



**PORTABLE
SCREW COMPRESSOR
ATMOS PD 51 / 71**

OPERATING MANUAL

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Maintenance and Inspection Manual for Atmos Compressors

This Maintenance and Inspection Manual is intended only as a supplement to the operating instructions and parts list for your Atmos compressor.

It does not replace these technical documents.

This Maintenance and Inspection Manual is intended for you, the machine attendant. It is provided to facilitate the required maintenance and inspection work and allow this work to be reviewed at any time. When this Maintenance and Inspection Manual is kept carefully it can contribute to reduction of the maintenance costs and increasing the operating reliability and service life of your compressor.

Attention

When starting up your compressor for the first time, observe the operating instructions under all circumstances.

Proper operation, care and continuous supervision of the compressor system are decisive for the operating reliability, performance and service life.

We cannot assume any liability for damage resulting from failure to observe the operating instructions, improper repairs or use of other than genuine parts.

Questions/Parts orders

Always indicate:

- Machine number (rating plate)
- Machine model.

We request you to present this Maintenance and Inspection Manual to our service personnel on request.

Thank you.

Danger

Please observe the maintenance instructions (service intervals and points) given in the operating instructions.

Perform inspection, maintenance and repair work only when the machine is standing still, not under voltage and not under pressure.

Safety devices such as guards must not be removed during operation.

Service Contact Partner, name: _____

Plant Maintenance Personnel, Name: _____

Number of associated Parts List: _____

Machine model: _____

Machine serial number: _____

Year of production: _____

Data acc. to compressor rating plate: _____

Operating pressure (\leq max. operating pressure): _____

Remarks: _____

1.1 Information on the compressor

Atmos screw compressors are the product of many years' research and development. These preconditions, together with high quality standards, guarantee the manufacture of screw compressors with a long service life, a high degree of reliability and cost-effective operation. The strict environmental protection standards have of course been complied with.

Confirmation of Conformity

The compressor and its accessories conform to the safety requirements laid out in the EC Directives 89/392 and 95g368 EEC and in EN 474-1.



Fig. 1

1.2 Normal use

The compressors have been built using the latest techniques in design and in accordance with recognized safety regulations.

Nevertheless, the operator or third parties may be exposed to risk to life and limb in the course of the use of the compressor (e.g. through flying pieces of building material, swirling particles of dirt or dust, electrical current, thermal vibrations, noise or mechanical hazards), and the machine or other tangible assets may be impaired, for reasons that could not have been avoided through preventive constructional safety measures.

Hazards occur particularly when:

- * The compressor is not used for its intended purpose
- * The compressor is not operated by trained personnel
- * Unauthorized changes or modifications are carried out on the compressor
- * You are not wearing the prescribed protective clothing
- * You do not comply with the safety instructions

- * You do not observe the information in the operating manual

For this reason every person involved in the operation, maintenance and repair of the compressor must read and observe the operation manual and the safety regulations. This is to be confirmed by signature as required.

Furthermore, the following naturally apply:

- * The relevant accident prevention regulations
- * Generally recognized safety and traffic regulations
- * Particular national regulations

The compressor is designed for providing compressed air:

- * For operating compressed-air appliances
- * For conveying bulk material
- * For sandblasting and paint-spraying operations
- * For cleaning machines and shuttering material - do not direct towards persons!
- * For blow-cleaning drilled holes.

Any other use, or any additional use, for example as respiratory air, is regarded as not being for the originally intended purpose. The manufacturer / supplier accepts no liability for any resulting damage. The risk is assumed by the user alone.

The compressor may only be used in a technically perfect condition, for its intended purpose, with appropriate awareness of safety regulations and hazards, subject to compliance with the operating manual. In particular, faults representing safety hazards are to be corrected at once.

1. Foreword

1.3 Specifications type PD 50

Trade name	Delivery volume	Operating pressure	Pressure range	Ambient temperature		max. installation height	Oil fill (compressor)	Diesel engine	Type of cooling	Engine power	Engine speed		Oil fill (engine)	Fuel tank capacity
				min.	max.						No-load	On-load		
	[m ³ /min]	[barg]	[barg]	[°C]	[°C]	[m above sea level]	[l]			[kW]	[rpm]	[rpm]	[l]	[l]
PD 50	5.0	7.0	5-8	-10	50	1000	9.0	F3M2011	Oil	35.5	1700	2700	6.75	60
PD 50 G *	5.0	7.0	5-8	-10	50	1000	9.0	F3M2011	Oil	35.5	1700	2700	6.75	60

Trade name	Gross vehicle weight rating	Operational weight (rigid chassis)	Operational weight (height-adjustable chassis)	Length (max.)	Width with mudguard	Height	Rim	Tyres	Tyre pressure	Compressed air connections	max. permissible noise level, acc. to 2000/14/EC	max. sound intensity acc. to PN8NTC 2.2 at the operators location, distance 1m	max. sound intensity acc. to PN8NTC 2.2 distance 7m
	[kg]	[kg]	[kg]	[mm]	[mm]	[mm]			[barg]		[dB/1pW]	[dB(A)]	[dB(A)]
PD 50	1025.0	868	908	3528	1490	1336	4 1/2 J x 13	165 SR 13	2.5	2 x 3/4"	100.0	84	71
PD 50 G *	1025.0	935	975	3528	1490	1336	4 1/2 J x 13	165 SR 13	2.5	2 x 3/4"	100.0	84	71

* 7 kVA, one-phase 110 V AC, 50 Hz or
8 kVA, 400/230 V AC, 50 Hz

** 7 kVA, one-phase 110 V AC, 50 Hz or
8 kVA, 400/230 V AC, 50 Hz or
12 kVA 400/230 V AC, 50 Hz

1. Foreword

1.4 Specifications type PD 70

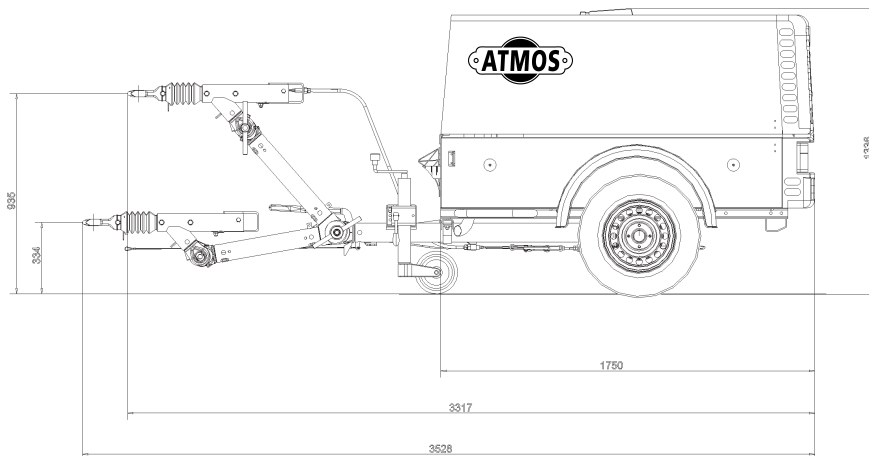
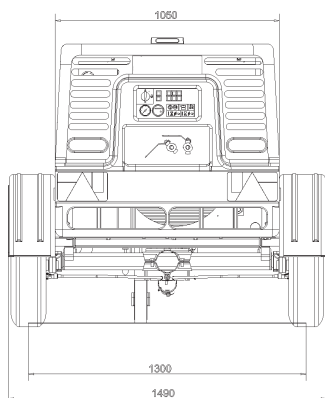
Trade name	Delivery volume [m ³ /min]	Operating pressure [barg]	Pressure range [barg]	Ambient temperature		max. installation height [m above sea level]	Oil fill (compressor) [l]	Diesel engine	Type of cooling	Engine power [kW]	Engine speed		Oil fill (engine) [l]	Fuel tank capacity [l]
				min. [°C]	max. [°C]						No-load [rpm]	On-load [rpm]		
PD 70	7.6	7.0	5-8	-10	50	1000	14.0	BF4M2011	Oil	61.0	1550	2700	10.0	120
PD 70 G **	7.6	7.0	5-8	-10	45	1000	14.0	BF4M2011	Oil	61.0	1550	2700	10.0	120

Trade name	Gross vehicle weight rating [kg]	Operational weight (rigid chassis) [kg]	Operational weight (height-adjustable chassis) [kg]	Length (max.) [mm]	Width with mudguard [mm]	Height [mm]	Rim	Tyres	Tyre pressure [barg]	Compressed air connections	max. permissible noise level, acc. to 2000/14/EC [dB/1pW]	max. sound intensity acc. to PN8NTC 2.2 at the operators location, distance 1m [dB(A)]	max. sound intensity acc. to PN8NTC 2.2 distance 7m [dB(A)]
PD 70	1300	1069	1100	3790	1580	1390	5 1/2 J x 14	185 R 14	2.8	2 x 3/4" + 1 x 1 1/2", or 3 x 3/4" + 1 x 1 1/2" optional	101	84	72
PD 70 G**	1300	1153	1184	3790	1580	1390	5 1/2 J x 14	185 R 14	2.8		101	84	72

** 7 kVA, one-phase 110 V AC, 50 Hz or
8 kVA, 400/230 V AC, 50 Hz or
12 kVA 400/230 V AC, 50 Hz

1. Foreword

PD 50



PD 70

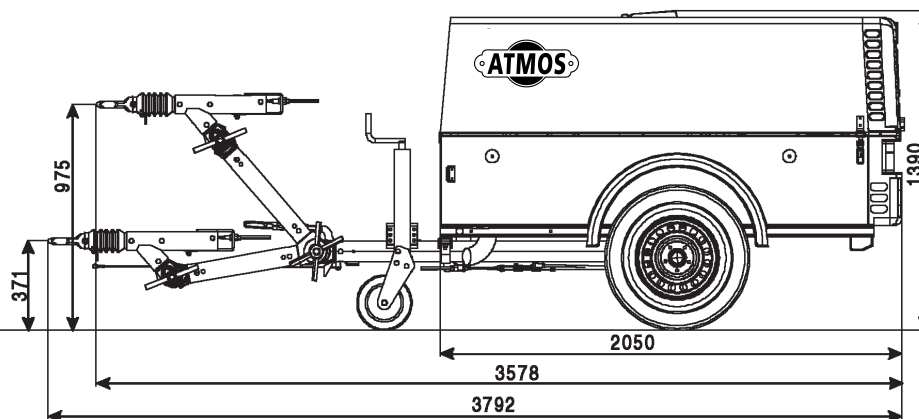
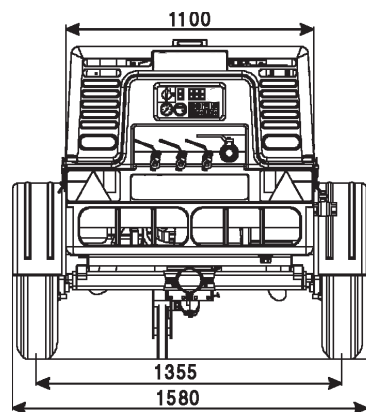


Fig. 2

1.5 Maintenance and care

Care and maintenance are all-important if the screw compressor is to meet the demands placed upon it. Compliance with the prescribed maintenance intervals and careful execution of care and maintenance work are therefore essential, especially under difficult working conditions.

Service

In case of faults, or should you require spare parts for the screw compressor, please contact your local Atmos agent.

In case of damage, the trained technical staff will guarantee a fast, expert repair using Atmos spare parts. Original Atmosir spare parts are manufactured according to the state of the art and guarantee continued reliable operation.

If you have important questions,

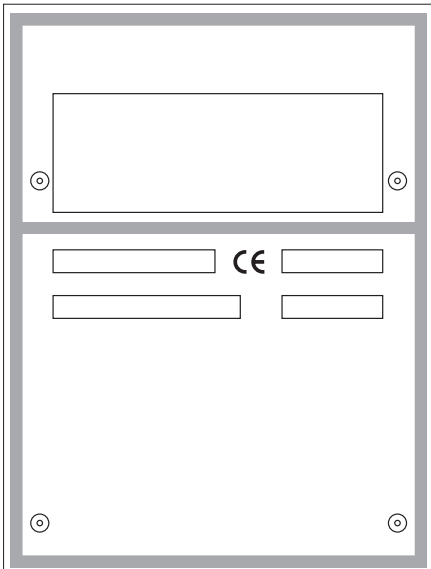


Fig. 3

Please enter the data from the identification plate for your compressor, in the spaces above. In case of questions or orders for spare parts, please give us the compressor type, compressor number and the year of construction as given on the identification plate.

If you give us this data you can be sure that you will be given the correct information or sent the spare parts you require.

1.6 General information

This operating manual is to help you to get to know the compressor and to use it for its intended applications. It contains important information about how to operate the compressor safely, cost-effectively and with due care. Compliance with the instructions in this manual will help to avoid danger, reduce repair costs and downtime, and increase the reliability and service life of the compressor.

This operating manual is to be supplemented by instructions concerning current national regulations for accident prevention and environmental protection. It must always be available at the site of the compressor. The operating manual is to be read and used by all persons in charge of work with the compressor, for example operation, including setting up, correcting faults during operation, disposal of waste products from production, care, disposal of process materials, upkeep (maintenance, inspection, repair) and transport.

Besides the operating instructions and the current regulations applicable in the user's country and at the sites of operation concerning accident prevention, the recognized technical rules for safe and proper working are also to be complied with.

Warranty

Only use this compressor with accurate knowledge of and in compliance with this manual.

Atmos Chrast s.r.o. do not accept responsibility for safe functioning of the compressor for actions that do not correspond to normal use or for purposes not mentioned in the manual.

Warranty claims cannot be entertained for:

- * Operating errors
- * Inadequate maintenance
- * Incorrect fuels
- * Damage caused by non-use of original Atmos parts
- * Modification of the system.

The Guarantee and Liability terms of Atmos General Terms and Conditions are not extended through the above instructions.

Any unauthorized modification of the compressor system/station or the installation of components (e.g. fine separators) not released by the manufacturer result in the loss of the CE symbol.

This fact results in the termination/ expiration of the guarantee and warranty claims against the manufacturer.

Safety regulations

Danger

It is important that you follow the safety regulations in Chapter 3 of the operating manual.

Technical modifications

We reserve the right to undertake modifications without notice in the interests of technical progress.

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3. Security Regulations

3.1 Identification of safety instructions

Atmos accepts no responsibility for any damage or injury caused by non-compliance with these safety measures or non-observance of normal care and caution during the handling, operation, maintenance or repair of this compressor, even if not expressly stated in this operating manual.

If any of the regulations contained in this manual do not correspond to local statutory provisions, particularly with reference to safety, then the stricter of the two applies.

These safety instructions are of a general nature and are applicable to various types of machine and equipment. For this reason it is possible that some information may not apply to the aggregate(s) described in this manual.

Danger

Places thus marked refer to possible dangers for persons.

Attention

Places thus marked refer to possible dangers for machines or parts of machines.

Note

Places thus marked give general and technical information for optimum, cost-effective machine use.

3.2 General safety instructions

Organizational measures

Please keep this operating manual handy at all times on the site of the machine / installation, in the bag provided.

Please note and pass on general statutory and other binding regulations that may supplement the operating manual for the prevention of accidents and the protection of the environment. Such obligations may be for example the handling of hazardous materials, or the provision and/or wearing of personal protective equipment, or traffic regulations.

Instructions, including supervisory responsibility and duty of notification for taking account of special in-plant factors, for example regarding work organization, sequences of operations, personnel assigned to certain tasks, are to be added to the operating manual.

Personnel delegated to work with the machine must have read the operating manual before beginning this work, particularly the chapter on safety instructions. It is too late to do this while working. This applies particularly to personnel only using the machine occasionally, e.g. for setting up and maintaining the machine.

Safety and danger-conscious working by the personnel in compliance with the operating manual should be checked at least occasionally.

The personnel must not have long, loose hair, or wear loose clothing or jewellery, including rings, due to risk of injury through catching. Personal protective equipment should be worn if necessary or as required by regulations.

Pay attention to all safety and danger warnings on the machine/ installation!

Make sure that all safety and danger warnings on the machine / installation can be read.

For all safety-relevant modifications to the machine / installation or its operating behavior, stop the machine / installation immediately and report the fault to the competent authority / person.

Spare parts must meet the technical requirements laid down by the manufacturer. This is always guaranteed when original spare parts are used.

Replace hydraulic hoses at the given intervals, or at suitable intervals, even if no safety-relevant defects are visible (DIN 20066, Part 5).

Observe the intervals stipulated or those given in the operating manual for routine checks and inspections.

Workshop equipment suitable for carrying out maintenance work is essential.

The location and operation of fire extinguishers must be made known. Observe the instructions concerning fire alarm and firefighting.

Limiting values (pressure, temperature, time settings etc.) must be permanently marked.

Personnel selection and qualification; basic tasks

Work on or with the machine / installation may only be carried out by reliable personnel. Observe the minimum statutory age.

Only trained or specially instructed personnel may be assigned to this work. The responsibility of the personnel for operating, setting up, maintaining and repairing the machine / installation must be clearly defined.

Make sure that only authorized personnel use the machine.

Define who is responsible for operating the machine, and authorize him to ignore instructions from third parties if these instructions could compromise safety.

Only allow personnel that are training, that are under instruction or are attending a course of general training to use the machine / installation under the constant supervision of an experienced person.

Work on the electrical systems of the machine / installation may only be carried out by a trained electrician in accordance with electrical regulations.

Only persons with special knowledge and experience of hydraulics may work on system elements, for example components under pressure.

3.3 Modifications and alterations to the machine

No alterations, additions, or modifications to the machine may be carried out without the approval of the manufacturer. This is also true for the installation and the adjustment of safety devices and valves as well as for welding at supporting and pressurized parts. Unauthorized modifications to the machine are prohibited for reasons of safety.

Original parts are specially designed for our machines. We must explicitly point out that parts and special accessories not supplied by us are not approved by us. Installing or using such products may thus adversely affect active and/or passive safety.

The manufacturer accepts no liability whatsoever for damage resulting from the use of non-original parts or special accessories. This also applies to the installation and adjustment of safety devices and valves as well as to welding on bearing and pressurized parts.

Note

The General Type Approval becomes invalid in case of modifications or alterations which change or infringe upon the external geometry as well as the gross axle weight rating.

3. Security Regulations

3.4 Loading / Relocation / Transport

Loading / Relocation

All loose parts that could fall down when the machine is lifted must first be removed or secured; pivoting parts like doors, etc. must be immobilized.

For lifting heavy parts, hoisting gear and heavy-lift facilities with the appropriate capacities, which have been checked and approved in accordance with local safety regulations, must be used.

For lifting machines or parts of machines with one or more lifting eyes, only hooks or shackles complying with local safety regulations may be used. Never fasten cables, chains or ropes to or through lifting eyes.

Lifting hooks, lifting eyes, shackles etc. must never be bent and must always be stressed in alignment with the load-carrying axis. The load capacity of the hoisting gear is reduced if the lifting force is applied at an angle to the axis.

All bearing parts must be stressed vertically, as far as possible, for maximum safety and optimum performance of the hoisting gear. If required, a support is to be installed between the hoisting gear and the load. Secure the load properly.

When heavy loads are being conveyed by means of hoisting gear, it is imperative to keep well clear of the load in order to avoid accidents.

Never leave the load suspended on the hoisting gear.

Acceleration or braking of the means of transport must remain within the approved limits.

The hoisting gear is to be set up in such a way that the object is lifted vertically. Should this not be possible, precautions must be taken to prevent the load from swinging. Thus it is possible to use two sets of hoisting gear, both with an angle of inclination of not more than 30° to the vertical.

Nominate experienced supervisors for the lifting process.

Machines may only be hoisted correctly using hoisting gear in accordance with the information in the operating manual (limit stop points for heavy-lift facilities etc.)

Only use a suitable transport vehicle with sufficient carrying capacity.

Before or immediately after completion of loading, secure the machine / installation to prevent accidental shifting. Display an appropriate warning. Before putting the machine / installation back into operation, the securing devices must be duly removed.

Parts to be removed for transport purposes must be carefully refitted and fixed again before putting the machine / installation back into operation.

When putting the machine / installation back into operation again, only proceed in accordance with the operating manual.

Transporting the complete unit

Make sure that the air vessel is not under pressure.

Lift and secure supporting gear.

Make sure that the drawbar eye can move freely in the tow bar.

Check to make sure that the drawbar is adjusted to the bar height of the towing vehicle.

Check to make sure that the body is closed and locked, and that the cable for the rapid-emergency brake is connected to the towing vehicle.

Join up the connections of the air brake, if present.

Check to make sure that the wheels are properly tightened, that the tyres are in a roadworthy condition, that the tyre pressure is correct and that the brakes function properly.

Connect the cable for the signalling and lighting fittings. Check the proper functioning of the lighting.

Release the handbrake.

Before transporting the unit, always check to make sure that the accessories are firmly attached so that they can cause no accidents!

When using public roads, tracks and spaces, observe the current traffic regulations, and if necessary make the unit roadworthy first!

Never exceed the maximum towing speed. Observe national regulations!

Always switch on lights if visibility is poor and during lighting-up time!

When going through underpasses, bridges, tunnels, overhead power lines, etc., always make sure that you have enough clearance!

Always keep a safe distance from the edges of foundation ditches and embankments!

Do not travel across slopes transversely: always keep equipment and loads near ground level (for example, do not place them on the bodywork).

On descents, always adapt speed to the circumstances! Never change into low gear during the descent, but always beforehand. When leaving the driver's seat, always secure the unit to make sure that it cannot roll away or be used without authorization!

Avoid all operations that adversely affect the stability of the unit.

3.5 Installation on site / Starting / Normal operation

Installation on site

Besides the general technical operation in accordance with the regulations of the local authorities, it is essential that the following guidelines be observed.

Before switching on the machine / installation, or starting it up, make sure that nobody can be injured by the machine / installation as it starts up.

The installation is to be set up in such a way that it is adequately accessible and that the necessary cooling is ensured. Never block the admission of air.

The air intake is to be designed in such a way that no dangerous admixtures (inflammable solvent vapors etc., but also dust and other dangerous or toxic substances) can be taken in. This also applies to flying sparks.

The air intake is to be designed in such a way that no loose personal clothing can be drawn in.

Make sure that the compressed air line from the compressor to the air network can expand as a result of heat and cannot come into contact with inflammable materials.

The compressed air line connected at the air exit of the unit must not be under strain.

