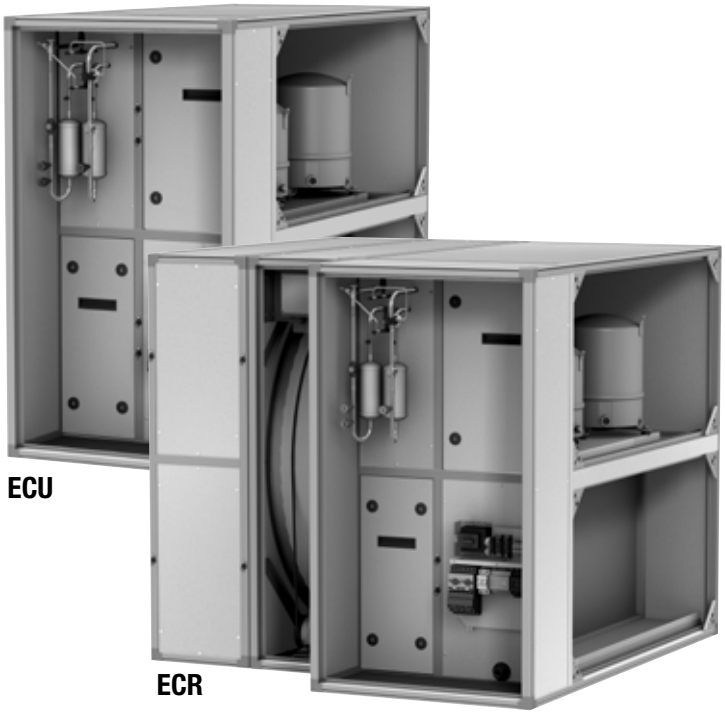
Air Cooling Products

StarCooler®

Operation and Maintenance Instructions



ECU = StarCooler
ECR = StarCooler with cooling energy recovery

Project: .....

IV PRODUKT
Air handling with the focus on LCC

Contents

1. The Cooling and Heat Pump System

1.1 General

All cooling and heat pump systems operate according to the same principle. The system moves the heat content in a medium, such as air, water, gas, etc. from one place where the heat isn't wanted or needed, to another place where it is possible to utilise the heat, or get rid of it.

Your system has been designed and installed to meet given performance requirements. We've selected and combined special components to meet these requirements with optimum safety and at lowest possible total cost.

We have designed the system according to specific fundamental prerequisites, which must exist for it to operate. These prerequisites should not be altered without first checking whether the system can cope with this change.

1.2 How the cooling circuit works

See the flow charts.

The refrigerant in the cooling circuit absorbs heat from the component being chilled while it passes through the evaporator. As its pressure drops, the refrigerant evaporates and transforms from liquid to gas.

The cold suction gas that now has absorbed heat from the cooled space/medium is sucked back into the compressor where it is compressed and heats up.

In all fully hermetic compressors, the suction gas is also used to cool the electric motor that drives the compressor. The refrigerant now contains heat from the component being chilled, heat from the compressor motor and heat generated by compression.

The refrigerant is in hot gas form when it leaves the compressor and circulates to the condenser where it gives off heat.

The refrigerant then condenses as it cools, transforming it from gas to liquid. This course of events occurs repeatedly in a totally closed system, until the temperature in the chilled/heated medium drops/rises to its set point.

1.3 How the controller works

1.3.1 StarCooler ECU

1.3.1.1 Interlocking

The compressors are interlocked across the supply air and extract air fans. If a fan stops, the compressors will also stop.

1.3.1.2 Operation

As the cooling signal gains strength, stepping switch SK1 switches in the compressors. As the cooling signal losses strength, the compressors are switched out. In the event of low airflow and an extract air temperature higher than 50 °C, the in-operation pressure switch in Cooling Circuit One will reduce the cooling output. Resets itself automatically via stepping switch with 15 minute delayed switch in.

1.3.1.3 Compressor protection

If the motor protection or safety circuit alarm trips, the compressor will stop and the group alarm relay will be energized. The alarm text can be read on the stepping switch. In the event of an alarm, take action to remedy the malfunction and press the reset button on the stepping switch (arrow down)!

The safety circuit alarm for the compressor will trip if any of the following two malfunctions should arise:

- High pressure in the system, HP (pressure switch must be reset manually)
- Low pressure in the system, LP

If the safety circuit alarm trips repeatedly, call an authorized refrigeration service company.

