

Service manual

Screw Compressor

M27

No.: 9_9547 02 USE

Original instructions
/KKW/M27 2.02 en 01 SBA-MOBILAIR

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1	Regarding this Document	
1.1	Using this document	1
1.2	Further Documents	1
1.3	Copyright	1
1.4	Symbols and labels	1
1.4.1	Warnings	1
1.4.2	Potential damage warnings	2
1.4.3	Other alerts and their symbols	2
2	Technical Data	
2.1	Nameplate	4
2.2	Options summary	4
2.2.1	Compressed Air Treatment	5
2.2.2	Tool lubricator	5
2.2.3	Compressed air distributor	5
2.2.4	Non-return function	6
2.2.5	Low temperature equipment	6
2.2.6	Equipment for fire hazard areas	6
2.2.7	Battery isolating switch	6
2.2.8	Chassis	6
2.2.9	Lighting	7
2.2.10	Stationary frame design	7
2.2.11	Sealed floor pan	7
2.2.12	Hose reels	7
2.2.13	Anti-theft device	8
2.3	Machine (without options)	8
2.3.1	Sound pressure level	8
2.3.2	Torques	8
2.3.3	Ambient conditions	8
2.3.4	Additional specifications	8
2.4	Chassis	9
2.4.1	Weights	9
2.4.2	Tires	9
2.4.3	Wheel nut/bolt tightening torque	9
2.4.4	Towbar tightening torque	10
2.4.5	Weights of stationary frame design	10
2.5	Compressor	10
2.5.1	Working pressure and FAD	10
2.5.2	Compressed air outlet	10
2.5.3	Pressure relief valve	10
2.5.4	Temperature	11
2.5.5	Cooling oil recommendation	11
2.5.6	Cooling oil charge	12
2.6	Engine	12
2.6.1	Engine data	12
2.6.2	Oil recommendation	12
2.6.3	Fuel recommendation	13
2.6.4	Recommended Cooling Fluid	13
2.6.5	Fluid volumes	13
2.6.6	Batteries	13
2.7	Options	14
2.7.1	Tool lubricator	14
2.7.2	Low temperature equipment	14
2.7.3	Air hose with hose reel	15

3	Safety and Responsibility	
3.1	Basic instructions	16
3.2	Specified use	16
3.3	Incorrect Use	16
3.4	User's Responsibilities	16
3.4.1	Observe statutory and universally accepted regulations	16
3.4.2	Determining personnel	17
3.4.3	Adherence to inspection schedules and accident prevention regulations	17
3.5	Dangers	17
3.5.1	Safely dealing with sources of danger	18
3.5.2	Safe machine operation	20
3.5.3	Organizational Measures	23
3.5.4	Danger areas	24
3.6	Safety devices	24
3.7	Safety signs	24
3.8	Emergencies	27
3.8.1	Correct fire fighting	27
3.8.2	Injury from handling operating fluids/materials	28
3.9	Warranty	28
3.10	Environmental protection	29
4	Design and Function	
4.1	Bodywork	30
4.2	Component identification	31
4.3	Machine function	32
4.4	Operating modes and control modes	33
4.4.1	Operating modes	33
4.4.2	MODULATING control	33
4.5	Safety devices	34
4.5.1	Monitoring functions with shutdown	34
4.5.2	Further safety devices	34
4.6	Options	34
4.6.1	Air treatment options	34
4.6.2	Low temperature equipment options	36
4.6.3	Options for operating in fire hazard areas	38
4.6.4	Sealed floor pan option	38
4.6.5	Battery isolating switch option	39
4.6.6	Hose reel option	39
4.6.7	Anti-theft device option	39
4.6.8	Chassis options for road-worthy and stationary machines	40
5	Installation and Operating Conditions	
5.1	Ensuring safety	42
5.2	Installation conditions	42
6	Installation	
6.1	Ensuring safety	45
6.2	Reporting Transport Damage	45
6.3	Fitting the towbar	45
6.3.1	Fitting the height-adjustable towbar	46
6.3.2	Fitting the fixed-height towbar	48
6.3.3	Fitting a non-adjustable towbar (US)	48
6.4	Adjusting the chassis	49
6.4.1	Adjusting the height on an unbraked towbar	49
6.4.2	Adjusting the height on a braked towbar	51
6.4.3	Changing the towing eye	53

7	Initial Start-up	
7.1	Ensuring safety	60
7.2	Before initial start-up (or recommissioning)	60
7.2.1	Instructions to be observed before commissioning or recommissioning	60
7.2.2	Special measures for recommissioning after storage	61
7.3	Checking installation and operating conditions	61
7.4	Low-temperature operation (winter)	62
7.4.1	Starting assistance	62
7.4.2	Starting up low-temperature equipment	64
8	Operation	
8.1	Ensuring safety	66
8.2	Starting and stopping	66
8.2.1	Commissioning the machine	67
8.2.2	Starting the machine	67
8.2.3	Allow the machine to run up to operating temperature	68
8.2.4	Running the machine under load	68
8.2.5	Shutting down the machine	68
8.3	Operating the tool lubricator	69
8.4	Using the low-temperature equipment	70
8.4.1	Operating the machine with frost protector	70
8.4.2	Coolant pre-heating	71
8.5	Operating the battery isolating switch	72
8.6	Using the hose reel	72
8.6.1	Operating the machine with an extension air hose	73
8.6.2	Operating the machine without an extension air hose	73
8.6.3	Securing the hose reel for transport	74
8.7	Cleaning the machine after operation	74
9	Fault Recognition and Rectification	
9.1	Basic instructions	75
9.2	Engine faults and alarms	75
9.2.1	Engine refuses to start or comes to a stop	75
9.2.2	Engine does not reach full speed	76
9.2.3	Indicator lamp remains on	76
9.3	Compressor faults and alarms	77
9.3.1	Working pressure too high	77
9.3.2	Working pressure too low	77
9.3.3	Safety relief valve blowing off	78
9.3.4	Machine overheating	78
9.3.5	Too much oil residue in the compressed air	79
9.3.6	Oil flows from the compressor air filter after shutdown	79
9.3.7	High moisture content in the compressed air	80
10	Maintenance	
10.1	Safety	81
10.2	Maintenance schedules	82
10.2.1	Logging maintenance work	82
10.2.2	Regular maintenance tasks	82
10.3	Engine maintenance	86
10.3.1	Water cooler maintenance	86
10.3.2	Engine air filter maintenance	90
10.3.3	Fuel system maintenance	93
10.3.4	Changing the engine oil	97
10.3.5	Changing the engine oil filter	100
10.3.6	Drive belt maintenance	101

10.3.7	Battery maintenance	103
10.4	Compressor Maintenance	106
10.4.1	Checking cooling oil level	106
10.4.2	Filling or topping off the cooling oil	107
10.4.3	Changing the cooling oil	108
10.4.4	Replace the compressor oil filter	110
10.4.5	Oil separator tank dirt trap maintenance	111
10.4.6	Changing the oil separator cartridge	113
10.4.7	Compressor air filter maintenance	115
10.4.8	Checking safety relief valves	117
10.5	Cleaning the cooler	118
10.5.1	Cleaning the cooler / radiator	118
10.5.2	Cleaning the compressed air aftercooler	119
10.6	Maintenance of rubber sealing strips	120
10.7	Chassis maintenance	121
10.7.1	Wheel checks	121
10.7.2	Towbar maintenance	121
10.7.3	Brake system maintenance	123
10.8	Maintenance for Optional Items	126
10.8.1	Tool lubricator maintenance	127
10.8.2	Compressed air water separator maintenance	128
10.8.3	Frost protector maintenance	129
10.8.4	Engine air intake shut-off valve maintenance	130
10.8.5	Draining liquid accumulation within the machine	132
10.9	Documenting maintenance and service work	133
11	Spares, Operating Materials, Service	
11.1	Note the nameplate	134
11.2	Ordering consumable parts and operating fluids/materials	134
11.3	KAESER AIR SERVICE	135
11.4	Service Addresses	135
11.5	Spares for service and repair	135
11.6	Assembly diagrams - chassis	209
12	Decommissioning, Storage and Transport	
12.1	De-commissioning	211
12.1.1	Temporary de-commissioning	211
12.1.2	Long-term decommissioning and storage	212
12.2	Transport	213
12.2.1	Safety	213
12.2.2	Towing the compressor on the road	213
12.2.3	Parking the compressor	221
12.2.4	Transporting with a crane	224
12.2.5	Transporting with a forklift truck	225
12.2.6	Transporting as a load	225
12.3	Storage	227
12.4	Disposal	227
13	Annex	
13.1	Identification	228
13.2	Pipeline and instrument flow diagram (P+I diagram)	228
13.3	Dimensional drawings	232
13.3.1	Dimensional drawing, chassis without parking brake	232
13.3.2	Dimensional drawing, stationary machine (skids)	234
13.3.3	Dimensional drawing, stationary machine (base frame)	236
13.4	Wiring diagrams	238

13.4.1	Electrical Diagram	238
13.4.2	Lighting and signaling system connection	248
13.4.3	Lighting and signaling system connection	253
13.5	Fuel circulation diagram	258

Fig. 1	Location of safety signs	25
Fig. 2	Bodywork	30
Fig. 3	Side view (canopy removed)	31
Fig. 4	General design	32
Fig. 5	Air treatment options	35
Fig. 6	Tool lubricator	36
Fig. 7	Frost protector	37
Fig. 8	Coolant pre-heating	38
Fig. 9	Battery isolating switch	39
Fig. 10	Container for safety chain	40
Fig. 11	Minimum distance from excavations, slopes, or walls	43
Fig. 12	Fitting the height-adjustable towbar	46
Fig. 13	Fitting the fixed-height towbar	48
Fig. 14	Fixed-height towbar	48
Fig. 15	Height-adjustable towbar sa	50
Fig. 16	Height-adjustable towbar sb	52
Fig. 17	Changing the towing eye (height-adjustable drawbar)	54
Fig. 18	Changing the towing eye (towbar with service brake)	55
Fig. 19	Changing the towing eye	57
Fig. 20	Changing the towing eye (US version)	58
Fig. 21	Jumper cable connection diagram	63
Fig. 22	Coolant pre-heater checklist	65
Fig. 23	Starting instruments	67
Fig. 24	Warm-up period when ambient temperatures are below 14°F	68
Fig. 25	Setting the tool lubricator	69
Fig. 26	Frost protector on and off	70
Fig. 27	Battery isolating switch	72
Fig. 28	Hose reel	73
Fig. 29	Checking coolant level	87
Fig. 30	Draining the coolant from the radiator	90
Fig. 31	Maintenance indicator	91
Fig. 32	Engine air filter maintenance	92
Fig. 33	Cleaning the filter element	92
Fig. 34	Bleeding the fuel system	94
Fig. 35	Fuel filter with water trap	96
Fig. 36	Changing the engine oil	98
Fig. 37	Detail oil drain valve	98
Fig. 38	Changing the engine oil filter	100
Fig. 39	Belt tension checking by hand	102
Fig. 40	Safety signs - warning stickers on the battery.	103
Fig. 41	Checking cooling oil level	106
Fig. 42	Draining the compressor cooling oil	109
Fig. 43	Changing the oil filter	110
Fig. 44	Oil separator tank dirt trap maintenance	112
Fig. 45	Changing the oil separator cartridge	113
Fig. 46	Maintenance indicator	116
Fig. 47	Compressor air filter maintenance	117
Fig. 48	Cleaning the cooler / radiator	119
Fig. 49	Cleaning the compressed air aftercooler	120
Fig. 50	Ball coupling (EC version)	123
Fig. 51	Ball coupling (USA version)	123
Fig. 52	Checking the brake lining thickness	124
Fig. 53	Brake system adjustment	125
Fig. 54	Brake rod adjustment	126

Fig. 55	Tool lubricator maintenance	127
Fig. 56	Cleaning the dirt trap	128
Fig. 57	Filling the frost protector	130
Fig. 58	Engine air intake shut-off valve maintenance	131
Fig. 59	Towing alignment	214
Fig. 60	Ball coupling (ALKO-EU version)	215
Fig. 61	Ball coupling wear indicator (ALKO-EU version)	216
Fig. 62	Ball coupling (ALKO-USA version)	217
Fig. 63	Release the parking brake with gas spring assistance	218
Fig. 64	Automatic jockey wheel in transport position	218
Fig. 65	Safety signs: secure chocks	219
Fig. 66	Installing the safety chains	220
Fig. 67	Contact braking cable attachment	220
Fig. 68	Actuating the parking brake with gas spring assistance	221
Fig. 69	Warning "Risk of injury due to falling towing device"	222
Fig. 70	Safety sign - secure the chocks	224
Fig. 71	Transport using a forklift truck	225
Fig. 72	Load secured by strapping	226
Fig. 73	Identification	228

Tab. 1	Danger levels and their definitions (personal injury)	1
Tab. 2	Danger levels and their definition (damage to property)	2
Tab. 3	Nameplate	4
Tab. 4	Combined label for coupling load and options fitted.	5
Tab. 5	Air treatment options	5
Tab. 6	Tool lubricator option	5
Tab. 7	Compressed air distributor option	5
Tab. 8	Non-return option	6
Tab. 9	Low temperature equipment options	6
Tab. 10	Optional equipment for fire hazard areas	6
Tab. 11	Battery isolating switch option	6
Tab. 12	Chassis options	6
Tab. 13	Lighting options	7
Tab. 14	Options for stationary frame design	7
Tab. 15	Sealed floor pan option	7
Tab. 16	Hose reel option	7
Tab. 17	Anti-theft device option	8
Tab. 18	Sound pressure level	8
Tab. 19	Torques for hex-head screws	8
Tab. 20	Ambient conditions	8
Tab. 21	Machine weights	9
Tab. 22	Tires	9
Tab. 23	Wheel nut/bolt tightening torque	9
Tab. 24	Towbar tightening torque	10
Tab. 25	Machine weights	10
Tab. 26	Working pressure and FAD	10
Tab. 27	Compressed air distributor	10
Tab. 28	Relief valve activating pressure	11
Tab. 29	Airend discharge temperature	11
Tab. 30	Machine temperatures	11
Tab. 31	Cooling oil recommendation	11
Tab. 32	Cooling oil charge	12
Tab. 33	Engine data	12
Tab. 34	Engine oil recommendation	13
Tab. 35	Fluid volumes	13
Tab. 36	Batteries	13
Tab. 37	Road breaker lubricant recommendation	14
Tab. 38	Ambient conditions	14
Tab. 39	Recommended antifreeze	14
Tab. 40	Coolant pre-heater	14
Tab. 41	Additional discharge valve for the air hose	15
Tab. 42	Danger areas	24
Tab. 43	Safety signs	25
Tab. 44	Chassis - Road-worthy Machines	40
Tab. 45	Chassis - Stationary Machines	41
Tab. 46	Height-adjustable towbar	49
Tab. 47	Measures for recommissioning the compressor after a long period of storage	61
Tab. 48	Installation conditions checklist	61
Tab. 49	Frost protector checklist	64
Tab. 50	Alarm: Engine refuses to start or comes to a stop.	75
Tab. 51	Alarm: Engine does not reach full speed.	76
Tab. 52	Indicator lamp remains on	76
Tab. 53	Alarm: Working pressure too high	77
Tab. 54	Alarm: Working pressure too low	77

Tab. 55	Alarm: Safety relief valve blowing off	78
Tab. 56	Alarm: Machine overheating	78
Tab. 57	Fault: Too much oil residue in the compressed air	79
Tab. 58	Fault: Oil flows from the compressor air filter after shutdown	79
Tab. 59	Fault: High moisture content in the compressed air	80
Tab. 60	Maintenance intervals and regular maintenance tasks	82
Tab. 61	Regular maintenance tasks	83
Tab. 62	Regular maintenance task options	85
Tab. 63	KAESER coolant mixture table	89
Tab. 64	Oil drain valve	98
Tab. 65	Oil drain valve	109
Tab. 66	Lubricating points of the towbar	122
Tab. 67	Maintenance log	133
Tab. 68	Compressor spare parts	134
Tab. 69	Engine spare parts	134
Tab. 70	"Temporarily decommissioned" information notice	211
Tab. 71	"Long-term decommissioning and storage" checklist	212
Tab. 72	"Long-term decommissioning and storage" information notice	213
Tab. 73	Ball coupling wear indications	216

1 Regarding this Document

1.1 Using this document

The operating manual is a component of the product. It describes the machine as it was at the time of first delivery after manufacture.

- Keep the operating manual in a safe place throughout the life of the machine.
- Supply any successive owner or user with this operating manual.
- Please insert any amendment or revision of the operating manual sent to you.
- Enter details from the machine nameplate and individual items of equipment in the table in chapter 2.

1.2 Further Documents

Further documents included with this operating manual are:

- Certificate of acceptance / operating instructions for the pressure vessel
- Manufacturer's declaration / declaration of conformity in accordance with applicable directives
- Engine documentation (compressors driven by internal combustion engine)

Missing documents can be requested from KAESER.

- Make sure all documents are complete and observe the instructions contained in them.
- Make sure you provide the data from the nameplate when ordering documents.

1.3 Copyright

This service manual is copyright protected. Queries regarding use or duplication of the documentation should be referred to KAESER. Correct use of information will be fully supported.

1.4 Symbols and labels

- Please note the symbols and labels used in this document.

1.4.1 Warnings

Warning notices indicate dangers that may result in injury when disregarded.

Warning notices indicate three levels of danger identified by the corresponding signal word:

Signal term	Meaning	Consequences of ignoring the warning
DANGER	Warns of an imminent danger	Will result in death or severe injury
WARNING	Warns of a potentially imminent danger	May result in death or severe injury
CAUTION	Warns of a potentially dangerous situation	May result in a moderate physical injury

Tab. 1 Danger levels and their definitions (personal injury)

Warning notices preceding a chapter apply to the entire chapter, including all sub-sections. For example,

1 Regarding this Document

1.4 Symbols and labels

⚠ DANGER

*These show the kind of danger and its source.
The possible consequences of ignoring a warning are shown here.
If you ignore the warning notice, the "DANGER" signal word indicates a lethal or severe injury will occur.*

- *The measures required to protect yourself from danger are shown here.*

Warning notes referring to a sub-section or the subsequent action are integrated into the procedure and numbered as an action.

For example,

1. **⚠ WARNING** *These show the kind of danger and its source.
The possible consequences of ignoring a warning are shown here.
If you ignore the warning notice, the "WARNING" signal word indicates that death or severe injury may occur.*
 - *The measures required to protect yourself from danger are shown here.*
2. Always read and comply with warning instructions.

1.4.2 Potential damage warnings

Unlike the warnings shown above, damage warnings do not indicate a potential personal injury.

Warning notices for damages are identified by their signal term.

Signal term	Meaning	Consequences of ignoring the warning
NOTE	Warns of a potentially dangerous situation	Damage to property is possible

Tab. 2 Danger levels and their definition (damage to property)

For example,

NOTICE

*These show the kind of danger and its source.
Potential effects when ignoring the warning are indicated here.*

- Carefully read and fully comply with warnings against damages.

1.4.3 Other alerts and their symbols



This symbol indicates particular important information.

Material Here you will find details on special tools, operating materials or spare parts.

Precondition Here you will find conditional requirements necessary to carry out the task.
The conditions relevant to safety shown here will help you to avoid dangerous situations.

- This symbol is placed by lists of actions comprising one stage of a task.
 1. For instructions with several steps ...
 2. ... the sequence of actions is numbered.

Result Shows the expected conclusion of the previous action.

Option da > Information relating to one option only is marked with an option code (e.g., "option da" means that this section is only valid for machines with the air treatment components "aftercooler and cyclone moisture separator"). Option codes used in this service manual are explained in chapter 2.2.



Information referring to potential problems are identified by a question mark.

The cause is named in the help text ...

> ... and a remedy given.



This symbol refers to important information or measures concerning environmental protection.

Further information Further topics are introduced here.

2 Technical Data

2.1 Nameplate

The machine's nameplate provides the model designation and important technical information. The nameplate is located on the outside of the machine (see illustration in chapter 13.1)

➤ Enter here the nameplate data as a reference:

Feature	Value
Vehicle identity number	
Permissible total weight	
Permissible coupling load	
Permissible axle load	
Portable compressor	
Material number	
Serial number	
Year of manufacture	
Total weight	
Lifting point load capacity	
Rated motor power	
Engine speed	
Maximum working pressure	

Tab. 3 Nameplate

2.2 Options summary

A list of the options fitted to your machine helps relate the information in this service manual. A list of the options fitted is given as code letters on the right side of the coupling load / options label.

The label can be found

- on the outside of the machine
- on the front (see chapter 13.1)



The following table lists all possible options. Only the codes for those options fitted appear on the label.

M27	part number	Serial number:
Given here is the specified coupling load.		Options fitted
		da _ _ _ _
		ea _ _ _ _
		fa _ _ _ _
		ha _ _ _ _

		ba bb _ _ _ _
		la lb _ _ _ _

		oa oe _ _ _ _
		_____ ne
		_____ sh
		_____ sc
		ta tb _ _ te
		sf _ ua _ _
		02-M0277-US

Tab. 4 Combined label for coupling load and options fitted.

- Take the fitted options from the combined coupling load / options label and enter them here as reference.

**2.2.1 Option da
Compressed Air Treatment**

Option	Option code	Available?
Aftercooler and water separator	da	

Tab. 5 Air treatment options

**2.2.2 Option ea, ec
Tool lubricator**

Option	Option code	Available?
Tool lubricator (with option fa)	ea	
Tool lubricator (with option fc)	ec	

Tab. 6 Tool lubricator option

**2.2.3 Option fa, fc
Compressed air distributor**

Option	Option code	Available?
Non-separated compressed air distribution line	fa	
Separated compressed air distribution lines, downstream of the option	fc	

Tab. 7 Compressed air distributor option

2.2.4 Option ha
Non-return function

Option	Option code	Available?
Check valve	ha	

Tab. 8 Non-return option

2.2.5 Option ba, bb
Low temperature equipment

Option	Option code	Available?
Low temperature equipment	ba	
Low temperature equipment + engine coolant pre-heating	bb	

Tab. 9 Low temperature equipment options

2.2.6 Option la, lb
Equipment for fire hazard areas

Option	Option code	Available?
Spark arrestor	la	
Spark arrestor and engine air intake shut-off valve (automatic)	lb	

Tab. 10 Optional equipment for fire hazard areas

2.2.7 Option oa
Battery isolating switch

Option	Option code	Available?
Battery isolating switch	oa	

Tab. 11 Battery isolating switch option

2.2.8 Option sa, sb, sd, se, sh
Chassis

Option	Option code	Available?
EU chassis 01	sa	
EU chassis 02	sb	
EU chassis 03	sd	
EU chassis 04	se	
US chassis	sh	

Option	Option code	Available?
EU = Europe, US = United States of America		

Tab. 12 Chassis options

Further information For an exact description of the characteristics of the chassis and models, see chapter 4.6.8.

2.2.9 Option ta, tb, tc, te Lighting

Option	Option code	Available?
None (stationary)	ta	
Reflective warning triangle	tb	
EG - 12 V	tc	
USA - 12 V (DOT conformity)	te	

Tab. 13 Lighting options

2.2.10 Option sc, si Stationary frame design

Option	Option code	Available?
Stationary skids	sc	
Stationary frame	si	

Tab. 14 Options for stationary frame design

Further information For a detailed description of the frame design, see chapter 4.6.8.

2.2.11 Option oe Sealed floor pan

Option	Option code	Available?
Sealed floor pan	oe	

Tab. 15 Sealed floor pan option

2.2.12 Option ua Hose reels

Option	Option code	Available?
Hose reels	ua	

Tab. 16 Hose reel option

**2.2.13 Option sf
Anti-theft device**

Option	Option code	Available?
Anti-theft device	sf	

Tab. 17 Anti-theft device option

2.3 Machine (without options)
2.3.1 Sound pressure level

Sound pressure levels comply with the American EPA Standard.
 Measurement distance: 23 ft

	M27
Guaranteed sound pressure level [dB(A)]	76

Tab. 18 Sound pressure level

2.3.2 Torques

Recommended values for hexagonal bolts of strength category 8.8

Hex-head screws							
Thread	M6	M8	M10	M12	M14	M16	M18
Torque [lbf in]	85	204	407	708	1124	1726	2478

Tab. 19 Torques for hex-head screws

2.3.3 Ambient conditions

Positioning	Limit value
Maximum altitude amsl* [ft]	3000
Minimum ambient temperature [°F]	+14
Maximum ambient temperature [°F]	+113

* Higher altitudes are permissible only after consultation with the manufacturer.