Compressed-air lines have to be marked distinctly according to local regulations.

If several compressors are arranged in a system, manually operated valves have to be installed so that each machine may be shut off individually. For the purpose of shutting off pressurized systems, you should never rely on the effectiveness of return valves alone.

Safety devices, protective covers, or insulations mounted on the system must not be removed or modified in any way.

3. Security Regulations

All pressure tanks located outside the unit with an approved operating pressure higher than atmospheric pressure and fitted with two or more pressure feed lines must be equipped with an additional safety device to automatically prevent the approved operating pressure from being exceeded by more than 10%.

Pipes and other parts with a surface temperature of more than 80 °C must be suitably secured against contact and suitably marked.

Electrical connections must comply with local regulations.

With compressors fitted with generators, use equipotential bonding systems for the protection of persons.

Install the machine so that it is as horizontal as possible; a slight inclination is permissible (see information in Chapter "Installation").

Set up the machine in such a way that no inlets, outlets or gates are blocked, even when the doors are open.

Before disconnecting the machine from the towing vehicle, apply the handbrake. Disconnect the rapid-emergency brake cable and lighting cable, disconnect the lines of the air brakes, use chocks to ensure that the machine does not roll away.

If a machine with a combustion engine has to work in a fire-risk environment, the unit must be fitted with a spark catcher.

In dusty environments, set up the machine in such a way that the wind does not blow dust in its direction. During operation in clean environments, the intervals for cleaning the air intake filter and the cooler elements are much longer.

Do not install the machine directly in front of walls. Make sure that the warm air coming from the engine and cooling systems is not drawn into the air intake under any circumstances. Drawing this warm air in through the engine or cooler fan could lead to overheating; if it is drawn into the combustion chamber, this will result in a loss of power.

Never relocate the machine if external lines or hoses are connected to the discharge valves, in order to avoid damage to the valves and/or collecting pipe and hoses.

No force may be exerted on the discharge valves, for example by pulling the hoses or fitting additional equipment (e.g. a water separator, compressed air oiler, etc.) directly to the discharge valve.

Make sure that:

- * All bolted connections have been tightened
- * All electrical wiring has been connected correctly and is in good condition
- * The engine exhaust system is operationally safe and that no inflammable material is in the vicinity
- * The wheel nuts are properly tightened; never exceed the specified torque.

Normal operation

Before starting work, make yourself familiar with the working environment at the installation site. The working environment includes, for example, obstacles in the working and transport areas, the carrying capacity of the ground, and any necessary cordoning off of the building site from public traffic areas.

Take the necessary precautions to make sure that the machine / installation is only operated in a safe, functional condition.

Only operate the machine when all protective devices, shutdown devices, sound-insulating equipment and extraction equipment is in place and working.

Be careful: loose articles of clothing, hair or limbs can still be drawn in by revolving parts.

Verify regularly that:

- * All protective equipment is properly positioned and fixed in place
- * All hoses and/or pipes within the system are in good condition, are properly fixed in place and do not chafe
- * There are no leaks (fuel, oil or coolant leaks)
- * All bolted connections have been tightened
- * All electrical wiring is properly connected and is in perfect condition
- * Safety valves and other pressure-relief devices are in perfect condition and are not blocked, for example by dirt or paint
- * The safety devices all work properly

All connected components must be of the correct size and be suitable for the specified operating pressure and temperature.

Only use the correct type and size of hose coupling and connection.

Before blowing through a hose or air line, it is essential to hold the open end firmly. If the open end is not held firmly, it can whiplash and cause damage or injury.

Avoid any working methods that could be considered risky!

Never play about with compressed air.

Never direct compressed air onto the skin or towards another person.

Never use compressed air for cleaning clothing. When using compressed air to clean equipment, work with extreme caution and always wear suitable eye protection.

The compressed air produced by these compressors must not be used as breathable air, unless it has been processed specially for such an application in accordance with the "Safety requirements for breathable air."

When breathing apparatus with cartridges is used, make sure that the correct cartridge has been inserted and that its service life has not expired.

Never use the machine in environments where the possibility cannot be ruled out that inflammable or toxic vapors may be taken in.

Never operate the system at temperatures and/or pressures below or above the values indicated in the technical data sheet.

Persons working in environments or rooms in which the acoustic pressure is 85 dB(A) or higher must wear ear muffs. Caution: this may impair communication between persons. Warnings may not be heard. Inform supervisor.

Shieldings and doors must be closed during operation so that the flow of cool air within the housing is not deflected and the efficiency of the sound-insulating is not reduced. Doors and hoods may only be opened briefly.

With water-cooled combustion engines with a closed cooling circuit, the cap of the coolant recovery bottle must not be removed before the system has cooled down to ambient temperature.

Never fill up with fuel while the engine is running. Make sure that fuel does not come into contact with hot machine parts.

Do not smoke while filling up with fuel.

Filling up at a pump can cause static electricity and possibly sparks. In order to avoid this, a ground cable must be connected to the system while it is being filled up.

3. Security Regulations

The exhaust emissions of combustion engines contain carbon monoxide - a lethal gas. If a machine with such an engine has to work in an enclosed room, the exhaust gases must therefore be conducted out of doors by means of a hose or pipe with an internal diameter of at least 100 mm. The use of extraction systems is highly recommended in test rooms for mobile machines.

Before connecting or disconnecting hoses, always close the compressor air outlet valves. Before disconnecting a hose, always make sure that it is not under pressure.

A hose connected to an air valve must be fitted with a safety wire for operating pressures above 7 bars; it is in fact recommended that this safety device should be used for pressures above 4 bars. The steel wire has a diameter of 8 mm and is firmly clamped to the hose at least every 500 mm. Both ends are fitted with cable lugs.

Check the machine / installation for external damage and faults at least once per shift. Any changes noticed (including changes in operating performance) must be reported immediately to the authority or person in charge. If necessary, shut down and secure the machine immediately.

In case of malfunction, shut down and secure the machine / installation immediately. Have malfunctions corrected immediately.

Observe the operating manual for start-up and shutdown procedures as well as inspection displays.

3.6 Special jobs / Maintenance

Care

Observe the setting, maintenance, and inspection work and intervals stipulated in the operating manual, including information about the replacement of parts / partial sections. This work may only be carried out by specialists.

Maintenance work, tests and repairs should be carried out in a well ventilated room, away from heat, open flames, or sparks. Appropriate prohibition signs (fire, open flames, no smoking) must be put up.

Loss of oil leads to a very slippery floor. Statistics have shown that many accidents can be attributed to the installation or maintenance of machines on oily floors or machine components. For this reason, always start maintenance work by cleaning the floor and the machine exterior.

Inform operating personnel before beginning to carry out special work or maintenance. Nominate a supervisor.

After completing repair work, always check to see whether any tools, loose parts or cloths have been left in or on the machine, driving engine or driving equipment.

Maintenance and repair work is only to be carried out under the supervision of or by a person qualified for this work.

For all work concerning the operation, production adjustment, conversion, or settings of the machine / installation and its safety-relevant equipment, as well as servicing, maintenance, and repair, observe the operating manual for startup and shutdown procedures and the instructions for maintenance work.

All maintenance and repair work may only be carried out when the system is shut down, or, with electrical systems, when the mains power supply is switched off. Make sure that the equipment cannot be switched on by accident.

Whenever the machine/system is completely powered down for maintenance and repair procedures, it has to be secured against unintentional power-on or the mains supply has to be cut off with electrical systems.

- * Switch off battery master switch and/or detach connector.
- * Put up a warning sign on the main switch "Attention! Maintenance work." Close off the complete maintenance area, if required.
- * Disconnect the starter battery.

Individual parts and larger subassemblies must be carefully attached to the hoisting gear and secured in case of replacement.

Only use suitable, technically perfect hoisting gear and load suspension devices with adequate carrying capacity. Keep clear of suspended loads.

Before removing any part under pressure, separate the aggregate effectively from all sources of pressure and release the pressure from the complete system.

Never use inflammable solvents or carbon tetrachloride to clean parts.

Take precautions to avoid toxic vapors from cleaning fluids.

Absolute cleanliness is essential during maintenance and when carrying out repairs.

Only carry out maintenance and repair work when the machine is located on an even, stable base and is secured against running away and against buckling.

Only carry out inspection, maintenance, and repair work when the screw compressor system is at a standstill and is not under pressure.

Protective devices, i. e. protective grids, may not be removed during operation.

Caution while the screw compressor is in operation.

After the work has been completed, replace any protective devices that have been removed. Operation without protective devices is not permissible.

Working clothing should be close-fitting during work on running screw compressor systems.

Maintenance

During maintenance and repair work, the contractor has to inform the personnel about the dangers that can occur during their work and about measures to avert such dangers.

The personnel have to support all measures to improve safety at work.

Safety devices for preventing or eliminating dangers must be serviced regularly and their functioning tested at least once per year. Faults discovered must be corrected at once or reported to the supervisor.

Only use the correct tools for maintenance and repair work.

Only use original spare parts.

All maintenance and repair work may only be carried out when the system is shut down, or, with electrical systems, when the mains power supply is switched off. Make sure that the aggregate cannot be switched on by accident.

Whenever the machine/system is completely powered down for maintenance and repair procedures, it has to be secured against unintentional power-on or the mains supply has to be cut off with electrical systems.

- * Switch off battery master switch and/or detach connector.
- * Put up a warning sign on the main switch "Attention! Maintenance work." Close off the complete maintenance area, if required.
- * Disconnect the starter battery.

Before removing or opening any part under pressure, separate the equipment effectively from all sources of pressure and release the pressure from the complete system.

3. Security Regulations

For moveable machines support the towing mechanism and axle with appropriate means if work is to be carried out underneath the units (a jack is not sufficient).

Observe the safety precautions for work on batteries.

Pay attention to cleanliness. Prevent dirt from entering by sealing the parts and exposed openings with a clean cloth, paper, or tape.

Before the aggregate is approved for operation after maintenance or an overhaul, make sure that operating pressures, temperatures, and time settings are correct and that the control and shutdown devices are working properly.

The electric motor, generator, air filter, electrical components and control equipment are to be protected against the penetration of dampness - for example when cleaning with a steam jet - by covering or sealing them.

Under no circumstances should the sound-insulating material be removed or modified.

Never use solvents with dangerous properties for cleaning parts.

Maintenance work, tests, and repairs should be carried out in a well ventilated room, away from heat, open flames, or sparks. Appropriate prohibition signs (fire, open flames, no smoking) must be put up.

Wear suitable eye protection when inspecting the system. Make sure that the openings of spray containers, valves, pipes, or atomizers are never directed at yourself or at any other person during the inspection.

The fuel used in these systems is highly inflammable, toxic and poisonous. Avoid contact with eyes and skin, and never inhale vapors. Should you accidentally swallow fuel, do not induce vomiting, but seek medical attention.

Should fuel come into contact with the eyes, or in case of eye irritation by vapors, flush eyes with plenty of clean water and seek medical attention.

Every time a message is displayed or there is a suspicion that an internal part of the machine has overheated, the machine must be shut down. Never open the inspection cover, however, before the machine has cooled down sufficiently to rule out the possibility of the oil vapors igniting spontaneously when mixed with air.

In order to avoid an increase in operating temperature, inspect and clean the heat transfer surfaces (cooling ribs etc.) regularly. Draw up a schedule for the most suitable cleaning intervals for each machine.

Avoid damaging the safety valves and other pressure-reducing devices. In particular, make sure that they are not blocked through paint, oil carbon, or dust accumulation, which could impair the effect of these devices.

The insulation or protective shielding of parts whose temperature may exceed 80 °C and which may accidentally be touched by personnel may not be removed before these parts have cooled down to room temperature.

Check the accuracy of the pressure and temperature displays regularly. If the permissible tolerance limits have been exceeded, then they must be replaced.

Never carry out welding work or any other work that produces heat in the vicinity of fuel or oil systems. Systems, which could contain fuel or oil, have to be completely drained and cleaned, e.g. by means of a steam jet, before proceeding with the work to be carried out.

Never carry out any welding work on any pressure tank or components under pressure, or modify them in any way.

If work causing heat, flames, or sparks has to be carried out on a machine, the surrounding components must be protected with nonflammable material.

Before dismantling or overhauling a compressor, engine, or any other machine, make sure that no movable part with a weight of more than 15 kg can move or roll away.

Machines whose main movement is back and forth must be moved at least once, rotating machines several times, in order to make sure that there is no mechanical malfunction in the machine or in the driving part.

Only experienced persons may be charged with slinging loads and instructing crane drivers. These instructors must remain within sight of the operator or be in touch with him via walkie-talkie or similar device.

During assembly work above body height, use appropriate or otherwise safety-relevant climbing aids and working platforms. Do not use machine parts as climbing aids! Wear safety belts when carrying out maintenance work at greater heights.

Keep all steps, handles, railings, platforms, scaffolds, and ladders free of dirt, snow, and ice.

Before beginning maintenance and repair, clean the machine, particularly couplings and bolted connections, of oil, fuel, and special care products. Do not use aggressive detergents. Use lintfree cloths for cleaning.

After cleaning, remove all covers and seals.

After cleaning, check all fuel, engine oil, and hydraulic fluid lines for leaks, loose connections, chafing and damage. Correct any faults immediately.

Always tighten bolted connections loosened during maintenance and repair work.

If it is necessary to dismantle safety devices during machine set-up, maintenance, and repair work, the safety devices must be reassembled and checked immediately after completing the maintenance and repair work.

Ensure safe, environment-friendly disposal of process materials as well as replaced parts. Components containing oil, for example fine separators, and oils must be disposed of. Oil must not enter the soil!

Safety precautions for work with batteries

The fluid contained in batteries is diluted sulfuric acid which can cause blindness if brought into contact with the eyes, or serious burns if brought into contact with the skin. For this reason it is essential to work with the greatest of care when servicing batteries, e.g. when checking battery charge, and to take all necessary safety precautions.

Always wear long-sleeved overalls, acid-resistant gloves and safety goggles.

On charging a battery, an explosive gas mixture is formed in the cells, which can escape through the vent holes in the sealing caps. If ventilation is poor, a highly explosive atmosphere can form around the battery, and can persist for several hours after charging.

Thus:

- * Never smoke in the vicinity of batteries that are being charged or have just been charged.
- * Put up prohibition signs for fire, open flames and smoking in workshops where batteries are charged.
- * Never interrupt a current-carrying circuit at battery terminals because of the danger of spark formation.

3. Security Regulations

- * Proceed particularly cautiously when connecting or disconnecting reinforcement cables or quick-charge cable clamps.

When starting up using jumper cables or auxiliary batteries, first connect the positive terminals and then the negative terminals. After starting the engine, first disconnect the negative terminal (ground cable) and only then the positive terminal. Disconnect the auxiliary battery after the starting procedure in order to avoid the risk of the release of gas (explosion hazard).

3.7 Instructions concerning particular hazards

Electrical Energy

Only use original fuses with the specified amperage.

In case of faults in the electrical power supply, shut down the machine / installation immediately!

Work on electrical systems or equipment may only be carried out by a trained electrician or by trained persons under the leadership and supervision of a trained electrician in accordance with the standards of electrical engineering.

Machine and system parts where service, maintenance, and repair work is being carried out must be switched off load, if required by regulations. First check the deenergized parts to make sure they are off load, then connect to ground and short-circuit, and insulate neighbouring parts that are under tension.

The electrical equipment of a machine / installation must be inspected / tested regularly. Faults, such as loose connections or overheated cables, must be corrected immediately.

If work has to be carried out on live parts, then call in a second person to operate the emergency stop switch or master switch with overvoltage release. Cordon off the working area with a red-and-white safety chain and a warning sign.

Only use insulated tools.

Keep an adequate distance between the machine/unit and overhead power lines! When working near overhead power lines, equipment must not come near the power lines! Danger! Find out about the safe distance to be observed!

After touching high-voltage lines:

- * Do not leave the machine.
- * Move the machine away from the danger area.

- * Warn outsiders not to come closer or touch the machine.
- * Make sure that the voltage is switched off.
- * Do not leave the machine until the line which has been touched or damaged, has been switched off load!

When working with high-voltage assemblies, ground the supply cable after voltage has been isolated, and short-circuit the components, e.g. capacitors, with a ground rod!

Gas, dust, steam, smoke

Only carry out welding, burning, and grinding work on the machine / installation when this has been explicitly permitted, as there may be for example risk of fire and/or explosion.

Prior to welding, burning and grinding remove any dirt and inflammable substances from the machine/system and its environment and ensure proper ventilation (danger of explosion)!

Only operate combustion engines in properly ventilated rooms. Ensure ventilation is adequate before starting up in closed rooms.

Follow the local regulations applicable at the respective site of installation.

Hydraulic and pneumatic systems

Work on hydraulic equipment may only be carried out by persons with special knowledge of and experience in hydraulics.

Check all lines, hoses, and bolted connections regularly for leaks and visible damage. Repair any damage immediately. It is essential that damaged parts should be replaced! Spurting fluid can lead to injuries and fires.

Before beginning repair work, relieve the pressure in system sections to be opened and in pressure lines (hydraulic and compressed-air lines) in accordance with the descriptions of the subassemblies.

Hydraulic and compressed-air lines must be routed and fitted in accordance with the regulations. Do not confuse the connections!

The fittings, length, and quality of hoses must be in accordance with the requirements.

Noise

Sound-insulating equipment on the machine / installation must be in operative position during operation.

Wear the prescribed personal ear muffs. Caution: this may impair communication between persons. Warnings may not be heard. Inform supervisor.

The power of perception may become adversely affected by the noise and by carrying ear protection. Warnings may, therefore, not be heard. Circumspect behaviour by all concerned is necessary.

Noise, even when it is not very loud, can make us nervous and irritated, and after a longer period of time our nervous system can suffer serious damage. For this reason a separate machine room is preferable, in order to keep the noise from the machines out of the workshop.

Depending on the number of machines in a machine room, the noise generated can be very loud. Depending on the level of sound pressure in places where people are present, the following precautions must be taken:

Below 70 dB(A): No special measures required.

Above 70 dB(A): Persons permanently present in the room must wear ear muffs.

Below 85 dB(A): For occasional visitors who are only in the room briefly, no special protective measures are required.

Above 85 dB(A): Noisy room. There must be a warning sign at every entrance pointing out that persons entering the room - even if only briefly - must wear ear muffs.

Above 95 dB(A): The warning signs at the entrances must be supplemented by the recommendation that even occasional visitors must wear ear muffs.

Above 105 dB(A): Special ear protectors adapted to the volume and spectral composition of the noise must be available. A warning sign to this effect must be put up at every entrance.

Make sure that sound propagated through walls and frames does not cause an excessive sound level in the surroundings.

3. Security Regulations

Oils, Greases and Other Chemical Substances

When handling oils, greases and other chemical substances, observe the safety regulations applicable for the product.

Caution when handling process materials (risk of burning / scalding).

Potentially-explosive environments

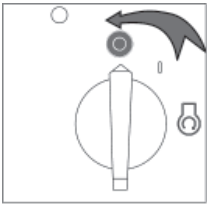
The operation of the compressor in areas where there is a risk of explosion is strictly forbidden! (Exception: specially-made compressors with the necessary technical modifications for use in such areas)

Note

Atmos accepts no responsibility for any damage or injury caused by noncompliance with these safety measures or noncompliance with normal care and caution during the handling, operation, maintenance or repair of this compressor, even if not expressly stated in this operating manual.

