Screw Compressor
Model: SM 11
GL-Nr.: BA-SM11.L-1.9623.80040-00
Index: 090201

- Cabinet heaters
- 115 V receptacle
- Outdoor modification
- Rainhoods
- Switchable Modulation
- Synthetic lubricant
- Food Grade lubricant

Wiring Diagram:

Serial No.: ________________________

KAESER COMPRESSORS, Inc.
P.O. Box 946 • Fredericksburg, Virginia 22404 • Tel. (540) 898-5500 • Fax. (540) 898-5520
# Table of Contents

1 **Technical Specification** ......................................................... 1 – 1

1.1 Compressor Unit ................................................................. 1 – 1
1.2 Noise Level ........................................................................ 1 – 1
1.3 Motor ................................................................................ 1 – 1
1.4 Electrical Connection .......................................................... 1 – 2
1.5 Set Point of the Safety Relief Valve ...................................... 1 – 2
1.6 Installation Requirements ...................................................... 1 – 2
1.7 Oil Capacities ....................................................................... 1 – 2
1.8 Oil recommendations ........................................................... 1 – 3
1.9 Maintenance for the Electrical Motor ..................................... 1 – 5
1.10 Dimensional Drawing ........................................................... 1 – 5

2 **Safety Regulations** ................................................................. 2 – 7

2.1 Explanation of Symbols and References ............................... 2 – 7
2.2 General Safety Precautions ................................................... 2 – 7
2.3 Electrical Power Supply ......................................................... 2 – 8
2.4 Spare Parts .......................................................................... 2 – 8
2.5 Compressed Air System .......................................................... 2 – 8
2.6 Environmental Protection ........................................................ 2 – 8

3 **General** .............................................................................. 3 – 10

3.1 Proper use of the Compressor ............................................... 3 – 10
3.2 Improper use ........................................................................ 3 – 10
3.3 Compressed Air Treatment ..................................................... 3 – 10
3.4 Copyright ............................................................................ 3 – 10

4 **Transport** ........................................................................... 4 – 11

4.1 Transport Instructions ............................................................ 4 – 11
4.2 Packaging ............................................................................ 4 – 11

5 **Construction and Operation** .................................................. 5 – 12

5.1 Principle of Compression ........................................................ 5 – 12
5.2 Brief Description .................................................................. 5 – 12
5.3 Pipe and Instrument Flow Diagram (P & I Diagram) ............. 5 – 12
5.4 DUAL Control ..................................................................... 5 – 15
5.5 QUADRO Control ................................................................. 5 – 16
5.6 VARIO Control .................................................................... 5 – 17

6 **Installation** .......................................................................... 6 – 18

6.1 Installation Requirements ....................................................... 6 – 18
6.2 Connection of the Compressed Air Supply ......................... 6 – 19
6.3 Electrical Connection ............................................................ 6 – 19

7 **Putting into Operation** ............................................................ 7 – 20

7.1 Points to be Observed before Putting into Operation .......... 7 – 20
7.2 Points to be Observed before Starting the Compressor Unit .................................................. 7 – 20
7.3 Functional Check of the Door Interlock Switch .................. 7 – 21
7.4 Direction of Rotation Check .................................................. 7 – 23
7.5 Motor Overload Relay Adjustment ........................................ 7 – 23
7.6 Setting the Air System Pressure .............................................. 7 – 23
7.7 Measures to be taken before Initial Start ............................... 7 – 24
7.7.1 Pour a small quantity of oil into the air inlet port ............ 7 – 24
# Table of Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table of Contents</strong></td>
<td></td>
</tr>
<tr>
<td>7.7.2 Running the compressor in idle</td>
<td>7 – 24</td>
</tr>
<tr>
<td>7.7.3 Checklist</td>
<td>7 – 25</td>
</tr>
<tr>
<td><strong>8 Operation</strong></td>
<td>8 – 26</td>
</tr>
<tr>
<td>8.1 Control Panel</td>
<td>8 – 26</td>
</tr>
<tr>
<td>8.2 SIGMA CONTROL</td>
<td>8 – 26</td>
</tr>
<tr>
<td>8.2.1 Function keys</td>
<td>8 – 27</td>
</tr>
<tr>
<td>8.2.2 Light emitting diodes and plain text display</td>
<td>8 – 27</td>
</tr>
<tr>
<td>8.3 Starting and Stopping the Compressor Unit</td>
<td>8 – 28</td>
</tr>
<tr>
<td>8.4 Acknowledgement of Alarms</td>
<td>8 – 28</td>
</tr>
<tr>
<td>8.5 Acknowledgement of Service Messages</td>
<td>8 – 29</td>
</tr>
<tr>
<td><strong>9 Maintenance</strong></td>
<td>9 – 30</td>
</tr>
<tr>
<td>9.1 Observe the following rules during all maintenance and servicing work:</td>
<td>9 – 30</td>
</tr>
<tr>
<td>9.2 Regular Maintenance</td>
<td>9 – 31</td>
</tr>
<tr>
<td>9.3 Opening and Closing the Compressor Cabinet</td>
<td>9 – 32</td>
</tr>
<tr>
<td>9.4 Checking the Drive Belt Tension</td>
<td>9 – 33</td>
</tr>
<tr>
<td>9.5 Drive Belt Change</td>
<td>9 – 34</td>
</tr>
<tr>
<td>9.6 Cleaning or Replacing the Filter Mat</td>
<td>9 – 34</td>
</tr>
<tr>
<td>9.7 Cleaning or Replacing the Air Filter</td>
<td>9 – 35</td>
</tr>
<tr>
<td>9.8 Servicing the Electric Motor</td>
<td>9 – 36</td>
</tr>
<tr>
<td>9.9 Testing the Safety Relief Valve on the Oil Separator Tank</td>
<td>9 – 36</td>
</tr>
<tr>
<td>9.10 Venting the compressor unit</td>
<td>9 – 36</td>
</tr>
<tr>
<td>9.11 Oil Filter Change</td>
<td>9 – 38</td>
</tr>
<tr>
<td>9.11.1 Removal and replacement of the oil filter cartridge</td>
<td>9 – 38</td>
</tr>
<tr>
<td>9.12 Oil Top Up</td>
<td>9 – 39</td>
</tr>
<tr>
<td>9.13 Cleaning the Oil Cooler and Aftercooler</td>
<td>9 – 41</td>
</tr>
<tr>
<td>9.13.1 Removing and cleaning the oil cooler/air aftercooler</td>
<td>9 – 41</td>
</tr>
<tr>
<td>9.14 Oil Change (Oil Separator Tank and Oil Cooler)</td>
<td>9 – 43</td>
</tr>
<tr>
<td>9.14.1 Oil change using external pressure source</td>
<td>9 – 44</td>
</tr>
<tr>
<td>9.14.2 Oil top–off</td>
<td>9 – 45</td>
</tr>
<tr>
<td>9.14.3 Draining the oil using own compressed air</td>
<td>9 – 45</td>
</tr>
<tr>
<td>9.14.4 Procedure for putting back into operation</td>
<td>9 – 46</td>
</tr>
<tr>
<td>9.15 Changing the Oil Separator Cartridge</td>
<td>9 – 46</td>
</tr>
<tr>
<td>9.16 Maintenance Schedule</td>
<td>9 – 49</td>
</tr>
<tr>
<td><strong>10 Spare Parts and After Sales Service</strong></td>
<td>10 – 50</td>
</tr>
<tr>
<td>10.1 Service parts and maintenance parts</td>
<td>10 – 50</td>
</tr>
<tr>
<td>10.2 Service and Maintenance Agreement</td>
<td>10 – 50</td>
</tr>
<tr>
<td><strong>11 Appendix</strong></td>
<td>11 – 51</td>
</tr>
<tr>
<td>11.1 Wiring Diagram</td>
<td>11 – 51</td>
</tr>
<tr>
<td>11.2 Trouble shooting: Possible cause-Remedy</td>
<td>11 – 67</td>
</tr>
<tr>
<td>11.2.1 Airend temperature is too high (greater than 167°F–200°F)</td>
<td>11 – 67</td>
</tr>
<tr>
<td>11.2.2 Motor overload relay switches the unit off</td>
<td>11 – 67</td>
</tr>
<tr>
<td>11.2.3 Compressor is running but produces no pressure</td>
<td>11 – 68</td>
</tr>
<tr>
<td>11.2.4 Oil leaks out of air filter</td>
<td>11 – 69</td>
</tr>
<tr>
<td>11.2.5 Full–load/Idle sequence occurs too frequently (short cycles)</td>
<td>11 – 69</td>
</tr>
<tr>
<td>11.2.6 Safety relief valve blows off</td>
<td>11 – 69</td>
</tr>
<tr>
<td>11.2.7 Oil inside the unit</td>
<td>11 – 69</td>
</tr>
<tr>
<td>11.2.8 Excessive oil consumption</td>
<td>11 – 70</td>
</tr>
</tbody>
</table>
1 Technical Specification

1.1 Compressor Unit
Model ............................... SM 11
Maximum gauge working pressure ........ 110/125/145/190 psig
Minimum gauge working pressure ............. 80 psig
Free air delivery at max. gauge ............. 42/40/36/29 cfm
Operating temperature approx. .......... 167 – 200 °F
(Varies with ambient temperature and operating conditions)
Weight ...................................... 377 lbs

Drawings:
Dimensional drawing ....................... T 7339.5
P & I flow chart ............................. FSM11STL–00018.00
(Epipework and instrument flow chart)
Electrical diagram ......................... SSM11–U1002.00

1.2 Noise Level
Noise level to CAGI–Pneurop ............... 69 dB(A)
at 1 m distance (free sound field measurement)

1.3 Motor
Compressor motor:
Rated power ............................. 10 hp
Rated speed ............................. 3600 rpm
Specification class .................. TEFC

V–belt set for:
110 psig Compressor unit – Part number .... 6.2539.0
125 psig Compressor unit – Part number .... 6.2539.0
145 psig Compressor unit – Part number .... 6.2539.0
190 psig Compressor unit – Part number .... 6.2511.0
1.4 **Electrical Connection**

Main voltage .............................................. 208 V 3–phase

Full load current FLA ........................................ 28 A

Frequency .................................................. 60 Hz

Recommended main disconnect fuses
(Dual element or time–delay) .............................. 50 A

Recommended power supply cable (Cu multi–stranded)
Cross–section ......................................................... 6 AWG

**Attention!** Maximum dual element time–delay fuses are selected according to 1996 N.E.C. Article 240–6, 430–52 and Tables 430–14 & 150.


