ORIGINAL

Operating Instruction

Compressor unit with direct current motor

KC 100 and KC 200

Manufacturer:

Koci Elektromaschinen GbR
Zittauer Straße 12
02796 Kurort Jonsdorf
Germany

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List of content

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1. Introduction

These operating instructions are applicable for the compressor units KC 100 and KC 200.
Description: **compressor unit with direct current motor**

Type: _____

Machine no.: _____

Please read these operating instructions carefully to enable a safe operation.

1.1 Owner's responsibility

These operating instructions are part of the product. The owner/ operator has to consider on own authority:

- Operating and maintenance staff has access to these operating instructions always.
- All advices and safety regulations have to be fulfilled during shutdown and operating.
- These operating instructions have to be retained for further utilization.

1.2 Copyright

The duplication of text, technical data, drawings or similar is prohibited and demands the agreement of the manufacturer.
Technical changes at the compressor unit stay reserved for the manufacturer.

1.3 General advices

The company Koci Elektromaschinen GbR determined that requirements regarding to spare parts and their delivery, information for reparation or questions about technical issues of the compressor can be handled only with the correct type or machine number.
If you did not purchase the compressor directly from the manufacturer please first contact your provider.

Additionally it is prohibited to remove the appliance rating plate.

EU-Konformitätserklärung
(EC – Declaration of Conformity)

Koci Elektromaschinen GbR
Zittauer Straße 12
D - 02796 Kurort Jonsdorf

Hiermit erklären wir, dass die Maschinen/ Baueinheit:
(We declare the compliance of the product):

Bezeichnung: **Gleichstrom – Kompressoraggregat**
(Description) **(compressor unit with direct current motor)**

Typ: **KC 100 und KC 200**
(Type) **(KC100 and KC200)**

Modell: **1.0 bis 1.5**
(model) **(1.0 – 1.5)**

folgenden einschlägigen Bestimmungen entspricht (with the following requirements):

EG – Richtlinien (EC – Directives):
EG – Maschinenrichtlinie 2006/42/EG (2006/42/EG – machine-directive)
EG – Niederspannungsrichtlinie 2014/35/EU (2014/35/EU - low voltage directive)
EG – Richtlinie 72/245/EWG, in der Fassung 2004/104/EG, zuletzt geändert durch 2009/19/EG für von Fahrzeugen verursachte Funkstörungen (elektromagnetische Verträglichkeit) - als EUB / elektrische Unterbaugruppe / DEKRA-Bescheinigung Nr.: 200614931
(72/245ECC – directive relating to the radio interference (electromagnetic compatibility) of vehicles)

HAMANN CONSULT AG Schallpegelmessung (sound level gauging)

Person, die die technischen Unterlagen zur Verfügung stellt: Frau Brigitta Lachmann
(Person in charge of technical documents)

Kurort Jonsdorf, 30.06.2016

Koci, Silke - Geschäftsführer (managing director)

2. Warranty and complaints

The legal foundation of our guarantee management is the German Civil Code. But please consider the following regulations:

- Work carried out on our compressors under guarantee is only done in our workshop as a matter of principle because the machines are classified as easy to transport. In case of contact by others any guarantee claim cannot be asserted.
- Equally guarantee does not apply, if the compressor has been modified or altered without consultation and approval by our company.
- The guarantee is limited to the compressor only and includes material and manufacturing faults.
- Faults resulting from natural wear and tear, improper use, installation or insufficient maintenance are disregarded. Wear and tear elements are:
  - Solenoid discharge valve
  - Non-return valve
  - Pressure switch
  - Air filter
  - Fuse

  Furthermore the tube cooler is excluded from guarantee in case of traceable use as carry handle, what is not allowed and results destruction of itself.
- We reserve the right to determine how and by whom the repairs are to be made.
- Costs that may arise as an after-effect of the compressor's breakdown will not be accepted by our company.