3. Security Regulations

3.8 Symbols and definitions



Emergency stop



Do not operate with the hood open



Do not step on pressure-conducting parts



Do not remove the compressor documentation



Do not inhale compressed air



Caution: Hot surfaces



Caution: Hot and dangerous exhaust fumes



Caution: Under pressure



Only operate with protective grating

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Only start with the bleed cocks closed

Caution: Pressure vessel

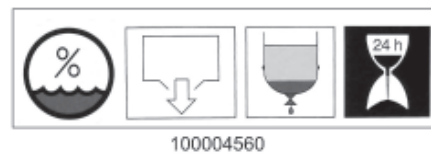
Caution: Vessel is pressurised



100004561

Check filling level

Observe the operating instructions



100004560

Bleed water from the pressure vessel after every 24 operating hours or if the water ratio is too high



Caution: Do not use ether spray



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Sound level data

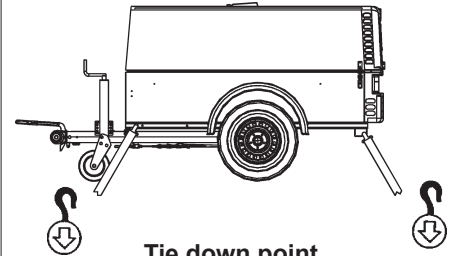


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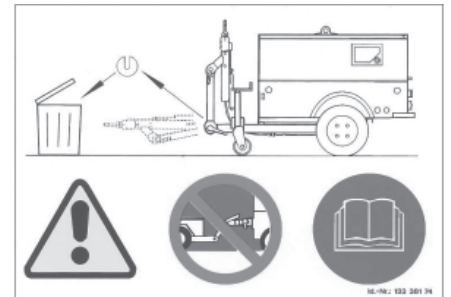


Hoisting point

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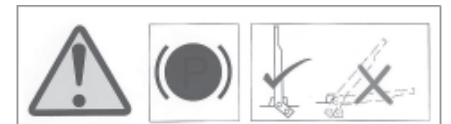


Tie down point



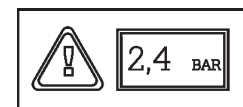
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Caution: Do not move with the transport safety locking



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Caution: Remember the handbrake

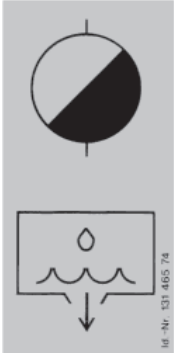


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Note tyre pressure

3. Security Regulations

Options



**Condensation
drain from after-
cooler or from
after-cooler with
subsequent
filtering**

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**Caution: Protect from wetness.
Do not direct a water jet at the
generator.**



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Danger of electric shock

4. Construction and functional description

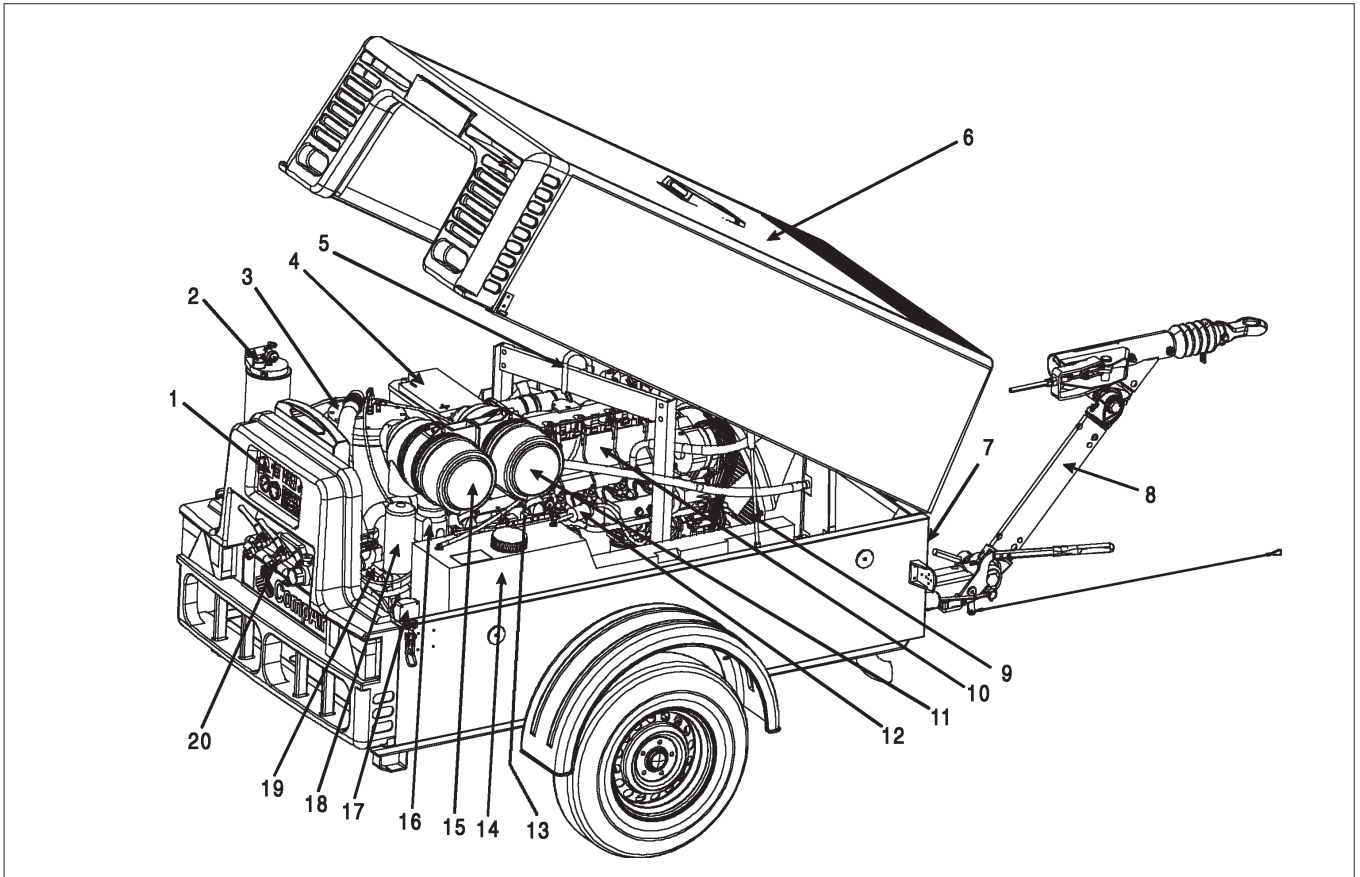


Fig. 4

- 1 Instrument panel
- 2 Tool oiler
- 3 Pressure tank
- 4 Battery
- 5 Oil filter (compressor)
- 6 Hood
- 7 Vehicle and chassis type identification number
- 8 Chassis
- 9 Oil cooler
- 10 Engine
- 11 Diesel engine
- 12 Fuel line filter
- 13 Proportional controller
- 14 Fuel tank
- 15 Air filter (compressor)
- 16 Suction controller
- 17 Main battery switch
- 18 Oil filter (compressor)
- 19 Compressor
- 20 Taps

4.1 Construction

Compressor and engine

The PD 50 and PD 70 series is a sound proofed mobile compressor system. The core is a single-stage, oil-flooded screw compressor. The Atmos screw profile represents the state-of-the-art. The air is delivered pulsation-free.

The drive assembly is a medium-cooled diesel engine, which drives the screw rotors of the compressor by a flexible coupling.

Shielding (Body)

The shielding consists of a low box mounted on a base-frame. A cover, which can be opened wide for servicing is fixed to the base-frame. The opening of the cover is effectively supported by pneumatic springs. The hook inside is for hanging up a load suspension device. The machine rests on rubber elements to prevent vibrations and noise.

For convenient assembly, all individual parts of the cover are screwed together with machine screws. For the prevention of corrosion, the compressor body is fully galvanised, electrostatically powder coated and burnt at °C 220. The sound absorbing mats are inserted and easy to be cleaned.

Frame and chassis

The complete compressor unit is mounted on an easy-to-transport single-axle chassis. The chassis is equipped with automatic overrun brakes and parking brakes, as well as a jockey wheel adjustable in height.

Airflow

Fresh air is sucked in through the admission opening at the back of the compressor. The air intake volume is air for the engine and for the compressor too, as well as cooling air for the engine and for the oil cooler of the compressor.

4. Construction and functional description

4.2 Functional description (see fig.5)

Oil circuit

The oil required for sealing and cooling the rotors as well as for lubricating the roller bearings is injected into the compressor (23) from the pressure tank (13), which is under system pressure. The difference in pressure between the pressure tank and the oil injection position is approx. 1 bar. The oil hereby passes the oil cooler (20) and the oil filter (19). The intake control valve (2) is fitted with a non-return function, so that when the system is switched off, flooding of the air filter (1) is prevented.

Air circuit

The intake air flows through the air filter (1) and the suction control valve (2) into the compressor (23). During compression, oil is injected in order to lubricate, cool and seal the screw rotors. The compressed air-oil mixture flows into the pressure tank (13). Centrifugal pre-separation of the oil is ensured through tangential entry into the tank.

Any remaining oil is separated from the air in the fine separator.

The compressed air is fed via the Venturi nozzle (11) / the pressure retention valve (option) to the compressed air discharge. The venturi nozzle (11) effectively prevents the system pressure from falling below the minimum operating pressure required for the system to work properly. A temperature monitoring device (22, 6) as well as an operational pressure manometer are integral parts of the air circuit.

Regulation

Note

It is not possible to start up the compressor if there is insufficient fuel is available.

Starting up: The control function is inactive at start up, i.e. as the system rises, the engine speed is lowered to idling and the suction throttle closed. Once the diesel engine has warmed up, the throttle/speed control is activated pressing the load button.

The throttle/speed control enables the volume of air tapped (10) to be adjusted infinitely between 0% and 100%.

The control valve (2) is connected to the engine speed control lever over a second set cylinder. When starting, the engine is set to full load and the control valve is open. The compressor (23) starts to produce and pressure builds up inside the

container (13). When exceeding the operating pressure the P-controller (3) feeds the set cylinder of the controller with air. Each change of the pressure at the admission opening causes a proportional pressure raise at the exit. This control pressure operates the control cylinder. Over the calibrated opening of the exhaust air nozzle (5) the control air gets partly into the atmosphere and any condensate will be let off. The throttle valve closes (throttle-type governor) and the engine speed will be lowered (speed control). That way the air volume will be adjusted variable to the required air. If the air output drops down to zero, the throttle valve is completely closed and the engine runs under idle running speed. Over the exhaust air nozzle (5) the sucked in air will be let off over a leakage cleft. When the pressure of the container drops down the control pressure of the controller drops down too; the throttle valve opens and the engine speed will increase.

When turning off the engine the backlash flap inside the controller will be closed through the system pressure. The release valve (3), which closes parallel to the engine lifting magnet, loses power and opens. The container pressure drops down to zero.

4. Construction and functional description

4.3 System description

1. Air filter - diesel engine
2. Diesel engine
3. Oil cooler - diesel engine
4. Engine actuating cylinder
5. Nozzle - engine servo cylinder
6. Engine temperature transmitter
7. Engine oil pressure
8. Fuel level switch
9. Air filter - compressor
10. Compressor
11. Suction controller
12. Nozzle – suction controller
13. Oil filter – compressor oil
14. Temperature switch
15. Orifice, evacuation line
16. Oil cooler – compressor oil
17. Pressure tank
18. Fine separator
19. Safety valve
20. Venturi nozzle
21. Air bleed component 2 x 3/4" (3 x 3/4")
22. Pressure gauge
23. Controller unit / proportional controller
24. Controller unit / load switching valve
25. Controller unit / relief valve
- Option**
26. Chalwyn valve
- Option**
27. Compressor oil temperature controller
- Option oiler**
28. Oiler reservoir
29. Oiler valve
- Option heat exchanger/after-cooler/ subsequent filter**
30. Cooler
31. Condensation run-off
32. Filter combination
33. Heat exchanger
34. Oil temperature controller - heat exchanger
- Option**
35. Extraction lever oil-free compressed air
36. Backlash valve
- Option**
37. Extraction lever 1 1/2"
- Option**
38. Backlash valve
- Option**
39. Solenoid valve - generator option
- Option clean air**
40. Pressure control
41. Activated carbon filter
42. One-hand coupling
43. Pressure gauge
44. Fuel cooler

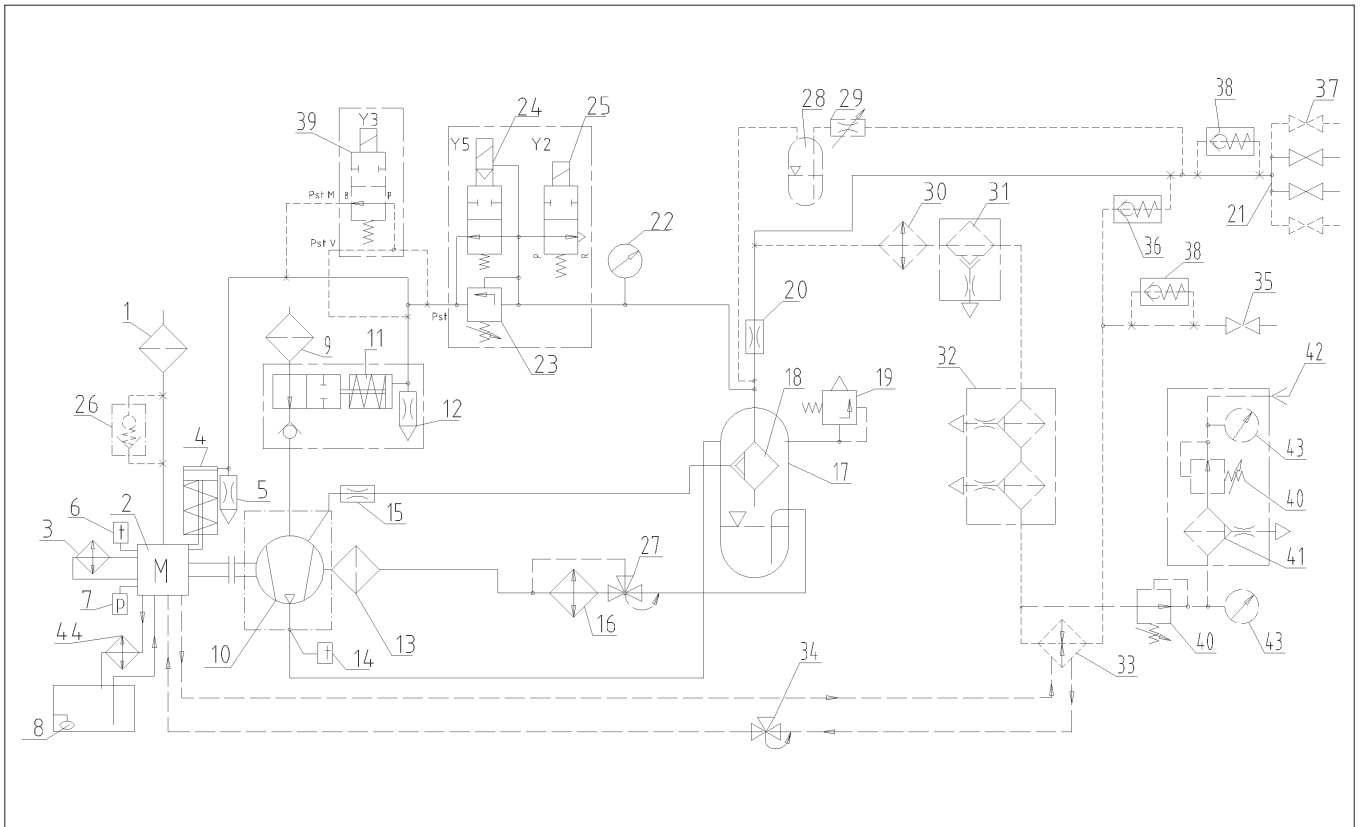


Fig. 5

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4. Construction and functional description

4.4 Wiring diagram

D1-D8 Semi-conductor diode
 D10 Battery charge pilot lamp
 D11 Fault pilot lamp
 D12 Option lamp "Pre-heating running"
 D13 Lamp "Warn run ended"
 D14 Option
 D15 Option lamp "Engine temperature too high"
 D16 Option lamp "Compressed air temperature too high"
 D17 Lamp "Fuel shortage – switch off"

F1 Fuse
 F2 Fuse
 F3 Fuse (option)
 G1 Generator
 G2 Battery
 K1-K8 Small relay 12 V
 M1 Starter
 P1 Hours of operation counter
 R1.1 Option heating flange

S1 Main switch
 S1.1 Main battery switch
 S2 Load button
 S3 Oil pressure
 S4 Engine temperature
 S5 Compressed air temperature
 S6 Fuel shortage
 X1 Plug connector (pin/socket)
 X2 Generator plug
 Y1 Lifting magnet - fuel
 Y2 Solenoid valve ressure relief
 Y3 Solenoid valve generator idling automatic
 Y5 Solenoid valve load switch valve

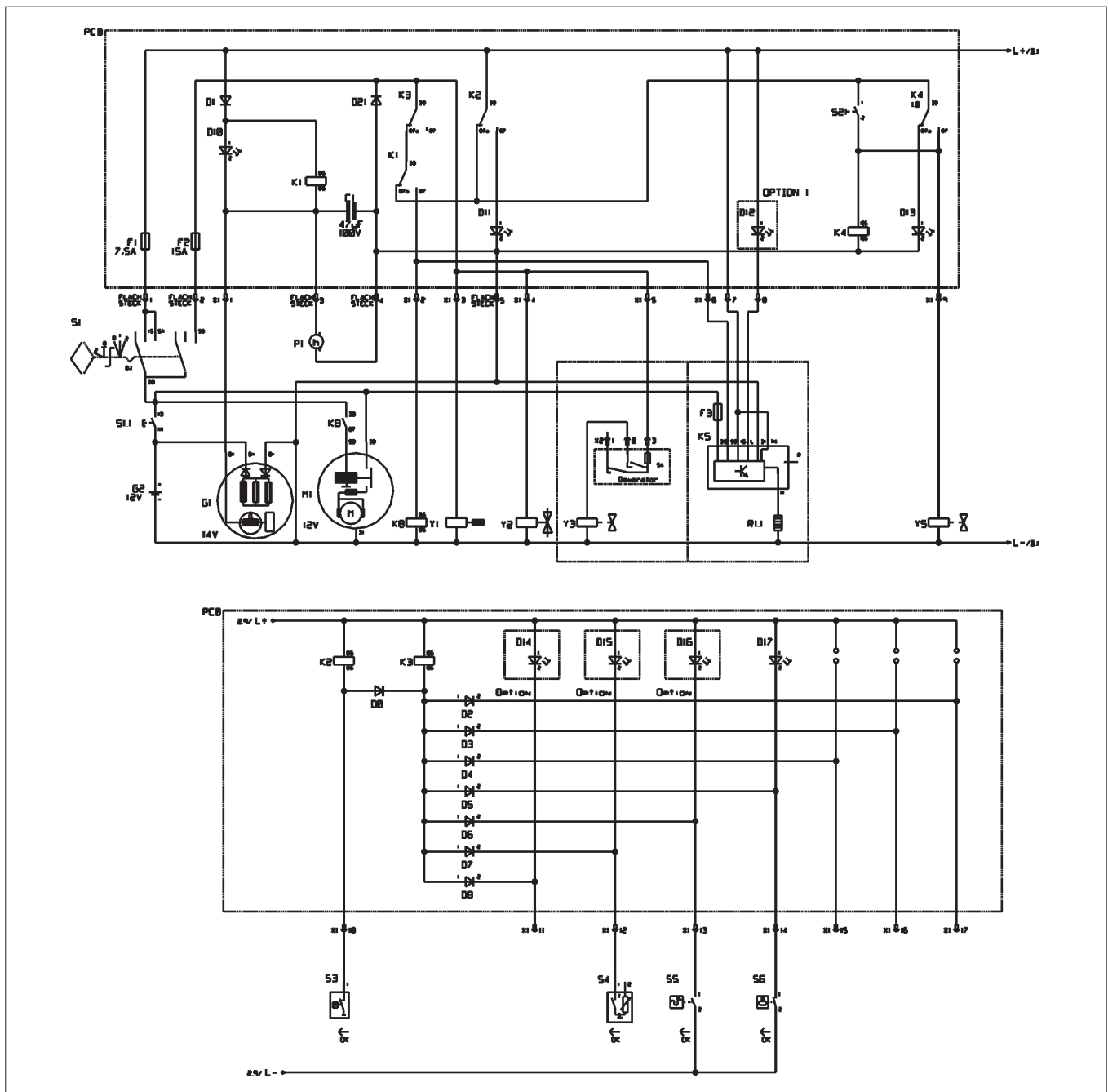


Fig. 6

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4. Construction and functional description

4.5 Terminal Diagram DIN ISO 1724

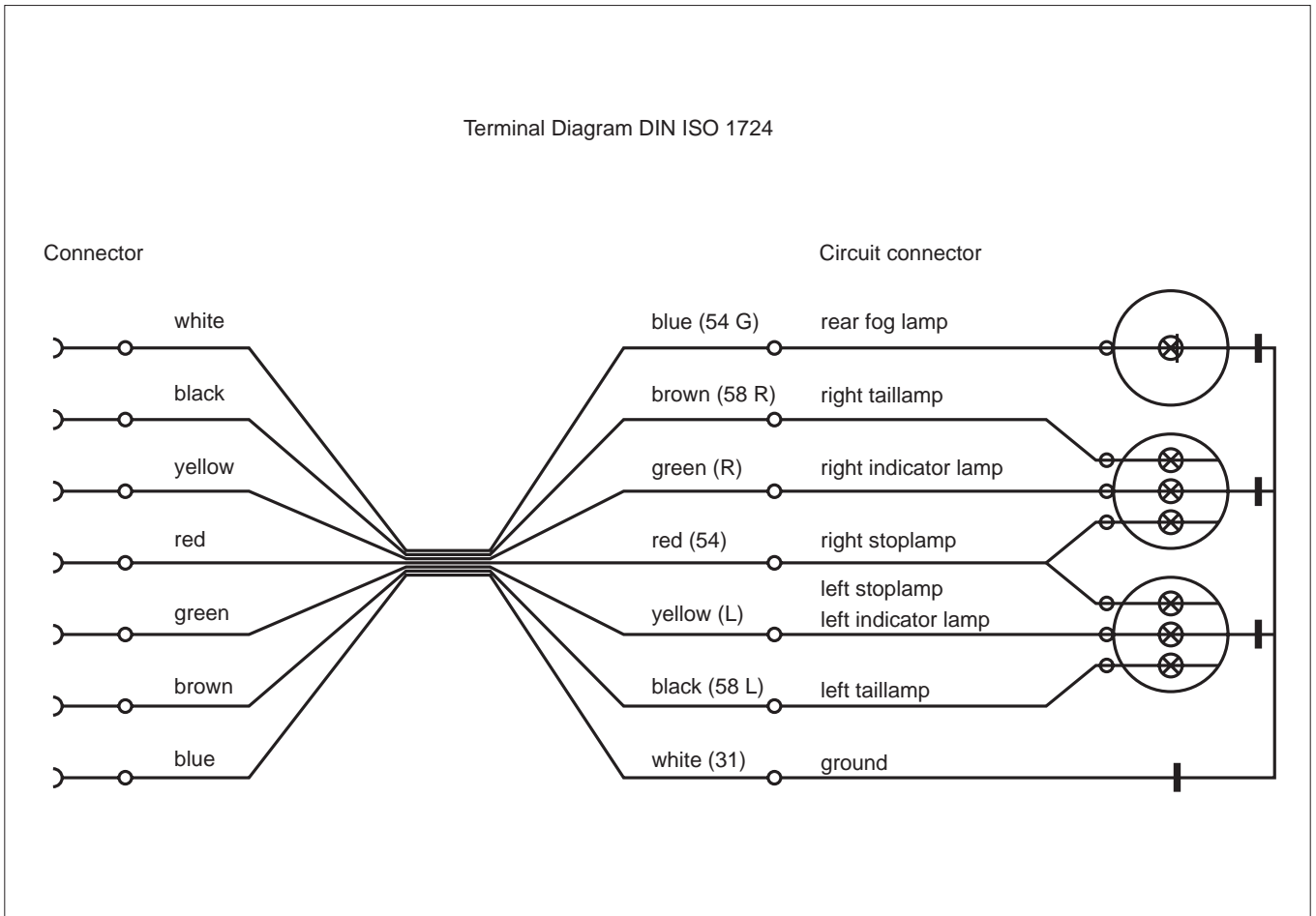


Fig. 7

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The terminal diagram is designed for a voltage of 12 Volts!

5. Transport and installation on site

5.1 Transport

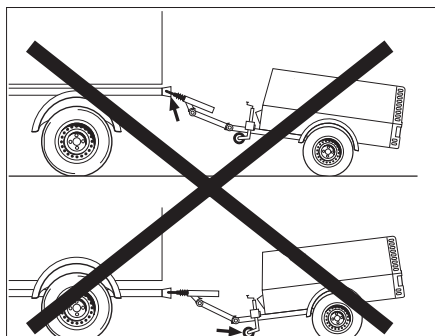


Fig. 8

Danger

Make sure to check the torque after 50 kilometers following wheel mounting and at regular intervals.

