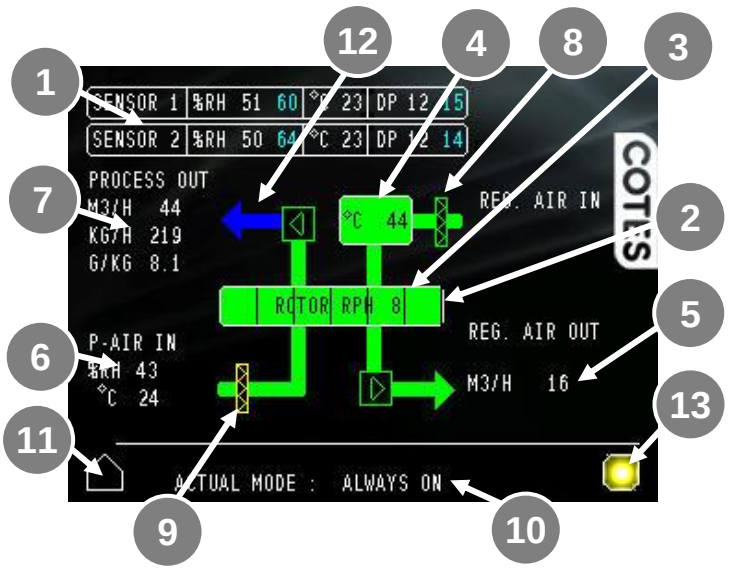
Screen	Action
	To access the setup menu, press “shift” and “OK” simultaneously
	Next step is to switch the controller to stop mode. To do this, press button “1” on the number keyboard.
	After this you will be asked for confirmation. Press “0” to confirm.
	The controller should display status as “Stopped”. Now You can adjust the time/date settings. If you skip the previous steps, the controller will refuse the new values in the control menu ! Press “4” to go to setup menu.

	To change current date press “1” and to change current time press “2”.
	Enter the correct date values in the order: day/month/year. To “jump” from dd to mm to yy, press the “right arrow” next to the “OK” button. To leave the menu without saving press simultaneously “SHIFT” and “UP arrow”. Confirm correct values by pressing “OK”. If everything is done correctly, the controller will go back to setup screen, otherwise CPU will not react to pressing “OK” (i.e. if controller is still in run mode, or bad values)
	Fill in the correct values in the order: hours/minutes/seconds. To “jump” from hh to mm to ss, press the “arrow RIGHT” next to the “OK” button. To leave the menu, press simultaneously “SHIFT” and “UP arrow”. Confirm correct values by pressing “OK”. If everything is done correctly, the controller will go back to setup screen, otherwise CPU will not react to pressing “OK” (i.e. if controller is still in run mode, or bad values)
	After adjustments, you must switch the controller to “Run” mode. Press simultaneously “SHIFT” and “UP arrow” to go back.
	Press button “1” to return the controller to run mode. Before You choose Run mode please be sure that the On/Off button on front panel of the machine is OFF! Otherwise the machine will start operating immediately after you select Run mode! If the entered adjustments were correct, and the controller is in Run mode. you should see main menu.

HOW TO OPERATE WITH PLC BASED DEHUMIDIFIER

The dehumidifier needs to be turned on at the main switch.
After a while the PLC overview screen will appear.

Overview menu



1. **Actual measurement and target value for % relative humidity and temperature –** within the space concerned (as registered by external sensors that are not part of the dehumidifier).
   The blue number is the **target value**. Pressing this will send you to the humidity menu.

   In Configuration-B, only one sensor is available. Configuration-C and Configuration-D can be equipped with a second room sensor. Both sensors can calculate the dew point required in the humidity adjustment process.

2. **Rotor –** If the rotor is turning, this moves.

3. **Rotor speed –** in revolutions per hour (RPH).

4. **Regeneration air temperature –** shows the temperature of the heated regeneration air. If the temperature is shown in red, an overheating alarm was triggered

5. **Regeneration air flow** (Configuration-C and Configuration-D) **–** shows the current air flow based on internal measurements. In Configuration-B, the percentage of the maximum speed of the fan is shown.

6. **Inflow process air conditions** (Configuration-D) **–** actual process air inlet conditions measured in % relative humidity and temperature. This measurement is taken directly after the process air has passed through the process filter.

7. **Process air flow** (Configuration-C and Configuration-D) **–** shows the current process air flow, based on internal measurements. These are in different units, depending on configuration values.

8. **State of the regeneration air filter –** if this is yellow, the filter should be replaced soon. If this is red, the service interval has been exceeded. A mechanical pressure switch triggers a warning (yellow alarm) if the set point is reached. The set point can be manually adjusted at the pressure switches inside the dehumidifier.
9. **State of the process air filter –** if this is yellow, the filter should be replaced soon. If this is red, the service interval has been exceeded. A mechanical pressure switch triggers a warning (yellow alarm) if the set point is reached. The set point can be manually adjusted at the pressure switches inside the dehumidifier.

The pressure switch for process air filter is set to 160 Pa and the pressure switch for regeneration air filter is set to 180 Pa, by default. The setting on the pressure switches must not exceed 200 Pa. Be aware that the available external pressure (or flow) will decrease as the filters get dirtier. Also note that higher air flows will reduce the expected lifetime of filters.

10. **Actual mode –** Indication of chosen program.
11. **Return to main menu**
12. **Pre-Post unit settings –** a blue arrow is only visible if any pre-post module is active. If you press this shortcut, you will go to directly to the module settings.
13. **Alarm/warning –** shows the state of the dehumidifier unit:
    Green = everything is OK.
    Yellow = warning = a service will soon be required (the dehumidifier continue to operate).
    Red = alarm = there is a fault or malfunction somewhere (the dehumidifier stops immediately).

Note that if you attempt to change values, you will be asked to enter an operator code (1234).

MAIN menu

START/STOP Turn the dehumidifier on and off.

HUMIDITY Setup target for relative humidity and/or dew point.

PROGRAMS This is where you decide how you want the dehumidifier to operate:

- Always On, RH On/Off (all configurations),
- Capacity Control (Configuration-B),
- Energy, Quiet, Custom programs (Configuration-C and Configuration-D),
- Energy+ (Configuration-D).

INFO This provides information about this particular dehumidifier product, including the dehumidifier type, serial number, build date, software revision and running hours, as well as contact information to the dealer and the manufacturer. A performance log is available to provide indications of % relative humidity and dew point. This performance log registers data every hour.

