



Cooling unit

EcoCooler

Operation and Maintenance Instructions



ACU – EcoCooler



ACR – EcoCooler with cooling recovery

Order no :

Object :

Original instructions



Air handling with the focus on LCC

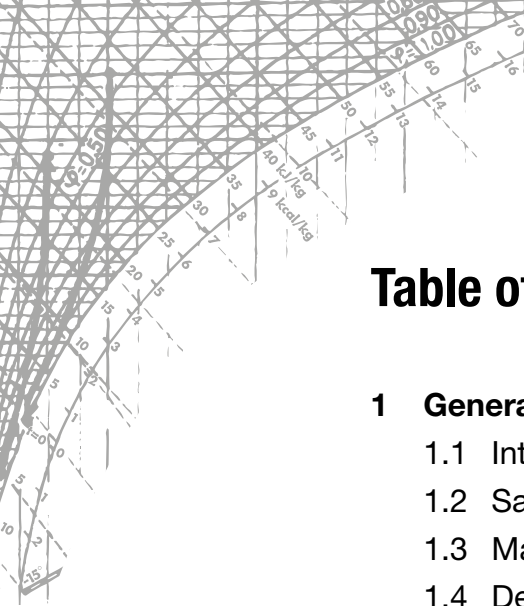


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Air handling with the focus on LCC

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Air handling with the focus on LCC

1 General

1.1 Intended use

The EcoCooler ACU and EcoCooler ACR cooling units are designed for cooling supply air in buildings (comfort cooling). The EcoCooler ACR cooling unit also has a function for recovering cooling from the extract air from the air handling unit.

The cooling unit is designed to be installed together with IV Produkt AB air handling units. The cooling unit should not be used as a standalone unit.

1.2 Safety precautions

Safety precautions for cooling units installed together with ventilation units can be found in the **Operation and Maintenance Instructions** and the **Assembly Instructions** for the relevant range of units.

1.3 Manufacturer

The cooling units are made by:

IV Produkt AB
 Sjöuddevägen 7
 SE-350 43 VÄXJÖ

1.4 Designations

The details of the cooling unit can be found on the model identification label placed on the front cover.

Cooling unit	
Order number	7xxx-xxxx
Code Key	ACU-300-AA-1V-0-40-U-H
Model	FLEXOMIX
Name of project	LA1
Date of manufacture	2014-05-03
PS Max allowable press.	26,0 bar (e)
PT Test pressure	37,2 bar (e)
TS Temperature range	(-50)-(+60) °C
Protection level - low	0,3 bar (e)
Protection level - high	26 bar (e)
Nominal cooling power	0409 kW
Refrigerant, Fluid group	R407C / II
Code	0
Refrigerant charge	Circuit 1 8,1 kg
	Circuit 2 - kg
	Circuit 3 - kg
Contains fluorinated greenhouse gases covered by the Kyoto Protocol.	
IV Produkt AB VÄXJÖ, SWEDEN <small>Art. Nr. 19121-0008_04</small>	

Typical model identification label

1.5 CE marking and EU Declaration of Conformity

The cooling units are CE marked, which means that upon delivery, they conform to applicable provisions in EU Machinery Directive 2006/42/EC as well as to the EU Directives applicable to the type of unit. As certification confirming that the requirements have been met, we provide an EU Declaration of Conformity, which is available at www.ivprodukt.se.

The CE marking applies to units that IV Produkt AB manufactures and supplies with control equipment mounted on the unit casing.

1.6 Maintenance

Regular maintenance of cooling units should be performed by a qualified cooling engineer.

1.7 Handling of refrigerant

The following information summarises the requirements and guidelines for handling the refrigerant used in cooling units. For further information, see the F-gas Regulations and the Refrigerant Regulations KMF. The purpose of the regulations is to contribute to achieving EU goals for reduced climate impact in accordance with the Kyoto Protocol.

Operator responsibilities

Generally speaking, the cooling unit operator must:

- Minimise and prevent leakage
- Take corrective action to remedy any leakage that arises
- Ensure that the service and repair of the refrigerant circuit is carried out by a certified refrigeration technician
- Ensure that refrigerant is handled in an environmentally secure manner and in accordance with national regulations.

By operator, we refer to the European Parliament's definition: "...the natural or legal person exercising actual power over the technical functioning of the equipment and systems...".

Leakage inspection and registration

The following applies to one-piece units with 3 kg refrigerant content or more per circuit:

- **Leakage inspections** must be carried out by a certified refrigeration technician:
 - On installation/commissioning
 - Periodically at least once every 12 months, i.e. there can be no more than 12 months between inspections
 - Within one month after any work is performed (e.g. sealing a leak, replacing a component).
- 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, person and company who carried out service and maintenance.

If the total refrigerant content of the ventilation system exceeds 10 kg, the result of the inspections (inspection report) must be sent to the regulatory authorities and be in their possession no later than 31 March of the following year.