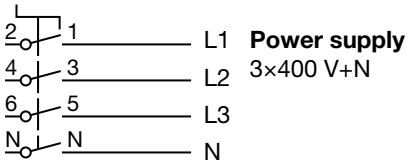
1.3.1.4 Technical description

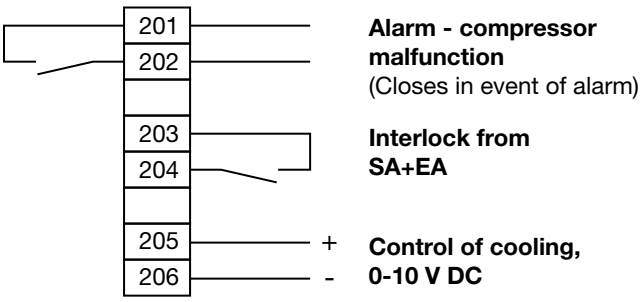
The electrical equipment panel of the ECU unit contains the following:

- Main switch
- Protective motor switch
- Contactors
- Auxiliary relays
- Stepping switch

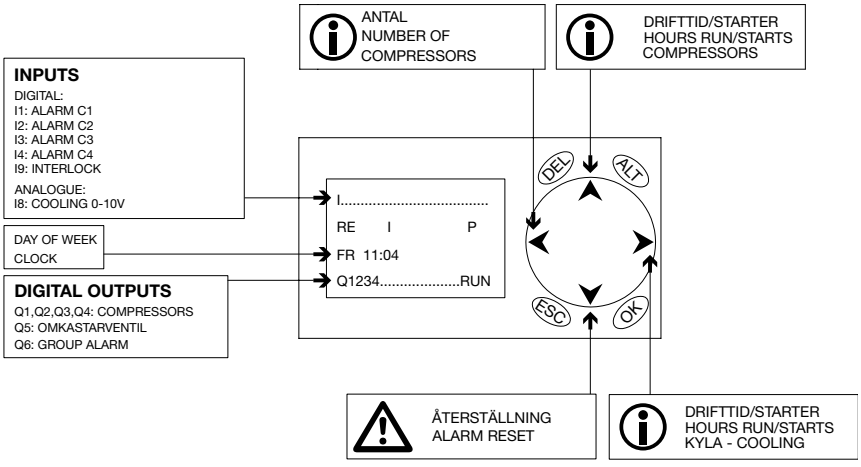
The electrical equipment panel is mounted inside the ECU unit and has been internally pre-wired and tested at the factory.

Electrical Connections:





Size	Rec. fuse
ECU-100	16 AT
ECU-150	20 AT
ECU-190	25 AT
ECU-240	25 AT
ECU-300-1	35 AT
ECU-300-2	50 AT
ECU-360-1	35 AT
ECU-360-2	50 AT
ECU-480-1	50 AT
ECU-480-2	63 AT
ECU-600-1	63 AT
ECU-600-2	80 AT
ECU-740-1	63 AT
ECU-740-2	80 AT
ECU-740-3	100 AT
ECU-850-1	80 AT
ECU-850-2	80 AT
ECU-850-3	125 AT



1.3.2 StarCooler with cooling recovery, ECR

1.3.2.1 Interlocking

The compressors are interlocked across the supply air and extract air fans. If a fan stops, the compressors will also stop.

1.3.2.2 Operation

If the room/extract air temperature is lower than the outdoor temperature, the rotary heat exchanger starts for maximal cooling energy recovery. As the cooling signal gains strength, the stepping switch is used to start the compressors. As the cooling signal losses strength, the compressors are switched out. In the event of low airflow and an extract air temperature higher than 50 °C, the in-operation pressure switch in Cooling Circuit One will reduce the cooling output. Resets itself automatically via stepping switch with 15 minute delayed switch in.

1.3.2.3 Compressor protection

If the motor protection or safety circuit alarm trips, the compressor will stop and the group alarm relay will be energized. The alarm text can be read on the stepping switch. In the event of an alarm, take action to remedy the malfunction and press the reset button on the stepping switch (arrow down)!

The safety circuit alarm for the compressor will trip if any of the following two malfunctions should arise.

- High pressure in the system, HP (the pressure switch must be reset manually)
- Low pressure in the system, LP

If the safety circuit alarm trips repeatedly, call an authorized refrigeration service company.

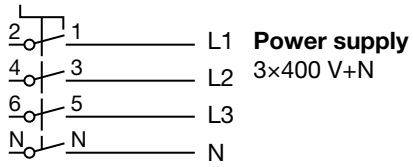
1.3.2.4 Technical description

The electrical equipment panel of the ECR unit contains the following:

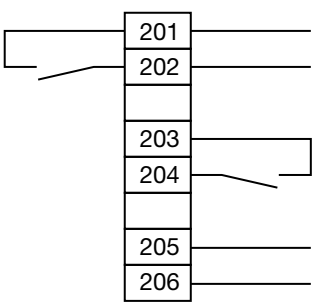
- Main switch
- Protective motor switch
- Contactors
- Auxiliary relays
- Stepping switch

The electrical equipment panel is mounted inside the ECR unit and has been internally pre-wired and tested at the factory.