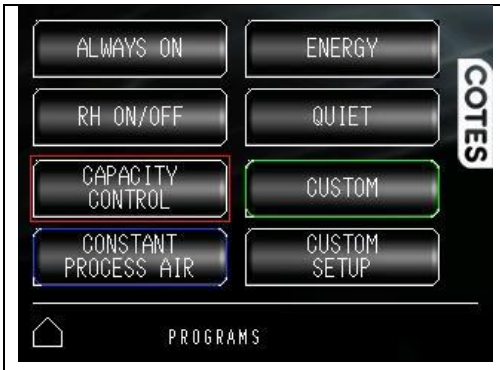
SERVICE This is where you can see the status of the dehumidifier components and their life expectancy. There is also a diagnostics menu. Here you can also reset the timer after a time-expired component has been replaced.
Yellow = service is needed (the dehumidifier continue to operate).
Red = critical alarm and service is needed immediately (the dehumidifier stops operating).

ALARM This is where you check any alarms or warnings detected by the control system (yellow flashing = warning detected, red flashing = alarm detected). Alarms also have to be manually reset after fixing the fault.

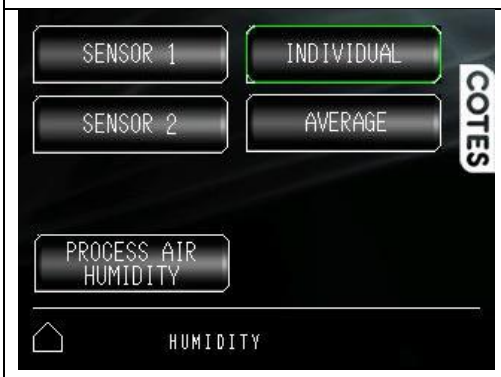
SETUP This is where you can change the settings for your dehumidifier.

First setup of PLC dehumidifier

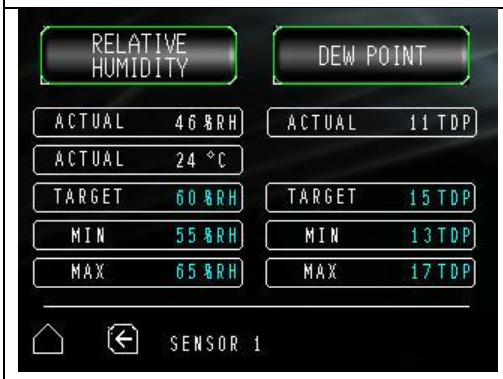
The basic programs for Cotes dehumidifiers are ALWAYS ON and RH ON/OFF. You should choose the program best suited to your needs. The ALWAYS ON program is the simplest – it runs the dehumidifier at full capacity all the time. You should use this if you have an external hygrostat fitted and do not need any additional functions, but wish to keep all the safety features of the PLC unit. The RH ON/OFF program uses the room sensor (temperature and relative humidity) included with the dehumidifier in order to maintain the target relative humidity and/or dew point at the place where the sensor is located. For details on the other programs, please consult the extended PLC manual.
Step-by-step instructions about how to set up your dehumidifier for the RH ON/OFF program are provided below:



1. Go to the programs menu and choose the RH ON/OFF program:
2. If you are not logged in, you will be asked for the operator's code (1234). Enter this code and press log in, then select the desired program again.
3. Go back to Main menu
4. Select the target humidity level.



5. This shows settings for SENSOR 1 (and SENSOR2 if included)
6. Select SENSOR 1



7. Use this menu to select your control conditions – relative humidity and/or dew point. You can select the target value here as well as setting the minimum and maximum values. The dehumidifier will start working if the measured value is above the maximum setting and will stop when it measures a value below the minimum setting. If you choose both control conditions options, the dehumidifier will start when either of the conditions are outside the selected range, and will continue to work until both measurements are again inside the selected range.
8. You can go back to the main menu and start the dehumidifier

For more details about how to operate a PLC dehumidifier, see :
“PLC EXTENDED OPERATING HANDBOOK”.

SECTION 6 / SERVICE AND REPAIR

HOW TO SERVICE AND REPAIR THIS DEHUMIDIFIER

Service and maintenance work on this dehumidifier

Cotes designs its dehumidifier units so that they are as robust as possible, and only need a minimum of service and maintenance.

None of the components require lubrication or adjustment.

The only maintenance work you need to do is listed below.

Once a month

- Check or replace the filters for incoming air and regeneration air. For Configuration-B, Configuration-C and Configuration-D, the filter guard will automatically provide a warning if there are problems.
- Check that the fans are operating (by listening to check whether they are turning).

Once a year

We also recommend the following annual checks.

- Check the service indication menu in the PLC controller. Are the working hours of any component inside near their time-to-change limit? If so, replace. See time-to-change limits below:
    - Process air filter. Depends on the working environment. Specified for 8,700 hours under normal conditions.
    - Regeneration air filter. Depends on the working environment. Specified for 8,700 hours under normal conditions.
    - Air filter for electrical box. Depends on the working environment. Specified for 8,700 hours under normal conditions.
    - Process air fan: 40,000 hours
    - Regeneration air fan: 30,000 hours
    - Motor and gear for rotor: 30,000 hours
    - Heaters: 40,000 hours
    - Filter guard (if installed): 40,000 hours
    - Manometer (if installed): 40,000 hours
    - Rotor, including gaskets: 60,000 hours
    - Electrical board including PLC controller: 60,000 hours
- External humidity sensor should be calibrated or replaced (with recycled instruments)
- Internal humidity sensor (only Configuration-D) should be replaced (with recycled instruments)
- Check the wear on the rotor gaskets, especially the gasket placed on the circumference of the rotor. The red side of the gasket is made of Teflon®, and this coating must be intact over its entire surface.
- Check the inside of the cabinet for any signs of dirt or corrosion. Check that the drive belt for the rotor is still tight and that no parts of it are too worn or close to the breaking point.

- Check that the insulation on all electrical cables is intact, with no mechanical or heat damage.
- Check that the insulation on the electric heater(s) is intact.
- Check that all cables inside the electrical box are properly attached, all miniature circuit breakers (MCBs) are switched on and all components are intact.
- Test that all electric components are working as intended – for example by following the instructions in the “Commissioning” section of this handbook.

Service/repair work on this dehumidifier

Service area must be clear at all time.