Tab. 20 Ambient conditions

2.3.4 Additional specifications

For specifications, according to the machine's operating license, such as:

- dimensions,
- track width,
- footprint,

can be found in the dimensioned drawings in Chapter 13.3.



The dimensional drawings also show the position of the following inlets and outlets:

- Cooling air inlet
- Cooling air outlet
- Compressed air outlet
- Exhaust

2.4 Chassis

2.4.1 Option sa, sb, sd, se, sh Weights



Maximum weights are shown. Actual weights of individual machines are dependent on equipment fitted (see machine nameplate).

Option	sa	sb	sd	se	sh
Chassis type	EU chassis	EU chassis	EU chassis	EU chassis	US chassis
Height-adjustable towbar	x	x	–	–	–
Fixed height towbar	–	–	x	x	x
Parking brake	–	x	x	x	–
Service brake	–	x	–	x	–
Actual total weight [lb]*					
Permissible axle load [lb]	1653	1653	1653	1653	1653

x = available, – = not available

EU = Europe, US = United States of America

* Enter here the actual overall weight from the nameplate as reference.

Tab. 21 Machine weights

2.4.2 Tires

Characteristic/markings	Value
Tyre size	145/80 R 13
Maximum and recommended tire pressure [psi]	39
Wheel bolts	M 12 x 1.5

Tab. 22 Tires

2.4.3 Wheel nut/bolt tightening torque

Fixing medium	Thread	Wrench size	Torque [lbf in]
Wheel bolt	M 12 x 1.5	19	800

Tab. 23 Wheel nut/bolt tightening torque

2.4.4 Towbar tightening torque

Components	Thread	Strength category	Torque [lbf in]
Ball coupling	M12	8.8	760
Towing eye	M12	8.8	760
Towbar	M12	8.8	760
	M16	8.8	1860

Tab. 24 Towbar tightening torque

**2.4.5 Option sc, si
Weights of stationary frame design**


Maximum weights are shown. Actual weights of individual machines are dependent on equipment fitted (see machine nameplate).

Option	sc	si
Type of stationary frame design	Skids	Frame
Actual total weight [lb]*		

* Enter here the actual total weight from the nameplate as reference.

Tab. 25 Machine weights

2.5 Compressor
2.5.1 Working pressure and FAD

Maximum working pressure [psig]	100	–	–	–
SIGMA airend	11-G	–	–	–
Free air delivery [cfm]	92	–	–	–

Tab. 26 Working pressure and FAD

2.5.2 Compressed air outlet

Outlet valve ["]	Number
G 3/4	2
G 1 1/2	–

Tab. 27 Compressed air distributor

2.5.3 Pressure relief valve

Maximum working pressure: see machine nameplate

Maximum working pressure [psig]	100	–	–	–
Relief valve activating pressure* [psig]	130	–	–	–

*The pressure relief valve is fitted onto the oil separator tank.

Tab. 28 Relief valve activating pressure

2.5.4 Temperature

A combination valve automatically regulates the compressor temperature depending on the ambient temperature.

Temperatures	Values	
Airend compressed air outlet [°F]	+194	+140
Ambient [°F]	+50	+77

Tab. 29 Airend discharge temperature

Machine temperatures	Values
Recommended airend discharge temperature for switching to load [°F]	86
Typical airend discharge temperature during operation [°F]	167 212
Maximum airend discharge temperature (automatic safety shut-down) [°F]	239

Tab. 30 Machine temperatures

2.5.5 Cooling oil recommendation

A sticker showing the type of oil used is located near the oil separator tank filler. Information on ordering cooling oil is found in chapter 11.

Characteristic	SIGMA FLUID	
Oil grade	S-460	MOL
Classification	Silicone-free, synthetic oil	Mineral oil
Application	Standard oil for all applications except in connection with foodstuffs. Particularly suitable for machines with a high duty cycle.	Standard oil for all applications except in connection with foodstuffs. Particularly suitable for machines with a low duty cycle.
Approval	—	—
Viscosity at 104 °F	45 mm ² /s (D 445; ASTM test)	44 mm ² /s (DIN 51562-1)
Viscosity at 212 °F	7.2 mm ² /s (D 445; ASTM test)	6.8 mm ² /s (DIN 51562-1)
Flash point	460 °F (D 92; ASTM test)	428 °F (ISO 2592)

Characteristic	SIGMA FLUID	
Oil grade	S-460	MOL
Density at 59 °F	864 kg/m ³ (ISO 12185)	–
Pour point	-50.8 °F (D 97; ASTM test)	-27.4 °F (ISO 3016)
Demulsibility at 29 °F	40/40/0/10 min (D 1401; ASTM test)	–

Tab. 31 Cooling oil recommendation

2.5.6 Cooling oil charge

Cooling oil	Fluid volume [qt]
Machine	2.4

Tab. 32 Cooling oil charge

2.6 Engine

2.6.1 Engine data

Feature	Specification
Make/Model	Kubota D-1105
Engine control	Mechanical
Fuel injection	Mechanical
Rated engine power [hp]	24.8
Speed at LOAD mode [rpm]	2850
speed at IDLE mode [rpm]	2100
Type of fuel	Diesel *
Fuel consumption under LOAD mode [gal/h]	1.4
Oil consumption related to fuel consumption [%]	approx. 0.2

* Use only diesel fuel to EN 590 or ASTM D975. Consult the engine manufacturer on the use of other fuels if necessary.

Tab. 33 Engine data

2.6.2 Oil recommendation

The engine oil must meet the following classification:

- ACEA, class E4, E7
- API, class CF, CI-4



The engine is filled initially with engine oil of viscosity class SAE 10W-40.

Ambient temperature [°F]	Viscosity class
-22 86	SAE 0W-30 SAE 5W-30
-22 104	SAE 0W-40 SAE 5W-40
-4 86	SAE 1 W-30
-4 104	SAE 10W-40
-5 104	SAE 15W-40
23 104	SAE 20W-50

Tab. 34 Engine oil recommendation

2.6.3 Fuel recommendation

The diesel fuel must meet the requirements of EN 590 and ASTM D975 respectively.

According to these standards a specific portion of bio diesel is permitted in the fuel.

Depending on the country of origin, bio diesel can be produced from different plant materials and thus have different properties.

Affected by temperature, atmospheric oxygen and time, these bio diesel components in the fuel may decompose in the fuel and thus cause damages within the fuel system.



The use of other fuels as well as the mixing with additives is only permitted after consultation with the engine manufacturer.

The engine service manual gives further information on fuel use.

2.6.4 Recommended Cooling Fluid

The engine coolant must meet the requirements of specification ASTM D4985.



Do not use a common coolant / antifreeze that only meets the requirements of ASTM D3306. Such coolants are intended only for light use in vehicles and could shorten the useful life of the engine.

The engine service manual gives further information on coolant application.

2.6.5 Fluid volumes

Description	Fluid volume [gal]
Engine oil	1.3
Fuel	10.6
Coolant	1.3

Tab. 35 Fluid volumes

2.6.6 Batteries

Feature	Value
Voltage [V]	12
Capacity [Ah]	60

Feature	Value
PTC testing current [A] (according to EN 50342)	480

Tab. 36 Batteries

Further information Depending on machine equipment, a higher capacity battery may be required. See chapter 2.7.2.

2.7 Options

2.7.1 Option ea, ec Tool lubricator

Name	Temperature range [°F]	Fluid volume [gal]
Special road breaker lubricant	-13 122	0.7

Tab. 37 Road breaker lubricant recommendation

2.7.2 Option ba Low temperature equipment

2.7.2.1 Ambient conditions

Installation	Limit value
Maximum altitude amsl* [ft]	3000
Minimum ambient temperature [°F]	-13
Maximum ambient temperature [°F]	+113

* Higher altitudes are permissible only after consultation with the manufacturer.

Tab. 38 Ambient conditions

2.7.2.2 Compressed air line frost protection

Antifreeze	Fluid volume [qt]
Wabcothyl	0.32

Tab. 39 Recommended antifreeze

2.7.2.3 Option bb Coolant pre-heating

Coolant pre-heater	Value
Voltage [V]	230
Power [W]	550

Tab. 40 Coolant pre-heater

2.7.3 Option ua
Air hose with hose reel

The machine is equipped with an additional discharge valve for this option.

Name	Discharge valve	Compressed air hose
Size ["]	G 3/4	–
Number	1	–
Length [ft]	–	66

Tab. 41 Additional discharge valve for the air hose

3 Safety and Responsibility

3.1 Basic instructions

The machine is manufactured to the latest engineering standards and acknowledged safety regulations. Nevertheless, dangers can arise through its operation:

- danger to life and limb of the operator or third parties,
- Impairments to the machine and other material assets.



Disregard of warning or safety instructions can cause serious injuries!

- Use this machine only if it is in a technically perfect condition and only for the purpose for which it is intended; observe all safety measures and the instructions in the service manual!
- Immediately rectify (have rectified) any faults that could be detrimental to safety!

3.2 Specified use

The machine is intended solely for generating compressed air for industrial use. Any other use is considered incorrect. The manufacturer is not liable for any damages that may result from incorrect use. The user alone is liable for any risks incurred.

- Keep to the specifications listed in this service manual.
- Operate the machine only within its performance limits and under the permitted ambient conditions.
- Do not use compressed air for breathing purposes unless it is specifically treated.
- Do not use compressed air for any application that will bring it into direct contact with food products unless it is specifically treated.

3.3 Incorrect Use

Improper usage can cause damage to property and/or (severe) injuries.

- Only use the machine as intended.
- Never direct compressed air at persons or animals.
- Do not use untreated compressed air for breathing purposes.
- Do not allow the machine to take in toxic, acidic, flammable, or explosive gases or vapors.
- Do not operate the machine in areas in which specific requirements with regard to explosion protection are in effect.

3.4 User's Responsibilities

3.4.1 Observe statutory and universally accepted regulations

- Observe relevant statutory and accepted regulations during operation, transporting and maintenance of the machine.

3.4.2 Determining personnel

Suitable personnel are experts who, by virtue of their training, knowledge, and experience as well as their knowledge of relevant regulations can assess the work to be done and recognize the possible dangers involved.

Authorized operators possess the following qualifications:

- are of legal age,
- are familiar with and adhere to the safety instructions and sections of the service manual relevant to operation,
- have received adequate training and authorization to operate vehicles and electrical and compressed air devices.

Authorized maintenance personnel possess the following qualifications:

- are of legal age,
- have read, are familiar with and adhere to the safety instructions and sections of the service manual applicable to maintenance,
- are completely familiar with the safety concepts and regulations of motor vehicle, electrical and compressed air engineering,
- are able to recognize the possible dangers of motor vehicle, electrical and compressed air devices and take appropriate measures to safeguard persons and property,
- have received adequate training in and authorization for the safe installation and maintenance of this machine.

Authorized transport personnel possess the following qualifications:

- are of legal age,
 - are familiar with and adhere to the safety instructions and sections of the service manual relevant to transporting,
 - are trained and authorized in safe vehicle transporting,
 - are familiar with the safety regulations relating to handling motor vehicles and transport goods,
 - are able to recognize the possible dangers of motor vehicles and take appropriate measures to safeguard persons and property.
- Ensure that personnel entrusted with operation, maintenance and transporting are qualified and authorized to carry out their tasks.

3.4.3 Adherence to inspection schedules and accident prevention regulations

The machine may be subject to local inspection schedules.

- Ensure that local inspection schedules are adhered to.

3.5 Dangers

Basic instructions

The following describes the various forms of danger that can occur during machine operation.

Basic safety instructions are found in this service manual at the beginning of each chapter in the section entitled 'Safety'.

Warning instructions are found before a potentially dangerous task.

3.5.1 Safely dealing with sources of danger

The following describes the various forms of danger that can occur during machine operation.

Exhaust fumes

Exhaust gases from combustion engines contain carbon monoxide, a colour- and odour-less but highly toxic gas. The inhalation of minute quantities can be lethal. Furthermore, diesel exhaust contains soot particles, some of which are noxious.

- Do not inhale exhaust fumes.
- Never use the machine in enclosed spaces, only in the open.
- Direct the exhaust fumes to the open air with a pipe ($\varnothing >$ than 4 in).

Fire and explosion

Spontaneous ignition and combustion of fuel can result in serious injury or death.

- Do not allow open flames or sparks at the place of use.
- Do not smoke while re-fueling.
- Never refuel the machine when it is running.
- Do not allow fuel to overflow.
- Wipe up spilled fuel immediately.
- Provide a fire extinguisher in the immediate vicinity.
- For the operation in combustible environment, fit the machine with an exhaust silencer (Option Ia).

Hot coolant

The cooling system of a liquid-cooled engine at running temperature is under high pressure. Coolant can spray out when the filler cap is opened causing severe burns.

- Let the machine cool down before opening the cooling system.
- Unscrew the filler cap carefully by a quarter to half a turn at first. Remove the filler cap only when pressure has escaped completely.

Electricity

Touching voltage carrying components can result in electric shocks, burns or death.

- Allow only qualified and authorised electricians or trained personnel under the supervision of a qualified and authorised electrician to carry out work on electrical equipment according to electrical engineering regulations.
- Check regularly that all electrical connections are tight and in order.
- Switch off any external power sources.
For example, the connections to the electrical engine cooling water pre-heater.

Forces of compression

Compressed air is a contained force. Uncontrolled release of this force can cause serious injury or death. The following information concerns work on components that could be under pressure.

- Wait until the compressor has automatically vented (check: the pressure gauge must read 0psig!)

- Then open an outlet valve carefully to ensure that the line between the minimum pressure / check valve and the compressed air outlet is vented.
- Do not carry out welding, heat treatment or mechanical modifications to pressurized components (e.g. pipes and vessels) as this influences the component's resistance to pressure. The safety of the machine is then no longer ensured.

Compressed air quality

The composition of the compressed air must be suitable for the actual application in order to preclude health and life-threatening dangers.

- Use appropriate systems for air treatment before using the compressed air from this machine as breathing air (fresh air reinforcement) and/or for the processing of foodstuffs.
- Use foodstuff-compatible cooling oil whenever compressed air is to come into contact with foodstuffs.

Spring force

Springs under tension or compression store energy. Uncontrolled release of this force can cause serious injury or death.

Minimum pressure / check valves, pressure relief valves and inlet valves are powerfully spring-loaded.

- Do not open or dismantle any valves.

Rotating components

Touching the fan wheel, the coupling or the belt drive while the machine is switched on can result in serious injury.

- Do not open the access doors and cover panels while the machine is running.
- Switch off and lock out the machine and check that no voltage is present before opening the access doors or canopy.
- Wear close-fitting clothes and a hair net if necessary.
- Make sure all covers and safety guards are in place and secured before starting.

Temperature

The operation of the combustion engine and the compression generate high temperatures. Touching hot components may cause injuries.

- Avoid contact with hot components.
These include, for example, engine, compressor airend, oil and compressed air lines, coolers and oil separator tank. Any objects in or near the flow of exhaust gas or discharged cooling air will become very hot.
- Wear protective clothing.
- Wear protective gloves when connecting or disconnecting compressed air hoses.
- Allow the machine to cool down before commencing any maintenance work.
- When welding is taking place on or near the machine take adequate measures to ensure that no parts of the machine or any oil vapours can ignite because of sparks or heat.

Noise

The enclosure absorbs the machine noise to a tolerable level. This function will be effective only if the bodywork is closed.

- Operate the machine only with closed bodywork and intact sound insulation.
- Wear hearing protection if necessary.
The pressure relief valve blowing off can be particularly loud.

Operating fluids/materials

The used operating fluids and materials can cause adverse health effects. Suitable safety measures must be taken in order to prevent injuries.

- Strictly forbid fire, open flame and smoking.
- Follow safety regulations when dealing with fuel, lubricants, antifreeze and chemical substances.
- Avoid contact with skin and eyes.
- Do not inhale fumes or vapours from fuel or oil.
- Do not eat or drink while handling fuel, cooling and lubricating fluids or antifreeze.
- Suitable fire extinguishing material must be to hand.
- Use only KAESER approved operating materials.

Unsuitable spare parts

Unsuitable spare parts compromise the safety of the machine.

- Use only spare parts approved by the manufacturer for use in this machine.
- Use only genuine KAESER replacement parts on pressure bearing parts.

Conversion or modification of the machine

Modifications, additions to and conversions of the machine can result in unpredictable dangers.

- Do not convert or modify the machine!
- Do not fit any non-approved additional components.
- Do not make any changes to the machine that will increase its weight beyond the permissible limit and/or endanger its safe use or transportation.
- Obtain written approval by the manufacturer prior to any technical modification or expansion of the machine.

3.5.2 Safe machine operation

Information on conduct that will help in handling the machine safely is given here.

Personal protective equipment

When working on the machine you may be exposed to dangers that can result in accidents with severe adverse health effects.

- Wear protective clothing as necessary.

Suitable protective clothing (examples):

- Safety workwear
- Protective gloves
- Safety boots
- Eye protection
- Ear protection

3.5.2.1 Transporting

The weight and size of the machine require safety measures during its transport to prevent accidents.

- Allow transportation only by personnel trained in safely dealing with motor vehicles and the transporting of goods.
- Ensure that no persons are on the machine when transporting.

Transport as trailer

Non-compliance with the basic rules for safe trailer operation may cause severe accidents during machine transport.

- The maximum permissible load for the towing vehicle coupling and the maximum coupling load given for the machine must not be exceeded.
- Avoid causing a shift in the center of gravity by an excessive or incorrectly distributed load.
- Do not tow in a manner that will impose excessive stress on the machine or chassis.
- Adjust towing speed to accommodate ground conditions. This applies particularly to unpaved roads and when taking curves.
- The towbar must be parallel with the ground otherwise towing instability can develop, resulting in damage to the machine and/or towing vehicle.
- Before moving the machine, make sure any security devices (e.g. anti-theft chain) are released.

Transport as trailer on public roads

- Do not tow machines without illumination and signaling equipment on public roads.
- Ensure all running gear, including chassis, wheels, brakes, signalling and lighting, is in safe condition.
- The local laws and regulations regarding the use of public roads must be observed.

Transporting with a crane

Non-compliance with the safety regulations for load suspension and hoisting equipment may cause severe accidents during lifting and moving the machine with cranes.

- Do not enter the danger zone while the machine is being lifted.
- Never lift and move the machine over people or occupied buildings.
- Avoid extreme weight shifting caused by additional loads or additions (tilting).
- Do not exceed the lifting capacity on the machine's lifting point (lifting eye).
- Only the designated lifting point should be used to attach lifting gear and under no circumstances are handles, towbar or other components to be used.
- Use only hooks and shackles that comply with local safety regulations
- Do not attach cables, chains or ropes directly to the machine's lifting eye.
- Do not manipulate the crane suspension system, in particular the holding points of the crane lifting eye.
- If screwed crane fixings had to be removed, please use only new self-locking nuts when installing.
- Avoid jerking when lifting, as this may damage components.
- Loads must be slowly lifted and carefully set down.
- Never allow the load to hang from the crane longer than necessary.



The following are forbidden:

- Air transport of the machine by slinging beneath a helicopter.
- Dropping by parachute.

3.5.2.2 Positioning

A suitable installation location for the machine prevents accidents and faults.

- Do not position the machine directly against a wall. A build up of heat from the exhaust can damage the machine.
- Ensure accessibility so that all work on the machine can be carried out without danger or hindrance.
- Do not operate in areas in which specific requirements regarding explosion protection are in force.
- Ensure adequate ventilation.
- Place the machine in such a manner that the working conditions in its environment are not impaired.
- Comply with limit values for ambient temperature and humidity.
- The intake air must not contain any damaging contaminants,

Damaging contaminants are for instance:

- Exhaust gases from internal combustion engines,
 - Flammable, explosive, or chemically instable gases and vapors,
 - Acid or base forming substances such as ammonia, chlorine, or hydrogen sulfide.
- Do not position the machine in warm cooling outlet air from other machines.
 - Keep suitable fire extinguishing agents ready for use.
 - Chock the wheels to prevent unwanted movement.
 - Do not place additional loads on the machine (e.g. excavator bucket as anti-theft measure).

3.5.2.3 Commissioning, operation and maintenance

During commissioning, operation and maintenance you may be exposed to dangers resulting from electricity, pressure, and temperature. Careless actions can cause accidents with severe adverse effects for your health.

- Allow maintenance work to be carried out only by authorised personnel.
- Wear close-fitting, flame-resistant clothing. Wear protective clothing as necessary.
- Switch off the machine and lock out the supply disconnecting device.
- Wait until the compressor has automatically vented (check: The pressure gauge must read 0 psig!)
- Then open the outlet valve carefully to ensure that the line between the minimum pressure / check valve and the compressed air outlet is vented.
- Allow the machine to cool down.
- Do not open the bodywork while the machine is switched on.
- Do not open or dismantle any valves.
- Use only spare parts approved by KAESER for use in this machine.
- Carry out regular inspections:
 - for visible damage and leakage,

- of safety devices,
 - of the EMERGENCY STOP device,
 - of parts needing monitoring.
- Pay particular attention to cleanliness during all maintenance and repair work. Cover components and openings with clean cloths, paper or tape to keep them clean.
 - Do not leave any loose components, tools, or cleaning rags on or in the machine.
 - Components removed from the machine can still be dangerous.
Do not attempt to open or destroy any components taken from the machine.
 - Use only suitable compressed air hoses.

Compressed air hoses must meet the following requirements:

- that are of the right type and size for the highest permissible machine working pressure,
 - that are not damaged, worn or of reduced quality,
 - that have hose couplings and connections of the right type and size.
- Make sure compressed air hoses are depressurized before disconnecting from the machine.
 - Secure the open end of an air hose before applying air pressure. An unsecured hose may whiplash and cause injury.
 - At working pressures >100 psig, compressed air hoses should be secured by a cable to their respective outlet valves.

3.5.2.4 Parking the compressor

Improper parking and use of the parked machine endangers personnel and material.

- Select an even surface for parking.
- Use a coupled towing vehicle to move the machine into position.
- Place chocks under the wheels.
- Pull on the parking brake.
- Loosen the lighting and signaling system.
- Detach the breakaway cable / safety chain.
- Lower the prop stand / wind down the jockey wheel.
- Uncouple the compressor
- Ensure that the machine is properly separated from the towing vehicle.
- Remove the towing vehicle from the machine.
- Nobody must enter the parked machine or, in particular, its chassis.
- Nobody must sit on the parked machine or, in particular, its towing mechanism.

3.5.2.5 Decommissioning, storage, disposal

Improper handling of old operating fluids and components represent a danger for the environment.

- Drain out fluids and dispose of according to environmental regulations.
These include, for example, fuel, engine oil, compressor cooling oil, and engine coolant.
- Dispose of the machine in accordance with local environmental regulations.

3.5.3 Organizational Measures

- Designate personnel and their responsibilities.

- Give clear instructions on reporting faults and damage to the machine.
- Give instructions on fire reporting and fire-fighting measures.

3.5.4 Danger areas

The table gives information on areas dangerous to personnel.

Only authorized personnel may enter these areas.

Task	Danger area	Authorized personnel
Transport	Within a 10 ft radius of the machine.	Operating personnel to prepare for transport. No personnel during transport.
	Beneath the lifted machine.	No personnel!
Commissioning	Within the machine.	Maintenance personnel
	Within a 3 ft radius of the machine.	
Operation	Within a 3 ft radius of the machine.	Operating personnel
Maintenance	Within the machine.	Maintenance personnel
	Within a 3 ft radius of the machine.	

Tab. 42 Danger areas

3.6 Safety devices

Safety devices ensure safe working with the machine.

- Do not change, bypass or disable safety devices.
- Regularly check safety devices for their correct function.
- Do not remove or obliterate labels and notices.
- Ensure that labels and notices are clearly legible.

Further information More information on safety devices is contained in chapter 4.5.

3.7 Safety signs

The diagram shows the positions of safety signs on the machine. The table lists the various safety signs used and their meanings.