3. Reference of utilization

3.1 conventional utilization

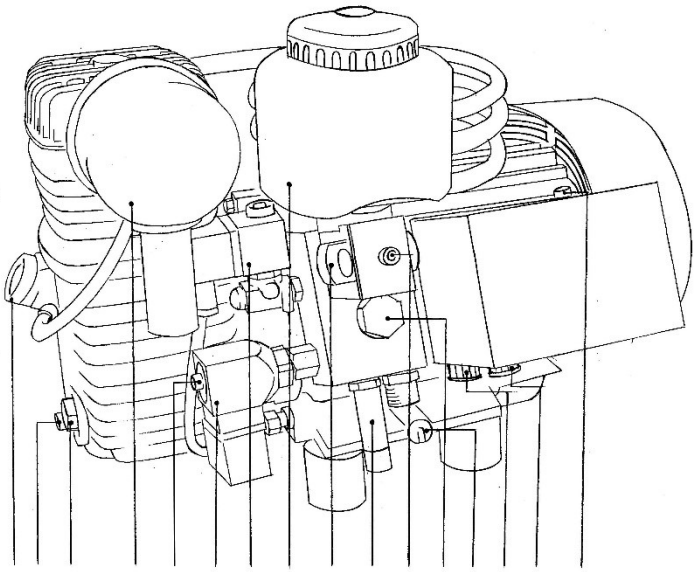
The compressor units with DC motor are designed for versatile applications in which a compressed air supply is needed to permanent disposition.
The compressor is provided solely for production of compressed air. Any other use is considered improper. The manufacturer is not responsible for any damages resulting from improper utilization – the risk carries the operator by himself.
Correct use includes also the compliance with the manufacturer's regulations of installation, operating and maintenance.

3.2 unconventional utilization

The compressor unit must not be used in hazardous areas - it is **not** protected against explosions.
Without additional air treatment compressed air from oil lubricated compressors is not suitable for the filling of breathing air equipment and use in dentistry or for operations where compressed air comes directly into contact with food.
Compressed air must **never** be directed at people. The concentrated energy causes a life-threatening situation.

4. Technical information about the compressor unit

4.1 Components account



1 oil filler neck
2 oil drain plug
3 oil level eye
4 air filter and intake manifold
5 pressure – adjustment screw
6 pressure switch
7 solenoid discharge valve[1]
8 antifreeze reservoir[1]
9 switch summer/ winter operation of the antifreeze pump[1]
10 safety valve
11 adjustment screw for antifreeze[1]
12 non-return valve
13 cable entry for battery 31 -
14 main terminal negative 30 +
15 cable entry
16 fine-wire fuse 12 V or 24 V

4.2 Technical description

The compressor unit with DC motor and control unit is a compact, powerful unit in block manner, which is composed of two main parts, the single cylinder – compressor and the DC motor as a drive source. Furthermore, we would like to mention following principal technical details that are integrated into the compressor and contribute to increased safety and functionality.

General area:
- intake silencer with air filter
- 4 rubber mounts for vibration damping
- tube cooler
- compressed air tank/ pressure container (delivery on request)

Area control block:
- solenoid discharge valve[1]
- pressure switch
- non-return valve
- safety valve
- silencer for the discharge air
- antifreeze pump with antifreeze reservoir(installation on request)

Field electric machine:
- power relay
- suppression equipment
- thermostats
- low voltage protection
- operating voltage independent of the control voltage
- ensure a low control current
- security protection by circuit board against false engaging from the outside of the compressor

To ensure the electrical connection security and the corresponding control over the compressor, a control light outside the device signals the respective operating.
An integrated momentum balance in the engine reduces vibration and provides a quiet and low-wear run. For further noise reduction the compressor units are fixed on four rubber mounts and completed with an intake silencer and an exhaust box on the discharge valve.