Tighten wheel nuts or screws evenly in a diagonal sequence to the specified torque using a torque wrench.

Replacing the trailer coupling ring

The coupling arrangements which can be used:

- * Trailer coupling ring RD 40
- * Coupling 50 dia.
- * Coupling ring 2" dia. (only for UK)
- * Coupling ring 68 x 25 dia. (only for France)

A different coupling unit in the form of a complete kit may be ordered, if necessary. Replacing the trailer coupling ring is permitted only if proper fitting is carried out by an inspectorate for the sector covered by the Regulations Authorizing the Use of Vehicles for Road Traffic (e.G. the TÜV - Technical Inspectorate, DEKRA - German Motor Vehicle Monitoring Association, etc.). The inspection station provides a fitting certificate to be kept with the vehicle documents.

Danger

The screw compressor may only be transported on public roads if

- * **The machine group (engine) is not running,**
- * **The pressure tank is not under pressure,**
- * **The shieldings are closed,**
- * **The blocks are firmly hooked in place,**
- * **Hoisted and secured tail wheel,**
- * **The tyres and brakes are operationally safe and roadworthy,**

- * **The lighting is fully functional.**

Never exceed the maximum towing speed! Danger! Observe national regulations!

Please also observe the safety instructions in Chapter 3 on the subject of transporting.

Before transporting the compressor, check to make sure that the drawgear of the towing vehicle and the drawbar eye or trailer hitch ball connection are aligned exactly to each other.

When transporting the screw compressor with a vehicle, the following points must be observed:

- * The shieldings are closed.
- * The blocks are firmly hooked in place.
- * The support(s) is(are) retracted and locked in position (jockey wheel).
- * Drawbar is connected to the towing vehicle.
- * The drawbar is adjusted to the height of the towing vehicle (option).
- * The contact-breaking cable is connected to the towing vehicle. Safety chains are attached on towing vehicle.
- * The electrical cable (option) is connected to the vehicle and to the screw compressor .
- * Check the lights (tail lights, brake lights, indicator lights, and rear fog lamp) (option).
- * Check to make sure that the wheels are properly tightened, the tyres are in a roadworthy condition and the tyre pressure is correct (danger of accidents).

When parking the compressor, use the support or the jockey wheel to secure the compressor in a horizontal position. Apply the parking brake. Use chocks to ensure that the machine does not roll away.

Attention

Always keep a safe distance from the edges of foundation ditches and embankments! Do not travel across slopes transversely.

5.2 Link up breakaway cable

If the towing connection becomes uncoupled, the trailer is braked by the breakaway cable. Put the breakaway cable in the eye provided or wind it around the towing collar and hitch it up to the cable with the snaplink.

The breakaway cable must be attached in a way that ensures that even on extremely sharp bends there is no danger of activating the locking brake.

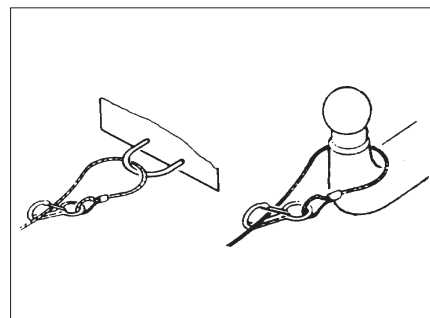


Fig. 9

5.3 Loading/Relocation

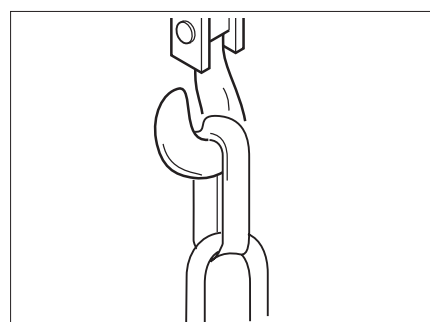


Fig. 10

Danger

Only use hoisting gear (e.g. crane) with appropriate lifting capacity for the loads occurring!

Only use the correct suspension gear!

Keep clear of the swiveling range of the hoisting gear!

Keep clear of suspended loads!

All loose parts that could fall down during hoisting must first be removed or secured; pivoting parts, like doors, towbars, etc. must be secured in such a way that they cannot move.

Never leave the load suspended on the hoisting gear. Acceleration or braking of the means of transport must remain within the approved limits.

Please also observe the safety instructions in Chapter 3 on the subject of loading.

Attention

Do not attempt to use a crane hook or similar load suspension devices direct on the lifting device to avoid damages to the lifting device!

5. Transport and installation on site

Use proper hoisting gears only such as hoisting straps in compliance with DIN standard 61360 with proper lifting capacity for connecting the load suspension device (e.g. crane) and the lifting device.

Only deploy load bearing equipment which corresponds to the safety instructions for lifting gear.

Use a transport harness compliant with local regulations for transporting by helicopter. The eyes provided may not be used for this purpose (max. acceleration if the eyes are used = 2 x g)

Never lift up or lash down the unit using the shieldings!

Never relocate the machine if external lines or hoses are connected to the discharge valves, in order to avoid damage to the valves and/or collecting pipe and hoses.

When loading, the following points must be observed:

- * Secure the load suspension device or the hoisting gear in the lifting device of the screw compressor.
- * When hoisting the compressor, set up the hoisting gear in such a way that the compressor, which must be set up horizontally, is lifted vertically.
- * Only relocate the compressor by itself.
- * Raise and lower the compressor carefully.
- * After relocating, remove the load suspension device or the hoisting gear from the lifting device.
- * Tie down the compressor on the cargo area of the means of transport.
- * Only tie it down at towbar and wheel axles.
- * When the chassis is being dismantled, the shieldings with machine group may only be supported under the base frame.

5.4 Installation on site

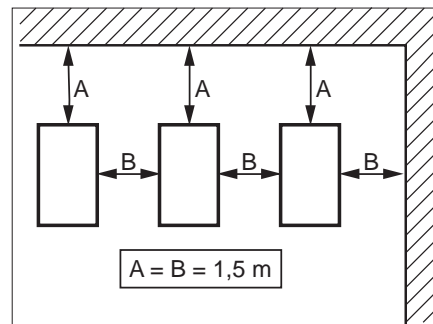


Fig. 11

Danger

The air intake must be positioned in such a way that loose personal clothing cannot be drawn in.

Make sure that the pressure pipe from the compressor to the aftercooler or the air system can expand as a result of heat, and that it does not come into contact with inflammable materials.

The air intake is to be designed in such a way that no dangerous admixtures (inflammable solvent vapors etc., but also other dangerous or toxic substances) can be taken in. This also applies to flying sparks.

Pipes and other parts with a surface temperature of more than 80 °C must be suitably secured against contact and suitably marked.

The operation of the compressor in areas where there is a risk of explosion is strictly forbidden! (Exception: specially-made compressors with the necessary technical modifications for use in such areas)

Please also note the safety instructions in Chapter 3 on the subject of installation on site.

Location

The complete system is to be set up in such a way that it is easily accessible and that the required cooling is guaranteed. Never block the air intake. Ensure that the entering of moisture and dirt together with the intake air is kept to a minimum.

The compressor is to be set up away from walls.

Attention

The screw compressor is to be set up in such a way that no air reflection can take place, i.e. neither waste air nor exhaust emissions may be drawn in; the same applies to dangerous admixtures to the air. Drawing this waste air in could lead to overheating and a loss of power.

The compressor must be set up in as horizontal a position as possible. Maximum permissible inclination during operation:

- * In direction of pull: 15 degrees
- * Backwards: 15 degrees
- * To the right and to the left: 15 degrees

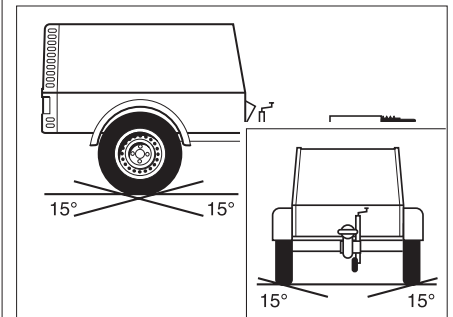


Fig. 12

Attention

Greater inclinations endanger the operating reliability of the screw compressor.

When setting up the unit on ground that is not horizontal, or with a variable angle (see operating instructions) please consult Atmos.

Set up the machine in such a way that no inlets, outlets or gates are blocked, even when the doors are open. Before disconnecting the machine from the towing vehicle, apply the handbrake. Disconnect contact-breaking cable and lighting cable, uncouple air brake lines.

Secure wheels with chocks.

Note

In dusty environments, set up the machine in such a way that the wind does not blow the dust in the direction of the machine. During operation in clean environments, the intervals for cleaning the air intake filter and the cooler elements are much longer.

Attention

No force may be exerted on the discharge valves, for example by pulling the hoses or fitting additional equipment (e.g. a water separator, compressed air oiler, etc.) directly at the discharge valve.

5. Transport and installation on site

Temperatures/air humidity

Install the compressor in a location with maximum possible frost protection. The suction air temperature must be within the range specified on the data sheet.

Attention

An oil-temperature regulator (option) is necessary for operation of the system at high temperatures (+40° C and above) and/or high rel. air humidity (greater than 90 %) or at temperatures below 0°C. For operation involving long periods of idling and/or low partial loads an oil temperature regulator is also required.

Altitude

For operation at an altitude above 1,000 m, the compressor and engine must be adapted (modified design).

Note

Particularly in case of installation out of doors and at night, observe fuel temperature. At temperatures below 0 °C, summer diesel fuel tends to precipitate and block the fuel filter. In this case use winter diesel fuel.

6. Preparing the compressor for operation

6.1 Checking oil levels

6.1.1 Checking the oil level in the pressure tank

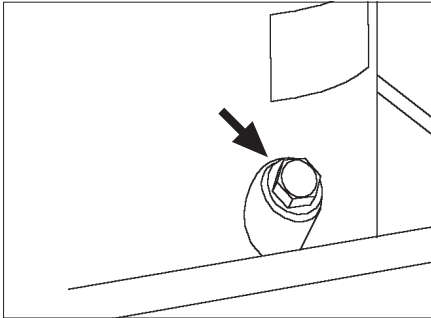


Fig. 13

Danger

Only check the oil level when the engine is at a standstill and the compressor is not under pressure.

The pressure tank may be under pressure and the oil may be hot.

Risk of scalding! Spill no oil!

Check for leaks.

Proceed as follows:

- * Before checking the oil level in the engine and in the compressor ensure that the vehicle is standing horizontally.
- * Ensure that the screw compressor has been out of operation for some time.
- * Unscrew dipstick.
- * The oil level should be within the marks on the dipstick.
- * Correct as required.
- * Check the seal on the dipstick and replace if required.
- * Screw in dipstick and tighten firmly.

Attention

After a short test run, the oil level should be between the markings on the dip stick. For oil specifications, see recommended lubricants, Chapter 8.1.

6.1.2 Checking the oil level in the engine

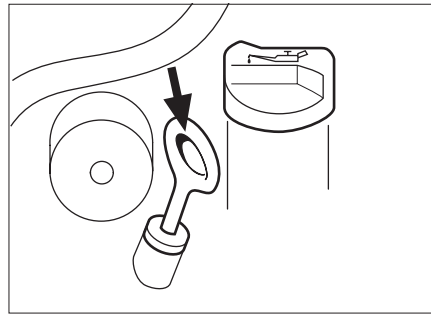


Fig. 14

Danger

Only check the oil level when the compressor engine is at a standstill. Spill no oil! The oil may be hot. Risk of scalding!

Check for leaks.

Proceed as follows:

- * Ensure that the screw compressor is standing horizontally.
- * Ensure that the screw compressor has been out of operation for some time.
- * Unscrew dipstick.
- * The oil level should be as near as possible to the upper dipstick mark.
- * Correct as required.
- * Screw in dipstick.
- * Close oil filler.
- * For oil specifications, see "Engine Operating Manual".

Attention

After a short test run, the oil level must not be above or below the upper or lower dipstick marks. For oil specifications, see engine instruction manual.

6.2 Battery

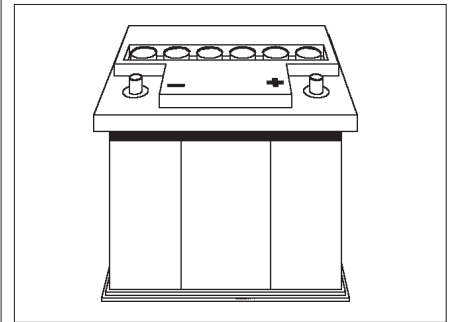


Fig. 15

Danger

When working with battery acid (electrolyte), wear acid-resistant goggles, gloves and apron.

The gases released by the battery are explosive. Avoid sparks and open fires in the vicinity of the battery.

Do not allow acids to come into contact with skin or clothing. Wear safety goggles.

Place no tools on the battery.

The battery is filled and charged in accordance with DIN 43539. The battery is fastened with clamping strips.

The batteries used are ready to be installed and ready for service. Replacement batteries should be of the same type as the batteries installed (low gassing). The replacement battery should be unfilled and only be preloaded so that it has to be filled with battery acid. The battery and the acid should have a temperature of at least +10 °C.

Proceed as follows:

- * Fill up with battery acid as far as the base of the control insert
- * Leave the battery to stand for some time
- * Then shake it gently
- * If required, top up with acid
- * Tighten sealing caps
- * The battery is ready for use
- * Leave for 1 hour

6. Preparing the compressor for operation

6.3 Filling up the fuel tank

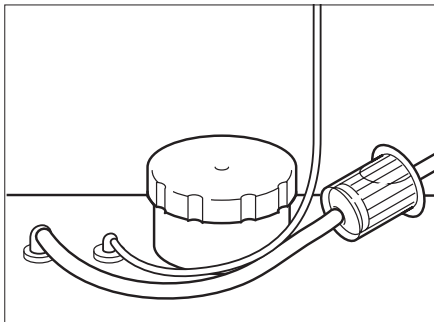


Fig. 16

Danger

Only fill up with fuel when the screw compressor is at a standstill. Cleanliness is essential! Spill no fuel! Filling up at a pump can cause static electricity and possibly sparks.

Proceed as follows:

- * Open tank lid
- * Fill up tank with commercially available branded diesel fuel, using a sieve (use summer or winter diesel fuel depending on outside temperatures)
- * Close tank tight with tank lid
- * With the Deutz engines M2011, the injection pump is self-ventilating. When the tank is empty, immediately fill in fuel to ensure that the fuel pump is always filled with fuel. This condition may result in starting problems.
- * Close hood.

Note

It is not possible to start up the compressor if there is insufficient fuel is available.

The fuel tank should always be filled up in good time. For outside temperatures below 0 °C, use only winter diesel fuel.

More information on fuel quality, see engine operating manual.

For outside temperatures below 0 °C, observe the operating manual of the engine manufacturer for winter operation.

You can reduce the occurrence of condensation in the fuel tank considerably by filling it up in good time. This also prevents downtimes and starting problems that can occur when the fuel tank is run dry.

6.4 Checking the air filter maintenance display

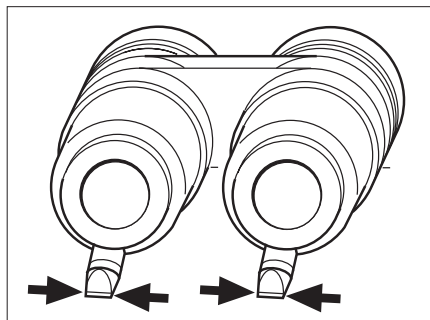


Fig. 17

When the red service sector in the transparent part is fully visible, the air filter is due for maintenance. (See Chapter Maintenance, air filter replacement.)

Empty the dust emission valve by pressing together the emission slot in the direction of the arrow.

Note

Clean the emission slot from time to time.

7. Putting the compressor into operation

7.1 Initial operation

Transport inspection

Every Atmos screw compressor has already run in the factory and has already undergone a thorough test before shipment. This test ensures that the compressor complies with the given data and works perfectly. Independent of the care taken in the factory it is still possible for the compressor to be damaged during transport. For this reason it is recommended that the unit should be examined for possible damage during transport.

Remove any transport seals (dummy flange, plugs, etc.) and dehydrating agents before start-up. Distribution tubes and connection lines must have the specified dimensions and must be suitable for use with the max. operating pressure and the media to be taken up.

During the first hours of operation, the compressor should be observed in order to be able to ascertain any possible malfunctions.

Transport safety locking of the towing arrangement

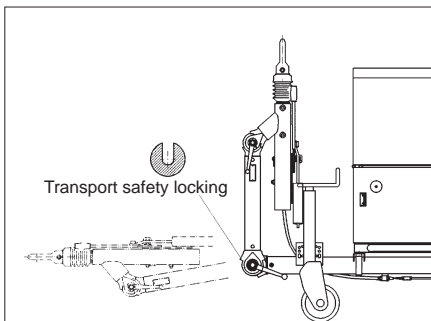


Fig. 18

The towing arrangement is positioned vertically in accordance with Figure 18. The clamp must be released and the spacer removed on initial use. The towing arrangement can then be adjusted according to the required trailer height and locked with the clamp/ratchet (see here Undercarriage Operating Instructions).

7.2 Operating elements

Operating panel:

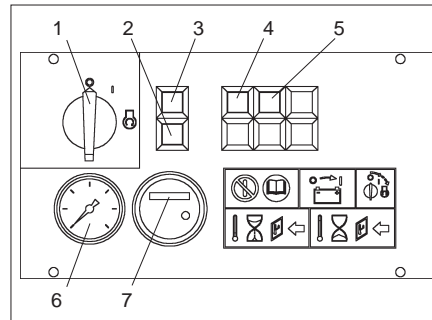


Fig. 19

- 1 Ignition switch
- 2 Start / Run valve
- 3 "Battery charge" pilot lamp
- 4 "Fault" pilot lamp
- 5 "Fuel shortage" warning lamp
- 6 Operating pressure gauge
- 7 Hours of operation counter

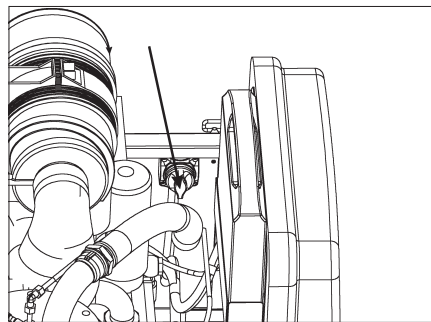


Fig. 20 Main battery switch

7.3 Start-up

Danger

Before starting up, make sure that no one is in the danger area of the engine / screw compressor.

Compressors may not be operated in hazardous environments unless they have been specially designed for this purpose (e.g. exhaust protected against emission of flying sparks etc.).

Never, under any circumstances, use "Startpilot" (Spray-can starting aid), ether or other starting aids - Danger of explosion!

After service work has been completed: Make sure that all protective devices have been refitted and that all tools have been removed.

The exhaust emissions of combustion engines contain carbon monoxide - a lethal gas. If a machine with such an engine has to work in an enclosed

room, the exhaust gases must therefore be conducted out of doors by means of a pipe or hose with an internal diameter of at least 100 mm. The use of extraction systems is highly recommended in test rooms for mobile machines.

Only operate the compressor with the hood closed. The hood may only be opened briefly for minor adjustments while the compressor is running.

Skilled personnel only are authorized to work with the hood open.

When working with the screw compressor in operation and with the shielding/hood open, wear ear protection.

Caution: this may impair communication between persons. Warnings may not be heard. Inform supervisor.

Attention

Opening the covering interferes with the flow of cool air in the compressor section.

Full sound-insulating is only achieved when the covering is closed.

Check the oil levels in the pressure tank and in the engine of the compressor each time before start-up.

Do not start the compressor unless the air tapping cocks are closed.

Note

It is not possible to start up the compressor if there is insufficient fuel is available.

Starting up the compressor:

- * Close air tapping cocks.
- * Switch on main battery switch.
- * Turn ignition switch to position "On" I; the indicator lamps "Battery charge" and "Fault" come on.
- * Turn the ignition switch further to position II.
- * Hold the ignition switch in position II until the engine starts running and the "Battery charge" and "Fault" indicator lamps go off.
- * Release the ignition switch.
- * If the engine has not started after 15 seconds at the latest, turn the ignition key back to position III (Off-Aus). As soon as the starter has reached a standstill and the pressure tank is no longer under pressure, the engine can be started again.

7. Putting the compressor into operation

- * After the start, the engine runs at the idling speed and the compressor at reduced pressure.
- * If the engine was started cold, let it warm up for approximately 2 minutes and then press the START/RUN valve (2). If the engine is warm, the START/RUN valve can be pressed immediately.
- * The installation is now ready to operate. Check that all the hoses and tools have been connected correctly and open the desired air outlet valves.

Start-up using jumper cables / auxiliary batteries

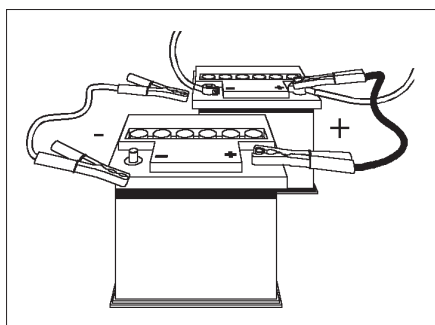


Fig. 21

Danger

Longer operation with an auxiliary battery or jumper cables connected can lead to sudden emissions of gas. An inflammable air / gas mixture is formed. Explosion hazard!

Attention

Serious damage can be caused to the electrical system if wrongly connected.

- * Ignition switch in position **⊙** (Off-Aus)
- * First connect positive terminal then negative terminal (ground).
- * Start as described in section "Starting up the compressor."

Note

After the engine has started, first disconnect the negative cable (ground) and then the positive cable.

7.4 Setting the operating pressure

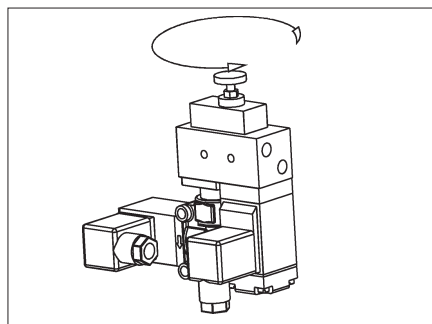


Fig. 22

Danger

The setting of the operating pressure may only be carried out by a specialist.

The operating overpressure of the screw compressor is set by the manufacturer (see the identification plate on each compressor).