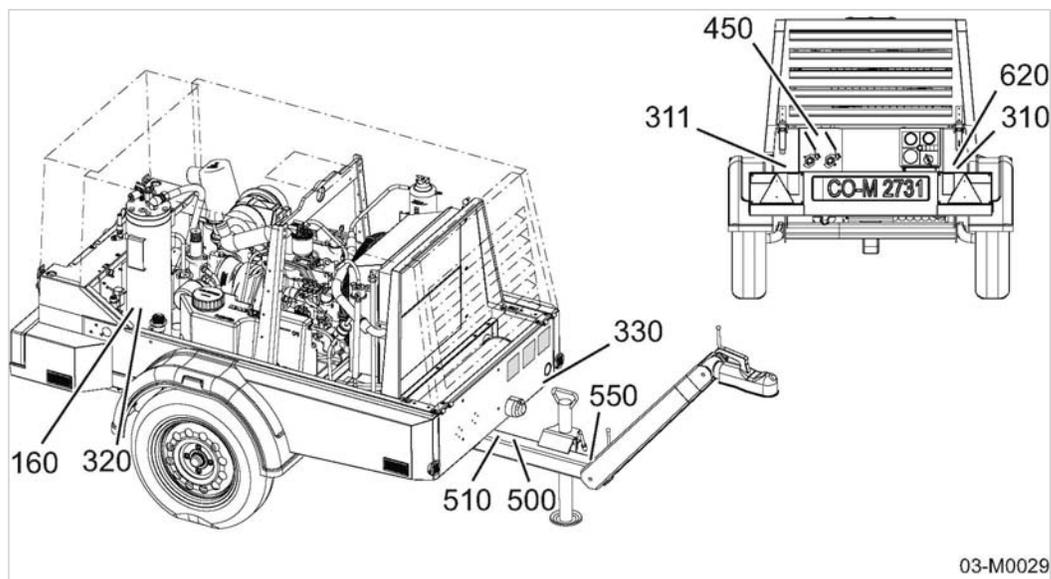


Fig. 1 Location of safety signs

Item	Sign	Meaning
190*		<p>Wrong cooling oil level. Risk of machine defects or rising oil consumption (oil content for pure air).</p> <ul style="list-style-type: none"> ➤ Check cooling-oil level. ➤ Run the machine only with proper cooling-oil level.
282		<p>Explosive hydrogen gas. Severe injury or death could result from exploding gas.</p> <ul style="list-style-type: none"> ➤ Keep flames, sparks and other sources of ignition away.
283		<p>Battery contains acid. Severe injury result from contact with battery acid.</p> <ul style="list-style-type: none"> ➤ Do not allow battery acid to contact eyes, skin, clothing or painted surfaces.. ➤ Do not attempt to jump-start if battery fluid is frozen. ➤ Bring temperature of battery up to at least 60°F before attempting to jump-start it may explode.
303		<p>Fire or explosion caused by refueling. Severe injury or death result from inflaming fuel.</p> <ul style="list-style-type: none"> ➤ Use diesel fuel only. ➤ NEVER attempt to refuel the compressor while it is operating. ➤ Always replace fuel filter cap after refueling. ➤ Always wipe up fuel spills which may occur inside the compressor enclosure and allow the machine to ventilate.

* Location within the machine

** Towable machines only

3 Safety and Responsibility

3.7 Safety signs

Item	Sign	Meaning
310		Injury or damage from open machine.
311		<ul style="list-style-type: none"> ➤ Operate the machine only when closed. ➤ Transport the machine only when closed.
320*		<p>Loud noise and oil mist when the safety relief valve opens. Ear damage and burns can result.</p> <ul style="list-style-type: none"> ➤ Wear ear protection and protective cloths. ➤ Close all maintenance doors and cover panels. ➤ Work carefully.
330		Hot surface can cause burns.
331		<ul style="list-style-type: none"> ➤ Let the machine cool down. ➤ Work carefully. ➤ Wear protective cloths and gloves.
332		Hot surface can cause burns.
333		<ul style="list-style-type: none"> ➤ Let the machine cool down. ➤ Work carefully. ➤ Wear protective cloths and gloves. ➤ Do not inhale dangerous gases.
390		Rotating fan blades and V-belt drive.
391		<p>Severe injury could result from touching the fan blades and v-belt drive while it is rotating.</p> <ul style="list-style-type: none"> ➤ Never switch the machine on without guard in place over the fan blade. ➤ Isolate completely from the power supply (all conductors) and ensure the supply cannot be switched on again (lock off).
430		<p>Connect air hoses only in full compliance with OSHA standard 29 CFR 1926,302 (bX7).</p> <p>The required safety devices should be tested in accordance with their manufacturer's recommendations to verify that they reduce pressure in case of hose failure and will not nuisance trip with the hose and tool combinations in use.</p>
440		<p>Compressed air quality.</p> <p>Injury and/or contamination can result from breathing compressed air. Contamination of food can result from using untreated compressed air for food processing.</p> <ul style="list-style-type: none"> ➤ Never breathe untreated compressed air! ➤ Air from this compressor must meet OSHA 29 CFR1910.134 and FDA 21 CFR178.3570 standards, if used for breathing or food processing. Use proper compressed air treatment. ➤ Food grade coolant must be used for food processing.

* Location within the machine

** Towable machines only

Item	Sign	Meaning
450		<p>Loud noise and compressed air blast! Hearing damage and injury if ball valve is opened without a compressed air hose being connected.</p> <ul style="list-style-type: none"> ➤ Connect a compressed air hose. ➤ Then open the ball valve.
500**		<p>Drawbar load and ground clearance. Danger of fishtailing, incorrect towing vehicle load, damage to the machine caused by rollover or contact with the ground.</p> <ul style="list-style-type: none"> ➤ Always line up the drawbar so that the machine is level with the ground.
510**		<p>Malfunction due to lack of maintenance. Accidents and machine damage possible.</p> <ul style="list-style-type: none"> ➤ Maintain the chassis regularly. ➤ Follow instructions in the service manual.
600*		<p>Pressure and spring force. Serious injury or death can result from loosening or opening component that is under pressure and heavily spring loaded.</p> <ul style="list-style-type: none"> ➤ Never open (dismantle) valve. ➤ Contact authorized KAESER distributor.

* Location within the machine

** Towable machines only

Tab. 43 Safety signs

3.8 Emergencies

3.8.1 Correct fire fighting

Suitable measures

Calm and prudent action can save lives in the event of a fire.

- Keep calm.
- Give the alarm.
- Shut down the machine from the instrument panel if possible.
- Warn and move endangered personnel to safety.
- Help incapacitated persons.
- Close the doors.
- When trained accordingly: Attempt to extinguish the fire.

Extinguishing substances

- Suitable extinguishing media:
 - Foam
 - Carbon dioxide
 - Sand or soil
- Unsuitable extinguishing media:
 - Strong jet of water

3.8.2 Injury from handling operating fluids/materials

The following operating fluids/materials are in the machine:

- Fuel
- Lubricating oil
- Compressor cooling oil
- Engine coolant
- Battery electrolyte
- Tool lubricant (option e)
- Antifreeze (option ba)

Eye contact

Fuel, oil and other fluids/materials can cause irritation.

- Rinse open eyes thoroughly for a few minutes.
- Seek medical advice for persistent irritation.

Skin contact

Fuel, oil and other fluids/materials may irritate after prolonged contact.

- Wash thoroughly with skin cleaner, then with soap and water.
- Contaminated clothing should be intensively cleaned before reuse.

Inhalation

Fuel and oil vapors impair breathing.

- Clear the respiratory tract from fuel or oil vapor.
- Seek medical help if difficulty with respiration continues.

Ingestion

- Wash out the mouth immediately.
- Do not induce vomiting.
- Seek medical aid.

3.9 Warranty

This service manual contains no independent warranty commitment. Our general terms and conditions of business apply with regard to warranty.

A condition of our warranty is that the machine is used for the purpose for which it is intended under the conditions specified.

Due to the multitude applications for which the machine is suitable the obligation lies with the user to determine its suitability for his specific application.

In addition, we accept no warranty obligation for:

- the use of unsuitable parts or operating materials,
- unauthorized modifications,
- incorrect maintenance,
- incorrect repair.

Correct maintenance and repair includes the use of original spare parts and operating materials.

- Obtain confirmation from KAESER that your specific operating conditions are suitable.

3.10 Environmental protection

The operation of this machine may cause dangers for the environment.

- Do not allow operating materials to escape into the environment or into the sewage system.
- Store and dispose of operating materials and replaced parts in accordance with local environmental protection regulations.
- Observe relevant regulations.
This applies particularly to parts contaminated with fuel, oil, coolants and acids.

4 Design and Function

4.1 Bodywork

Bodywork is understood to be the exterior of the machine mounted on the chassis.

The bodywork has several functions when it is closed:

- Weather protection
- Sound insulation
- Guarding against touching
- Cooling air flow

Safe and reliable operation is only ensured when the bodywork is closed.

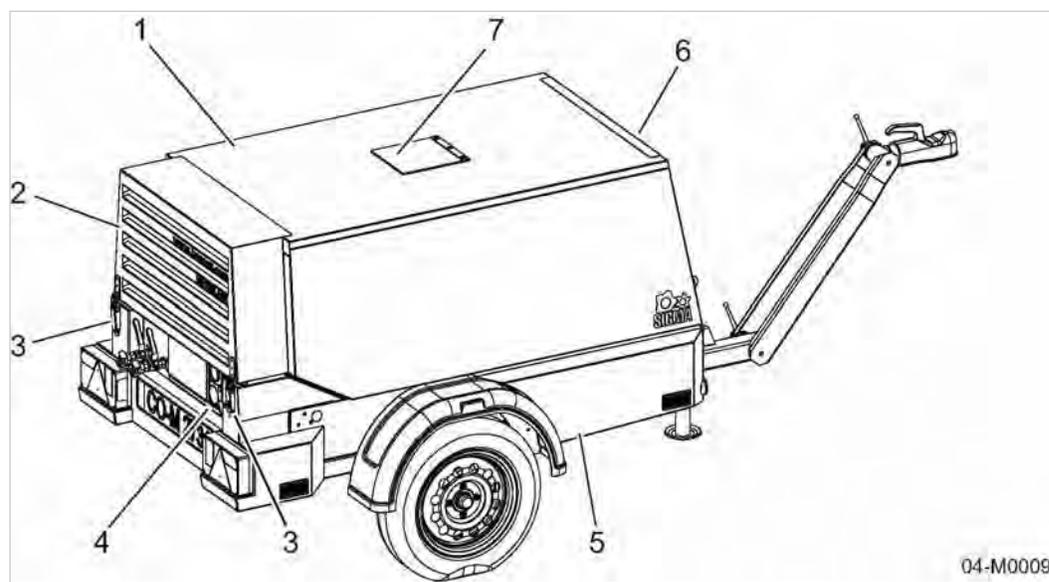


Fig. 2 Bodywork

- | | |
|---------------------|-------------------------|
| ① Canopy | ⑤ Lower body |
| ② Cooling air inlet | ⑥ Cooling air outlet |
| ③ Snap fastener | ⑦ Cover for lifting eye |
| ④ Instrument panel | |

The canopy ① can be opened when all the snap fasteners ③ are released.
 The canopy opens independently.
 Two gas-filled springs maintain the opened position of the canopy.

The bodywork is not suitable for the following uses:

- Walking on, standing, or sitting on.
- As resting place or storage for any kind of load.

4.2 Component identification

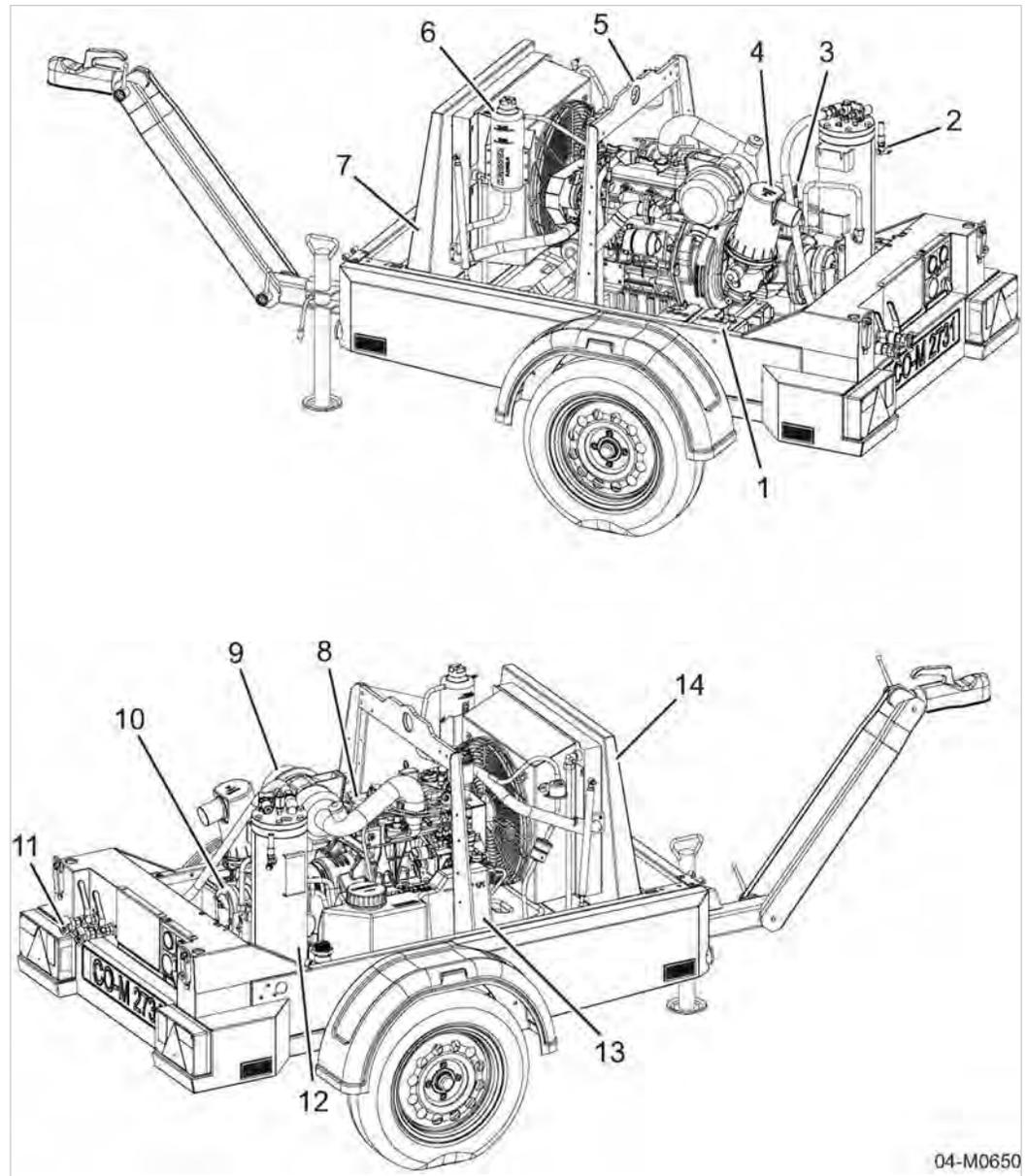


Fig. 3 Side view (canopy removed)

- | | | | |
|---|--------------------------------|---|-----------------------------|
| ① | Battery | ⑧ | Engine |
| ② | Safety (pressure) relief valve | ⑨ | Engine air filter |
| ③ | Thermostatic valve | ⑩ | Airend |
| ④ | Compressor air filter | ⑪ | Compressed air outlet valve |
| ⑤ | Lifting eye | ⑫ | Oil separator tank |
| ⑥ | Coolant expansion tank | ⑬ | Fuel tank |
| ⑦ | Water cooler | ⑭ | Oil cooler |

4.3 Machine function

Machine function (without options)

Item numbers correspond to the pipe and instrument flow diagram in chapter 13.2.

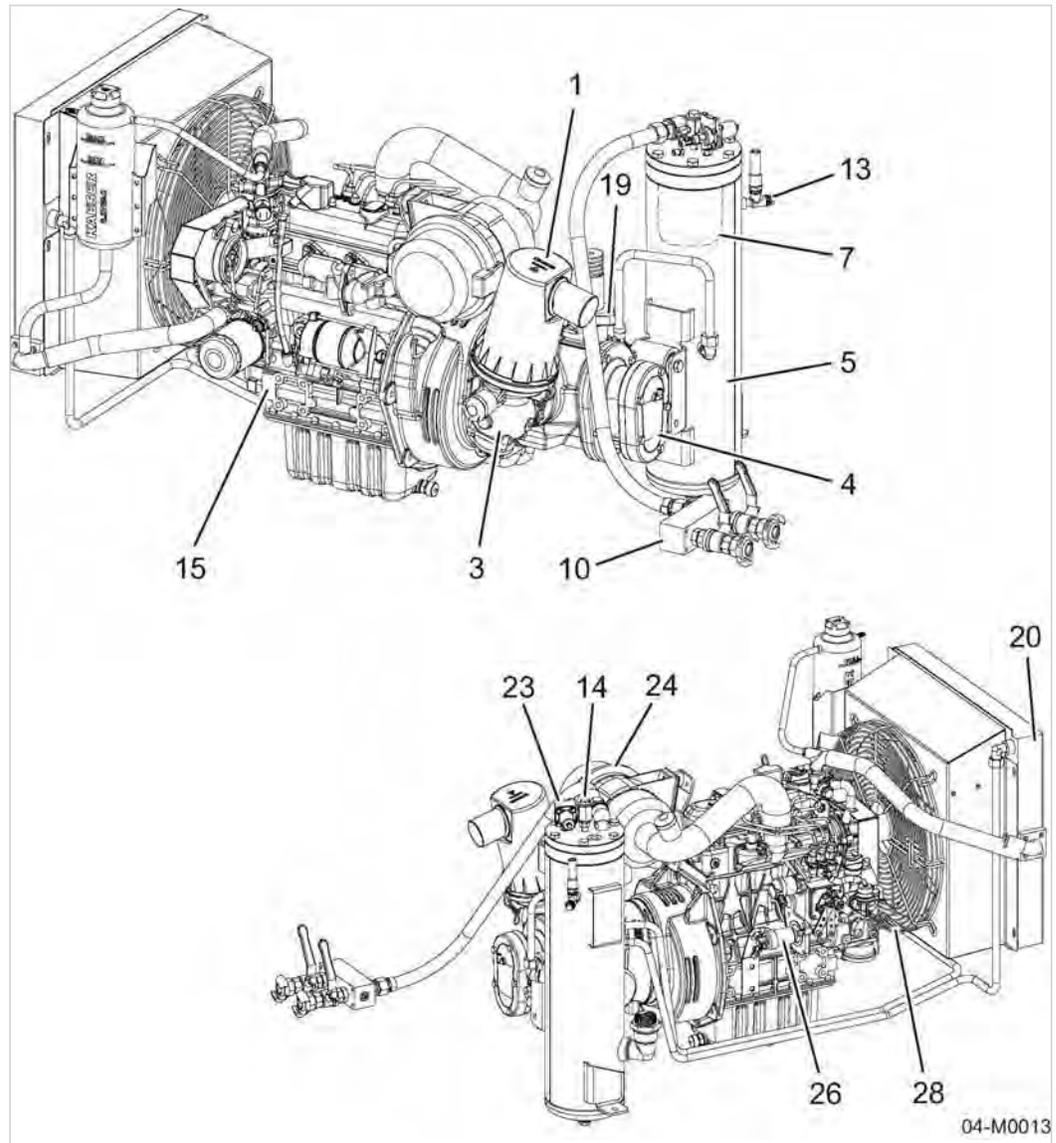


Fig. 4 General design

- | | | | |
|---|--------------------------------|---|--|
| ① | Compressor air filter | ⑮ | Engine |
| ③ | Inlet valve | ⑲ | Combination valve (thermostatic valve) |
| ④ | Airend | ⑳ | Oil cooler |
| ⑤ | Oil separator tank | ㉓ | Proportional controller |
| ⑦ | Oil separator cartridge | ㉔ | Engine air filter |
| ⑩ | Compressed air distributor | ㉖ | Engine speed control cylinder |
| ⑬ | Safety (pressure) relief valve | ㉘ | Fan |

Ambient air is cleaned as it is drawn in through the filter ①.

The air is then compressed in the airend (4).

The airend is driven by an internal combustion engine (15).

Cooling oil is injected into the airend. It lubricates moving parts and forms a seal between the rotors themselves and between them and the airend casing. This direct cooling in the compression chamber ensures a very low airend discharge temperature.

Cooling oil recovered from the compressed air in the oil separator tank (5) gives up its heat in the oil cooler (20). The oil then flows through the oil filter (21) and back to the point of injection. Pressure within the machine keeps the oil circulating. A separate pump is not necessary. A thermostatic valve (19) maintains optimum cooling oil temperature.

Compressed air, freed of cooling oil in the oil separator tank (5), flows through the minimum pressure nozzle (8) into the air distributor (10). The minimum pressure nozzle ensures that there is always sufficient internal air pressure to maintain cooling oil circulation.

The cooling fan (28) ensures optimum cooling of all components within the enclosure.

4.4 Operating modes and control modes

4.4.1 Operating modes

The machine operates in the following modes:

- **LOAD**
 - The inlet valve is open.
 - The engine runs at maximum speed.
 - The airend delivers compressed air.
- **MODULATING**
 - With the help of a control valve (the proportional controller) the degree of opening of the inlet valve is continuously varied in response to the air demand.
 - This MODULATING control ensures minimum fuel consumption during times of low demand. The load and fuel consumption of the engine rises and falls with the air demand.
 - The airend delivers compressed air.
- **IDLE**
 - The inlet valve is closed.
 - The control valve opens, allowing pressure in the oil separator tank to be applied to the inlet valve.
 - Compressed air then flows in a closed circuit through the airend, the oil separator tank and the control valve.
 - The pressure in the oil separator tank remains constant.
 - The engine runs at minimum speed.
- **STANDSTILL (shut down)**
 - The inlet valve closes.
 - The venting valve opens to depressurize the machine.
 - The engine stops.

4.4.2 MODULATING control

The control system regulates the volume of air generated to match the actual demand. The machine keeps the working pressure constant by varying the volume of compressed air delivered, thereby matching the air demand.

With the help of a mechanical control valve (the proportional controller), the opening and closing of the inlet valve is continuously varied in relation to the actual air demand. The airend provides compressed air for connected consumers.

This continuous delivery regulation minimizes fuel consumption of the engine. The load and fuel consumption of the engine rises and falls with the air demand.

4.5 Safety devices

4.5.1 Monitoring functions with shutdown

The following functions are monitored automatically.

- Engine oil pressure
- Coolant temperature
- Airend discharge temperature
- Engine alternator



The fuel stop device is activated when an alarm occurs. The engine comes to a stop and the venting valve releases pressure from the machine.

4.5.2 Further safety devices

The following safety devices are provided and may not be modified in any way.

- Pressure relief valve:
This valve protects the system from excessive pressure. It is factory set.
- Enclosures and covers over moving parts and electrical connections:
These protect against accidental contact.

4.6 Options

The options available for your machine are described below.

4.6.1 Option da Air treatment options

For some applications, the compressed air generated by this machine must be treated before use. The following is description of the possible air treatment options that may be fitted to the machine.

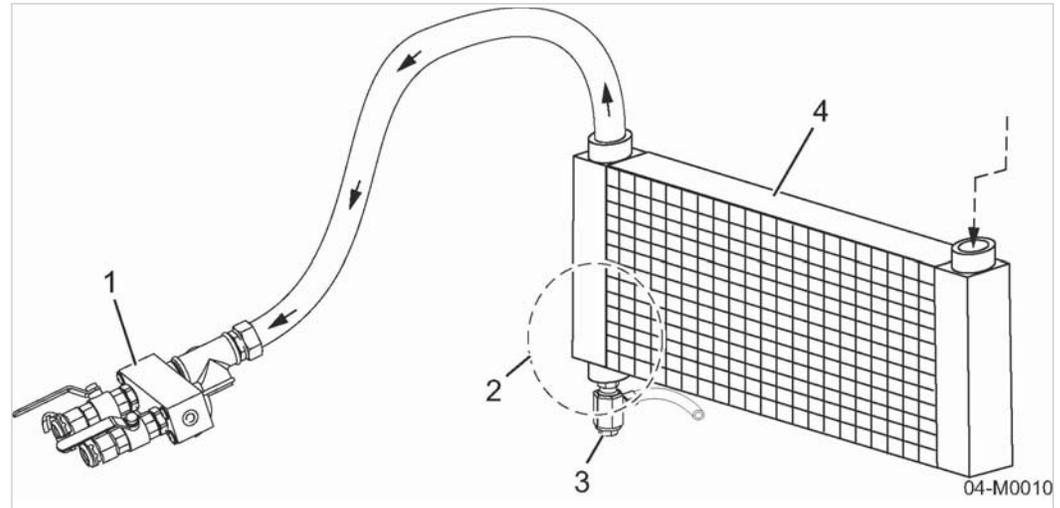


Fig. 5 Air treatment options

- | | | | |
|---|----------------------------|---|--|
| ① | Compressed air distributor | ③ | Dirt trap |
| ② | Water trap (Option da) | ④ | Compressed air aftercooler (Option da) |

4.6.1.1 Option da
Compressed air aftercooler

The aftercooler lowers the compressed air temperature to only 9°F to 18°F above ambient. Most of the moisture carried in the air is removed this way in the aftercooler.

