

## BMA 0010

### Instruction and Installation Manual Oil-Air Cooler ACN

- Compact oil-air cooler
- High cooling capacity
- High operating pressure
- Low pressure loss
- Low noise emission

## Contents

---

<b>1. Basic information</b>	<b>3</b>	<b>10. Important information for Ex-zones</b>	<b>10</b>
1.1 Notes on this Instruction and Installation Manual	3	10.1 Instruction manual supplement "Ex"	10
1.2 Accuracy at time of going to press	3	10.2 Intended use	10
1.3 Intended purpose	3	10.2.1 Explosive atmosphere	10
1.4 Warranty and liability	3	10.2.2 Instructions for use	10
1.5 Guarantee and claims	3	10.3 Industrial safety instructions	10
1.6 Contact information	3	10.4 Installation and assembly	10
<b>2. Safety</b>	<b>4</b>	10.5 Checks, maintenance and repairs	11
2.1 Standards and directives	4	10.6 Testing	11
2.2 Safety instructions – graphic design and form	4		
2.3 Symbols used	4		
2.4 Warning labels	4		
2.5 General safety instructions	4		
<b>3. Description/specification</b>	<b>5</b>		
3.1 Sub-assemblies and options	5		
3.2 Nameplate / identification label	5		
<b>4. Installation of the oil-air cooler</b>	<b>6</b>		
4.1 Installation site	6		
⇨ Installation in enclosed spaces	6		
⇨ Installation in the open	6		
⇨ Installation in dirty environments (spaces)	6		
4.2 Installation mode and position	6		
4.3 Electrical connections	6		
⇨ Terminal assignment	6		
4.4 Hydraulic connection	6		
<b>5. Commissioning and start-up</b>	<b>7</b>		
<b>6. Operating the unit</b>	<b>7</b>		
<b>7. Maintenance</b>	<b>7</b>		
7.1 Regular maintenance work	7		
7.2 Annual inspections:	7		
<b>8. Cleaning</b>	<b>8</b>		
8.1 Cleaning the radiator	8		
8.2 Cleaning the inside of the cooler housing	8		
<b>9. Dismantling and assembling the sub-assemblies</b>	<b>8</b>		
9.1 Dismantling the radiator	8		
9.2 Dismantling the electric motor and fan	9		
⇨ ACN 5	9		
⇨ ACN 10 – ACN 60	9		
⇨ ACN 70 – ACN 100	9		

## 1. Basic information

---

### 1.1 Notes on this Instruction and Installation manual

Please read the installation manual carefully before installing and operating the ACN oil-air cooler; pay particular attention to the safety instructions. The Instruction and Installation Manual is part of your product. Keep the Manual in a safe place in the vicinity of the ACN oil-air cooler. Property rights to this Instruction and Installation Manual remain with R+L HYDRAULICS GmbH.

### 1.2 Accuracy at time of going to press

We reserve the right to make technical amendments and alterations to reflect the current state of development. The ACN oil-air cooler described here represents the current state of the art at the time this Instruction and Installation Manual went to press.

### 1.3 Intended purpose

The intended purpose of the ACN oil-air cooler is the cooling of hydraulic fluid (mineral oil, HFC (polyglycol > 40%), HFD) in industrial plants and systems.

### 1.4 Warranty and liability

Unauthorised technical modifications to the ACN oil-air cooler are prohibited. Any such modifications are made entirely at the customer's risk and exclude the manufacturer from any warranty claims or liability.

### 1.5 Guarantee and claims

Please contact your R+L HYDRAULICS Partner in the event of any faults or breakdowns. R+L HYDRAULICS accepts no liability for any consequential loss or damage resulting from unauthorized repairs and/or modifications carried out by the customer.

### 1.6 Kontaktdaten

#### R+L HYDRAULICS GmbH

Postfach 1546  
D - 58775 Werdohl  
Germany

Phone: +49 (0) 2392 509-0  
Fax: +49 (0) 2392 509-509  
E-mail: [info@rl-hydraulics.com](mailto:info@rl-hydraulics.com)  
[www.rl-hydraulics.com](http://www.rl-hydraulics.com)

## 2. Safety

### 2.1 Standards and directives

The ACN oil-air cooler is 'partly completed machinery' under the terms of the EU Directive 2006/42/EC.

By applying standard DIN EN ISO 12100:2011-03 during design and construction of the ACN oil-air cooler, the manufacturer has taken into account the general requirements regarding safety and ergonomics.

### 2.2 Safety instructions – graphic design and form



#### DANGER

Warns of an accident that will occur if instructions are not followed. The accident will cause serious, possibly life-threatening injuries or death e.g. by coming into contact with high-voltage electrical units.



#### WARNING

Warns of an accident that can occur if instructions are not followed. The accident may cause serious, possibly life-threatening injuries or death e.g. by coming into contact with high-voltage electrical units.



#### CAUTION

Warns of an accident that can occur if instructions are not followed. The accident can lead to light injuries such as burns, skin damage or crushing.



#### CAUTION

Warns of possible material damage.



#### NOTICE

Important general information



#### NOTICE

Important information about environmental protection

### 2.3 Symbols used



High voltage, danger of electrocution



Danger, handle with care: flammable materials



Cross-reference "see Section 'xx', page yy"

### 2.4 Warning labels



Danger, hot surfaces



Hearing protectors must be worn

### 2.5 General safety instructions

- The company operating the ACN oil-air cooler must ensure compliance with all requirements concerning use for the intended purpose.
- The operator is responsible for preventing adverse influence on the component materials by chemicals in the immediate environment of the cooler.
- If the ACN oil-air cooler is used as part of a larger plant, the plant operator is responsible for compliance with all workplace health and safety requirements and with any additional national regulations in the country concerned.
- "Safety first" should always be top priority when carrying out adjustments or maintenance work on the ACN oil-air cooler.

## 3. Description

---

### 3.1 Sub-assemblies and options

The main sub-assemblies of the ACN oil-air cooler are the radiator, the housing with mounting points and the fan sub-assembly, consisting of fan, protective grid and motor (➔ see Appendix Fig. 1 and 2). The fan sub-assembly for sizes ACN 70 to ACN 100 also contains the motor console used for attaching the motor to the housing (➔ see Appendix Fig. 3)

ACN oil-air coolers are available with one- or three-phase electric motors; detailed motor data can be found on the motor nameplate.

Optional thermostat switches are available; these can be screwed into the radiator and activate the fan automatically when the system temperature reaches a certain level. The necessary motor controls must be installed beforehand.

Under normal operating conditions, the noise emission level of oil-air coolers of sizes ACN 5 to ACN 100 is between 61dB(A) and 84dB(A) +/- 3dB(A). These values can be exceeded if the device is installed in an unfavourable location or operated under extreme conditions.

For general information on dimensions and technical data ➔ see Appendix, Section "Technical Data and Dimensions".

