

Operating instructions CDH050 heat pump

Version 1.0







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01 OPERATION

01.01 Control unit

Here is a picture where the individual parts are labeled

01.02 Indicator lights and operating modes

The individual operating modes of the system are explained below. The meaning of the indicator lights can also be seen. These are described here with the numbers used in the illustration (picture above).

(1)...Green

(2)...Orange

(3)...Blue

(4)...Red

Machine status	(1)	(2)	(3)	(4)	Interpretation
Initialization	-	-	-	-	System is being parameterized, please wait
Waiting for system	-	-	-	-	System waiting for release (see section x.y and
approval normal					y.x)
Waiting for system release	В	В	В	В	System waiting for release (see section x.y and
with bridge gas detector					y.x)
Waiting for start (manual	-/B	-	-	-	Green starts to flash half an hour before the set
and time window)					time window, otherwise green is off.
Oil preheating	В	-	-	-	Compressor oil is being preheated. Please wait
					for the displayed time (visualization).
Check room conditions	Х	-	-	-	The system switches on the room fan to check
and prepare process					the current conditions; this process takes 45-
					120s. If operation is required, all components are
					started
Heating mode active	Х	Х	-	-	System is in heating mode
Cooling mode active	Х	-	Х	-	System is in cooling mode
Cooling mode with fan	Х	-	В	-	System does not actively cool, but circulates air
only					
Drying active, heating	Х	Х	-	-	The system is in drying mode and is heating up
Drying active, cooling	Х	-	Х	-	The system is in drying mode and is cooling
Drying active, drying	Х	Х	Х	-	The system is in drying mode and is drying
Hysteresis	Х	B/-	B/-	-	Target values reached, system in standby until
					set hysteresis values are reached. Then starts
					automatically. Depending on the active mode,
					the corresponding lamps flash: No mode: all off,
					Heating: orange, Cooling: Blue, Drying: Orange +
					Blue
Defrosting	Х	В	-	-	System frees the upper register from ice
Temporary error	-	-	-	В	System had to stop. After a waiting period, it
					starts automatically
Permanent error	-	-	-	Х	System had to stop. It must actively be restarted.



Emorgonovicton		v	v	v	v	Emorgoney stop is pross	d All components are
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Emergency stop	Х	Х	Х	Х	Emergency stop is pressed. All components are
					switched off and a physical restart is required
					(pull emergency stop and flip toggle switch)

X: lights up continuously | B: flashes | -: does not light up

01.03 Switching on the system

Before switching on:

- Check that the machine is stable and level
- Only start when all protective covers and flaps are closed
- Check electrical supply line and air hoses for damage
- If defects are apparent, this must be reported and rectified

The steps required to start the system are listed below:

- 1. Check the system according to the warning above.
- 2. Connect the mains plug, the air hoses and the condensate drain as described in chapter 6.2.
- 3. Turn the toggle switch to the ON position
- 4. Wait approx. 60s until the system shows something on the display / web visualization
- 5. Set your desired mode and the corresponding target parameters

(If the system displays "offline" (see visualizations), the antennas (in the connection box) can be installed in a different position)

01.04 Switching off the system

If the system is still in operation, it is advisable to deactivate the start command first. This makes the next start process easier, reduces the load on the machine and ensures that the condensate tray and hoses (in the machine) are emptied. Condensate that is not drained can cause damage to the machine (freezing).

Then turn the toggle switch to the OFF position. Then disconnect the mains plug and remove the installed air hoses and the condensate drain.

01.05 Visualizations

The system has 3 display options: Main visualization, Display, WebApp.

The color coding for the main visualization and the display follows the following scheme:

Blue: active or everything is OK

Brown: not critical but attention required

Red: relevant parts not active or there is a problem.

The individual options are explained below.

01.05.1 Main visualization

The main visualization can be accessed via an end device with a browser (HTML5-capable). The resolution is 1920x1080 pixels. A device with a larger display (PC, laptop) is therefore recommended. First connect the end device to the machine via LAN cable (see **Fehler! Verweisquelle konnte nicht gefunden werden.** Ethernet connection). Then check which IP settings the end device has (for Windows: Ethernet settings → adapter



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options). By default, "Obtain an IP address automatically" is activated on the end device. With this setting, the end device receives the IP from the machine. If manual settings are available, an IP with the following characteristics must be set: 172.30.1.xx (where xx > 5).