4.6.1.2 Option da
Water trap

Condensate accumulating during the air cooling process is separated, fed to the exhaust gas silencer and evaporated there.

4.6.1.3 Option ea
Tool lubricator

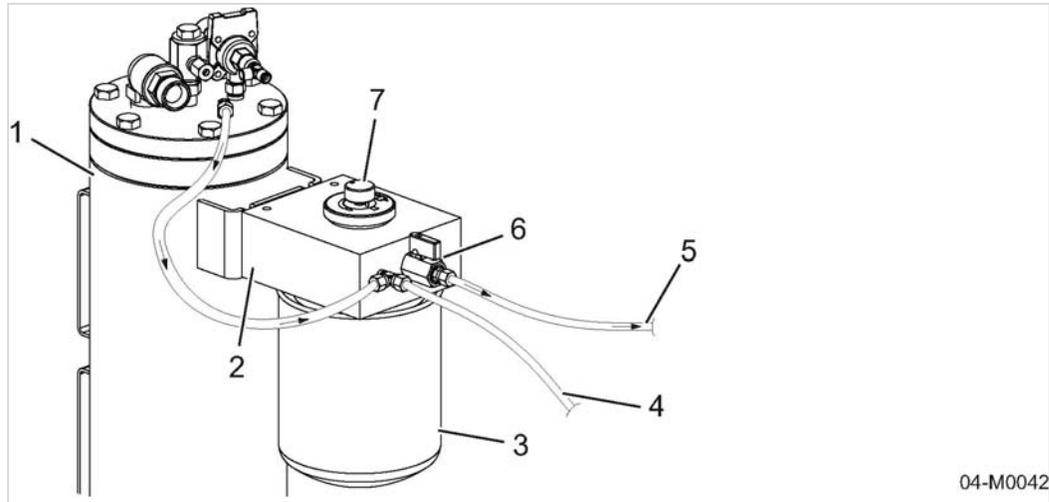
Compressed air containing lubricating oil is needed for the lubrication of certain air tools. The tool lubricator introduces a fine oil mist into the compressed air for this purpose.

The amount of oil in the compressed air is controlled by a metering valve on the lubricator:

- minimal oil to lubricate the tools and prevent corrosion,
- more oil for cleaning and to prevent wear in the tools.

The oil flow can be cut off completely by a shut-off valve.

The oil flow adjusts automatically to changes in air demand (one or more tools/consumers on line).



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Fig. 6 Tool lubricator

- | | |
|----------------------|--------------------------------------|
| ① Oil separator tank | ⑤ Air line with additional lubricant |
| ② Tool lubricator | ⑥ Shut-off ball valve |
| ③ Oil tank | ⑦ Metering knob |
| ④ Venting line | |

Please note for air tools that should not be lubricated:

NOTICE

Lubrication with tool oil.

Air tools that must not be lubricated can be damaged.

- *Blow any residual oil out of the line before connecting such an air tool.*

4.6.2 Option ba, bb Low temperature equipment options

Special equipment is provided for operation in extremely low temperatures.

This equipment guarantees machine operation at temperatures from -13°F to +113°F.

The electrical system enables trouble-free engine starting at ambient temperatures as low as -4°F.

4.6.2.1 Option ba Frost protection

Control air is mixed with an alcohol-based antifreeze to prevent control and regulating devices freezing. This considerably lowers the freezing point of any moisture in the air.

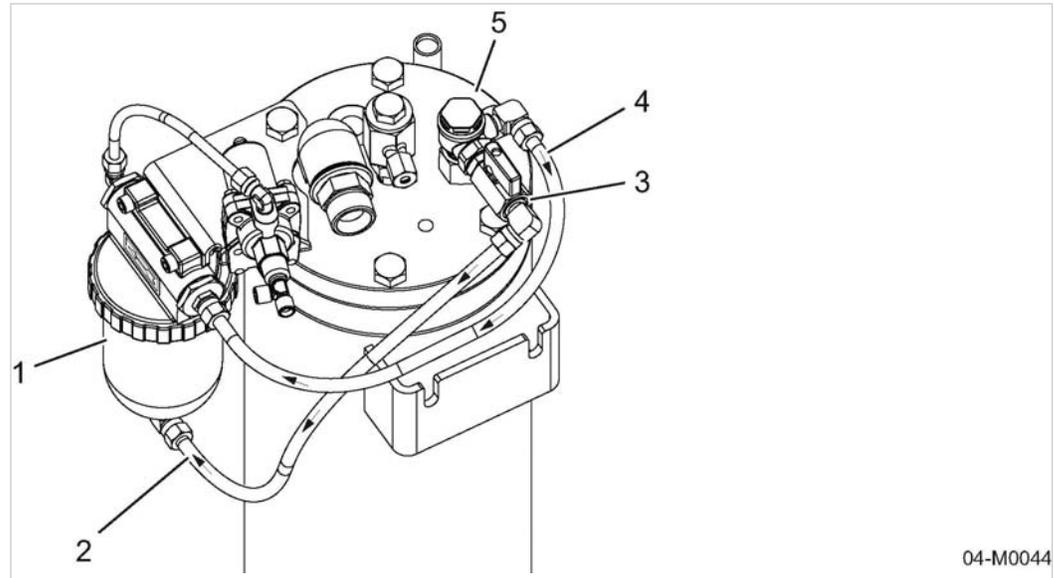


Fig. 7 Frost protector

- | | |
|-----------------------------------|------------------------------|
| ① Frost protector | ④ Control line (bypass line) |
| ② Control line (frost protection) | ⑤ Oil separator tank cover |
| ③ Shut-off valve | |

Operating the machine in cold temperatures:

The frost protector is activated when the machine is started or stopped in ambient temperatures below freezing. The compressed air carries antifreeze to coat and protect airlines and valves. This prevents freezing up of control and regulating components.

The heat of the machine prevents individual control components freezing up during operation.

Operating the machine in summer:

At outside temperatures above 32 °F, it is no longer necessary to inject the control lines in the machine with antifreeze before shutting it down.

**4.6.2.2 Option bb
Coolant pre-heating**

The engine coolant can be pre-heated to improve cold-starting.

The power supply to the coolant preheater takes place via a separate network connector. A flexible power cable joins the machine's power plug to the user's power socket.

The coolant pre-heater works according to the principle of self-circulation.

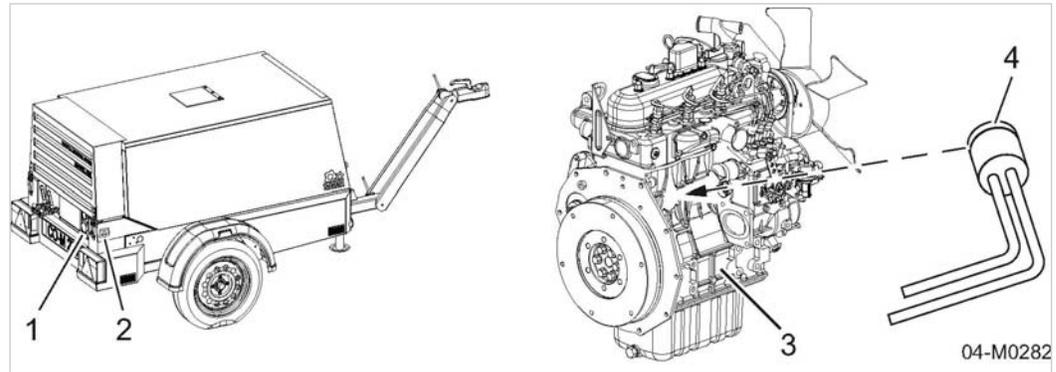


Fig. 8 Coolant pre-heating

- | | |
|---|-----------------------|
| ① Control panel | ③ Engine block |
| ② Connection for the coolant pre-heater | ④ Coolant pre-heating |

The ideal coolant pre-heating period is 2-3 hours before the machine is started. A pre-heating period of more than 3 hours is not necessary, as the maximum effect has already been achieved within this period (thermal balance).

Continuous operation of a maximum of 6 hours must be followed by a rest of approximately 3 hours.

4.6.3 Option la, lb Options for operating in fire hazard areas

4.6.3.1 Option la Spark arrestor

A spark arrestor on the exhaust silencer is required when operating a diesel engine in a fire hazard area and in forestry and agricultural applications. In such applications, a spark may ignite flammable materials.

The spark arrestor prevents the exhaust silencer from emitting any glowing fuel residue.

4.6.3.2 Option lb Engine air intake shut-off valve

Any flammable gas drawn into the diesel engine's air intake alters and enriches the controlled fuel/air mixture fed to the engine. This causes a sudden and uncontrolled increase in engine speed that can lead to serious mechanical damage. Without appropriate preventive measures, the engine and compressor can be destroyed. Explosion or fire are also possible.

When flammable gas is drawn into the engine, shutting off the fuel supply will not stop the engine right away. Only by shutting off the air intake can the engine be brought to an immediate stop.

The self-closing valve shuts off the engine air intake as soon as flammable gas is drawn in. This brings the engine to an immediate stop.

4.6.4 Option oe Sealed floor pan option

The machine is fitted with a sealed floor pan.

In the event of a leak, all liquids required for the machine's operation are caught in the floor pan. Service openings in the floor pan are closed with plugs. These openings must be tightly re-closed after performing any cleaning work.

4.6.5 Option oa Battery isolating switch option

The «battery isolating switch» disconnects the battery completely from the machine's electrical system (fire protection, battery discharge protection).

NOTICE

Danger of short circuit!

Damage to the machine electrical components is possible.

- *Use the «battery isolating switch» only when the machine is shut down.*
- *Do not use the «battery isolating switch» as a main or emergency switch.*

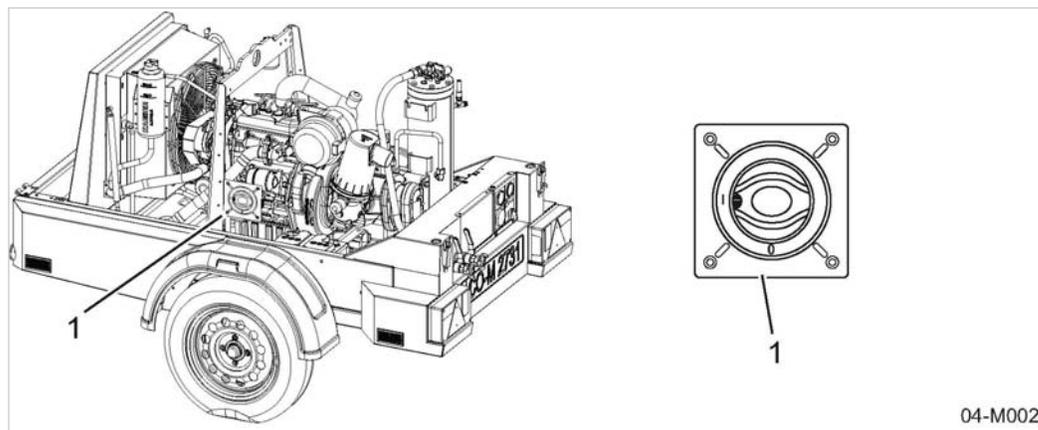


Fig. 9 Battery isolating switch
① «Battery isolating switch»

4.6.6 Option ua Hose reel option

The machine is provided with an extension hose to allow connection and operation of remote air tools. A hose reel is provided for safe storage of this hose.

4.6.7 Option sf Anti-theft device option

The machine is fitted with a security chain as theft protection. The supplied safety chain is stored in a container at the front of the machine.

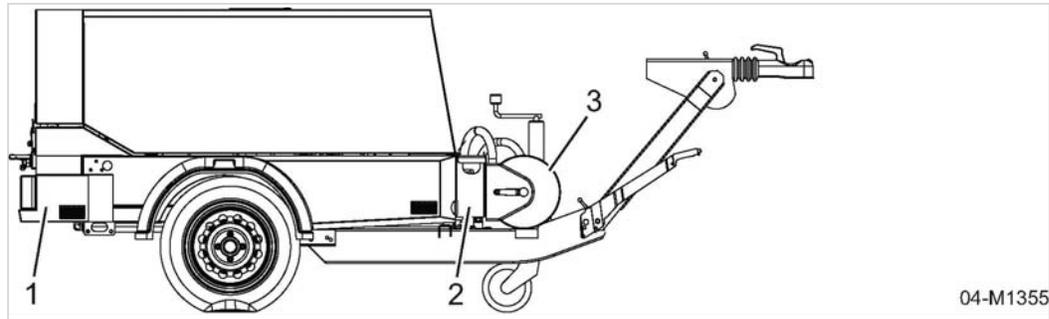


Fig. 10 Container for safety chain

- ① Machine
- ② Container for safety chain
- ③ Hose reel (option ua)

4.6.8 Chassis options for road-worthy and stationary machines

4.6.8.1 Option sa, sb, sd, se, sh Chassis of road-worthy machines

The chassis fitted with options *sb* and *se* are equipped with a service brake.

If the towing vehicle brakes during towing, the trailer presses the overrun device together to a point where the trailer is actively braked.

Function:

- The overrun device activates the relay lever.
- The relay lever pulls the brake actuating rod with the brake cable.
- The brake joint lock is twisted and spreads the brake shoes in the drum brake.
- The trailer brakes.

Option	Name	Features
sa	EU chassis 01	<ul style="list-style-type: none"> ■ Single-axle ■ Axle rubber-sprung ■ Prop stand ■ Height-adjustable towbar ■ Safety chains*
sb	EU chassis 02	<ul style="list-style-type: none"> ■ Single-axle ■ Axle rubber-sprung ■ Jockey wheel ■ Height-adjustable towbar ■ Service brake ■ Parking brake ■ Breakaway cable

EU = Europe, US = United States of America

*country-specific accessories

Option	Name	Features
sd	EU chassis 03	<ul style="list-style-type: none"> ■ Single-axle ■ Axle rubber-sprung ■ Jockey wheel ■ Fixed height towbar ■ Parking brake ■ Breakaway cable
se	EU chassis 04	<ul style="list-style-type: none"> ■ Single-axle ■ Axle rubber-sprung ■ Jockey wheel ■ Fixed height towbar ■ Service brake ■ Parking brake ■ Breakaway cable
sh	US chassis	<ul style="list-style-type: none"> ■ Single-axle ■ Axle rubber-sprung ■ Prop stand ■ Fixed height towbar ■ Without parking brake

EU = Europe, US = United States of America

*country-specific accessories

Tab. 44 Chassis - Road-worthy Machines

Further information For adjusting the chassis, see chapter 6.4,
for dimensional drawings of road-worthy machines, see chapter 13.3.

4.6.8.2 Option sc, si Chassis of stationary machines

Option	Name	Features
sc	Skids	<ul style="list-style-type: none"> ■ Frame designed as skid ■ Used as stationary machine ■ Mounted on truck/trailer platform
si	Frame	<ul style="list-style-type: none"> ■ The mounting assembly is designed as a frame. ■ Used as stationary machine ■ Mounted on truck/trailer platform

Tab. 45 Chassis - Stationary Machines

Further information For dimensional drawings of stationary machines, see chapter 13.3.

5 Installation and Operating Conditions

5.1 Ensuring safety

The conditions in which the machine is installed and operated effect the safety of personnel and surroundings.

Warning instructions are located before a potentially dangerous task.



Disregard of warning instructions can cause serious injuries!

Complying with safety warnings

Disregard of safety warnings can cause unforeseeable dangers!

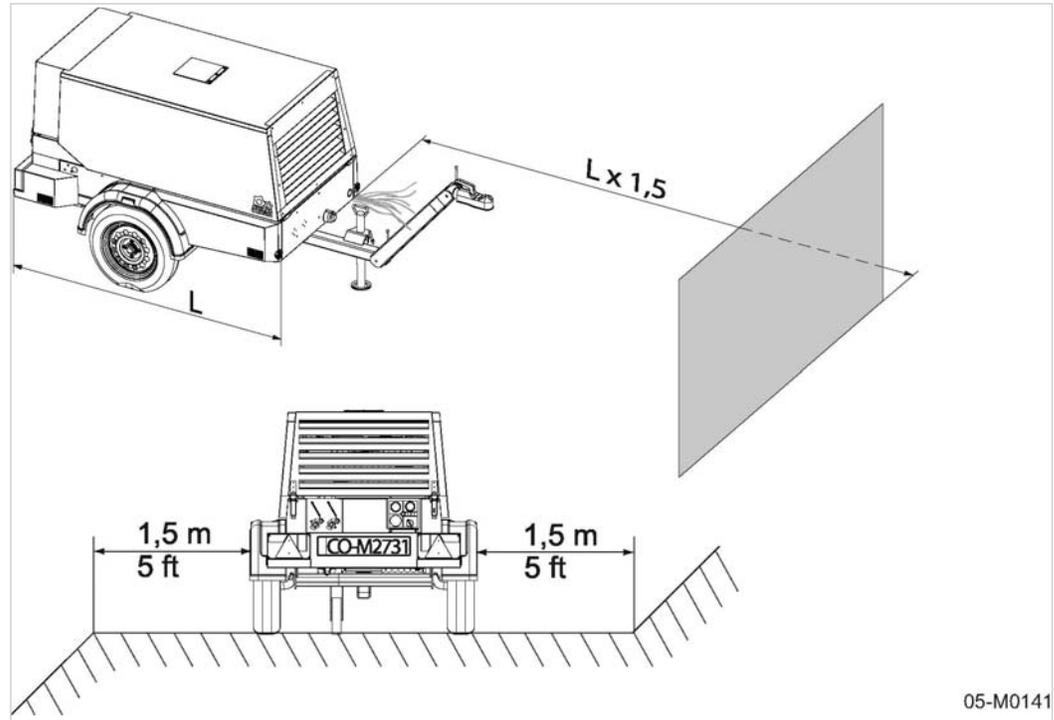
- Strictly forbid fire, open flame and smoking.
- If welding is carried out on or near the machine, take adequate measures to prevent sparks or heat from igniting fuel or oil vapors or parts of the machine.
- Do not store any flammable materials in the vicinity of the machine.
- The machine is not explosion-proof!
Do not operate in areas in which specific requirements with regard to explosion protection are applied.
- Keep suitable fire extinguishing agents on hand and ready for use.
- Ensure that required ambient conditions are maintained.

Required ambient conditions may be:

- A specific ambient temperature range
- Air composition at the installation site:
 - clean with no damaging contaminants (e.g., dust, fibers, fine sand)
 - free of explosive or chemically-unstable gases or vapors
 - free of acid/alkaline forming substances, particularly ammonia, chlorine or hydrogen sulfide.

5.2 Installation conditions

Precondition The ground must be level, firm and capable of bearing the weight of the machine.



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Fig. 11 Minimum distance from excavations, slopes, or walls

1. Keep sufficient distance (at least 5 feet) from the edges of excavations, slopes, and walls.
2. Ensure that the machine is as level as possible.



The machine can be temporarily operated on a slope of not more than 5°.

3. Ensure accessibility so that all work on the machine can be carried out without danger or hindrance.
4. **NOTICE** *Danger of burning from build up of heat and hot exhaust!*
Insufficient distance from a wall may cause heat build up that could damage the machine.
 - Do not position the machine directly against a wall.
 - Always ensure sufficient ventilation space around the machine.
5. Position the machine as far as possible from any wall.
6. Ensure there is enough free space all round and above the machine.
7. Keep air inlet and outlet openings free of obstructions so that the cooling air can flow freely through the machine.
8. Position the machine in such a manner that:
 - wind does not blow into the cooling air outlet.
 - exhaust gases and heated cooling air can not be drawn into the compressor.
9. **NOTICE** *Ambient temperature too low!*

Frozen condensate and highly viscous engine or compressor cooling oil can cause damage when starting the machine.

- *Use winter grade engine oil.*
- *Use low viscosity compressor cooling oil.*
- *Allow the machine to warm up in IDLE (low speed), see chapter 8.2.3.*

10. At ambient temperatures below 32°F, follow the instructions in chapter 7.4.

6 Installation

6.1 Ensuring safety

Follow the instructions below for safe installation.

Warning instructions are located before a potentially dangerous task.



Disregard of warning instructions can cause serious injuries!

Complying with safety warnings

Disregard of safety warnings can cause unforeseeable dangers!

- Follow the instructions in chapter 3 "Safety and Responsibility".
- Installation work may only be carried out by authorized personnel.

Further information Details of authorized personnel are found in chapter 3.4.2.

Details of dangers and their avoidance are found in chapter 3.5.

6.2 Reporting Transport Damage

1. Check the machine for visible and hidden transport damage.
2. Inform the carrier and the manufacturer in writing of any damage found.

6.3 Fitting the towbar

For space reasons, the machine is mounted on a transport frame when delivered. Prior to removal of the transport frame, you must loosen the transport securing means and install and/or adjust one of the following towing devices as applicable for your machine:

- Shifted adapter  of the height-adjustable towing device.
- Disassembled adapter  of the height-adjustable towing device.
- Shifted fixed-height towing device.
- Disassembled fixed-height towing device.

Material Protective gloves

Wrench

Hard rubber hammer

Precondition The machine is standing firm and level.

The machine is switched off.

CAUTION

Danger of pinching!

Severe pinching injury to fingers is possible.

- *Always wear protective gloves.*
- *Work carefully.*

1. Loosen the transport safety means.
2. Remove the securing strap and the foam from the towing device.

6.3.1 Fitting the height-adjustable towbar

Option sa, sb

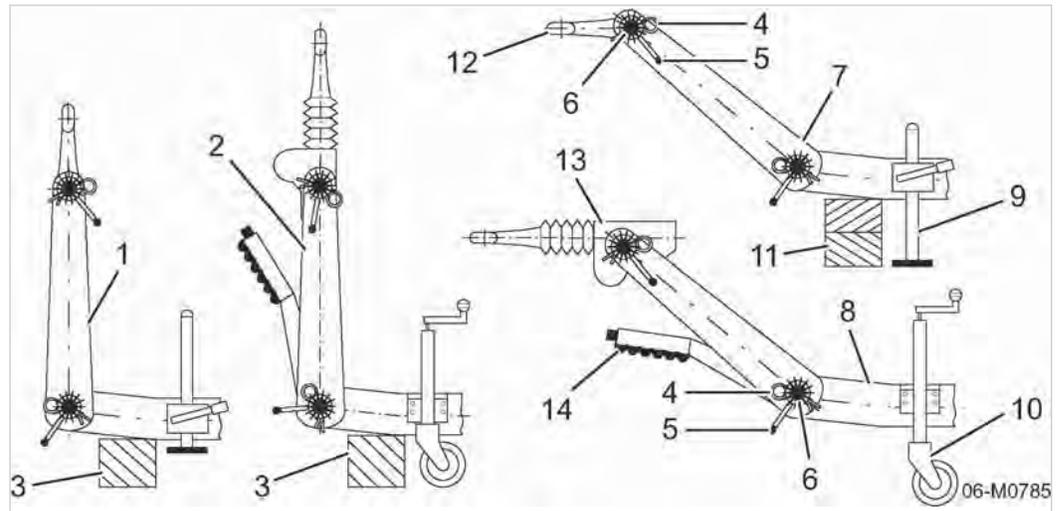


Fig. 12 Fitting the height-adjustable towbar

- | | | | |
|---|----------------------------------|---|---------------------------|
| ① | Delivery state, towing device sa | ⑧ | Towbar tube |
| ② | Delivery state, towing device sb | ⑨ | Prop stand |
| ③ | Transport frame | ⑩ | Jockey wheel |
| ④ | Split pin | ⑪ | Base |
| ⑤ | Locking lever | ⑫ | Towing eye |
| ⑥ | Joint | ⑬ | Overrun braking mechanism |
| ⑦ | Towbar center piece | ⑭ | Parking brake |

Option sa	Option sb
<ol style="list-style-type: none"> 1. Use a suitable base to jack up the towing device until the machine is in horizontal position. 2. Throw the clamping lever to loosen the support's clamp. 3. Push the support downward. 4. Throw the clamping lever to secure the support's clamp. 5. Draw out both split pins. 6. Loosen the lower locking lever. 7. Adjust the adapter. 8. Tighten the lower locking lever. Make sure the teeth in the adjustment joint mesh together. 9. Loosen the upper locking lever. 10. Bring the towing eye into the horizontal position. 11. Tighten the upper locking lever. Make sure the teeth in the adjustment joint mesh together. 12. Secure both locking levers with a tap of a hammer. 13. Insert both split pins. 	<ol style="list-style-type: none"> 1. Crank the jockey wheel downward until the machine is standing horizontally. 2. Draw out both split pins. 3. Loosen the lower locking lever. 4. Adjust the adapter. 5. Tighten the lower locking lever. Make sure the teeth in the adjustment joint mesh together. 6. Loosen the upper locking lever. 7. Bring the overrun braking mechanism into the horizontal position. 8. Tighten the upper locking lever. Make sure the teeth in the adjustment joint mesh together. 9. Secure both locking levers with a tap of a hammer. 10. Insert both split pins.