Diagrams and manual must be kept near the machine.

Machine will automatically startup in case of power loss and recover of electricity.

Safety instructions

Before opening the dehumidifier, make sure that the electric current is switched off at the mains before you open top cover or front door.

The QS10 safety switch should also be switched OFF and locked.

You should never just turn off the power to the dehumidifier while it is running. The correct procedure is to press STOP C35 DEHUMIDIFIER (Configuration-A; press the operating button), after which the machine runs a cooling cycle before the regeneration air fan stops. Turning off the dehumidifier properly prevents any over-heating.

WARNING

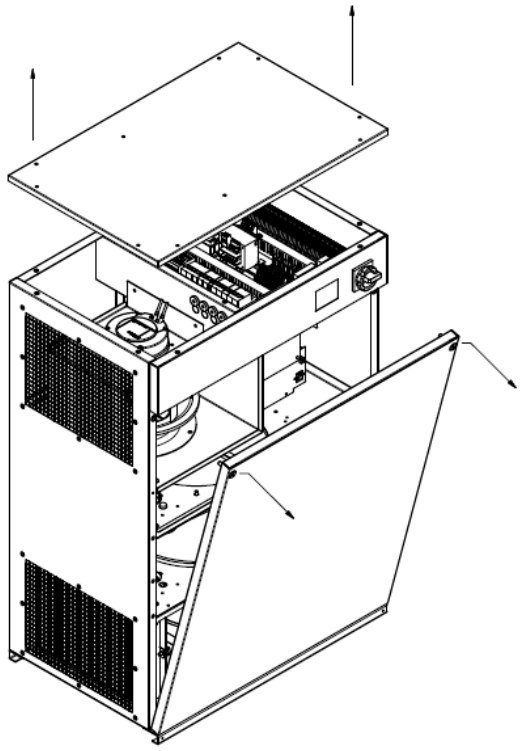
Make sure that electric current is switched off at the mains
before you open top cover or front door

The QS10 safety switch should also be switched off and locked.

Easy access for quick service

The electrical switchboard (contacts, fuse breakers, thermal relays, etc.) is placed in the electrical box in the top of the dehumidifier cabinet, directly under the top cover, to make them easy to get to.

All other electrical components (fan motors, gear motor, heating elements, etc.) are easy to access when the service door for these parts is opened.



Connecting 230V motors

All C35 dehumidifiers are fitted with 230V AC electric motors for the fans. This means it doesn't matter how the plus/minus cables are connected.

Nevertheless, the gear motor must be connected correctly and you must check that the rotor turns clockwise when connected.

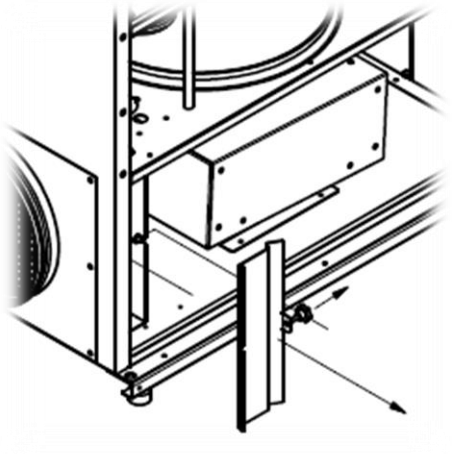
Replacing filters

Use only high-temperature resistance filters for the regeneration air flow.
(Except if special filters are specified).

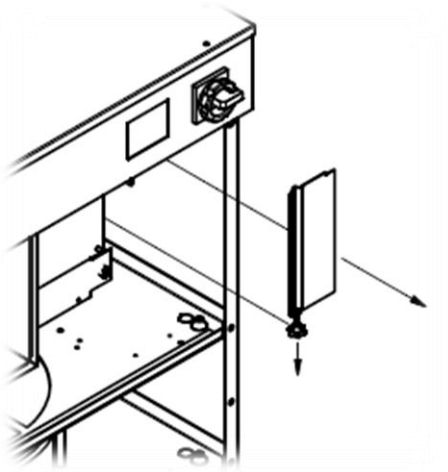
The following is standard procedure for replacing the filters:

- Open front door
- Loosen the finger screws on the filter doors
- Replace the filters

Process air filter



Regeneration air filter



NOTE

You should only use high-temperature resistance filters for the regeneration air flow for safety persuasions if power failure occurs.

Replacing fans

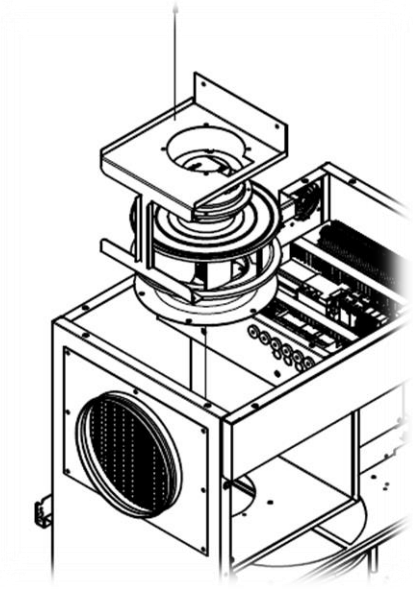
The following is standard procedure for replacing the process air fan;

- Remove top cover
- Disconnect cables for process air fan
- Remove the screws on the fan bracket
- Remove the screws on the fan
- Remove the fan bracket
- Remove the fan
- Replace the process air fan

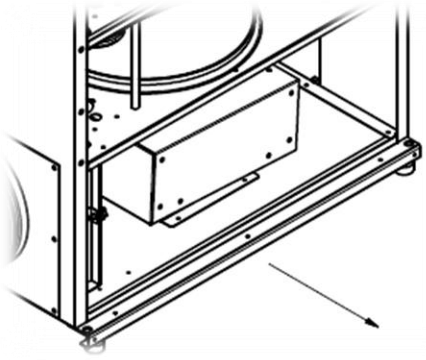
The following is standard procedure for replacing the regeneration air fan:

- Disconnect cables for regeneration air fan
- Dismount screw clamp fastened to the regeneration air fan box
- Remove the regeneration air fan box
- Insert a replacement regeneration air fan box, or remove the screws on the regeneration air fan box and replace the regeneration air fan

Process air fan



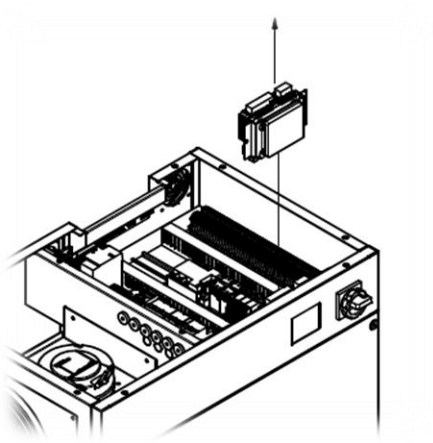
Regeneration air fan



Replacing PLC

The following is standard procedure for replacing the PLC unit.

