Operation and Maintenance

ThermoCooler HP

Size 100-1280

Order number:

Project name:

Documentation for your unit:

1. Go to *docs.ivprodukt.com (*Order Portal) or scan the QR code.
2. Enter your order number.
3. Press ENTER or click on search.
4. Select your order.

Order Portal

Is any documentation missing?

See details in section

"2.2 Documentation and support", on page 11.

TABLE OF CONTENTS

1 SAFETY

This section addresses important safety aspects of assembly, with the aim of raising safety awareness and avoiding personal injuries and damage to surroundings and units.

- This manual contains important instructions. Read it carefully and follow the instructions.
- Pay special attention to warning and information messages, as well as markings on the product.
- Keep the manual for future use.

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1.1 Intended use

Intended use

The ThermoCooler ThermoCooler HP is intended to be used to cool and heat supply air in properties. The reversible heat pump is designed to be installed together with IV Produkt AB air handling units.

The reversible heat pump should not be used as a standalone unit.

Intended users

The contents of this manual are intended for personnel who electrically connect, commission and maintain the reversible heat pump on site. By operator, we refer to the European Parliament's definition: "...the physical or legal person exercising actual responsibility over the technical functioning of the equipment and systems...". The operator is usually the owner of the system.

Operator responsibilities:

- minimising and prevention of leakages
- Take corrective action to remedy any leakage that arises
- Ensure that leak inspection, service and repair of the refrigerant circuit are carried out by a certified refrigeration technician
- Ensure that refrigerant is handled in an environmentally safe manner and in accordance with national regulations.

Maintenance and servicing of the reversible heat pump must be carried out by a certified refrigeration technician.

Intended user environment

- The unit is usually placed indoors, but is also available as an outdoor version.
- When assembled indoors, the unit must be assembled in a ventilated area that maintains a temperature between +7 and +30 °C, and that maintains a moisture content of <3.5 g/kg in dry air in the winter.

1.2 Unintended uses

Any use other than specified in "*1.1 Intended use*", *on page 5* is prohibited unless specifically permitted by IV Produkt. It is not permitted to use the unit in potentially explosive environments.

1.3 General safety

Failure to comply with the safety precautions may result in injury to persons or damage to air handling units. To avoid personal injuries and damage to surroundings or units:

- Follow national and local laws/regulations for safe work, e.g. fall protection when working at a height.
- Do not wear loose clothing or jewellery that may get fasten.
- Do not step or climb on the unit.
- Use appropriate tools.
- Use appropriate personal protective equipment.
- Note the unit's markings: product signs, information and warning stickers.

Personal Protective Equipment (PPE)
Personal protective equipment must always be used based on the risks present in the workplace. For example, wear protective footwear with steel toecaps, hearing protection, protective helmet, gloves, safety eyewear, fully-covering clothing, safety overalls, facial/protective mask and/or fall protection equipment where the work and work environment requires it.

1.4 Structure of alert messages

Warning notices in the instruction warn of risks when handling and assembling the product. Carefully follow the instructions published in warning notices.

 The warning symbol indicates that a risk exists.

WARNING! indicates a potential risk that, if not avoided, can cause **life-threatening or serious**situations that can lead to death or personal injury.
CAUTION! indicates a potential risk that, if not avoided, could cause **material damage** to the product or surroundings as well as impairment of product function.

"Risk of xxxxxx. " indicates the risk in a short risk title.

A description in italics provides more detailed information about what the risk entails.

- The bullet points indicate how the user avoids harm.

1.5 General warning notices

WARNING!
Risk of life-threatening or serious personal injury.
Electrical voltage can cause electric shock, burns and death. The product must not be energised during assembly.

- Electrical connection and electrical work may only be carried out by a qualified electrician.
- For initial start-up of the unit, see Operation and Maintenance of the unit on IV Produkt's order portal.

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WARNING!

Risk of burns.

The parts, pipes and components of the unit may be hot during and after operation of the unit.

- When the unit is in operation, inspection hatches must be closed and locked.
- During service or other interventions, the unit must be switched off.
- Inspection hatch for cooling unit/reversible heat pump: Wait at least 30 minutes after shutting down the unit before opening the compressor door.
- Inspection hatch for heating coil: Wait at least 5 minutes after shutting down the unit before opening the compressor door.

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WARNING!

Risk of cutting.

Sharp edges can cause cuts.

- Use appropriate personal protective equipment when the work requires it.

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WARNING!

Risk of fire in the event of a refrigerant leak.

A2L refrigerants are mildly flammable and can ignite in the event of a leak.

- If external damage to the cooling circuit has led to a refrigerant leak:
  - Evacuate the ventilation room
  - Ensure good ventilation
  - Call in certified refrigeration technician.
- Service of cooling units/reversible heat pumps may only be carried out by a certified refrigeration technician. When working on/servicing the unit:
  - Shut down the unit at the service switch in the control equipment, then turn the safety switch to the 0 position and lock. Note that there may be different safety switches for the different parts of the unit. All safety switches must be switched off and locked before repairs/service.
- Due to the risk of sparks, safety switches must not be used if there is a suspected refrigerant leak.
- When detector system installed:
  - Make sure the detector system is functioning.
  - Make sure that external dampers in the ductwork do not block the unit's air flow, such as through uncontrolled closing.

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1.6 Signs on the unit

Keep signs and stickers free of dirt. Replace missing, damaged or unreadable signs and stickers on the machine. Contact IV Product for replacement stickers by specifying the article number.

1.6.1 Nameplates

The reversible heat pump comes with a model rating plate placed on the inspection side. The type plate is used, among other things, for identification of the product.

