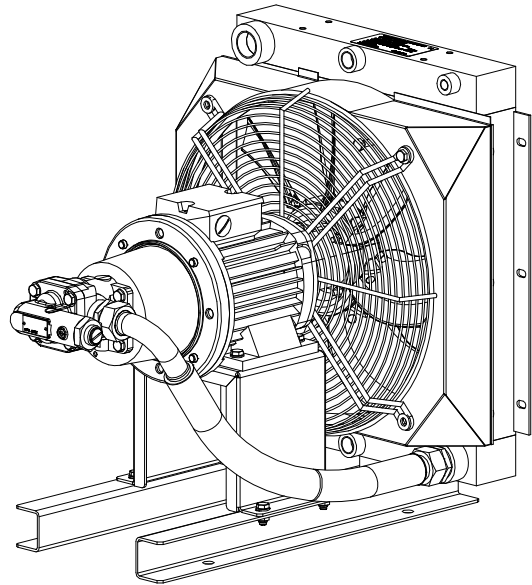




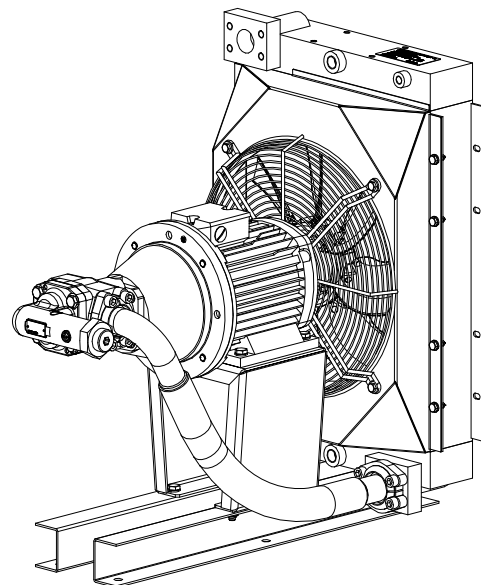
# Oil/air cooler

series  
OPC

according to directive 94/9/EC  
(ATEX 95)



**Oil/air cooler; example: OPC 200 to 400**



**Oil/air cooler; example: OPC 500 and 600**



The oil/air cooler series OPC is an efficient high-performance cooler. It has a compact design and was developed for cooling hydraulic oil, gear oil and lubricant.

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## 1 Advice

### 1.1 General advice

Please read through these assembly instructions carefully before you assemble the oil/air cooler. Please pay special attention to the safety instructions!



The oil/air cooler is suitable and approved for the use in hazardous locations. When using the cooler in hazardous locations please observe the special advice and instructions regarding safety in enclosure A.

The assembly instructions are part of your product. Please store them carefully and close to the oil/air cooler. The copyright for these assembly instructions remains with **KTR** Kupplungstechnik GmbH.

### 1.2 Safety and advice symbols



**DANGER!**

**Danger of injury to persons.**



**CAUTION!**

**Damages on the machine possible.**



**ATTENTION!**

**Pointing to important items.**



**WARNING!**

**Hints concerning explosion protection.**

### 1.3 General hazard warnings



**DANGER!**

**With assembly and disassembly of the oil/air cooler it has to be made sure that the entire drive train is secured against accidental switch-on. You may be seriously hurt by rotating parts. Please make absolutely sure to read through and observe the following safety indications.**

- All operations on and with the oil/air cooler have to be performed taking into account "safety first".
- Please make sure to switch off the power pack before you perform your work on the oil/air cooler.
- Secure the power pack against accidental switch-on, e. g. by providing warning signs at the place of switch-on or removing the fuse for current supply.
- Do not reach into the operation area of the machine as long as it is in operation.
- Please secure the rotating drive components against accidental contact. Please provide for the necessary protection devices and covers.

### 1.4 Intended use

You may only assemble and disassemble the oil/air cooler if you

- have carefully read through the assembly instructions and understood them
- had technical training
- are authorized by your company

The oil/air cooler may only be used in accordance with the technical data (see catalogue hydraulic components). Unauthorized modifications on the oil/air cooler are not admissible. We will not assume liability for any damage that may arise. In the interest of further development we reserve the right for technical modifications.