1.8 Extended warranty

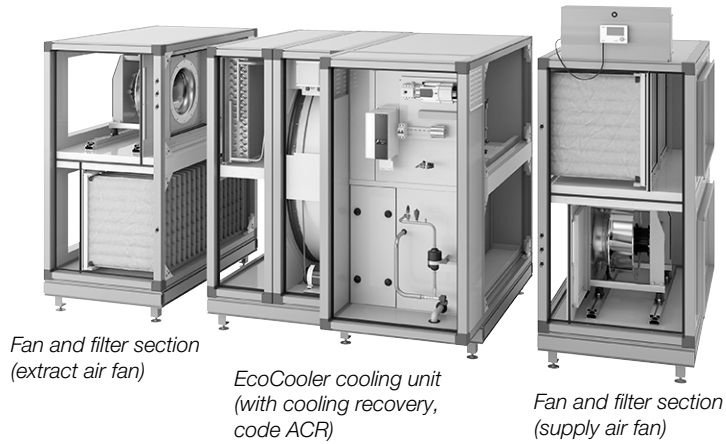
In cases in which the equipment delivered falls under a 5-year warranty, in accordance with ABM 07 with supplement ABM-V 07 or in accordance with NL 01 with supplement VU03, the IV Produkt Service and Warranty Manual is supplied with the product. In order to lay claim to an extended warranty, a complete, documented and signed IV Produkt Service and Warranty Manual must be presented.

1.9 Spare parts

Spare parts and accessories for this unit are ordered from your nearest IV Produkt sales representative. Always specify the product code when ordering. The code is stamped on a separate data label, affixed to each component. A separate spare parts list is supplied with the unit.

2 Technical description

2.1 Cooling unit, EcoCooler



EcoCooler is a range of integrated speed controlled cooling units with stepless cooling power. The cooling units are designed for cooling supply air in buildings (comfort cooling).

EcoCooler is designed to be installed together with IV Produkt AB air handling units. The cooling unit should not be used as a standalone unit.

Two different versions of EcoCooler are available:

- ACU, without cooling recovery (no rotor)
- ACR, with cooling recovery (with rotor). Cooling recovery means that the heat exchanger (rotary heat exchanger) starts up when the extract air/room temperature drops below the outdoor temperature and there is a cooling load.

Cooling circuit function

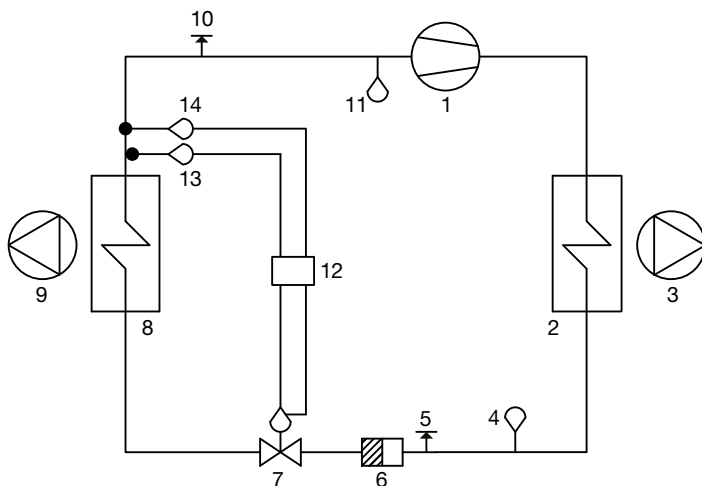
Most cooling units operate according to the same principle. The cooling unit moves the heat in the air from a location where the heat is unwanted or unneeded, to another location where the heat can be emitted.

From the compressor (position 1) the refrigerant is pressed as hot gas to the condenser (position 2) where heat is emitted. The refrigerant condenses from gas to liquid when it is cooled by the extract air.

The refrigerant passes the pressure reducing expansion valve (position 7) and undergoes a phase transformation in the evaporator (position 8) from liquid to gas (the refrigerant evaporates).

Inside the evaporator (position 8), the refrigerant absorbs the heat required for phase transformation. The heat is taken from the supply air which is thus cooled.

The cold refrigerant in gaseous form is drawn back into the compressor (position 1) where it is compressed and thus heated. The gas is also used for cooling the compressor's electric motor. The refrigerant now contains both the heat from the supply air, the compressor's motor heat and the compression heat.



- 1 Compressor
- 2 Condenser
- 3 Extract air fan
- 4 High pressure switch
- 5 Measurement tapping, high pressure
- 6 Drying filter
- 7 Expansion valve
- 8 Evaporator
- 9 Supply air fan
- 10 Measurement tapping, low pressure
- 11 Low pressure switch
- 12 Controller
- 13 Temperature sensor after evaporator
- 14 Pressure sensor

Flow chart for EcoCooler refrigerant systems (for refrigerant volume, see the type label on the unit)

Compressor

The EcoCooler is fitted with a speed-controlled compressor. Depending on the size, the EcoCooler can also be fitted with 1-3 step switch controlled compressors.