Result Towing device is pre-assembled.

Further information For adjusting the towing device to the height of the towing vehicle, see chapter 6.4.

6.3.2 Fitting the fixed-height towbar

Option sd, se

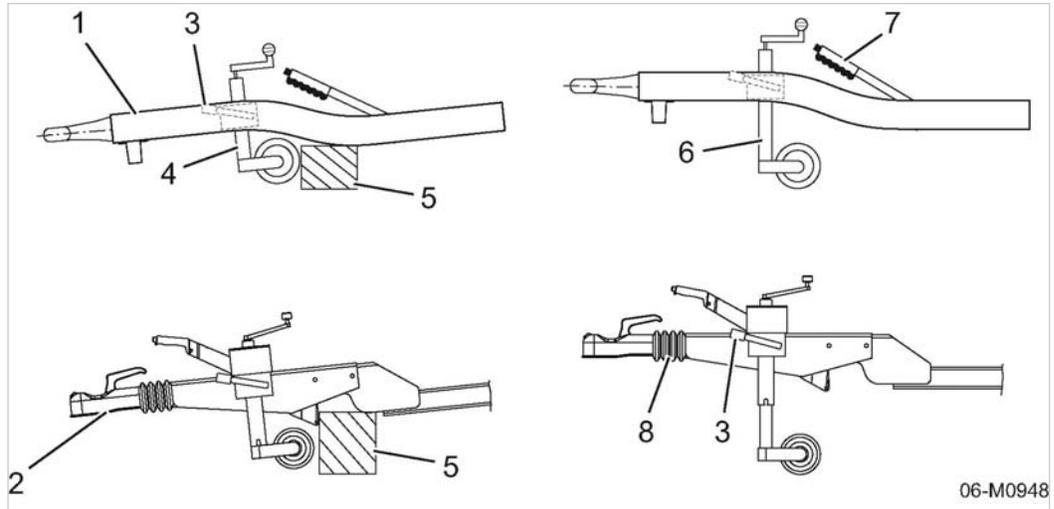


Fig. 13 Fitting the fixed-height towbar

- | | |
|------------------------------------|-----------------------------|
| ① Delivery state, towing device sd | ⑤ Transport frame |
| ② Delivery state, towing device se | ⑥ Jockey wheel cranked down |
| ③ Clamping lever | ⑦ Parking brake |
| ④ Jockey wheel | ⑧ Overrun braking mechanism |

Option sd, se

1. Check whether the clamping levers are properly tightened.
2. Crank down the jockey wheel.
3. Check whether the machine is in horizontal position.
4. If necessary, crank the jockey wheel further down.

Result Towing device is pre-assembled.

6.3.3 Fitting a non-adjustable towbar (US)

Option sh

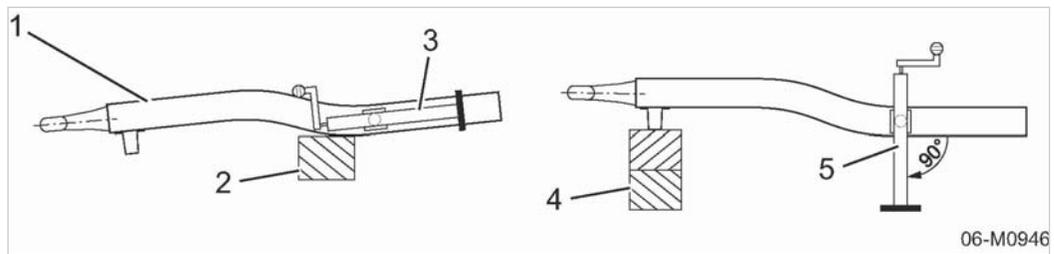


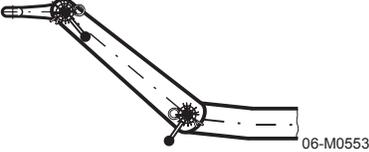
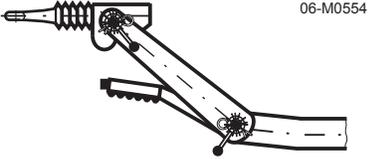
Fig. 14 Fixed-height towbar

- | | |
|-----------------------------|--------------------|
| ① Delivery state, towbar sh | ④ Base |
| ② Transport frame | ⑤ Support (turned) |
| ③ Support (delivery state) | |

1. Use a suitable base to jack up the towing device.
2. Remove the support's safety cotter pin.

3. Turn the support by 90° clockwise.
4. Insert the safety cotter pin.
The support is secured.
5. Lower the support.

6.4 Adjusting the chassis

Height-adjustable towbar		
Option	Type	Illustration
sa	unbraked	
sb	braked	

Tab. 46 Height-adjustable towbar

Material Pliers
Hard rubber hammer

Precondition The machine is shut down.
The machine is disconnected from the towing vehicle and safely parked.

⚠ CAUTION

Danger of pinching!
Severe injury to fingers is possible if they become trapped in the adjusting mechanism.

- *Wear protective gloves.*
- *Work carefully.*

➤ Adhere to the safety instructions in chapter 3.5.

6.4.1 Option sa Adjusting the height on an unbraked towbar

The purpose of height adjustment is to bring the towing eye, or coupling, to the correct height for the towing vehicle.

At the correct height, the towing eye or coupling should be parallel to the ground.

The height is adjusted by two serrated joints.

- Serrated joint 1: Adjustable position of the center piece relative to the chassis.
 - Maximum adjustment upwards: 50°
 - Maximum adjustment downwards: 10°
- Serrated joint 2: Adjustable position of the towing eye or ball coupling relative to the center piece.

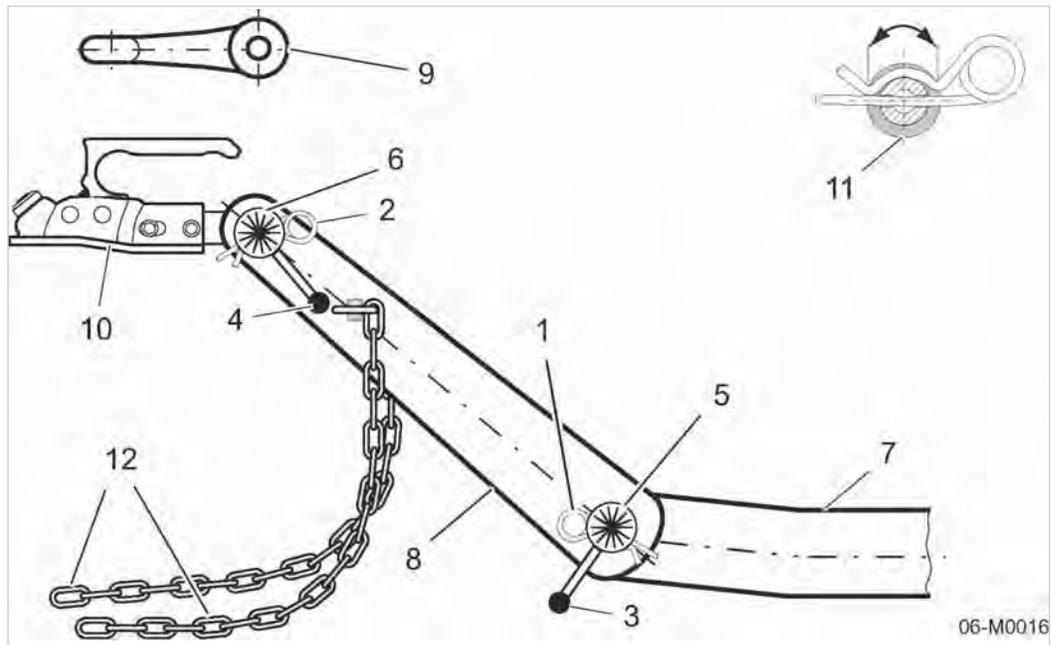


Fig. 15 Height-adjustable towbar sa

- | | |
|----------------------|---------------------------------|
| (1,2) Split pin | (8) Towbar center piece |
| (3,4) Locking lever | (9) Ball coupling |
| (5) Serrated joint 1 | (10) Towing eye |
| (6) Serrated joint 2 | (11) Split pin securing diagram |
| (7) Towbar tube | |

1. Draw out the split pin (1).
2. Undo the locking lever (3) until the serrated joint (5) is disengaged.
3. Make the angle adjustment to the serrated joint (5).
4. Tighten the locking lever (3) making sure the serrations engage.
5. Draw out the split pin (2).
6. Undo the locking lever (4) until the serrated joint (6) is disengaged.
7. Adjust the angle of the serrated joint (6) to bring the towing eye or coupling parallel to the ground at the height of the towing vehicle hitch.
8. Tighten the locking lever (4) making sure the serrations engage.
9. Check the height adjustment.

Check if:

 - the towing eye (10) or coupling is at the right height and parallel to the ground,
 - the serrated joints (5) and (6) are fully engaged,
 - The locking levers (3) and (4) are tightened.

10. Make sure the locking levers ③ and ④ are tight by striking with a hard rubber hammer.
11. Insert the split pins ① and ②.
12. Check the correct position of the split pin.



The split pin must be fully inserted so that it is trapped by its bow over the axis of the locking lever (see 15.).

Check locking position ①①.

- Split pin ① properly inserted.
- Split pin ② properly inserted.

13. Tighten the locking lever again after 30 miles.



The serrations in the adjustment joint will not disengage. The serrations are corroded together.

- Free the serrations by jerking the towbar horizontally and vertically.

6.4.2 Option sb Adjusting the height on a braked towbar

The purpose of height adjustment is to bring the towing eye, or coupling, to the correct height for the towing vehicle.

At the correct height, the towing eye or coupling should be parallel to the ground.

The height is adjusted by two serrated joints.

- Serrated joint 1: Adjustable position of the center piece relative to the chassis.
 - Maximum adjustment upwards: 50°
 - Maximum adjustment downwards: 10°
- Serrated joint 2: Adjustable position of the towing eye or ball coupling relative to the center piece.

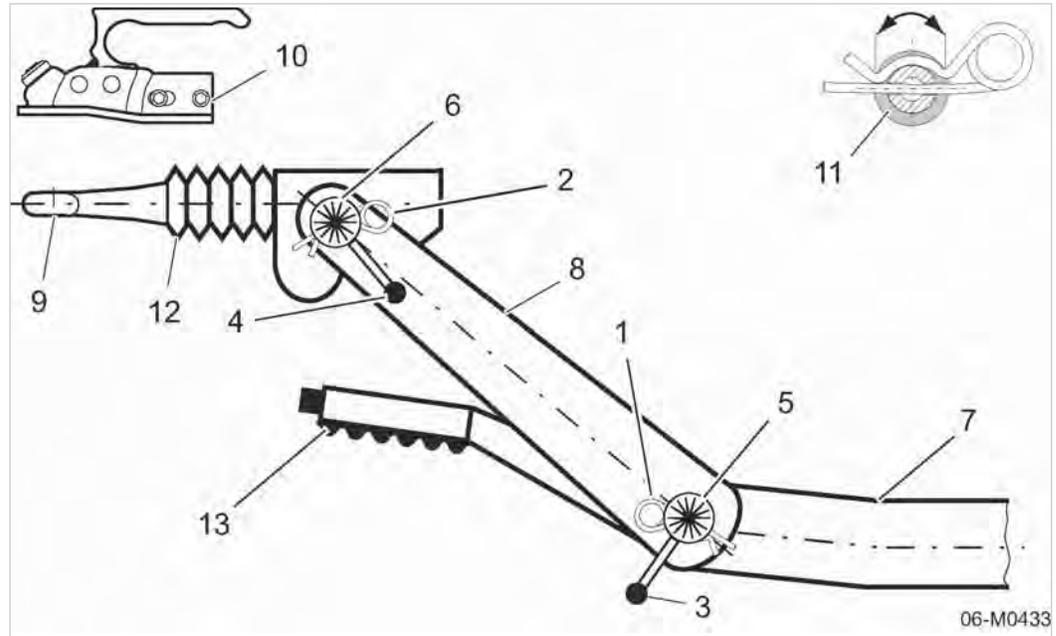


Fig. 16 Height-adjustable towbar sb

①,②	Split pin	⑨	Towing eye
③,④	Locking lever	⑩	Ball coupling
⑤	Serrated joint 1	⑪	Split pin securing diagram
⑥	Serrated joint 2	⑫	Overrun damper
⑦	Towbar tube	⑬	Parking brake
⑧	Towbar center piece		

1. Draw out the split pin ①.
2. Undo the locking lever ③ until the serrated joint ⑤ is disengaged.
3. Make the angle adjustment to the serrated joint ⑤.
4. Tighten the locking lever ③ making sure the serrations engage.
5. Draw out the split pin ②.
6. Undo the locking lever ④ until the serrated joint ⑥ is disengaged.
7. Adjust the angle of the serrated joint ⑥ to bring the towing eye or coupling parallel to the ground at the height of the towing vehicle hitch.
8. Tighten the locking lever ④ making sure the serrations engage.
9. Check the height adjustment.
Check if:
 - the towing eye ⑨ or coupling is at the right height and parallel to the ground,
 - the serrated joints ⑤ and ⑥ are fully engaged,
 - The locking levers ③ and ④ are tightened.
10. Make sure the locking levers ③ and ④ are tight by striking with a hard rubber hammer.
11. Insert the split pins ① and ②.

12. Check the correct position of the split pin.



The split pin must be fully inserted so that it is trapped by its bow over the axis of the locking lever (see 16).

Check locking position **(11)**.

- Split pin **(1)** properly inserted.
- Split pin **(2)** properly inserted.

13. Tighten the locking lever again after 50 km.



The serrations in the adjustment joint will not disengage. The serrations are corroded together.

- Free the serrations by jerking the towbar horizontally and vertically.

6.4.3 Changing the towing eye

The towbar can be fitted with various towing eyes or couplings.

Material Protective gloves
Wrench
Hammer
Installation pin (thin metal rod \varnothing 0.3 – 0.4 inch)

Precondition The machine is shut down.
The machine is disconnected from the towing vehicle and safely parked.

- Ascertain which towbar is fitted to the machine.

6.4.3.1 Option sa Changing the towing eye on the towbar

The following alternative tasks must be carried out to change the towing eye or coupling.

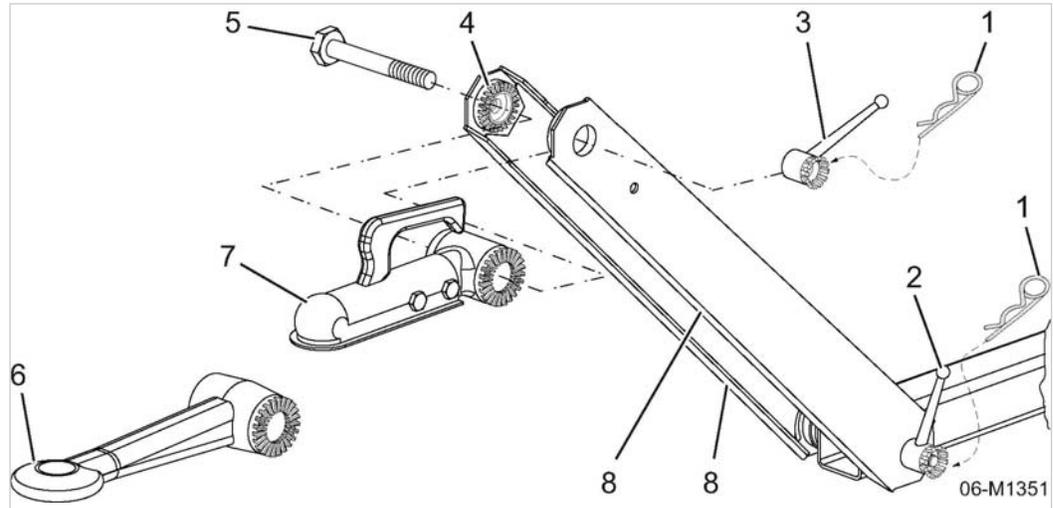


Fig. 17 Changing the towing eye (height-adjustable drawbar)

- | | |
|------------------|-----------------|
| ① Split pin | ⑤ Screw |
| ② Locking lever | ⑥ Towing eye |
| ③ Locking lever | ⑦ Ball coupling |
| ④ Serrated joint | ⑧ Side part |

Removing the ball coupling	Removing the towing eye
1. Remove both split pins ①.	1. Remove both split pins ①.
2. Loosen and remove the locking lever ③.	2. Loosen and remove the locking lever ③.
3. Loosen the locking lever ② 1-2 turns.	3. Loosen the locking lever ② 1-2 turns.
4. Shake the side parts.	4. Shake the side parts.
5. Check if the serrated joints have sufficient movement.	5. Check if the serrated joints have sufficient movement.
6. Secure the ball coupling ⑦ and withdraw the screw ⑤ from the side part ⑧.	6. Secure the towing eye ⑥ and withdraw the screw ⑤ from the side parts ⑧.
7. Remove the ball coupling.	7. Remove the towing eye.

Fitting the ball coupling	Fitting the towing eye
1. Position the new ball coupling between the two serrated joints of the side parts.	1. Position the new towing eye between the two serrated joints of the side parts.
2. Pass the hex-head bolt fully through the side parts.	2. Pass the hex-head bolt fully through the side parts.
3. Screw the locking lever ③ onto the thread of the bolt.	3. Screw the locking lever ③ onto the thread of the bolt.
4. Check if: <ul style="list-style-type: none"> ■ The serrated joints correctly engage with each other. ■ The ball coupling is set horizontally. 	4. Check if: <ul style="list-style-type: none"> ■ The serrated joints correctly engage with each other. ■ The ball coupling is set horizontally.
5. Tighten the locking lever ②.	5. Tighten the locking lever ②.
6. Tighten the locking lever ③.	6. Tighten the locking lever ③.
7. Check if: <ul style="list-style-type: none"> ■ Both side parts are correctly seated. ■ The ball coupling is correctly seated. 	7. Check if: <ul style="list-style-type: none"> ■ Both side parts are correctly seated. ■ The towing eye is correctly tightened.
8. Insert both split pins.	8. Insert both split pins.

6.4.3.2 Option sb, se Changing the towing eye on the towbar with service brake

The shock absorber is secured in the rear fixing screw. The shock absorber extends automatically. Use a mounting pin (thin metal rod with \varnothing 0.3 – 0.4 inch) for the installation.

The following tasks must also be carried out to change the towing eye or coupling.

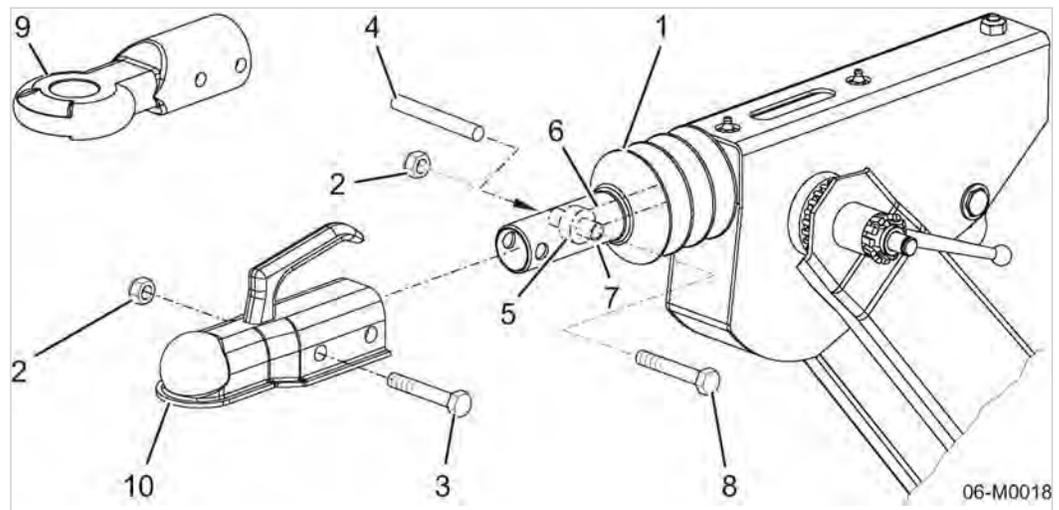


Fig. 18 Changing the towing eye (towbar with service brake)

- | | |
|-----------------------------|------------------|
| ① Protective sleeve | ⑥ Shock absorber |
| ② Self-locking nut | ⑦ Towbar tube |
| ③ Screw | ⑧ Screw |
| ④ Mounting pin | ⑨ Towing eye |
| ⑤ Shock absorber fixing eye | ⑩ Ball coupling |

Removing the ball coupling	Removing the towing eye
<ol style="list-style-type: none"> 1. Push back the protective sleeve (1). 2. Unscrew and remove the nuts (2) of both screw connections. 3. Use the mounting pin (4) to beat out the rear screw (8). Do not remove the pin in order to retain the centering of the shock absorber (6) in the towbar tube. 4. Remove the front screw (3). 5. Remove the ball coupling (10) from the towbar (7). 	<ol style="list-style-type: none"> 1. Push back the protective sleeve (1). 2. Unscrew and remove the nuts (2) of both screw connections. 3. Use the mounting pin (4) to beat out the rear screw (8). Do not remove the pin in order to retain the centering of the shock absorber (6) in the towbar tube. 4. Remove the front screw (3). 5. Remove the towing eye (9) from the towbar (7).
Fitting the ball coupling	Fitting the towing eye
<ol style="list-style-type: none"> 1. Push the new ball coupling (10) onto the towbar (7) until the fixing holes match. 2. Use the screw (8) at the rear fixing hole of the ball coupling to beat out the mounting and pin and to thread the shock absorber. 3. Insert the screw (3) through the front fixing hole. 4. Thread self-locking nuts (2) on both screws and tighten with torque wrench (see chapter 2.4.4). 5. Pull the protective sleeve to cover the screw connections. 	<ol style="list-style-type: none"> 1. Push the new towing eye (9) onto the towbar (7) until the fixing holes matches. 2. Use the screw (8) at the rear fixing hole of the ball coupling to beat out the mounting and pin and to thread the shock absorber. 3. Insert the screw (3) through the front fixing hole. 4. Thread self-locking nuts (2) on both screws and tighten with torque wrench (see chapter 2.4.4). 5. Pull the protective sleeve to cover the screw connections.

Checking the overrun braking mechanism

- Push the towbar tube in and out by hand.
If resistance is felt, the shock absorber is properly connected.

6.4.3.3 Option sd Changing the towing eye on the towbar

The following tasks must also be carried out to change the towing eye or coupling.