The oil/air cooler series OPC described in here corresponds to the technical status at the time of printing of these assembly instructions.

|   |           |                |               |                      |
|---|-----------|----------------|---------------|----------------------|
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**2 Technical data**

**Type OPC 200 to 400**

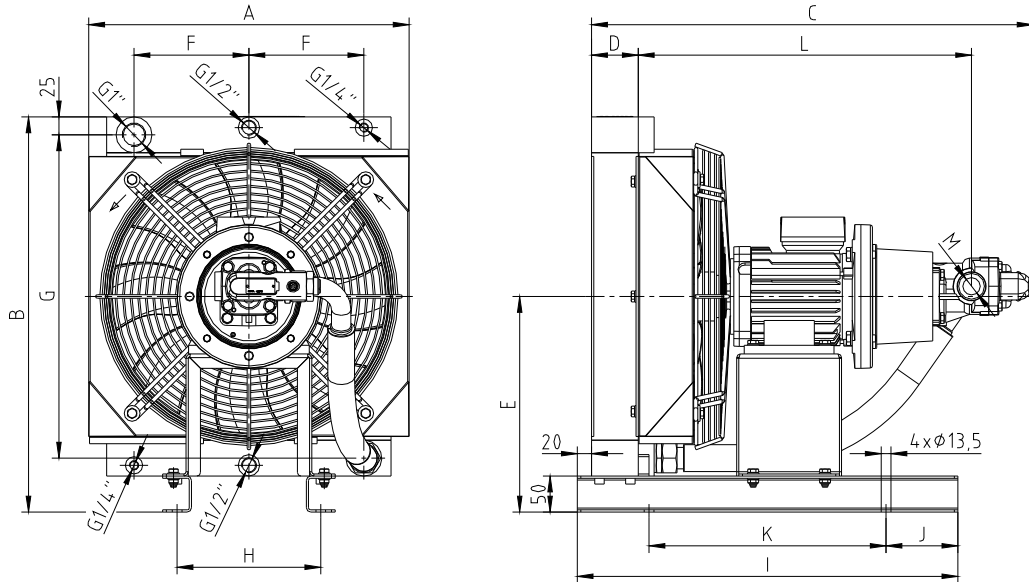


Illustration 1: OPC 200 to 400

**Table 1: Dimensions– Type OPC 200 to 400**

| Type of cooler     | Voltage        | Current [A] | Speed [RPM] | l/min. | kW/°C | Dimensions [mm] |     |      |     |     |     |    |     |
|--------------------|----------------|-------------|-------------|--------|-------|-----------------|-----|------|-----|-----|-----|----|-----|
|                    |                |             |             |        |       | A               | B   | C    | D   | E   |     |    |     |
| OPC 200-4D-0.75kW  | 230/400V 50 Hz | 1.8         | 1400        | 5.5    | 0.12  | 350             | 460 | 572  | 63  | 255 |     |    |     |
| OPC 200-12D-0.75kW |                |             |             | 16.7   | 0.14  |                 |     | 596  |     |     |     |    |     |
| OPC 200-16D-0.75kW |                |             |             | 21.4   | 0.15  |                 |     |      |     |     |     |    |     |
| OPC 300-4D-0.75kW  |                |             |             |        |       |                 | 5.5 | 0.20 | 446 | 550 | 615 | 65 | 300 |
| OPC 300-12D-0.75kW |                |             |             | 16.7   | 0.22  | 638             |     |      |     |     |     |    |     |
| OPC 300-16D-0.75kW |                |             |             | 21.4   | 0.24  |                 |     |      |     |     |     |    |     |
| OPC 400-4D-0.75kW  |                |             |             |        |       |                 | 5.5 | 0.24 | 446 | 550 | 645 | 95 | 300 |
| OPC 400-12D-0.75kW |                |             |             | 16.7   | 0.26  | 668             |     |      |     |     |     |    |     |
| OPC 300-16D-0.75kW |                |             |             | 21.4   | 0.28  |                 |     |      |     |     |     |    |     |

| Type of cooler     | Dimensions [mm] |     |     |     |     |     |     |        | Weight [kg] |
|--------------------|-----------------|-----|-----|-----|-----|-----|-----|--------|-------------|
|                    | F               | G   | H   | I   | J   | K   | L   | M      |             |
| OPC 200-4D-0.75kW  | 115             | 360 | 174 | 530 | 100 | 330 | 426 | G 3/4" | 35          |
| OPC 200-12D-0.75kW |                 |     |     |     |     |     | 435 | G 1"   |             |
| OPC 200-16D-0.75kW |                 |     |     |     |     |     |     |        |             |
| OPC 300-4D-0.75kW  | 160             | 450 | 200 | 530 | 100 | 330 | 464 | G 3/4" | 42          |
| OPC 300-12D-0.75kW |                 |     |     |     |     |     | 473 | G 1"   |             |
| OPC 300-16D-0.75kW |                 |     |     |     |     |     |     |        |             |
| OPC 400-4D-0.75kW  | 160             | 450 | 200 | 550 | 75  | 400 | 465 | G 3/4" | 46          |
| OPC 400-12D-0.75kW |                 |     |     |     |     |     | 474 | G 1"   |             |
| OPC 300-16D-0.75kW |                 |     |     |     |     |     |     |        |             |