When cooling is required, the frequency inverter increases the speed of the compressor. When there is more than one compressor, they are activated in fixed steps while the speed-controlled compressor is activated between steps. The function is reversed where less cooling is needed.

Compressor protection

In the event of an alarm initiated by the control equipment or the safety circuit, the compressor stops and an alarm indication is given. If the unit is equipped with integrated control equipment, the alarm can be read on the Climatix display.

In the event of an alarm, correct the fault and then reset the alarm. If the safety circuit alarm trips repeatedly, an authorised refrigeration service company must be called in.

The safety circuit consists of a low pressure control and a high pressure switch with a manual reset button. The safety circuit can trip for two different faults:

- High pressure in the system, HP (manual reset on the pressure switch)
- Low pressure in the system, LP (resets itself automatically)

Cooling function

For internal control (MX), the cooling unit is interlocked across the ventilation unit. If any of the fans stop, the cooling unit will also stop. The interlock and demand signal is sent via Modbus.

For external control (US, UC and MK), the interlock signal must be sent via a potential-free relay. The demand signal must be sent via 0–10 V.

Circuit board

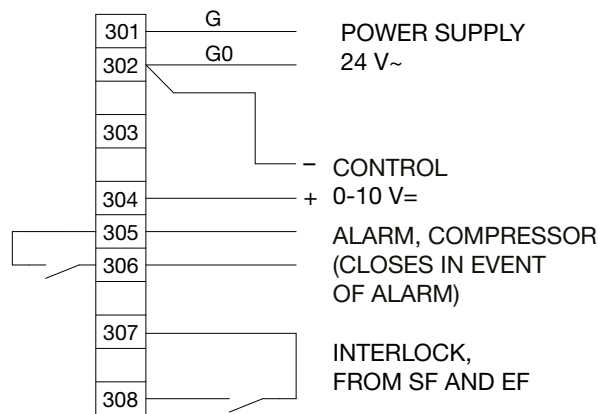
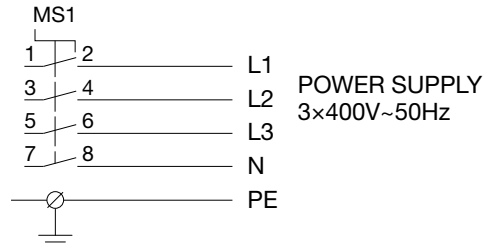
The circuit board for the cooling unit contains the following:

- Main switch
- Fuse
- Control unit
- Control unit for expansion valve

The circuit board is mounted inside the unit and has been internally prewired and tested at the factory.

3 Wiring instructions and fuse protection

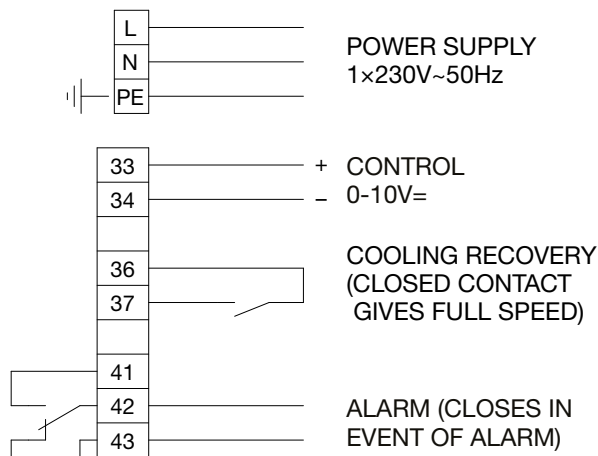
3.1 Electrical connections, ACU and ACR cooling units



EcoCooler cooling unit

For recommended fuse protection, see Section 7 Technical data.

3.2 Electrical connections, rotary heat exchanger to ACR



For recommended fuse protection, see Section 7 Technical data.

4 Operation

4.1 Commissioning rules

Commissioning may only be carried out by skilled personnel and according to the following check list and commissioning record (supplied with the cooling unit).

A copy of the commissioning record, after being signed by the person who commissioned the unit, must also be signed by the seller before it is sent to the IV Produkt Ordering Department.

The validity of the product warranty is conditional on the system having been correctly commissioned. No modifications to the cooling unit may be made during the warranty period without the approval of IV Produkt.