### 3.2 Nameplate

Every ACN oil-air cooler is fitted with a nameplate containing the following data (➔ see Appendix Fig. 4) and located on the top of the housing:

- Article name
- Article number
- Serial number
- Delivery date
- Max. operating pressure, static
- Max. operating pressure, dynamic
- Max. operating temperature

## 4. Installation of the oil-air cooler



### CAUTION

Risk of crushing! To avoid accidents and injuries when lifting, use only the appropriate hoisting equipment and procedures. Ensure that the hoisting machinery and equipment used are in perfect working order and approved for the weight of the oil/air cooler!

### 4.1 Installation site

When selecting the installation site, please ensure that it will have no adverse effects on the function of the ACN oil-air cooler and that draughts or noise will not inconvenience or harm personnel. Air inlets and outlets must not be covered or blocked at any time, so that cooling air can circulate freely. Recirculation of hot air (exhaust) must be avoided. Please ensure that the distance between the cooler and the nearest wall is equal to or larger than the height of the cooling package. (➔ see Appendix Fig. 5)

#### Installation in enclosed spaces

When the equipment is installed in enclosed spaces, adequate ventilation must be provided so that the warm air produced by the heat exchange process does not increase the temperature in the room. If adequate ventilation cannot be provided, air ducts must be installed between the ACN oil-air cooler and the outside air, allowing air to be sucked directly into the cooler and provide the ventilation required.

#### Outdoor installation

The increased viscosity of oil at low ambient temperatures must be taken into consideration when installing the heat exchanger outdoors. This can lead to increased dynamic pressure and system overload when starting from cold, so we recommend the installation of a bypass valve controlled by pressure or temperature if the cooler is installed outdoors. As an alternative, a thermostatically controlled oil heating system with permanent oil circulation through the ACN oil-water cooler can be fitted.

#### Installation in dirty environments (spaces)

Installing the heat exchanger in environments with heavily contaminated air results in dirt deposits on the cooling fins. As this reduces the cooling performance, the equipment must be cleaned regularly when installed in environments strongly contaminated with dust or oil (➔ see Appendix Fig. 8. Cleaning).

### 4.2 Installation position and orientation

The installation position does not affect the function of the ACN oil-air cooler. However, only the mounting points provided should be used (➔ see Appendix Figs. 6–8).

ACN 5:	front mounting flange
ACN 10–60:	Foot brackets or front mounting flange
ACN 70–100:	Foot brackets or front mounting flange

### 4.3 Electrical connections



#### DANGER

Risk of electrocution! Electrical equipment must be installed and connected to the mains by a qualified electrician!



#### DANGER

Risk of electrocution! Ensure that the device is not connected to the mains electricity supply during installation!



#### CAUTION

Check mains voltage and frequency! To avoid damage to the ACN oil-air cooler or electrical systems, always compare the information regarding mains voltage and frequency given on the motor nameplate before connecting the oil-air cooler to the mains and.



#### WARNING

Overload protection! Electric motors must be properly protected against overload in accordance with the customary technical rules and national regulations.

### 4.4 Hydraulic connections



#### WARNING

Connection must be free of tension and vibration! To prevent damage to the radiator, all hydraulic connections should be free of tension or vibration. R+L HYDRAULICS recommends the use of suitable hydraulic lines or compensators for the connection of the ACN oil-air cooler.

The oil-side connection of the ACN oil-air cooler is effected using the marked connection threads or flanges provided on the upper and lower collection tanks of the radiator (➔ see Appendix Fig. 11 + 12). The connection not in use is sealed with a sealing plug before leaving our factory.

The connecting pipes G 3/8" and M22 x 1.5 (ACN 5 – ACN 60) or G 1" (ACN 70 – ACN 100) are intended for the installation of measuring sensors or switches (➔ see Appendix Fig. 13).

## 5. Commissioning and start-up



### CAUTION

Risk of injury! Before operating for the first time, check that the ACN oil-air cooler has been installed and connected correctly.

#### Commissioning and start-up procedure:

- Please ensure that:
  - the ACN oil-air cooler is complete and none of the components show signs of damage.
  - the ACN oil-air cooler has been connected correctly.
  - the fan can rotate freely and without obstruction - a simple test is to turn the fan by hand. To prevent obstruction or damage to the fan blades, ensure that there is nothing protruding through the fan guard.
  - all screw-in oil connections have been sufficiently tightened.
  - the housing of the ACN oil-air cooler is free of foreign objects.
- Turned on the oil supply and check the hydraulic connections for possible leaks.
- In the event of a leak, retighten the screw connections; if necessary, replace the connections.
- Start the electric motor. Check that the fan is rotating in the direction of the arrow on the housing.
- If a three-phase motor is fitted and the fan is rotating in the wrong direction, reverse the terminal connections.
- Listen carefully for any unusual noises or vibration.
- Unusual noises or vibration indicate that the fan or drive motor may be damaged. Damaged components must be replaced immediately (➤ see Appendix Section 9.2 Dismantling the electric motor and fan).

## 6. Operating the unit



### CAUTION

Risk of burns or scalding! The ACN oil-air cooler can become very hot when in operation, so always allow ample time for the radiator to cool down before touching it. We recommend the installation of a guard to prevent accidental contact.

Please ensure that the following maximum permissible values/limits are not exceeded during operation.

Max. oil temperature:	120 °C
Max. ambient temperature:	40 °C
Max. operating pressure:	26 bar static / 20 bar dynamic
Max. power consumption:	see motor nameplate

## 7. Maintenance

### 7.1 Regular maintenance work

The user/operator should check the following items at regular intervals to ensure that the ACN oil-air cooler continues to function properly and safely:

- Noise and vibration:
 

Unusual noises or vibration indicate that the fan or drive motor may be damaged. Damaged components must be replaced immediately. (➤ see Appendix Section 9.2 Dismantling the electric motor and fan)
- Correct mounting:
 

Loose or missing mountings must be tightened or replaced.
- Soiling of the radiator:
 

Dirt on the radiator will reduce cooling performance and may be an indication of leaks, so the radiator must be cleaned regularly. (➤ see Section 8.1 Cleaning the radiator)
- Oil-tightness of the radiator:
 

Oil leaks can endanger the environment and constitute a risk to human health, so any leaky screw connections must be tightened or replaced. If oil is leaking from the radiator itself, the radiator must be replaced. (➤ see Section 9.1 Dismantling the radiator)
- Warning labels:
 

Warning labels must not be damaged or removed. Any defaced or missing labels must be replaced immediately.

### 7.2 Yearly inspections:

The electrical installations must be checked by a suitably qualified electrician once a year.

## 8. Cleaning



### DANGER

Risk of electrocution! Always disconnect the ACN oil-air cooler from the mains electricity supply during cleaning, especially when water or other liquids are used.



### CAUTION

Risk of injury! Always switch off drive motor before cleaning and ensure that it cannot be switched on again inadvertently.



### CAUTION

Risk of burns or scalding! The ACN oil-air cooler can become very hot when in operation, so always allow ample time for the radiator to cool down before touching it. We recommend the installation of a guard to prevent accidental contact.