**2 Technical data**

**Type OPC 500 and 600**

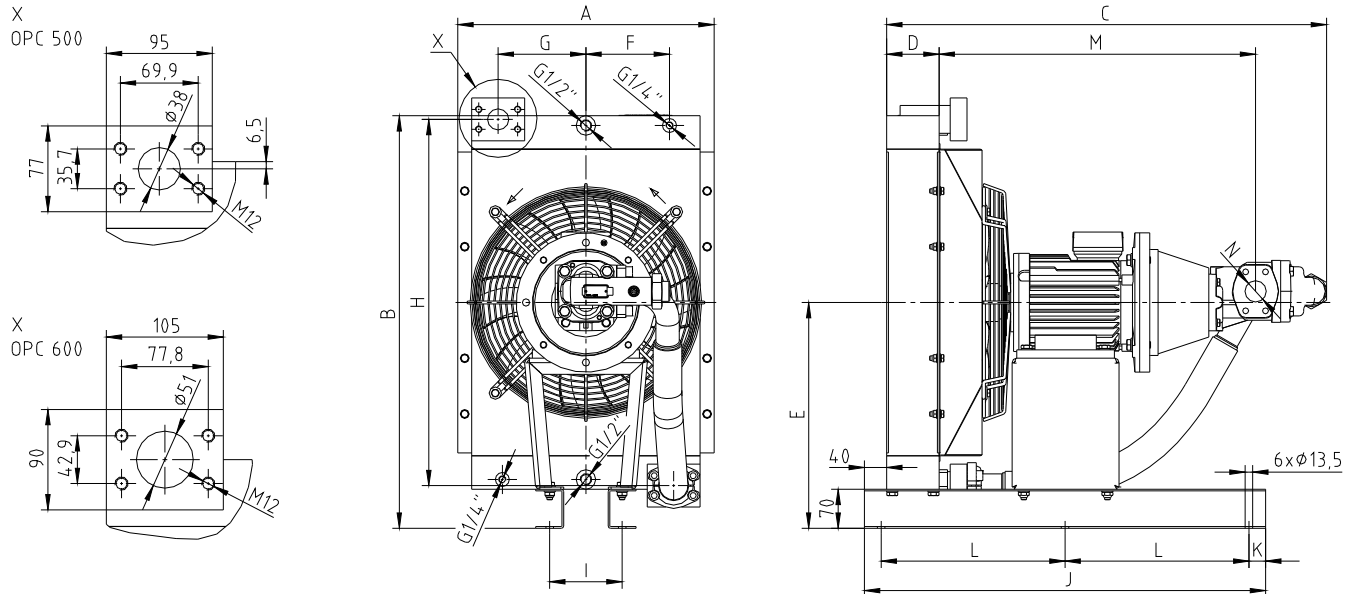


Illustration 2: OPC 500 and 600

**Table 2: Dimensions – Type OPC 500 and 600**

| Type of cooler    | Voltage        | Current [A] | Speed [RPM] | l/min. | kW/°C | Dimensions [mm] |      |     |    |     |
|-------------------|----------------|-------------|-------------|--------|-------|-----------------|------|-----|----|-----|
|                   |                |             |             |        |       | A               | B    | C   | D  | E   |
| OPC 500-16D-2.2kW | 230/400V 50 Hz | 4.9         | 1410        | 21.5   | 0.40  | 460             | 740  | 740 | 94 | 405 |
| OPC 500-25D-2.2kW |                |             |             | 33.4   | 0.48  |                 |      |     |    |     |
| OPC 500-32D-2.2kW |                |             |             | 42.7   | 0.50  |                 |      |     |    |     |
| OPC 500-40D-2.2kW |                |             |             | 53.5   | 0.52  |                 |      |     |    |     |
| OPC 600-16D-2.2kW |                |             |             | 607    | 840   | 21.5            | 0.65 | 819 | 94 | 455 |
| OPC 600-25D-2.2kW |                |             |             |        |       | 33.4            | 0.68 |     |    |     |
| OPC 600-32D-2.2kW |                |             |             |        |       | 42.7            | 0.70 |     |    |     |
| OPC 600-40D-2.2kW |                |             |             |        |       | 53.5            | 0.73 |     |    |     |