The browser can then be opened on the end device and the following can be entered in the address bar: 172.30.1.2

Öl wird vorgeheizt. Anlage ist in 27 min bereit.			Fehler-/ Infocodes FREIGABE		E	START	EN DE	offline 29	.01.2025 13:47	Admin	
	Einstellungen					<u>Elektrische Werte</u>					
Moduswahl:	Heizen /	Kühlen		Frocknen					Spannung	Strom	
	nur He	eizen	n	ur Kühlen				Phase 1:	230.0 V	0.5 A	
Betriebszeitfenster:	Mo Di	Mi	Do Fr	Sa				Phase 2:	230.0 V	0.5 A	
	Start:	0 h	Ende:	01	ı			Phase 3:	230.0 V	0.5 A	
Zieltemperatur Raum - Heizen:							Aktuelle elekri	sche Gesamtleistung:	0.3 kV	0.3 kW	
Zieltemperatur Raum - Kühlen:						Elektrischer Verbrauch: 0 kWh					
Zieltemperatur Raum - Trocknen:	22.0 °C				Thermische- / Prozess-Werte						
Zielfeuchte Raum:		6	0 %		92 g/kg		ufteintrittstemperatur	: 18.0 °C	Luftaustrittstemperatur	18.0 °C	
Temperatur Hysterese:		1	.5 K			Lu	uftfeuchtigkeit Eintritt	: 55.0 % / 7.06 g/kg	Luftfeuchtigkeit Austritt	: 55.0 % / 7.06 g/	
Feuchtigkeit Hysterese:			5%	-> 9.0 10.1)8 g/kg 76 g/kg	ļ	Aktuelle Nutzleistung	0.0 kW	Aktuelles Kondensat		
Zielvolumenstrom:		800	0 m³/h				Gesamtwirkungsgrad		Volumenstrom Raumluft	0 m³/h	
Luftmodus - Hysterese:	Stillst	and	C.	Dauerhaft			Heizarbeit	0 kWh	Kältearbeit	0 kWh	
Abtastrate / Lüfterdrehzahl:	4 m	in		80 %			Gesamtes Kondensat	: 0 kg	Reine Trocknungsenergie	0 kWh	
Externer Temperatursensor:	aktiv	aktiviert deaktiviert				Betriebszeit	0 h				
EINSTELLUNGEN / WERTE	PROZESS ADMIN- / MAST			- / MAST	er einste	ELLUNGEN					
Figure xx: Main visualization settings and values											

This should display the view shown below. (it may be necessary to "trust the application").

The visualization is divided into 3 areas: Header, display area and footer.

The following topics are visible and can be set within the header (from left to right):

Info box	This shows in plain text what the system is currently doing or what status it is in
Error/info codes	If there are no errors or information, this button is underlined in blue. If there is
	information, it is underlined in brown. If there is an error, the underline is red. If the
	button is then pressed, a list opens showing the error number and a brief description
	(more detailed explanation of error/info codes in a separate document and under
	01.08)
Release	This button can be used to change the basic system release. More detailed
	explanation under Settings.
Start	This button can be used to start or stop the system. More detailed explanation under
	Settings.
EN / DE	The visualization language can be changed using these two buttons
Internet access	The machine indicates whether it is online (underlined in blue) or offline (underlined
	in red).



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Date	The local time is displayed. If the machine is online, it will compare the time with the online server on a daily basis and correct it if necessary. If the machine is offline, there may be discrepancies between the machine time and the real time.
Users	The user who is currently logged in is displayed on the far right. There are 3 authorization instances: Customer, Admin, Master. The customer is logged in by default. Admin or master rights can be activated using a password. These allow more values to be viewed and more settings to be made.

The display area changes depending on the selection in the footer.