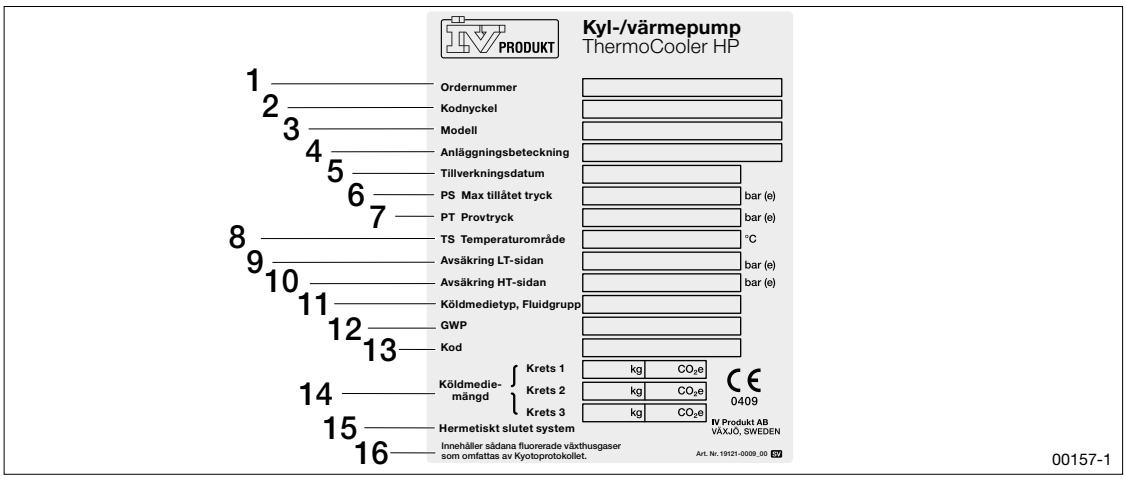

Figure: Type plate for reversible heat pump

1. Order number
2. Code key
3. Model
4. Plant designator
5. Date of manufacture
6. PS Max allowed pressure, bar (e)
7. PT Pressure test, bar (e)
8. TS Temperature range, °C
9. Fuse LT side, bar (e)
10. Fuse HT side, bar (e)
11. Refrigerant type, Fluid Group
12. GWP
13. Code
14. Refrigerant volume, Circuit 1, 2, 3 (kg, CO_2e)
15. Hermetically sealed system. Applies to refrigerants R410A and R454B (not available for Easy Access)
16. Contains fluorinated greenhouse gases controlled by the Kyoto Protocol.

1.7 Product liability

The unit complies with industry requirements for quiet air handling units with high-efficiency recovery systems for heating and cooling.

CE marking (EU)

The reversible heat pump is CE-marked and meets the applicable requirements according to specified directives and standards in the Declaration of Conformity. The marking covers the unit in the configuration in which it was delivered and provided that it has been assembled and commissioned in accordance with IV Produkt's instructions. The declaration does not cover assemblies that have been modified, components that have subsequently been added or other plants in which the unit may be included. The unit may not be put into service until the plant in which it is included complies with the requirements for CE-marking.

The Declaration Of Conformity can be found in the Order Portal, *"Documentation for your unit:", on page 2*.

Manufacturer
The Air Handling Unit is manufactured by IV Produkt AB, Sjöuddevägen 7, S-350 43 VÄXJÖ, Sweden.

Warranty
For proper function and for the warranty to be valid, the assembly instructions must be followed. The validity of the product warranty is conditional on the system having been commissioned correctly. Working on the reversible heat pump during the warranty period without the approval of IV Produkt shall render the warranty void. Regular maintenance of the reversible heat pump should be performed by a certified refrigeration technician.

Extended warranty
Extended warranty is a supplement to the order and to claim extended warranty (5 years), according to ABM07 with Appendix ABM-V07 or according to NL17 with Appendix VU20, a complete documented and signed IV Produkt Service and Warranty book must be presented.

Disclaimer
Continuous product development may give rise to specification changes without notice.

1.8 Operation and commissioning

Commissioning of the unit must be carried out by competent personnel in accordance with the Commissioning Procedure which is downloadable from IV Produkt's order portal. See *"Documentation for your unit:", on page 2*.

The unit has been designed and manufactured based on given operational cases that must comply with the unit's use for optimal function and a good operating economy. External circumstances should not be changed without checking that such changes are within the unit's intended area of operation.

1.9 Handling of refrigerant

The following information summarises the requirements and guidelines for handling the refrigerant used in reversible heat pumps. For further information, see the F-gas Regulations and the National Refrigerant Handling Regulations.

Leakage control and registration
Leakage control and record keeping must be carried out in accordance with national applicable regulations. For more information, see *"7 Inspect refrigerant circuit", on page 29.*

1.10 Compressor protection

The reversible heat pump is interlocked across the air handling unit. For more information, see *"3.4.1 Compressor and compressor protection", on page 14*.

1.11 Safe shut-off of units

WARNING!
Risk of crushing, compression injury or cuts.
There is no contact guard on moving parts, such as rotating fans, rotary heat exchangers and opening/closing dampers.

- The unit must not be energised until all ducts have been connected.
- When the unit is in operation, inspection hatches must be closed and locked.
- During service or other interventions, the unit must be switched off.
- Make sure the power is off before putting hands in moving parts.
- Inspection hatch for fan: Wait at least 3 minutes after shutting down the unit before opening the hatch.
- Inspection hatch for rotary heat exchanger: Wait at least 3 minutes after shutdown before opening the hatch.
- Inspection hatch for damper: Wait at least 3 minutes after shutdown before opening the hatch.
- Make sure that hands do not get caught in dampers that have a spring return (which can be closed even when not energised).

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WARNING!
Risk of personal injury.
During operation, an overpressure can be created inside the unit.

- Allow the pressure to drop before you open the inspection doors.

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WARNING!
Risk of burns.
The parts, pipes and components of the unit may be hot during and after operation of the unit.

- When the unit is in operation, inspection hatches must be closed and locked.
- During service or other interventions, the unit must be switched off.
- Inspection hatch for cooling unit/reversible heat pump: Wait at least 30 minutes after shutting down the unit before opening the compressor door.
- Inspection hatch for heating coil: Wait at least 5 minutes after shutting down the unit before opening the compressor door.

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1.11.1 Safety switch

The unit must be switched off with a lockable safety switch during servicing.

Turn off the unit
A lockable safety switch is installed by the customer and is not included in the delivery from the manufacturer.

When working on an energised unit, the unit must always be switched off and the safety switch set to position 0. For correct shutdown procedure see*"5.3 Turn off the unit for servicing", on page 20*

1.12 After the product lifetime expiry

For dismantling and decommissioning the air handling unit *"9 DISMANTLING AND DECOMMISSIONING", on page 34*.

2 GENERAL INFORMATION

2.1 Information messages, not safety-related

Symbol together with information text highlights difficulties and also gives tips and recommendations.

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2.2 Documentation and support

The documentation for your unit can be found in the Order Portal. See *"Documentation for your unit:", on page 2*.

It can take up to two weeks for all documentation to be available in the Order Portal. The text "Documentation in progress" appears until the documentation is complete. In case of missing or incorrect documentation, contact DU/Documentation. For other support, please contact the department to which the case relates. See contact details on the last page of the manual.

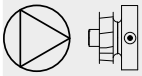
2.3 Terms and abbreviations used in the manual

Term	Explanation
Rotor	Rotary heat exchanger
Unit part	Part of the unit. Can contain a function (for example fan, media etc) but can also be an empty part.