Electrical Connections of Cooling Unit



Power supply
3×400 V+N

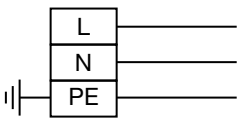


Alarm - compressor malfunction
(Closes in event of alarm)

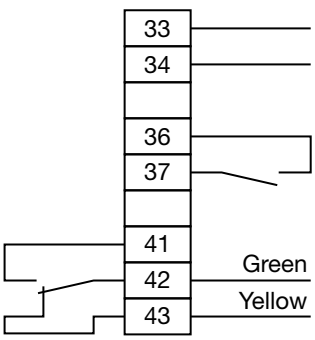
Interlock from SA+EA

Control of cooling, 0-10 V DC

Electrical Connections of Rotary Heat Exchanger



Power supply
230 V



Alarm - compressor malfunction
(Closes in event of alarm)

Cooling recovery
(Closed contacts switch the motor to full speed.)

Alarm
(Closes in event of alarm)

Size	Rec. fuse
ECR-100	16 AT
ECR-150	20 AT
ECR-190	25 AT
ECR-240	25 AT
ECR-300-1	35 AT
ECR-300-2	50 AT
ECR-360-1	35 AT
ECR-360-2	50 AT
ECR-480-1	50 AT
ECR-480-2	63 AT
ECR-600-1	63 AT
ECR-600-2	80 AT
ECR-740-1	63 AT
ECR-740-2	80 AT
ECR-740-3	100 AT
ECR-850-1	80 AT
ECR-850-2	80 AT
ECR-850-3	125 AT

2. Summary of Specific Rules in the Swedish Refrigeration Order

2.1 One-piece units containing less than 3 kg of refrigerant

The maintenance and service of these units should be carried out with good judgement and certain accountability. This means, for example, that if you discover a leak, you must not charge the refrigeration circuit with additional refrigerant until the leak has been sealed.

Furthermore, you must always take charge of refrigerant that you've captured from the unit either by reusing it or sending it to an appropriate facility for destruction.

As far as service and maintenance are concerned, no qualifications stipulated by authorities are required of the technician who carries out this work. However, the unit must be serviced with common sense and good judgement.

If servicing the unit requires remedial maintenance of the refrigerant circuit, only a certified refrigeration technician shall be permitted to carry out this work.

One-piece cooling units charged with 3 kg or less refrigerant shall be regarded as units that do not contain any refrigerant as far as calculations are concerned. This means that you are permitted to add or include any number of one-piece cooling units of the type described above in a system, without being required to take the increased refrigerant volume into consideration.

2.2 One-piece units containing more than 3 kg of refrigerant

Besides complying with the above, the units and components of these systems must be reported to authorities and be inspected at least once a year in accordance with local standards and regulations. The responsibility for seeing to it that this inspection is carried out rests on the owner of the system. A permit/authorisation for this is required for all fixed installations.

2.3 One-piece units containing a total of more than 10 kg of refrigerant

Besides complying with the above, entries concerning the performance and maintenance of the units and components of these systems must be entered in a journal. The responsibility for seeing to it that such a journal is kept up-to-date rests on the owner. This journal must then be sent to an inspectorate for scrutiny once a year. If each circuit is charged with refrigerant in excess of 10 kg, special requirements are made on the equipment in the system.

3. Instructions for Operating the System

3.1 Regulations for commissioning

Units containing more than 3 kg of refrigerant in each circuit require special commissioning by a certified refrigeration technician.
Prior to commissioning, the fitter shall execute the following:

3.1.1 DX Cooling unit:

1. Wire a power supply cable to the main switch and wire control signal cables for cooling operation.
2. Connect the condensate discharge pipe across a water trap to a floor drain.
3. Adjust the design air flows on the supply air and exhaust air sides respectively.
4. Fit a cold water supply and condensate discharge piping from the condenser if a Water-cooled condenser is included.

3.1.2 Rotary heat exchanger:

Wire a power cable and wire control signal cable leads to terminals in the control distribution cubicle.

All wiring must be completed prior to commissioning.

Adjust and record the supply air and extract air flows.

Only qualified technicians shall be allowed to commission the system according to an accompanying checklist complete with commissioning record.

After a copy of the commissioning record has been signed by the technician who has commissioned the unit, it must be signed by the seller. After that it must be sent in to IV Produkt.

The validity of the product warrantee is conditional on the system having been correctly commissioned.

No modifications in the unit are permissible during the warrantee period without the approval by IV Produkt.

Follow the fault tracing directions in the fault tracing schedule before you contact a service representative for servicing the unit under warrantee. This will prevent any unnecessary service calls.