| Type of cooler    | Dimensions [mm] |       |     |     |     |    |       |     |            | Weight [kg] |
|-------------------|-----------------|-------|-----|-----|-----|----|-------|-----|------------|-------------|
|                   | F               | G     | H   | I   | J   | K  | L     | M   | N          |             |
| OPC 500-16D-2.2kW | 150             | 157.5 | 657 | 130 | 720 | 30 | 330.0 | 547 | G 1"       | 75          |
| OPC 500-25D-2.2kW |                 |       |     |     |     |    |       | 568 | SAE 1 1/2" |             |
| OPC 500-32D-2.2kW |                 |       |     |     |     |    |       |     |            | 626         |
| OPC 500-40D-2.2kW |                 |       |     |     |     |    |       | 225 | 226.0      |             |
| OPC 600-16D-2.2kW | 96              |       |     |     |     |    |       |     |            |             |
| OPC 600-25D-2.2kW |                 | 96    |     |     |     |    |       |     |            |             |
| OPC 600-32D-2.2kW | 98              |       |     |     |     |    |       |     |            |             |
| OPC 600-40D-2.2kW |                 | 98    |     |     |     |    |       |     |            |             |



### 3 Assembly

The oil/air cooler series OPC is supplied ready for assembly.

#### 3.1 Components of oil/air cooler

| Component | Quantity | Description               |
|-----------|----------|---------------------------|
| 1         | 1        | Oil/air cooler „Type OPC“ |