2.4 Spare parts

Spare parts list can be found in the Order Portal. Order spare parts and accessories from IV Produkt. See contact details on the last page of the manual. When contacting, state the order number and unit designation from the nameplate, located on the unit.

2.5 Symbols on dimension drawings and in the manual

	Outdoor air		Extract air
	Supply air		Exhaust air
	Fan		Filter
	Shut-off damper		Trim damper
	Cooling coil water		Heating coil water
	Heating coil electric		Sound attenuator
	Rotary heat exchanger		Cross-flow heat exchanger
	Counter-flow heat exchanger		Compressor
	Media section		Reversible heat pump
			Quick connector

3 DESCRIPTION OF REVERSIBLE HEAT PUMP

3.1 Configuration of the unit

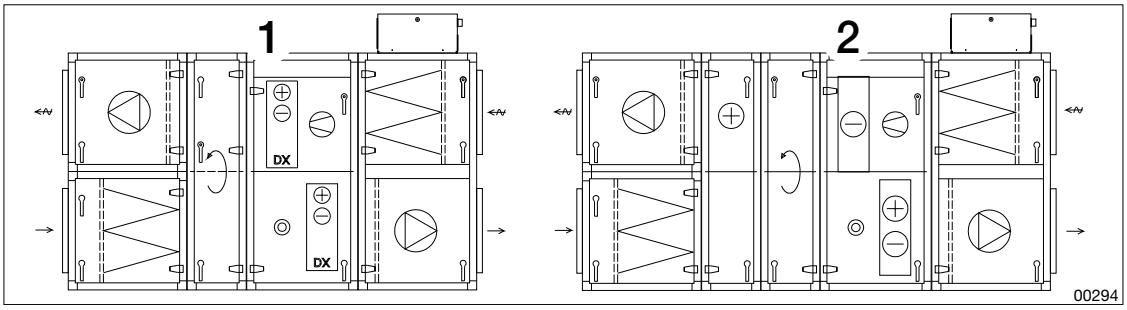


Figure:

1. ThermoCooler HP, standard variant
2. ThermoCooler HP, with extra cooling effect

3.2 Orientation of the unit's sides/parts

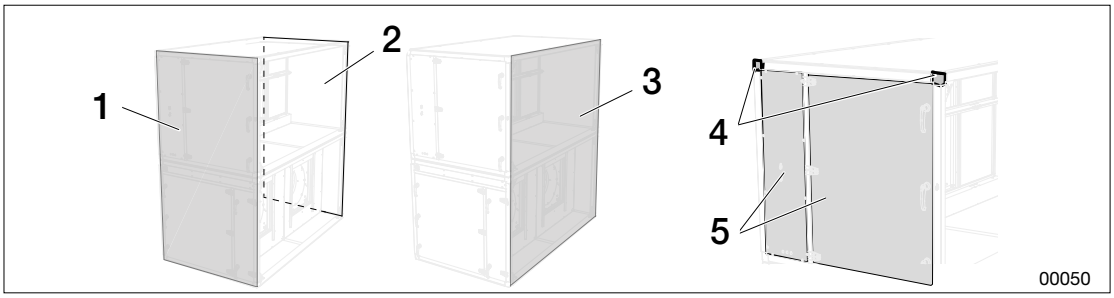


Figure: Parts of the unit

1. Access side
2. Back
3. Gable side
4. Assemble cover detail on joint
5. Covers

3.3 Signs/markings on the unit

All parts are marked with stickers that show what function the part has.


Filter


Rotary heat exchanger


Plate heat exchanger


Fan


Air cooler water


Air heater liquid


Air heater electric


Damper


Sound attenuator


Smoke by-pass


Air turner


Smoke by-pass from above


Media


Empty


Humidifier


Angle


Inspection


Temperature sensors


Earth

3.4 Operation of the reversible heat pump

ThermoCooler HP is a series of integrated, speed controlled reversible heat pumps with step-less cooling and heating power.

3.4.1 Compressor and compressor protection

The reversible heat pump is equipped with a speed-controlled PM scroll compressor. In some sizes, the reversible heat pump is equipped with one or two additional fixed compressors to achieve stepless cooling or heating output.

The reversible heat pump is interlocked over the air handling unit, which means that if any of the fans stop, the reversible heat pump is stopped. It cannot be restarted until the minimum airflow rate is reached. The same applies if a heater is fitted. The interlock and demand signal is sent via Modbus. See *"6 ALARM AND TROUBLESHOOTING", on page 23.*

3.4.2 Cooling mode

The condenser is normally, located in the extract air, but can also be located in the exhaust air.

- Supply air battery = evaporator (cooling coil)
- Extract air battery = condenser (heating coil)

3.4.3 Heating mode

The compressor will only start when the rotary heat exchanger’s energy recovery is insufficient to heat the compressor.

- Extract air battery = evaporator (cooling coil)
- Supply air battery = condenser (heating battery)

3.5 Detector system, refrigerant

The reversible heat pump with refrigerant R454B is equipped as standard with detectors to detect refrigerant leaks. For units with refrigerant R410A, the detector equipment is available as an optional extra.

To guarantee approved dilution in the event of a refrigerant leak, ensure that the air volumes are greater than the unit's specified minimum air flow, both on the supply air side and extract air side (see docs.ivprodukt.com - Technical data).

In the event of a refrigerant leak, the installed detector system ensures that the minimum permissible air flow is always achieved, which dilutes the refrigerant to an approved level.

For leak detection and ventilation to work effectively, the unit must have power and the service switch must remain in the 'Auto' position at all times after installation, except during work/servicing.

If the detector triggers a leak alarm, the unit's fans are started to dilute the refrigerant to an approved level, and an alarm notification is shown on the Climatix display.

Should a detector be non-functional, an alarm is triggered and the air handling unit is kept running until the fault is rectified.

In the event of an alarm, correct the fault and then reset the alarm.

If necessary, call a certified refrigeration service with the necessary knowledge of handling and maintaining equipment with refrigerants.

4 CONNECTION/CONTROL

WARNING!
Risk of life-threatening or serious personal injury.
Electrical voltage can cause electric shock, burns and death. The product must not be energised during assembly.

- Electrical connection and electrical work may only be carried out by a qualified electrician.
- For initial start-up of the unit, see Operation and Maintenance of the unit on IV Produkt's order portal.

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For assembly of the reversible heat pump, see Assembly Instructions for each unit type. For electrical connection, see the wiring instructions for each unit and the current control diagram on IV Produkt's order portal. See *"Documentation for your unit:", on page 2.*

4.1 Electric plate cooling circuit

The circuit board for the unit contains, among other things, main switch, fuses, control unit and, when executed with several circuits, also the control unit for expansion valve.