Pressure values can be set between 5 bar and the operating overpressure stated on the rating plate. Pressure values higher than this are not permitted.

Operating pressure is set by a specialist at the controller.

- * Remove counternut below the control knob of the regulator.
- * Raise pressure by turning the adjusting knob of the regulator clockwise (towards +).
- * Lower the pressure by turning the adjusting knob of the regulator anticlockwise (towards -).
- * In order to lower the pressure, open an air discharge valve.
- * After altering the pressure, lock the adjusting knob using the knurled nut.

This readjusted operating pressure is to be checked using the pressure gauge on the instrument panel at 100% air discharge and maximum engine speed.

7.5 Monitoring / fault

Danger

Bridging the safety switch in the automatic monitoring system is not permitted!

When the "Fault" indicator lamp lights up, the screw compressor is automatically shut down when the following faults occur:

- * **Fuel shortage**
- * Compressor temperature too high
- * Engine oil pressure too low
- * Engine oil temperature too high

After one of these faults, it is only possible to restart the machine after the fault that caused the machine to be shut down has been corrected.

Attention

Disconnect the battery or generator only when the engine is not running.

- * Switch off the machine if the compressed air transports oil spray or if excessive oil is consumed. (Refer to the trouble-shooting section)
- * Check that the "battery charge" pilot lamp is not illuminated. If it glows, even weakly, refer to the trouble-shooting section.
- * Check that the air pressure (7) assumes a value within the permissible pressure range.

If the machine cuts out, before switching off at the ignition switch (1) carry out the following checks:


- * Interrupt the electric connection to the engine oil pressure switch immediately after the engine has cut out and leave it in the interrupted state.

If the "fault" pilot lamp goes out immediately this indicates that either a too low engine oil pressure or a lack of fuel or a defective engine has led to the cut-out.

- * If the light continues glowing this indicates that an excessive engine temperature or compressor temperature led to the cut-out.

In order to trace the origin of the fault, interrupt the engine oil temperature switch (with the engine oil pressure switch still switched off). If the lamp now goes dark this indicates that the problem is related to the oil temperature.

7. Putting the compressor into operation

- * If the lamp continues glowing the fault is located somewhere else. In this case reconnect the engine oil temperature switch and interrupt the connection to the compressor temperature switch. If the lamp goes dark the compressor temperature has led to the cut-out.
- * Reconnect all electrical connections once the fault has been identified in order to re-establish the function of the protective elements. Also reconnect the engine oil pressure switch.
- * Switch the ignition switch to its position  (Off-Aus).

Note

These checks must be carried out immediately after the installation has cut out as the protective circuits reset themselves after cooling down.

If the ignition switch is pushed to the very left while the machine is running it will be switched off.

Pressure gauge for display: "Operating pressure"

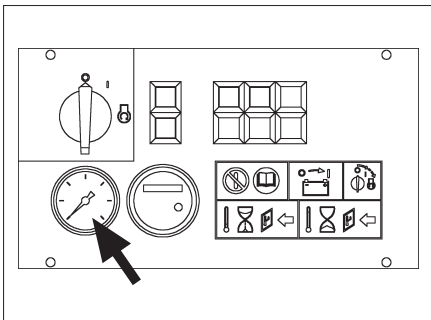


Fig. 23

Danger

Do not operate the compressor at pressures above the permissible operating pressure.

The pressure gauge shows the operating pressure of the compressor.

The permissible operating pressure is indicated on the nameplate!

7.6 Operation

Danger

Only operate the compressor at the permissible operating pressure and at the permissible temperature.

Only use the compressor for its intended purpose (see Chapter 1.2 of this operating manual) in order to avoid residual risk for persons and assets.

Only operate the compressor in a safe, functioning condition.

All components, hoses etc. fitted must be of the correct size and designed for the specified operating pressure and temperature.

When working with compressed air, wear suitable protective clothing (e.g. protective suit, safety goggles, etc.).


Wearing ear muffs may impair communication between persons. Warnings may not be heard. Inform supervisor.

Check the compressor regularly.

Leaking condensation contains a proportion of oil and must be collected and disposed of under safe conditions. Condensation must not enter the soil or the rivers. Major quantities of condensation accumulate particularly in versions with aftercoolers for processing compressed air. Provide a collecting basin.

7.7 Shutdown

In order to shut down the compressor:

- * Close air discharge valves. The screw compressor reduces the speed of the engine back to idling speed after the preset final pressure has been reached.
- * Allow the screw compressor to idle for a few minutes.
- * Return the ignition switch (1) to the position .

Note

This switch can also be used as an emergency stop switch. No other switching off method is provided.

- * Turn off power to the system using the main battery switch.

After the installation has come to a standstill all the air is automatically blown out of the pressure tank via the blow-off valve.

Danger

It is important that you ensure that the pressure is completely blown off via the blow-off valve.

Should this not be the case, open the air outlet valves, identify the fault and correct it.

7.8 Decommissioning

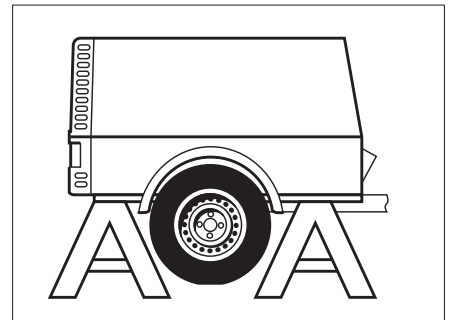


Fig. 24

If the system is to be closed down for a longer period of time (approx. 3 months or longer) the following preservation measures must be taken:

- * Engine preservation (see separate engine operating manual).
- * Disconnect battery cables.
- * No special measures are required at the compressor.
- * Relieve the strain on tyres by jacking up the vehicle.
- * Check tyre pressure every 2 months.
- * Release the handbrake.

Attention

When putting back into operation, carry out the maintenance work in accordance with Chapter 9 "Maintenance."

8. Fuels

8.1 Recommended lubricant for compressor

Note

In these screw compressors, circulating oil has not only a lubricating function, but in particular it also has cooling and sealing functions. It is therefore exposed to more difficult conditions. In particular the temperature conditions at the installation site and the consistency of the air (dust, dirt, and humidity content, as well as chemical influences) must be taken into account when selecting a suitable lubricant.

Attention

Do not mix oils of different specifications.

The maintenance intervals and the maximum and minimum operating temperatures given in this operating manual only apply when high-quality multi-grade oils are used.

Use of the wrong oil leads to impairment of function.

Change the compressor oil more frequently than specified if the equipment is operated under abnormal conditions, i.e. at a high ambient temperature, high air humidity or in a dusty environment. If necessary, analyse the oil.

Out of consideration for the high loads imposed on the lubricant in screw compressors with oil injection cooling, we recommend the use of suitable, non ageing, non foaming, corrosion-protective oils. They must meet the following requirements for hydraulic fluids:
ATMOS VDL 46
TEXACO Compressor Oil EP VD-L46 (32)
MOBIL Rarus 425 (424)
in accordance with
DIN 51524, Part 2, June 1985.

The viscosity of the lubricants should comply with viscosity class ISO VG 32 DIN 51519, July 1976, with 28 - 35 mm²/s(cSt) / 40 °C, or if the ambient temperature is constantly above 25 °C, with viscosity class ISO VG 46 DIN 51519, July 1976, with 41 - 50 mm²/s(cSt)/40 °C.

Attention

Conventional engine oils marked HD must not be used.

Other fluids may be used in accordance with ISO VG 32 and ISO VG 46.

If other lubricants are to be used, please contact:

ATMOS Chrast, s.r.o.

or your authorized dealer or your local branch.

8.2 Recommended engine oil

Lubricant specifications for the driving engine can be found in the enclosed engine operating manual.

8.3 Tool lubricants

Attention

Do not run the machine with an empty oiler tank! The tank must always contain a minimum of 0.2 l of tool oil.

The wrong tool lubricants lead to deposits that cause malfunctions in the appliances connected!

For the perfect lubrication of concrete breakers and pneumatic spades, we recommend the use of Atmos oilers or automatic pipe oilers, using the special synthetic oil.

The special advantages of tool oil are as follows:

- * Biodegradable,
- * Ice guard down to -50 °C, for use with sound absorbers,
- * Very good lubricity, thus wear-reducing,
- * No irritating exhaust gases, work in enclosed rooms possible,
- * Good cleaning effect, no residue formation
- * Excellent preservation properties, protects from corrosion.

When using compressed air consumers made by other manufacturers, then their regulations must be observed.

8.4 Diesel fuel

Use common diesel fuel with a sulfur content of less than 0.5 %. If the sulfur content is higher, oil has to be changed at shorter intervals.

The following fuel specifications are applicable:

- * DIN 51 601

- * Nato Codes F 54, F 75, and F 76
- * BS 2869: A1 and A2 (observe sulfur content with A2)
- * ASTM D 975-81 : 1-D and 2-D
- * VV-F-800a : DF-A, DF-1, and DF-2.

Note

See engine instruction manual.

At low temperatures, paraffin precipitation can cause blocks in the fuel system and disruptions in operation. Below outside temperatures of 0 °C use winter diesel fuel (to -15 °C). (This is usually available at gas stations in good time before the winter season begins.) Diesel fuel with additives is frequently offered for use at temperatures as low as -20 °C („Superdiesel“).

Note

Only mix in the tank. First put in the required quantity of petroleum, then fill up.

See engine instruction manual.

Below -15 °C or -20 °C, petroleum must be added.

If it is necessary to use summer diesel fuel below 0 °C, petroleum can also be added up to 60 %.

In most cases, adequate resistance to low temperatures can be achieved by adding a product to improve flow properties (fuel additive). Consult your engine service station.

Attention

The compressor must not be fuelled with bio-diesel (DIN 51606) or vegetable oil.

8.5 Recommended lubricants for the bogies

For relubrication use only lithium saponified grease which fulfils the following specifications:

- * consistency groups (NLGI) 2
DIN 51818
- * worked penetration 265-295
DIN ISO 2137
- * dripping point > 180 °C
DIN ISO 2176
- * operational temperature
- 40 °C ... +140 °C

This corresponds to a DIN 51502 lubrication grease, designation KP2N-4U.

Greases with different thickeners (soap base) must not be mixed.

Recommended grease: Fuchs Renolit LZR 2.

9.1 General maintenance

Clean the screw compressor at regular, not too long intervals:

- * Blow-clean all valves, controllers, fittings, pressure tank, oil cooler, radiator, screw compressor, and engine with compressed air or a steam jet appliance.
- * Inspect the cooling ribs of the radiator to make sure that air can pass through.
- * Clean the body at regular intervals. Then grease or oil the hinges of the body hood with multi-purpose grease.

If sound-absorbing matting has to be replaced, remove the retaining brackets, replace the old sound-absorbing matting with new matting, replace the retaining brackets.

9.2 Engine maintenance

The maintenance of the engine is to be carried out in accordance with the engine operating manual.

Danger

During inspection, adjustment, or maintenance work, remember that the surfaces of machine parts can be hot, particularly the exhaust system (risk of burning) and that the control device may move during operation (risk of crushing).

Attention

In addition to the maintenance charts of the engine the following items of the engine operating instruction apply after 50 operating hours after the start-up of new or overhauled engines:

- * Check engine for leaks, repair if necessary
- * Change engine oil
- * Replace oil filter cartridge
- * Changing the fuel filter cartridge and advance fuel filter
- * Check tappet clearance, adjust if necessary
- * Check engine mounts, tighten if necessary
- * Check V-belt, tension if necessary

Full load speed is factory-set by the manufacturer and must not be modified.

The idling speed must not be changed either, as this might cause serious damage to the screw compressor, e.g. damage to the coupling!

Advance fuel filter

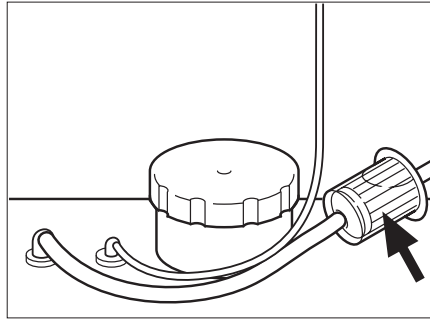


Fig. 25

Danger

Only change filters when the engine is at a standstill.

Do not spill fuel.

Attention

The filter changing intervals are specified in the engine manual.

Change the advance filter more often if there is considerable dirt.

Note

Ensure the system is free from leakage. Check the hoses for cracks and replace if necessary.

Dispose of contaminated filters in accordance with the regulations.

Changing the advance fuel filter:

- * Release the clamps.
- * Draw the ends of the hoses off.
- * Insert a new filter.
- * Fit the hose ends.
- * Fasten the clamps.

9.3 Maintenance of chassis and brakes

The maintenance of the chassis and the brakes must be carried out in accordance with the chassis instruction manual.

Work on the brakes may only be carried out by trained technical staff or by specialist brake services!

Danger

During inspection, adjustment, or maintenance work, remember that the surfaces of machine parts can be hot, particularly the exhaust system (risk of burning) and that the control device may move during operation (risk of crushing).

9. Maintenance

9.4 Compressor maintenance / Maintenance schedule

Operating hours	60 h	500 h	1000 h	1500 h	2000 h	2500 h	3000 h	3500 h	4000 h	4500 h	5000 h	5500 h	6000 h	6500 h	7000 h	7500 h	8000 h
For 2 boxes per annum: Maintenance every 500 h, although at least every 6 months For 1 boxes per annum: Maintenance every 1000 h, although at least each year	1. year			2. year		3. year		4. year		5. year		6. year		7. year		8. year	
Install a "Caution maintenance work" warning sign and cordon off a wide area around the workplace before starting any work																	
Check the oil level in the diesel engine	daily																
Check the oil level in the compressor	daily																
Empty fuel water separator (option)	daily																
Check tyre pressure and wheel nuts, retighten if necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adjust brake system (option) or have checked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lubricate chassis / draw gear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect safety valve	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lubricate hood hinges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean cooler (more frequently if used in a dusty environment)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change oil filter in the screw compressor		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Oil change (screw compressor)		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Inspect automatic operational monitoring		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Change fine separator every year or if differential pressure > 1bar		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Clean air filter (screw compressor/engine) between times or renew if the red field appears																	
Check hose lines for damage (leaks, formation of cracks) and replace, if damaged		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Clean screen of the suction-off line		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Inspect control (adjustment/function)		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Inspect solenoid valves		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Check the battery acid level		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Check clamping bolts and nuts and retighten, if necessary (chassis, frame and bodywork)		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Check suspension components		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
Engine maintenance																	
Unscrew vessel for tool oil and check inside for any corrosion. If rust is found, replace the vessel with a new, original spare part.		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
<input type="checkbox"/> These maintenance intervals must be observed! <input checked="" type="checkbox"/> For your own benefit, put a cross on the servicing schedule against maintenance work when performed.																	

9.4.1 Oil filter replacement (compressor)

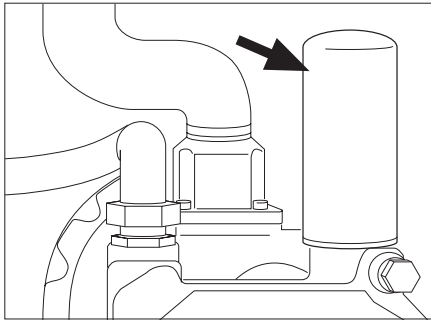


Fig. 26

Danger

Only replace the oil filter cartridge when the engine is at a standstill and the screw compressor is not under pressure.

Caution with hot oil: risk of scalding!

Spill no oil!

Attention

Change the oil filter every 1,000 operating hours, but at least once per year.

Note

Dispose of oil filter cartridge in accordance with the relevant regulations - hazardous waste!

Check for leaks.

Changing the oil filter:

- * Unscrew the oil filter cartridge using appropriate tools
- * Dispose of oil filter cartridge
- * Apply a thin coat of oil to the seal of the new oil filter cartridge
- * Screw on and tighten the new oil filter cartridge (follow the instructions on the oil filter cartridge)
- * Check for leaks
- * Check oil level, add oil if necessary

9.4.2 Oil change (compressor)

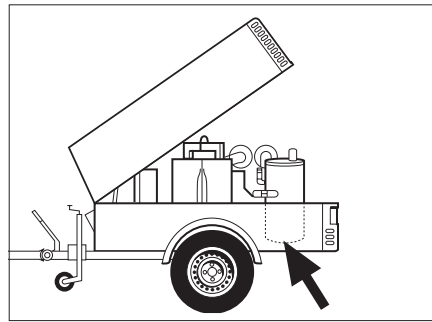


Fig. 27

Danger

Only change the oil when the engine is at a standstill and the screw compressor is not under pressure.

Caution when draining off hot oil: risk of scalding! Spill no oil!

Attention

Change the oil filter every 1,000 operating hours, but at least once per year.

The screw compressor must not be under pressure during oil change.

Drain the oil at operating temperature.

Do not mix oils of different specifications.

Note

Collect used oil, do not allow it to enter the soil. Dispose of oil in accordance with the relevant regulations - hazardous waste!

Spill no oil!

Check for leaks.

Changing the oil:

- * Unscrew dipstick
- * Place oil drain pan under oil drain valve
- * Unscrew the sealing cap of the pressure vessel
- * Collect used oil in the oil drain pan
- * When the used oil has been drained completely, use a **new** sealing ring on the sealing screw of the pressure vessel, position and tighten screw or close the oil drain valve
- * Fill up with new oil (see section "Specifications" in chapter 1 for initial oil capacity; use a little less oil when performing an oil change).
- * For lubricants see "Lubricant Table"
- * Check sealing ring on dipstick, replace if necessary
- * Screw in and tighten dipstick

- * Start screw compressor, run for approx. two minutes, check for leaks
- * Switch off screw compressor
- * Check oil level, add oil if necessary

9.4.3 Checking the automatic monitoring system

Danger

Caution! High voltage! The sensors of the automatic monitoring system must not be short circuited.

Check individually every 1000 operating hours:

1. Temperature sensor - screw compressor (pressure connection)
2. Oil pressure switch - engine
3. Oil temperature gauge - engine

Checking the automatic monitoring system:

- * Disconnect connecting cable
- * Connect to ground at oil temperature gauge.
- * Start screw compressor
- * The automatic monitoring system must switch off the screw compressor immediately after starting, and the "Fault" indicator lamp must come on.

9.4.4 Inspecting / Replacing the fine separator

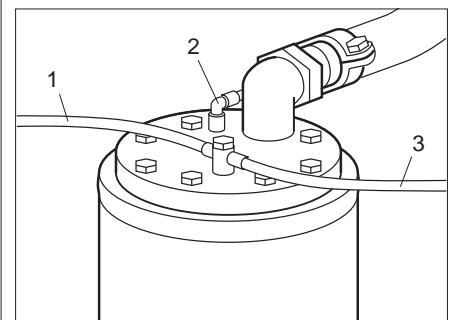


Fig. 28

- 1 Connection for P controller
- 2 Connection for compressor suction line
- 3 Oiler connection

Danger

Pressure tank is under pressure. Only work when the motor is at a standstill and the screw compressor is not under pressure.

Caution with hot oil: risk of scalding! Spill no oil!

9. Maintenance

Note

Dispose of fine separator in accordance with the relevant regulations - hazardous waste!

Check for leaks.

Replace the fine separator at least once per year or measure the differential pressure as follows:

- * When the engine is at a standstill and the screw compressor is not under pressure, unscrew the dipstick from the pressure tank.
- * Screw in the reducing adapter.
- * Screw the pressure gauge into the reducing adapter.
- * Start the screw compressor.
- * The difference in pressure between the pressure gauge on the pressure tank and the pressure gauge on the instrument panel must not exceed 1 bar.

If the differential pressure is > 1 bar, the fine separator cartridge must be replaced.

- * Remove all hexagon screws around the circumference of the lid.
- * Remove the lid and the old fine separator.
- * Remove the old seals from the pressure vessel, clean the sealing surface and fit a new seal.
- * Insert a new fine separator into the pressure vessel and fit a new seal.
- * Fit the lid. Insert the hexagon screws and tighten them across the diagonal (tightening torque see Chapter 9.4.9 "Torque specifications").
- * Check for leakage.
- * Dispose of the old fine separator cartridge in the specified manner.

9.4.5 Air filter replacement (compressor / engine)

Danger

All inspections and servicing work must be carried out when the engine is at a standstill and the screw compressor is not under pressure.

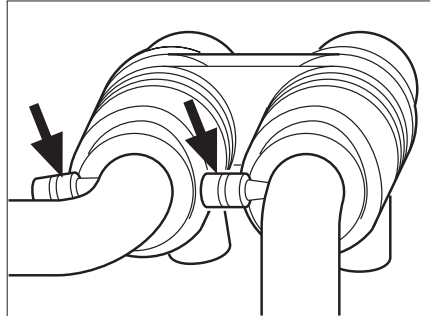


Fig. 29

Note

Check the air filter every week for dust.

Every air filter is supplied with a maintenance indicator, which indicates the adding of the filter cartridge. The maintenance intervals of the air filter depend on the air pollution.

If the red field of the maintenance indicator is visible and stays engaged when the screw compressor is turned off, you must exchange the air filter cartridge (at least every 12 months).

Replace the air filters of the screw compressor and of the engine once yearly.

Do not clean or reuse the air filter.

Attention

Replace the safety cartridge (optional) at the latest every third time the air filter element is replaced.

Replace air filter.

- * Loosen the tensioning brackets at the air filter and fold away.
- * Remove filter hood.
- * Remove filter cartridge from the filter hood.
- * Remove safety cartridge (optional) from the housing.
- * Replace filter cartridge.

Danger

Never clean the air filter cartridge with inflammable liquids.

Reassembling the air filter:

- * Clean the sealing surface in the filter housing.
- * Insert safety cartridge (optional) and ensure correct seating.
- * Insert the filter cartridge and make sure that the seal is properly seated.
- * Replace filter hood and fasten using the tensioning brackets (the tensioning brackets can only be closed if the filter cartridge with seal is seated properly on the sealing surface of the filter housing).
- * Reset the maintenance indicator by pressing the reset lever.