Tab	Authorization	Description
Settings / Values	All	All relevant settings can be made here and the most important
		operating values can be seen here.
Process	All	The process and all its parameters are displayed graphically
		here.
Admin/master	Admin,	On the left-hand side are settings that the admin can see. On
settings	Master	the right-hand side are further settings that only the master can
		see
Cold commissioning	Master	Only relevant for the manufacturer
Manual mode	Master	The components can be controlled manually on this tab.
		<pre>!!!CAUTION!!! may only be used by trained specialists and with</pre>
		extreme caution

01.05.02 Display

The display is located on the machine (see operating panel). It can be used to make all settings and view values that are subject to customer authorization. The display is structured like a tile system. The arrow keys can be used to switch between the tiles. The following graphic illustrates this:





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Each tile contains information about Internet access, the date, the language selection and the current tile position.

	offline	29.01.2025 14:	32		
	FREIGABE	START			
	Warte auf Betriebsst vorgeheizt	art, Öl wird			
	EN DE	Info: 1 /	/1		
Figure XX: Display visualization					

01.05.03 WebApp

If the system is online, it will establish a connection to the data server. All relevant data is exchanged via this. This in turn is displayed graphically in the WebApp. This means that setting values and current machine parameters can be changed or called up from anywhere.

Due to the multivalence of the WebApp, all relevant data for this service must be requested from the manufacturer/distributor and is not shown here.

01.06 Settings

All setting options up to admin authorization are explained below. The display of the settings may change depending on the visualization option, but the functionality is the same for all of them. (Note: not all input values are required for all operating modes. Values that are not used are visually greyed out)

Setting	Authorization	Value range	Information on
Release	All	0/1	Allows the basic activation of the components. This setting can only be made on the machine.
Start	All	0/1	Allows the system to start. If this is not given, operational capability is prepared (oil preheating).
EN / DE	All	0/1	Language selection English / German
Heating/cooling and drying mode selection	All	0/1	More detailed description under 01.07
Heating only and cooling only mode selection	Approval by manufacturer / distributor	0/1	More detailed description under 01.07
Operating time window	Approval by manufacturer / distributor	Weekdays 0 / 1 Start / End 023	These are activated / deactivated by clicking on the weekdays. An operating time window can be selected by entering times. If both values have the same number, 24-hour operation is automatically active (the



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			operating time window is the same for	
Target temperature room - heating	All	1029,5	Enters the target value for the heating/cooling and heating only modes.	
			Depending on the hysteresis selected and the prevailing outside temperatures, the maximum value may be adjusted	
			slightly downwards	
Target temperature room - cooling	All	15,534,5	Enters the target value for the heating/cooling and cooling only modes. Depending on the hysteresis selected and the prevailing outside temperatures, the minimum value may increase slightly, and the maximum value may decrease slightly	
Target temperature room - drying	All	15,5 29,5	Enters the target value for the drying mode.	
			Depending on the hysteresis selected, the minimum value can be adjusted slightly upwards and the maximum value slightly downwards	
Target humidity room	All	xx 98	Enters the target value for the drying mode. Depending on the selected target temperature and hysteresis, the minimum value is determined and, if necessary, the maximum value is corrected downwards.	
Temperature hysteresis	All	0,53	Enters the operating range around the target temperature value. The machine overrides the target value by the hysteresis value, switches off and waits until the target value is below the hysteresis value.	
Humidity hysteresis	All	210	Enters the operating range around the target humidity value. Exact impact can be seen under Drying mode description	
Target volume flow	All	400010000	Enters the desired room air volume flow rate. We recommend leaving this at approx. 8000 - unless fresh air operation is desired. In this case, the required outlet temperature can be achieved with a lower volume flow. If the machine requires more air for stable operation, it will ignore the default value.	
Air mode - hysteresis	All	0/1;0/1	Standstill means that the system also switches off the room fans once the target values have been reached. If permanently active, the room fans will continue to supply air	



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Sampling rate	All	160	Specifies the time after how many
			minutes the room air parameters are to
			be checked. This is only relevant in
			"Standstill" air mode
Fan speed	All	30100	Specifies the fan speed during
			"Continuous" air mode
External temperature	Approval by	0/1	This setting tells the machine which
sensor	manufacturer /		temperature sensor should be used for
	distributor		control. If "activated", the machine will
			use the external sensor. If "deactivated",
			the machine's internal sensor is used. If
			"activated" indicates that no external
			sensor is installed, the internal sensor is
			automatically used.
Control mode	Admin	0/1	If "Control" is selected, the machine will
			adjust the power when it approaches or
			exceeds the target value. If "Always max.
			power" is selected, the machine will
			always try to deliver the maximum
			possible power. Note: This setting has no
			effect on the maximum possible output.
			It is advisable to always operate the
			system with "Control", as this reduces
			the start-up and shut-down cycles and
			thus contributes to an increase in the
			machine service life
Resetting the meter	Admin	0 / 1	The previous meter values can be set to
values	/ Commit	0/1	Ω using the respective buttons
Set default settings	Admin	0/1	Pressing the button overwrites the
oet deladit settings		0/1	current settings with the fixed settings
Reset error status	Admin	0 / 1	Pressing the button takes the machine
		~/ ·	out of the error status on the software
			side and forces a restart. Note: No effect
			on error emergency ston and machine
			protection mode
			protection mode