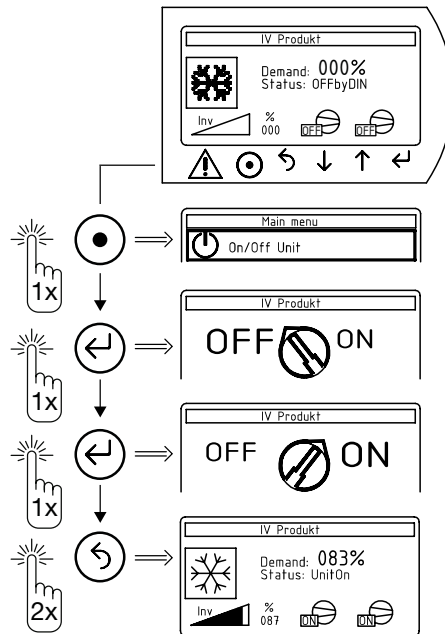
Follow the troubleshooting instructions in the troubleshooting chart before contacting a service representative for servicing a unit under warranty. This will prevent any unnecessary service calls.

4.2 Check list for commissioning cooling unit

The cooling unit must not be put into operation until all the items in the check list have been checked off.

1. Visually inspect the cooling unit for damage after transport and assembly.
2. Check that the cooling unit is correctly positioned and that the open space in front of the unit for servicing is sufficient (1.5 x depth of the unit, min. 1200 mm). For more information, see the separate assembly instructions for each unit series.
3. Check that the transport safety devices have been removed.
4. Check that the drain connection (evaporation water drainage) is connected to a floor drain via a water trap. Check that the drainage pipe slopes correctly to the drain. For more information, see the separate assembly instructions for each unit series.
5. Check that the incoming supply voltage, zero and earth are connected (see Section 3).
6. Check that the incoming control cabling is connected to the correct terminals (see Section 3).
7. Check that the automatic circuit breakers are set to the ON position and switch on the voltage.
8. It is important that the oil is warm inside the speed controlled compressor crankcase before starting the cooling unit. The crankcase heating must be switched on long enough before the unit begins operating so that the oil maintains a temperature of at least 30°C. The maximum warm-up time is approximately 2–3 hours. The temperature can be measured externally at the bottom of the compressor.
9. Start the air handling unit (supply and extract air fans).

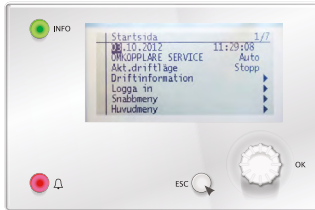
10. Check that there are supply and extract air flows and that they have been adjusted and recorded.
11. Test all control functions according to the air handling unit's functional description.
12. Start the cooling unit via the control unit according to the following menu sequence:



13. Check that the start and cooling signal is shown on the display. Status should indicate "UnitOn" and Demand: must show a percentage value
14. Connect the manometer rack for type R407C refrigerant to the service output and bleed the tubes. Check the low and high pressure readings for the pressure switches and the condensation and evaporation temperatures. Enter the readings in the commissioning record.
15. Allow the unit to operate until it stops according to the desired control function for the air handling unit.
16. Make sure that an inspection to detect leakage is carried out and that an inspection report is drawn up, see "1.7 Handling of refrigerant" on page 3.

4.3 Cooling status

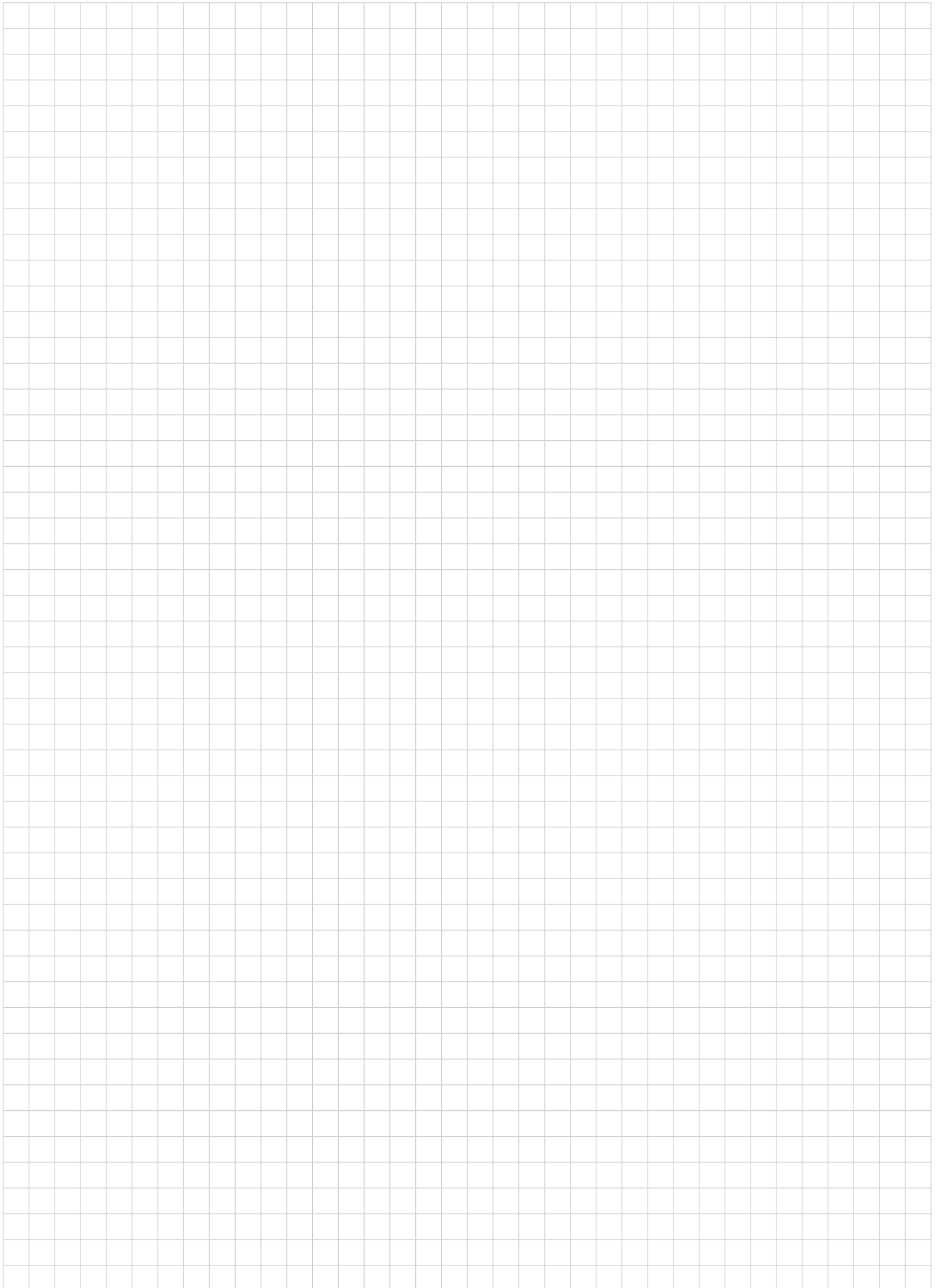
Unit incl. control (Climatix code MX)