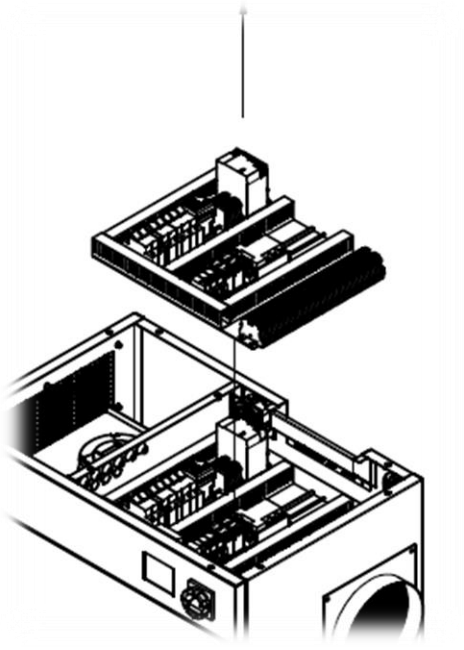
- Remove the top cover
- Disconnect cables for the PLC
- Remove the screws for the PLC bracket
- Replace the PLC



Replacing electrical board

The following is standard procedure for replacing an electrical board

- Open the top cover
- Disconnect all cables and sensors connected to the electrical board
- Remove the screws fastening the electrical board to the cabinet
- Replace the electrical board

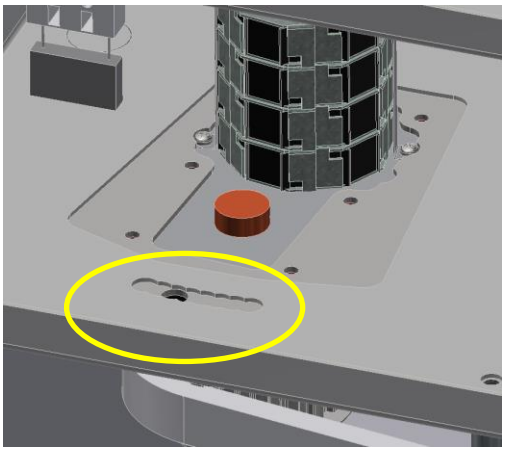


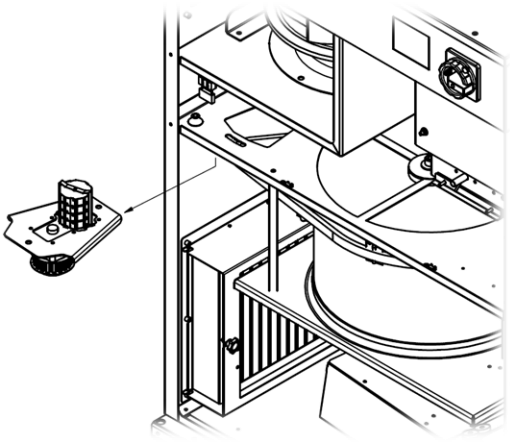
Replacing gear motor

The gear motor is installed/assembled on a bracket for easy removal and installation, because the combined assembly is extracted from the cabinet together. To remove the gear motor, the belt must first be loosened.

- Remove the bolt/nut in front of the gear motor (see picture below).
- Disconnect all electrical connections.
- Remove the drive belt from the pulley, and then remove the gear motor.
- You can now fit a replacement gear motor.
- Tighten the belt, by choosing a corresponding hole for the bolt/nut in front of the gear motor (see picture below).
- Reconnect all electrical connections.

When re-starting the unit, check that the rotor is moving. If not, swap the two cables on the motor.

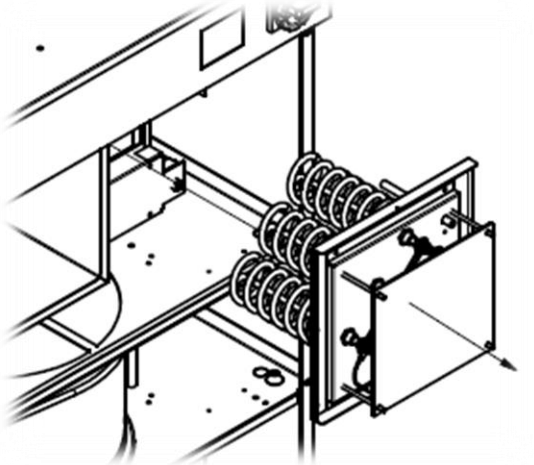




Replacing electric heaters

All electric heaters are mounted in the front of the heater section of the dehumidifier.

To replace these units, disconnect the wiring and unscrew the plate. You can then withdraw the plate and heaters from the heating section.