For electrical power supply please refer to chapter 2.3 and 6.3

1.5 **Set Point of the Safety Relief Valve**

110 psig Compressor Unit – Activating pressure .......... 140 psig

125 psig Compressor Unit – Activating pressure .......... 155 psig

145 psig Compressor Unit – Activating pressure .......... 175 psig

190 psig Compressor Unit – Activating pressure .......... 230 psig

1.6 **Installation Requirements**

Max. height above sea level of the place of installation ... 3000 ft.
(for all heights above please contact authorized KAESER distributor)

Min. ambient temperature .................................. 40 °F

Max. ambient temperature .................................. 105 °F

Min. cooling air/inlet air temperature ........................ 40 °F

Max. cooling air/inlet air temperature ........................ 105 °F

Air inlet opening ............................................... 2.2 sq.ft.

Exhaust air for solution A (see chapter 6.1):

Forced ventilation with exhaust ventilator .................. 1470 cfm at static pressure of 0.4 inches water column

Exhaust air for solution B (see chapter 6.1):

Exhaust air used for space heating:

Heating duct w x h .............................................. 7 3/4” x 14”

1.7 **Oil Capacities**

Total oil capacities ......................................... 1.32 gal

**After oil change or after long period of storage**

Quantity required for prelubrication of the airend ........ 0.1 quart

(Refer to chapter 7.7.1)
1.8 Oil recommendations

Lubrication of an air compressor is essential to reliable operation. Carbon and varnish can form in compressor oils. These deposits block the flow of lubricant and cause excessive wear and failure of moving parts. Contamination of the oil can allow the formation of acids, causing extensive internal corrosion. Water may be condensed decreasing the oil’s lubricity.

Oil in rotary compressors does much more than lubricate. During the compression process, it acts as a sealant in the airend which is important for maximum efficiency. The lubricant also absorbs much of the heat of compression to cool the airend and reduce the temperature of the compressed air. It’s not enough that a compressor fluid lubricates well, it must stand up to the heat, pressure and contaminants that are present in every air compressor.

KAESER COMPRESSORS has several lubricants available that are specially formulated to match these demands. They feature excellent lubricity, outstanding demulsibility (ability to separate from water), and long life.

<table>
<thead>
<tr>
<th>RECOMMENDED KAESER LUBRICANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGMA LUBRICANT</td>
</tr>
<tr>
<td>M−460</td>
</tr>
<tr>
<td>S−460</td>
</tr>
</tbody>
</table>

* Oil changes may need to be more frequent depending on ambient conditions. When high ambient temperatures or dirty conditions are present, oil changes may be necessary every 1,000 hours (4,000 hours for synthetic) or even shorter intervals. Oil change intervals required should be determined through periodic oil analysis.

M−SERIES SEMI−SYNTHETIC LUBRICANTS

- M−Series SIGMA compressor fluids are the highest quality petroleum lubricants. M−460 is specially blended to provide reliable performance in KAESER screw compressors.

S−SERIES SYNTHETIC LUBRICANTS

- S−Series SIGMA compressor oils are formulated from the most advanced synthetic lubricants. These “synthetic” lubricants begin as high quality petroleum feed stock. They are then refined, processed and purified into fluids with very consistent molecular structure. These oils are carefully blended to produce extremely consistent lubricants with superior properties. SIGMA synthetic lubricants feature all the advantages of both PAO and diester fluids.
- S−460 lubricant is recommended for compressors operating in ambient temperatures between 40°F and 105°F.

Specialty KAESER LUBRICANTS

- S−680 lubricant may be used when ambient temperatures are always between 70°F and 105°F.
- FG−460 synthetic hydrocarbon based food grade lubricant is designed for use in rotary screw compressors in the application where incidental food contact may occur with the discharge air. This lubricant meets the requirements of the FDA Regulation 21
CRF §178.3570 and is USDA H−1 approved. FG−460 is approved for canning, food packing, meat and poultry processing and other applications where incidental food contact may occur.

<table>
<thead>
<tr>
<th>SIGMA LUBRICANT</th>
<th>DESCRIPTION</th>
<th>MAXIMUM RECOMMENDED CHANGE INTERVAL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>S−680</td>
<td>ISO 68 Synthetic Lubricant</td>
<td>First Oil Change: 6,000 Hours</td>
</tr>
<tr>
<td>FG−460</td>
<td>ISO 46 Food Grade Synthetic</td>
<td>Subsequent Oil Change: 8,000 Hours</td>
</tr>
<tr>
<td></td>
<td>Lubricant</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>First Oil Change: 3,000 Hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subsequent Oil Change: 4,000 Hours</td>
</tr>
</tbody>
</table>

* Oil changes may need to be more frequent depending on ambient conditions. When high ambient temperatures or dirty conditions are present, oil changes may be necessary every 1,000 hours (4,000 hours for synthetic) or even shorter intervals. Oil change intervals required should be determined through periodic oil analysis.

**General Information**

KAESER synthetic lubricants should be stored in a protected location to prevent contamination. Do not re−use drums; flush and send to reconditioner.

Although the KAESER synthetic is not highly flammable, it will burn. While KAESER synthetic compressor oil is less flammable than equal viscosity mineral oils, it cannot be classified as a fire−resistant fluid. It has a flash point above 460°F. Since the user has total control over the conditions of the compressor lubricant, he assumes total responsibility for its safe usage.

Material Safety Data Sheets are available for each lubricant from your KAESER authorized distributors.

Regardless of the lubricant selected, the KAESER Sigma lubricants will separate readily from water. If condensate occurs it can easily be removed. Let the compressor sit so that any water can drain back to the separator tank and separate to the bottom. See chapter 9.14 proper draining procedure.

**Compatibility of KAESER Sigma Lubricants**

All the above listed KAESER Sigma lubricants are similar to mineral oil in its compatibility with paints, seals, gaskets and hoses. The typical precautions are required when changing over from mineral oil to KAESER synthetic hydrocarbon based lubricant. Never mix lubricants of different types or brands.

When switching from mineral oil to a synthetic oil, the plant’s system materials must be re−evaluated. Certain plastics are not compatible with synthetic oils. The following is a partial list of acceptable and not recommended materials:
## Technical Specification

<table>
<thead>
<tr>
<th>ACCEPTABLE</th>
<th>NOT RECOMMENDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viton</td>
<td>Celcon</td>
</tr>
<tr>
<td>High Nitrile Buna N</td>
<td>Neoprene</td>
</tr>
<tr>
<td>Teflon</td>
<td>SBR Rubber</td>
</tr>
<tr>
<td>Epoxy Paint</td>
<td>Low Nitrile Buna N</td>
</tr>
<tr>
<td>Oil Resistant Alkyd</td>
<td>Acrylic Paint</td>
</tr>
<tr>
<td>Nylon</td>
<td>Lacquer</td>
</tr>
<tr>
<td>Delrin</td>
<td>Polystyrene</td>
</tr>
<tr>
<td>PVC</td>
<td>ABS</td>
</tr>
</tbody>
</table>

### Attention!
Polycarbonate bowls can be etched by any synthetic lubricant. We recommend replacement with metal bowls, or the addition of metal guards.

### 1.9 Maintenance for the Electrical Motor

Relubricate the compressor motor bearings:

Under normal operating conditions, after \( 12000 \) h* (ambient temperature up to 77°F)

Under unsuitable conditions, after \( 6000 \) h* (ambient temperature up to 105°F)

but no later than \( 3 \) Years

* operating hours

### 1.10 Dimensional Drawing

(see following page)
2 Safety

Read this service manual carefully and observe cautionary references before putting this compressor package into operation and before carrying out any maintenance.

2.1 Explanation of Symbols and References

⚠️ This symbol is placed before all references to safety where danger to life and limb can occur during work. It is especially important that these rules are observed and that extreme care is taken in these cases. For their own protection, all other users must be informed of these safety rules. Observe general safety and accident prevention regulations as well as the safety rules laid down in this service manual.

⚠️ Attention! This symbol is placed by text where considerable attention must be paid so that recommendations, regulations, references and correct sequence of work are adhered to and that damage and/or destruction of the compressor unit and/or other equipment is prevented.

🌳 This symbol identifies environmental protection measures.

🚾 This symbol indicates operations to be carried out by the operator or service technician.

• This bullet identifies listings.

2.2 General Safety Precautions

⚠️ Work on power driven systems may only be carried out by trained or specialized personnel.

Prior to working on electrical systems of the compressor always perform the following steps in the sequence shown.

1. Lock the main disconnect in the "off" position in accordance with applicable lock out/ tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

2. Ensure the package cannot be switched on again

3. Check that no voltage is present

4. Lock the isolation shut–off valve in the "closed" position and vent all compressed air trapped between the compressor and the isolation shut–off valve in accordance with applicable lock out/ tag out procedures (example: OSHA CFR 29 § 1910.147).

⚠️ Attention! Any alterations or reconstruction carried out without the prior written authorization of KAESER COMPRESSORS Inc. will invalidate the warranty.
Safety

- Do not allow open flame and flying sparks at the installation site.
- Take necessary precaution when welding on or near the compressor package to ensure that sparks or high temperatures cannot cause fire or explosion.
- Ensure that the compressor package is supplied only with clean uncontaminated air.
- Do not allow the maximum ambient temperature to be exceeded (see chapter 1.6), unless special measures have been agreed upon between the manufacturer and the customer.
- Perform oil changes according to the service manual or at least once annually (see chapter 9.12).
- Do not mix cooling oils of different types.
- Maintain and monitor the operating temperature according to the manufacturer’s specifications to avoid build-up of condensate or varnish in the oil circuit (see chapter 1.1).
- Use only cooling oils recommended by the manufacturer (see chapter 1.8).
- If maintenance work is carried out on any part of the oil circulation system, top off the oil in the oil separator tank to the maximum level, run the compressor and keep it under constant observation for a short period. Check the oil level again and top off with oil to replace the oil taken up by the piping and the cooling system.
- Operation of compressor package is not recommended if the differential pressure across the separator cartridge is greater than 14.5 psi. Check periodically.