Option sd

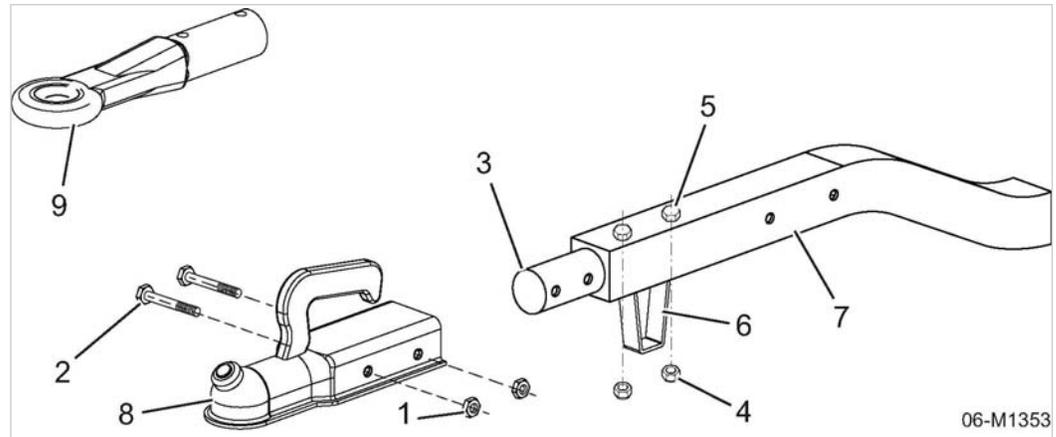


Fig. 19 Changing the towing eye

- | | |
|---------------------------------------|-----------------|
| ① Self-locking nut | ⑥ Prop stand |
| ② Screw (horizontal screw connection) | ⑦ Towbar tube |
| ③ Adapter | ⑧ Ball coupling |
| ④ Self-locking nut | ⑨ Towing eye |
| ⑤ Screw (vertical screw connection) | |

Removing the ball coupling	Removing the towing eye
1. Unscrew and remove the nuts ① of the horizontal screw connections.	1. Unscrew and remove the nuts ④ of the vertical screw connections.
2. Remove the screws ②.	2. Remove the prop stand ⑥.
3. Remove the coupling ⑧ from the adaptor ③.	3. Remove the screws ⑤.
4. Unscrew and remove the nuts ④ of the vertical screw connections.	4. Remove the towing eye ⑨ from the towbar ⑦.
5. Remove the prop stand ⑥.	
6. Remove the screws ⑤.	
7. Remove the adaptor from the towbar ⑦.	

Fitting the ball coupling	Fitting the towing eye
1. Align the adapter according to the corresponding bores in the tow bar tube.	1. Fit the new towing eye in the towbar.
2. Push the adapter into the towbar tube.	2. Position the towing eye so that the bolts can be freely inserted.
3. Position the adaptor so that the bolts can be freely inserted.	3. Insert the screws through the vertical fixing holes.
4. Insert the screws through the vertical fixing holes.	4. Position the support.
5. Position the support.	5. Secure the screws with the self-locking nuts.
6. Secure the screws with the self-locking nuts.	
7. Slide the new ball coupling onto the adapter.	
8. Position the ball coupling so that the bolts can be freely inserted.	
9. Insert the screws through the horizontal fixing holes.	
10. Secure the screws with the self-locking nuts.	

**6.4.3.4 Option sh
Changing the towing eye on a US towbar**

The following alternative tasks must be carried out to change the towing eye or coupling.

Option sh

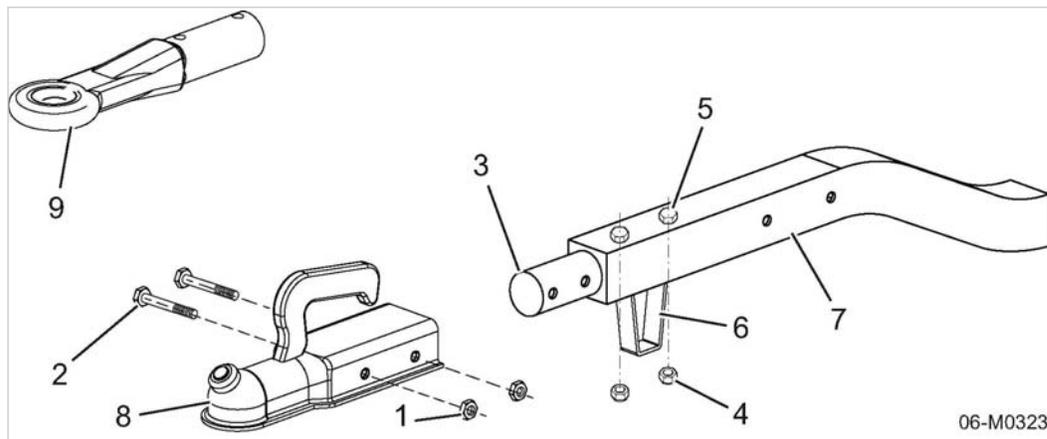


Fig. 20 Changing the towing eye (US version)

- | | |
|---------------------------------------|-----------------|
| ① Self-locking nut | ⑥ Prop stand |
| ② Screw (horizontal screw connection) | ⑦ Towbar tube |
| ③ Adapter | ⑧ Ball coupling |
| ④ Self-locking nut | ⑨ Towing eye |
| ⑤ Screw (vertical screw connection) | |

Removing the ball coupling	Removing the towing eye
<ol style="list-style-type: none"> 1. Unscrew and remove the nuts ① of the horizontal screw connections. 2. Remove the screws ②. 3. Remove the coupling ⑧ from the adaptor ③. 4. Unscrew and remove the nuts ④ of the vertical screw connections. 5. Remove the prop stand ⑥. 6. Remove the screws ⑤. 7. Remove the adaptor from the towbar ⑦. 	<ol style="list-style-type: none"> 1. Unscrew and remove the nuts ④ of the vertical screw connections. 2. Remove the prop stand ⑥. 3. Remove the screws ⑤. 4. Remove the towing eye ⑨ from the towbar ⑦.
Fitting the ball coupling	Fitting the towing eye
<ol style="list-style-type: none"> 1. Align the adapter according to the corresponding bores in the tow bar tube. 2. Push the adapter into the towbar tube. 3. Position the adaptor so that the bolts can be freely inserted. 4. Insert the screws through the vertical fixing holes. 5. Position the support. 6. Secure the screws with the self-locking nuts. 7. Slide the new ball coupling onto the adaptor. 8. Position the ball coupling so that the bolts can be freely inserted. 9. Insert the screws through the horizontal fixing holes. 10. Secure the screws with the self-locking nuts. 	<ol style="list-style-type: none"> 1. Fit the new towing eye in the towbar. 2. Position the towing eye so that the bolts can be freely inserted. 3. Insert the screws through the vertical fixing holes. 4. Position the support. 5. Secure the screws with the self-locking nuts.

7 Initial Start-up

7.1 Ensuring safety

Here you will find instructions for safe commissioning of the machine. Warning instructions are located before a potentially dangerous task.



Disregard of warning instructions can cause serious injuries!

Complying with safety warnings

Disregard of safety warnings can cause unforeseeable dangers!

- Follow the instructions in chapter 3 “Safety and Responsibility”.
- Commissioning work may only be carried out by authorized personnel!
- Make sure that no one is working on the machine.
- Ensure that all service doors and panels are locked.

Further information Details of authorized personnel are found in chapter 3.4.2.
Details of dangers and their avoidance are found in chapter 3.5.

7.2 Before initial start-up (or recommissioning)

Incorrect or improper commissioning can cause injury to persons and damage to the machine.

7.2.1 Instructions to be observed before commissioning or recommissioning



The initial start-up of every machine takes place at the factory. Every machine is also given a trial run and passes a careful check.

- Commissioning may only be carried out by authorized installation and service personnel who have been trained on this machine.
- Remove all packing materials on and in the machine.
- Observe the machine during the first few hours of operation to ensure that it is operating correctly.

7.2.2 Special measures for recommissioning after storage

- Carry out the following before every start-up after long period of storage:

Storage period longer than:	Remedy
5 months	<ul style="list-style-type: none"> ➤ Remove the desiccant from the openings in the air intake filters of the engine and compressor. ➤ Check the air and oil filters. ➤ Drain the preserving oil from the separator tank. ➤ Fill with cooling oil. ➤ Drain the preserving oil from the engine. ➤ Fill with engine oil. ➤ Check the engine coolant ➤ Check the battery charge. ➤ Re-connect the battery (batteries). ➤ Check all fuel lines, engine oil lines and compressor cooling oil lines for leaks, loose connections, wear and damage. ➤ Clean the bodywork with a grease and dirt dissolving agent. ➤ Check the tire pressures.
36 months	<ul style="list-style-type: none"> ➤ Have the overall technical condition checked by an authorized KAESER service representative.

Tab. 47 Measures for recommissioning the compressor after a long period of storage

7.3 Checking installation and operating conditions

- Check and confirm all the items in the checklist before starting the machine.

Task	See chapter	Confirmed?
➤ Are the operators completely familiar with safety regulations?	–	
➤ Have all the positioning conditions been fulfilled?	5	
➤ Is there sufficient cooling oil in the separator tank?	10.4.1	
➤ Is there sufficient oil in the engine?	10.3.4	
➤ Is the maintenance indicator on the air intake filters (engine and compressor) OK?	10.3.2, 10.4.7	
➤ Is there sufficient coolant in the coolant expansion tank?	10.3.1	
➤ Is there sufficient fuel in the fuel tank?	–	
➤ Is there sufficient tool oil in the tool lubricator? (Option ea, ec)	10.8.1	
➤ Is there enough antifreeze in the frost protector? (Option ba)	10.8.3	
➤ Are the access doors closed and all body panels in place?	–	
➤ Are the tire pressures OK?	–	

Tab. 48 Installation conditions checklist

7.4 Low-temperature operation (winter)

The machine's electrical equipment is designed for starting at ambient temperatures as low as 14°F.

- In temperatures below 32°F, use the following operating materials/components:
 - Winter-grade engine oil,
 - Low viscosity cooling oil for the compressor,
 - Winter-grade diesel fuel
 - Stronger battery



Use air hoses that are as short as possible under extremely cold conditions.

Allow the engine to warm up:

1. **NOTICE** *Problems with pneumatic control at low temperatures. Damage to the machine may be caused by ice particles in the pneumatic control and feedback systems.*
 - *Let the machine warm up in IDLE to ensure trouble-free regulation.*
2. Allow the machine to warm up in idle with open air outlet valves until an airend discharge temperature of 86°F is reached. The airend discharge temperature is shown on the temperature gauge switch on the instrument panel.

7.4.1 Starting assistance

If the machine's starter battery is discharged, it can be started with the battery of another vehicle or engine-driven machine.

Material Jumper cables

Precondition The machine is disconnected from the towing vehicle and safely parked.

⚠ WARNING

Fire and explosion hazard.

High currents caused by short-circuited battery. A shorted/damaged battery can catch fire or explode.

Battery casing may crack and allow acidic fluid to spray out.

- *Observe the instructions provided with the battery jumper cables.*
- *Do not connect the battery jumper cables to the negative pole of the discharged battery or to the bodywork of the machine.*
- *Work with caution.*

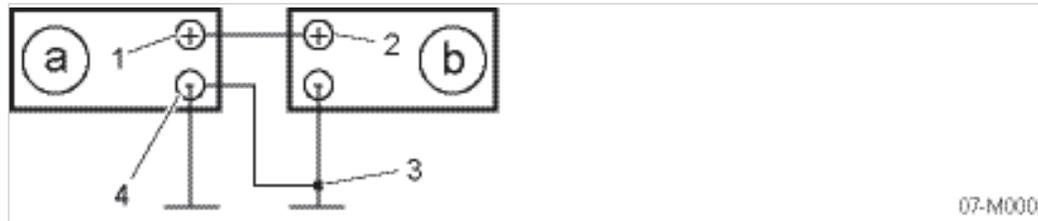


Fig. 21 Jumper cable connection diagram

- | | | | |
|---|--|---|--|
| Ⓐ | Assisting vehicle battery (external donor battery) | ② | Positive (+) terminal of the machine battery |
| Ⓑ | Engine battery (receiving battery) | ③ | Bare metal point on the engine block (ground) |
| ① | Positive (+) terminal starting assistance | ④ | Negative (-) terminal of assisting vehicle battery |

Observing the safety instructions:

1. **⚠ WARNING** *Fault in starting aid process!*
 - *Connect batteries of the same voltage only.*
 - *Ensure that machine and assisting vehicle do not touch.*
 - *Switch off all air/power consumers prior to connecting and disconnecting the batteries.*
 - *Only use battery jumper cables of sufficient cross-sectional diameters and with insulated terminal clamps.*
 - *Observe the instructions provided with the battery jumper cables.*
 - *Keep jumper cables away from rotating parts.*
 - *Avoid short-circuits due to incorrect poling and/or bridging with tools.*
 - *Do not bend over the battery when attaching jumper cables.*
 - *Do not attempt to start the machine if its battery is frozen. Allow the battery to thaw first.*
 - *Do not try to start the machine with a boost charger.*
2. Comply with the safety instruction shown when using starting aids and starter batteries.

Preparations

1. Park the assisting vehicle in close distance to the engine, without their bodywork touching each other.
2. Stop the engine of the assisting vehicle.
3. Open the accesses to the batteries (remove maintenance panels and pole caps).
4. Switch off all power consumers.

Connecting the battery jumper cables

1. Connect positive terminals ② and ①.
2. **⚠ DANGER** *Explosion hazard!*

7 Initial Start-up

7.4 Low-temperature operation (winter)

A spark may ignite an explosive gas mixture.

- *Do not, under any circumstances, connect the negative pole of the assisting machine to the negative pole of the battery in the machine to be started. This can cause sparks when connecting and disconnecting.*
- *Work with caution.*

3. Connect the minus terminal of the assisting battery (4) to a bare metal point on the compressor engine to be started (3) as far away from the battery as possible.

Starting the engine

1. Start the engine of the assisting vehicle and run at high speed.
2. Start the compressor engine.



Upon a successful start, run both engines for approximately 10 – 15 minutes. This is important, in particular for fully discharged batteries. They will pick up little current only in the beginning and have a high internal resistance. Any voltage peaks occurring in the engine generator in this state can be attenuated only by the battery of the assisting vehicle. The engine electronics in particular, of the machine is sensitive to overvoltage and could be damaged easily.

Disconnecting the battery jumper cables

1. Stop the engine of the assisting vehicle.
2. Disconnect the jumper cables in the reverse order, first negative (-) then positive (+).
3. Replace the pole caps.
4. Close the maintenance panels.



If the compressor engine stops as soon as the cables are disconnected, it can mean serious damage to the alternator or battery and it should be handed over to a specialized workshop.

7.4.2 Option ba, bb Starting up low-temperature equipment

- Ascertain which low temperature equipment is fitted to the machine.

Option ba Operating the frost protector

- Use the checklist when first starting the frost protector.

To be checked	See chapter	Confirmed?
Check the level of antifreeze in the frost protector.	10.8.3	
Close the tap on the frost protector.	8.4	

Tab. 49 Frost protector checklist

Option bb Operating the coolant pre-heater:

The engine coolant can be pre-heated to improve cold-starting.

The connection for the power supply is located on the right side of the machine (see illustration).

Option bb

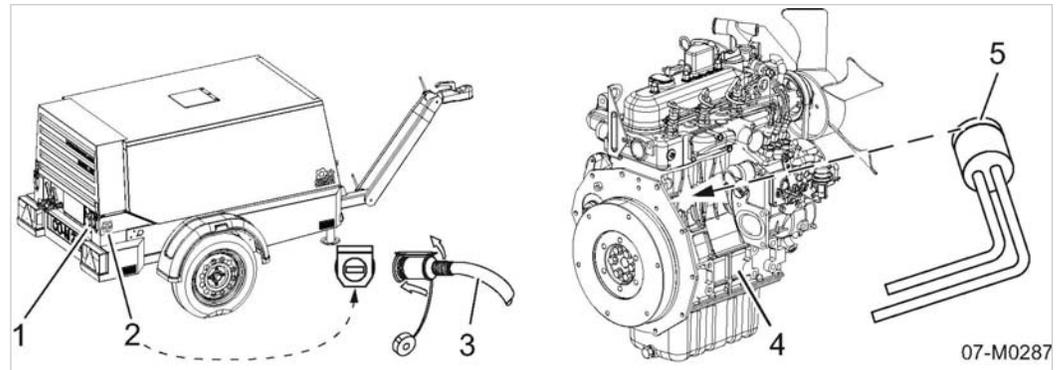


Fig. 22 Coolant pre-heater checklist

- | | | | |
|---|---------------------------------------|---|---------------------|
| ① | Control panel | ④ | Engine block |
| ② | Connection for the coolant pre-heater | ⑤ | Coolant pre-heating |
| ③ | Power cable | | |

1. **⚠ DANGER** *Danger of fatal injury from electric shock!*
Serious injury or death can result from a short-circuit in the electric coolant pre-heater.
 - *The power cable for the coolant pre-heater may only be plugged into an electrical socket fitted with a protective ground.*
 - *Have the coolant pre-heating and associated wiring checked according to the maintenance schedule.*
2. Connect the coolant pre-heater to the user's power socket with the power cable supplied.

8 Operation

8.1 Ensuring safety

Here you will find instructions for safe commissioning of the machine.
Warning instructions are located before a potentially dangerous task.



Disregard of warning instructions can cause serious injuries!

Complying with safety warnings

Disregard of safety warnings can cause unforeseeable dangers!

- Follow the instructions in chapter 3 “Safety and Responsibility”.
- Make sure that no one is working on the machine.

⚠ WARNING

*Danger of injury from hot, rotating and electrically live components!
Serious injury can be caused by touching such components.*

- *Ensure that all doors/canopy and panels are locked.*
- *Shut down the machine before opening any doors/canopy.*
- *Do not carry out any checks or settings while the machine is running.*

Further information Details of authorized personnel are found in chapter 3.4.2.
Details of dangers and their avoidance are found in chapter 3.5.

8.2 Starting and stopping

Precondition No personnel are working on the machine

NOTICE

*Serious damage to engine from cold starting sprays.
Cold-start assists, such as ether or other sprays, can cause severe engine damage.*

- *Do not use cold start sprays.*

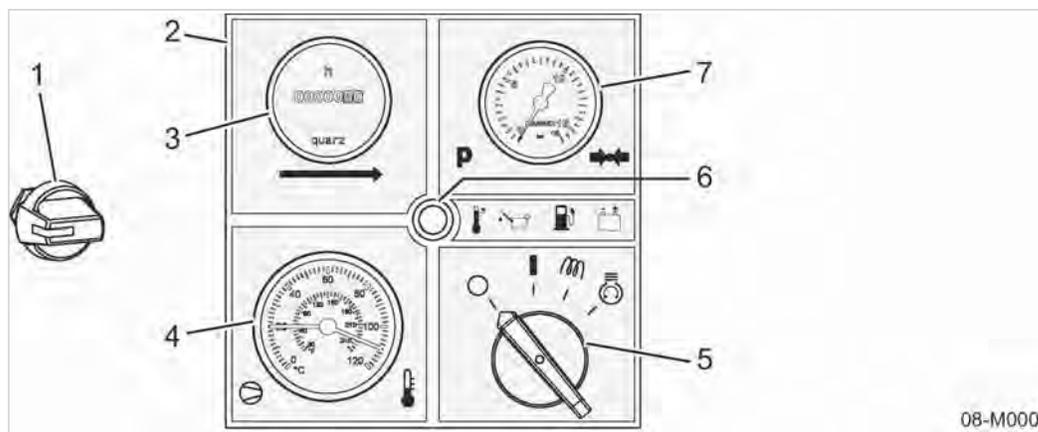


Fig. 23 Starting instruments

- | | |
|----------------------------|---|
| ① «Controller On» switch | ⓘ ON |
| ② Instrument panel | Ⓜ Preheating |
| ③ Operating hours counter | Ⓜ START |
| ④ Temperature gauge switch | Ⓜ Charging indicating light, Group alarm lamp |
| ⑤ «Starter switch »: | Ⓜ Compressed air outlet pressure gauge |
| ⑥ STOP / OFF | |

Notes concerning snow and ice

Considerable snow or ice may build up on the machine under low temperature conditions.

- Remove any snow and ice from the machine before operating.

8.2.1 Commissioning the machine

1. Open the canopy.
2. Turn the «Controller ON» ② switch to the I position.
3. Close and lock the canopy.
4. Open all compressed air outlet valves.

8.2.2 Starting the machine

1. **NOTICE** *Destruction of the starter!*
Improper operation could destroy the starter.
 - As long as the engine is running, do not actuate the starter switch.
 - Do not turn and hold the starter switch for longer than 30 seconds.
 - Wait for a few minutes after each attempt to start the engine.
 - The starter switch must be returned to the neutral position before each start attempt (re-start protection).
2. Turn the «ignition switch» ⑤ to the "I" position.
 The *charging indicator light* must be lit.
3. Turn the «starter switch» to "II" and hold (max. 5-10 seconds).
 The engine's glow plugs are energized and the engine preheated.

4. Turn the «starter switch» to "III" and release it as soon as the engine starts.

The *charging indicator light* extinguishes as soon as the engine is running.

A fault has occurred if the *charging indicator light* does not extinguish, see chapter 9.2.



The electric fuel pump starts automatically during preheating. This vents the fuel line before each start.

Maximum preheating time should be 5-10 seconds.

8.2.3 Allow the machine to run up to operating temperature

To avoid unnecessary wear, the engine should be run in IDLE until the airend discharge temperature reaches 68°F. The airend discharge temperature is shown by the temperature gauge switch on the instrument panel.

Option ba

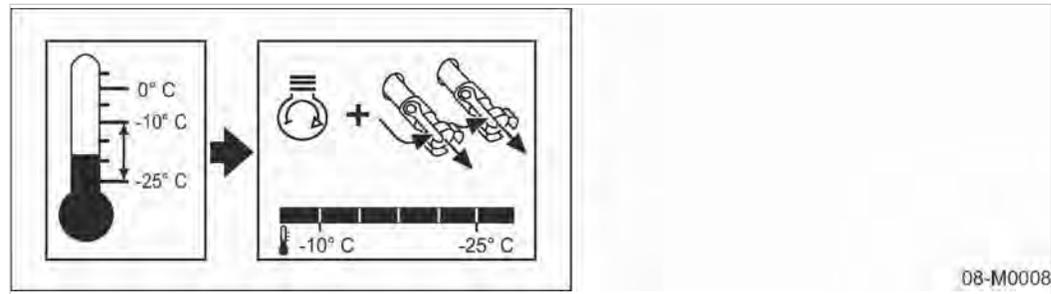


Fig. 24 Warm-up period when ambient temperatures are below 14°F

- Allow the machine to warm up in IDLE (low speed).

8.2.4 Running the machine under load

Precondition The airend discharge temperature must be at least 68°F.

1. Connect the consumer to the compressed air outlet valves.
2. Open the compressed air outlet valves.

8.2.5 Shutting down the machine

1. Close the «compressed air outlet valves» on the air distributor.
The engine runs in IDLE.
2. Turn the «starter switch» to "0" position.
The engine turns off.

Shutting down the machine

1. Open the canopy.
2. Turn the «Controller ON» switch to "0" position.
3. Close the canopy.



Lock the canopy if necessary.

8.3 Option ea Operating the tool lubricator

Precondition The machine is shut down.
Tool lubricator filled with oil

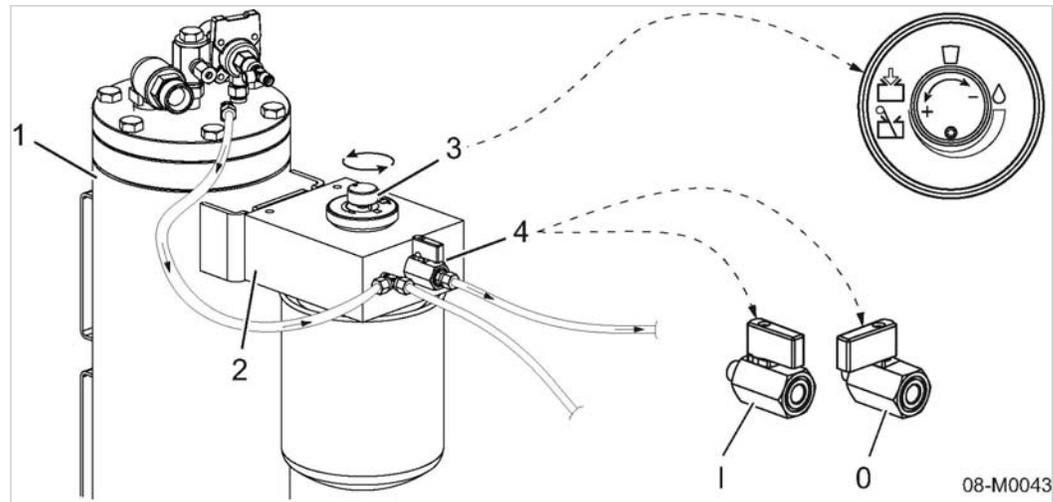


Fig. 25 Setting the tool lubricator

- | | |
|----------------------|------------------|
| ① Oil separator tank | ③ Metering knob |
| ② Tool lubricator | ④ Shut-off valve |
| | I – open |
| | 0 – closed |

➤ Open the canopy.