### 8.1 Cleaning the radiator

The radiator may be cleaned with compressed air or water. If the radiator is extremely dirty, it can also be cleaned with water using a high-pressure cleaner. The water jet must be directed lengthwise along the fins to avoid damaging them. Add a cleaning agent to the water if necessary, but please ensure that the cleaning agent used is compatible with aluminium. Oil and grease deposits can be washed off with hot water. Always cover the motor during cleaning and ensure that the radiator is cold when cleaning it with water.

### 8.2 Cleaning the inside of the cooler housing

The radiator must be removed in order to clean the inside of the cooler housing (➔ see Section 9.1 Dismantling the radiator). As a rule, cleaning the cooler housing with compressed air at is sufficient. To prevent dust and dirt from entering the motor, we recommend directing compressed air through the protective grid from the motor side. Particularly stubborn dirt can be removed using a degreaser.

## 9. Dismantling and assembling the sub-assemblies

### 9.1 Dismantling the radiator

R+L Hydraulics accepts no liability for consequential damage caused by unauthorised repairs and/or modifications carried out by the user/operator.



### CAUTION

Risk of injury! Always switch off drive motor before dismantling the radiator and ensure that it cannot be switched on again inadvertently.



### CAUTION

Risk of burns or scalding! The ACN oil-air cooler can become very hot when in operation, so always allow ample time for the radiator to cool down before dismantling.



### CAUTION

Risk of crushing! To avoid injuries caused by the radiator falling, always secure it before loosening the fixing screw.

Procedure for dismantling the radiator (➔ see Appendix Fig. 14):

- Turn the system off.
- Switch off fan motor and ensure that it cannot be restarted inadvertently.
- Make sure that the system is not under pressure.
- Shut off oil supply to the cooler.
- Remove cooler inlet and outlet pipes.
- Empty radiator completely.
- Remove the screws fixing the radiator to the housing.
- Remove the radiator.

Procedure for assembling the radiator:

- Refit radiator
- Attach the radiator to the housing with the screws provided. Secure screws with Loctite blue or similar liquid thread locker.
- Attach cooler inlet and outlet pipes to the radiator.
- Connect motor to the electricity supply.



## 9. Dismantling and assembling the sub-assemblies

### 9.2 Dismantling the electric motor and fan



**DANGER**

Risk of electrocution! Ensure that the unit has been disconnected from the mains electricity supply and the electrical wiring is current-free before dismantling des electric motor!



**CAUTION**

Risk of burns or scalding! The ACN oil-air cooler can become very hot when in operation, so always allow ample time for the radiator to cool down before dismantling the electric motor.

**ACN 5**

Procedure for dismantling the electric motor (➔ see Appendix Fig. 15):

- Turn off the unit and ensure that it is completely disconnected from the mains electricity supply.
- Disconnect wiring to and from the motor.
- Remove screws fastening the protective grid to the frame.

Procedure for installing the electric motor:

- Fasten protective grid to housing with screws and washers. Secure screws with Loctite blue or similar liquid thread locker.
- Connect motor to the mains electricity supply.
- For subsequent procedures, see Section 5. "Commissioning and start-up".

**ACN 10 – ACN 60**

Procedure for dismantling the electric motor (➔ see Appendix Fig. 16):

- Turn off the unit and ensure that it is completely disconnected from the mains electricity supply.
- Disconnect wiring to and from the motor.
- Secure the motor.
- Remove screws fastening the protective grid to the frame.
- Remove fan unit - consisting of protective grid, fan and motor – from the cooler housing.
- Remove locking screw at the front end of the motor shaft.
- Remove fan from motor shaft, using a puller if necessary.
- Release locking screws between protective grid and motor.
- Remove protective grid.

Procedure for installing the electric motor:

- Attach protective grid to the motor.
- Fasten protective grid to the motor with screws provided. Secure screws with Loctite blue or similar liquid thread locker.
- After lightly greasing the motor shaft, fit the fan on the shaft, using a spacer ring if necessary.
- Securely fasten fan to front end of motor shaft using screw and suitable washer(s).
- Attach fan unit – consisting of protective grid, fan and motor - to cooler housing.

- Fasten protective grid to housing with screws and washers. Secure screws against loosening with Loctite blue or similar liquid thread locker.
- Check that the fan is centred in its housing and able to rotate freely. If necessary, slightly loosen screws between protective grid and housing, then realign protective grid.
- Connect motor to the mains electricity supply.
- For subsequent procedures, see Section 5. "Commissioning and start-up".

**ACN 70 – ACN 100**

Procedure for dismantling the electric motor (➔ see Appendix Fig. 17):

- Turn off the unit and ensure that it is completely disconnected from the mains electricity supply.
- Disconnect wiring to and from the motor.
- Secure the motor.
- Release the screws fastening the protective grid to the housing.
- Release the screws fastening the motor console to the housing.
- Remove fan unit – consisting of protective grid, fan, motor console and motor – from the cooler housing.
- Remove locking screw at the front end of the motor shaft.
- Remove fan from motor shaft, using a puller if necessary.
- Remove protective grid.
- Remove screws fastening the motor console to the motor.
- Remove motor console.

Procedure for installing the electric motor:

- Attach motor console to motor.
- Fasten motor console to motor with screws provided. Secure screws with Loctite blue or similar liquid thread locker.
- Lay protective grid on motor console.
- After lightly greasing the motor shaft, fit the fan on the shaft.
- Securely fasten fan to front end of motor shaft using screw and suitable washer(s). Secure screw against loosening with Loctite blue or similar liquid thread locker.
- Attach fan unit – consisting of protective grid, fan, motor console and motor – to the housing.
- Securely fasten motor console to housing with screws and washers. Secure screws against loosening with Loctite blue or similar liquid thread locker.
- Securely fasten protective grid to housing with screws and washers. Secure screws against loosening with Loctite blue or similar liquid thread locker.
- Check that the fan is centred in its housing and able to rotate freely. If necessary, slightly loosen screws between motor console and housing and realign motor console.
- Connect motor to the mains electricity supply.
- For subsequent procedures, see Section 5. "Commissioning and start-up".

## 10. Important information for Ex-zones

### 10.1 Instruction manual supplement “Ex”

If the oil-air filter ACN is operated in or in connection with an explosive atmosphere, the following supplementary instructions in the “Instruction Manual Ex” must be followed in addition to the instructions in the specification “ACN and DCN oil-air filter” and “BMA 0010 Operating Manual and Fitting Instructions / oil-air filter ACN”.

### 10.2 Intended use

The oil-air filter is a component under the terms of RL 94/9/EC and may only be operated in or in connection with an explosive atmosphere if the conditions below are met.

#### 10.2.1 Explosive atmosphere

Ambient pressure  $p_0$  0.8 to 1.1 bar

Operation is forbidden in an explosive atmosphere resulting from explosive dust or unstable substances as defined in RL 67/548/EEC.