2.3 Electrical Power Supply

Attention! The main power supply and overcurrent protection must be installed by a qualified electrician in accordance with NEC, OSHA and any applicable local codes.

Compressor packages must be installed with a lockable main disconnect and fuses or other short-circuit and ground fault protection device.

For fuse and wire recommendations, see chapter 1.4

Please note that the conductors, fuses and procedure are KAESER’s recommendations. These recommendations do not supersede other applicable codes.

2.4 Spare Parts

Safe and reliable operation of the compressor package is guaranteed only with KAESER original spare parts and KAESER SIGMA cooling oil.

2.5 Compressed Air System

If a compressed air system is extended or changed, verify that the blowoff pressure and capacities of the safety relief valves on the air receiver tanks and in the system match the rating of all the compressor packages installed.

2.6 Environmental Protection

Condensate drainage

The condensate accumulating during compression must be fed via a suitable drainage system, collected in special canisters and disposed of according to environmental regulations.
Safety

Maintenance materials/wear items/replacement parts

Ensure that all wear items, maintenance and replacement parts accumulating during operation of the compressor package are disposed of according to environmental regulations.

The following points must be observed:

Avoid contact with skin and eyes.
Do not inhale vapours and oil mist.
Do not eat or drink when handling such materials.
Fire, open flame and smoking are strictly forbidden.
3 General

The service manual must always be available for use at the location of the compressor package.

3.1 Proper use of the Compressor
The compressor package is intended solely for the purpose of generating compressed air. Any further use outside of this purpose is considered improper. The manufacturer cannot accept liability for any damage caused by such improper use; the user alone is liable for any risks incurred.
Proper use of the compressor also includes adherence to the installation, removal, application, operational and maintenance instructions laid down by the manufacturer.

3.2 Improper use
Never direct compressed air toward persons. Compressed air is a concentrated form of energy and as such is dangerous to life.

3.3 Compressed Air Treatment
Never use compressed air from oil injected compressor packages for breathing purposes and production methods where the air has direct contact with food, without subjecting the compressed air to additional treatment.

3.4 Copyright
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All rights reserved. No part of this manual may be reproduced in any form without permission of KAESER COMPRESSORS, INC.
4 Transport

4.1 Transport Instructions
We recommend a fork lift truck or lifting equipment for transporting the compressor package to avoid damage to the cabinet and framework.

Attention:
Do not exert any side forces on the compressor unit when transporting with lifting equipment!

4.2 Packaging
The packaging provided with this compressor as delivered is intended to safeguard the package against normal road transport damage. Please dispose of in an environmentally friendly way and arrange for it to be recycled if possible.
5 Construction and Operation

5.1 Principle of Compression

The stationary compressor package is fitted with a single stage, oil–injected airend. The two rotors, the driven male rotor and the female rotor, both mounted in antifriction bearings, are fitted into the airend. As the rotors rotate, air is drawn into the upper side through the inlet port and is compressed on the lower side. The oil that is injected into the lower side absorbs heat generated by compression, prevents metal to metal contact between the rotors, seals the rotors and the housing from each other and also lubricates the antifriction bearings. The compressed air and oil mixture leaves the airend via the discharge port.

![Diagram of compressor components](image)

1 Drive shaft  
2 Oil injection  
3 Discharge port  
4 Male rotor  
5 Female rotor  
6 Air inlet port

5.2 Brief Description

The compressor block is driven by an electric motor via V–belts. An oil separator cartridge is fitted into the oil separator tank allowing practically oil free compressed air supply.

The control system of the compressor package ensures that compressed air is generated within the set pressure limits.

Safety devices protect the compressor package against failure of important systems through automatic shut–down.

The fan ensures ventilation of the compressor package and sufficient cooling air for the air–cooled oil cooler and air aftercooler.

5.3 Pipe and Instrument Flow Diagram (P & I Diagram)

(see following pages)
1 Air filter
2 Inlet valve
2.1 Oil filter with plug
3 Drive motor
4 Aired
4.1 Strainer
4.2 Pressure switch - Wrong direction of rotation
5.2 PT100 sensor
6 Oil separator tank
6.1 Pressure gauge
6.2 Hose coupling (oil side)
6.3 Hose coupling (air side)
6.6 Shut-off valve - Oil drain
6.9 Oil level sight glass: minimum/maximum oil level
7 Safety relief valve
8 Oil separator cartridge
9 Oil temperature controller
10 Oil filter
11 Oil cooler
12 Minimum pressure check valve
13 Air aftercooler
16 Dirt trap
17 Nozzle
18/19 Combined control/vent valve
18 Control valve
19 Vent valve
20 Shut-off valve - Vent line
21 Silencer
59.1 Pressure transducer Air system pressure
5.4 DUAL Control

In DUAL Control (combined idle and start-stop) the compressor normally runs at full-load, idle or standstill.

The controller regulates the compressor package between full-load and idle.

If the compressor package runs in idle for longer than the preset period (1) to (2), for example $t_1 = 6$ min, the drive motor is stopped completely (2). When the lower switching point $p_{\text{min}}$ (3) is reached the compressor package is automatically started again. Pressure rises to the upper switching point $p_{\text{max}}$ (4), and the compressor package switches to idle. If the pressure falls again to, for example, $p_{\text{min}}$ (5) within a shorter period (4) to (5), then the compressor is automatically switched from idle to full-load.
5.5 QUADRO Control

Functional description
Two fixed periods – the running period and idle/standstill period – are taken as the criterion for selection of the operating mode of the compressor package when the air mains pressure reaches the upper switching point. These two periods are set according to the maximum permissible cut—in frequency of the compressor motor.

The running period starts every time the compressor package is switched on. It lasts as long as the compressor motor runs and stops when the compressor package switches to full stop.

The idle/standstill period starts every time the operating mode changes from full load to off load running. It runs during idle and also when the compressor package is switched to standstill after the idle period. It stops when the compressor package switches to full load.

Every switching off point is delayed by the run—on period, during which time the compressor package vents.

The following switching cycles are possible:

- If the air systems pressure decays to the lower switching point, the compressor package switches to full load (1) irrespective of its previous operating mode. If the compressor motor was at a standstill the opening of the inlet valve is delayed to allow an unloaded compressor package start.

---

**Stop point for the running period or idle / standstill period**

- $p_{\text{max}}$ upper switching point
- $p_{\text{min}}$ lower switching point
- $t_{\text{rise}}$ pressure rise time (the time during which the air system pressure rises from the lower to the upper switching point)
- $t_{\text{decay}}$ pressure decay time (the time during which the air system pressure decays from the upper to the lower switching point)
If the air systems pressure rises to the upper switching point and the running period has already expired, the compressor package is switched off after the run–on period has expired (2).

If the air systems pressure rises to the upper switching point before the running period has expired then the pressure decay time of the previous switching cycle is taken as the criterium for the selection of the operating mode:

– If the pressure decay time $t_{\text{p decay}}$ was longer than the period set for the idle/standstill period, the compressor is switched to standstill after the run–on period has expired (3).

– If the pressure decay time $t_{\text{p decay}}$ was shorter than the period set for the idle/standstill period, the idle mode is selected (4), that is, the inlet valve closes and the compressor is vented with running motor. When the running period expires the compressor package switches to standstill only after the run–on period has also expired (5).

5.6 VARIO Control

Functional description:
The idle period is automatically lengthened or shortened by the variable idle control in relation to the number of motor starts. The number of motor starts during the preceding hour are measured.

A high switching frequency leads to longer idle periods.
A low switching frequency leads to shorter idle periods.
Installation

6 Installation

6.1 Installation Requirements

**Attention!** The compressor should be mounted on level surface. For any special application please consult with the manufacturer.

Safe operation of the compressor package is only ensured if the ambient temperature remains within the limits stated in chapter 1.6).

If the compressor is used in the open, take care that it is protected against the direct rays of the sun and against the ingress of dust and rain.

Install the compressor according to the following diagram. Adhere to the minimum distances shown to allow free access to the compressor package.

Adequate ventilation of the compressor space is ensured only if the minimum values (see chapter 1.6) are adhered to.

**Solution A: Forced Ventilation**

The ventilator intended for the compressor room must provide adequate ventilation in relation to the size of the compressor package (see chapter 1.6).
**Solution B: Exhaust Air used for Space Heating**

The hot air is forced through a conduit (see chapter 1.6) into the room to be heated.

**Attention!** Consult the manufacturer with regard to length of conduit and for maximum allowable pressure drop for this compressor package.

Safe operation of the compressor package is guaranteed only if the temperature limits (see chapter 1.6) of the cooling air are adhered to.

### 6.2 Connection of the Compressed Air Supply

**Attention!** The unit is set up ready to operate. Connect the discharge outlet of the compressor to the system pipework using a flexible hose line and isolation shut-off valve with drain.

Use the NPT adapter if necessary.

### 6.3 Electrical Connection

**Attention!** The main power supply and overcurrent protection must be installed by a qualified electrician in accordance with NEC, OSHA and any applicable local codes.

For fuse and wire recommendations, see chapter 1.4

The compressor is wired ready for connection to the main supplies. Feed the supply cable with cores marked L1, L2, L3 and PE through the cable inlet in the base frame into the control box and connect to the terminals marked L1, L2, L3 and PE in this box.

**Attention!** Maximum dual element time-delay fuses are selected according to 1996 N.E.C. Article 240-6, 430-52 and Tables 430-148 & 150.