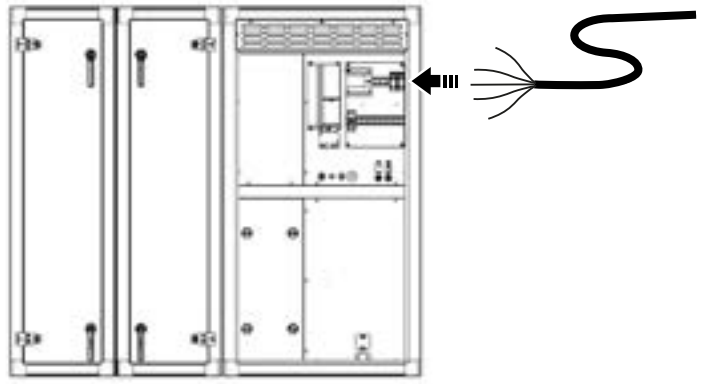
The circuit board is installed inside the unit and is internally prewired and tested at the factory.

4.2 Power supply

A residual current circuit breaker should not be used since the unit has a built-in frequency inverter and an ECLB should not be used.

If an ECLB is used, we recommend a 300 mA, type B ECLB specially adapted for the frequency inverter (intended for a frequency inverter, not personal protection.

The reversible heat pump requires a separate power supply and fuse protection.



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1. Connect the power supply to the main switch of the cooling unit/reversible heat pump.
2. Connect the control signal for cooling or heating operation.

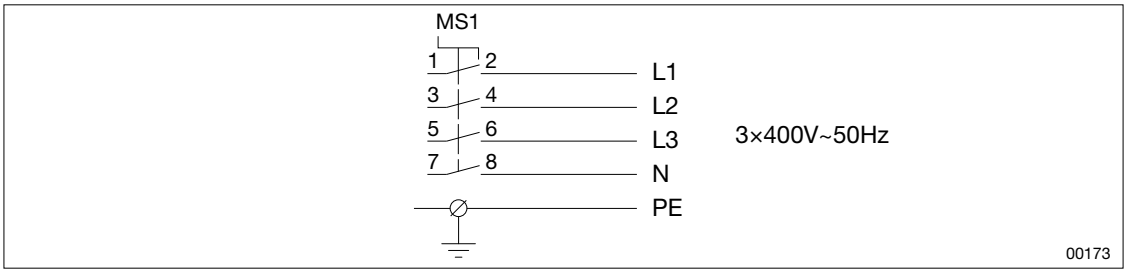


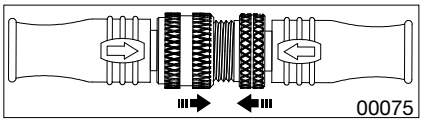
Figure: Schedule for power supply ThermoCooler HP

4.2.1 Connect using quick connectors

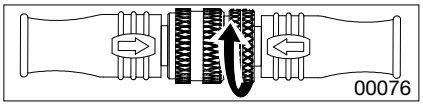
Quick connectors to be joined are marked with the same designation.

Quick connector, signal feed

1. Press together quick connectors according to marking (arrows or other).

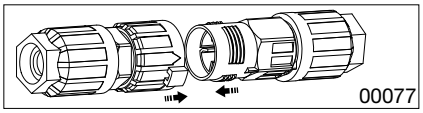


2. Screw together as hard as possible by hand.

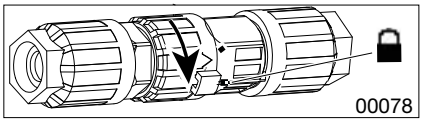


Quick connector, power supply

1. Press together quick connectors according to marking (arrows, dashes or similar).



2. Turn the arrow on the white cuff to the mark for closed (padlock).



4.3 Control using Modbus

The reversible heat pump and control system communicate via Modbus. Carel and Climatix are connected via pre-installed quick connectors.

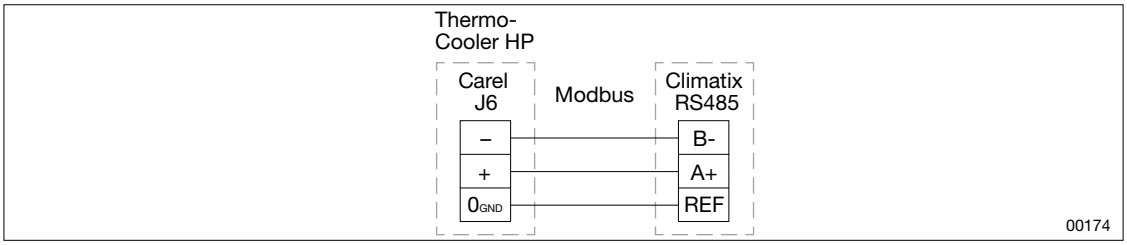


Figure: Schedule connection Carel and Climatix

4.3.1 Factory settings in Climatix

The operational parameters for the reversible heat pump may not be changed unless a check is first made to ascertain that the changes will be within the unit's operating range.

System settings > Configuration > Configuration 1

Parameter	Setting
Heat recovery	Thermal wheel
Heating	TCHP
Electric heater	TCHP
Cooling	TCHP

System settings > Configuration > Configuration 2

Parameter	Setting
Cooling recovery	TCR: Yes, Miscellaneous: No
Support operation	No
Support operation/ Osstp block	None
Freezing monitor	No
Pump heating	No
Pump alarm heating	No

System settings > Configuration > Integration

Parameter	Setting
Type of cooling, Modbus	Carel
No. of compressors	1, 2 or 3
High pressure sensor	Yes
Increased MB communication	Yes

System settings > Configuration > Basic data

Parameter	Setting
Electric battery electrical power	value dependent on output variant

4.4 Connection heater (optional)

If the heater is selected when ordering the reversible heat pump, it is delivered integrated and pre-connected with quick connectors.

The following wiring instructions apply if the heater is retrofitted. All connections are made internally in the reversible heat pump.