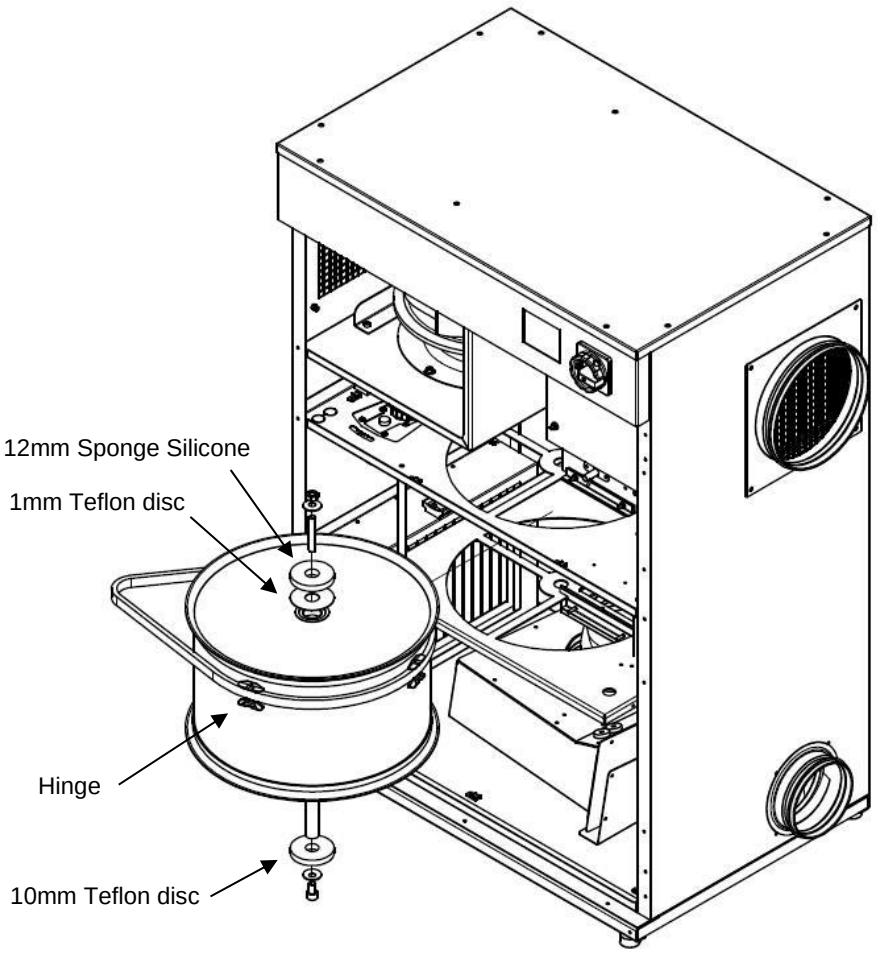
Replacing rotor, rotor gaskets and shaft

You do not need to remove the rotor to replace the rotor gaskets. You simply place the new gasket on the rotor and fix it in place with the three-part expansion ring. You then turn the rotor, which presses the gasket against the departing plates until only half of the gasket is on the rotor. The expansion ring then fastens.

The following is standard procedure for replacing rotor gaskets:

- Open door at the front of the cabinet.
- Remove the bolt/nut in front of the gear motor, so the drive belt can be loosened (see the picture in the “Replacing gear motor” section above).
- Remove the drive belt from the pulley.
- Remove the rotor gaskets.
- Mount new rotor gaskets.
- Tighten the metal clamps holding the rotor gaskets.

You *can* remove the rotor and mount new gaskets on it, but it is much easier to mount new gaskets *without* removing the rotor.



The following is standard procedure for replacing the rotor:

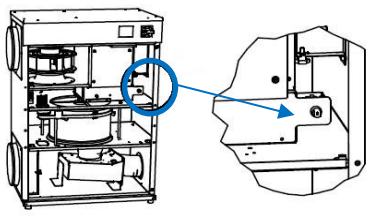
- Open door at the front of the cabinet.
- Remove the bolt/nut in front of the gear motor, to allow loosening of the drive belt (see the picture in the “Replacing gear motor” section above).
- Remove the drive belt from the pulley.
- Remove the rotor gaskets.
- Remove the flex-tube connections to the regeneration fan. The regeneration fan can now be moved slightly, so the rotor shaft can be removed.
- Remove the top and bottom bolts for the rotor shaft, and slide the rotor shaft out through the bottom.
- If needed, remove the bolts for the distance rods between the top and bottom rotor section plates. The bottom rotor section plate will now be free.
- Carefully slide out the rotor (including the top Teflon® and silicone discs, and the bottom Teflon® disc).
- You can now install a new rotor. Slide it back into the machine and put the 10mm solid Teflon® disc underneath the rotor. Put the 1mm Teflon® disc and the 12mm sponge silicone seal on top of the rotor. Make sure the 1mm Teflon® disc is below the 12mm sponge silicone seal (see illustration above).
- Reinstall the rotor shaft. If the bolts to the distance rods were loosened, these can be tightened now.
- Reinstall the flexible tube connections to the regeneration fan. Make sure the metal clamps are tightened, and the flexible tubes are properly connected. (Try pulling slightly on the flexible tubes – they should not move).
- Reinstall the rotor gaskets and tighten the metal clamps holding them. Turn the rotor and make sure the gaskets fold onto the rotor section plates (top/bottom) all the way around.
- Put the drive belt back on the pulley, and tighten the belt, by choosing a corresponding hole for the bolt/nut in front of the gear motor (see the picture in the “Replacing gear motor” section above).

NOTE:

Transfer hinges and the rotor guard bracket to the new rotor.
(see illustration above)

- The rotor guard bracket must be aligned with the rotor guard sensor.
- The hinges must be placed underneath the drive belt so that the belt will grip these when the rotor is turning.

TROUBLESHOOTING

Problem	Cause	Action
The unit (or parts of it) will not start after a power surge/an electrical short circuit	One or more fuse breakers have been triggered	Turn all fuse breakers on
The air is not as dry as expected	The rotor is not turning The regeneration air temperature is lower than expected The regeneration air flow is too low	If the drive belt is intact, change the gear motor Check that the regeneration air flow is not too high Check that all heating elements are functioning Check that the regeneration air filter is not clogged
The regeneration air temperature has large variations	The regeneration air flow is too low	Check that the regeneration air filter is not clogged
PLR Screen displays “Machine overheated” The PLC Alarm menu displays “Overheating Alarm”	The 252ST1 safety switch has been triggered and must be deactivated Temperature in heating box was higher than 176°C	Deactivate the safety switch by pressing the small green button. The switch is located next to the heating box inside the dehumidifier.  Check whether the regeneration air flow is too low Check whether the filters should be changed

If you have any queries or questions, please contact your Cotes dealer.

SECTION 7 / CONDENSATION OR HEAT RECOVERY UNIT

RECOMMENDED COMBINATIONS OF DEHUMIDIFIERS AND MODULES

Using an additional module alongside the dehumidifier unit might affect some of the nominal figures provided in the data sheet. Key points are listed below.

The **HR module** is not fully compatible with all the dehumidifier units in the range, and it is important to realize that the addition of a HR module will affect some of the nominal figures provided in the data sheet. This applies particularly to the figures for available external pressure, which will no longer apply because some pressure will be lost through the module itself. This loss of external pressure is because the airflow must be increased and because the heat exchanger in the module itself adds a resistance to the flow of air.