Select multi-strand copper core wire at 40°C ambient temperature according to 1996 N.E.C. 110-14(c), 220-3, 310-15, Table 310-16, 430-6, 430-22 and Tables 430-148 & 150.

**Wire temperature rating:**

<table>
<thead>
<tr>
<th>1.25 x FLA (see chapter 1.4)</th>
<th>wire temperature rating</th>
<th>correction factor for 40°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 100A</td>
<td>60°C</td>
<td>0.82</td>
</tr>
<tr>
<td>&gt; 100A</td>
<td>75°C</td>
<td>0.88</td>
</tr>
</tbody>
</table>
7 Putting into Operation

7.1 Points to be Observed before Putting into Operation

Every compressor package is given a test run at the factory and carefully inspected before shipment. The test run confirms that the package conforms to the specification data and runs perfectly. However, the compressor package could be damaged during transport. For this reason, we recommend that the package be examined for possible shipping damage. It is recommended that an operator observe the compressor package carefully during the first hours of operation for any possible malfunction.

**Attention!** Important functional components in the compressor package (such as minimum pressure check valve, safety relief valve, inlet valve and combination valve) are adjusted and fitted to factory standards and specifications. Alterations to these components are not allowed without prior written authorization with the manufacturer.

![Warning](image)

Do not disassemble the minimum pressure check valve, safety relief valve, inlet valve and v-belt tensioning devices. They are heavily spring loaded.

Disassembly by unqualified personnel may result in personal injury or equipment damage.

7.2 Points to be Observed before Starting the Compressor Unit

**Warning:** ANY NON-OBSERVANCE OF THIS OR OTHER REFERENCES (WARNING; ATTENTION; DANGER) CAN LEAD TO ACCIDENTS CAUSING INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

If a power failure occurs, the compressor package will start again automatically (normal setting) when the power is restored provided the system pressure is lower than the cut-in pressure entered in the SIGMA CONTROL.

Do not operate the compressor with open maintenance doors or with cover panels removed as personnel could be injured by rotating parts and electrical equipment.

- Remove all packaging materials, tools and transport securing devices on and in the compressor package.
- The operator is expected to practice safe working techniques and to follow all recommended operating and safety regulations when operating this compressor package.
- The operator of this compressor package is responsible for its safe operating condition.
- Do not operate this compressor package in locations where high dust conditions, poisonous, or inflammable gases could exist.
- Do not connect the compressor package to a supply voltage other than that stated on the nameplate.
- Do not install the compressor package in a location subject to freezing temperatures. The air temperature requirements at the air intake must be complied with (see chapter 1.6).
Initial Start

- If exhaust air ducts are to be installed the duct cross section must be equal or larger than the cooling air outlet of the compressor package and may not exceed the permitted pressure loss prescribed by the compressor manufacturer.
- During installation of the compressor package, ensure that a distance of at least 40 \text{"} is kept between the air intake of the unit and any wall.
- Check the oil level in the oil separator tank (see chapter 9.12).
- Check that the airend rotates in the correct direction (see chapter 7.4).
- Check the tension of the drive belts (see chapter 9.4).
- The ball valve (6.6, see chapter 5.3) must be closed.
- The ball valve (20, see chapter 5.3) must be open.

\begin{itemize}
  \item Lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.
  \item Check all screws on the electrical connections for tightness and tighten if necessary (carry out this check again after 50 hours of operation).
\end{itemize}

- This compressor is fitted with a run–in oil filter cartridge. Replace the filter cartridge after the run–in period of 200 hours (see chapter 9.11).

\section*{7.3 Functional Check of the Door Interlock Switch}

\begin{itemize}
  \item Do not operate the compressor unit with a malfunctioning door interlock switch.
  \item Do not attempt to modify or by-pass the door interlock switch.
\end{itemize}

1 \textit{Door interlock switch}

\textbf{Visual door interlock switch check}

- Check that the interlock switch operates smoothly by opening and closing the left–hand maintenance door.
Initial Start

Attention! If the insertion key (3) at the door interlock is incorrectly aligned, inadvertent shutdown of the compressor package can occur.

The insertion key (3) align with the door interlock switch (1) without binding against the sides of the interlock switch when the maintenance door is closed.

If necessary, re-align the insertion key (3).

- Loosen the bolts (4).
- Align the insertion key (3) so that it glides smoothly into the interlock switch (1).
- If necessary, use washers to help align the insertion key (3) with the interlock switch (1).
- Tighten the bolts (4) again.

Functional check of the interlock switch

Attention! A functional check of the door interlock switch must be made after initial start.

- Start the compressor package (see chapter 8.3).
- Open the left-hand maintenance door — the compressor package will shut down immediately if the door interlock switch functions correctly.
- Close the left-hand maintenance door.
- Reset the alarm message by pressing the acknowledge (reset) key (11, see chapter 8.2.1) on SIGMA CONTROL.

The compressor package is now ready to start again.
7.4 **Direction of Rotation Check**

**Attention!** The compressor is wired for connection to a clockwise phase sequence power supply.

A check of the direction of rotation can be made by testing the phase sequence. Arrows showing the direction of rotation are located on the motor and on the airend housing.

On your initial start, "bump" the unit and verify the direction of rotation.

If the direction of rotation is incorrect, change over the supply conductors L1 and L2.

**Attention!** If the airend rotates in the wrong direction, the compressor is automatically shut down by the safety air pressure switch (4.2, see chapter 5.3).

7.5 **Motor Overload Relay Adjustment**

**Attention!** Lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart. See chapter 2.3 for the main disconnect switch.

The relay is set to the standard adjustment at the factory.

For the rated motor current see motor nameplate.

**Compressor motor: Direct on-line start**

Adjustment:

To prevent the motor overload relay from tripping (because of voltage fluctuations, temperature influences or component tolerances), the value can be set up to 15% higher than the rated motor current.

**Motor overload adjustment**

**Reset button**

7.6 **Setting the Air System Pressure**

The air system pressure is preset at the factory. It can be changed in SIGMA CONTROL to match customer's operational requirements if the password is known (menu: Configuration → Pressure Settings → Air Main Pressure (AMP). For further details, consult the SIGMA CONTROL service manual.
7.7 Measures to be taken before Initial Start

Follow the procedure detailed below before initial start, after an oil change or if the compressor has not been operated for a period of three months or longer before starting the compressor:

7.7.1 Pour a small quantity of oil into the air inlet port

⚠️ Lock the main disconnect in the “off” position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

⚠️ Do not add oil unless the compressor package is completely vented.

See chapter 9.10 to vent the compressor.

☞ To pour in the oil, unscrew the filler plug (1) on the inlet valve (2) and then pour the prescribed quantity of oil (see chapter 1.7) into the airend.

☞ Manually rotate the airend in a counterclockwise direction with the drive belts.

☞ Screw the filler plug (1) back in.

**Attention!** This oil must be of the same type as the oil used to operate the compressor (see label near the oil filler plug on the oil separator tank).

If no additional oil is available, remove required amount of oil from the oil separator tank. See chapter 9.14 for this procedure.

If the compressor unit was at standstill for more than 12 months, additional precautionary steps have to be taken before putting the unit back into operation. In this case consult the manufacturer.

☞ Open the isolation shut-off valve between the compressor and the compressed air system.

7.7.2 Running the compressor in idle

At initial start run the compressor package in idle for 20 seconds by pressing the load/idle key (5, see chapter 8.2.1).

This measure ensures that the compressor package has sufficient time to flood the oil circulation.

⚠️ If a power failure occurs, the compressor package will start again automatically (normal setting) when the power is restored provided the system pressure is lower than the cut-in pressure entered in the SIGMA CONTROL.
7.7.3 Checklist

- Is the floor at the place of installation solid and level?
  - yes [ ] no [ ]

- Is the space large enough for the compressor package or its components?
  - yes [ ] no [ ]

- Are inlet and exhaust air apertures available in sufficient size and number?
  - yes [ ] no [ ]

- Are all components of the compressor package easily accessible?
  - yes [ ] no [ ]

- Is the power supply cable of sufficient cross-section? (have electrical connection carried out by qualified electrician or company familiar with local conditions)
  - yes [ ] no [ ]

- Is a shut off valve fitted by the user?
  - yes [ ] no [ ]

- Is a flexible connecting hose or axial compensator fitted between the compressor package and the compressed air system?
  - yes [ ] no [ ]

- Have all screws, bolts and electrical connections been checked for tightness?
  - yes [ ] no [ ]

- Has the oil level in the oil separator been checked?
  - yes [ ] no [ ]

- Is a main disconnect switch fitted (suited to the motor starting characteristics)?
  - yes [ ] no [ ]

- Has the setting of the drive motor overload current trip been checked?
  - yes [ ] no [ ]

- Have you ensured that there are no other air components located in the exhaust air flow of the compressor package?
  - yes [ ] no [ ]

- Have service personnel been instructed on safety regulations?
  - yes [ ] no [ ]
8 Operation

8.1 Control Panel

1 SIGMA CONTROL
2 EMERGENCY STOP pushbutton

8.2 SIGMA CONTROL

Operation of the compressor package is determined by the parameters preset in the controller and can differ from the standard settings described because of requirements specific to a customer.

Attention! Note the list of parameters supplied

Further details on individual function keys, LEDs and plain text display relating to possible alarms and service messages, display of events, etc. are given in the service manual supplied for the SIGMA CONTROL controller.
8.2.1 Function keys

1 ON key ("I")
2 OFF key ("0")
3 Timer ON/OFF key
4 Remote ON key
5 Load/idle key
6 Menu scroll – DOWN key
7 Menu scroll – UP key
8 Escape key
9 Return key
10 Info – event key
11 Acknowledge (reset) key

8.2.2 Light emitting diodes and plain text display

12 Four-line plain text display
13 Alarm LED
14 Communication alarm LED
15 Maintenance LED
16 Power ON LED
17 Load LED
18 Idle LED
19 Compressor ON LED
20 Remote ON/OFF LED
21 Timer ON/OFF LED
8.3 Starting and Stopping the Compressor Unit

Attention! Do not start and stop the compressor package with the main disconnect switch. The compressor must always be switched ON and OFF with keys (1) and (2).