#### 10.2.2 Instructions for use

The oil-air filter was designed to be free of ignition sources in accordance with DIN EN 14986. The oil-air filter is available in versions suitable for the following categories:

For use in Zone 1 or Zone 2:

CE Ⓜ II 2 G IIB TX

For use in Zone 22:

CE Ⓜ II 3 D TX.

The minimum ignition energy of combustible dusts is:

MZE  $\geq$  10 mJ

Permissible ambient temperature is:

$-20\text{ °C} \leq TU \leq +40\text{ °C}$

Maximum surface temperature is dependent on the oil involved. Maximum surface temperature is identical with maximum oil temperature.

The ignition temperature of the oil to be cooled must be at least 50°C higher than the maximum permissible surface temperature.

The presence of dust in the cooling air can cause inadmissible electrostatic charging of the powder coating of the cooler and housing, so the oil-air filter may only be used in a dust-free environment in Zone 1 or Zone 2.

Rubbing with a dry cloth can cause inadmissible electrostatic charging of the powder coating of the cooler and housing, so only damp cloths may be used for cleaning purposes.

The operating company is responsible for ensuring that all requirements for operation as intended are met.

### 10.3 Industrial safety instructions



If the oil-air filter is used as a component of a device or sub-assembly under the terms of RL 94/9/EC, the manufacturer of the device or sub-assembly is responsible for ensuring and confirming the conformity of the device or sub-assembly with the relevant directive.

If the oil-air filter is used as part of an installation, the company operating the installation is obliged to ensure that the requirements of RL 1999/92/EC and any additional national requirements are met.

The operating company is obliged to check whether, on the basis of the instructions for use, the oil-air filter is suitable for operation in the explosive atmosphere that is actually present.

There are no effective ignition sources during trouble-free operation of the oil-air filter. The operating company is obliged to perform the checks, maintenance and repairs set out in the instruction manual in order to ensure trouble-free operation.

The operating company must deactivate any oil-air filter that is not in full working order. The oil-air filter must not be operated again before completion of the necessary repairs.

### 10.4 Installation and assembly



Installation and assembly must be performed in accordance with the Instruction Manual BMA 0010 and the instructions provided in this supplement.

Only the self-locking screws supplied with the device may be used.

Any additional components used e.g. temperature or pressure sensors must belong to the Category assigned to the respective installation zone as defined in RL 1999/92/EC. Use components from Category II 2 G for Zone 1, Category II 3 G for Zone 2 and Category II 3 D for Zone 22. The manufacturer's instructions must be followed.

Always select a motor in Category II 2 G or II 2 D.

The oil-air filter must have a potential-free connection to adjacent components. The required earth resistance is  $<10^6$  ohm.

## 10. Important information for Ex-zones

### 10.5 Checks, maintenance and repairs



In addition to the maintenance instructions contained in the instruction manual BMA 0010, the following directions must be observed in order to prevent and identify faults.

Any faults must be rectified immediately in accordance with the maintenance and repair instructions.

The fan must be able to move freely at all times in order to prevent overheating, which can result in surface temperatures reaching inadmissible levels. To this end, clearances between the fan and the housing and radiator grille must be checked regularly. If the clearances fall below the minimum values specified in "TD Annex 7.7, clearance dimensions", the oil-air filter must be deactivated. It must not be operated again until the necessary repairs have been carried out.

The oil-air filter must not be used as a step, storage shelf or support, as this could lead to an inadmissible reduction of the above-mentioned minimum clearances required.

As any accumulation of dust on the fan can cause an imbalance that may result in damage to the motor bearings, the fan must be cleaned regularly.

Do not carry out checks, servicing or maintenance work on the oil-air filter if an explosive atmosphere is present.

Suitable safety measures in accordance with DIN EN 1127-1, Annex A must be implemented when work is carried out in an explosive atmosphere. Smoking, fire and naked flames are prohibited.

Only tools defined in DIN EN 1127-1, Annex A as suitable for such operating conditions may be used.

In order to maintain the explosion protection strategy, only replacement parts specified and approved by the manufacturer may be used in the event of repairs.

### 10.6 Testing



Under the terms of RL 1999/92/EC, the oil-air filter must be tested before first operation to ensure that it is assembled correctly and in perfect working order. The tests set out BMA 0010 and the additional tests specified below must be carried out and the results documented by qualified personnel or an employee of R+L HYDRAULICS GmbH, Werdohl.

The clearances between the fan and the housing and the fan and the radiator grille must be checked before first operation and at regular intervals thereafter, see Section 6.

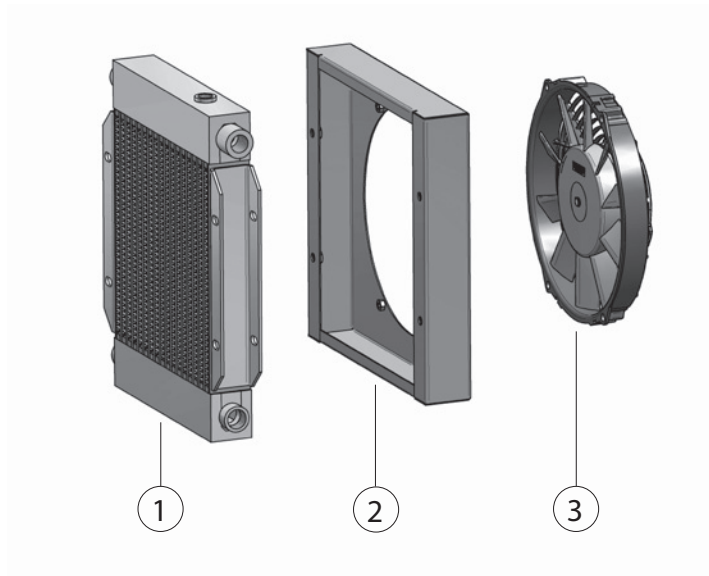
The potential-free connection with adjacent components and the earth resistance must be checked before first operation and at regular intervals thereafter, see Section 5.

Under the terms of RL 1999/92/EC, the oil-air filter must be tested at the latest every 3 years to ensure that it is in perfect working order. The tests must be carried out and the results documented by qualified personnel or an employee of R+L HYDRAULICS GmbH, Werdohl. Testing shall be in accordance with the provisions of BMA 0010 with the addition of the tests specified above.