Note that the energy consumption of a Cotes dehumidifier in BASIC configuration will remain the same with a HR module. However, the running time will fall due to the increased capacity when using a HR module without modulating heat.

The **LK module** is not fully compatible with all the dehumidifier units in the range. The LK module will impact the operating conditions for the dehumidifier.

The following guidelines with regard to compatibility must be respected:

Model	Compatibility with the LK module	Compatibility with the HR module
C35E-3.3	Fully compatible (BASIC configuration requires LK-kit)	Fully compatible
C35E-3.8	Fully compatible (BASIC configuration requires LK-kit)	Fully compatible
C35E-4.5	Fully compatible (BASIC configuration requires LK-kit)	Fully compatible
C35E-5.1	Fully compatible (BASIC configuration requires LK-kit)	Fully compatible
C35E-5.6	Only configuration B, C, D	Fully compatible
C35D-3.2	Not compatible	Fully compatible
C35D-4.5	Not compatible	Fully compatible
C35C-0.5	Not compatible	Not compatible
C35C-0.9	Not compatible	Not compatible

SPECIFICATIONS, ASSEMBLIES AND COMPONENTS

Please note that specifications and controls given in this handbook are in some situations approximate.

Table 4 Technical data C35LK

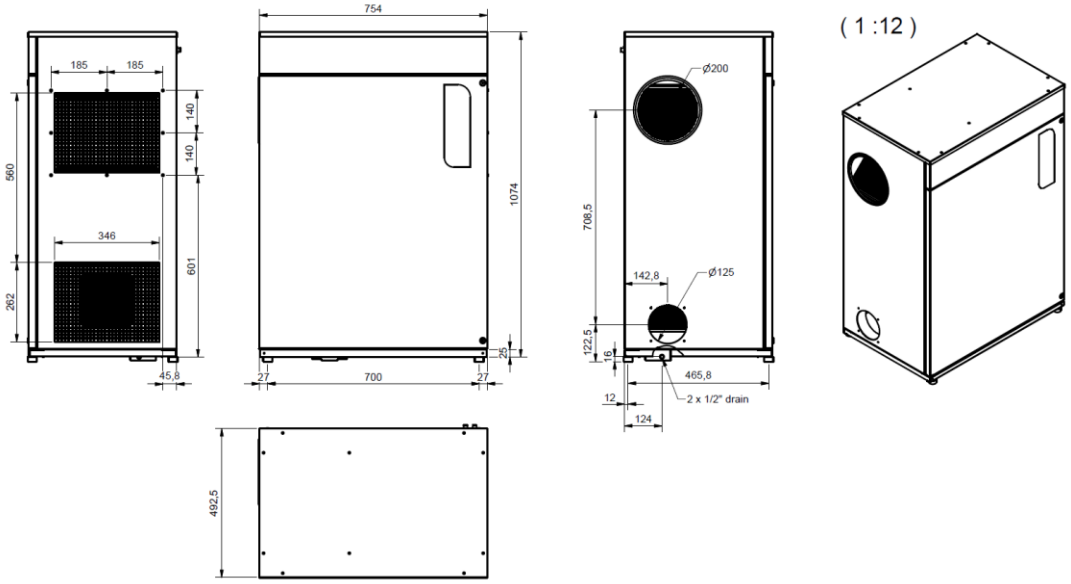
	Type	LK
Nominal power consumption	kW	0.17
Voltage	V	1x230
Frequency	Hz	50
Ground		1PH+PE

Table 5 Measurements C35LK/C35HR

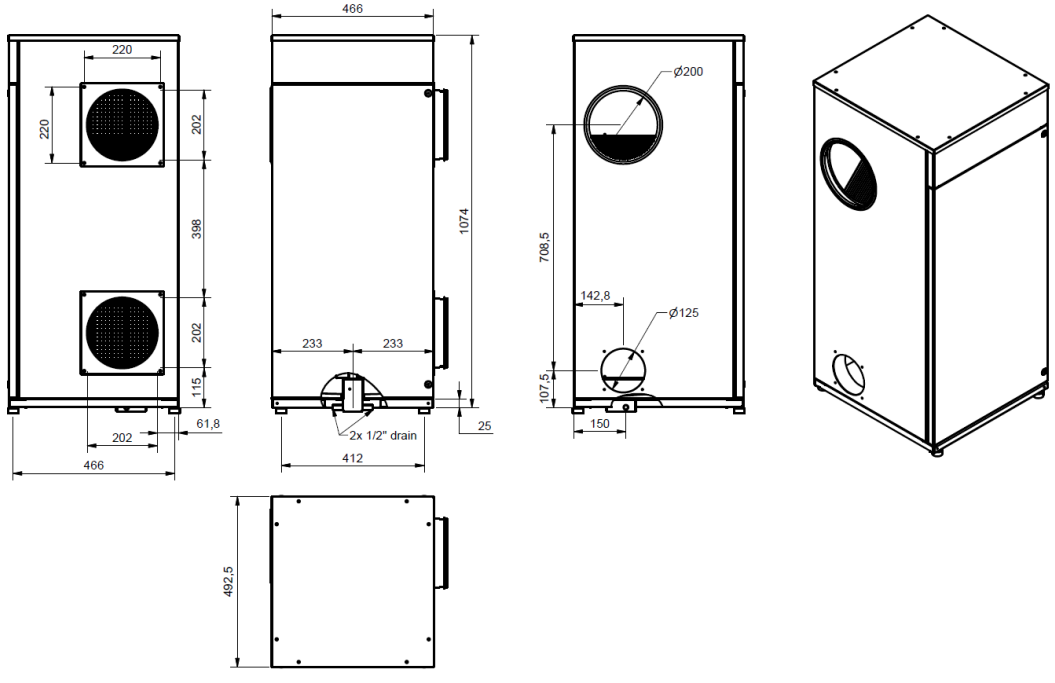
	Type	LK	HR
L x W x H cabinet	mm	492,5 x 756 x 1091	492,5 x 466 x 1091
L x W x H total	mm	532 x 756 x 1091	492,5 x 466 x 1091
Weight	kg	70	50
Air outlet	mm	360x250 (ø250)	200x200 (ø200)
Air inlet	mm	350x260 (ø250)	200x200 (ø200)
Drain size	inch	1/2"	1/2"