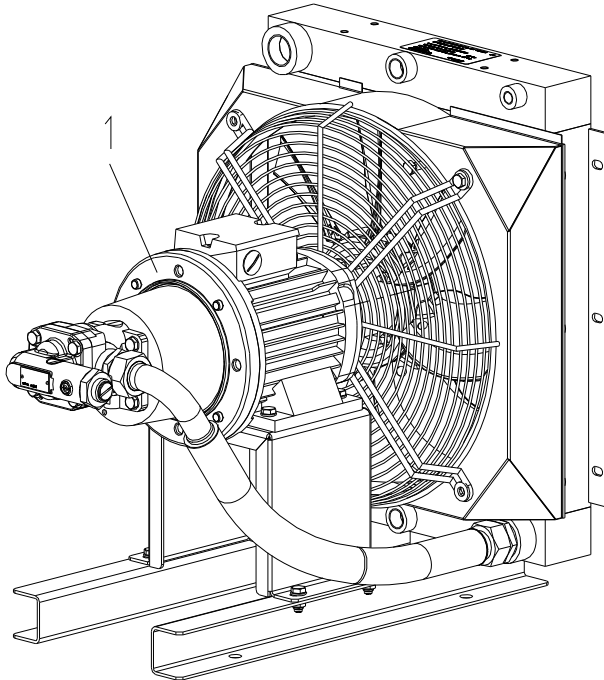


Illustration 3: Oil/air cooler; example: OPC 200 to 400

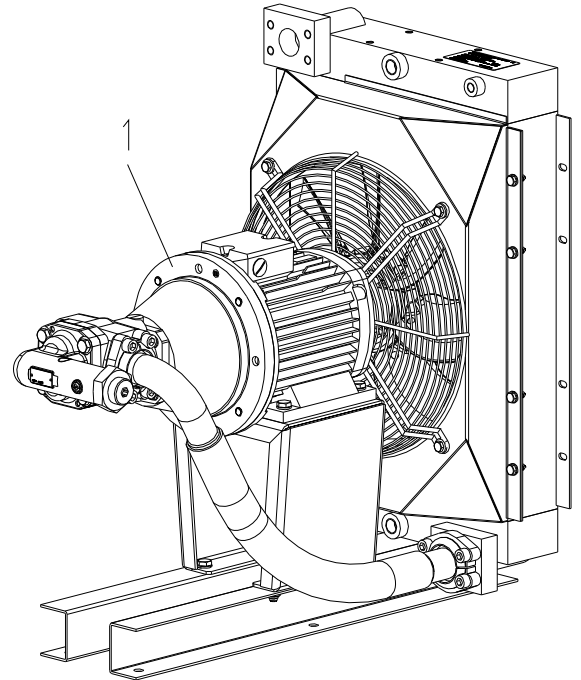


Illustration 4: Oil/air cooler; example: OPC 500 and 600

#### 3.2 Place of installation

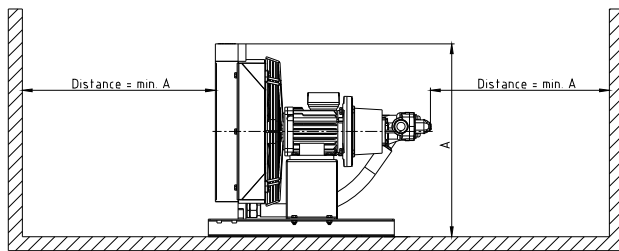


Illustration 5: Oil/air cooler; example: OPC 200 to 400

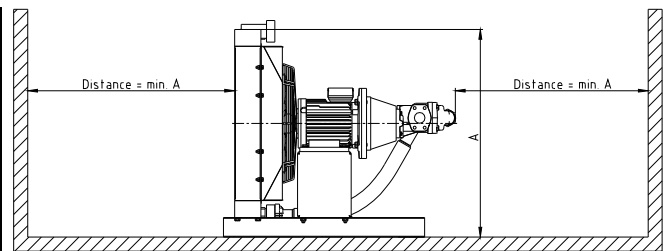


Illustration 6: Oil/air cooler; example: OPC 500 and 600

In order to achieve the optimum cooling capacity the distance to the nearest wall should not fall below the height of the cooling element (dimension A), since only in this way a proper air supply is ensured (see illustration 5 and 6).



**ATTENTION!**

The height of installation should not exceed the figure  $\leq 1000 \text{ m'}$ .



**CAUTION!**

Return flow of heated air as well as assembly of the cooling network in front of heat sources should be avoided.



**CAUTION!**

The engines have to be protected from direct solar radiation.



**ATTENTION!**

An unfavourable place of installation may increase the noise level by reflection of sound.

|   |           |                |               |                      |
|---|-----------|----------------|---------------|----------------------|
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### 3 Assembly

#### 3.3 Assembly of oil/air cooler

The oil/air cooler can be assembled in various conditions, while the vertical design should be preferred. Sufficient fastening has to be assured.



#### ATTENTION!

Some motors have covered holes which serve for draining off condensed water which may be generated.

Please use proper hydraulic hoses to connect the oil/air cooler. It is connected on the discharge side of the cooling element (see illustrations 7 and 8).

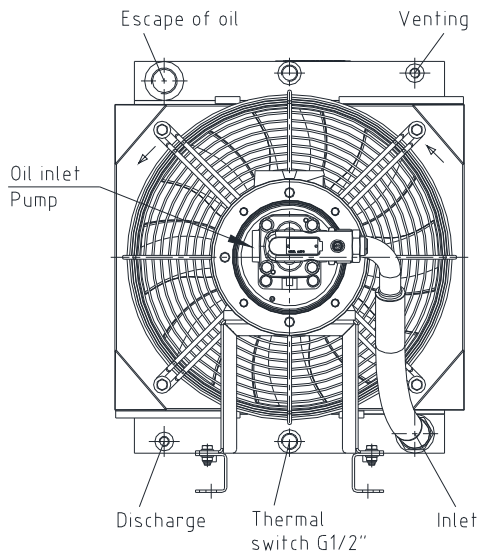


Illustration 7: Oil/air cooler; example: OPC 200 to 400

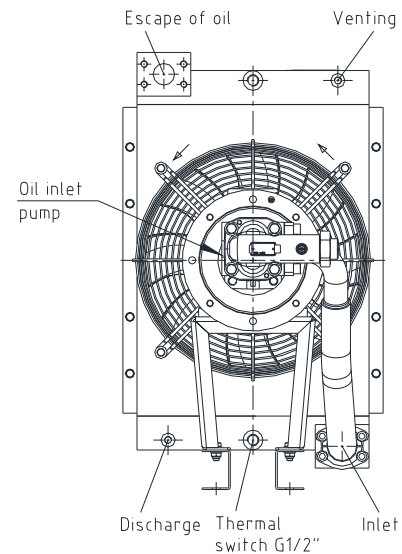


Illustration 8: Oil/air cooler; example: OPC 500 and 600



#### ATTENTION!

Please make sure that the connections and hoses are adapted to the oil/air cooler with regard to pressure, flow rate, temperature and liquidity.



#### WARNING!

With the use in hazardous locations only those hydraulic hoses may be used which comply with the specifications of the overall approval of the machine.

Motor and pump are supplied by KTR ready for use. With the inspection of the ROTEX<sup>®</sup> coupling (see KTR-N 40210) the disassembly or assembly of the bellhousing has to be performed in accordance with KTR-N 41010.

#### 3.4 Thermal switch – Motor/pump

A thermal switch for controlling the fan/motor/pump unit can be screwed directly in the cooler or tank (see illustration 7 and 8).



#### ATTENTION!

Please observe the attached operating/assembly instructions of motor, pump and thermal switch.



#### WARNING!

With the use in hazardous locations only those thermal switches may be used which comply with the specifications of the overall approval.

|   |                       |                                    |
|---|-----------------------|------------------------------------|
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### 3 Assembly

#### 3.5 Operating pressure and temperature

The maximum operating pressure must not exceed the load of 26 bar during operation.