3.2 Checklist

1. Check the power supply. Make sure that the phase leads are wired to the correct terminal and that the earth lead is wired. The zero lead must be wired to an aux. relay terminal. ☐
2. Check that input cables from an external control cubicle are wired to the correct terminal and in the correct manner according to the wiring diagram, e.g: – shielded cable – wired to correct terminal in motors – terminal block screws are tightened. ☐
3. Switch off **ALL** the protective motor switches. ☐
4. Switch on the power supply and fuses. ☐
5. Feel the compressors to make sure that the crankcase heating is working. ☐
6. Check that the protective motor switches are preset as stipulated in the commissioning record. ☐
7. It is important that the oil in the compressor crankcase is warm before the compressor is switched in. The crankcase heating should be switched in well in advance of commissioning (about 2 -3 hours) to allow the oil to reach a temperature of at least 30 °C. The temperature can be measured externally on the bottom of the compressor. ☐
8. Start (TFA). ☐
9. Check that the fans are operating and that the supply air and exhaust air flows have been adjusted and recorded. ☐
10. If a water-cooled condenser (WCC) is included, check that the inlet and outlet water pipes are properly connected and that there is supply water pressure. ☐
11. Run through all the control functions according to their functional description in the wiring diagram **WITHOUT STARTING THE COMPRESSORS.** ☐
12. Connect the manometer fitting on the service tapping, vent the hoses **N.B.: Type of refrigerant** ☐
13. Test the compressors separately and follow the commissioning record. Let the compressors run for a while before you begin measuring, approx.10 minutes. Test the safety functions. ☐
14. After the compressors have been tested separately, test all of them at the same time. Review the commissioning record. ☐
15. Let the unit run until it stops according to the preset control function. ☐
16. Send one copy of the commissioning records to IV Produkt. ☐

4. Maintenance Instructions and Procedures

4.1 General

This section of the instructions is intended for general use. We've worded it in such a way so as to enable you to carry out simple periodical inspections of the system and to show you simple checks that you can carry out before having to call for qualified service help, in the event of a malfunction. If more advanced troubleshooting in the system is required, the accompanying wiring diagrams and special instructions for the components of the system provide the necessary information.

4.2 Requirements by Authorities according to the Swedish Refrigerant Order

An inspector from an accredited company shall in accordance with Local Cooling Standards, inspect one-piece cooling units containing more than 3 kg of refrigerant. All service and modification of the cooling system and charged or captured refrigerant shall be recorded in the journal.

If the total volume of refrigerant exceeds 10 kg (N.B.! Concerns all the units in the building.), this must be reported to the local Environmental and Public Health Authorities and an annual report be submitted to them.

4.3 Requirements according to Directive 97/23/EC (PED)

Type designation	ECU, ECR	
PS (design pressure)	(-1) – 26	bar (e)
PT (max. permissible test pressure)	37.2	bar (e)
TS (max. permissible temperature)	(-50) – (+60)	°C
Protection, low pressure side	0.3	bar (e)
Protection, high pressure side	26	bar (e)
Opening pressure, safety valve		bar (e)
Fluid group	II	
Type of refrigerant	R 407C	
Code (O=Other)	O	
CE with Identification No. 0409. Agency notified: Det Norske Veritas Inspection AB		

This unit has been produced in accordance with the provisions of Pressure Equipment Directive 97/23/EC (PED).

The pressure-carrying cooling system contains a medium with a pressure that is higher than atmospheric pressure and therefore must not be tampered with or modified in any way. Only a person with certified qualifications shall be permitted to service the system.

Do not touch the pipe system. Certain sections of the pipework can reach temperatures higher than +50 °C.

Extremely important!
Prior to commissioning, remove all the transport locking devices from the unit. The compressors are secured to keep them from shifting and possibly damaging the pipe system.

4.4 Periodic Inspection

1. Appoint one or more refrigeration-qualified persons to be responsible for periodical inspections of the cooling system. Make sure that these persons possess knowledge of how the system operates and where system components are located.

2. The system is designed to operate automatically. The Commissioning Record indicates the settings at which the system was set when it was commissioned. Make sure that the settings on the thermostats, controllers, pressure switches and other adjustable components have not been altered by someone who lacks knowledge about how the system operates.

3. See to it that the machine room or other place where equipment is installed is kept clean.

4. Certain components in the system may require open air paths to operate properly. Make sure that these are not temporarily or permanently blocked in any way. If any of these components is equipped with an air filter or dirt filter, check the filter every third month. Replace filters whenever needed.

5. The cooling unit does not normally require any lubrication, oil changes or the like. In cases where special regulations pertain to any specific system component, this is explained in the instructions for that component.

6. The system and its components shall be inspected by a qualified service technician at least once a year. The inspection should include the following:

   – Check the refrigerant system for tightness.
   – Check that the system hasn't sustained any serious corrosion damage.
   – Check that the safety equipment is in good condition.

7. **Keeping a journal.** Entries shall be made every time each system is charged or emptied of refrigerant, the results of searches for leakage and other measures in conjunction with inspecting and servicing the refrigerant circuit and its operation.

8. Are you uncertain about anything regarding your cooling system? If so, get in touch with your contractor! Sometimes it's better and cheaper to call once too often than too seldom.