9.4.6 Checking the safety valve

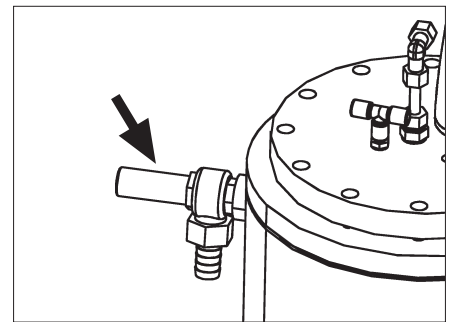


Fig. 30

Check the operation of the safety valve at least twice a year. The check is carried out with the system pressurised. Carefully turn the knob anti-clockwise, until the internal pressure lifts the valve cone, releasing a mixture of oil and air. Then turn the knob fully clockwise again.

In accordance with national standards, but at least once a year, carry out a suitable test to check whether the valve blows down at the correct pressure.

If the valve is not working properly, replace it immediately with a new one designed for the system. This type of operation may only be carried out by trained personnel.

Danger

The screw compressor must not be operated with a faulty safety valve!

A mixture of oil and air will escape when the valve is checked/tested.

9.4.7 Control

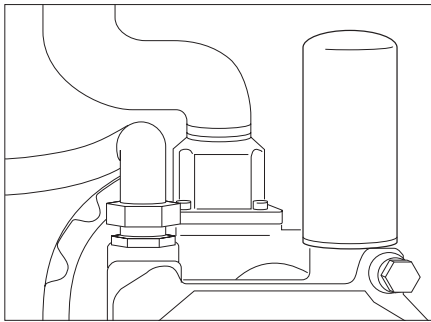


Fig. 31

The regulation is designed as continuous speed control consisting of:

- * The intake control valve,
- * The engine control cylinder,
- * The regulator itself.

The intake control valve comprises:

- * the control piston for the volume flow-rate throttle control and acts as a check valve preventing flooding of the suction control valve and the air filter with oil when the screw compressor is switched off.

9.4.8 Battery maintenance

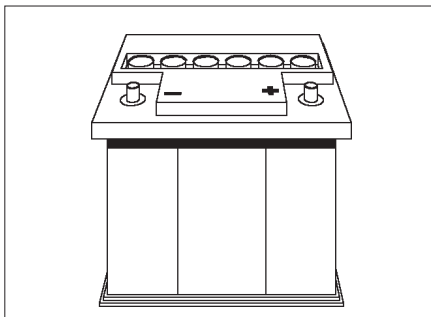


Fig. 32

Danger

The gases released by the battery are explosive.

Avoid sparks and open fires in the vicinity of the battery.

Do not allow acids to come into contact with skin or clothing. Wear safety goggles.

Place no tools on the battery.

The battery is maintenance-free in accordance with DIN.

Attention

Check the acid level after a maximum of 1,000 operating hours, or after 24 months, whichever occurs first, and fill up with distilled water if necessary.

For battery maintenance please also refer to the manufacturer's instructions and the engine operating manual.

9.4.9 Torque specifications PD 50

For the compressors PD 50, PD 50 G the following tightening torques apply to screwed connections:

Wheel screws	90 Nm
Pressure vessel cover	40 Nm
Safety valve	50 Nm
Engine bearing/ rubber metal element	90 Nm
Compressor bearing/ rubber metal element	90 Nm
Chassis mounting screw	90 Nm
suspension / frame property class 12.9 (Durluk screw)	169 Nm
property class 8.8	90 Nm
suspension cross girder	90 Nm
hose clip (engine, compressor/cooler)	max. 12 Nm
hose clip (compressor/ pressure container)	max. 30 Nm

9.4.10 Torque specifications PD 70

For the compressors PD 70 PD 70 G the following tightening torques apply to screwed connections:

Wheel screws	90 Nm
Pressure vessel cover	40 Nm
Safety valve	50 Nm
Engine bearing/ rubber metal element	90 Nm
Compressor bearing/ rubber metal element	90 Nm
Chassis mounting screw	90 Nm
suspension / frame property class 8.8	90 Nm
suspension cross girder	90 Nm

10. Troubleshooting

Problem	Possible cause(s)	Correction
Insufficient or no air supply	Clogged air filter	Clean air filter
	Screw compressor engine speed misadjusted	Set speed
	Clogged oil fine separator filter cartridge	Replace compressor oil, oil filter and oil fine separator filter cartridge
	Wrong setting at controller	Adjust
	Spring and plunger inside the intake control valve are not fully opened	Clean, replace parts if necessary, readjust
Insufficient pressure	Pressure control valve defective	Repair or replace
	Outflow valve dirty	Clean
	Control line defective	Repair or replace
	Intake control valve defective	Repair or replace
Compressor becomes excessively hot (automatic shutdown)	Wrong oil	Replace
	Compressor oil level too low	Fill up with oil
	Fan broken	Replace
	Oil cooler dirty (outside)	Clean
	Oil filter clogged	Replace
	Leak in oil line	Repair or replace
	Air short circuit	Repair
Screw compressor will not start	No fuel	Fill up with fuel
	Fuel filter clogged	Replace fuel filter cartridge
	Fuel line loose, broken, or jammed	Repair line
	Operating voltage low	Charge battery or replace
	Electrical connection loose, corroded, or broken	Replace
	Air in system	Extend starting operation (automatic ventilation)
	Solenoid valve out of order	Replace
	Relay defective	Replace
	Starter defective	Replace
	Other engine problems	See engine operating manual
	Fuse defective	Replace (on the back of the instrument panel).
	Switch defective	Replace

10. Troubleshooting

Problem	Possible cause(s)	Correction
Oil in air line	Orifice in oil return line clogged	Repair / clean
	Oil fine separator defective	Replace
	Too much oil in pressure tank	Correct
Safety valve blows off	Controller set too high	Set
	Pressure control valve defective	Replace or repair
	Intake control valve, control cylinder, engine, or connected control lines defective	Replace
	Valve for intake control valve is missing / is defective	Repair or replace
	Safety valve defective	Replace
Oil comes out of the air filter of the compressor after the screw compressor has been shut down	Intake control valve defective (backlash flap, O-ring, spring)	Check and repair
Engine starts but switches off again immediately, or the system switches off while running	V-belt defective	Replace
	Oil pressure switch/engine defective	Replace
	Oil temperature switch defective	Replace
	Engine temperature switch defective	Replace
	Compressor defective	Check
	Cable defective or cable cover not plugged onto sensor	Replace or plug onto sensor
	Relay defective	Replace
	Solenoid valve defective	Replace
	Generator defective	Repair or replace
	Generator controller defective	Repair or replace
	Other engine problems	See engine operating manual

11. Generator option

11.1 Introduction

This manual describes the operation and maintenance of synchronous generators with switchboxes.

All information relates to data available at the time of going to press.

The manufacturer reserves the right to make changes at any time, without prior notice or obligation. It is therefore always advisable to check for updates.

No part of this publication may be reproduced or transmitted in any form or by any means, without the prior written consent of the manufacturer.

Synchronous generators may only be used as such. No other form of use is permitted.

11.2 Generator safety precautions

Danger

Do not top up current-generating units (generators) with fuel during operation!

Follow the additional fire and explosion protection regulations in the case of installation in enclosed spaces.

Attention! Exhaust gases are toxic! Do not operate generators in non-ventilated, enclosed spaces!

Check that electrical loads and their connections are in perfect condition.

Synchronous generators operate safely and reliably. Before commissioning, read through the safety precautions in this manual carefully.

- * **Ensure that children under the age of fourteen and animals do not have access to the generator while it is running.**
- * **To avoid endangering people or animals, or causing accidents or damage to the machine, always carry out the usual checks before switching the generator on.**
- * **There is always a risk of electric shock if a generator is used improperly. Never touch the generator, or equipment connected to it, with wet hands.**
- * **When using several generators, or if the public mains is available, do not interconnect these systems.**
- * **Caution! Connecting the generator to the public mains can damage it and severely endanger personnel.**

- * **The IP 54 protection means the generator is protected against splashes, spray and other foreign bodies. Do not, however, clean the generator with high-pressure equipment.**
- * **Generators may only accept up to their nominal load if operated according to the standard temperature range and cooling conditions specified. If installed under different conditions, or if cooling of the engine or generator is impaired, for example in confined spaces or under unfavourable circumstances, their output must be reduced.**
- * **Do not modify the generator/switchbox. Such changes, or the use of unsuitable parts, will invalidate approval under machinery safety legislation and certification to EU/EEC Directives.**

11.3 Operating principle

The generator is a self-excited brushless synchronous internal pole generator which is controlled electronically. It consists of the main machine, exciterrotary rectifiers and generator regulator assemblies, housed in a common enclosure. The main machine of the synchronous 3-phase generators has various design features, including a damping cage and balancing system, which allow it to handle an extremely asymmetrical load. All of the other equipment required for safe electrical operation is accommodated in the directly mounted switchbox.

The splashproof and dustproof generator is driven by the engine using V-belts. Over the range from no-load to nominal output, the voltage it supplies is controlled by a highly integrated electronic regulator, which is fully encapsulated in the cover of the switchbox, so that the output voltage over this range complies with IEC 38 requirements. This standard is comparable with the public mains.

The stability of the output frequency is entirely dependent on that of the speed of the combustion engine. You must therefore ensure that this engine is serviced, maintained and operated properly.

If the generator is overloaded briefly (for less than the thermal response time of the circuit breaker), or devices with excessive startup consumption levels are connected, the regulator automatically limits the output/startup consumption (through the excitation current). This leads to a (desired) withdrawal of the output voltage. Please take account of this when operating several devices simultaneously on your generator.

Note

Switch devices (loads) on one after the other, starting with that with the least favourable startup characteristics.

If the generator is extremely dirty, insufficiently ventilated, or operating under otherwise unacceptable conditions, to prevent it or the regulator being damaged by overheating, the output voltage is reduced to about half its nominal value if the temperature inside the switchbox exceeds 80 °C. This compromises the connected devices, which must be switched off or unplugged immediately. Always avoid operating the generator under such conditions, and keep it clean (particularly fan cowl air inlets, cooling fins).

The generator is fitted with a thermal-magnetic circuit breaker, which not only protects against overloads, but also switches off in the event of an insulation fault on a connected device. Interruption of power distribution during operation may be caused by an insulation fault on a device (in which case an indicator lamp comes on), or an overload (when it does not). If an overload has occurred, eliminate its cause, wait for a short time, then reset the circuit breaker. On generators with a hinged glass cover over the circuit breaker, open the cover, grasp the breaker's operating handle and push upwards (always in the centre = yellow mark, not on one side!). Then carefully close the cover again, and tighten its knurled screws, without exerting force. After the circuit breaker has released due to an overload (indicator lamp off), wait for a short time until it can be reset. The thermal-magnetic or thermal circuit breaker is designed in accordance with the machine specifications, particularly in relation to shock and vibration resistance, and ambient temperature. Only use an original part if replacements are needed.

11. Generator option

11.4 Operating the generator (Working safely with electrical equipment)

This state-of-the-art synchronous generator has been designed and built with maximum safety in mind. It will help you get the most out of your work or leisure activities. However, like all electrical equipment, it can represent a source of danger (e.g. risk of electric shock) if the operating instructions in this section are not followed exactly. Please observe the instructions and the notes on dangers affixed to your generator.

Before starting the generator, all devices must be unplugged and switched off. Only plug the devices in (one after the other) and switch them on after the engine driving the generator has reached its nominal operating speed.

Keep the glass cover over the circuit breaker on the front panel closed at all times. Tighten the knurled screws by hand to maintain IP protection.

Do not open the generator or the switchbox. The brushless synchronous design does not require maintenance.

Do not modify the internal wiring.

Repairs to electrical components and to electrical operating equipment (supply cables, loads) may only be carried out by suitably trained electricians.

The circuit breakers, control, alarm and release devices and the insulation monitors are specially designed for the generator and its sockets. Only use original spare parts if replacements are needed.

The generator meets the requirements of the Protective isolation with equipotential bonding conductor and insulation monitoring with circuit breakers regulation in DIN/VDE 0100 Part 728 §4.2.4.2.1 and the German Gas Installation and Plumbing Association (DVGW) regulation GW 308. The system is an IT type, with neutral and PE (equipotential bonding conductor).

The generator does not have to be earthed (with a ground rod for example) to ensure adequate safety protection. However, if desired or required, defined earthing of the generator can also be provided.

Earthing of the neutral (N), or connecting of the neutral to the equipotential bonding conductor (PE), is prohibited on the generator, the distribution system and all other devices. The use of so-called neutralised devices is not permitted, and would lead to insulation monitoring being enabled automatically.

The generator must not be used to inject power into a construction site distribution system.

To avoid unwanted interaction, do not connect distribution systems with additional insulation monitors to the generator with its built-in equivalent.

During insulation and voltage tests carried out on the generator by trained electricians, disconnect the insulation monitor.


Because the generator is not earthed, fault current circuit breakers used in distribution systems and equipment cannot be relied upon to operate correctly when such units are connected to the generator, and, due to the Electrical isolation with insulation monitoring and circuit breaking protective measure, are not actually required.

The insulation monitor and circuit breaker should be checked daily when the generator is in use, following the quick reference instructions for Testing/insulation monitoring/starting/connecting equipment which are affixed to the generator.

Attention

Devices connected the generator which cause the circuit breaker to release, and the red indicator lamp for Insulation fault to light up, must not be connected to other generators (without insulation monitoring), or to the public mains. Have equipment with insulation faults immediately replaced or repaired by the manufacturer or a suitable electrical specialist.

When working in restricted conductive areas, i.e. as defined in DIN/VDE 0100 706 (e.g. in boilers), only one power tool or mobile measuring instrument may be connected to the generator or for each such load an additional isolating transformer, or one isolating transformer with several secondary windings, should be used. Handheld lights may only ever be used in restricted conductive areas when operated off a SELV (safe extra low voltage) isolating transformer.

Many portable power tools conform to German protection class II (i.e. they are double insulated, symbol ). These devices should be used if possible. Use a cable and plug to connect any protection class I device (i.e. with metal housing parts that are not double insulated) to be used to the PE (equipotential bonding) conductor.

Only connect devices and distribution systems which are in good condition to the generator. The insulation, and plug and socket combinations, must be in good condition to ensure user safety. Do not use any damp or dirty connectors.

The distribution systems (e.g. extension cables, device leads) must be carefully chosen, laid and maintained. Check the electrical cables regularly, replacing rather than repairing any that are faulty.

To cope with the greater mechanical strains and stresses on the generator's distribution system, use rubber-sheathed cables to the minimum standard of H07RN-F or A07RN-F in accordance with DIN/VDE 0282 Part 810, or equivalent designs, as moveable (extension) cables. Where the cables may be under severe stress, lay them in mechanical protection systems, or with strong covers, or use NSSHöü cables in accordance with VDE 0250.

The lengths and conductor cross sections of the extension cables must match the type of equipment and the duty.

It is essential to ensure supply cables do not exceed the maximum lengths specified! When using extension cables or moveable distribution systems, the sum of the lengths of all extension cables connected to a generator must not exceed 250 metres (for a copper conductor cross section of 2.5 mm² - for all sockets). The total length of the extension cable, or the moveable distribution system, connected to any particular socket must not exceed 60 m for a copper conductor cross section of 1.5 mm², or 100 metres for one of 2.5 mm².

Note

For defined releasing of the circuit breaker, a loop resistance of 1.5 Ω per socket must not be exceeded.

The circuit breaker must not be used for routine switching on of the 3-phase generator. If several devices, particularly those with different power consumption levels, are connected to the AC sockets, different voltage drops can arise, depending on the turn-on time of the neutral.

Avoid overloading the generator. In particular, to ensure user safety and optimum performance, it is essential to observe the following rules:

1. Only devices whose voltage and frequency data on the load identification plate conform to those on the generator identification plate may be connected.
2. Only devices whose power consumption does not exceed the output specified on the generator identification plate may be used. The total power consumption of all of the loads connected to the generator must not exceed its output.

11. Generator option

3. Note that the starting consumption of devices driven by electric engines is generally a multiple of the specified rating. If in doubt, it is advisable to contact the equipment manufacturer directly.

The maximum current specified for each socket must not be exceeded.

If normal cooling cannot be maintained, or the operating conditions are unacceptable in other respects, reduce the consumption, rather than operating the generator right up to its rating.

Ideal operating conditions are:

1. Ambient temperature: 25 °C
2. Air pressure: 100 kPa (1 bar)
3. Relative humidity: 30%

Do not operate the generator at ambient temperatures above 40 °C, below -10 °C, or in direct sunlight.

More detailed instructions for operation under unfavourable conditions can be found in the combustion engine manual.

11.5 Testing insulation monitoring/ startup/device connection

Testing insulation monitoring

Attention

Do not start the generator until you have fully read and thoroughly understood the safety precautions and operating instructions in this manual.

During operation, check at least once a day that the protective measure for the risk of electric shock through indirect contact (in accordance with DIN and GW 308 requirement for Protective isolation with insulation monitoring and circuit breaking) is working properly.

With the engine running, carry out the following test:

1. Unplug all devices connected to the generator; open the glass cover and switch the circuit breaker to ON/I.
2. Press the red test button.
3. Check whether the circuit breaker releases and red the INSULATION FAULT indicator lamp lights up.
4. Press and hold down the green reset button for at least 2 seconds – the red indicator lamp must go out.
5. Switch the circuit breaker to ON/I; close the glass cover (tighten the knurled screws by hand); the generator is now ready for use.

Attention

The generator may only be used if the circuit breaker released during the test and the indicator lamp came on until the reset button was pressed.

Setting the range switch

Turn the range switch to the required position:

1st position:

Compressed air and electrical power, variable engine speed.

- * Compressed air and electrical power can be consumed up to maximum engine speed.
Note that engine speed is reduced in the event of an overload.
- * Compressed air mode without consumption of electric power:
→ engine speed matched to demand
- * Additional consumption of electric power
→ variable engine speed is matched to consumption automatically up to maximum speed
- * Automatic no-load operation, i.e. the engine continues to run at maximum speed for 100 seconds, if the electrical power consumption is less than 75 VA for a brief period.

2nd position:

As 1st position, but with the engine running at constant speed

- * Same functions as for 1st position, but with the engine running at constant, maximum speed

Switching on

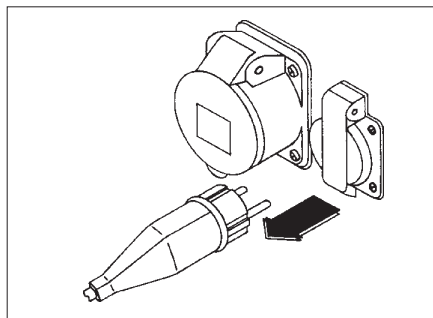


Figure 33

Danger

Follow safety precautions!

- * Carry out the usual checks (safety precautions, installation location, oil level, fuel, etc) before using the machine.

- * Ensure that all the devices on the generator output sockets have been disconnected.

Note

All device switches must be in the AUS / 0 / OFF position.

Danger

Unchecked devices may endanger personnel on startup, and may be damaged or cause damage.

- * Start the generator.

Note

Do not load the generator until the engine has warmed up.

- * Check that the circuit breaker is engaged in the ON / I position (close the glass cover).

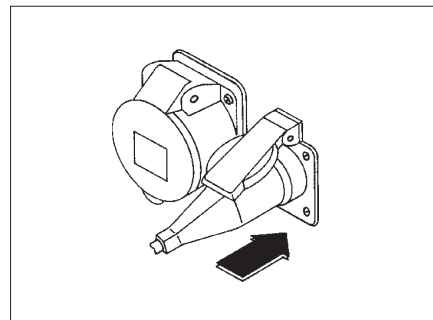


Figure 34

Connect the devices to the output sockets one after the other, ensuring that the current specified for each socket is not exceeded, and the generator is not overloaded.

Note

Turn the devices on, one after the other, using the device switches.

If possible, plug in/switch on devices with high startup currents first. Only connect suitable equipment in perfect condition to the generator.

Switching off

- * Turn the devices off, one after the other, using the device switches.

Note

If possible, switch devices with the highest current consumption off last.

- * Switch the devices off one after the other.

11. Generator option

Note

Ensure the covers of unused sockets are closed again properly.

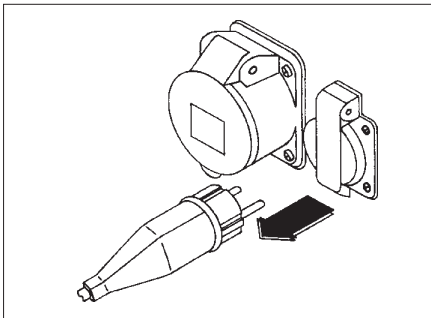


Figure 35

* Allow the engine to continue running for about 2 minutes, so that the generator cools down.

* Stop the generator.