# APPENDIX

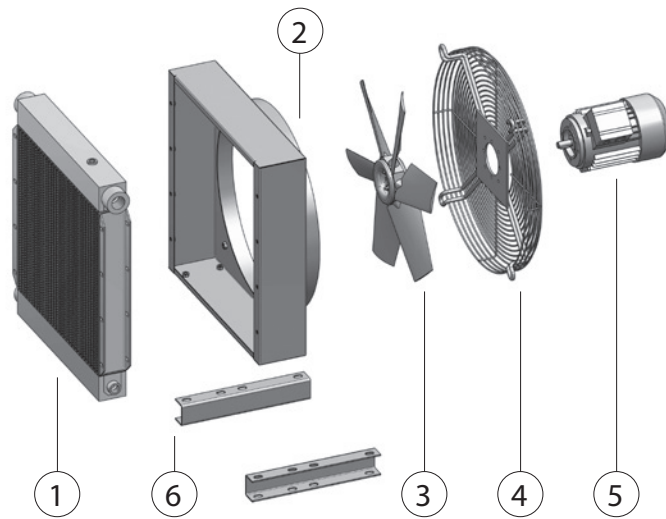
## Illustrations & diagrams

**Fig. 1:**  
Sub-assemblies ACN-5



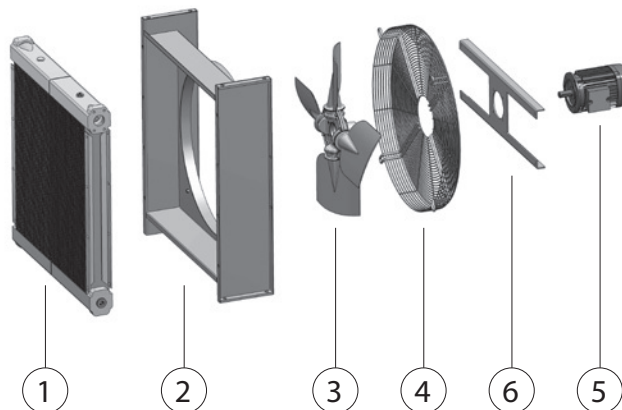
- 1. Radiator
- 2. Housing
- 3. Fan sub-assembly

**Fig. 2:**  
Sub-assemblies ACN-10 – ACN-60



- 1. Radiator
- 2. Housing
- 3. Fan
- 4. Protective grid
- 5. Motor
- 6. Foot brackets

**Fig. 3:**  
Sub-assemblies  
ACN-70 – ACN-100



- 1. Radiator
- 2. Housing
- 3. Fan
- 4. Protective grid
- 5. Motor
- 6. Motor console

## Illustrations

Fig. 4:  
Nameplate

<b>R+L HYDRAULICS</b>	
Gerätebezeichnung / unit designation	DCN-5-1-12-S
Artikelnummer / material number	DCN0001
Seriennummer / serial number	NC 001122 - 01
Datum / date	08.10.2012
Max. Betriebsdruck statisch / max. operating pressure static	20 bar
Max. Betriebsdruck dynamisch / max. operating pressure dynamic	26 bar
Max. Betriebstemperatur / max. operating temperature	120 °C
Motordaten siehe Motortypenschild / motor data see motor type plate	
R+L Hydraulics GmbH, D-58791 Werdohl, Friedrichstraße 6	

Fig. 5:  
Required clearances

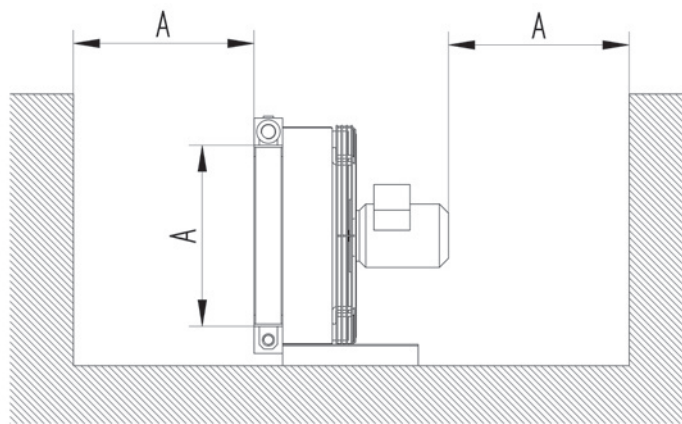


Fig. 6:  
Sub-assemblies  
ACN-70 – ACN-100

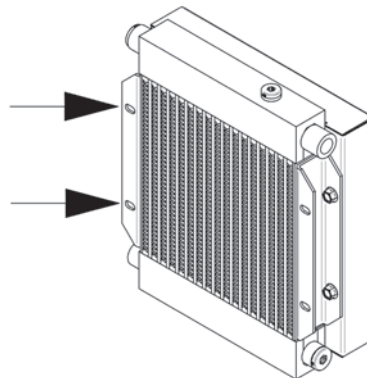
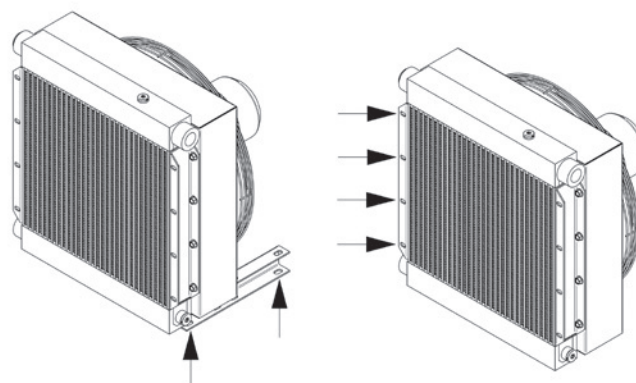
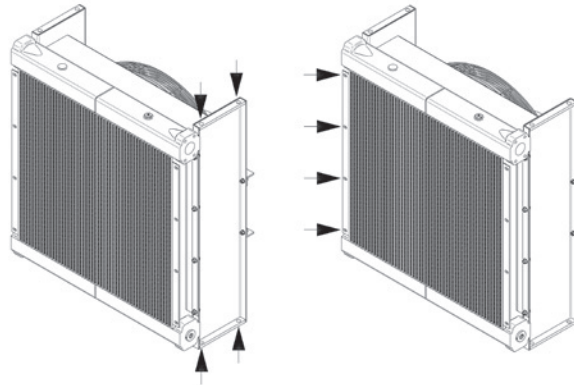


Fig. 7:  
Mounting points  
ACN-10 – ACN-60

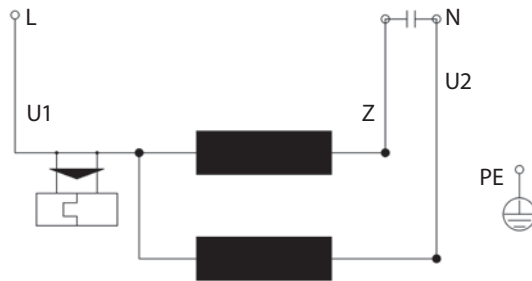


## Illustrations

**Fig. 8:**  
Mounting points ACN-70 – ACN-100



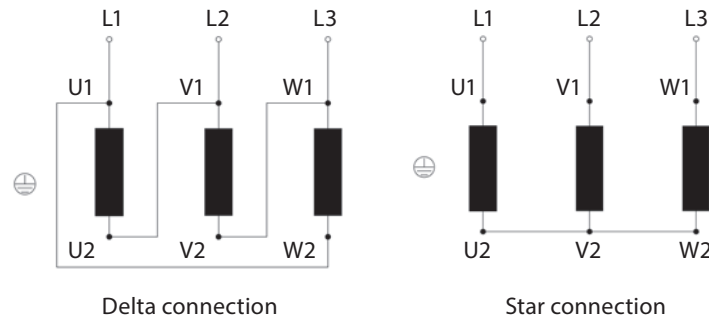
**Fig. 9a:**  
Electrical connections ACN-5  
(230V 50Hz, one phase)