To turn the compressor ON (local):

- Switch on the main disconnect switch.

The controller carries out a self-test. The self-test sequence is visible in the display (12). Afterwards, the green LED (16) illuminates permanently.

- Press the ON key (1) – LED (19) illuminates.

The compressor status is indicated by LEDs (17) and (18):

Attention! If LED (19) is illuminated and both LEDs (17) and (18) are extinguished the compressor package is at standstill but on duty.

The compressor package can start at any moment.

To turn the compressor OFF (local):

- Press the OFF key (2) – LED (19) extinguishes.

- Lock the main disconnect in the “off” position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

See chapter 2.3 for the main disconnect switch.

8.4 Acknowledgement of Alarms

If an alarm occurs the compressor package is shut down immediately and the red LED (13) on SIGMA CONTROL flashes.

The bottom line in the display (12) shows the actual fault causing the alarm. A list of alarms that may occur during operation is included in the SIGMA CONTROL service manual.

- Remove the fault.

- Acknowledge alarm with the reset key (11) – LED (13) extinguishes.

The compressor package is now ready to start again.

Attention! If the compressor was shut down with the EMERGENCY STOP pushbutton, then reset by rotating the latched pushbutton in the direction of the arrow before acknowledging the alarm.
8.5 Acknowledgement of Service Messages

When maintenance is due the yellow LED (15) on SIGMA CONTROL flashes.

Attention! Before any maintenance is due an initial warning is displayed to allow coordination of service and maintenance personnel and provision of necessary servicing materials. (lubricants, spare parts, etc.).

Maintenance due is shown in the display (12).
A list of service messages that may occur during operation is included in the SIGMA CONTROL service manual.

- Carry out the maintenance work.
- Acknowledge service message with the reset key (11) – LED (15) extinguishes.

Attention! When the respective maintenance has been carried out, the remaining interval period (programmed interval until the next maintenance is due) must be reset.

Detailed information on resetting service counters is to be found in the service manual for SIGMA CONTROL.
9 Maintenance

9.1 Observe the following rules during all maintenance and servicing work:

Work on power driven equipment may only be carried out by trained or specialized personnel. Follow all applicable OSHA and local safety regulations.

If a power failure occurs, the compressor package starts again automatically (normal setting) provided the line pressure is lower than the pressure threshold parameter entered in SIGMA CONTROL.

Lock the main disconnect switch in the “off” position in accordance with applicable lock out/tag out procedures to ensure the compressor does not restart (see chapter 2.3 for main disconnect switch).

Ensure that no maintenance personnel is working on the compressor unit, that all panels are latched back on again and all maintenance doors are closed before restarting the compressor unit.

To start the compressor unit see chapter 8.3).

Carry out a visual and functional check of the door interlock switch after any maintenance and servicing work.

See chapter 7.3 for details.

The following points must be observed when handling lubricating and cooling materials:

Avoid contact with skin and eyes.
Do not inhale vapours and oil mist.
Do not eat or drink when handling such materials.
Fire, open flame and smoking are strictly forbidden.

Ensure that all lubricants, consumable materials and replacement parts accumulating during operation and servicing of the compressor package are disposed of according to environmental regulations.
### 9.2 Regular Maintenance

<table>
<thead>
<tr>
<th>Interval</th>
<th>Work to be done</th>
<th>See chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 and 24 h after initial start</td>
<td>Check the v-belt tension</td>
<td>9.4</td>
</tr>
<tr>
<td>50 h after initial start</td>
<td>Check all electrical connections for tightness and tighten if necessary</td>
<td></td>
</tr>
<tr>
<td>200 h after initial start</td>
<td>Replace the run-in oil filter</td>
<td>9.11</td>
</tr>
<tr>
<td>Weekly</td>
<td>Check the oil level</td>
<td>9.12</td>
</tr>
<tr>
<td></td>
<td>Check the filter mats for contamination</td>
<td>9.6</td>
</tr>
<tr>
<td>500 h</td>
<td>Check the v-belt tension</td>
<td>9.4</td>
</tr>
<tr>
<td></td>
<td>Clean or replace the air filter*</td>
<td>9.7</td>
</tr>
<tr>
<td>1000 h</td>
<td>Check the oil cooler and air aftercooler for contamination</td>
<td>9.13</td>
</tr>
<tr>
<td></td>
<td>Clean or replace the filter mats*</td>
<td>9.6</td>
</tr>
<tr>
<td>1000 to 2000 h</td>
<td>Replace the oil filter**</td>
<td>9.11</td>
</tr>
<tr>
<td>Proper interval varies.</td>
<td>Change the oil*</td>
<td>9.14</td>
</tr>
<tr>
<td>See chapter 1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000 to 3000 h**</td>
<td>Change the oil separator cartridge*</td>
<td>9.15</td>
</tr>
<tr>
<td>Annually</td>
<td>Check all electrical connections for tightness and tighten if necessary</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Have the safety relief valve checked by authorized KAESER distributor</td>
<td>9.9</td>
</tr>
<tr>
<td>6000/12000 hours or at least</td>
<td>Have the compressor motor bearings relubricated by authorized KAESER distributors*</td>
<td>9.8</td>
</tr>
<tr>
<td>within three years</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The maintenance period can vary depending on the cycle rate and environmental conditions.

** Not to exceed 2000 service hours.

We urgently recommend that a record is kept of the maintenance work done (see chapter 9.16).
9.3 Opening and Closing the Compressor Cabinet

To open:
- Open the access door (1).
- Pull the locking lever (3, photo A) outwards, turn 90° in the direction of the arrow and latch onto the frame.
- Lift the panel (2) and remove.

To close:
- Turn the locking lever (3) to its initial position.
- Attach the panel (2) making sure that it latches.
- Close the access door (1).

⚠️ Close all maintenance doors and panels correctly before starting the compressor package.

Diagram:
- 1 Maintenance door
- 2 Cover panel
- 3 Unlocking lever
9.4 Checking the Drive Belt Tension

Switch off the compressor unit (see chapter 8.3).

Lock the main disconnect switch in the "off" position in accordance with applicable lock out/tag out procedures to ensure the compressor does not restart.

Check the tension of the belt drive after the first 2 and 24 hours of operation and thereafter every 500 hours of operation.

Re-tension the belt drive if the belts have stretched to the point where the indicator pin (3) is situated at the top end of its indicator slot.

Loosen the hexagonal nut (1).

Tension the belt drive with the hexagonal nut (2) until the indicator pin (3) is situated at the bottom end of its indicating slot.

Tighten the hexagonal nut (1).

1 Hexagonal nut
2 Hexagonal nut
3 Indicator pin
9.5 Drive Belt Change

- Switch off the compressor unit (see chapter 8.3).

⚠️ Lock the main disconnect switch in the "off" position in accordance with applicable lock out/tag out procedures to ensure the compressor does not restart.

- Loosen the hexagonal nut (2, see chapter 9.4).
- Screw the hexagonal nut (1, see chapter 9.4) until the V-belts are loose.
- Remove the V-belts.

⚠️ Attention! It is essential that replacement belts are all precisely the same length (each set) and absolutely oil-proof. For this reason we recommend that only original KAESER drive belts are used.

- Place the new V-belts over the motor and compressor pulleys without straining them.
- Set the belt drive tension (see chapter 9.4).

⚠️ Attention! Check the belt drive tension after 2 hours of operation and then again after 24 hours of operation, as experience shows that the belts stretch mostly during this period.

9.6 Cleaning or Replacing the Filter Mat

Clean the filter mat every week depending on the dust content of the intake air and replace if necessary as detailed in the maintenance schedule (see chapter 9.2).

- Switch off the compressor package (see chapter 8.3).

⚠️ Lock the main disconnect switch in the "off" position in accordance with applicable lockout/tagout procedures to ensure the compressor does not restart.

![Diagram of filter mat with labels 1 and 2]

1 Filter mat
2 Holding frame

Removal and fitting:

- Open the snap fasteners (turn the flat—head screw with a screwdriver counter-clockwise 90°) and remove the holding frame.
- Fit the holding frame and close the snap fasteners (turn the flat—head screw with a screwdriver clockwise 90° then press until the fasteners snap in).
Maintenance

**Cleaning:**
Rinse the mat in warm water (approximately 105°F), if necessary, use a mild detergent soap to rinse out oily dust. The mat can also be tapped, vacuum cleaned or blown out with compressed air (not in excess of 30 psig).

**Attention!** If the mat is heavily soiled or has been cleaned often (maximum five times), replace it.

### 9.7 Cleaning or Replacing the Air Filter

Clean the air filter after every 500 service hours.

- Stop the compressor package (see chapter 8.3).

**Attention!** Lock the main disconnect switch in the "off" position in accordance with applicable lock out/tag out procedures to ensure the compressor package does not restart.

1. Air filter
2. Air filter cap
3. Wing nut for opening air filter housing
4. Air filter cartridge

**To open the air filter housing:**

- Unscrew the wing nut (3) and remove the air filter cap (2) and the filter cartridge (4).
- Clean the air filter cap and sealing surfaces.

**Cleaning the air filter cartridge (4) by tapping:**

- Tap the air filter cartridge several times on the front with the ball of the hand.

**Attention!** Do not use excessive force otherwise the air filter cartridge may be damaged.

- Clean all sealing surfaces.

**Cleaning the air filter cartridge with compressed air:**

- Use dry, compressed air blowing at a pressure of not more than 30 psig at a slant from the inside to the outside of the air filter cartridge surfaces.

**Attention!** Do not clean the air filter cartridge with fluids. If the air filter cartridge is heavily contaminated or was already cleaned several times (max. five times), replace.

Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psig and then only with effective chip guarding and personal protective equipment. (OSHA CFR 29 § 1910.242)
To close the filter housing:

- Insert the filter cartridge (4) and replace the air filter cap (2).
- Screw on the wing nut (3) tightly.

9.8 Servicing the Electric Motor

Compressor motor:
The electrical motor bearings are permanently greased.