01.07 Mode selection

The respective modes are explained below and how the machine works is shown. Important note:

If the machine is in operation (active compressor) and a mode change is forced (e.g. from heating/cooling to drying), it is recommended that the target parameters for the planned mode are set first. Although the values are displayed less clearly, they can still be changed. This can avoid unnecessary starts and stops.

If the mode limits are exceeded or not reached when entering the target values, the system automatically adjusts the values.

In addition, the target values may be assessed internally as not feasible. This can happen, for example, if the system is to heat at very low outside temperatures. For example, the target value can be set to +25°C, but the internal limit can be set to 20°C. As long as the machine is under power, it will remember the specified target values and use them again as an internal control reference when conditions are more favorable.



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!!!CAUTION!!! If the machine is switched off, it remembers the last INTERNAL control reference. This means that after a restart, the target temperature may no longer be 25°C but 20°C (example figures). It is therefore advisable to check the input data after a restart.

01.07.01 Heating / Cooling

For this mode, it is necessary to set the target temperature to Room - Heating anyway - Cooling and the temperature to Hysteresis. The system will not allow the cooling target temperature to be lower than the heating target temperature. If a value is entered that would trigger this, the machine automatically adjusts the other value.

When the mode is started, the machine first decides which operating mode it will prioritize first. Example: Target value heating = 20° C, target value cooling = 24° C. If the current temperature is < 20° C, heating is selected. If it is > 24° C, cooling is selected. If it is in between, no operating mode is initially selected, and the machine goes into hysteresis pause.

If an operating mode is active, an attempt is made to reach its target temperature or heating/cooling is performed until the hysteresis limit is reached. The machine will then stop. Depending on how the room air subsequently behaves, the current operating mode is restarted or changed. It should be noted that a change of operating mode only takes place if the current hysteresis limit is exceeded/falls short by 1°C and the hysteresis limit of the other operating mode is also exceeded/falls short.



The following diagram illustrates this:





In example 1, it can be seen that the switchover points correspond to the respective hysteresis limits. This is because the target values (heating and cooling) are far apart. In example 2, the target values are closer together. To prevent frequent mode changes, the switchover points are below or above the hysteresis limits.

Figure XX: Representation of hysteresis and switchover points heating/cooling example 2

01.07.02 Heating only or cooling only

For this mode, it is necessary to set the room heating or cooling target temperature and the temperature hysteresis. The system will not allow the cooling target temperature to be lower than the heating target temperature . If a value is entered that would trigger this, the machine automatically adjusts the other value.

When the mode is started, the machine decides whether it needs to become active or not. If the current temperature is below the heating target value (heating only) or above the cooling target value (cooling only), it will become active. Otherwise, the hysteresis pause is started.

If the operating mode is active, the target temperature is attempted to be reached or heated (heating only) / cooled (cooling only) until the hysteresis limit is reached. The machine will then stop. When the room air has cooled down again (heating only) or heated up again (cooling only), the operating mode is restarted.

01.07.03 Drying

For this mode, it is necessary to set the drying target temperature, the temperature hysteresis, the target humidity and the humidity hysteresis. The humidity values must be specified as a relative value (%). The relative values (%) refer to the target temperature. The machine automatically determines the absolute humidity values, which form the basis for control.

Within the drying mode, all 3 possible operating modes (heating, cooling, drying) can be used. The machine decides automatically and independently which operating mode is required.

Humidity control:

As already mentioned, the control is always based on the absolute humidity. The following scenario can therefore occur:



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Target temperature = 22°C

Target humidity = 60%

Actual temperature = 17°C

Actual humidity = 70%

Although the actual humidity value is greater than the target humidity value, the machine will not dry. This is because the absolute target humidity is 9.916 g/kg and the absolute actual humidity is 8.456 g/kg. It is therefore already dry enough, it just needs to be heated up. The visualizations support the assessment of the humidity content by always displaying the absolute values.