Status information can be read on the Climatix display (Mainmenu/Unit/Cooling). The following is presented:

Carel ACUACR	Value	Explanation
Unit status	UnitOn	Status of cooling unit
Cooling outp signal	x%	Cooling load from Climatix cooling regulator.
Inverter signal out	x.x%	Frequency to the compressor.
Compr.nbr	Comp1	
Comp. Gen.alarm	Normal	
Alarm handling	>	The alarm is displayed if there is a fault with the inverter or compressor. In the event of an alarm, see "Alarm information for inverter and compressor".

Compressor C1 output	On/Off	Compressor operating mode.
Suction temp EEV comp. 1	x.x°C	Measured suction gas temp.
Evaporation temp EEV comp. 1	x.x°C	Calculated evaporation temp based on low pressure.
Evaporation prs EEV comp. 1	x.x bar	Relative pressure from low pressure sensor.
Superheat comp. 1	x.xK	Measured overheating.
Operation prs C1	x.x bar	Relative pressure from high pressure sensor.
Circuit 1 EEV opening	x.x%	Expansion valve position.
Compr 1 Condensing temp	x.x°C	



5 Maintenance instructions

5.1 General

This part of the instructions is generic. It is designed to enable you to carry out a simple periodic inspection of the unit and to show some simple checks you can perform before calling in expert support in the event of a fault.

For those qualified to work on the unit, the attached connection and circuit diagrams and the control manual will provide the necessary information.

5.2 Requirements under Directive 97/23/EC (PED)

Type name	ACU, ACR	
PS (design pressure)	(-1) – 26	bar (e)
PT (max. test pressure)	37.2	bar (e)
TS (max. temperature)	(-50) – (+60)	°C
Fuse protection, low-pressure side	0.3	bar (e)
Fuse protection, high-pressure side	26	bar (e)
Opening pressure, safety valve		bar (e)
Fluid group	II	
Refrigerant type	R407C	
Code (O=Other)	O	
CE with ID 0409 Registered body: Inspecta Sweden AB		

This unit is manufactured in accordance with the PED Directive 97/23/EC.

5.3 Periodic inspection

General

The IV Produkt cooling unit has been designed and fabricated along given operation parameters that must be met in order for the unit to operate optimally and provide good operating economy. The operation parameters must not be changed unless a check is first made to ascertain that the changes will be within the unit's operating range.

Requirements and guidelines for handling refrigerant

The following information summarises the requirements and guidelines for handling the refrigerant used in cooling units. For further information, see the EU F-gas Regulation (EC) No 842/2006 and the Swedish Refrigerant Regulations (KMF, SFS 2009:1605). The purpose of the regulations is to contribute to achieving EU goals for reduced climate impact in accordance with the Kyoto Protocol.

Operator responsibilities

Generally speaking, the cooling unit operator must:

- Minimise and prevent leakage
- Take corrective action to remedy any leakage that arises
- Ensure that the service and repair of the refrigerant circuit is carried out by a certified refrigeration technician
- Ensure that refrigerant is handled in an environmentally secure manner and in accordance with national regulations.