Colour coding:

- U1: Blue
- Z: Brown
- U2: Black
- PE: Green/yellow

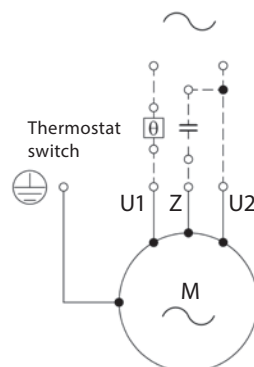
**Fig. 9b:**  
Electrical connections ACN-5  
(230/400V 50Hz, three phases)



Colour coding:

- L1: Black
- L2: Blue
- L3: Brown
- U1: Black
- V1: Blue
- W1: Brown
- U2: Green
- V2: White
- W2: Yellow

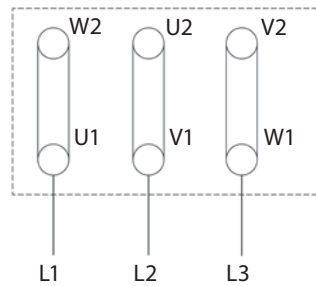
**Fig. 10a:**  
Electrical connections  
ACN-10 – ACN-60 (230 V 50 Hz, one phase)



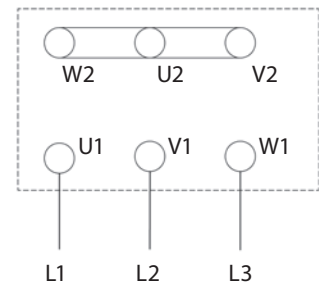
For terminal assignment,  
please refer to label in motor  
terminal box

## Illustrations

**Fig. 10b:**  
Electrical connections ACN-10 – ACN-100  
(230/400V 50Hz, three phases)

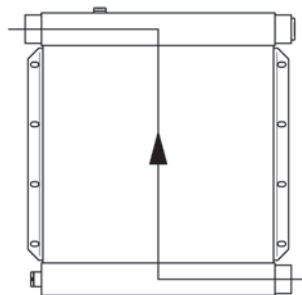


Delta connection

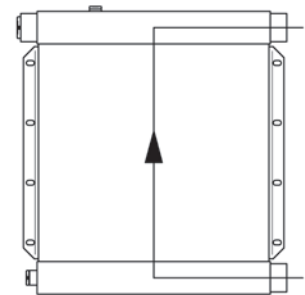


Star connection

**Fig. 11:**  
Hydraulic connection  
One-way radiator  
(ACN-5-1 bis ACN-100-1)

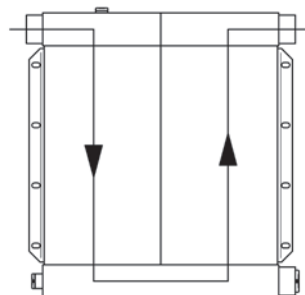


Variant a (Standard)

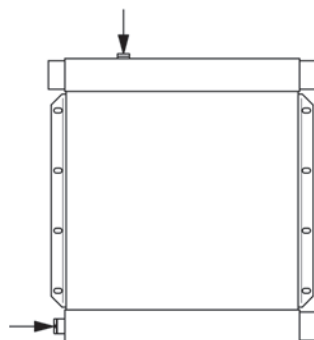


Variant b (reduced cooling performance)

**Fig. 12:**  
Hydraulic connection  
Two-way radiator  
(ACN-5-2 bis ACN-60-2)

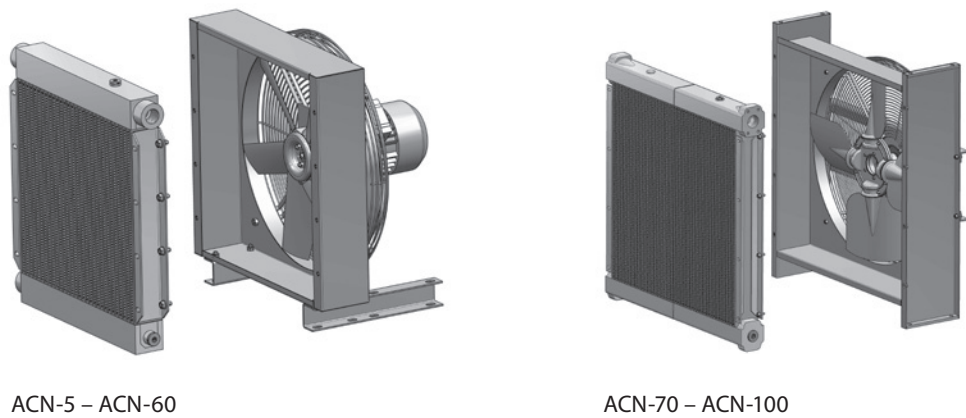


**Fig. 13:**  
Measurement ports

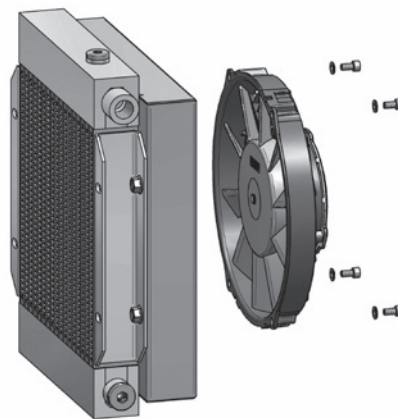


## Illustrations

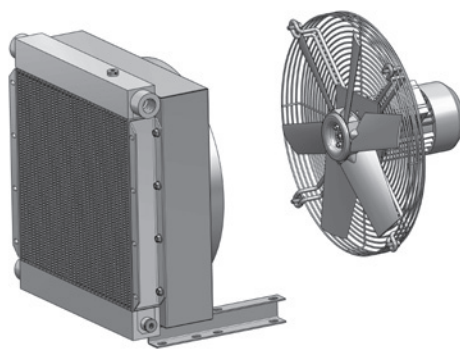
**Fig. 14:**  
Dismantling the radiator



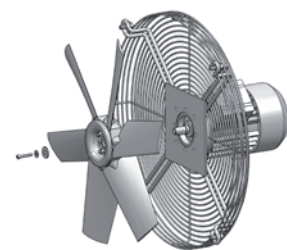
**Fig. 15:**  
Dismantling the electric motor ACN-5