Attention! Have the motor bearings replaced by authorized KAESER distributors in accordance with the maintenance schedule (see chapter 1.9).

9.9 Testing the Safety Relief Valve on the Oil Separator Tank

To test the set point of the safety relief valve, the compressor must be run so that its discharge pressure exceeds the maximum pressure set on the SIGMA CONTROL.

See chapter 1.5 for the safety relief valve activating pressure.

Attention! Have the safety relief valve tested by an authorized KAESER distributor in accordance with the maintenance schedule (see chapter 9.2).

For more details see SIGMA CONTROL manual.

9.10 Venting the compressor unit

- Switch off the compressor unit (see chapter 8.3).

Attention! Lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures to ensure the compressor does not restart.

Lock the isolation shut-off valve in the "closed" position and vent all compressed air trapped between the compressor and the isolation shut-off valve in accordance with applicable lock out/tag out procedures.

The oil circulation system of the compressor package vents automatically.
Venting the oil separator tank:

- **Ball valve**
- **Pressure gauge**
- **Hose coupling**
- **Filler plug**
- **Nozzle**
- **Oil separator tank**
- **Oil level**
- **Screwed sealing plug**
- **External pressure source**

The pressure gauge on the oil separator tank must indicate zero psig.

Oil mist can escape when the oil separator tank is vented.

Insert the nozzle (6) in the hose coupling (3) on the oil separator tank. The residual pressure in the oil separator tank escapes.

Remove the nozzle (6) from the hose coupling (3).

Venting the air aftercooler:

- **Warning**: When the compressor package is vented, pressure is still present in the air aftercooler and the pipework up to the minimum pressure check valve. For this reason the compressor package must be isolated from the compressed air system by closing the shut-off valve between the compressor package and the compressed air system. If isolation shut-off valve is not available, vent the compressed air system completely.

- Carefully remove the screw fitting (4, see chapter 9.13). The air aftercooler vents.
- Tighten the screw fitting again.

Close all maintenance doors and panels correctly before starting the compressor package.
9.11 Oil Filter Change

⚠️ Hot oil; beware of scalding.

**Attention!** Replace the run—in oil filter cartridge with a standard oil filter cartridge (supplied with the compressor) after approximately 200 operating hours.

Change the oil filter cartridge according to the regular maintenance schedule (see chapter 9.2) or when the corresponding service message is displayed on SIGMA CONTROLLER (see chapter 8.1). It is recommended that the oil filter cartridge is replaced always when the oil is changed.

9.11.1 Removal and replacement of the oil filter cartridge

💡 Stop the compressor package under full load (see chapter 8.3).

⚠️ Lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

⚠️ Before opening or removing pressurized components (pipes, hoses, tanks, etc.) it is imperative that the compressor package is completely depressurized.

💡 Venting the compressor package (see chapter 9.10).

1 Oil filter cartridge
2 Turn in this direction to unscrew the cartridge

💡 Twist the used or contaminated oil filter cartridge counter clockwise to remove and catch escaping oil in a suitable container.

.'.$ Dispose of the old oil filter and any used, accumulated oil according to environmental care regulations!

💡 Clean the face of the combination block with a lint free cloth.

💡 Lightly oil the gasket of the new filter cartridge before screwing into position.

💡 Screw in the new filter cartridge clockwise by hand until the gasket fits tightly.
Maintenance

Attention! Do not use a tool as this may cause damage to the oil filter cartridge and the gasket.

- Check the oil level (see chapter 9.12).
- Open the isolation shut-off valve between the compressor and the compressed air system.

Perform a test run

When the operating temperature is reached (see chapter 1.1), shut down the compressor package (see chapter 8.3) and lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

Afterwards, carry out a visual check for leaks.

9.12 Oil Top Up

Check the oil level weekly with the oil level sight gauge when the compressor unit is shut down. If necessary, top up the oil to the maximum level. To do this, it is imperative that the compressor unit is switched off under full load conditions and that the oil level is allowed to settle for five minutes. Do not exceed the maximum level.

- Stop the compressor package under full load (see chapter 8.3).

Attention!

Lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

Attention!

Before opening or removing pressurized components (pipes, hoses, tanks, etc.) it is imperative that the compressor package is completely depressurized.

- Venting the compressor package (see chapter 9.10).
Unscrew the oil filler plug (4) on the oil separator tank.

Top off the oil to the maximum mark.

Check the gasket ring of the filler plug (4) for damage and then screw in the filler plug.

Open the isolation shut-off valve between the compressor and the compressed air system.

**Attention!**

After an oil change or oil cooler cleaning (with removal of the oil cooler) run the compressor package up to operating temperature to ensure that the combination valve closes and that the oil cooler is flooded with oil.

Afterwards, repeat the procedures “Venting the Compressor Package” (chapter 9.10) and “Topping off the Oil” (chapter 9.12).

**Attention!**

Always use the same brand and type of oil when topping off the oil. (see label on the oil separator tank).

During an oil change, drain the old oil completely and always replace the oil filter.

Never mix different oil types or brands.

Oil recommendations see chapter 1.8
9.13 Cleaning the Oil Cooler and Aftercooler

The oil cooler and air aftercooler must be checked for clogging regularly. Heavy contamination could lead to excessive temperatures in the oil circulation system.

See regular maintenance schedule for cooler maintenance interval (chapter 9.2).

Switch off the compressor package under full load (see chapter 8.3).

Lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures to ensure the compressor does not restart.

Before opening or removing pressurized components (pipes, hoses, tanks, etc.) it is imperative that the compressor package is completely depressurized.

Venting the compressor package (see chapter 9.10).

9.13.1 Removing and cleaning the oil cooler/air aftercooler

Unscrew the hose connector (2) and the pipe connector (3) from the combination valve.

Unscrew the Allen screws (1) on the aftercooler.

Remove and check the O-ring on the aftercooler.

Close up the pipes and openings on the combination valve, and aftercooler.
Unscrew the hex bolt (5).

The hex socket head bolts (6) are located behind two protective caps.

**Attention!** Before unscrewing the two hex socket head bolts (6) prop up the combination oil/air aftercooler.

- Remove the protective caps and unscrew the two hex socket head bolts (6).
- Take out the aftercooler.

**Attention!** Do not direct compressed air, water or steam jets toward any person. These represent contained energy and as such, are dangerous to life.

The soiled cooler laminations may be cleaned with water or steam jet only in designated cleaning areas with oil separators suited for such purpose!

- Clean the cooler laminations with compressed air, water or steam jet.

**Attention!** Seat the O–rings correctly in the compressed air inlet of the oil/air aftercooler during reassembly.

- Reassemble in the reverse order.
- See chapter 9.12 for topping off the oil.
- Open the isolation shut-off valve between the compressor and the compressed air system.

**Perform a test run**

When the operating temperature is reached (see chapter 1.1), shut down the compressor package (see chapter 8.3) and lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

Afterwards, carry out a visual check for leaks.
9.14 Oil Change (Oil Separator Tank and Oil Cooler)

For type of oil and frequency of oil change see chapter 1.8

Oil change must be carried out with warm to the touch condition of the compressor package (Oil temperature approx. 104°F).

**Danger of scalding with hot oil.**

When inserting the maintenance hose into the compressor’s hose couplings, always have the ball valve closed and the hose end secured before slowly opening the ball valve. Beware of air/oil mist that could blow out of the hose. Unrestricted air/oil flow through the hose end will result in a whipping action which could cause severe injury or death.

If the compressor package operates in ambient temperatures close to the maximum ambient temperature (see chapter 1.6), change the oil more often (e.g. 1/2 or 1/4 of recommended interval).

**Attention!** Drain the oil out of the oil separator tank, cooler and the oil pipes completely. See chapter 9.14.4 for putting back into operation.

**Attention!** If a heat recovery system is fitted drain all the oil in the heat exchanger during the oil change.

Stop the compressor package under full load (see chapter 8.3).

**Attention!** Lock the main disconnect in the “off” position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

---

**Diagram:**

1. Ball valve
   - A shut
   - B open
2. Pressure gauge
3. Hose coupling
4. Filler plug
   - oil top – off
5. Oil separator tank
6. Nozzle
7. Oil level
8. Screwed sealing plug
   - oil cooler
9. Ball valve – oil drain
10. Hose coupling
11. External pressure source
Before opening or removing pressurized components (pipes, hoses, tanks, etc.) it is imperative that the compressor package is completely depressurized.

Venting the compressor package (see chapter 9.10).

9.14.1 Oil change using external pressure source

Close the ball valve (1).

Insert the nozzle (6) in the hose coupling (3) on the oil separator tank (5).

Connect the nozzle to external pressure source. Pressurize the oil separator tank (5) until the pressure gauge (2) on the oil separator tank (5) shows approximately 43.5 psig.

Remove the nozzle (6) from the hose coupling (3) on the oil separator tank (5).

Drain the oil from the oil separator tank:

Prepare a clean container to catch escaping oil.

Attention! The container must be large enough to hold the total oil content of the compressor unit (see chapter 1.7).

Hang the oil drain hose (10) into the container and secure.

Slowly open the ball valve (9). The remaining pressure in the oil circulation forces out the oil. When air escapes, close the ball valve (9) immediately.

Before opening or removing pressurized components (pipes, hoses, tanks, etc.) it is imperative that the compressor package is completely depressurized.

Venting the compressor package (see chapter 9.10).

Drain the oil from the oil cooler:

Prepare an oil container to catch the escaping oil.

Slowly unscrew the oil drain plug (1). The oil drains under the force of gravity.

Screw the oil drain plug (1) back in tightly.

Dispose of the old oil according to environmental regulations.

1 Oil drain plug (oil cooler)
9.14.2 Oil top-off

Unscrew the oil filler plug (4) on the oil separator tank.

**Attention!** Always use the same brand and type of oil when topping off the oil. (see label on the oil separator tank).

During an oil change, drain the old oil completely and always replace the oil filter.

Never mix different oil types or brands.