**CAUTION!**

With dynamic load pressure peaks exceeding 16 bar should be avoided.

The maximum permissible temperature of the medium to be cooled must not exceed 80 °C.



**ATTENTION!**

The temperature of the environment and the medium to be cooled should not change suddenly. Please note boiling and freezing point.

#### 3.6 Electrical connection

Before connecting the motor to the electricity supply network compare the specifications on the type label (see illustration 10 or 11) of the motor to the voltage, fuse and frequency of the mains.



**WARNING!**

With the use in hazardous locations only electric motors and pumps with ATEX approval may be used.

The torsional direction of the fan and the air flow have to comply with the arrows specified on the oil/air cooler (see illustration 9).

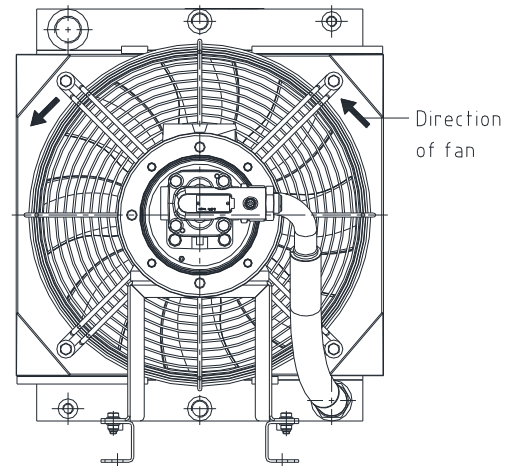


Illustration 9: Torsional direction - fan



**ATTENTION!**

The electric motors may only be connected to the electric supply by qualified personnel. Please observe the generally admitted specifications and electrical safety regulations!



**CAUTION!**

Incorrect connections, damaged cables etc. may energize the components connected or make the electric motor rotate in the wrong direction.



**WARNING!**

The cooler has a separate grounding connection. It has to be connected to the grounding of the machine. The grounding connection of the motor has to be connected to the grounding cable of the electricity grid.



**ATTENTION!**

Please observe the operating instructions of the electric motor used by you.



**ATTENTION!**

Please observe the operating instructions of the pump used by you.



**ATTENTION!**

We recommend to use an overload protection for the electric motor.

|   |           |                |               |                      |
|---|-----------|----------------|---------------|----------------------|
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### 3 Assembly

#### 3.7 Cooling medium

The oil/air cooler is suitable for cooling mineral oil.



**CAUTION!**

With the use in hazardous locations the oil/air cooler may only be used for cooling hydraulic fluids and mineral oils. Any other use of OPC is not permissible.

#### 3.8 Start-up

Please make sure that the oil/air cooler is connected and fastened properly.



**CAUTION!**

A grounding cable has to be connected with the oil/air cooler in the position marked (on the yellow grounding symbol).

**Please observe the following procedure:**

- Flush the oil/air cooler with the same fluid/medium as the other systems.
- Filter the fluid/medium after flushing.
- The oil/air cooler and the protective grid have to be free from damage.
- The fan needs to rotate freely. The minimum gap (as per chapter 4.3) for fixed components needs to be observed.
- Hydraulic connections have to be tightened.
- The internal side of the fan housing has to be free from any objects.



**DANGER!**

Components which may be ejected may cause personal injuries, damage other components or generate sparking.

#### 3.9 Maintenance and service

Preventing maintenance operations have to be performed by the user regularly.

**The following items have to be reviewed:**

- Unusual noise or vibrations must not be generated.



**CAUTION!**

With vibrations inspect the screw connection of motor and pump. If the damage has not been repaired in this way, please consult with KTR Kupplungstechnik GmbH.



**CAUTION!**

During operation please pay attention to changes in operating noise of the ROTEX® coupling.

- Proper fastening of the oil/air cooler has to be assured.
- Impurity of the oil/air cooler reduces the cooling power, make sure to clean your cooler (see item *cleaning*).
- Inspect the oil/air cooler for damages, defective components have to be replaced.
- Inspect the cooler grid, the pump and the screwing on the pipeline for leakages.

|   |                       |                                    |
|---|-----------------------|------------------------------------|
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### 3 Assembly

#### 3.9 Maintenance and service



**CAUTION!**

Leakages have to be repaired immediately.

Oil which has escaped has to be removed properly, since oil residues may vaporize on hot components and ignite.



- Inspect distances between fan and protective grid (see chapter 4.3).
- Inspect the individual components of the device for electrically conductive connections (including the grounding cable connection).
- The motor temperature has to be inspected with the device operating.