5. Fault Tracing and Searching for Leakage

5.1 Fault-tracing Schedule

SYMPTOM	POSSIBLE CAUSE	REMEDIAL MEASURE
Too high a temperature in cooled component/ medium.	The power supply has been interrupted.	Check the control/safety switches and fuses.
	No flow or poor flow across the evaporator.	Check that nothing is blocking the flow.
	The thermostat/control equipment is incorrectly set/faulty.	Adjust the setting or replace the equipment.
	The compressor is not working.	See ”Compressor”
The compressor is not working.	The power supply has been interrupted.	Check the control/safety switches and the fuses.
	The safety circuit has switched out the compressor.	Check and reset if needed.
	The compressor is faulty.	Verify the fault. replace the compressor.
The low pressure switch switches out the compressor.	Inadequate refrigerant volume.	There is a leak in the system. Seal the leak and charge with refrigerant.
	No flow or poor flow across the evaporator.	Check the flow.
	The expansion valve is faulty.	Check, replace the valve.
	The low pressure switch is faulty.	Check, replace the switch.
The high pressure switch switches out the compressor.	No flow or poor flow across the condenser.	Check the airflow across the condenser. Check the water saving valve setting.
	The high pressure switch is faulty.	Check, replace the switch.
Substantial frosting on the evaporator.	The expansion valve is not adjusted correctly/faulty.	Check, replace the valve.
	Inadequate refrigerant volume.	Check the sight glass. The system is leaking; seal the leakage; charge with refrigerant.

5.2 Searching for leakage

A search to detect leakage in the system should be made at least once per calendar year as a preventive measure. This leakage search should be recorded and entered in the journal.

The cooling system may develop a leak. This becomes apparent first by impaired cooling performance or the system won't operate at all due to a momentary leakage.

If you suspect refrigeration leakage, check the level of refrigerant in the sight glass of the system. The sight glass is located in the liquid pipe by the cooling unit.

If you see bubbles continuously forming in the sight glass, and the cooling performance of the system is at the same time poor, the system is probably leaking. If you see one or two or just a few bubbles in the sight glass, when the unit starts up, and notice that it operates with reduced output or operates normally, this does not necessarily mean that the refrigerant volume is too low.

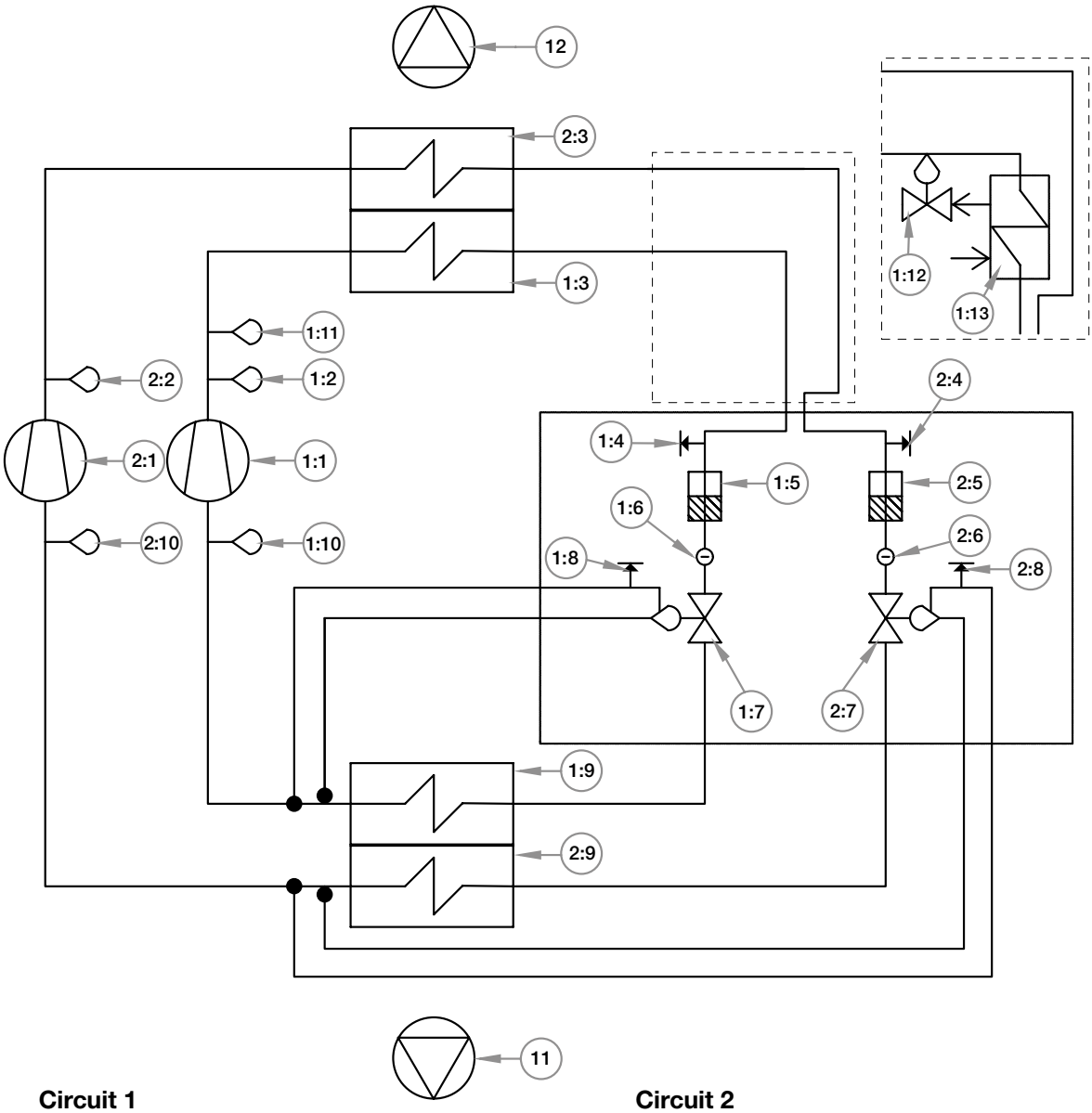
IF BUBBLES APPEAR IN THE SIGHT GLASS AND THE PERFORMANCE OF THE SYSTEM IS NOTICEABLY BAD – CALL AN AUTHORISED SERVICE REPRESENTATIVE FOR HELP.