[1] only compressors with antifreeze pump

4.3 Technical Data

Compressor Unit KC 100/1.2.1

		12 V	24 V	48 V	80 V	110 V
Max. working pressure:	bar	10	10	10	10	10
Inlet volume:	l/min	75	75	75	75	75
Effect. capacity 6 bar:	l/min	52	52	52	52	52
Compressor speed:	rpm	1500	1500	1500	1600	1600
Motor rating:	kW	0,5	0,5	0,53	0,53	0,55
Power consumption:	A	48	24	13	8	5,5
System of protection:	IP	66	66	66	66	66
Shielded:		yes	yes	yes	yes	yes
Oil filling:	l	0,13	0,13	0,13	0,13	0,13
Weight:	kg	20	20	20	20	20
Noise level:	dB(A)	84	84	84	84	84
Dimension (LxWxH):	mm	390x255x320		390x265x320		

Compressor Unit KC 200/1.2.1

		12 V	24 V	48 V	80 V	110 V
Max. working pressure:	bar	10	10	10	10	10
Inlet volume:	l/min	150	150	150	150	150
Effect. capacity 6 bar:	l/min	104	105	105	106	106
Compressor speed:	rpm	2400	2500	2500	2600	2600
Motor rating:	kW	1	1	1	1,2	1,2
Power consumption:	A	96	48	24	16	5,5
System of protection:	IP	66	66	66	66	66
Shielded:		yes	yes	yes	yes	yes
Oil filling:	l	0,13	0,13	0,13	0,13	0,13
Weight:	kg	25	25	25	25	25
Noise level:	dB(A)	84	84	84	84	84
Dimension (LxWxH):	mm	440x255x320		440x285x320		

5. Commissioning

5.1 Location and assembly references

- Before the initial start-up the compressor unit must be screwed tightly on its location
- The compressor unit must be protected from dust and dirt to ensure the conventional functionality.
- The connection of the compressor should be chosen in accordance to the guidelines for the installation of compressed-air lines with a slight incline towards the boiler.
- Enough cooling should be provided.
- In case of installation in a vehicle, the cooling direction must no work against the airflow.
- The connection of the compressor unit should be done with a flexible hose connection.
- Please use the rubber mounts for placement and storing.
- The device has IP66 (splash-proof). So please protect the air supply (flexible hose connection towards air filter) and all the other parts from intensive water contact.
- The environment is not allowed to be humid or wet and no gases or liquids should be places nearby the compressor.

under voltage protection and control light

1. Under voltage protection

The operator should provide an operating voltage between -10 % and +20 % of the rated voltage.
The following faults occur, when the operating voltage does not lie correctly:

a) **The compressor cannot be switched on** – Fault: operating voltage under -10% of rated voltage.
b) **The compressor turns off automatically** – Fault: operating voltage under -25% of rated voltage.
c) **The compressor turns off automatically and can be switched on again only after the control switched was turned off and a waiting time of about 10 seconds.** – Fault: short interruption of operating voltage or control line (loose connection).

A correct and safe operation is only guaranteed, when the connection follows the description of the manufacturer or a confirmed (by the manufacturer) compliant circuit.
You have to be able to switch off the compressor at any time.

Any self-made changes in the original circuit during the legal warranty period cause an immediate loss of any claims.

2. Control light

The control switch and light have to be installed within the operator's viewing area.
An illumination of the control light indicates:

- **Loose connection** – Motor turns off automatically
- **excess temperature** – Motor turns off automatically and can be switched on after its cooling (ca. 45 min).

Please always investigate the reason of an occurring fault or glowing control light and arrange quick remedy to avoid consequential damages.

5.2 Installation – electrical

It is the responsibility of the operator/ owner to ensure that the compressor is wired professionally. Any electrical work should be carried out by a competent electrician and installed to meet all applicable local and national codes and regulations.
Therefore please read the following regulations carefully:

- Current, voltage and polarity of the power system must match the information on the appliance rating plate of the motor.

- The fuse regarding to the control lead should have (61) 2A.

- safety fuse in the lead-in:

	12 V	24 V	48 V	80 V	110 V
KC100/1.21	80 A	40 A	16 A	10 A	10
KC200/1.21	150 A	80 A	40 A	20 A	16

- The cross-sectional area of the lead-in must be chosen in such a way that, when the compressor is operating, the voltage on the terminal board or power relay does not fall below the necessary operating voltage. (12, 24, 48 or 80 V)

- Cu wire in mm²:

	Cu wire	Cu wire > 1m length
KC100/1.21 12V	10,0	16,0
KC100/1.21 24V	6,0	10,0
KC200/1.21 12V	25,0	35,0
KC200/1.21 24V	10,0	16,0
KC100/1.21 48V	2,5	4,0
KC100/1.21 80V	1,5	2,5
KC200/1.21 48V	2,5	4,0
KC200/1.21 80V	2,5	4,0
KC100/1.21 110V	1,5	2,5
KC200/1.21 110V	2,5	2,5

- The control 61 and KK can have at maximum a 0,75mm² Cu wire.