By operator, we mean the European Parliament's definition: "...the natural or legal person exercising actual power over the technical functioning of the equipment and systems...".

Leakage inspection and registration

The following applies to one-piece units with 3 kg refrigerant content or more per circuit:

- **Leakage inspections** must be carried out by a certified refrigeration technician:
 - On installation/commissioning
 - Periodically at least once every 12 months, i.e. there can be no more than 12 months between inspections
 - Within one month after any work is performed (e.g. sealing a leak, replacing a component).
- 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, person and company who carried out service and maintenance.

Inspection

Check:

1. The fins on the condenser and evaporator to detect mechanical deformations
2. The drip tray and drain with water trap (clean if necessary)
3. That the water trap (without non-return valve) is filled with water.

Cleaning

If the fins are fouled, they should be vacuumed from the inlet side. Alternatively, you can blow them clean with compressed air from the outlet side. If they are severely fouled, you can clean them with warm water mixed with dishwashing detergent that will not corrode aluminium.

Function

Check that the cooling unit operates as it should by temporarily lowering the temperature setting (setpoint).

6 Alarm management and troubleshooting

6.1 Troubleshooting in the event of an alarm


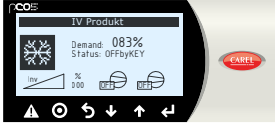
The alarms for the cooling circuits are presented on the control unit display. To ascertain what has caused the alarm, follow the procedure below.

Inspection	Possible cause	Corrective action
Has the high pressure switch tripped?	YES ⇒ No or too low air flow across the condenser	Check the air flow across the condenser. Rest the pressure switch manually.
	Defective high pressure switch	Check/replace
NO ↓		
Has the low pressure control tripped? Can be read via menu "Status: Alarm".	YES ⇒ Insufficient refrigerant volume	Look for leakage, seal the leak and top up with refrigerant
	No or too low air flow across the evaporator	Check/adjust the flow
	Defective expansion valve or low pressure control	Check/replace
NO ↓		
Is the LED flashing red on the frequency inverter?	YES ⇒ Phase failure/voltage failure	Check the 3-phase supply, measure the incoming voltage. Reset the frequency inverter by switching off the voltage for 1 minute or more. Check that the compressor is running without dissonance.
	Overload/defective stepless compressor	Reset the frequency inverter by switching off the voltage for 1 minute or more. Check that the compressor is running without dissonance.

Alarm information for inverter and compressor

For unit incl. control (code MX), alarm information can be read on the Climatix display (Mainmenu/Unit/Cooling/Alarms).

For unit excl. control (code UC, MK, US), alarm information can be read on the Carel display. Press the alarm symbol to view alarms.

 Climatix alarm (code MX)	 Carel alarm (code UC, MK, US)	Explanation and corrective action
Cooling unit	-	
Sum alarm	-	Sum alarm
Alarm C1 R. pressure switch	Compressor1alarm	High pressure switch tripped or alarm for frequency inverter
Alarm C1 EEV motor fault	Motor error	Fault on electrical connection to expansion valve.
Alarm C1 low pressure sensor	S1 probe	Power cut or short circuit to low pressure sensor. Check EVD, cabling and sensor.
Alarm C1 suction gas sensor	S2 probe	Power cut or short circuit to suction gas sensor. Check EVD, cabling and sensor.
Alarm C1 high pressure sensor	S3 probe	Power cut or short circuit to high pressure sensor. Check EVD, cabling and sensor.
Alarm C1 low overheating	Low SH	Compressor stoppage caused by low overheating.
Alarm C1 LOP	LOP	Compressor stoppage caused by low evaporation temperature.
Alarm C1 MOP	MOP	Compressor stoppage caused by high evaporation temperature.
Alarm C1 communication EVD	EVD 1 offline	Fault on communication to EVD (expansion valve control).
Alarm C1 low suction gas temp	Low suction temp	Low suction gas temperature.