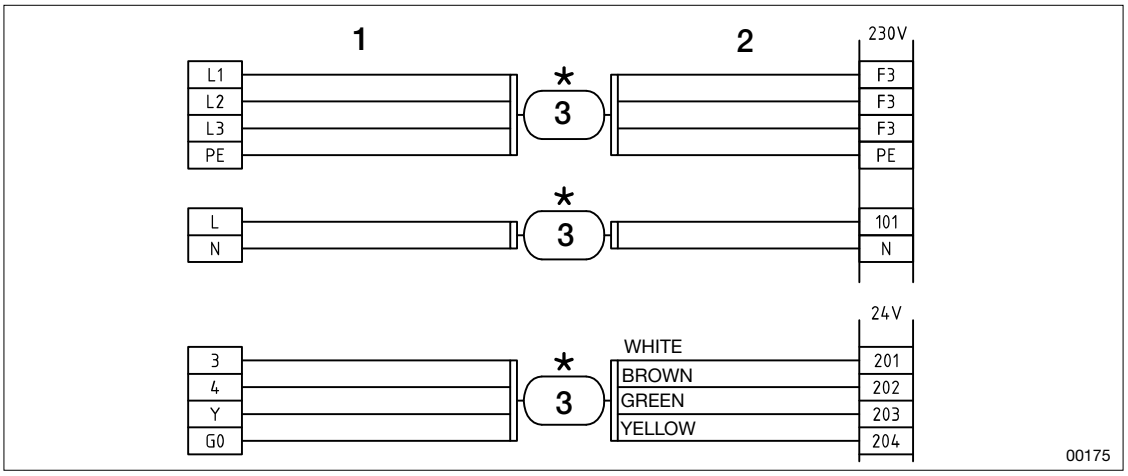


Figure: Connecting when ThermoCooler HP retrofitting

1. Three quick connectors (males)
2. Three quick connectors (females)
3. Quick connectors, connected

5 COMMISSIONING

WARNING!
Risk of life-threatening or serious personal injury.
Electrical voltage can cause electric shock, burns and death. The product must not be energised during assembly.

- Electrical connection and electrical work may only be carried out by a qualified electrician.
- For initial start-up of the unit, see Operation and Maintenance of the unit on IV Produkt's order portal.

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CAUTION!
Risk of damage to compressor.
Circulation of cold oil in the speed-controlled compressor may damage the compressor.

- The reversible heat pump must be powered up for at least 8 hours before it is first started.
- Make sure that no alarm is triggered about 30 seconds after the unit is energised. If an alarm is triggered, follow instructions for the alarm.

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Unit size 600-980 and 1080-1280

- The compressors of the second and third circuits depend on the correct phase sequence. 30 seconds after the unit is energized, the phase sequence is checked. If incorrect phase sequence is detected, alarms are triggered. See *"6 ALARM AND TROUBLESHOOTING", on page 23.*

5.1 Prior to commissioning

For reversible heat pumps with refrigerant R454B:

- Make sure that external dampers communicate with the unit's control equipment so that the air flow through the unit cannot be blocked uncontrollably.

1. See *"1 SAFETY", on page 5*.
2. Plug in power via a lockable safety switch.
3. Connect all channels.
4. Wait at least eight hours before starting the unit starts.

5.2 Start/turn off the unit

Start and shut down operation with service switches in the control equipment.

5.3 Turn off the unit for servicing

1. Start and shut down operation with service switches in the control equipment.
2. Turn the safety switch to the 0 position.
3. Lock the safety switch.

5.4 Operating parameters, cooling

Parameter	Value	Explanation
Regulator	x %	Cooling regulator output signal
Cooling output signal	x %	Cooling load from Climatix to Carel
Heating output signal	x %	Heating load from Climatix to Carel
Status		Status of reversible heat pump
Status HP		Heat pump operation status
Settings	>	Blocking operation settings
DX cooling	Off/step 1	
Alarm	>	The alarm is displayed if there is a fault with the inverter or compressor. In the event of an alarm, see "", on page 14.
Compressor C1	On/Off	Compressor operating mode
Suction gas temp C1	x.x°C	Measured suction gas temp
Evaporation temp C1	x.x°C	Calculated evaporating temp based on low pressure
Low pressure C1	x.x bar	Relative pressure from low pressure sensor
Overheating C1	x.x K	Measured superheating
High pressure C1	x.x bar	Relative pressure from high pressure sensor
Expansion valve 1	x %	Expansion valve position
Condensation temp C1	x.x °C	
Hot gas temperature	x.x °C	Temperature of compressor output
Liquid line temperature	x.x°C	Temperature downstream of condenser
Supercooling	x.x°C	Measured supercooling

5.5 Status information detector system

Status information is read on the Climatix display.

Information	Value/ example	Explanation
Supply air		
Refrigerant leakage	Normal	Leak alarm information
Detector alarm	Normal	Detector alarm information
Concentration LFL	0.0 %	Current measured refrigerant concentration
Temperature chip	22.2 °C	Internal detector temperature
Heater temperature	25.0 °C	Internal detector heater temperature
FW Version	1.0	Detector software version
Sensor ID	54291003	Detector identification number
Extract air		
Refrigerant leakage	Normal	Leak alarm information
Detector alarm	Normal	Detector alarm information
Concentration LFL	0.0 %	Current measured refrigerant concentration
Temperature chip	23.5 °C	Internal detector temperature
Heater temperature	25.0 °C	Internal detector heater temperature
FW Version	1.0	Detector software version
Sensor ID	54291211	Detector identification number
Calibrate detector		Function to calibrate or test the detector
Calibration status supply air	OK	Calibration information
Calibration status extract air	OK	Calibration information

6 ALARM AND TROUBLESHOOTING

The operating parameters of the reversible heat pump may not be changed so that they are outside the operating range of the unit. If faults occur, alarms are triggered and:

- the compressor is stopped.
- a red light flashes on the Climatix display and on the Carel unit.

Call for authorized cooling service if the same alarm is repeated after action taken.

6.1 Alarm reset

1. Check what the alarm means.
2. Fix as described.
3. Press and hold the Carel display button (*Alarm reset)* for about three seconds.

6.2 Alarm Climatix

Leakage control and part replacement in the cooling circuit must be carried out by a certified refrigeration technician. See "*1.9 Handling of refrigerant", on page 9* and "*7 Inspect refrigerant circuit", on page 29*.

Alarm code	Possible cause	Corrective action
Compr. No. of alarms	No. of alarms	See alarms in Carel table
C1 H. pressure switch	1. Pressure switch triggered. 2. Alarm from frequency inverter.	1. Check the high pressure switch by pressing the red button. 2. Reset the frequency inverter by turning off the 3-phase supply (wait 60 seconds) and turning on the 3-phase supply again.
C1 EEV motor fault	Fault on electrical connection to the expansion valve.	Ensure the correct electrical connection to the expansion valve.
C1 low pressure sensor	Open circuit or short circuit to low pressure sensor.	Ensure that: • EVD and transducer are functional • there is no breakage of cables.
C1 suction gas sensor	Open circuit or short circuit to suction gas sensor.	Ensure that: • EVD and sensor are functional • there is no breakage of cables.
C1 high pressure sensor	Open circuit or short circuit to high pressure sensor.	Ensure that: • EVD and sensor are functional • there is no breakage of cables.