- The oil level on the compressor block must be checked. The oil level must be within/ at the red circle of the oil level eye.

Regulation:

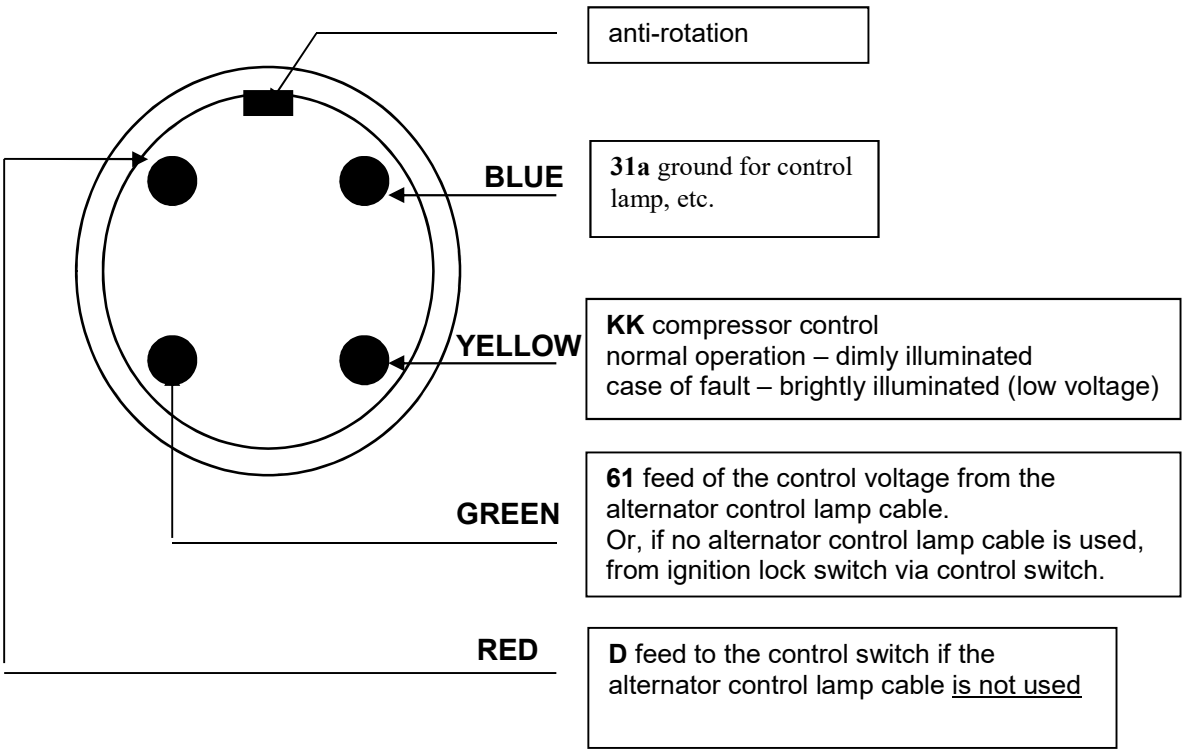
The compressor is regulated automatically by means of a pressure switch depending on the compressed air requirements. After the system has been switched on for the first time, the pressure switch controls the compressor's operating corresponding to the set pressure.