Dimensions

Condensation module

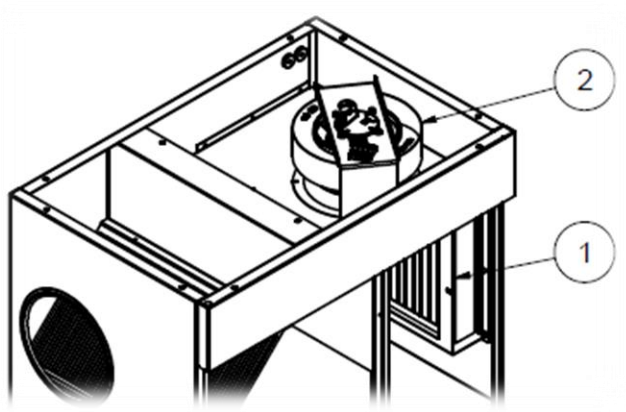


Heat recovery module



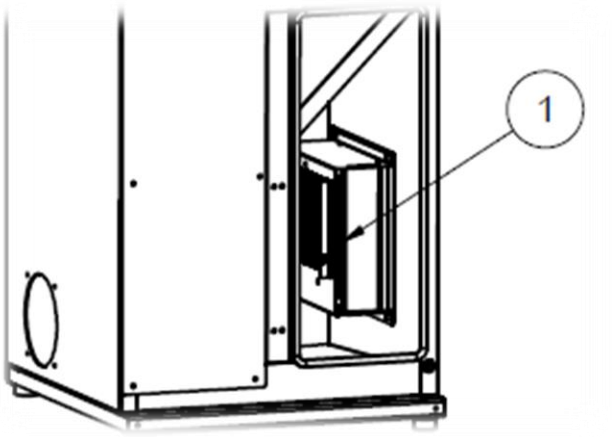
Spare parts

Condensation module



CONDENSATION UNIT		
1	Condensation air filter	130268
2	Condensation fan	801715

Heat recovery module



HEAT RECOVERY UNUT		
1	Regeneration air filter	130268

HOW TO INSTALL A CONDENSATION UNIT OR HEAT RECOVERY UNIT

Removing the packaging

Cotes condensation units (LK module) and heat recovery units (HR module) are delivered in a wooden box. Please dispose of this packaging responsible, and recycle it if possible.

Handling

Cotes condensation units and heat recovery units are built to be very robust, so there is no need for special handling, apart from normal sensible care and attention.

Note that the weight of the condensation unit is 70 kg and the weight of the heat recovery module is 50 kg. We recommend that you use a forklift to move such units around and to place them in position.

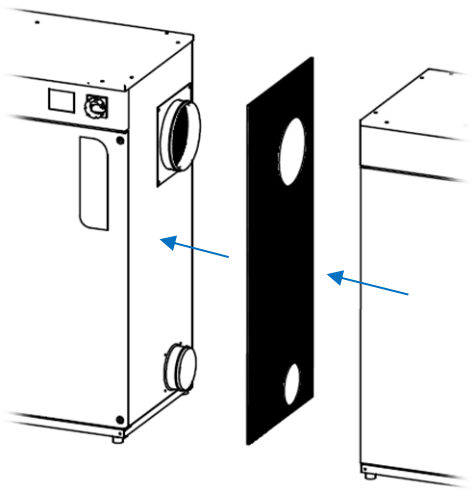
Where to mount the condensation or heat recovery unit

The condensation and heat recovery units are designed for indoor installation mounted directly onto the Cotes adsorption dehumidifier on the right side connecting the units to the regeneration air flow.

Note that both units cannot be mounted on the dehumidifier at the same time. The condensation or heat recovery unit must be installed 0–5 mm away from the C35 dehumidifier. The dehumidifier must have the duct connectors installed on both the regeneration air inlet and outlet before installing the water condensation or heat recovery unit.

To ensure stable operation of the dehumidifier with condensation or heat recovery unit the regeneration filter – found in the dehumidifier – must be removed. No filter is needed for regeneration circuit when using a condensation unit and for heat recovery unit a filter is found at the inlet in the bottom.

Place the foam insulation sheet between the dehumidifier and LK module to reduce any risk of external condensation.



Connection need for condensation (LK)- and Heat Recovery (HR) unit – Drain

When installing a HR or LK unit, the unit must be placed in an upright position, with the bottom plate parallel to the horizontal plane. It is critical that the unit is positioned correctly, otherwise the water condensate will not be sufficiently drained.

The heat recovery unit HR is equipped with one drain connection that has to be guided to the drain in the building as minor condensate may get formed inside the unit.

The condensation unit LK is equipped with two drain connections found on the bottom of the unit. The drain connection to the left (seen from the front) is the main drain.

For both the Heat recovery unit, and the LK unit, a hose must be mounted to the drain connections that guides water to a drain in the building. The hose that is connected to the drain pipe, must be of sufficient size to be mounted on the outside of the drain pipe.

Minimum internal diameter of the Hose = 14mm

For the LK/HR unit's main drain, an "air-lock" must be made with, or in connection with, the drain hose, and must be minimum 30mm below the drain (See illustration). For the LK unit, if an 'air-lock' is not in place, the low relative pressure inside the unit will pull outside air in, and stop the water from draining.

The secondary drain does not need an Airlock.

We recommend keeping some free space below the module to make sure it is easy to install drain hose(s) and an air-lock. An additional floor or wall bracket can be provided to make sure there is enough space. For details, please contact your Cotes dealer, or Cotes.

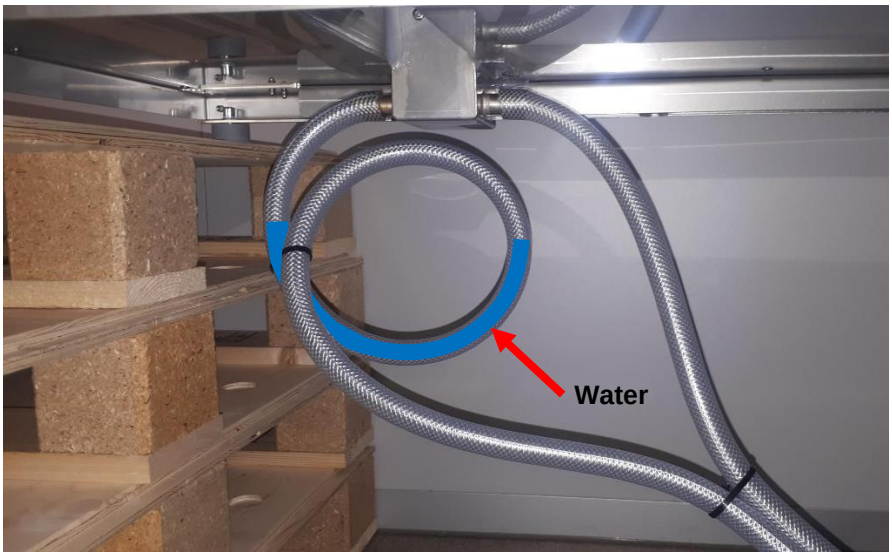
NOTE

Before the machine is started, the 'air-lock' must be filled with water, otherwise the unit may not function properly.