Alarm code	Possible cause	Corrective action
C1 low overheating	Compressor stoppage caused by low overheating.	• Reset the alarm so that the compressor can start again. • During compressor operation, ensure that the expansion valve regulates the overheating to its set point.
C1 LOP	Compressor stoppage caused by low evaporation temperature.	• Reset the alarm. • In case of recurring faults, contact authorized service personnel.
C1 MOP	Compressor stoppage caused by high evaporation temperature.	• Reset the alarm so that the compressor can start again. • During compressor operation, ensure that the expansion valve regulates the overheating to its set point.
Alarm C2 communication EVD	Communication error to EVD 2 (expansion of valve control).	Ensure that there is no breakage of cables to EVD.
C3 communication EVD	Communication error to EVD 3 (expansion valve control).	Ensure that there is no breakage of cables to EVD.
C1 low suction gas temp	Low suction gas temperature.	• Reset the alarm. • In case of recurring faults, contact authorized service personnel.
Offline cpcoe1	No communication between Carel c.pco and Carel c.pcoe.	Ensure that: • c.pcoe energised communication cable is connected both in Carel c.pco and Carel c.pcoe.
C1 Exhaust air battery pressure sensor failure	Interruption or short circuit to pressure sensor for exhaust air battery.	Ensure that: • c.pcoe and sensor are functional • there is no breakage of cables.
C1 Exhaust air battery pressure sensor failure	Interruption or short circuit to pressure sensor for exhaust air battery.	Ensure that: • c.pcoe and sensor are functional • there is no breakage of cables.
C1 Expansion line temp sensor fault	Interruption or short circuit to temperature sensor for expansion line.	Ensure that: • c.pcoe and sensor are functional • there is no breakage of cables.

Alarm code	Possible cause	Corrective action
C1 RCP1 Heat Pmp-DwnTmOut	The compressor has been pumping refrigerant to the condenser for longer than 240 seconds.	Ensure that: • the neutral conductor is connected. • the compressor rotates and builds a rise in pressure. • closed valves are tight.
C1 ECP1 Heat Pmp-DwnTmOut	The compressor has been pumping refrigerant to the condenser for longer than 240 seconds.	Ensure that: • the neutral conductor is connected. • the compressor rotates and builds a rise in pressure. • closed valves are tight.
C1 RCP1 Cooling Pmp-DwnTmOut	The compressor has been pumping refrigerant to the condenser for longer than 240 seconds.	Ensure that: • the neutral conductor is connected. • the compressor rotates and builds a rise in pressure. • closed valves are tight.
Refrigerant leakage, supply air	Refrigerant has been detected at the reversible heat pump's supply air coil.	The unit's fans will automatically start provided that the 'Service Switch' is in the 'Auto' position.
Refrigerant leakage, extract air	Refrigerant has been detected at the reversible heat pump's extract air coil.	The unit's fans will automatically start provided that the 'Service Switch' is in the 'Auto' position.
Detector alarm, supply air, Busoffl	No communication with detector.	Inspect/replace detector.
Detector alarm, extract air, Busoffl	No communication with detector.	Inspect/replace detector.

6.3 Alarm Carel

Leakage control and part replacement in the cooling circuit must be carried out by a certified refrigeration technician. See *"1.9 Handling of refrigerant", on page 9* and *"7 Inspect refrigerant circuit", on page 29*.

Alarm code	Possible cause	Corrective action
"AL 59 Compr 1, Low Cond Temp"	Condensation temperature too low due to: • return air temperature too low. • return air flow too low. • distorted flows.	Ensure that: • the exhaust air is at the right temperature. • the air flows are correct.
76 Drive MainsPhase-Loss	The incoming phase to the frequency inverter is missing.	Check that all three phases are connected to the frequency inverter.

Alarm code	Possible cause	Corrective action
81 Drive U_phaseLoss	There is no phase between the frequency inverter and the compressor.	Check that all three phases are connected to the frequency inverter.
82 Drive V_phaseLoss	There is no phase between the frequency inverter and the compressor.	Check that all three phases are connected to the frequency inverter.
83 Drive W_phaseLoss	There is no phase between the frequency inverter and the compressor.	Check that all three phases are connected to the frequency inverter.
94 Drive offline	No communication with the frequency inverter.	Check that the frequency inverter is energised with 3-phase 400V.
94 Drive offline	Supply voltage missing.	Connect supply voltage (3x400V).
118 Compr 1, Low evaporation pressure	Low evaporation temperature or low pressure in circuit 1.	Ensure that there is no leakage in the cooling circuit.
120 Compr 1, Low pressure diff."	No pressure difference between the high-pressure and low-pressure side	Contact service technicians.
121 Compr 1, High pressure switch	Circuit 1, high pressure switch tripped.	Ensure that the airflow is correct and that fire dampers are working
172 Compr 2, Motor protector	• Circuit 2, motor protector alarm • There is no phase between the frequency inverter and the compressor.	Check that all three phases are connected to the frequency inverter.
173 Compr 3, Motor protector	• Circuit 3, motor protector alarm • There is no phase between the frequency inverter and the compressor.	Check that all three phases are connected to the frequency inverter.
174 Compr 2, High pressure switch	Circuit 2, high pressure switch tripped.	Ensure that the airflow is correct and that fire dampers are working
175 Compr 3, High pressure switch	Circuit 3, high pressure switch tripped.	Ensure that the airflow is correct and that fire dampers are working
176 Compr 2, LowEvapPressure	Low evaporation temperature or low pressure in circuit 2.	Ensure that there is no leakage in the cooling circuit.
177 Compr 3, LowEvapPressure	Low evaporation temperature or low pressure in circuit 3.	Ensure that there is no leakage in the cooling circuit.
180 Compr 1, High pressure switch	Circuit 1, high pressure switch tripped.	Ensure that: • the air flow is correct. • fire dampers work.
183 Exhaust Air_ C1_4wayRevValve	Four-way valve in wrong position	Contact service technicians.