Pressure switch settings made at the factory

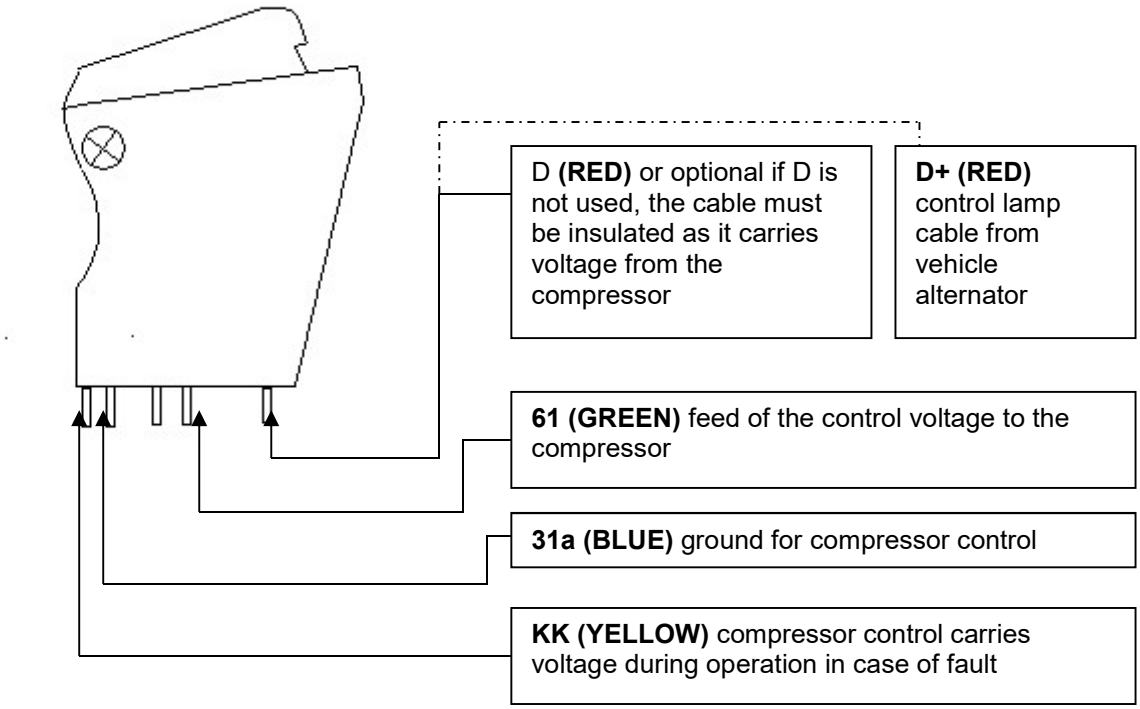
max. operational excess pressure	pressure switch - off excess pressure	pressure switch – on excess pressure
10 bar	8 – 9 bar	ca. 7 bar