11.6 Technical characteristics of 8 kVA 400/230 V generator

Generator model	GTS-DWG 8/5-2-ZE
Generator type	Synchronous, internal pole
Generator frame	B3/two bearings
Degree of protection	IP 54

Generator characteristics:
Extremely low dynamic internal resistance, same output voltage whether hot or cold, no dangerous overvoltage during dynamic overspeed, small reactive effect from non-linear or very inductive equipment, trouble-free operation of equipment with phase control, no dangerous overvoltage of the unloaded phases, load current may have significant DC components

Power system (IEC 38/50Hz)	3-phase AC 400V/230V
----------------------------	----------------------

Amplified phases 3

Nominal output (0.8 cap/ind)	
single-phase	5000VA
3-phase (sym)	8000VA
Nominal current	
single-phase	21.6A
3-phase (sym)	11.5A
Startup current	4.1 times I_{rated}
Operating mode	S1, continuous
Protective measure	Electrical isolation, with equipotential bonding conductor in accordance with VDE 0100.728

Coolant	Air/externally ventilated with own fan, independent of direction of rotation
Permissible speed range	0 to 4000 rpm
Speed for nominal output	3000 to 4000 rpm
Efficiency at nominal output	
at 0.8 ind	0.80
at 1.0	0.82
Distortion factor	< 5%
Weight	53 kg
Overall size	BG132
Overall length	426 mm

Generator regulator

Model	LCAR 3
Connector assignment	

Pin	Colour	Function
1	red	F1
2	grey	F2
3	violet	1/2 U
4	violet	1/2 V
5	violet	1/2 W

Switchbox

Degree of protection	IP 54
Dimensions	211x311x135
Design	Front panel type
Fusing	All poles
L1	B16A
L2	B16A
L3	B16A
N	leading N

Insulation monitoring

Model	GMW-RISO1.0
Controls	Red test button Green reset button

Electronic evaluation system

Integrated on the generator controller	
Speed reduction	Activation < 75W
Time to speed reduction	100 seconds

Outputs

Output for speed reduction	
Potential-free make contact	
Switch voltage:	max. 250V AC max. 40V DC/1A
Current:	max. 6A
Make-break capacity	max. 1500V AC
Admissible load current	5A/AC1 at 1x10 ⁵ switching cycles 1A/24V DC L-R load at 2x10 ⁵ switching cycles

Range switch

Type	2 stage switch
Max. voltage at switching contacts	54V (DC)

Measurement reference potential	N
---------------------------------	---

Generator data

Winding	Colour	Ins. class	Resistance (at 20°C)/Ω
U-N	brown-blue	F	0.59
V-N	white-blue	F	0.59
W-N	black-blue	F	0.59
1/2 U-N	yellow-blue		0.65
1/2 V-N	yellow-blue		0.65
1/2 W-N	yellow-blue		0.65
1F1-1F2	red-grey	H	28

(All resistances measured using the 4-wire R method)

11.7 Technical characteristics of 12 kVA 400/230 V generator

Generator model	DWG (BL4) 13/7-2-ZE
Generator type	Synchronous, internal pole, brushless with exciter, electronically controlled
Generator frame	B3/two bearings
Degree of protection	IP 54

Generator characteristics:
Extremely low dynamic internal resistance, same output voltage whether hot or cold, no dangerous overvoltage during dynamic overspeed, small reactive effect from non-linear or very inductive equipment, trouble-free operation of equipment with phase control, no dangerous overvoltage of the unloaded phases, load current may have significant DC components

Power system (IEC 38/50Hz)	3-phase AC 400V/230V
----------------------------	----------------------

Amplified phases 3

Nominal output (0.8 cap/ind)	
single-phase	7000VA
3-phase (sym)	13000VA
Output current	
single-phase	30.4A
3-phase	18.9A
Startup current	4.1 times I_{rated}
Operating mode	S1, continuous
Protective measure	Electrical isolation, with equipotential bonding conductor in accordance with VDE 0100.728

11. Generator option

Coolant	Air/externally ventilated with own fan, independent of direction of rotation
Permissible speed range	0 to 4000 rpm
Speed for nominal output	3000 to 4000 rpm
Efficiency at nominal output at 0.8 ind	0.80
at 1.0	0.82
Distortion factor	< 5%
Weight	64.4 kg
Overall size	BG132
Overall length	508 mm

Generator regulator

Model	LCAR 3 BL		
Connector assignment	Pin	Colour	Function
	1	red	F1
	2	grey	F2
	3	violet	1/2 U
	4	violet	1/2 V
	5	violet	1/2 W

Switchbox

Degree of protection	IP 54
Dimensions	211x311x135
Design	Front panel type
Fusing	All poles
	L1 ... B16A
	L2 ... B16A
	L3 ... B16A
	N ... leading N

Insulation monitoring

Model	GMW-RISO1.0
Controls	Red test button Green reset button

Electronic evaluation system

Integrated on the generator controller	
Speed reduction	Activation < 75W
Time to speed reduction	100 seconds

Outputs

Output for speed reduction	
Potential-free make contact	
Switch voltage:	max. 250V AC max. 40V DC/1A
Current:	max. 6A
Make-break capacity	max. 1500V AC

Admissible load current	5A/AC1 at 1x10 ⁵ switching cycles 1A/24V DC L-R load at 2x10 ⁵ switching cycles
-------------------------	--

Range switch

Type	2 stage switch
Max. voltage at switching contacts	54V (DC)

Measurement reference potential N

Generator data

Winding	Colour	Ins. class	Resistance (at 20°C)/Ω
U-N	brown-blue	F	0.390
V-N	white-blue	F	0.390
W-N	black-blue	F	0.390
1/2 U-N	yellow-blue		0.47
1/2 V-N	yellow-blue		0.47
1/2 W-N	yellow-blue		0.47
1F1-1F2	red-grey	H	25.4

(All resistances measured using the 4-wire R method)

11.8 Technical characteristics of 7 kVA 110 V generator

Generator model	WG 7/5-2
Generator type	Synchronous, internal pole, electronically controlled
Generator frame	B3/two bearings
Degree of protection	IP 54

Generator characteristics:
Extremely low dynamic internal resistance, same output voltage whether hot or cold, no dangerous overvoltage during dynamic overspeed, small reactive effect from non-linear or very inductive equipment, trouble-free operation of equipment with phase control, no dangerous overvoltage of the unloaded phases, load current may have significant DC components

Power system (IEC 38/50Hz)	1-phase AC 2 x 115V
----------------------------	------------------------

Amplified phases 3

Nominal output (0.8 cap/ind)	7000VA
Nominal current	32A + 2 x 16A
Startup current	4.1 times I _{rated}
Operating mode	S1, continuous
Protective measure	Electrical isolation, with equipotential bonding conductor in accordance with VDE 0100.728

Coolant Air/externally ventilated with own fan, independent of direction of rotation

Nominal speed for nominal frequency 3000 rpm

Min. speed for nominal output 3000 rpm
Efficiency at nominal output at 0.8 ind 0.80
at 1.0 0.82

Distortion factor < 5%
Weight 53 kg
Overall size BG132
Overall length 357 mm

Generator regulator

Model	WLAX		
Connector assignment	Pin	Colour	Function
8 pole	1	red	F1
	2	grey	F2
	3	not assigned	
	4	yellow	ZU
	5	yellow	ZV
	6	yellow	ZW
	7	brown	L1
	8	blue	N

4-pole	1	black switch contact
	2	black switch contact
	3	not assigned
	4	not assigned

Switchbox

Degree of protection	IP 54
Dimensions	211x311x135
Design	Front panel type
Fusing	All poles
	U1 ... C32A
	U2 ... 2 x 16A

Insulation monitoring

Model	GMW-RISO1.0
Controls	Red test button Green reset button

Areas of application
engines difficult to get running, welding devices (incl. inverters), pumps, compressors, tools, construction machinery, illumination

Generator data

Winding	Colour	Ins. class	Resistance (at 20°C)/Ω
U1-N	brown-blue	F	0.165
U2-N	black-blue	F	0.165
W-N	black-blue	F	0.28
ZU-ZN	yellow-yellow	F	2.5
ZV-ZN	yellow-yellow	F	2.5
ZW-ZN	yellow-yellow	F	2.5
1F1-1F2	red-grey	H	22.1

(All resistances measured using the 4-wire R method)

11. Generator option

11.9 Generator switchbox wiring diagram 8 KVA and 12 KVA 400/230 V

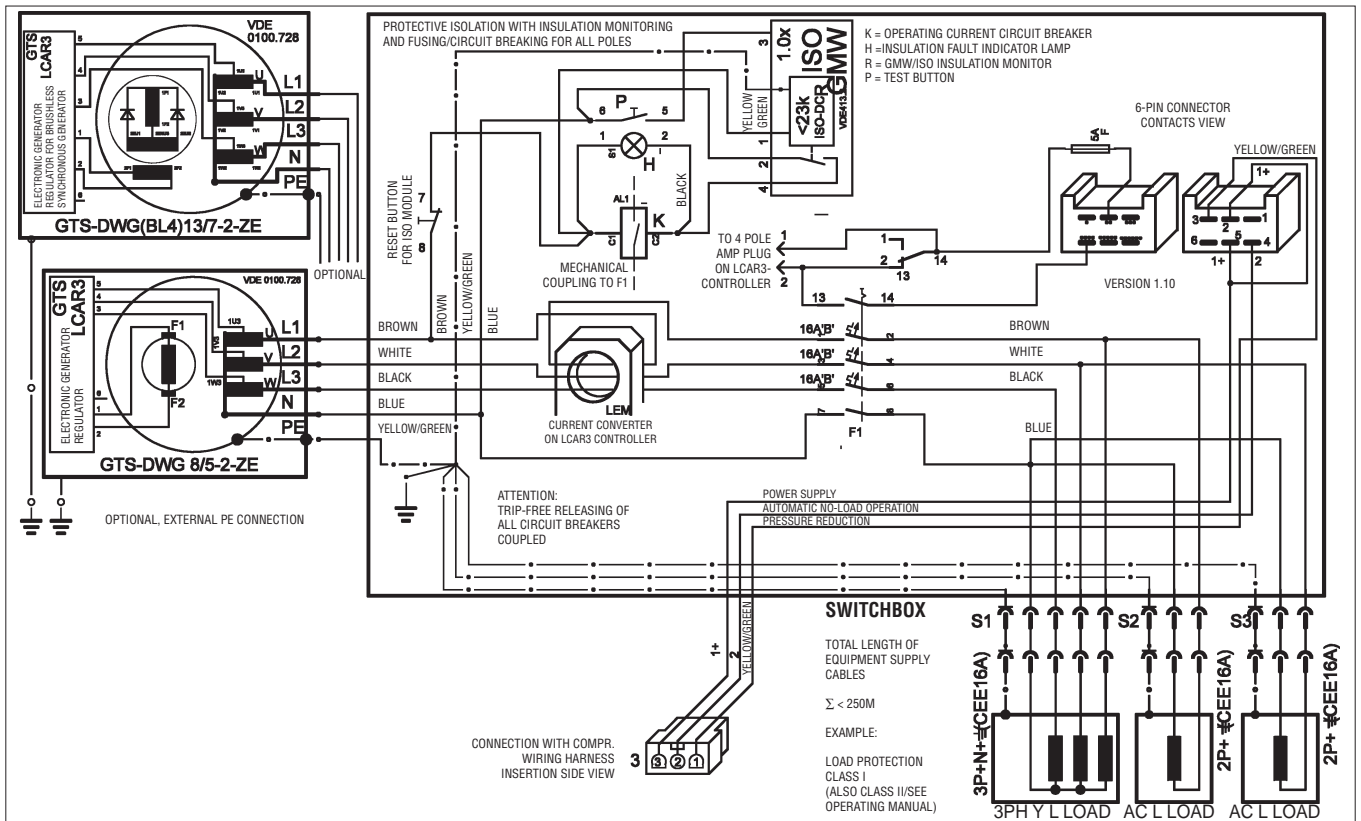


Fig. 36

11.10 Generator switchbox wiring diagram 7 KVA 110 V

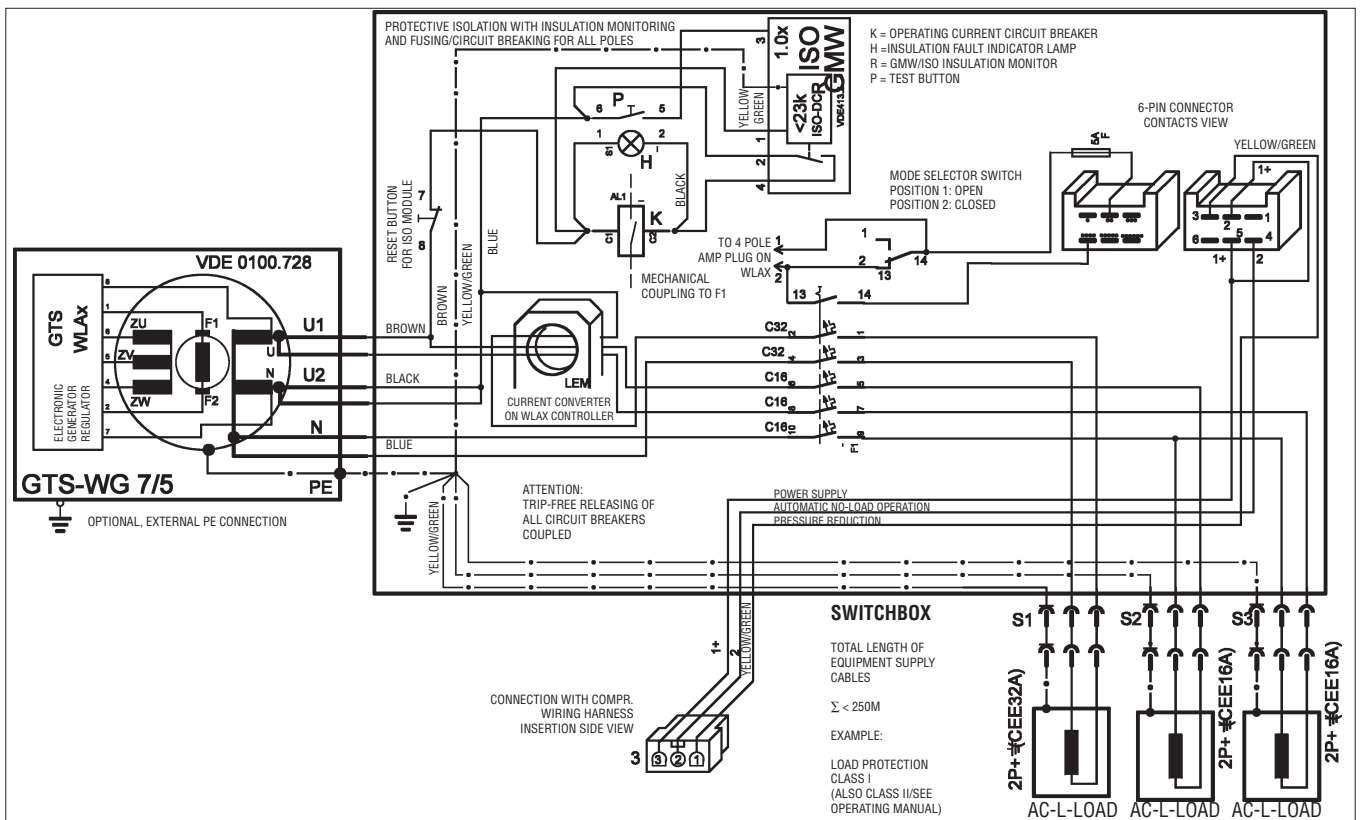
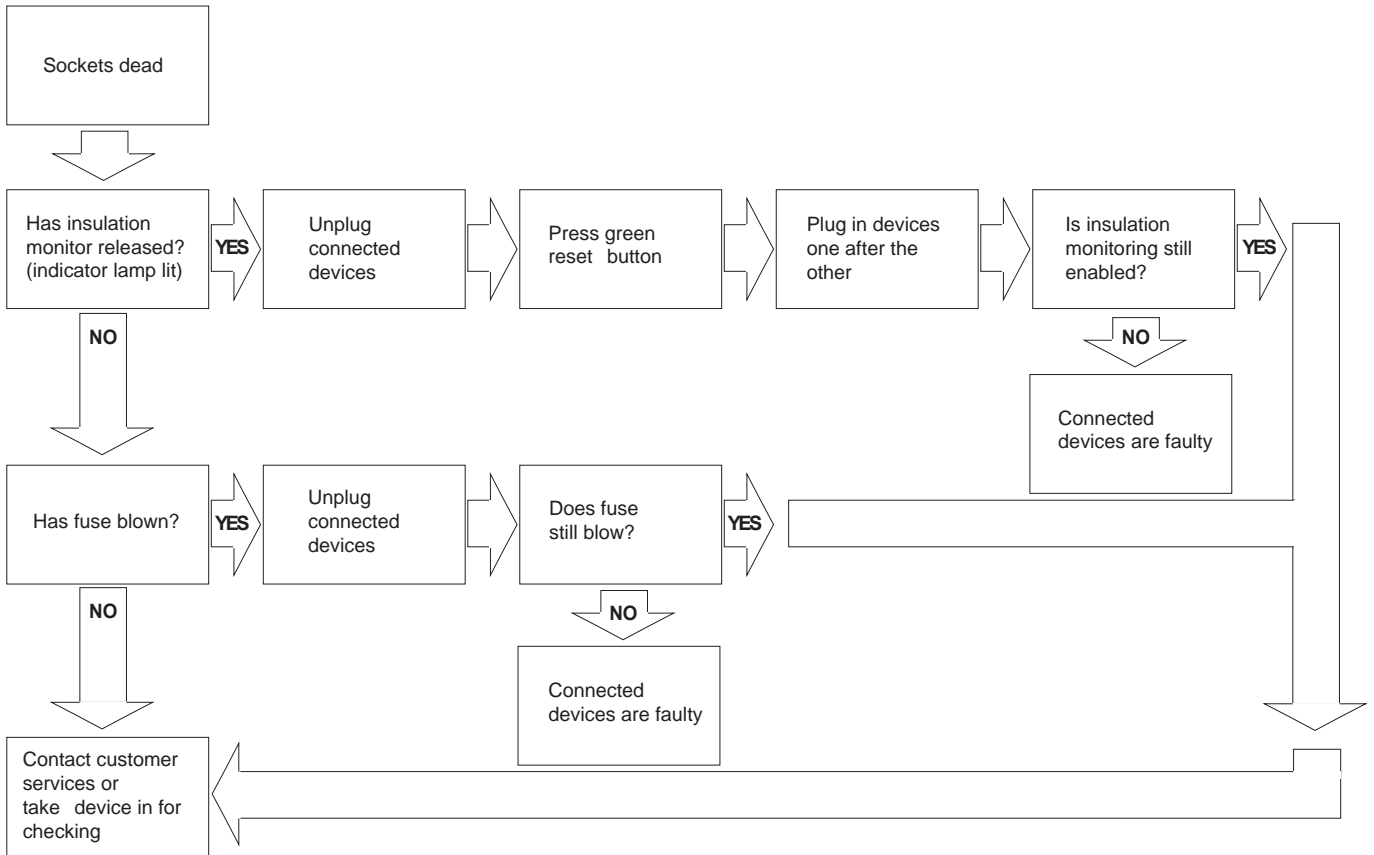


Fig. 37

11. Generator option

11.11 Troubleshooting



11. Generator option

Problem	Possible cause(s)	Correction
The generator supplies no or insufficient voltage.	The generator circuit breaker has tripped due to overload or is defective.	Check electrical load output. Check that all electrical terminals are properly seated. Check generator protective switch and replace if required. Check connected electrical loads for short or earth contact.
	Drive motor speed too low.	Set to nominal speed, max. 3,100 rpm.
	Mode switch in position 0.	Position switch in position 1.
	Generator circuit breaker not depressed.	Press the protective switch.
	Compressor operating pressure set too high, engine overloaded, speed decreases.	Re-adjust the operating pressure at the adjuster.
	Coil of the "Speed increase" solenoid valve defective.	Check and replace solenoid valve if required.
Complete or significant voltage drop during operation under load.	Insufficient engine speed or speed control inoperative.	Have the nominal speed adjusted by the engine after-sales service max. 3,100 rpm. Check that all electrical terminals are properly seated. Check connected electrical loads for short or earth contact.
	The engine output has been reduced due to climatic or other conditions.	Do not operate the generator at nominal output, see the operating instructions for the engine.
	Compressor operating pressure set too high.	Re-adjust.
Excessive generator voltage.	Excessive engine speed.	Have adjusted to nominal speed.
Voltage fluctuates in short intervals.	Diesel engine operates irregularly.	Have checked by the engine after-sales service.
	The engine speed control operates irregularly or is defective.	Check according to the operating instructions supplied by the engine manufacturer.
Generator heats up to unacceptable levels.	Clogged cooling air supply.	Ensure that the cooling air supply is not restricted.
	Machine is dusted.	Clean the machine and position in a way that dust-free cooling air only will be taken in. It is strictly recommended that the cooling air is cleaned at regular intervals.
	Output reduction due to set-up at too high an altitude.	Partial load operation possible only.
	Ambient temperature too high.	The generators are designed to ensure that no danger exists at ambient temperatures of up to 35 °C. In higher ambient temperature environments, the generator may be operated at partial load only.

When additional problems occur, call for compressor service!

Attention

Use genuine spare parts only!

12. Heat exchanger option

12.1 Safety regulations for the use of the heat exchanger

Danger

When operating the compressor, please observe the general safety regulations laid forth in the compressor operating manual.

The heat exchanger operates fully automatically. Operating errors at the heat exchanger are excluded.

12.2 Design and operation

System function diagram:
see page 21, fig. 5

- * The compressed air is heated up in a heat exchanger by means of the engine oil.
- * The diesel engine is equipped with an oil temperature regulator, which ensures that the engine oil has the proper minimum temperature required for operation and which bypasses the heat exchanger at the diesel engine during start-up and warm-up until the required engine oil temperature has been reached.

The second oil temperature regulator, which is located in the oil line, for heating up the compressed air ensures that the compressed air may not be heated up exceeding maximum specified temperatures during summer operation.

This fully automatic uniform temperature control ensures both the proper temperature of the compressed air and the proper engine oil temperature irrespective of the ambient temperatures which the installation will be operated in.

12.3 Maintenance/Care

This system is maintenance-free.

For information on engine oil change see the operating instructions of the engine.

12.4 Troubleshooting

Compressed air temperature too low

Defective oil temperature regulator in the engine or in the oil line -> replace.

Compressed air temperature too high

Defective oil temperature regulator in the oil line -> replace.

13. Compressed air processing option (After cooler / Filter)

13.1 Safety regulations for alternate compressed air processing

Danger

When operating the compressor, please observe the general safety regulations laid forth in the compressor operating manual.

13.2 Design and operation

System function diagram:
see page 21, fig. 5

After cooler option

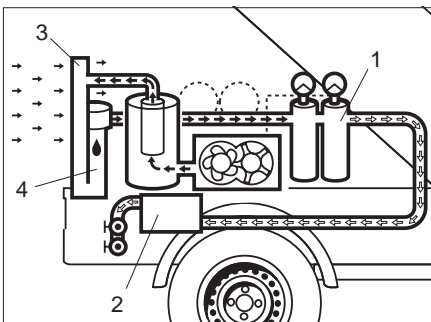


Fig. 38

- 1 Filter
- 2 Heat exchanger
- 3 After cooler
- 4 Condensate separator

In an air cooler (on the cooling air intake side), the compressed air is cooled down to a temperature close to the prevailing ambient air temperature downstream of the pressure vessel. A condensate separator with continuous condensate discharge is installed downstream the air-cooler.

Attention

When there is a danger of freezing or when the machine is switched off for a prolonged period, any remaining condensation must be drained from the secondary cooler. For doing this the bottom cover of the secondary cooler must be opened and it must be emptied utilising the pressure remaining in the machine.

Filter option (ZTV-SIB 90)

A residual oil contents in the compressed air of < 0.01 ppm is achieved by means of filtering. The filter assembly consists of a fine filter and an extra-fine filter. Both filters are equipped with a collecting receiver with continuous condensate discharge. The separated or filtered liquids are brought together to a common drain.

Attention

The oil-containing condensate has to be collected. Do not allow to enter into the soil or into the drains!