**ATTENTION!**

It must not exceed the temperature class specified in the type label (see illustration 10 or 11).

- The bearings of the motors are permanently lubricated.



**ATTENTION!**

Re-lubrication is not possible. Please observe the service life of the motor bearing as per the data sheet of the motor manufacturer.

#### 3.10 Cleaning



**DANGER!**

Please make sure before cleaning that the oil/air cooler has cooled down. Touching the heated components causes burns.



**CAUTION!**

With cleaning processes, e. g. with water, disconnect the cooler from the main power supply. The protection class needs to be observed.

##### Side of air fins

The air fins can be cleaned with compressed air. If seriously soiled, cleaning should be done by means of a high-pressure cleaner and degreasing agent. The jet should be kept carefully and in parallel with the air fin.

##### Oil side of cooling element

The oil side of the cooling element is cleaned by flushing with a degreasing agent. Afterwards flush with the fluid/medium which is used later.

|   |                       |                                    |
|---|-----------------------|------------------------------------|
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GmbH  
D-48407 Rheine

**Oil/air cooler  
Series OPC  
Operating/Assembly instructions**

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### 3 Assembly

#### 3.11 Marking of standard oil/air cooler

The standard oil/air cooler of series OPC is marked as follows:



Illustration 10: Example - type label

#### 3.12 Spares inventory, customer service addresses

A basic requirement to ensure the operational readiness of the oil/air cooler is a stock of the most important spare parts on site.


Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage at [www.ktr.com](http://www.ktr.com).



#### ATTENTION!

**KTR does not assume any liability or warranty for the use of spare parts and accessories which are not provided by KTR and for the damages which may incur as a result.**

### 4 Enclosure A

Advice and instructions regarding the use in  hazardous locations

Sizes: OPC 200 to OPC 600

#### 4.1 Intended use in hazardous locations

Conditions of operation in  hazardous locations

The oil/air coolers comply with the specifications as per EC directive 94/9/EC.

#### Industry (with the exception of mining)

- *Equipment group II of category 2 and 3 (oil/air cooler is not approved/not suitable for equipment group 1)*
- *Media class G (gases, fogs, steams), zone 1 and 2 (oil/air cooler is not approved/not suitable for zone 0)*
- *Media class G (dusts), zone 22 (oil/air cooler is not approved/not suitable for zones 20 and 21).*
- *Explosion group IIC (explosion class IIA and I (IIA1) is included).*

|   |                       |                                    |
|---|-----------------------|------------------------------------|
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#### 4 Enclosure A

Advice and instructions regarding the use in  hazardous locations

#### 4.1 Intended use in hazardous locations

Temperature class (for devices of category 2G):

| Temperature class | Ignition temperature (Tz) | max. perm. medium temperature |
|-------------------|---------------------------|-------------------------------|
| T1                | > 450 °C                  | 360 °C                        |
| T2                | 300 °C < Tz ≤ 450 °C      | 240 °C                        |
| T3                | 200 °C < Tz ≤ 300 °C      | 160 °C                        |
| T4                | 135 °C < Tz ≤ 200 °C      | 108 °C                        |
| T5                | 100 °C < Tz ≤ 135 °C      | 80 °C                         |
| T6                | 85 °C < Tz ≤ 100 °C       | 68 °C                         |

Explanation:

The permissible ambient temperature  $T_a$  for the use of oil/air coolers is intended from - 20 °C to + 40 °C. Subject to the operation the media temperature may be considerably higher than the ambient temperature. The component with the lowest temperature class is decisive for the operation.

#### 4.2 Marking for hazardous locations

The oil/air coolers series OPC for the use in hazardous locations are marked as follows:

Short labelling:



II 2G c IIB T X

The labelling with explosion group IIB includes the explosion groups IIA and I (IIA1).


Illustration 11:  
Examples - type labels



|   |                       |                                    |
|---|-----------------------|------------------------------------|
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#### 4 Enclosure A

Advice and instructions regarding the use in  hazardous locations

#### 4.3 Start-up for the use in locations



##### CAUTION!

The oil/air cooler may only be used in the locations marked in the type label of the oil/air cooler and motor and pump. The element with the least favourable class is decisive here. The decision of assessment of the place of operation is subject to the user.



##### ATTENTION!

The start-up of the coolers is permissible by qualified personnel only.

- It has to be made sure that oil connection lines are properly connected.
- The connections as well as the cooling element and pump have to be tested for leakages after start-up.
- The electric motor is to be connected such that the torsional direction marked on the oil/air cooler is observed as described with 3.6 *Electrical connection*.
- The cooler has to be grounded separately in the place marked (equipotential bonding of cooler).