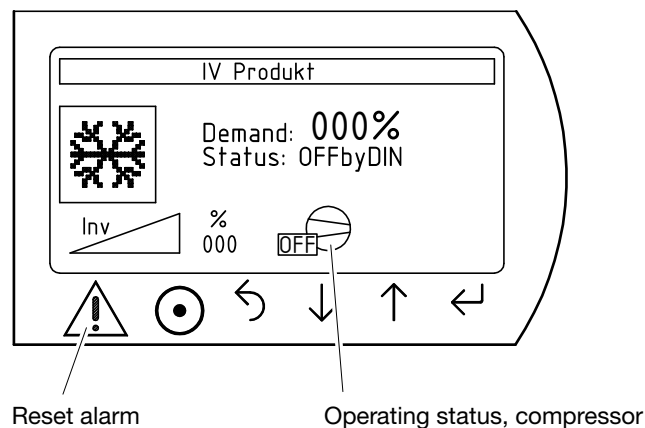
6.2 Troubleshooting via symptoms

Symptom	Possible cause	Corrective action
Low cooling power - too high temperature in the cooled object	The power supply has been interrupted.	Check the control/safety switches and fuses.
	No air flow or too low air flow across evaporator.	Check that nothing is inhibiting the air flow.
	The control equipment is incorrectly preset/defective	Adjust the settings or replace the equipment.
Compressor is not operating	The power supply has been interrupted.	Check the control/safety switches and fuses.
	Compressor has opened a safety circuit.	Check and reset, if needed.
	Defective compressor	Check/replace
Frost on the evaporator	The expansion valve is incorrectly preset/defective	Check/replace
	Insufficient refrigerant volume	Search to detect leakage, seal the leak and charge with refrigerant
	Low supply air flow	Adjust the flow

Alarm reset

In the event of an alarm initiated by the frequency inverter or the safety circuit, the compressor stops and the sum alarm relay is energised. The alarm is displayed in the control unit menus "Operating information, compressors" and "Status: Alarm".

In the event of an alarm, take corrective action to correct the fault, and then press the "Alarm reset" button on the control unit. If the safety circuit alarm trips repeatedly, an authorised refrigeration service company must be called in.



7 Technical data

7.1 EcoCooler without cooling recovery (code ACU)

Cooling unit		EcoCooler for Envistar Flex and Flexomix (ACU)											
		Size		100		150		190		240		300	
		Output variant		1V	1V	2V	1V	2V	1V	2V	1V	2V	
Air flow	min.	m ³ /s	0.25	0.38	0.44	0.50	0.50	0.58	0.69	0.68	0.68		
	max.	m ³ /s	0.95	1.61	1.61	2.12	2.12	2.48	2.48	2.91	2.91		
Max cooling power*		kW	12.9	20.7	23.3	22.3	28.9	31.7	36.0	33.4	40.0		
Output requirement compressor		kW	3.0	4.5	5.5	4.5	6.6	6.8	8.6	6.8	9.5		
No. of compressors		units	1	1	1	1	1	1	1	1	1		
Max. operating current		A	9	15	20	15	20	20	29	20	29		
Rec. fuse protection, 3x400V+N 50Hz		A	16	20	25	20	25	25	32	25	32		
Refrigerant R407C	circuit 1	kg	2.9	4.8	4.8	6.0	6.0	7.1	7.1	8.1	8.1		

Cooling unit		EcoCooler for Envistar Flex and Flexomix (ACU)																	
		Size		360		480		600			740			850			980		
		Output variant		1V	2V	1V	2V	1V	2V	3V	1V	2V	3V	1V	2V	3V	1V	2V	3V
Air flow	min.	m ³ /s	0.85	0.85	1.07	1.07	1.34	1.34	1.34	1.71	1.71	1.71	1.98	1.98	1.98	2.38	2.38	2.38	
	max.	m ³ /s	3.64	3.64	4.61	4.61	5.75	5.75	5.75	7.34	7.34	7.34	8.47	8.47	8.47	10.0	10.0	10.0	
Max cooling power*		kW	48.5	61.9	66.0	78.1	73.8	83.5	96.8	96.5	106	122	109	126	142	112	129	166	
Output requirement compressor		kW	10.2	16.1	14.9	19.3	15.4	18.3	22.8	20.1	24.2	30.0	21.8	28.8	36.0	22	29	42	
No. of compressors		units	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3		
Max. operating current		A	29	43	41	54	43	54	57	51	64	73	55	73	88	55	73	88	
Rec. fuse protection, 3x400V+N 50Hz		A	32	50	50	63	50	63	63	63	80	80	63	80	100	63	80	100	
Refrigerant R407C	circuit 1	kg	6.2	6.9	6.9	7.6	8.6	8.6	9.2	6.2	6.2	6.6	6.8	6.8	9.2	6.7	9.1	7.1	
	circuit 2	kg	4.6	6.6	6.5	6.4	7.0	7.0	7.4	8.4	8.4	9.5	9.4	9.4	10.8	6.7	9.1	7.1	
	circuit 3	kg	-	-	-	-	-	-	-	5.8	5.8	7.1	7.2	7.2	8.8	8.6	9.9	8.2	

* Applies with $t_{\text{outdoor air}} +26^{\circ}\text{C}$, RH 50 % and $t_{\text{extract air}} +22^{\circ}\text{C}$.