Connection plug – cable installation – control line

view of cable or solder side



control switch with control lamp



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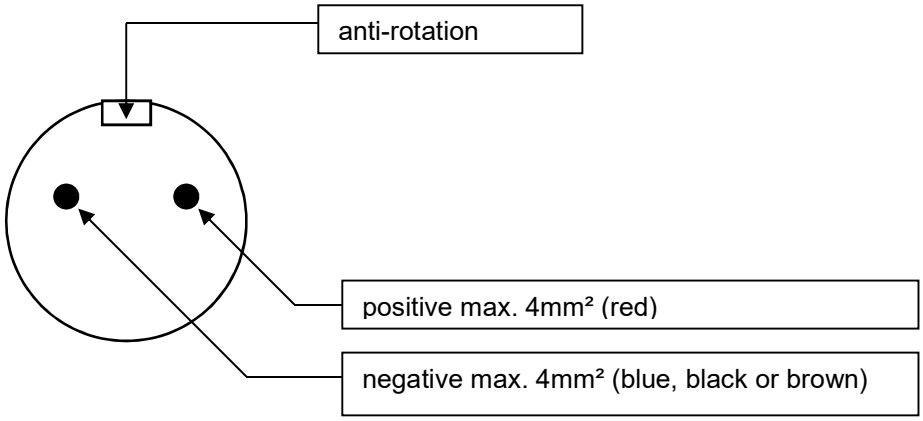
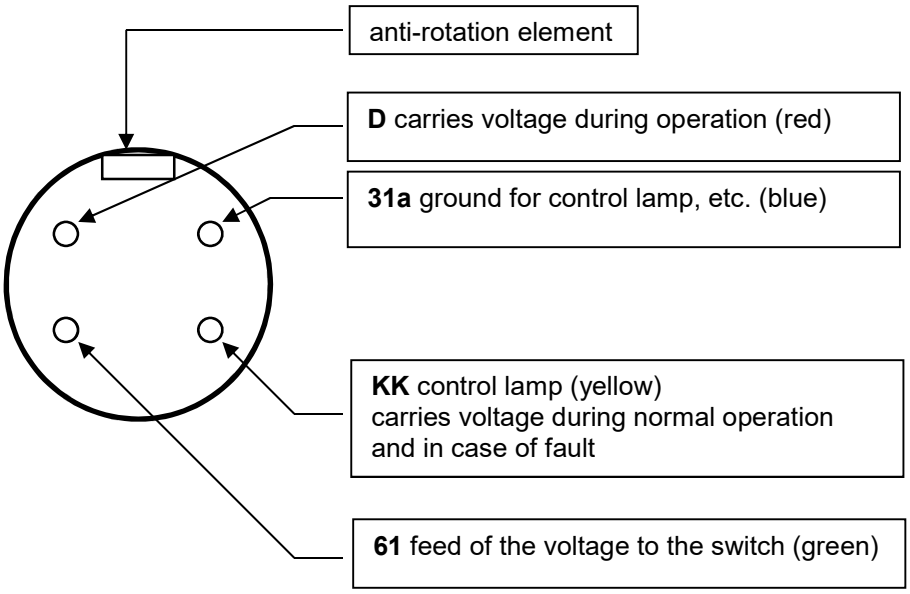
KC 100 and KC 200 48 V and more

jack in compressor for main cable entry



jack in compressor for control lead



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6. Maintenance

We advise the owner/ operator of the following maintenance guideline that have to be kept necessarily.

General reference notes

Please be sure that the compressor unit is switched off completely. Pressure leading lines have to be exhausted – drain the pressure in the container. Work on power-operated equipment must be carried out only by trained personnel or by specialists.

Compressor block

Check the oil level every six months – the oil level is not allowed to fall below the red circle in the oil level eye.
Attention:
If the oil level has dropped below the lower mark, oil must be refilled necessarily as it is determined by the oil regulations. Under no circumstances should more oil be filled than displayed in the max. oil level of the oil level eye.

- Switch off the compressor.
- Do an oil change every 500 operational hours or at least once per year.
- Unscrew the oil drainage screw and drain off all the oil in warm condition.
- Collect the oil in a receptacle and dispose of it correctly.
- The casing should be rinsed out with a small amount of new oil and then fill up with new oil.
- If due to unfavourable operating conditions water is discovered in the oil – this can be identified by a milky coloration in the oil level eye – the oil must be changed immediately.
- Please consider using a sieve or the original can when refilling the oil.

Oil regulation: motor – Oil SAE 5 W30

Cylinder head and valves

- The cylinder head is to be unscrewed after 3.000 operating hours, the function of the valves is to be checked and please clean the plate of the valve.
- Complete valve plates and/ or cylinder heads can be delivered from store.
- The compressor should be rebuilt after about 10.000 operating hours.

Clean and replace air filter

- The changeable insert in the air filter cap and the filter itself are made of foam or felt material.
- The filter should be replaced if a notable layer of dust is discovered on the filter or after 500 operating hours at least.

Maintenance of the bearings and carbon brushes of the DC motor

- The motor bearings are permanently lubricated and do not require re-lubrication.
- Under normal operating conditions, with system and surrounding temperatures of about 25 °C, the bearings should be replaced by new ones after about 10.000 hours of operation (rebuild).
- Increased wear of the bearings is to be expected if the surrounding temperature is much higher, approx. 40 °C, whereby changing the bearings is recommended after about 5.000 operating hours.
- The bearings should be replaces after three years regardless of the number of operating hours.
- After 1.500 operating hours the dc motor should be cleaned inside. Please make a visual inspection of the carbon brushes in that case.
- The carbon brushes are to be replaced as needed by the manufacturer or a specialist.
- If the commutator has shrunk considerably or if it is no longer round, it is necessary to rework this by the manufacturer or a specialist.