Oil recommendations see chapter 1.8

Top off the oil to the maximum mark.
See chapter 1.7 for the quantity of oil.
Check the gasket ring of the filler plug (4) for damage and then screw in the filler plug.

9.14.3 Draining the oil using own compressed air

Shut down the compressor unit under full load (see chapter 8.3).

**Attention!** Lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures to ensure the compressor does not restart.

Lock the isolation shut-off valve in the "closed" position and vent all compressed air trapped between the compressor and the isolation shut-off valve in accordance with applicable lock out/tag out procedures.

The compressor unit oil circulation system vents automatically.
The pressure gauge on the oil separator tank must indicate zero psig.
Check the vent line ball valve (1).

**Attention!** Close all maintenance doors and panels correctly before starting the compressor package.

Start the compressor package (see chapter 8.3) and allow to run for approximately 30 seconds.

Stop the compressor package under full load (see chapter 8.3).

**Attention!** Lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

Check the actual pressure on the pressure gauge (2). Open the shut-off valve (1), let the pressure on the pressure gauge (2) sink to approximately 40 psig and then close the shut-off valve (1) again.

Drain the oil from the oil separator tank and the oil cooler. Proceed as detailed in chapter 9.14.1.
Open the shut-off valve (1).
Top off the oil. Proceed as detailed in chapter 9.14.2.
Close all maintenance doors and reattach all cover panels.
9.14.4 Procedure for putting back into operation

Refer to chapter 7.7.1 and follow the instructions in section “Pouring a small quantity of oil into the air inlet port”.

Refer to chapter 7.7.2 and follow the instructions in section “Running the compressor package in idle”.

Refer to chapter 9.10 and follow the instructions in section “Venting the compressor package”.

Top off with oil again (see chapter 9.14.2).

Open the shut-off valve between the compressor package and the air system.

Start the compressor package (see chapter 8.3) and run until working temperature is reached (see chapter 1.1).

Top off the oil, see chapter 9.12.

Perform a test run

When the operating temperature is reached (see chapter 1.1), shut down the compressor package (see chapter 8.3) and lock the main disconnect in the “off” position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

Afterwards, carry out a visual check for leaks.

9.15 Changing the Oil Separator Cartridge

The service life of the oil separator cartridge is strongly influenced by the degree of contamination of inlet air and on strict adherence to the recommended maintenance intervals of the air and oil filters.

We recommend that the oil separator cartridge is changed with the oil or when the relevant service message / alarm message is displayed on SIGMA CONTROL (see chapter 8.1).

Stop the compressor package under full load (see chapter 8.3).

Lock the main disconnect in the “off” position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

Before opening or removing pressurized components (pipes, hoses, tanks, etc.) it is imperative that the compressor package is completely depressurized.

Venting the compressor package (see chapter 9.10).
Grounding the oil separator cartridge is by means of a spring, inset and clamped in the separator cover (5).

Do not damage the spring when changing the separator cartridge because grounding can only be ensured when it is in perfect condition.

1. Unscrew the hexagonal bolts (4) and remove the cover plate (5).
2. Take out the old oil separator cartridge (8) with the O ring (6) and O ring (9) and dispose of according to environmental regulations.
3. Clean the sealing surfaces of the oil separator tank.

**Attention!** The oil separating cartridge is disposable and cannot be cleaned.

1. Insert the new O ring (9) into the groove (10) in the oil separator tank.
2. Insert the new oil separator cartridge (8) and then insert the new O ring (6) into the groove (7).
3. Fit the cover plate (5) and tighten down with the hexagonal bolts (4).
4. Unscrew the union nut of the elbow fitting (12) and pull out the control air pipe (13).
5. Unscrew and remove the elbow fitting (12) from the oil separator tank together with the dirt trap screen filter (11).
6. Replace the old dirt trap screen filter with a new one.
7. Wrap teflon tape around the outside thread of the elbow fitting (12) and screw back into the oil separator tank.
Insert the control air pipe (13) into the elbow fitting (12) and tighten up the union nut.

Open the isolation shut-off valve between the compressor and the compressed air system.

⚠️ Perform a test run

When the operating temperature is reached (see chapter 1.1), shut down the compressor package (see chapter 8.3) and lock the main disconnect in the "off" position in accordance with applicable lock out/tag out procedures (example: OSHA CFR 29 § 1910.147) to ensure the compressor does not restart.

Afterwards, carry out a visual check for leaks.
9.16 Maintenance Schedule

Model No. .................................. Serial No. .................................

<table>
<thead>
<tr>
<th>Date</th>
<th>Description of work</th>
<th>Operating hours</th>
<th>Signature</th>
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10 Spare Parts and After Sales Service

10.1 Service parts and maintenance parts

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<thead>
<tr>
<th>Description</th>
<th>No. off</th>
<th>Order No.</th>
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<td>Air filter cartridge</td>
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<tr>
<td>Oil separator cartridge Complete set</td>
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<td>6.2024.0</td>
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<td>Comprising:</td>
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<td>Separating cartridge</td>
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<td>O Ring</td>
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<td>Dirt trap screen filter</td>
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<td>Hose pipe from the minimum pressure check valve to the air/oil cooler</td>
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<tr>
<td>Hose pipe from the air/oil cooler to the compressor air end</td>
<td>1</td>
<td>8.1181.0</td>
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See chapter 1.3 for details of the V-belt set.

Model
Year
psig
cfm
Hz/RPM
Phase
Part-No.
Serial-No.
Voltage
FLA
Scheme

Important for spare parts orders:

Enter the data on the compressor name plate in the name plate shown above.

Always quote the data on the name plate when ordering spare parts.

Attention! Always order original spare parts from the compressor manufacturer to avoid lower quality spare parts in your compressor unit.

10.2 Service and Maintenance Agreement

We recommend that you take out a service and maintenance agreement with an authorized KAESER distributor. This is your best guarantee of reliable air supplies.
Appendix

11 Appendix

11.1 Wiring Diagram
Wiring Diagram
compressor SM 11
direct on line start
208V 3Ø 60CY

manufacturer: KAESER COMPRESSORS
96450 COBURG
GERMANY
<table>
<thead>
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<th>Lfd. Nr.</th>
<th>Benennung</th>
<th>Zeichnungsnr (Kunde)</th>
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<th>Blatt</th>
<th>Anlagenkennzeichen</th>
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</table>
Input voltage 208V 3Ø 60CY
supply line cross-section and
fusing see service manual

compressor motor
Secondary side is ground.

While extracting
the connecting cable
control of insulation
is required.

all non-designated conductors
115V AC: 16AWG red MTW-flexible
24V DC: 18AWG blue MTW-flexible
alarm/maintenance indications

KAESER KOMPRESSOREN

compressor SM 11

mother board/inputs

- 0.6 answerback signal main contactor
- 0.7 load/delay-off external
- 1.0 Remote ON/OFF
- 1.1 FAILURE external
- 1.2 maintenance external

** default setting
 can be changed
 through the user interface

*** Remove the link when an alarm
 sensor is connected.
combined control/vent valve
condensate drain, User's connection

mother board

KAESER
KOMPRESSOREN

wiring diagram
compressor SM 11
mother board/outputs

SSM11-U1002.00
malfunction indicators

- A10 Sigma Control
- A10.1...A10.5 mother board, inputs/outputs
- G1 power unit
- 1M main contactor
- 1M compressor motor
- 1FU, 2FU primary control fuse
- 3FU secondary control fuse
- PB emergency stop pushbutton
- DLS1 door safety interlock switch
- T control transformer
- X11 terminal strip,
- 1X1...1X3 connector strip Sigma Control, mother board
- 1X7...1X9 connector strip Sigma Control, interface
- 1X01...1X03 connector plug, Sigma Control
- 2X1, 2X3, 2X20 connector strip adapter 1, inside
- 2X01, 2X03, 2X020 connector plug adapter 1, inside
- 2X31...2X43 connector strip adapter 1, external
- 2X031...2X043 connector plug adapter 1, external
- 1SV control valve

motor overload relay
safety air pressure switch - direction of rotation
temperature probe airend discharge temperature

automatic shutdown
indicating function

indicating function

component legend
compressor SM 11

KAESER KOMPRESSOREN
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
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<tbody>
<tr>
<td>Stückzahl</td>
<td>Benennung und Verwendung</td>
<td>Description and function</td>
<td>Fabrikatsbezeichnung</td>
<td>Typ, Bezeichl.-Nr., Sitzung-Nr., Normbezeichnung, notwendige techn. Daten, z.B. Steuerspannung, Frequenz, Einsatzgebiet</td>
<td>Identification data</td>
<td>Typ, order No, document No, equipment code No, basic technical data</td>
<td>Lfd. Nr. Item</td>
<td>Betriebsmittel-Kennz. nach DIN 40199, Teil 2 Identifying symbol of device</td>
<td>Stromlaufplan Planabschnitt</td>
<td>Circuit diagram sheet No.: section No.</td>
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<td>1</td>
<td>control panel</td>
<td>206202.0</td>
<td>CKC</td>
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<td>motor starter</td>
<td>A 50-30-00-89</td>
<td>7.575.00020</td>
<td>ABB</td>
<td>1</td>
<td>interference suppressor</td>
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</tbody>
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In Zweifelsfällen gilt die deutsche Fassung.

When rendering the equipment, all data enclosed by the heavy lines of columns B and C should be stated. In addition, the data in columns D to G should be given together with the No. of this list of equipment, insofar as they are helpful in answering technical inquiries. When ordering spare parts, also quote the serial No. of the product if stated on the rating plate.

The German version applies in cases of doubt.