13.3 Maintenance instructions

Danger

Prior to and when carrying out maintenance and repair procedures, please do observe the general safety regulations in chapter 3 of the compressor operating manual.

Attention

The filters have to be disposed of.

The post cooling systems is maintenance-free. For cleaning procedures, see 9.1 „General maintenance“ in the compressor operating manual.

Post option

Filter change is required at latest when a differential pressure of 400 mbar has been reached or after approximately 500 operating hours - depending on the degree of contamination.

13.4 Troubleshooting

Problem	Possible cause(s)	Correction
Increased air humidity of the compressed air	Contaminated air cooler.	Clean
	Aperture or silencer in condensate separator collecting tank clogged.	Replace or clean
Oil in discharge air line	See chapter 10 "Troubleshooting" in this manual.	
	Aperture or silencer in filter collecting tanks clogged.	Replace or clean
	Faulty filter cartridges.	Replace

14.1 Notes on safety and description of function

Danger

See the separate instruction manual for the filter unit for notes on safety and description of function!

System function diagram:
see page 20, fig. 5

15.1 Safety regulations for the use of an oil temperature controller

Danger

Please observe the general safety regulations in the compressor manual when operating the compressor.

Operation of the oil temperature controller is fully automatic. Mal-operation of the oil temperature controller itself is impossible.

15.2 Design and function

See page 21, fig. 5, for system function diagram.

With the aid of the oil temperature controller, the compressor oil circuit is kept at an optimum service temperature.

The oil temperature controller regulates the temperature of the oil within the set temperature limits, and only feeds as much oil to the cooler as is necessary to achieve the desired oil temperature.

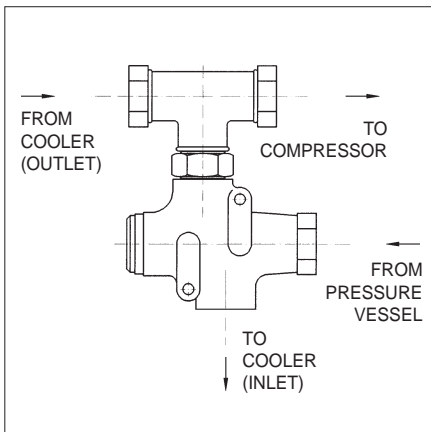


Figure 39

15.3 Maintenance / care

This system is maintenance-free.

15.4 Troubleshooting

Compressed air temperature too low

Oil temperature controller in the oil line is defective -> replace it.

16.1 Introduction

Attention

The user forfeits all rights to claim if parts other than those of the manufacturer are used.

We reserve the right to modify design and performance without prior notice. Please quote axle number, model and article number when contacting us with queries or ordering spare parts.

16.2 Safety

- * It is most important that the wheel and the hub are compatible dimensionally. This means that the P.C.D., wheel bolts and inset must all be compatible both with the hub and the rim. Particular attention must be paid to the recommended torque figures for the wheel bolts.
- * No welding is permitted on the AL-KO axle.
- * Please note the swing arm movement. (See assembly instructions).
- * The AL-KO wheel brakes are matched to the AL-KO overrun devices. Before using an overrun from another manufacturer, please check the compatibility with our Technical Department.

Attention

Model details must not be obscured by paint now concealed by components.

16.3 KHV13 height-adjustable towing system, model B 3.5.13

The adjustable joint between the drawbar and intermediate arm, and between the overrun system and intermediate arm, consists of toothed heads or retainers with Hirth-type or radial serrations.

The radial serrations are secured with fastening screws. The fastening nut must be tightened to the specified torque in order to establish a no-play, torque transmitting connection. The tightening torque depends on the permitted gross weight of the trailer and the length of intermediate (swivelling) arm

Adjusting procedure

After the spring-loaded plugs have been released from the fastening nuts, the nuts can be loosened until the teeth are exposed. The angle of the intermediate arm can then be adjusted.

Danger

Care must be taken without fail to ensure that the overrun or towing system is always aligned parallel with the drawbar.

The vehicle must not be driven unless the overrun system is parallel with the drawbar!

After the coupling has been adjusted for height, the serrations should be locked together with the clamping nuts and secured against working loose by means of the spring-loaded plugs.

The radial serrations of the intermediary piece and the drawbar are joined by union bolts M28x1.5 and M36x1.5 respectively.

M28x1.5	T = 400 Nm
M36x1.5	T = 650 Nm

The radial serrations of the intermediary piece and the run-up assembly are joined by union bolts M20x1.5 and M28x1.5 respectively.

M20x1.5	T = 250 Nm
M28x1.5	T = 400 Nm

16.4 Braking system

Introduction

- * KNOTT over-run brake systems consist of over-run hitches and wheel brakes used in combination with KNOTT torsional thrust spring axles. They are approved in all countries of the EC and in Switzerland.
- * With the KNOTT autoreverse system 'Backmat' there is no problem changing the direction of travel from forward to reverse. The braking system is ready for immediate operation again when changing from reverse to forward travel.
- * KNOTT torsional thrust spring axles as well as rubber spring axles have superb springing and excellent dampening characteristics. With the torsional thrust spring axles the spring elements with their vulcanized rubber are pretensioned before being pressed into the axle tubes. There is no squashing of the rubber during spring action. Instead the rubber is stretched in accordance with its characteristics.

With the rubber spring axles the axle tube bears the axle by pretensioned rubber strings. The results of the stretching are exceptionally long life and zero maintenance.

Attention

- * **Use the jack only under the fixing brackets or at the chassis, never in the centre.**
- * **Towing eye and ball coupling may only be changed by specialists.**
- * **Use a new safety nut every time one of these items is changed.**
- * **Use specified torque setting:**
 - Ball coupling**
 - M12 8.8: T = 77 Nm**
 - M14 10.9: T = 125 Nm**
 - Towing eyes**
 - M12 10.9: T = 115 Nm**
 - M14 10.9: T = 180 Nm**
- * **When using the ball coupling, please follow the instructions given.**

16. Undercarriage

Over-run hitches

KNOTT over-run hitches are available for both hydraulic and mechanical brakes.

Handbrake lever with power reservoir, code „KH“

With the type “KH” the spring reservoir is under torsion at the centre point. If the handbrake is applied, then it works automatically and requires almost no force. The system is designed so that when the handbrake is applied, sufficient energy is stored within the spring. When transmitted through the brake rods this prevents the brake shoes from slipping away from the brake drum.

16.5 Adjusting the braking system

16.5.1 Preparations

- * Jack up the trailer
- * Release the handbrake
- * Pull out the drawbar [5] of the overrun-system as far as it will go

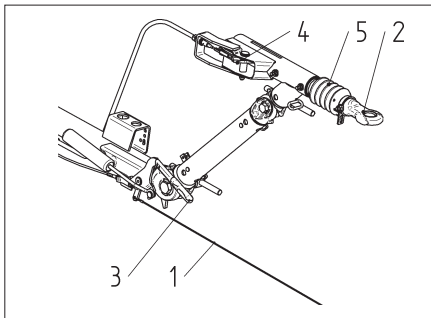


Fig. 40: KNOTT overrun brake

- 1 Contact-breaking cable
- 2 Trailer coupling ring (varies by type)
- 3 Handbrake lever
- 4 Transmission lever
- 5 Drawbar and bellows

Danger

When any disconnection of the braking system takes place, secure handbrake lever by reinserting the security bolt [15] (see warning plate [16]).

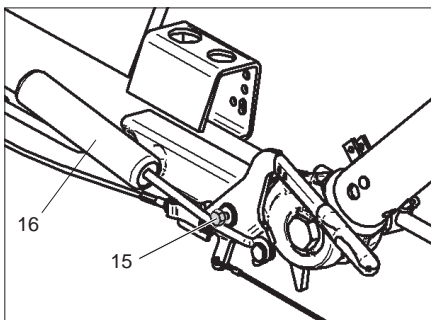


Fig. 41

- 15 security bolt
- 16 Warning plate

16.5.2 Preliminary requirements:

- * When carrying out adjustments, always start with the wheel brakes.
- * When carrying out adjustments, turn the wheel only in the direction of forward travel.
- * **Insert the security bolt [15]** (see warning plate)!
- * Do **not pre-tension** the expanding locking mechanism in the brake. If necessary, loosen the brake linkage [6] at the brake compensator [8].
- * **Check the expanding locking mechanism and control cable [11] for ease of movement.**

Attention

- * **The compression spring [7] may only be lightly pre-tensioned and must not become fully compressed when activated!**
- * **Bowden cable [14] must not activate brake.**
- * **Never readjust the braking system or brakes by the brake linkage [6] or turnbuckles (if fitted) in the linkage!**

16.5.3 Adjusting the brake

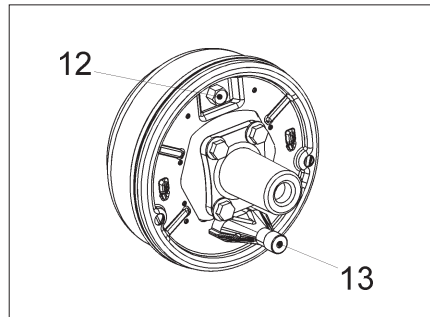


Fig. 42: KNOTT wheel brake

- 12 Adjusting screw
- 13 Cable entry

Tighten the adjusting screw [12] (on the outside of the brake plate, opposite the cable entry [13]), turning clockwise until the wheel can only be turned with difficulty or not at all.

Wrench sizes for adjusting screws [12]

Brake size	Wrench size
160x35 / 200x50	SW 17
250x40	SW 19
300x60	SW 22

Ease off the adjusting screw [12] in the anticlockwise direction (approx. 1/2 turn) until the wheel turns freely. Slight rubbing noises, which do not effect the free turning of the wheel, are permitted.

When the brake is correctly adjusted, the actuating travel of the control cable [11] will be 5-8 mm.

Carry out the adjustment procedure, as described, on all the wheel brakes in succession.

16.5.4 Adjusting the brake compensating system

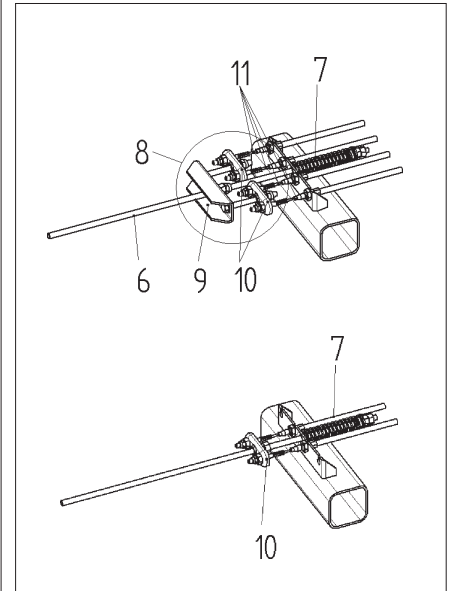


Fig. 43 KNOTT transmission system for tandem and single-axle chassis.

- 6 Brake linkage
- 7 Compression spring
- 8 Compensating balance assembly
- 9 Compensating balance (tandem) or master compensator
- 10 Compensating balance (single axle)
- 11 Control cable

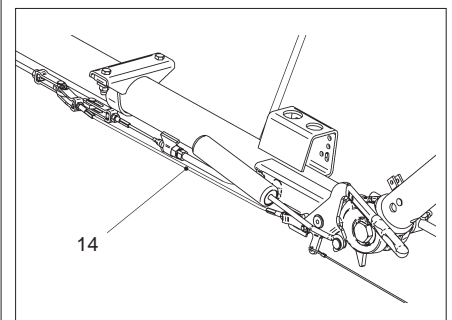


Fig. 44 KNOTT transmission system for tandem and single-axle chassis.

- 14 Bowden cable for handbrake

- * **Insert the security bolt [15]** (see warning plate)!
- * Remove the bowden cable [14].
- * Preadjust the length of the brake linkage [6] (slight play permitted).
- * Insert the bowden cable [14].

16. Undercarriage

- * Remove the security bolt [15].
- * Operate the handbrake lever [3] and check the position of the compensating balances [9 and 10]. They should be at right angles to the direction of towing.
- * If necessary, adjust the position of the balance [10] and control cables [11]; in the case of tandem trailers, also adjust the master compensator [9] on the linkage [6].
- * The compression spring [7] may only be lightly pre-tensioned and must not become fully compressed when activated!

16.5.5 Adjusting the brake linkage [6]

Adjust the brake linkage [6] so that it is free of play longitudinally, without initial tension (reversing lever [4] free of play).

Readjustment

- * Operate the handbrake lever [3] powerfully several times in order to settle the braking system.
- * Check the position of the brake compensating balances [9 and 10] which should be at right angles to the direction of towing
- * Check the play in the linkage [6]; if necessary, adjust the linkage [6] again so that it is free of play, but **without** initial tension

Slight play in the bowden cable [14] must persist.
- * Check the position of the handbrake lever [3];

when checking the dead centre of the lever, resistance starts 10-15 mm above dead centre
- * Check that the wheels rotate freely with the brake released.

Final check

- * Check fastenings for security (secure the hexagon locking nuts of the screw fastenings for the transmission system, control cables, brake compensators, turnbuckle, linkage, etc.).
- * Check the bowden cable for slight play [14]; if necessary, adjust the cable.
- * Check the compression spring [7] for initial tension.

Test run

- * If necessary, carry out 2-3 brake tests

Brake test

- * Recheck the play in the brake linkage [6] and, if necessary, readjust the linkage [6] for length free of play (during operating braking with empty trailer should be used maximally 1/2 of the overrun travel)

16.6 Readjusting the braking system

In general, readjusting the wheel brakes adequately serves to readjust the braking system, i.e. to compensate for brake lining wear. To readjust the wheel brakes, proceed as described under 'Adjusting the braking system'. Check the play in the linkage [6] and readjust if necessary.

Attention

- * **Check the expanding locking mechanism and control cable [11]**
- * **The expanding lock compensator must not be pre-tensioned in the brake.**
- * **Do not attempt to compensate for ease of movement caused by brake lining wear by readjusting (shortening) the brake linkage [6], e.g. by way of the linkage screw fastenings**

Readjustment

- * Operate the handbrake lever [3] powerfully several times in order to settle the braking system
- * Check the position of the brake compensating balances [9 and 10] (which should be at right angles to the direction of towing).
- * Recheck the play in the linkage [6]; if necessary, adjust the linkage [6] again so that it is free of play, but **without** initial tension.
- * Check the positions of the handbrake lever [3], the play in the bowden cable and compression spring [7] (only light initial tension);
- * when checking the dead centre of the lever, resistance starts 10-15 mm above dead centre

Final check

- * Check the screw fastenings for the transmission system (control cables, brake compensators, linkage, etc.).
- * during operating braking with empty trailer should be used maximally 1/2 of the overrun travel

- * Check the bowden cable for slight play [14]; if necessary, adjust the cable.
- * Check the tension of the compression spring [7]

16.7 Maintenance and care

KNOTT – overrun systems

- * The overrun system must be lubricated with lithium-soap grease by way of the grease nipples and at all the moving parts.
 - a) every 5000 km (3000 miles)
 - b) or every 6 months
 - c) or if they become stiff
- * Inspect the bellows for damage, replace if necessary
- * Replace the overrun shock absorber every 20,000 km (12,500 miles) or every 3 years at the latest.
- * Check the play at the coupling point every 20,000 km (12,500 miles). If the play exceeds 3 mm, replace the guide bearing or drawbar.
- * Check the tightening torques of the fastening screws at the guide bearing every 5000 km (3000 miles);

Screws with grease nipple
50 +5 Nm
Screws without grease nipple
80 +5 Nm
- * Check the tightening torques at the clamping block of the drawbar and clamping socket (drawbar tube - axle joint) every 5000 km (3000 miles);

M12 screws 80 +5 Nm
M14 screws 90 +10 Nm
- * Check that the braking system is correctly adjusted every 5000 km (3000 miles).

Vertically adjustable drawbars

Clean the faces of the tooth systems free of fretting rust or other contamination at least once a year in order to maintain a good fit.

Lubricate the threaded bolts and joints once a year or at any time if they become stiff.

Attention

Do not grease the tooth system!

16. Undercarriage

If desired, a lifting and adjusting system can be installed between the drawbar and the overrun system. The control arms of the adjusting system permit swivelling about an angle of -10° to $+49^{\circ}$ in six positions. In every case, the overrun system or drawgear always remains horizontal.

An integral gas-filled strut automatically generates lifting force which reduces the force required by the user. If the strut becomes damaged or develops a leak, it must be replaced.

Information regarding dual-row angular ball bearings:

- * These bearings are maintenance-free, have been provided with a lifetime lubrication, and have an extremely high running performance.
- * The bearings have been fixed in their correct position using a safety flanged nut. This flanged nut must be tightened with a torque of 280 ± 10 Nm.
- * It is recommended to check this tightening torque in the course of service works.
- * The flanged nut can only be unscrewed and re-used once. Afterwards, a new nut must be used. When releasing or tightening the flanged nut, grease the threads slightly, so as to avoid damage to the fine thread.
- * Due to the high durability and the maintenance-free design of these dual-row angular ball bearings, there will be no damage at the bearings under normal conditions.
- * If, due to exceptional circumstances, problems were to occur with these bearings, completely new brake drums with pressed-in bearings, circlips and new locking nuts should be installed in principle.
- * Due to the design characteristics of the bearings, the brake drums and the wheels may have a slight axial and tilting play; however, this is insignificant.

16.8 Malfunctions and remedies

Malfunction	Cause	Remedy
Insufficient braking effect	Excessive backlash in brake system	Re-adjust brake system
	Brake linings not "run in"	Actuate hand-brake lever slightly; drive 2-3 kilometers
	Brake linings glazed, oily or damaged	Replace brake shoes completely; clean braking areas in the brake drums
	Overrunning hitch hard to operate	Grease overrunning hitch
	Brake linkage is jammed or deformed	Eliminate cause
	Brake Bowden cables rusty or kinked	Replace Bowden cables
Brake reacts by jerks	Excessive backlash in brake system	Re-adjust brake system
	Shock absorber of overrunning hitch defective	Replace shock absorber
	Backmat brake shoe is jammed in the brake shoe holder	Replace compl. brake shoes with brake shoe holders
Trailer is braked unilaterally	Wheel brakes are actuated unilaterally	Re-adjust brake system
	Causes: possibly specified under "Insufficient braking effect"	see above
Trailer is already braked when the accelerator pedal is released	Shock absorber of overrunning hitch defective	Replace shock absorber
Reverse driving had to accomplish, or even impossible	Brake system adjusted too tightly	Re-adjust brake system
	Bowden cables pre-loaded	Re-adjust brake system
	Backmat brake shoe is jammed in the brake shoe holder	Replace compl. brake shoes with brake shoe holders
Braking action of hand-brake insufficient	Incorrect setting	Re-adjust brake system Actuate hand-brake lever as far as possible
	Causes: possibly specified under "Insufficient braking effect"	idem
	Backmat brake shoe is jammed in the brake shoe holder	Replace compl. brake shoes with brake shoe holders
Wheel brakes get hot	Brake system incorrectly set	Re-adjust brake system
	Causes: possibly specified under "Insufficient braking effect"	idem
	Backmat brake shoe is jammed in the brake shoe holder	Replace compl. brake shoes with brake shoe holders
	Wheel brakes dirty	Clean
	Reversing lever of overrunning hitch is jammed	Remove reversing lever, clean it and grease it with Molykote
	Handbrake lever not or only partially released	Set handbrake lever into zero- position

16. Undercarriage

Malfunction	Cause	Remedy
Ball coupling does not rest on ball	Coupling dirty on the inside Ball of towing vehicle too big	Clean and grease thoroughly Check ball diameter: According to DIN 74058, the ball on the car must not exceed 50 mm in diameter when new. If the ball diameter decreases to less than 49.5 mm, the ball has to be replaced. The ball must be perfectly spherical

Danger

Works on the brake system may only be carried out in specialized workshops.

When replacing braking shoes, make sure that all brake shoes of the axle are replaced.

When working at the wheel brakes, make sure that the springs, the brake shoes and the spreading lever are correctly installed; observe the correct sense of rotation.

When adjusting the wheel brakes, turn wheels in forward direction!

Basically, a readjustment according to chapter 17.5 "Fitting of the braking system" must be effected whenever works are carried out at the brake system.

If the wheel brakes or the brake drum have got very hot, continue to drive carefully on, if possible, until they have somewhat cooled down.

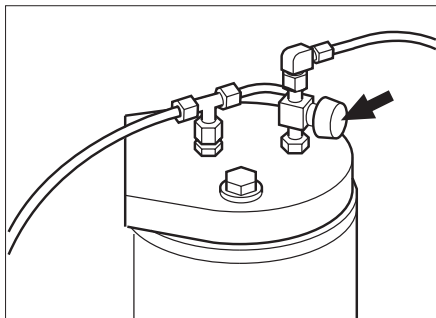


Fig. 45

Attention

Do not run the machine with an empty oiler tank! The tank must always contain a minimum of 0.2 l of tool oil.

Danger

Only refill the tool oiler, when the screw compressor is out of operation and depressurized!

Only screw off the oiler reservoir, when the screw compressor is out of operation and depressurized!

Do not spill any oil!

Watch out for leakage!

The oil dosage is continuously variable at the adjusting knob.

- * Turning the adjusting knob clockwise (symbol »-«) will reduce the oil flow up to 0-quantity (i.e. no oil for tool lubrication in the compressed air).
- * Turning the adjusting knob counterclockwise (symbol »+«) will increase the oil flow.

Check the oil level in the depressurized tool oiler

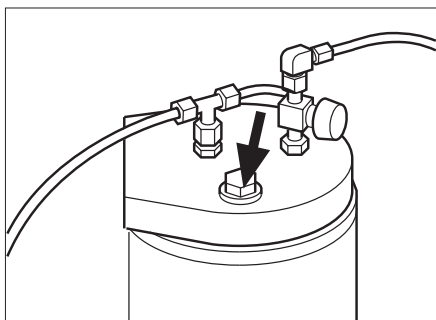


Fig. 46

- * Shut down the screw compressor and wait until the compressor is depressurized.
- * Unscrew the screw plug.
- * The oil must be visible in the oiler reservoir; refill, if necessary.

- * Check the seal of the screw plug, replace if required.
- * Screw in the screw plug with the seal and tighten.
- * Check for leaks after start-up of the screw compressor.