Checking the safety valve

- If the maximum permissible operating pressure (10 bar) is exceeded in the pressure container, the safety valve opens and ejects the excess air (at 11 bar) in order to protect the compressor and the compressed air user attached to it.
- The safety valve must be bled occasionally in order to prevent the valve seat sticking.
- A defect safety valve has to be replaced completely.
- The compressor must be switched of thereby and the compressed air reservoir emptied.

Attention: Interventions in the controls are prohibited as such action cancels any liability.

Pressure container (accessory if requested)

- The condensed water that gathers in the pressure container must be drained off every day using the condensed water drainage tap.
- Leaky pipe connections can lead to extensive loss of pressure.
- Occasional tightening of the pipe connections in necessary to prevent loss due to leakage.

Performance check

The effective performance of the compressor can be checked by measuring the compressed air reservoir filling time:

- Switch off the compressor.
- Close the compressed air reservoir.
- Release container pressure using condensation drainage tag and then close it again.
- Switch on the compressor and simultaneously check the refill time until excess pressure and compare it with the table.

Filling time in seconds (ca.) for 10-litre pressure container with the conditions of a constant voltage. (1 V deviations are about 100 rpm)

Typ	3 bar	6 bar	8 bar	10 bar
KC100/1.21 12V 24V	30	60	90	120
KC100/1.21 48V 80V	28	55	80	115
KC100/1.21 110V	28	55	80	115
KC200/1.21 12V 24V	20	35	50	65
KC200/1.21 48V 80V	20	35	50	65
KC200/1.21 110V	20	35	50	65

Torque specification

Please consider the following torque specifications during maintenance or assembly of replacement parts:

- E-connections KC 100 M5 3Nm
- E-connections KC 200 M8 10Nm
- oil drain plug 15 Nm
- oil level eye 2 Nm
- cylinder head and cylinder M6 15 Nm
- bearing shield and crankcase M5 5 Nm
- blower wheel M6 3 Nm
- rubber mount 20 Nm
- cam plate M8 30 Nm
- lid beneath M5 2 Nm

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Reference notes to anti-freeze pump

Your new compressor is equipped optionally with an anti-freeze pump that includes an anti-freeze reservoir.

Please use the following notes to ensure the correct functionality of this equipment:

Anti-freeze: You can use a standard commercial anti-freeze.

Switching over the pump: (from winter to summer operation)
The pump can be switched from winter to summer operation of the compressor.
Blue – winter operation: slide to the right
Red – summer operation: slide to the left

Attention: Do not switch over when the compressor is working!

Setting the anti-freeze pumping capacity
The pump is set to the min. anti-freeze pumping capacity. Depending on the weather conditions the pump can be set to a higher capacity by turning the adjusting screw (M6 hex socket screw) more toward the outside.

Attention: First loosen the securing nut – then adjust the adjusting screw – then tighten the securing nut again.

7. Safety regulations – environment protection

Explanation of the compressor's danger sign:

Caution: Hot surface – Please touch only with safety gloves!

7.1 Safety regulations

The European standards provide the most important regulation that the owner/ operator has to care about.
Furthermore we recommend considering the following:

- Be sure that no flames or sparks appear in the surroundings of the compressor.
- It is not allowed to switch on the compressor without the fan cover as protection from rotating parts. The fan cover hast to be screwed tightly after any maintenance or reparation.
- Ensure that the compressor only intakes clean air without any detrimental mixture.
- Never use the tube cooler as carry handle because of possible damage (breakage) increasing the loss of performance and possibility of injuries.
- During operation of the compressor, the tube cooler's surface is very hot – only touch with safety gloves.

7.2 Environment protection

Replacement parts, operating and auxiliary materials are to be disposed of according to the corresponding environmental regulations.

8. Troubleshooting

Before you start working on the compressor and its electrical system, be sure that it is turned off completely and can not be switched on again/ by accident. Check professionally that the compressor carries no voltage.
Work on the compressor must be carried out only by trained personnel or by specialists.