**Fig. 16:**  
Dismantling the electric motor ACN-10 – ACN-60

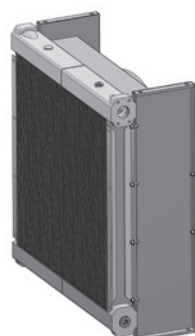


a. Dismantling fan sub-assembly

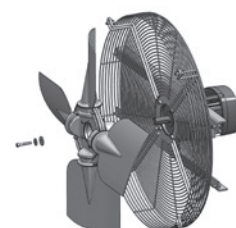


b. Dismantling fan and protective grid

**Fig. 17:**  
Dismantling electric motor ACN-70 – ACN-100



a. Dismantling fan sub-assembly

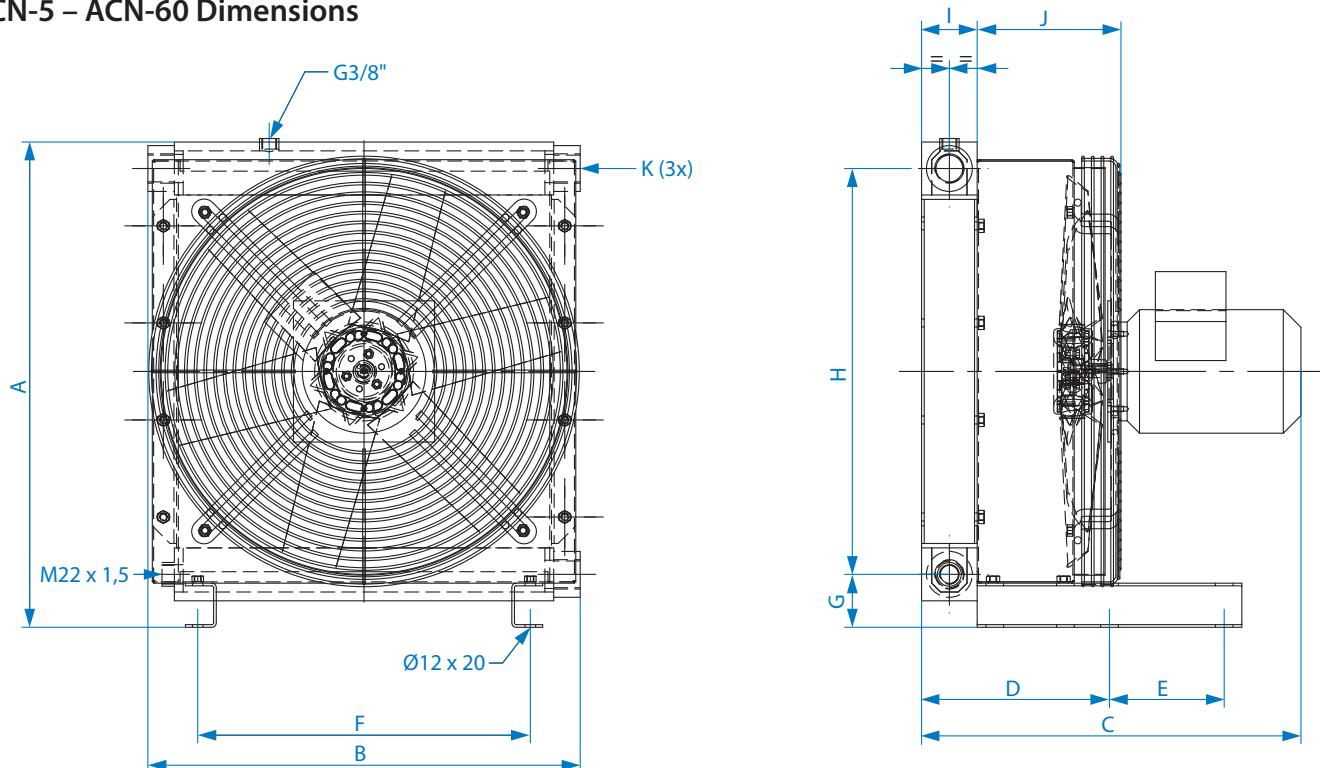


b. Dismantling fan and protective grid



## Technical data and dimensions

### ACN-5 – ACN-60 Dimensions



Frame size	A	B	C	D	E	F	G	H	I	J	K
ACN-5	340	300	142	*	*	272	25	290	45	97	G1/2"
ACN-10	430	347	396	199	100	239	40	360	63	128	G1"
ACN-20	430	347	426	230	100	239	40	360	94	128	G1"
ACN-30	550	490	430	213	130	377	60	460	63	163	G1"
ACN-40	550	490	461	244	130	377	60	460	94	163	G1"
ACN-50	712	670	470	213	130	554	72	610	63	183	G1 1/2"
ACN-60	712	670	500	244	130	554	72	610	94	183	G1 1/2"