Keep in mind that refrigerant must not be released into the atmosphere and that escaping refrigerant can cause burns if it comes into contact with skin. If it becomes necessary to remedy some malfunction in the refrigerant circuit, the staff doing this work must wear the proper protective equipment.

REMEDIAL MAINTENANCE OF THE REFRIGERANT SYSTEM MUST ONLY BE CARRIED OUT BY AN ACCREDITED INSPECTORATE – A COMPANY WITH A REQUIRED PERMIT

6. Flow Chart for the Refrigeration System

6.1 Flow chart for the ECU and ECR refrigeration systems



Circuit 1

1:1 KK Compressor
1:2 GP HIGH pressure switch
1:3 KD Condenser
1:4 MU HIGH PRESSURE meas. tapping
1:5 FT Drying filter
1:6 SG Sight glass
1:7 VS Thermostatic expansion valve
1:8 MU LOW PRESSURE meas. tapping
1:9 EV Evaporator
1:10 GP LOW pressure switch
1:11 DP In-op. pressure switch, ACA
1:12 Water saving valve
1:13 Water-cooling condenser

11 Supply air fan
12 Extract air fan

Circuit 2

2:1 KK Compressor
2:2 GP HIGH pressure switch
2:3 KD Condenser
2:4 MU HIGH PRESSURE meas. tapping
2:5 FT Drying filter
2:6 SG Sight glass
2:7 VS Thermostatic expansion valve
2:8 MU LOW PRESSURE meas. tapping
2:9 EV Evaporator
2:10 GP LOW pressure switch

7. Technical Specification

7.1 Technical specification for the ECU

7.1.1 Specification **Cooling Unit** **ECU-a -b -c -d -e -f -g**

a - Size:	100, 150, 190, 240, 300, 360, 480, 600, 740, 850
b - Casing:	00 = Standard insulation E3 = Insulation to Fire Resistance Class EI30
c - Capacity variant:	10 = 1 (sizes 100–850) 20 = 2 (sizes 300–850) 30 = 3 (sizes 740-850)
d - Water-cooled condenser	0 = Without 1 = With (For Capacity Variant 2 and 3 only)
e - Supply vltage	40 = 400 V AC
f - Supply air:	U = Upper airflow path N = Lower airflow path
g - Insp. side:	H = Right-hand V = Left-hand

7.1.2 Survey of the capacities, ECU

Size			**100**	**150**	**190**	**240**	**300**		**360**		**480**		**600**	
Capacity variant			1	1	1	1	1	2	1	2	1	2	1	2
Air volume	min.	(m^3/s)	0.32	0.54	0.71	0.82	0.97		1.22		1.54		1.93	
	max.	(m^3/s)	0.95	1.60	2.12	2.47	2.92		3.65		4.63		5.76	
Max. cooling power *		(kW)	13.5	21.9	28.8	37.9	40.8	54.0	49.6	66.7	80.6	99.7	89.8	113.9
Power demand of compressor		(kW)	2.8	5.2	6.5	7.9	8.9	14.2	11.3	17.1	16.1	24.9	18.0	29.2
Coefficient of cooling performance		(C.O.P.)	4,9	4.2	4.4	4.8	4.6	3.8	4.4	3.9	5.0	4.0	5.0	3.9
Number of compressors		(qty)	2	2	2	2	2	2	2	2	2	2	2	3
Number of control steps		(qty)	3	3	3	3	3	3	3	3	3	3	3	3
Max. op. current, 3×400V +N 50Hz		(A)	7.7	14.4	17.4	19.8	22.6	33.9	28.4	39.2	35.2	49.7	42.5	64.5
Rec. fuse, 3×400V +N 50Hz		(A)	16	20	25	25	35	50	35	50	50	63	63	80
Refrigerant, R407C	Circuit 1	(kg)	1.4	2.1	2.8	3.1	3.2	6.1	4.5	7.1	6.2	9.2	7.4	9.5
	Circuit 2	(kg)	1.8	2.9	3.5	3.7	4.7	5.9	5.4	7.5	9.2	9.5	9.5	10.0

* Applicable to $t_{outdoor\ air}$ +26 °C, RH 50% and $t_{extract\ air}$ +22 °C.