NOTE

The two drain must not be connected by a Y connection and guided in one common hose to the drain in the building. Water has to float independently from each of the LK drain connections to the drain in the building.

Illustration of the Airlock:



Connections needed for the condensation unit – electrical

First, make sure that the main switch is OFF.

The condensation unit has a pre-mounted cable connected to the condensation air fan. This cable must be directly connected to the terminals 306X1 in the electrical board located in the C35 dehumidifier. For further information, please consult the electrical diagram on page 306.

In order to enable the LK unit in the PLC control: Go to main menu – Setup – Advanced and press the “LK module” button. The button will light up and a text showing “LK MODULE” is found in the “overview menu/screen”.

Connections needed for the condensation unit in C35 Configuration-A – electrical

The C35 Configuration-A has no built-in regeneration fan adjustment and cannot control the regeneration air fan speed, which is needed when installing the condensation unit.

A Reg Air Fan Kit is therefore available for the C35 Configuration-A to make it possible to control the regeneration air fan using a potentiometer.

For more information how to connect Regeneration Air Fan Kit check the electrical diagram on page 102. The potentiometer should be setup according to list below:

Model	Potentiometer setting
C35E-3.3	5.3
C35E-3.8	5.3
C35E-4.5	6.4
C35E-5.1	9.0

HOW TO ADJUST THE AIR FLOW WITH THE HR MODULE

Once the dehumidifier is operating, you should adjust the air flows as follows

NOTE

The nominal figures are based on operation at 20°C. If the air temperature differentiates significantly from this, the flow rate should be corrected for another density.

For example, if the air flow rate is measured in the regeneration outlet, the volumetric flow rate of air must be 10–15% higher than the nominal value, due to the lower density of warm air.

Configuration-A:

- Adjust the regeneration air to a flow rate of 15–25% higher than the nominal values given under SECTION 3 / TECHNICAL DETAILS > Specifications. Check the air flows using a suitable instrument (pitot pipe/thermo-anemometer or similar) in the duct..
- Check the temperature after the heating elements. The temperature in the regeneration box is shown on the LCD display inside the electrical box. Make sure the C35 dehumidifier and HR module are fully heated before you take readings.
- The temperature increase across both the HR module and electric heater should be approximately +95°C, and must not exceed 125°C. In cases where it is hard to access the regeneration flow, the temperature increase alone can be used to adjust the flow rate. Be aware that the maximum temperature will occur when outdoor temperatures are highest. If exceptionally high ambient temperatures are expected (>30°C), the aim should be a temperature increase of less than 95°C. The temperature increase can be limited by increasing the regeneration flow rate. The temperature must be kept lower than 125°C to avoid causing damage to the switch regulating the heater. If the temperature is too high, please consult Cotes or your local dealer.

Configuration-B:

- Adjust the regeneration air to a flow rate of 15–25% higher than the nominal values given under SECTION 3 / TECHNICAL DETAILS > Specifications. Check the air flows using a suitable instrument (pitot pipe/thermo-anemometer or similar) in the duct.
- Check the temperature after the heating elements. The temperature in the regeneration system is shown on the PLC display on the front of the dehumidifier. Make sure the C35 dehumidifier and HR module are fully heated before you take readings.
- The temperature increase should be approximately +95°C, and must not exceed 125°C. In cases where it is hard to access the regeneration flow, the temperature increase alone can be used to adjust the flow rate. Be aware that the maximum temperature will occur when outdoor temperatures are highest. If exceptionally high ambient temperatures are expected (>30°C), the aim should be a temperature increase of less than 95°C. The temperature

increase can be limited by increasing the regeneration flow rate. If the temperature is too high, please consult Cotes or your local dealer.

Configuration-C and Configuration-D:

- In the Configuration-C and Configuration-D, the dehumidifier is self-adjusting, and adjusts according to default air flows.

SECTION 8 / FORMALITIES AND GENERAL/LEGAL INFO

WARRANTIES

Warranty conditions

The Cotes factory warranty is only valid if a documented programme of service and preventive maintenance has been carried out.

Maintenance must have been carried out at intervals of six months or less. Documentation for this must be in the form of a written log/journal, with attested entries.

All spare parts must have been purchased from Cotes or an authorised Cotes dealer.

LEGAL NOTICES

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VAT no. DK 15 20 03 32

Declares at its own liability that the following models of Cotes adsorption dehumidifiers:

C30, C35, C65, C105

covered by this declaration complying with the following directives**:**

Machinery Directive 2006/42/EC

Ecodesign 327/2011 directive 2009/125/EF as regards the eco-**design** fans driven by motors with input power **between** and 125W to 500kW

EMC Directive 2014/30/EU

RoHS 2011/65/EC

Aarhus, Denmark, 01/12/2020

Thomas Rønnow

CEO

HOW TO UPDATE AND IMPROVE THIS COTES DEHUMIDIFIER

Energy recovery

An energy recovery system can be placed beside the dehumidifier to reduce the amount of energy needed for heating the regeneration air.

Extra insulation

The doors of the Cotes dehumidifier can be insulated to ensure that the sound pressure level of the unit is reduced and to ensure that all energy (both cooling and heating) is kept inside the unit.

Additional cooling/heating coil

A pre-cooling coil can increase the amount of moisture removed, especially when very dry air is needed.

Additional post cooling/heating

A post cooler/heater unit can be attached to the dehumidifier to control the temperature downstream from the dehumidifier.

Additional/better filters

If cleaner air is needed, it is possible to replace the fitted filter with a different filter featuring other specifications. If an additional filter is required, please contact Cotes expert and find out how the unit can be changed for this to be done.

Next step

Please contact Cotes or a Cotes dealer to find the best solution.

WHOM TO CONTACT

Help when and where you need it

Contact Cotes in Denmark or your local dealer:

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