Where is the fault?	**Fault and remedy**
Operating voltage to contact terminal 30 relay (+), D+ (61) no control voltage – (31), control light is not on	Pre-fuse is defective, change fuse, no voltage from the alternator, *Check alternator, not properly connected, Check electrical system on the vehicle!*
Operating voltage to contact terminal 30 relay (+), No operating voltage to Plug D (Fuse F1) – (31), control light is not on	Check Fuse F1, change fuse, *Bend contacts in fuse holder,* no voltage from alternator, *not properly connected, Check electrical system on the vehicle!*
Operating voltage to contact terminal 30 relay (+), operating voltage to plug D (Fuse F1), No voltage at Plug 61 left plug under Fuse F1 in connection box, control light is on - dim	Defective control switch, *not properly connected, check circuit against circuit diagram. Check electrical system on the vehicle!*
Operating voltage to contact terminal 30 relay (+), operating voltage at Plug D (Fuse F1), no voltage at Plug 61 left plug under Fuse F1 in connection box, operating voltage at power relay (K1) on, control light is on – dim	Power contact on power relay (K1) no flow-through, *Exchange power relay (K1).*
Operating voltage to contact terminal 30 relay (+), operating voltage at Plug D (Fuse F1), voltage at Plug 61 – left Plug under Fuse F1 in connection box, control light is on – bright	Control voltage too low < 75% of operating voltage *Check electrical system on the vehicle, increase control voltage!* if control voltage < 90% of operating voltage the controls function again, motor can be switched on again. *Switch off control switch and switch on again after c. 15 seconds.* If motor doesn't run: *please send in for repair!*
Motor sometimes switches off but can be switched back on after a short while.	Loose contact – check fault on controls Automatic reconnection lock has been triggered. *Check electrical system on the vehicle! Switch off control switch and switch on again after c. 15 seconds.*
Compressor running too slowly, not enough power, check operating voltage at contact terminal 30 relay (+) on.	Operating voltage at terminal 30 relay (+) contacts terminal 31 (-) at motor *if voltage drop at the cable, use cable of greater sectional diameter. Check electrical system on the vehicle!*

Compressor running, not enough power, operating pressure not achieved, when the compressor has switched off, air escapes at noise absorber	Safety valve won't close, *Screw Pos. 11 (undo brass screw on the front of the control block SW 24)*, *clean relief valve and seat and check for damage – put back together again,* If there is damage: renew valve cone or *send control block in for repair.*
Compressor running, not enough power, operating pressure not achieved, during operation air escapes at noise absorber (underside of control block – left next to the safety valve)	Relief valve won't close, *Remove aluminium cap on the left side of the control block (unscrew), check voltage at the coil, if there is voltage*, *exchange defective coil,* If no or too little voltage: *Send compressor in for repair.*
Compressor running, not enough power, operating pressure not achieved, during operation air escapes at noise absorber	*clean relief valve dismantle relief valve with coil, clean valve cone and seat, check for damage and put back together again.* If there is damage: *exchange relief valve or send control block in for repair.*
control light on – bright After longer operation motor becomes very hot and switches off, motor can only be switched on again after a longer period (c. 1 hour).	Triggered by temperature sensors. *Send compressor in for repair. Not enough cooling*
Safety valve discharges at a pressure under 11 bar.	Safety valve is defective *Change safety valve.*
Compressor does not work at all – main fuse is faulty. Please first investigate the reason before replacing the fuse.	Motor or compressor may had to work under Pressure. Solenoid discharge valve, non-return valve are damaged.

If there are any faults not appearing in this table or that you cannot repair, please do not hesitate to contact our company.

9. Storing & Transport

- The storage should be dry to avoid corrosion.
- Temperatures under 0 °C could damage the compressor, if water would remain in the inside.
- During the transport the compressor must be standing.
- It must be screwed tightly on the four rubber mounts.
- Use a wood pallet to give more stability.
- Never let oil drain out of the compressor during the transport.

10. Replacement parts

With spare parts requirements please contact our company to enable the fastest possible processing.