7.1.3 Survey of the capacities, ECU - cont.

Size			**740**			**850**		
Capacity variant			1	2	3	1	2	3
Air volume	min.	(m^3/s)	2,45			2,82		
	max.	(m^3/s)	7,34			8,47		
Max. cooling power *		(kW)	92,3	100,2	125,8	111,6	123,5	145,1
Power demand of compressor		(kW)	18,8	23,3	34,9	21,5	29,4	40,3
Coefficient of cooling performance		(C.O.P.)	4,9	4,3	3,6	5,2	4,2	3,6
Number of compressors		(qty)	3	3	3	4	4	4
Number of control steps		(qty)	3	3	3	3	3	3
Max. op. current, 3×400V +N 50Hz		(A)	46,5	57,2	77,5	58,4	70,4	93,0
Rec. fuse, 3×400V +N 50Hz		(A)	63	80	100	80	80	125
Refrigerant, R407C	Circuit 1	(kg)	7,8	7,8	9,9	8,7	8,7	9,7
	Circuit 2	(kg)	5,9	5,9	7,4	7,1	7,1	8,5
	Circuit 3	(kg)	5,9	5,9	7,4	7,1	7,1	8,5

* Applicable to $t_{outdoor\ air}$ +26 °C, RH 50% and $t_{extract\ air}$ +22 °C.

7.2 Technical Specification for the ECR

7.2.1 Specification

Cooling unit	**ECR-a -b -c -d -e -f -g -h**
a - Size:	100, 150, 190, 240, 300, 360, 480, 600, 740, 850
b - Casing:	00 = Thermal insulation E3 = EI30
c - Capacity variant:	10 = 1 (size 100-850) 20 = 2 (size 300-850) 30 = 3 (size 740-850)
d - Water-cooled condenser:	0 = Without 1 = With (For Capacity Variant 2 and 3 only)
e - Supply voltage:	40 = 400 VAC
f - Rotor:	NO = Normal HY = Hygroscopic NP = Normal Plus HP = Hygroscopic Plus
g - Supply air:	U = Upper airflow path N = Lower airflow path
h - Insp. side:	H = Right-hand V = Left-hand
ECRT-01 -a -c	**Split version**

7.2.2 Survey of the Capacities, ECR

Size			**100**	**150**	**190**	**240**	**300**		**360**		**480**		**600**	
Capacity variant			1	1	1	1	1	2	1	2	1	2	1	2
Air volume	min.	(m^3/s)	0.32	0.54	0.71	0.82	0.97		1.22		1.54		1.93	
	max.	(m^3/s)	0.95	1.61	2.12	2.47	2.92		3.65		4.63		5.78	
Max. cooling power *		(kW)	18.2	28.6	38.6	49.2	54.4	70.9	65.5	86.5	105.5	129.0	118.1	148.1
Power demand of compressor		(kW)	2.6	4.9	6.1	7.5	8.4	13.6	10.7	16.3	15.3	23.9	17.1	27.4
Coefficient of cooling performance		(C.O.P.)	6.9	5.8	6.3	6.6	6.5	5.2	6.1	5.3	6.9	5.4	6.9	5.4
Number of compressors		(qty)	2	2	2	2	2	2	2	2	2	2	2	3
Number of control steps (incl. cooling energy recovery)		(qty)	4	4	4	4	4	4	4	4	4	4	4	4
Max. op. current, 3×400V +N 50Hz		(A)	7.7	14.4	17.4	19.8	22.6	33.9	28.4	39.2	35.2	49.7	42.5	64.5
Rec. fuse, 3×400V +N 50Hz		(A)	16	20	25	25	35	50	35	50	50	63	63	80
Refrigerant, R407C	Circuit 1	(kg)	1.4	2.1	2.8	3.1	3.2	6.1	4.5	7.1	6.2	9.2	7.4	9.5
	Circuit 2	(kg)	1.8	2.9	3.5	3.7	4.7	5.9	5.4	7.5	9.2	9.5	9.5	10.0

* Applicable to $t_{outdoor\ air}$ +26 °C, RH 50%, $t_{extract\ air}$ +22 °C and hygroscopic rotor (HY).