7.2 EcoCooler with cooling recovery (code ACR)

Cooling unit			EcoCooler for Envistar Top					EcoCooler for Envistar Flex and Flexomix (ACR)										
			Size		06	10	16	21		100	150		190		240		300	
			Output variant		2V	2V	2V	1V	2V	1V	1V	2V	1V	2V	1V	2V	1V	2V
Air flow	min.	m ³ /s	0.15	0.20	0.41	0.61	0.61	0.25	0.38	0.44	0.50	0.50	0.58	0.69	0.68	0.68		
	max.	m ³ /s	0.57	0.94	1.54	2.08	2.08	0.95	1.61	1.61	2.12	2.12	2.48	2.48	2.91	2.91		
Max cooling power*		kW	10.3	16.1	26.1	29.5	33	17.1	26.6	29.6	29.7	38.2	41.3	46.5	44.1	53.2		
Output requirement compressor		kW	1.6	2.8	4.1	4.6	5.7	3.0	4.5	5.3	4.5	6.4	6.5	8.3	7.6	9.3		
No. of compressors		units	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Max. operating current		A	14.5	18	14	14	19	9	15	20	15	20	20	29	20	29		
Rec. fuse protection	230V+N 50Hz	A	16	20	-	-	-	-	-	-	-	-	-	-	-	-		
	3x400V+N 50Hz	A	-	-	20	20	25	16	20	25	20	25	25	32	25	32		
Refrigerant** circuit 1		kg	1.7	2.1	5.0	5.2	5.2	2.9	4.8	4.8	6.0	6.0	7.1	7.1	8.1	8.1		

Cooling unit			EcoCooler for Envistar Flex and Flexomix (ACR)																	
			Size		360		480		600			740			850			980		
			Output variant		1V	2V	1V	2V	1V	2V	3V	1V	2V	3V	1V	2V	3V	1V	2V	3V
Air flow	min.	m ³ /s	0.85	0.85	1.07	1.07	1.34	1.34	1.34	1.71	1.71	1.71	1.98	1.98	1.98	2.38	2.38	2.38		
	max.	m ³ /s	3.64	3.64	4.61	4.61	5.75	5.75	5.75	7.34	7.34	7.34	8.47	8.47	8.47	10.0	10.0	10.0		
Max cooling power*		kW	62.7	79.6	86.4	103	97	111	127	126	138	159	143	163	185	146	168	213		
Output requirement compressor		kW	9.7	15.5	14.4	18.2	14.9	17.4	22.1	18.9	22.8	28.6	20.7	27.4	34.0	22	28	40		
No. of compressors		units	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3		
Max. operating current		A	29	43	41	54	43	54	57	51	64	73	55	73	88	55	73	88		
Rec. fuse protection, 3x400V+N 50Hz		A	32	50	50	63	50	63	63	63	80	80	63	80	100	63	80	100		
Refrigerant R407C	circuit 1	kg	6.2	6.9	6.9	7.6	8.6	8.6	9.2	6.2	6.2	6.6	6.8	6.8	9.2	6.7	9.1	7.1		
	circuit 2	kg	4.6	6.6	6.5	6.4	7.0	7.0	7.4	8.4	8.4	9.5	9.4	9.4	10.8	6.7	9.1	7.1		
	circuit 3	kg	-	-	-	-	-	-	-	5.8	5.8	7.1	7.2	7.2	8.8	8.6	9.9	8.2		

* Applies with $t_{\text{outdoor air}} +26^{\circ}\text{C}$, RH 50%, $t_{\text{extract air}} +22^{\circ}\text{C}$ and standard rotor in hygroscopic design (HY).

** R410A for Envistar Top 06–10, R134a for Envistar Top 16–21, R407C for Envistar Flex and Flexomix.

8 Ordering keys

8.1 Cooling unit

ACU -a-b-c-0-e	Cooling unit ACU
ACR -a-b-c-0-e	Cooling unit with cooling recovery ACR
a - Size	100, 150, 190, 240, 300, 360, 480, 600, 740, 850, 980
b - Casing	AA = Standard (class T3) PA = ThermoLine low energy (class T2) BA = Insulation to fire resistance rating EI 30
c - Output variant	1V = 1 (sizes 100–980) 2V = 2 (sizes 150–980) 3V = 3 (sizes 600–980)
e - Voltage	40 = 3×400V+N, 50Hz

ACU-R -a-b-c-d	Set of pipes ACU
ACR-R -a-b-c-d	Set of pipes ACR
a - Size	100, 150, 190, 240, 300, 360, 480, 600, 740, 850, 980
b - Output variant	1V = 1 (sizes 100–980) 2V = 2 (sizes 150–980) 3V = 3 (sizes 600–980)
c - Supply air	U = Up N = Down
d - Insp. side	H = Right V = Left

8.2 In sections for ACR

ACRT-01 -a-c	In sections
a - Size	100, 150, 190, 240, 300, 360, 480, 600, 740, 850, 980
c - Output variant	1V = 1 (sizes 100–980) 2V = 2 (sizes 150–980) 3V = 3 (sizes 600–980)

Change history

101104.01	First version
101222.02	Updated refrigerant volume, reference to commissioning record
110415.03	Updated model identification label, refrigerant text, refrigerant volume
121211.04	Updated refrigerant text, refrigerant volume, maintenance etc.
130321.05	Updated refrigerant text.
140825.06	New casing and Modbus.
1606.29.07	Size 980 added.



Air handling with the focus on LCC

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