KAESER KOMPRESSOREN
compressor SM 11 controller
electrical component parts list

GSM11-U1002.00

Blatt 1
<table>
<thead>
<tr>
<th>Terminal Strip</th>
<th>Internal Setting</th>
<th>Terminal Connection</th>
</tr>
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<tbody>
<tr>
<td><strong>1</strong> failure external</td>
<td><strong>4</strong> Remote ON/OFF</td>
<td><strong>1</strong> compressor SM 11</td>
</tr>
<tr>
<td><strong>2</strong> maintenance external</td>
<td></td>
<td><strong>2</strong> terminal strip - X11</td>
</tr>
<tr>
<td><strong>3</strong> load/delay-off external</td>
<td></td>
<td><strong>3</strong> -</td>
</tr>
</tbody>
</table>

### Notes
- **Supply line cross-section** see service manual
- **s.b.c.** supplied by customer
- **Kaeser** KOMPRESSOREN
- **KSM11-U1002.00** Blatt 1
- **Default setting** can be changed through the user interface
- **Remove the link when an alarm sensor is connected.**
11.2 Trouble shooting: Possible cause—Remedy

Attention! Do not carry out any repair if the work to be done is not exactly known.

### 11.2.1 Airend temperature is too high (greater than 167°F–200°F)

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling air inlet or outlet is too close to wall or other blockage.</td>
<td>Situate unit for adequate air flow.</td>
</tr>
<tr>
<td>Air intake filter mats are clogged.</td>
<td>Clean the mats or replace if necessary.</td>
</tr>
<tr>
<td>Ambient temperature is too high.</td>
<td>Provide cooler air from other source or move compressor to a cooler location. See chapter 1.6.</td>
</tr>
<tr>
<td>Ambient temperature too low.</td>
<td>Provide warmer air from other source or move compressor to warmer location or add a cabinet heater. See chapter 1.6.</td>
</tr>
<tr>
<td>Cooling air supply is inadequate.</td>
<td>Provide required amount of ventilation.</td>
</tr>
<tr>
<td>If cooling air outlet duct is used it may be too narrow or too long.</td>
<td>Consult authorized KAESER distributor for duct requirements.</td>
</tr>
<tr>
<td>On air cooled units the fins of the coolers (oil cooler and air aftercooler) are clogged.</td>
<td>Clean with compressed air, water or steam injector. See chapter 9.13.</td>
</tr>
<tr>
<td>On water cooled units the heat exchanger elements may be clogged.</td>
<td>Inspect heat exchanger elements. Clean or replace as necessary.</td>
</tr>
<tr>
<td>Oil level is low.</td>
<td>Check oil level and add necessary amount of recommended oil.</td>
</tr>
<tr>
<td>Thermostatic valve is not functioning correctly.</td>
<td>Check the valve spring and actuating piston. Replace defective parts.</td>
</tr>
<tr>
<td>Idle pressure is too low for proper oil circulation.</td>
<td>Check idle pressure at the separator tank. If the pressure is low check the inlet valve. Adjust inlet valve to maintain adequate idle pressure.</td>
</tr>
<tr>
<td>Wrong oil is used.</td>
<td>Drain old oil completely and replace with recommended type.</td>
</tr>
<tr>
<td>Oil filter is clogged.</td>
<td>Consult authorized KAESER distributor for other oil types not listed.</td>
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<tr>
<td>Airend is defective.</td>
<td>Replace filter.</td>
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<tr>
<td></td>
<td>Check airend and replace if defective.</td>
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### 11.2.2 Motor overload relay switches the unit off

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload relay is defective or setting is wrong.</td>
<td>Check line current and adjust overload relay as necessary.</td>
</tr>
<tr>
<td></td>
<td>Replace relay if defective.</td>
</tr>
</tbody>
</table>
### Appendix

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor is running two phase: defective motor or blown fuse.</td>
<td>Check input power, check wiring, tighten any loose connections.</td>
</tr>
<tr>
<td></td>
<td>Replace fuse(s) or motor if necessary.</td>
</tr>
<tr>
<td>Oil separator cartridge is contaminated.</td>
<td>Check pressure differential across cartridge. Replace cartridge and dirt trap strainer if necessary.</td>
</tr>
<tr>
<td>Motor starts against pressure because system does not get vented.</td>
<td>Check ball valve in vent line and open if it is closed.</td>
</tr>
<tr>
<td></td>
<td>Check the diaphragm in the vent valve and replace if defective.</td>
</tr>
<tr>
<td></td>
<td>Check the minimum pressure check valve. Adjust minimum pressure function or replace defective parts as necessary.</td>
</tr>
<tr>
<td></td>
<td>Check airend and replace if defective.</td>
</tr>
<tr>
<td></td>
<td>Provide adequate compressor ventilation.</td>
</tr>
<tr>
<td></td>
<td>Repair or replace motor.</td>
</tr>
<tr>
<td>Airend is defective.</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature is above 104°F.</td>
<td></td>
</tr>
<tr>
<td>Defective motor: bad bearings or short circuit in windings.</td>
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#### 11.2.3 Compressor is running but produces no pressure

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Remedy</th>
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</thead>
<tbody>
<tr>
<td>Airend rotates in wrong direction.</td>
<td>Reverse motor polarity.</td>
</tr>
<tr>
<td>Inlet valve does not open or opens only partially.</td>
<td>Check the inlet valve, control valve and lines. Replace defective parts as needed</td>
</tr>
<tr>
<td>Vent valve does not close at full load.</td>
<td>Check the combined control/vent valve and control lines. Replace defective parts as needed</td>
</tr>
<tr>
<td>Minimum pressure check valve is defective.</td>
<td>Check the valve and replace defective parts.</td>
</tr>
<tr>
<td>Leaks in plant system.</td>
<td>Check for open valves, loose connections, defective tools, etc.</td>
</tr>
<tr>
<td>Plant system air, demand exceeds capacity of compressor</td>
<td>Reduce system demand or install additional compressor(s).</td>
</tr>
<tr>
<td>Air leak in unit.</td>
<td>Tighten loose connections, repair or replace defective parts as necessary.</td>
</tr>
<tr>
<td>Socket is still in the hose coupling at the oil separator tank or aftercooler.</td>
<td>Remove socket from coupling.</td>
</tr>
<tr>
<td>Safety relief valve has blown off.</td>
<td>See chapter 11.2.5.</td>
</tr>
<tr>
<td>Airend is defective.</td>
<td>With unit running, slowly and carefully place hand over air inlet filter casing. If not, airend is producing no pressure.</td>
</tr>
</tbody>
</table>

---

- [Appendix](#)
- [11.2.3 Compressor is running but produces no pressure](#)
Appendix

11.2.4 Oil leaks out of air filter

**Possible cause:**
- Oil level in separator tank is too high.
- Inlet valve faulty.

**Remedy:**
- Drain oil to correct level.
- Find the fault and replace the defective part.

11.2.5 Full–load/Idle sequence occurs too frequently (short cycles)

**Possible cause:**
- Receiver tank size is too small or there is no tank.
- Diameter of hose connecting the unit to the receiver tank is too small.
- Minimum pressure check valve leaks.
- Flow is restricted at discharge.

**Remedy:**
- Consult authorized KAESER distributor for recommended tank size.
- Connecting hose diameter should not be smaller than the air discharge pipe diameter. Install larger hose if necessary.
- Check the valve and replace defective parts.
- Look for plugged filters, partially closed valves, frozen pipes or malfunctioning pressure regulators.

11.2.6 Safety relief valve blows off

**Possible cause:**
- System does not discharge at idle.
- Oil separator cartridge is contaminated.
- Minimum pressure check valve does not open.
- Safety relief valve not properly sized for the pressure of the compressor unit.

**Remedy:**
- Make sure ball valve in vent line is open. Check the control lines, inlet valve and combined control/vent valve. Replace defective parts as needed.
- Check the cartridge pressure differential and replace cartridge if necessary.
- Check the valve for blockage and replace defective parts as necessary.
- Check blow–off pressure and compare to name plate of the compressor. Replace if necessary.

11.2.7 Oil inside the unit

**Possible cause:**
- Socket is still in the hose coupling at the separator tank.
- Safety valve has blown off.
- Oil is coming out of air filter.
- Hose coupling on separator tank is loose.
- Oil cooler leaks.

**Remedy:**
- Remove the socket from the coupling.
- See chapter 11.2.5.
- See chapter 11.2.4.
- Tighten coupling or replace as needed.
- Replace oil cooler.
11.2.8 Excessive oil consumption

**Possible cause:**
- Wrong oil is being used in the unit.
- Oil separator cartridge has ruptured.
- Oil separator cartridge mountings are loose.
- Oil level in separator tank is too high.
- Scavenger line is clogged.

**Remedy:**
- Replace with correct oil type.
- Consult authorized KAESER distributor for other oil types not listed.
- Check pressure differential and replace oil separator cartridge if necessary.
- Tighten mounting bolts.
- Drain oil to correct level.
- Inspect dirt trap strainer in scavenger line. Clean or replace clogged parts as necessary.
SECTION 1 INTRODUCTION

1. FOREWORD
This manual is provided for the operator’s use and reference when ordering parts. An illustrated parts breakdown is included for identification. All compressor parts meet the manufacturer’s highest quality used in the manufacture of the original equipment.

2. DESCRIPTION
The parts breakdown lists every part, assembly and sub-assembly of the compressor unit. Each part is identified with a number. The location of and relationship between parts are clearly illustrated. Questions pertaining to the number, description and needed for each assembly are dealt with in the following pages.

3. TO ORDER PARTS
When ordering parts, furnish the following information to prevent any error:
- Model designation and serial number of the unit as shown on compressor nameplate
- Reference number, part number, description and quantity required as listed.

4. CAUTION
Never use parts other than the ones approved by the manufacturer and listed in this parts manual. The use of parts not approved by the manufacturer may result in hazardous conditions, over which the manufacturer has no control, bodily injury, and damage to the compressor unit. Such action would invalidate the manufacturer’s warranty of the compressor unit.
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<th>Description</th>
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<td>Washer</td>
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1) Unit SM 8 110 psig
2) Unit SM 8 125 psig
3) Unit SM 8 145 psig
4) Unit SM 8 190 psig
5) Unit SM 11 110 psig
6) Unit SM 11 125 psig
7) Unit SM 11 145 psig
8) Unit SM 11 190 psig

144-U-B07
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1) SM 110 psig
2) SM 125 psig
3) SM 145 psig
4) SM 190 psig
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Part 11 is included in the complete oil separating cartridge set No. 6.2008.1