Adding lubricating oil

1. Open the shut-off valve ④.
2. Close the canopy.

Setting the oil flow

The amount of oil the compressed air should contain depends on the application and must be determined by the user. It depends on the nature of the air consumers and the supply hoses.

The metering valve controls the flow of oil into the air.

- Turning clockwise: reduces the oil flow.
- Turning counter-clockwise: increases the oil flow.

1. Set the required oil flow.
2. Close the canopy.

Further information Fill the tool lubricator with suitable oil (see chapter 10.8.1)

Shutting off lubricating oil

1. Close the shut-off valve ④.
2. Close the canopy.

**8.4 Option ba, bb
Using the low-temperature equipment**

- Determine which low temperature equipment is fitted to the machine.

**8.4.1 Option ba
Operating the machine with frost protector**

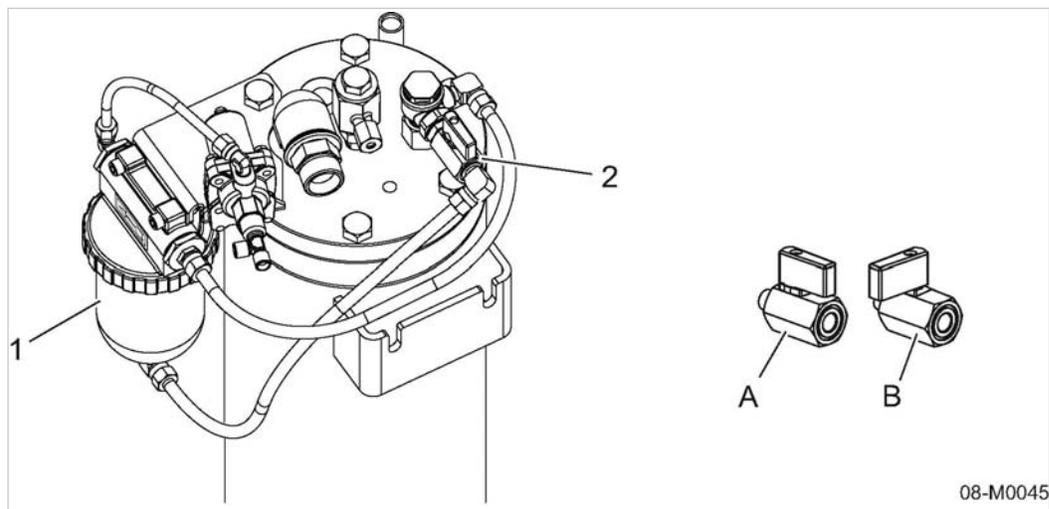


Fig. 26 Frost protector on and off

- ① Frost protector tank
- ② Shut-off valve
A – open
B – closed

Switching on the frost protector:

Operation at temperatures below 32°F (winter operation):

After each daily operation of the machine, the compressed air conduits and valves must be moistened with antifreeze.

For this purpose, the defroster must be activated for a short time. Antifreeze is added to the compressed air.

Precondition Frost protector filled with antifreeze
The machine is switched off.

1. Raise the canopy.
2. Open the shutoff valve ② on the frost protector (position A).
3. Close the canopy.
4. Start the machine.

5. Let the machine run for a short time.
6. Switch the machine off.
7. Raise the canopy.
8. Close the shutoff valve  on the frost protector (position B).

Result Conduits and valves are sufficiently moistened.
The machine is ready for winter operation.



The container for the antifreeze agent is empty.
➤ Activate the defroster only for a short time, after daily use.



Activate the defroster only for a short time as described above. The antifreeze agent will be used up unnecessarily if the defroster runs continuously.

Further information See chapter 10.8.3 for filling the frost protector with antifreeze.

Using with the frost protector switched off

Operating at temperatures above 32°F (summer operation):

Precondition The machine is switched off.

1. Raise the canopy.
2. Keep the frost protector shut-off valve permanently closed (position 0).
3. Close the canopy.

8.4.2 Option bb Coolant pre-heating

- Start the coolant pre-heating as described in chapter 7.4.2.

8.5 Option oa Operating the battery isolating switch

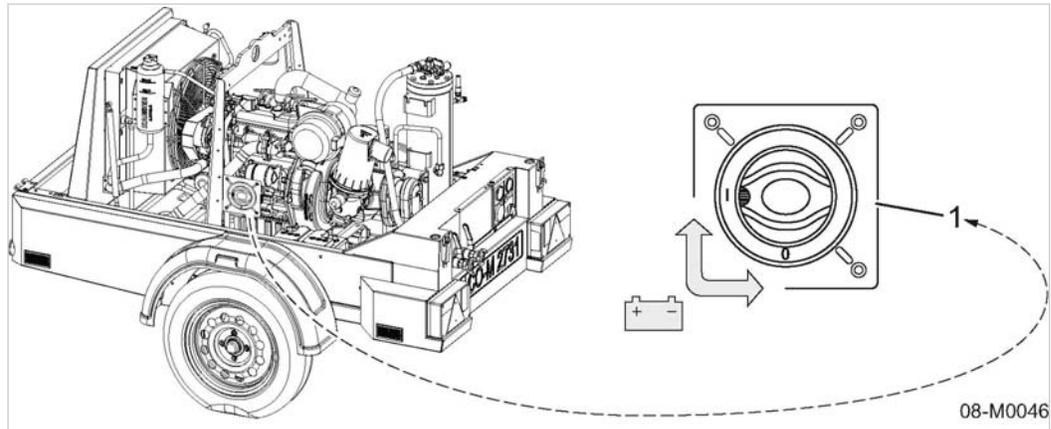


Fig. 27 Battery isolating switch

- ① «Battery isolating switch»
I – on
0 – off

➤ Open the canopy.

Start the machine

1. Switch the «battery isolating switch» on.
The battery is now connected to the machine's electrical system. The machine can now be started.
2. Close the canopy.

Shutting down the machine

1. Switch the «battery isolating switch» to the “off” position.
The battery is disconnected from the machine's electrical system.
2. Close the canopy.

8.6 Option ua Using the hose reel

The hose reel is fitted at the front of the machine, to the right side of the towbar. An additional shut-off valve for the compressed air extension hose facilitates activating the compressed air at the front of the machine.

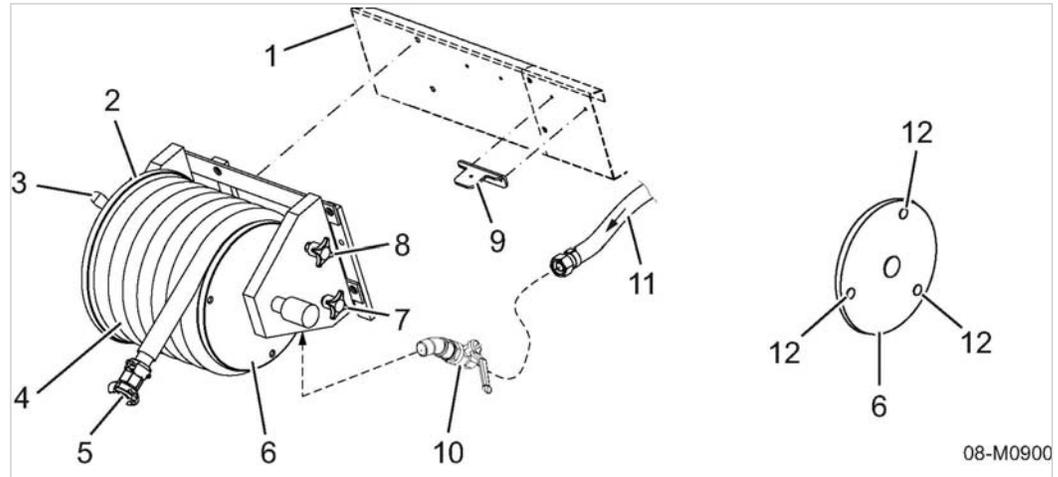


Fig. 28 Hose reel

- | | | | |
|---|-----------------------------|---|---|
| ① | Front side, machine | ⑦ | Clamping screw |
| ② | Hose reel | ⑧ | Transport securing screw |
| ③ | Winding handle (fold out) | ⑨ | Bracket |
| ④ | Hose | ⑩ | Shut-off valve, compressed air extension hose |
| ⑤ | Hose coupling | ⑪ | Hose from compressed air distribution |
| ⑥ | Side wall with safety bores | ⑫ | Securing pin hole |

8.6.1 Operating the machine with an extension air hose

1. Pull the hose coupling ⑤ of the bracket ⑨.
2. Loosen the transport securing bolt ⑧.
3. Loosen the clamping screw ⑦.
4. Unfold the crank ③.
5. Reel out the required length of hose ④.
6. Tighten the clamping screw ⑦.
The reel is locked against unwanted reeling in or out.
7. Fold the crank ③.
8. Connect the air tool.
9. Put the machine into operation.
10. Open the shut-off valve for the compressed air extension hose ⑩.

8.6.2 Operating the machine without an extension air hose

1. Close the shut-off valve for the compressed air extension hose.
2. Disconnect the air consumer.
3. Unfold the crank.
4. Coil the hose evenly and tightly.
5. Tighten the clamping knob.
The reel is locked against unwanted reeling in or out.
6. Fold the crank handle in again.

8.6.3 Securing the hose reel for transport

1. Check that the hose is firmly and evenly reeled in.
2. Coil up the hose again, if necessary.
3. Align the transport securing bolt with one of the securing bores (12) at the side wall of the hose reel (6).
4. Engage the securing screw fully.
5. Tighten the clamping knob.
6. Plug the hose coupling onto the bracket (9).

8.7 Cleaning the machine after operation

Material High-pressure cleaner

Precondition The machine is shut down.

The machine is cooled down.

The machine is fully vented, the pressure gauge reads 0 psig.

All compressed air consumers are disconnected and the air outlet valves are open.

Maintain the following minimum distances to the object to be cleaned in order to prevent damages to the machine when cleaning with the high-pressure cleaner.

- Circular section jets: approximately 2.3 ft
- Fan jets: approximately 1 ft
- Dirt blasters: approximately 1 ft



Keep the water jet in permanent motion during the cleaning process. You prevent thus damage.

1. **NOTICE** *Machine damage caused by strong water jet!*
Direct water jets can damage or even destroy sensitive components.
 - Do **not** directly focus a strong water jet towards sensitive components.
 - Work with caution.
2. Carefully clean the machine with the high-pressure cleaner.



Water has accumulated in the sealed floor pan.

- Drain the water.



Catch the liquid and dispose in accordance with applicable environmental regulations.

Further information See chapter 10.8.5 for information to the draining of liquids within the machine.

9 Fault Recognition and Rectification

9.1 Basic instructions

The following tables are intended to assist in fault finding and rectification.

1. Do not attempt fault rectification measures other than those given in this manual!
2. In all other cases:
Have the fault rectified by an authorized KAESER service representative.

Further information Observe the instructions in chapter 3 "Safety and Responsibility" and prevailing local safety regulations when rectifying faults and malfunctions.
Comply with local applicable safety provisions!

9.2 Engine faults and alarms

Further information The engine service manual provides further information.

9.2.1 Engine refuses to start or comes to a stop

Possible cause	Remedy	Where can I get help?		
		Specialized workshop	KAESER Service	Engine service manual
Defective starter.	Have changed.	X	–	–
The fuel cut-off device has not opened.	Check the coil and electrics and have changed if necessary.	X	–	–
Fuel tank empty.	Fill up the fuel tank.	–	–	–
Airlock in the fuel line between fuel tank and injector pump.	Bleed the fuel line (see chapter 10.3.3).	–	–	X
Fuel filter clogged.	Clean or replace, see chapter 10.3.3.	–	–	X
Fuel line broken.	Have changed.	X	X	–
Defective control fuse or relay.	Have repaired or replaced if necessary.	X	X	–
Airend discharge temperature too high.	Have adjusted.	–	X	–
Defective temperature gauge switch giving no enable signal	Have repaired or replaced if necessary.	–	X	–
Starter switch defective.	Have repaired or replaced if necessary.	–	X	–
Electrical connections and/or cables loose or broken	Tighten the connection or have the cable replaced.	X	X	–
Defective battery or low charge.	Maintain battery, see chapter 10.3.7.	–	–	–

Possible cause	Remedy	Where can I get help?		
		Specialized workshop	KAESER Service	Engine service manual
Defective alternator.	Have repaired or replaced if necessary.	X	X	–
Defective alternator regulator.	Have repaired or replaced if necessary.	X	X	–
Oil pressure switch indicating insufficient oil pressure.	Check engine oil level, see chapter 10.3.4.	–	–	X
	Have the engine repaired or exchanged.	X	X	–

Tab. 50 Alarm: Engine refuses to start or comes to a stop.

9.2.2 Engine does not reach full speed

Possible cause	Remedy	Where can I get help?		
		Specialized workshop	KAESER Service	Engine service manual
Airlock in the fuel line between fuel tank and injector pump.	Bleed the fuel line (see chapter 10.3.3).	–	–	X
Fuel filter clogged.	Clean or replace, see chapter 10.3.3.	–	–	X
Fuel line broken.	Have changed.	X	X	–
Speed adjustment cylinder maladjusted or defective.	Have repaired or replaced if necessary.	X	X	–

Tab. 51 Alarm: Engine does not reach full speed.

9.2.3 Indicator lamp remains on

Possible cause	Remedy	Where can I get help?		
		Specialized workshop	KAESER Service	Engine service manual
Electrical connections and/or cables loose or broken	Tighten the connection or have the cable replaced.	X	X	–
Defective alternator.	Have repaired or replaced if necessary.	X	X	–
Defective alternator regulator.	Have repaired or replaced if necessary.	X	X	–

Possible cause	Remedy	Where can I get help?		
		Specialized workshop	KAESER Service	Engine service manual
Engine oil pressure too low.	Check engine oil level, see chapter 10.3.4.	–	–	X
	Check the engine and have repaired if necessary.	X	X	–

Tab. 52 Indicator lamp remains on

9.3 Compressor faults and alarms

9.3.1 Working pressure too high

Possible cause	Remedy	Where can I get help?	
		Specialized workshop	KAESER Service
Proportional controller maladjusted or defective.	Have repaired or replaced if necessary.	–	X
Inlet valve not closing.	Check the controller, the control air line and the inlet valve and replace if necessary.	–	X
Pressure gauge indicating false pressure.	Have repaired or replaced if necessary.	–	X
Venting valve does not blow off.	Check the connections and function and have repaired or replaced as necessary.	–	X

Tab. 53 Alarm: Working pressure too high

9.3.2 Working pressure too low

Possible cause	Remedy	Where can I get help?	
		Specialized workshop	KAESER Service
Proportional controller maladjusted or defective.	Have repaired or replaced if necessary.	–	X
Inlet valve not opening or only opening partially.	Have repaired or replaced if necessary.	–	X
Pressure gauge indicating false pressure.	Have repaired or replaced if necessary.	–	X
Pressure relief valve maladjusted and/or leaking.	Have repaired or replaced if necessary.	–	X
Venting valve does not close.	Check the connections and function and have repaired or replaced as necessary.	–	X

Possible cause	Remedy	Where can I get help?	
		Specialized workshop	KAESER Service
The engine runs at maximum speed (LOAD).	See chapter 9.2.	X	X
Engine air filter and/or compressor air filter clogged.	Clean or change, see chapters 10.3.2 and 10.4.7.	–	–
Oil separator cartridge heavily clogged.	Change, see chapter 10.4.6.	–	–

Tab. 54 Alarm: Working pressure too low

9.3.3 Safety relief valve blowing off

Possible cause	Remedy	Where can I get help?	
		Specialized workshop	KAESER Service
Oil separator cartridge heavily clogged.	Change, see chapter 10.4.6.	–	–
Inlet valve not closing.	Check the controller, the control air line and the inlet valve and replace if necessary.	–	X
Pressure relief valve maladjusted and/or leaking.	Adjust or have replaced if necessary.	–	X

Tab. 55 Alarm: Safety relief valve blowing off

9.3.4 Machine overheating

Possible cause	Remedy	Where can I get help?	
		Specialized workshop	KAESER Service
Defective cooling fan.	Have the blades or the complete fan wheel replaced.	–	X
Oil cooler clogged.	Clean surface, see chapter 10.5.	–	–
Defective working element in the combination valve.	Have repaired or replaced if necessary.	–	X
Working pressure too high (proportional controller maladjusted).	Reset to the permissible value or have replaced.	–	X
Oil separator cartridge heavily clogged.	Measure the pressure differential and change the cartridge if greater than 14.5 psig. Change, see chapter 10.4.6.	–	X
Compressor oil filter clogged.	Change, see chapter 10.4.4.	–	–
Compressor cooling oil level too low.	Topping up, see chapter 10.4.2.	–	–

Possible cause	Remedy	Where can I get help?	
		Specialized workshop	KAESER Service
Oil pipes leaking.	Seal leaks or have pipes changed.	X	X
Engine cooling system or cooling fan defective.	Have repaired.	X	X
Ambient temperature too high.	See installation conditions in chapter 5.2.	–	–

Tab. 56 Alarm: Machine overheating

9.3.5 Too much oil residue in the compressed air

Possible cause	Remedy	Where can I get help?	
		Specialized workshop	KAESER Service
Oil separator cartridge scavenge line clogged.	Clean the oil separator cartridge dirt trap or replace the strainer and nozzle if necessary. See chapter 10.4.5.	–	X
Fractured oil separator cartridge.	Change, see chapter 10.4.6.	–	–
Oil level in the oil separator tank too high.	Reduce to maximum level, see chapters 10.4.1 and 10.4.3.	–	–

Tab. 57 Fault: Too much oil residue in the compressed air

9.3.6 Oil flows from the compressor air filter after shutdown

Possible cause	Remedy	Where can I get help?	
		Specialized workshop	KAESER Service
Defective non-return function of the inlet valve.	Have repaired or replaced if necessary.	–	X

Tab. 58 Fault: Oil flows from the compressor air filter after shutdown

9.3.7 Option da
High moisture content in the compressed air

Possible cause	Remedy	Where can I get help?	
		Specialized workshop	KAESER Service
Blocked condensate drain on the compressed air water trap.	Clean the compressed air water trap or replace the strainer and nozzle if necessary. See chapter 10.8.2.	–	X

Tab. 59 Fault: High moisture content in the compressed air

10 Maintenance

10.1 Safety

Follow the instructions below to ensure safe machine installation and maintenance.

Warning instructions are located before a potentially dangerous task.



Disregard of warning instructions can cause serious injuries!

Basic safety instructions

Disregard of safety notes can cause unforeseeable dangers!

- Follow the instructions in chapter 3 “Safety and Responsibility”.
- Maintenance work may only be carried out by authorized personnel.
- Make sure that no one is working on the machine.
- Ensure that all protective devices and cover panels are in place and secured.
- Ensure that all tools have been removed from the machine.
- Do not carry out any checks or maintenance while the machine is running.



The opened canopy is held up by gas struts.

- Check that the canopy remains open.

Change any gas strut that is not able to hold the canopy open.

Working on pressure systems

Compressed air is contained energy. Uncontrolled release of this energy can cause serious injury or death. The following safety concerns relate to any work on components that could be under pressure.

- Disconnect the air consumers.
- Wait until the machine is automatically vented (check that the pressure gauge indicates 0 psig).
- Open outlet valves carefully to ensure that the line between the minimum pressure/check valve and the compressed air outlet is vented.
- Do not open or dismantle any valves.

Working on the drive system

Touching rotating, very hot, or electrically live components can result in serious injury.

- Shut down the machine before opening the canopy.
- Disconnect the negative terminal on the battery.
- Ensure that the machine is cooled down.

Further information Details of authorized personnel are found in chapter 3.4.2.

Details of dangers and their avoidance are found in chapter 3.5.

10.2 Maintenance schedules

10.2.1 Logging maintenance work



The maintenance intervals given are recommended for KAESER original components with average operating conditions.

- In adverse conditions, perform maintenance work at shorter intervals.

Adverse conditions are, e.g.:

- high temperatures
- a lot of dust
- frequent use

- Adjust the maintenance intervals with regard to local installation and operating conditions.

- Logging all maintenance work.

This enables the frequency of individual maintenance tasks and deviations from our recommendations to be determined.

Further information A list is given in chapter 10.9.

10.2.2 Regular maintenance tasks

The following table lists the various maintenance intervals.

Maintenance interval	Short description
Daily	–
Every 250 h, at least annually.	A250
Every 500 h, at least annually.	A500
Every 1000 h, at least annually.	A1000
Every 1500 h, at least annually.	A1500
Every 2000 h, at least every 2 years.	A2000
Every 3000 h	A3000
Every 36000 h, at least every 6 years.	A36000

Tab. 60 Maintenance intervals and regular maintenance tasks

The table below lists regular maintenance tasks.

- Carry out maintenance tasks punctually taking ambient and operating conditions into consideration.

10.2.2.1 Machine maintenance schedule

➤ Carry out maintenance tasks according to the following schedule.

Component Function	Daily	A250	A500	A1000	A1500	A2000	A3000	A36000	See chapter	Note
Engine										
Check inlet air filter maintenance indicator	X								10.3.2	
Check engine oil level.	X								10.3.4	Engine SM
Clean the engine air filter			X						10.3.2	
Change the engine oil			X						10.3.4	
Replace the engine oil filter.			X						10.3.5	Engine SM
Check/adjust the drive belt tension.			X						10.3.6	Engine SM
Change engine air filter.				X					10.3.2	
Have the engine mounts checked.				X						SW
Have the valve clearance adjusted.					X					SW Engine SM
Replace the drive belt.							X		10.3.6	SW Engine SM
Have the multi-ribbed belt / jockey wheel checked/replaced.							X			SW Engine SM
Check the engine coolant level.	X								10.3.1	Engine SM
Clean the cooler.		X							10.5	
Check coolant hoses and clamps.			X							
Check antifreeze concentration.			X						10.3.1	Engine SM
Change the coolant.				X					10.3.1	Engine SM
Fill up the fuel tank	X									
Emptying the fuel pre-filter (water trap).	X								10.3.3	

Engine SM = engine manufacturer's service manual; SW = specialized workshop.

Component Function	Daily	A250	A500	A1000	A1500	A2000	A3000	A36000	See chapter	Note
Clean the fuel filter.			X						10.3.3	Engine SM
Clean the tank fuel strainer.			X							
Clean the fuel tank.			X							
Check fuel lines and hose clamping bands, have replaced if necessary.				X						SW
Change the fuel prefilter.				X					10.3.3	Engine SM
Replace the fuel microfilter.				X					10.3.3	Engine SM
Check the fuel return line for leakage and firm fixing.			X							
Have the fuel injectors checked.							X			SW
Have the fuel injector pump checked.							X			SW
Check the battery electrolyte level and connections.			X						10.3.7	
Compressor unit										
Check inlet air filter maintenance indicator.	X								10.4.7	
Check the cooling oil level.	X								10.4.1	
Clean the compressor air filter.		X							10.4.7	
Clean the oil cooler.		X							10.5	
Have the pressure relief valve(s) checked.			X						10.4.8	
Check/clean the oil separator tank dirt trap.			X						10.4.5	
Change compressor air filter.				X					10.4.7	
Change the cooling oil.				X					10.4.3	
Change the compressor oil filter.				X					10.4.4	
Change the separator cartridge in the oil separator tank.						X			10.4.6	
Chassis/bodywork										
Check the tire pressures.		X								
Check wheel bolts and nut for tightness.		X								
Carry out chassis maintenance.			X						10.7	

Engine SM = engine manufacturer's service manual; SW = specialized workshop.

Component Function	Daily	A250	A500	A1000	A1500	A2000	A3000	A36000	See chapter	Note
Grease the ball coupling, joints and towbar.			X						10.7.2	
Brake maintenance			X						10.7.3	
Check wear on the brake linings.			X						10.7.3.2	
Have the wheel brakes adjusted.			X							SW
Check all screw connections, hinges, locks, catches, handles and snap fasteners for wear and secure fixing.		X								
Carry out rubber sealing strip maintenance.			X						10.6	
Have the lifting point checked.			X							SW
Other maintenance tasks										
Check all accessible fittings, pipes and clamps for wear and tightness.			X							
Check hoses for leaks and wear.			X							
Have hose lines replaced.								X		SW
Check that all electrical connections are tight.			X							

Engine SM = engine manufacturer's service manual; SW = specialized workshop.