##### CAUTION!

Leakages have to be removed immediately.

Oil which has escaped has to be removed properly, since oil residues may vaporize on hot components and ignite.

- When the motor is running vibrations and unusual noise (frictional noise, squeaking, etc.) must not arise.



##### CAUTION!

With vibrations inspect the screw connection of motor and pump.

If the damage has not been repaired, the oil/air cooler must not be operated any longer. Please consult with KTR Kupplungstechnik GmbH.



##### CAUTION!

During operation please pay attention to changes in operating noise of the ROTEX® coupling.

- The oil/air cooler may be set up horizontally only and must be screwed to the base through all fastening holes.
- It has to be assured that the suction distances and discharge distances (distance A, as described in place of arrangement) are observed.
- The cooler grid must not be sealed by foreign substances.
- Inspect distances between fan and protective grid.



##### ATTENTION!

The minimum gap width between rotating components and fixed components is at least 1 % of the relevant contact diameter. The distance is 2.8 mm for OPC 200 (Ø 280 mm), for OPC 600 consequently 5.2 mm (Ø 520 mm). This distance may be reduced to 10 % of the shaft diameter with a minimum of 2 mm and a maximum of 13 mm. The result is that the minimum gap is assessed as being sufficient for all fans with a shaft diameter up to 200 mm.

- With the trial run please make sure that the permissible motor temperature is not exceeded. The temperature classes of cooler and motor specified in the type label have to be observed reliably (see chapter 4.1).

|   |                       |                                    |
|---|-----------------------|------------------------------------|
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|---|--|---|
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|   |  |   |
|   |  |   |

**4 Enclosure A**

**Advice and instructions regarding the use in  hazardous locations**

**4.4 Assembly – disassembly**

The cooler is assembled by KTR Kupplungstechnik GmbH.  
The oil/air cooler is supplied ready for use.


A repair of the cooler by the plant operator/an external fitter is permissible only after written authorization by KTR Kupplungstechnik GmbH.

With an interim storage the oil/air cooler needs to be protected against environmental impacts (moisture, solar radiation, etc.) as well as excessive dust exposure.

**4.5 Permissible accessories for the use in  hazardous locations**

Only those accessories certified by ATEX and complying with the temperature class (example: thermal switch, etc.) may be mounted to the oil/air cooler.


**WARNING!**  
 Any modifications in design on the oil/air cooler intended for the use in hazardous locations are not permissible.


**CAUTION!**  
 The customer bears the sole responsibility for all machining processes performed subsequently. KTR does not assume any warranty claims.

|   |                       |                                    |
|---|-----------------------|------------------------------------|
| Please observe protection note ISO 16016. | Drawn: 15.05.14 Kb/Wy | Replaced for: KTR-N dated 04.05.12 |
|   | Verified: 03.07.14 Kb | Replaced by:                       |



KTR Kupplungstechnik  
GmbH  
D-48407 Rheine

**Oil/air cooler  
Series OPC  
Operating/Assembly instructions**

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#### 4 Enclosure A

Advice and instructions regarding the use in  hazardous locations

#### 4.6 EC Certificate of conformity

### EC Certificate of conformity

according to the EC directive 94/9/EC dated March 23, 1994  
and to the legal regulations

The manufacturer - KTR Kupplungstechnik GmbH, D-48432 Rheine - states that the

#### **Oil/air coolers - OPC**

are devices corresponding to article 1 (3) b) of directive 94/9/EC and comply with the general safety and health requirements according to enclosure II of directive 94/9/EC.

According to article 8 (1) of directive 94/9/EC the technical documentation is deposited with the institution:

IBExU  
Institut für Sicherheitstechnik GmbH  
Fuchsmühlenweg 7  
  
09599 Freiberg

The manufacturer - KTR Kupplungstechnik GmbH, D-48432 Rheine - states that the

#### **oil/air coolers - OPC**

described in the present operating instructions are in accordance with the following standard:

|                  |   |
|------------------|---|
| 2006/42/EG       | Machinery Directive (MRL)               |
| 97/23/EG         | Directive for Pressure Equipment (DGRL) |
| DIN EN ISO 12100 | Safety of machines                      |

Rheine, 2014-05-14  
Date

i. V.   
Christoph Bettmer  
Product Manager

Please observe protection note ISO 16016.

|           |                |
|-----------|----------------|
| Drawn:    | 15.05.14 Kb/Wy |
| Verified: | 03.07.14 Kb    |

|               |                      |
|---------------|----------------------|
| Replaced for: | KTR-N dated 04.05.12 |
| Replaced by:  |                      |