When the mode is started, the machine decides which operating mode to select. If the current temperature is below 15°C, it will switch to heating mode (minimum temperature required for active drying). If the temperature is above 15°C and below the target value, the absolute humidity decides. If this is below the target value, heating mode is started; if it is above, drying mode is activated. If the temperature is above the target value, the humidity is the deciding factor. If it is too humid, cooling is activated. If it is dry enough, the hysteresis pause is started.

If the operating mode is active, an attempt is made to keep both the temperature and the humidity within the respective hysteresis ranges:

- Heating active
 - 0 Below 15°C \rightarrow continue heating
 - Below upper temperature limit 0
 - Absolute humidity < (upper humidity range + target humidity) / $2 \rightarrow$ Continue heating
 - Absolute humidity > (upper humidity range + target humidity) / 2 and temperature > 17°C \rightarrow Switch to drying
 - Above the upper temperature limit 0
 - Absolute humidity < (upper humidity range + target humidity) / $2 \rightarrow$ Hysteresis -pause
 - Absolute humidity > (upper humidity range + target humidity) / $2 \rightarrow$ Switch to cooling
 - In hysteresis pause 0
 - As long as absolute humidity < (upper humidity range + target humidity) / 2, wait until the temperature falls below the lower temperature limit, then heat again
 - If absolute humidity > (upper humidity range + target humidity) / 2 then either switch to drying (temperature < target value) or to cooling (temperature > target value)
- **Cooling active**
 - Above lower temperature limit 0
 - Absolute humidity < lower humidity limit \rightarrow Hysteresis pause
 - Ice detected on the register \rightarrow Switch to heating
 - Absolute humidity > lower humidity limit \rightarrow Continue cooling
 - Below lower temperature limit 0
 - Absolute humidity < lower humidity limit \rightarrow Hysteresis pause
 - Ice detected on the register \rightarrow Switch to heating
 - Absolute humidity > lower humidity limit \rightarrow Switch to drying
 - In hysteresis pause 0
 - Humidity > upper humidity limit



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- Temperature > target value → Start cooling
- Temperature < target value → Switch to drying
- Humidity < upper humidity limit
 - Temperature < lower temperature limit \rightarrow Switch to heating
 - Otherwise stay in hysteresis pause
- Drying active
 - o Below upper temperature limit
 - Absolute humidity < lower humidity limit → Hysteresis pause
 - Ice detected on the register or temperature < $15^{\circ}C \rightarrow$ Switch to heating
 - Absolute humidity > lower humidity limit \rightarrow Continue drying
 - Above upper temperature limit
 - Absolute humidity < lower humidity limit→ Hysteresis pause</p>
 - Ice detected on the register → Switch to heating
 - Absolute humidity > lower humidity limit → Switch to cooling
 - o In hysteresis pause
 - Humidity > upper humidity limit
 - Temperature > target value → Switch to cooling
 - Temperature < target value → Start drying
 - Humidity < upper humidity limit
 - Temperature < lower temperature limit -> Switch to heating
 - Otherwise stay in hysteresis pause

01.08 Errors and information

The system differentiates between 4 categories of malfunctions:

- Information:
 - Should point out to the user that not everything is ideal
 - However, there is no condition that could damage the machine or the environment
 - It is nevertheless advisable to work on and resolve these issues
- Temporary errors
 - These can occur if certain environmental conditions or events mean that operation must initially be stopped
 - After a certain waiting time, the machine will automatically resume operation
 - The more temporary events are counted by the machine and only reset after an error-free minimum operating time. If more than 3 events are detected, the error is converted into a permanent error
- Permanent errors
 - If this is the case, the machine will no longer start automatically and must be checked manually
 - The machine will not continue operation until the machine is restarted or the "Reset" button is clicked (visualization with at least admin rights or WebApp)
- Machine protection

• This is a special form of permanent error. It can only be reset using Master rights If there is information or an error, this can be viewed via the main visualization (at the top of the tab) or on the display. A brief description in the main visualization indicates the type of event. An FAQ on all error and information messages can also be viewed on the display.

The detailed error list is listed separately, please contact the sales department/manufacturer for further information on this.



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