Alarm code	Possible cause	Corrective action
189 Phase rotation order	Incorrect phase sequence for supply voltage on compressor 2	Shut off voltage and switch two of the incoming phases
190 Exhaust Air LowEvapFrost-Protec	The evaporator is at risk of freezing due to: • return air temperature too low. • return air flow too low. • distorted flows.	Ensure that: • the exhaust air is at the right temperature. • the air flows are correct.
228 Offline c.pcoe I/O	No communication between Carel c.pco and Carel c.pcoe.	Ensure that: • C.PCOE is energised • c.pcoe energised communication cable is connected both in Carel c.pco and Carel c.pcoe.
233 AI C1 PumpDownHtgRetTimeOut	The compressor has been pumping refrigerant to the condenser for longer than 240 seconds.	Check that: • the neutral conductor is connected. • the compressor rotates and builds a rise in pressure. • closed valves are tight.
234 AI C1 PumpDownHtgExhTimeOut	The compressor has been pumping refrigerant to the condenser for longer than 240 seconds.	Check that: • the neutral conductor is connected. • the compressor rotates and builds a rise in pressure. • closed valves are tight.
235 AI C1 PumpDownClgRetTimeOut	The compressor has been pumping refrigerant to the condenser for longer than 240 seconds.	Check that: • the neutral conductor is connected. • the compressor rotates and builds a rise in pressure. • closed valves are tight.
255 AI TCR C1 SensorReturnAirCoilPressure	Interruption or short circuit to pressure sensor for exhaust air battery.	Ensure that: • c.pcoe and sensor are functional • there is no breakage of cables.
256 AI TCR C1 SensorExhaustAirCoilPressure	Interruption or short circuit to pressure sensor for exhaust air battery.	Ensure that: • c.pcoe and sensor are functional • there is no breakage of cables.
257 AI TCR C1 SensorReturnAirCoilPressure	Interruption or short circuit to temperature sensor for expansion line.	Ensure that: • c.pcoe and sensor are functional • there is no breakage of cables.

6.4 Troubleshooting

Leakage control and part replacement in the cooling circuit must be carried out by a certified refrigeration technician. See "*1.9 Handling of refrigerant*", *on page 9* and "*7 Inspect refrigerant circuit*", *on page 29*.

Event/alarm code	Possible cause	Corrective action
The high pressure switch has tripped	• No or too low air flow across the condenser • The high pressure switch is defective	1. Ensure that the airflow over the condenser is correct. 2. If the airflow is not correct, reset the pressure switch manually. 3. If the above steps do not fix the error, replace the high-pressure pressure switch.
Is the LED flashing red on the frequency inverter?	• Phase/voltage drop. • Overload. • The compressor is defective.	1. Ensure the correct incoming voltage on the 3-phase. 2. If the incoming voltage is faulty, break the voltage one minute to reset the frequency inverter. 3. Check that the compressor is running without dissonance.
Low cooling power - too high temperature in the cooled object	1. The power supply has been interrupted 2. Separate supply not connected 3. None or too low air flow across evaporator 4. Control equipment incorrectly adjusted or defective	1. Ensure that actuators/work switches or fuses have not tripped 2. Connect supply 3. Check that nothing is inhibiting the air flow. 4. Adjust the settings or replace the equipment
Compressor is not operating	1. The power supply has been interrupted. 2. Incorrect phase sequence (compressor 2) 3. Compressor has opened a safety circuit. 4. Defective compressor	1. Ensure that actuators/work switches or fuses have not tripped 2. Switch two of the incoming phases 3. Reset the compressor 4. Replace compressor
Frost on the evaporator (heating loss)	1. Expansion valve is defective 2. Insufficient refrigerant volume 3. Low extract air flow	1. Expansion valve 1 2. Ensure that there is no leakage in the cooling circuit. Top up with refrigerant. 3. Adjust the flow

7 Inspect refrigerant circuit

7.1 Checks/record keeping, according to the European F-gas Regulation

Leakage control must be carried out by a certified refrigeration technician. See "1.9 Handling of refrigerant", on page 9.

Different countries may have different regulations regarding leakage control and record keeping. See also "7.3 Country-specific requirements and laws", on page 30.

		Leakage control		Register administration
Size	Refrigerant	Assembly leak detection	Every 12 months	In case of control/intervention
100	R410A	Yes [1]	-	-
	R454B	-	-	-
150	R410A	Yes [1]	-	-
	R454B	-	-	-
190	R410A	Yes	Yes	Yes
	R454B	-	-	-
240	R410A	Yes	Yes	Yes
	R454B	-	-	-
300	R410A	Yes	Yes	Yes
	R454B	-	-	-
360	R410A	Yes	Yes	Yes
	R454B	-	-	-
400	R410A	Yes	Yes	Yes
	R454B	-	-	-
480	R410A	Yes	Yes	Yes
	R454B	Yes [1]	-	-
600	R410A	Yes	Yes	Yes
	R454B	-	-	-
740	R410A	Yes	Yes	Yes
	R454B	Yes [1]	-	-

		Leakage control		Register administration
Size	Refrigerant	Assembly leak detection	Every 12 months	In case of control/intervention
850	R410A	Yes	Yes	Yes
	R454B	Yes [1]	-	-
980	R410A	Yes	Yes	Yes
	R454B	Yes [1]	-	-
1080	R410A	Yes	Yes	Yes
	R454B	-	-	-
1280	R410A	Yes	Yes	Yes
	R454B	Yes [1]		

[1] Applicable in Sweden.

7.1.1 Registry administration of events/inspections

The operator must record events, such as the volume and type of refrigerant topped up, refrigerant taken into possession, results of inspections and work done, persons and companies who carried out service and maintenance.

7.2 Use and inspection of pressurised equipment

Inspection must be carried out in accordance with the applicable national legislation.

7.3 Country-specific requirements and laws

Unless otherwise specified in this manual, comply with national legal requirements regarding leakage control and registry administration according the country in question.

7.3.1 Sweden

All sizes
Assembly leak detection shall always be performed during installation/commissioning of units.

7.3.2 Size 240-1080

The operator must always notify the installation to the supervisory authority. This should be done well in advance of installation.

A control report shall reach the supervisory authority by 31 March of the following year at the latest. If there are several machines at a facility subject to periodic leak detection requirements, their CO_2e values are to be added together. If the total amount is more than 14 CO_2e (tonnes), an inspection report shall be submitted.

7.4 Detector system, refrigerant

For a description of the function of the Detector System, see *"3.5 Detector system, refrigerant", on page 15*.

8 CARE AND MAINTENANCE

8.1 Check function

Check that the reversible heat pump in the air handing unit is operating as it should by temporarily lowering/increasing the temperature setting (setpoint).

8.2 Maintenance and service

WARNING!

Risk of life-threatening or serious personal injury.

Electrical voltage can cause electric shock, burns and death. The product must not be energised during assembly.

- Electrical connection and electrical work may only be carried out by a qualified electrician.
- For initial start-up of the unit, see Operation and Maintenance of the unit on IV Produkt's order portal.