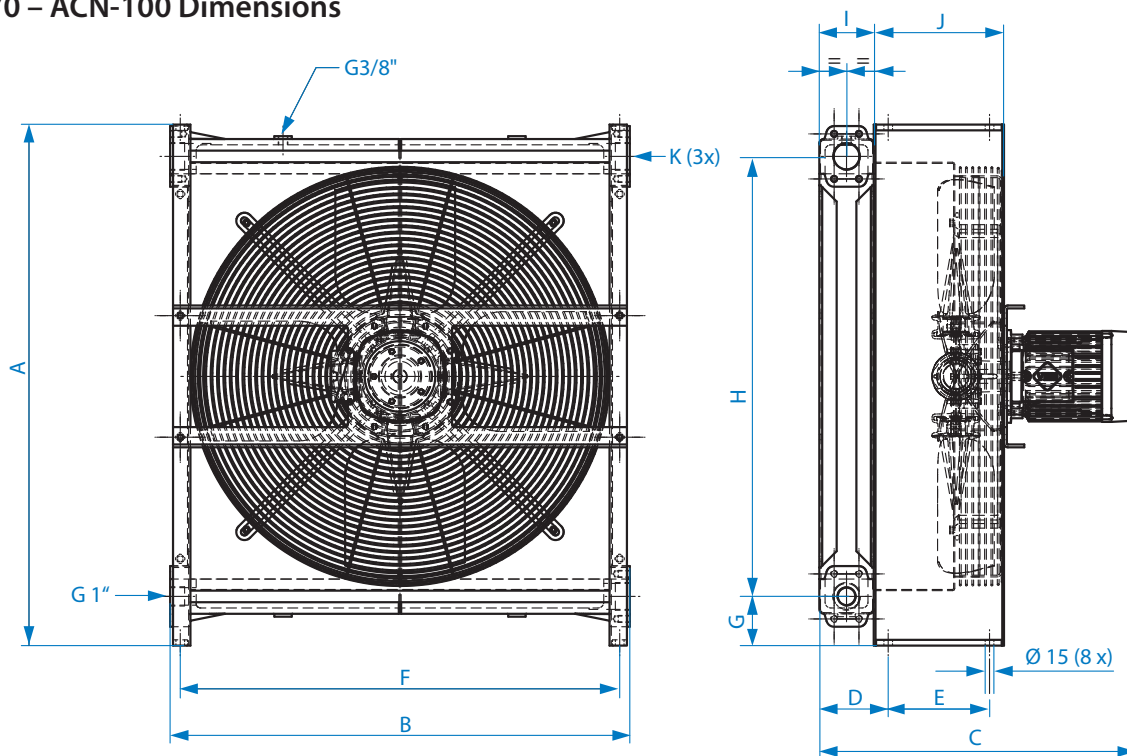
\* ACN-5 without mounting brackets

### Technical data

Series	Motor	Power consumption	Airflow	Noise level	Noise level	Weight	Order code
	[kW/UPM]	[A]	[m³/sec.]	1 m [dB(A)]	7 m [dB(A)]	[kg]	
ACN-5	0.11/2450	0.51	0.24	-	-	8	ACN-5-X-230.1-S
ACN-5	0.10/2500	0.2	0.23	-	-	8	ACN-5-X-400.2-S
ACN-10	0.37/3000	1	0.41	74	57	17	ACN-10-X-400.2-S
ACN-10	0.25/1500	0.8	0.24	61	44	17	ACN-10-1-400.4-S
ACN-20	0.37/3000	1	0.42	76	59	20	ACN-20-X-400.2-S
ACN-30	0.25/1500	0.8	0.62	70	53	25	ACN-30-X-400.4-S
ACN-30	0.18/1000	0.7	0.49	62	45	26	ACN-30-1-400.6-S
ACN-40	0.25/1500	0.8	0.63	72	55	32	ACN-40-X-400.4-S
ACN-50	0.55/1500	1.5	1.42	77	60	40	ACN-50-X-400.4-S
ACN-50	0.18/1000	0.7	0.88	67	50	37	ACN-50-1-400.6-S
ACN-60	0.55/1500	1.5	1.25	77	60	49	ACN-60-X-400.4-S

Noise levels can vary by ±3 dB (A) due to sound reflecting from nearby objects, natural frequency of the unit etc. We reserve the right to amend technical data without notice.

### ACN-70 – ACN-100 Dimensions



Frame size	A	B	C	D	E	F	G	H	I	J	K
ACN-70	900	794	585	119	175	759	85	760	94	225	SAE 2" und G1 1/2"
ACN-80	1000	908	571	119	175	873	85	860	94	225	SAE 2" und G1 1/2"
ACN-90	1100	1008	647	119	200	973	85	960	94	250	SAE 2" und G1 1/2"
ACN-100	1200	1075	647	119	200	1040	85	1060	94	250	SAE 2" und G1 1/2"

### Technical data

Series	Motor [kW/UPM]	Power consumption [A]	Airflow [m³/sec.]	Noise level 1 m [dB(A)]	Noise level 7 m [dB(A)]	Weight [kg]	Order code
ACN-70	0.75/1000	2.43	1.78	77	64	91	ACN-70-1-400.6-S
ACN-70	0.37/750	1.6	1.3	69	56	91	ACN-70-1-400.8-S
ACN-80	1.1/1000	3.15	2.82	79	68	115	ACN-80-1-400.6-S
ACN-80	0.55/750	2.04	2.05	72	60	115	ACN-80-1-400.8-S
ACN-90	2.2/1000	5.35	3.6	85	72	140	ACN-90-1-400.6-S
ACN-90	1.1/750	3.25	2.56	76	64	134	ACN-90-1-400.8-S
ACN-100	2.2/1000	5.35	4.48	84	71	160	ACN-100-1-400.6-S
ACN-100	1.1/750	3.25	3.2	76	64	154	ACN-100-1-400.8-S

Noise levels can vary by ±3 dB (A) due to sound reflecting from nearby objects, natural frequency of the unit etc. We reserve the right to amend technical data without notice.

## Declaration of Incorporation under the terms of Machine Directive 2006/42/EG

---

### Appendix II 1B Original Declaration of Incorporation

Manufacturer:	R+L HYDRAULICS GmbH Friedrichstrasse 6 58791 Werdohl Germany
Person authorised to compile the relevant technical documentation:	R+L HYDRAULICS GmbH Friedrichstrasse 6 58791 Werdohl Deutschland
Product:	ACN oil-air cooler Heat exchanger for the cooling of oil, water/glycol (glycol content > 40 %), HFD fluids Frame sizes ACN 5 bis ACN 100

The manufacturer hereby declares that the above-named product is 'partly completed machinery' under the terms of the Machine Directive. The product is intended exclusively for incorporation in machinery or partly completed machinery and therefore does not fulfil all the requirements of the Machine Directive.

The applied and fulfilled essential requirements of the Machine Directive for this product are listed in the Appendix to this Declaration.

The special technical documentation in accordance with Appendix VII Part B has been compiled. The person authorised to compile the technical documentation undertakes to transmit relevant information to the national authorities in response to any reasoned request. Documentation may be transmitted by normal mail in hard copy form, or via electronic data media.

The product must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machine Directive.

The above-named product fulfils the requirements of the following relevant directives:

Pressure Equipment Directive 2014/68/EU  
Low Voltage Directive 2014/35/EU  
Machine Directive 2006/42/EG  
Regulation 327/2011 to ERP-Directive 2009/125/EG

Werdohl, 01.06.2023

*Timo Weber*

---

Timo Weber, Managing Director

Number Appendix I	Description	Applied	Fulfilled	Remarks
1.	<b>Essential health and safety requirements</b>			
1.1.2.	Principles of Safety Integration	x	x	
1.1.3.	Materials and products	x	x	
1.1.4.	Lighting	x	x	
1.1.5.	Design of machinery to facilitate its handling	x	x	
1.1.6.	Ergonomics	x	x	
1.3.	Protection against mechanical hazards	x	x	
1.3.1.	Risk of loss of stability	x	x	
1.3.2.	Risk of break-up during operation	x	x	
1.3.3.	Risks due to falling or ejected objects	x	x	
1.3.4.	Risks due to surfaces, edges or angles	x	x	
1.3.7.	Risks related to moving parts	x	x	
1.3.8.2.	Moving parts involved in the process	x	x	
1.3.9.	Risks of uncontrolled movements	x	x	
1.4.	Requirements for guards and protective devices	x	x	
1.4.1.	General requirements	x	x	
1.4.2.	Special requirements for guards	x	x	
1.4.2.1.	Fixed guards	x	x	
1.5.	Risks due to other hazards	x	x	
1.5.1.	Electricity supply	x	x	
1.5.3.	Energy supply other than electricity	x	x	
1.5.4.	Errors of fitting	x	x	
1.5.5.	Extreme temperatures	x	x	
1.5.8.	Noise	x	x	
1.5.9.	Vibrations	x	x	
1.6.	Maintenance	x	x	
1.6.1.	Machinery maintenance	x	x	
1.6.4.	Operator intervention	x	x	
1.6.5.	Cleaning of internal parts	x	x	
1.7.	Information	x	x	
1.7.1.	Information and warnings on the machinery	x	x	
1.7.2.	Warning of residual risks	x	x	
1.7.4.	Instructions	x	x	
1.7.4.1.	General principles for the drafting of instructions	x	x	
1.7.4.2.	Contents of the instructions	x	x	
1.7.4.3.	Sales literature	x	x	