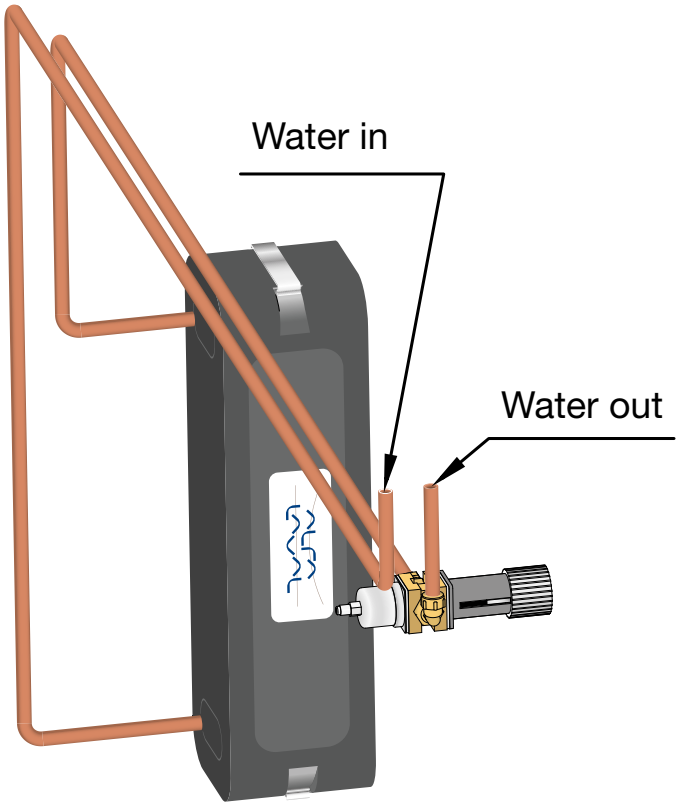
7.2.3 Survey of the Capacities, ECR - cont.

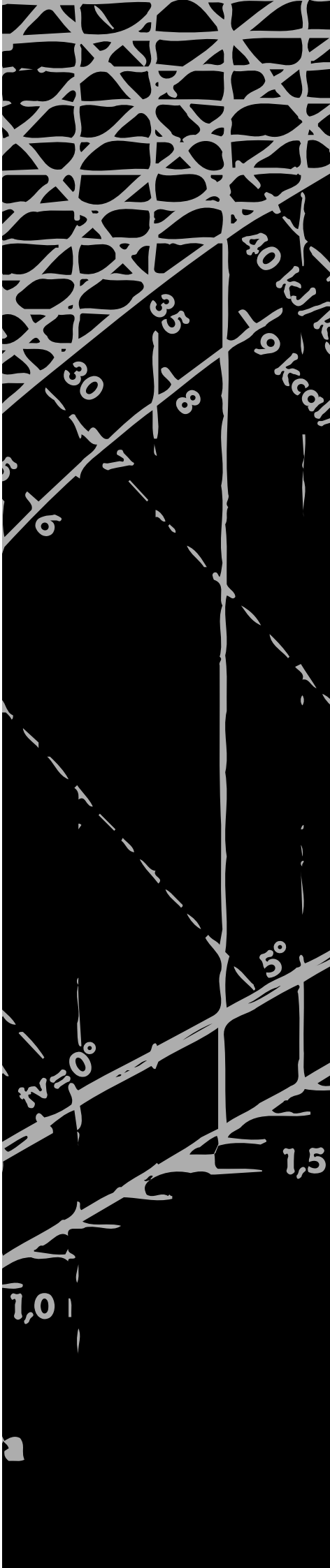
Size			**740**			**850**		
Capacity variant			1	2	3	1	2	3
Air volume	min.	(m^3/s)	2,45			2,82		
	max.	(m^3/s)	7,34			8,47		
Max. cooling power *		(kW)	121,3	131,8	162,4	145,8	160,7	186,6
Nominal power demand of compressor		(kW)	18,1	22,0	32,5	20,5	27,7	38,1
Nominal coefficient of cooling performance		(C.O.P.)	6,7	6,0	5,0	7,1	5,8	4,9
Number of compressors		(st)	3	3	3	4	4	4
Number of control steps (incl. cooling energy recovery)		(st)	4	4	4	4	4	4
Max. op. current, 3×400V +N 50Hz		(A)	46,5	57,2	77,5	58,4	70,4	93,0
Rec. fuse, 3×400V +N 50Hz		(A)	63	80	100	80	80	125
Refrigerant, R407C	Circuit 1	(kg)	7,8	7,8	9,9	8,7	8,7	9,7
	Circuit 2	(kg)	5,9	5,9	7,4	7,1	7,1	8,5
	Circuit 3	(kg)	5,9	5,9	7,4	7,1	7,1	8,5

* Applicable to $t_{outdoor\ air}$ +26 °C, RH 50%, $t_{extract\ air}$ +22 °C and hygroscopic rotor (HY).

7.3 Water-cooled condenser, WCC

The cooling units equipped with a water-cooled condenser must be connected to a mains cold water supply as well as a discharge pipe run to a floor gulley.
Dimension of pipes to be connected = CU 15 mm.





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PRODUKT

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