00176

WARNING!

Risk of fire in the event of a refrigerant leak.

A2L refrigerants are mildly flammable and can ignite in the event of a leak.

- If external damage to the cooling circuit has led to a refrigerant leak:
  - Evacuate the ventilation room
  - Ensure good ventilation
  - Call in certified refrigeration technician.
- Service of cooling units/reversible heat pumps may only be carried out by a certified refrigeration technician. When working on/servicing the unit:
  - Shut down the unit at the service switch in the control equipment, then turn the safety switch to the 0 position and lock. Note that there may be different safety switches for the different parts of the unit. All safety switches must be switched off and locked before repairs/service.
- Due to the risk of sparks, safety switches must not be used if there is a suspected refrigerant leak.
- When detector system installed:
  - Make sure the detector system is functioning.
  - Make sure that external dampers in the ductwork do not block the unit’s air flow, such as through uncontrolled closing.

00352

WARNING!

Risk of burns.

The parts, pipes and components of the unit may be hot during and after operation of the unit.

- When the unit is in operation, inspection hatches must be closed and locked.
- During service or other interventions, the unit must be switched off.
- Inspection hatch for cooling unit/reversible heat pump: Wait at least 30 minutes after shutting down the unit before opening the compressor door.
- Inspection hatch for heating coil: Wait at least 5 minutes after shutting down the unit before opening the compressor door.

00184

WARNING!

Risk of crushing, compression injury or cuts.

There is no contact guard on moving parts, such as rotating fans, rotary heat exchangers and opening/closing dampers.

- The unit must not be energised until all ducts have been connected.
- When the unit is in operation, inspection hatches must be closed and locked.
- During service or other interventions, the unit must be switched off.
- Make sure the power is off before putting hands in moving parts.
- Inspection hatch for fan: Wait at least 3 minutes after shutting down the unit before opening the hatch.
- Inspection hatch for rotary heat exchanger: Wait at least 3 minutes after shutdown before opening the hatch.
- Inspection hatch for damper: Wait at least 3 minutes after shutdown before opening the hatch.
- Make sure that hands do not get caught in dampers that have a spring return (which can be closed even when not energised).

00185

WARNING!

Risk of personal injury.

During operation, an overpressure can be created inside the unit.

- Allow the pressure to drop before you open the inspection doors.

00187

CAUTION!

Risk of damage to the product.

Corrosive substances and strong cleaning agents can damage the surface layer.

- Never use strong cleaning agents or corrosive substances when cleaning the unit.

00183

8.3 Maintenance

Before maintenance and service, the unit must be turned off, see *"5.2 Start/turn off the unit", on page 20.*

For more information on cleaning batteries, see separate instruction "Cooling coil, cleaning" in the Order Portal.

Area	Inspection	Corrective action
Laminae on condenser/evaporator	Check visually and make sure that they have not been subjected to mechanical impact or that they are chipped or folded at the edges.	Comb the slats with a lamella comb. If damage remains, contact service.
Laminae on condenser/evaporator	Check visually and make sure they are clean.	If they are dirty, clean by vacuuming from the inlet side or by gently blowing from the outlet side. In the event of heavier fouling, you can clean them with warm water mixed with dishwashing detergent that does not corrode aluminium.
The internal surfaces of the unit	Check visually and make sure they are clean.	If necessary, clean with a cloth or mop and non-corrosive detergent.
The drip tray and drain with water trap	Water trap without non-return valve: Visually inspect and ensure that the water trap is filled with water. Water trap with non-return valve: Inspect and ensure that the non-return valve closes tightly.	Top up with water if it is missing. Clean or replace the water trap.

For service schedule, see separate manual, Envistar Flex Operation and Maintenance. Before ordering warranty service, follow the instructions in *"6 ALARM AND TROUBLESHOOTING", on page 23*.

8.3.1 Refrigerant detectors

The detectors are self-calibrating and do not require set-up or maintenance. For a description of the function of the Detector System, see *"3.5 Detector system, refrigerant", on page 15*.

9 DISMANTLING AND DECOMMISSIONING

WARNING!
Risk of cutting.
Sharp edges can cause cuts.
- Use appropriate personal protective equipment when the work requires it.

00181

WARNING!
Risk of serious personal injury.
Contact with refrigerants can cause frostbite to the skin.
- Refrigerants and parts containing refrigerants may only be handled by persons with certificates in accordance with current EU regulations for refrigerants.
- Use appropriate protective equipment.

00331

EXERCISE CAUTION!
Risk of personal injury.
Contact with the oil can cause skin irritations.
- Draining oil in the compressors should only be carried out by certified persons in accordance with current EU regulations for refrigerants.
- Use appropriate protective equipment.
- Wash hands and other body parts that have been in contact with the oil.

00330

9.1 Dismantling the unit

Sorting and recycling must take place in an environmentally safe manner according to current regulations in the country where the product is being phased out.

1. Turn off all electricity and make sure that the unit is fully deenergised. See "*1.11 Safe shut-off of units*", *on page 10.*
2. Removing the refrigerant.
3. Drain the oil from the reversible heat pump’s compressors.
4. Remove covers, electrical components and filters.
5. Knock apart profiles and joins.
6. Split the covers and remove internal insulation.
7. Sort and recycle.

9.2 Material content

For more specific information for reuse and recycling regarding each unique unit, contact IV Produkt. Up to 90% of the material in the unit can be recycled.

WARNING!
Risk of inhalation of harmful particles.
When replacing filters, particles such as dust and the like can detach from used filters.

- Use a breathing mask when changing filters.
- Be careful when handling used filters.

00295

Component/part	Material	Notes
Covers	Finishes: ALC sheeting (Steel, Aluminium, Zinc) Inside: Insulation (fibre-glass wool)	Standard internal insulation may be replaced by other insulation. See the unit's documentation.
Ingredients in rotor adhesives, gaskets and mouldings	Polyamide, Polypropyl-ene, Polyurethane	Polymera material.
Moldings, damping, etc	Rubber	
Joints	Plastics, aluminium	
Electricity, electronic components, cables, connectors, etc	Metal, plastic, etc	
Filter	Filter bags: Fiberglass, synthetic materials	Used disposable filters shall be sort-ed and disposed of as combustible waste. Used filters can contain high levels of contaminants and should be handled carefully to prevent dust and dust from coming loose and spreading into the inhaled air. Wear a breathing mask when dismantling filters.
Surfaces	Some surfaces may be specially treated	Contact IV Produkt for more informa-tion.

You are welcome to contact us

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