Tab. 61 Regular maintenance tasks

10.2.2.2 Maintenance schedule for options

- Carry out maintenance tasks according to the following schedule.

Option Function	Daily	A250	A500	A1000	A2000	See chapter	Note
Option ea – tool lubricator							
Check the oil level in the tool lubricator.	X					10.8.1	
Option da – Compressed air water trap							
Clean and check the dirt trap.			X			10.8.2	
Option da – Compressed air aftercooler							
SW = refer to a specialised workshop; KS = call KAESER Service							

Option Function	Daily	A250	A500	A1000	A2000	See chapter	Note
Clean the cooler.		X				10.5.2	
Option ba – frost protector							
Winter operation Check the level of antifreeze in the frost protector.	X					10.8.3	
Engine coolant pre-heater (Option bb):							
Have the coolant pre-heating and associated wiring checked.			X				SW
Option lb - engine air intake shut-off valve							
Clean/check the engine air intake shut-off valve.		X				10.8.4	
Option oe – sealed floor pan							
Checking the machine interior for liquid accumulations	X					10.8.5	
SW = refer to a specialised workshop; KS = call KAESER Service							

Tab. 62 Regular maintenance task options

10.3 Engine maintenance

- Perform maintenance tasks according to the schedule in chapter 10.2.2.1.

10.3.1 Water cooler maintenance

Material Coolant
Coolant tester
Receptacle
Funnel
Cleaning cloth

Precondition The machine is shut down.
The machine is standing level.
The machine is fully vented, the pressure gauge reads 0 psig.
The machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.

⚠ WARNING

*Danger of scalding by hot coolant!
Serious injuries can be caused by hot coolant.*

- *Let the machine cool down before opening the cooling system.*

⚠ CAUTION

There is danger of injury from coolant containing antifreeze!

- *Avoid eye and skin contact with coolant. If the eyes are affected, rinse immediately with running water.*
- *Wear protective glasses and gloves.*

NOTICE

Insufficient coolant can damage the engine.

Insufficient coolant will cause the engine to overheat. Overheating can cause serious damage to the engine.

- *Check the coolant level daily.*
- *Top up the coolant as necessary.*

- Open the canopy.

10.3.1.1 Checking coolant level

Check the coolant level of the engine daily before starting.

The level is checked on the coolant expansion tank:

- The tank is semi-transparent so the coolant level can be seen from the outside.
- The level should be between the *minimum and maximum markings* with the engine cooled down.

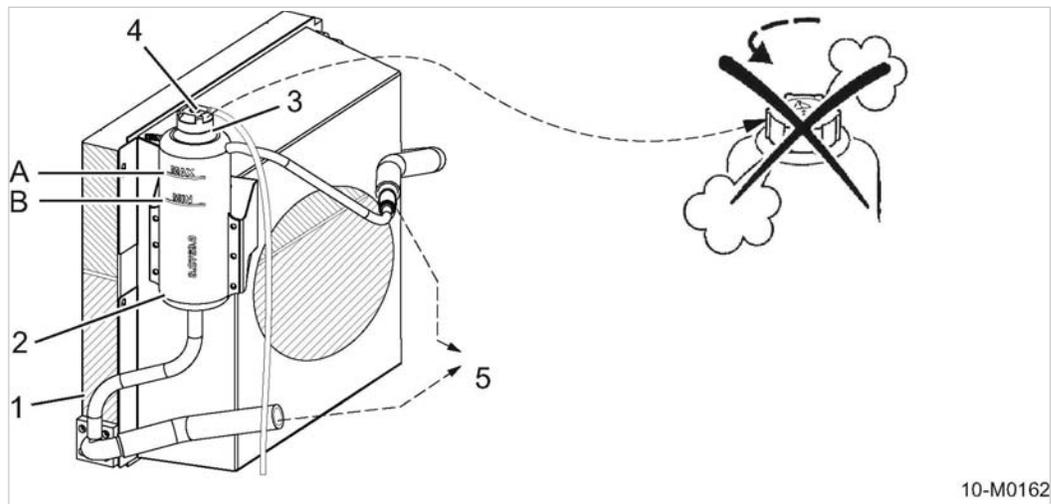


Fig. 29 Checking coolant level

- | | | | |
|---|-------------------------------|---|-----------------------|
| ① | Water cooler | ③ | Filler port with cap |
| ② | Coolant expansion tank | ④ | Overflow |
| A | <i>maximum marking (FULL)</i> | ⑤ | Motor connection hose |
| B | <i>minimum marking (LOW)</i> | | |

1. Check the level of coolant in the expansion tank.
Top off when the coolant level falls below the *minimum marking* B.
2. Close the canopy.



Determine and rectify the cause of coolant loss.

10.3.1.2 Checking the coolant

The coolant should be checked according to the maintenance schedule to ensure quality and operational life.

Coolant quality can be determined by the following parameters:

- Visual check
- Antifreeze concentration measurement
- Unscrew and remove the expansion tank filler cap ③.

Visual check

The coolant should be checked for its color and any particles or sediments floating in it.

- Take a coolant sample and have analyzed.
The coolant should be changed if it is discolored or has floating particles.

Antifreeze concentration measurement

An instrument (e.g. refractometer) is used to check antifreeze concentration.

Maximum frost protection is ensured with an antifreeze concentration of 55% by volume, as frost protection and heat transfer properties deteriorate beyond this point. Higher concentration also leads to higher operating temperature.

1. **NOTICE** *The engine can be damaged if the antifreeze concentration is insufficient.*

Corrosion

Damage to the cooling system

Engine casing fracture

- *Check coolant.*
- *Protect the coolant against frost.*
- *Top off as necessary.*

2. Use the coolant tester as instructed by the manufacturer to test the coolant.
Change the coolant when the concentration of antifreeze is too low.

Finish off the work steps

1. Screw on the filler cap.
2. Close the canopy.

10.3.1.3 Mixing coolant

Do not use water without coolant additive. Water alone is corrosive at engine operating temperature. Water alone does not offer sufficient protection from boiling or freezing.

The coolant is a mixture of clean, fresh water and antifreeze with corrosion inhibitor.

For reasons of corrosion protection and the need to raise the boiling point, the coolant must remain in the cooling system throughout the year.

The maximum permissible coolant life is 2 years.

- Follow coolant recommendations in chapter 2.6.4.

Preparing coolant

Precondition Coolant must meet the specification of ASTM D4985.

- The coolant should be mixed in the proportions given by the manufacturer.

KAESER coolant mixture table

Antifreeze	Water	Frost protection to [°F]
1 part	2 parts	-0.4
1 part	1.5 parts	-13
1 part	1 part	-35

Tab. 63 KAESER coolant mixture table



The concentration of antifreeze should not be less than 33% for ensured corrosion protection.

10.3.1.4 Filling and topping off the coolant

The proportion of antifreeze in the coolant should not fall below 33% to ensure frost and corrosion protection and prevent the build up of deposits in the cooling circuit. Topping up with water alone dilutes the antifreeze concentration and is forbidden.



Make sure that there is sufficient room for the coolant to expand when hot without overflowing.

Precondition The negative cable to the battery is disconnected.

1. Remove the expansion tank filler cap.
2. Mix a quantity of coolant according to the table and top up to the mark.
Top up until the coolant level is just below the *maximum marking* (A).
3. Screw on the filler cap.
4. Reconnect the negative battery terminal.
5. Close the canopy.
6. Start the engine and allow to IDLE for about 1 minute.
7. Stop the engine.
8. Open the canopy.
9. Check the coolant level.
Top up if the coolant level in the expansion tank has fallen.
10. Carry out a visual check for leaks.
11. Close the canopy.

10.3.1.5 Draining the coolant

Precondition The machine is cooled down.
The negative cable to the battery is disconnected.

The entire cooling agent of the motor can be drained by opening the screw plug at the water cooler.

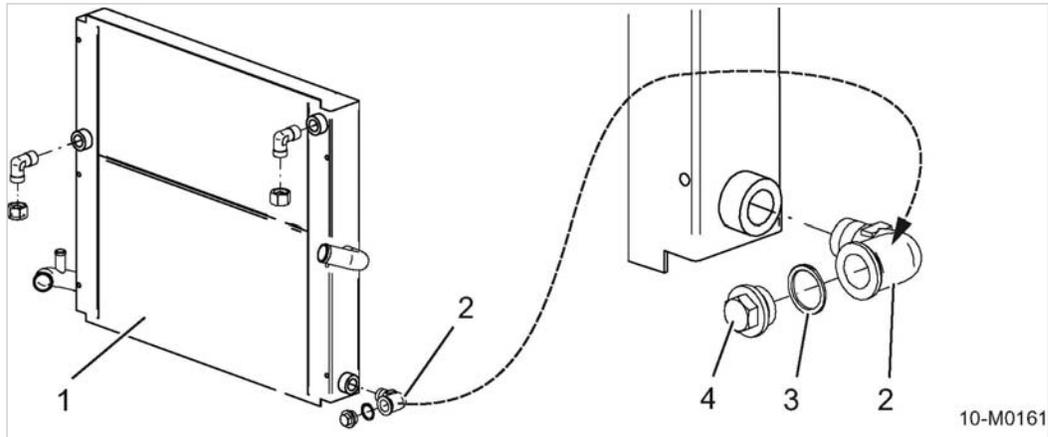


Fig. 30 Draining the coolant from the radiator

- | | | | |
|---|---------------------------|---|------------|
| ① | Water cooler | ③ | Gasket |
| ② | Drain point, water cooler | ④ | Screw plug |

1. Remove the expansion tank filler cap.
2. Position a receptacle beneath the water cooler drain point ②.
3. Remove the plug ④.
Cooling agent is drained.
4. Insert the screw plug with sealing ring and tighten.
5. Replace and tighten the expansion tank filler cap.
6. Close the canopy.



- Dispose of used coolant in accordance with environmental protection regulations.

Further information

The operating manual supplied by the engine manufacturer provides further information on coolant change and cleaning the cooling system.

10.3.2 Engine air filter maintenance

Clean the filter according to the maintenance schedule or if the maintenance indicator shows this to be necessary.

Replace the air filter element after 2 years at the latest or after it has been cleaned 5 times.



- Using the engine without an air filter element is not permitted!
- Do not use an air filter element with damaged folds or gasket.
- The use of an unsuitable air filter can permit dirt to ingress the engine and cause premature wear and damage.

Material

Compressed air for blowing out
Spare parts (as required)
Cleaning cloth

Precondition

The machine is shut down.
The machine is fully vented, the pressure gauge reads 0 psig.
The machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.

NOTICE

Damaged filter element.

Wear can occur in the engine from the intake of any contaminated air.

- *Do not try to clean the filter element by striking or knocking it.*
- *Do not wash the filter element.*

- Raise the cover.

Checking contamination of the air filter

Air filter maintenance is necessary when the yellow piston inside the maintenance indicator reaches the red zone.

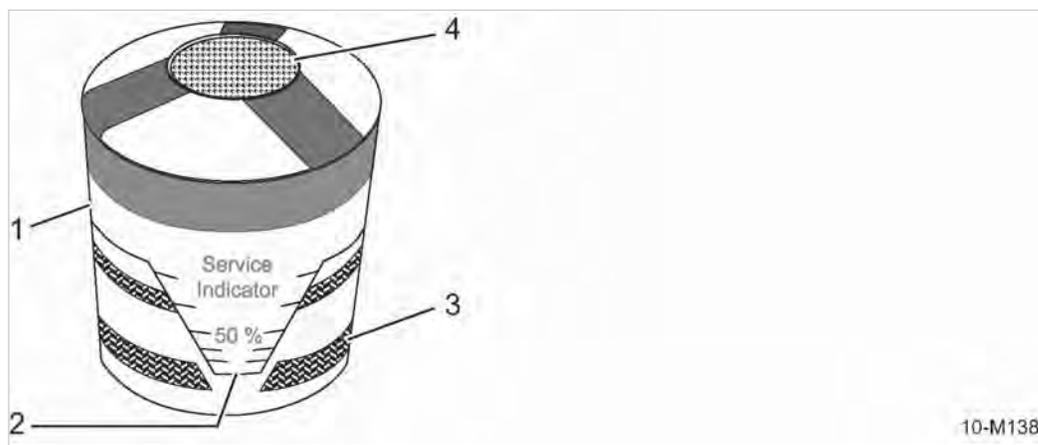


Fig. 31 Maintenance indicator

- | | |
|-------------------------|----------------------------|
| ① Maintenance indicator | ③ Red zone indicator scale |
| ② Indicator piston | ④ Reset knob |

- Check the air filter maintenance indicator.
If the yellow piston reaches the red zone, clean or renew the filter element.

Cleaning the air filter:

The dust evacuator valve must be at the bottom. The dust evacuation valve ② is on the filter cap.

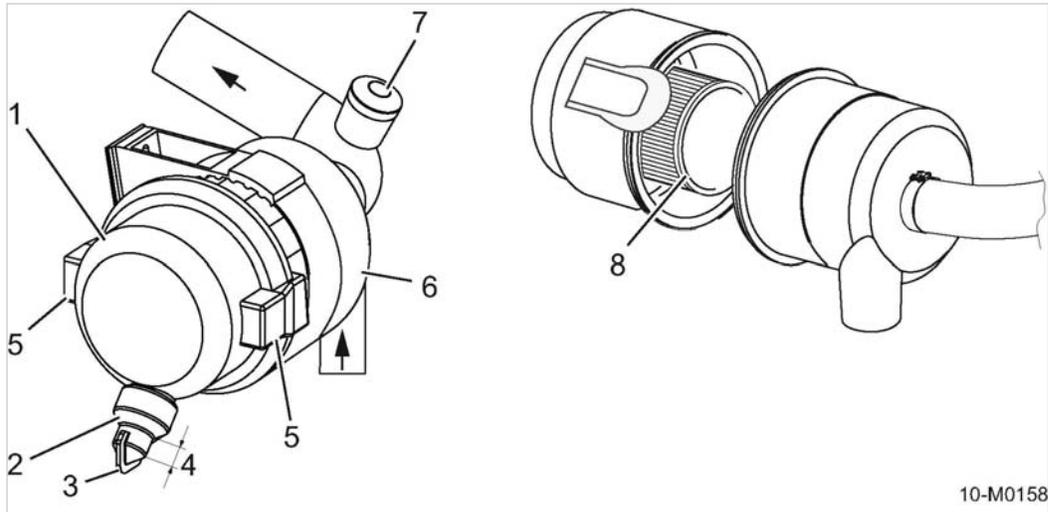


Fig. 32 Engine air filter maintenance

- | | |
|-------------------------|-------------------------|
| ① Filter cap | ⑤ Spring retaining flap |
| ② Dust evacuating valve | ⑥ Filter housing |
| ③ Drain slit | ⑦ Maintenance indicator |
| ④ Valve part | ⑧ Filter element |

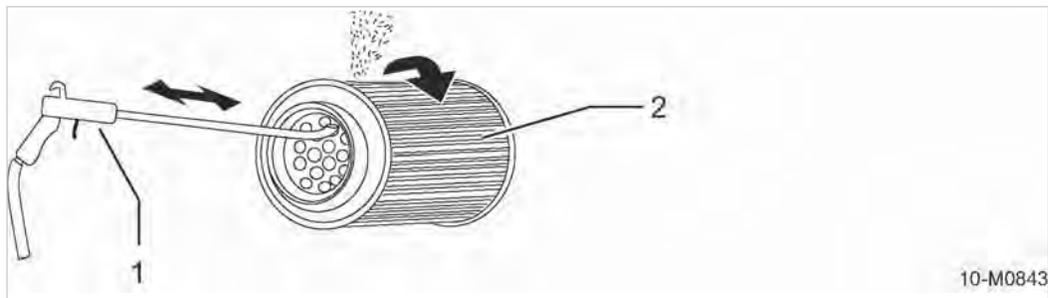


Fig. 33 Cleaning the filter element

- | |
|---|
| ① Compressed air gun with blast pipe bent to 90° at the end |
| ② Filter element |

1. Press both spring flaps together, lift the cap and remove the filter element.
2. Carefully clean the inside of the housing, the cover and sealing faces with a damp cloth.
3. Cleaning the filter element:
 - Use dry compressed air (≤ 72 psig!) at an angle to blow dust from the filter element from inside to outside until no further dust develops.
 - The blast pipe must be long enough to reach the bottom of the element.
 - The tip of the blast pipe should not be allowed to touch the element.
 - Clean sealing faces.
4. Inspect the element carefully for any damage.
Replace any damaged filter element.

5. To empty the dust evacuator valve (2):
 - Pinch the valve part (4) above the drain slit (3) (drain slit opens).
 - Remove any dust clumps.
 - Clean the slit.
6. Insert the cleaned or new filter element into the filter housing. Make sure it is properly in place and sealed by its gasket.
7. With the dust evacuator valve pointing to the bottom, place the filter cover in front of the filter casing.
8. Place the filter cap on the housing and press home.
9. Press on the cap until the spring retaining flaps snap home.

Resetting the maintenance indicator:

- Press the reset knob on the maintenance indicator a number of times.
The yellow piston within the indicator is reset and the maintenance indicator is ready for use again.
- Close the cover.



Dispose of old parts and contaminated materials according to environmental regulations.

10.3.3 Fuel system maintenance

Material Spare parts
Receptacle
Cleaning cloth

Precondition The machine is shut down.
The machine is standing level.
The machine is fully vented, the pressure gauge reads 0 psig.
Machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.
The negative cable to the battery is disconnected!

⚠ DANGER

*Danger of fire from spontaneous ignition of fuel!
Serious injury or death could result from the ignition and combustion of fuel.*

- *Allow no open flames or sparks at the place of use.*
- *Ensure that the maximum ambient temperature is not exceeded at the place of use.*
- *Stop the engine.*
- *Wipe up escaped fuel.*
- *Keep fuel away from hot machine parts.*
- *Ensure that the maximum ambient temperature is not exceeded at the place of use.*

Bleeding the fuel system

The electric fuel pump is used to bleed the system. The negative battery terminal must be connected for the pump to operate and bleeding to be carried out.

When the starter switch is turned to the "II" position, the pump starts and bleeds the fuel system. The engine is not started!

Air can find its way into the fuel system under certain conditions or maintenance tasks:

- Fuel tank empty.
- Replacing the filter element/cartridge of:
 - Fuel pre-filter
 - Main fuel filter
- Replacing the fuel pump
- Work on the fuel lines

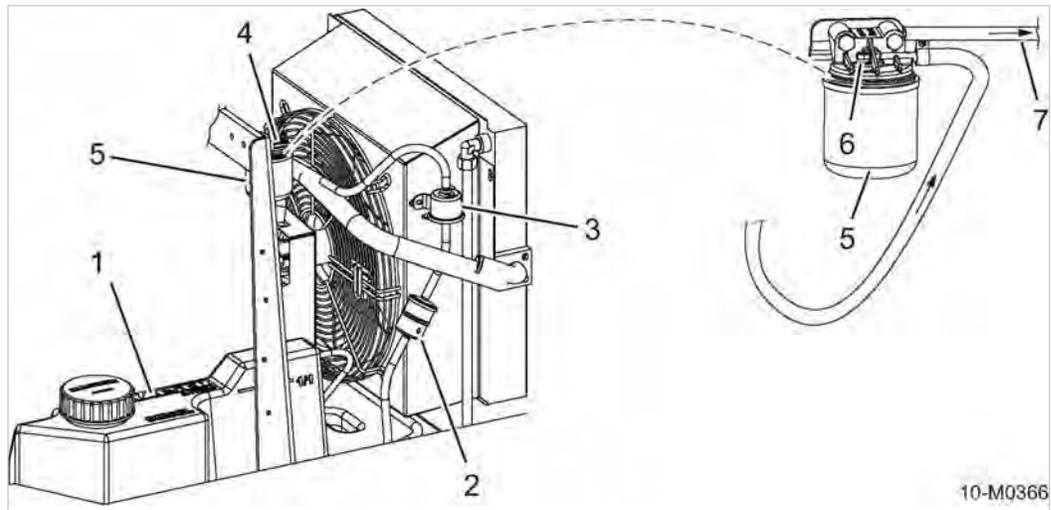


Fig. 34 Bleeding the fuel system

- | | |
|--------------------------------|--------------------------------------|
| ① Fuel tank | ⑤ Filter cartridge, main fuel filter |
| ② Fuel pre-filter | ⑥ Bleed screw, main fuel filter |
| ③ Electric fuel pump | ⑦ Fuel feed line |
| ④ Upper part, main fuel filter | |

1. Reconnect the negative battery terminal.
2. Turn the starter switch to the "II" position.
The fuel system is bled.

Changing the fuel prefilter element

The filter element should be changed according to the maintenance schedule.

Precondition The negative cable to the battery is disconnected!

1. Place the fuel receptacle under the prefilter.
2. Loosen the hose clamp on the filter cap.
3. Pull off the fuel line.
4. Catch fuel in the receptacle.

5. Remove the prefilter cap.
6. Withdraw the filter element.
7. Insert the new element.
8. Replace the filter cap.
9. Connect the fuel line.
10. Tighten the hose clamp.
11. Bleed the system as described previously.



Catch any escaping fuel.

Dispose of escaped fuel, contaminated fuel and working materials and components contaminated with fuel according to environmental regulations.

Replacing the filter cartridge of the main fuel filter:

The filter cartridge of the main fuel filter should be changed according to the maintenance schedule.

Use a filter wrench to loosen the cartridge if necessary.

Precondition The negative cable to the battery is disconnected!

1. Place a receptacle under the filter cartridge (5).
2. Unscrew and remove the cartridge (5).
3. Take a new filter cartridge.
4. Smear fuel on the gasket.
5. Spin on the new oil filter by hand until the gasket is firmly seated.
6. Bleed the system as described previously.



Catch any escaping fuel.

Dispose of escaped fuel, contaminated fuel and working materials and components contaminated with fuel according to environmental regulations.

Starting the machine and performing a test run:

1. Start the machine and allow it to idle for about 1 minute.
2. Visually check the fuel system for leaks.
3. Shut down the machine.
4. Tighten all fittings.

10.3.3.1 Option ne Maintaining the fuel water trap

The fuel water trap is positioned between the fuel tank and the fuel pre-filter.

It protects the fuel pump against water that separates out from the diesel and against early wear.

Material Wrench
 Receptacle
 Cleaning cloths

Precondition The machine is shut down.
 The machine is standing level.
 The machine is fully vented, the pressure gauge reads 0 psig.
 Machine cooled down.
 The negative cable to the battery is disconnected.

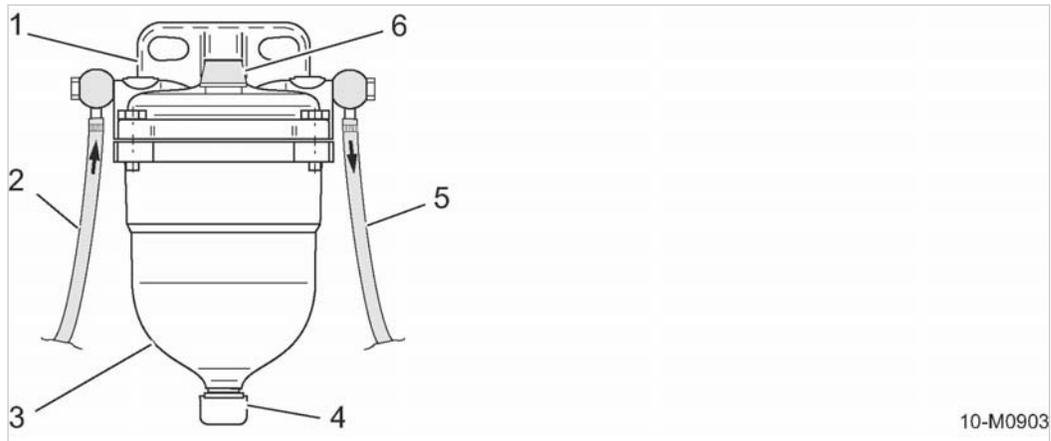


Fig. 35 Fuel filter with water trap

- | | | | |
|---|------------------|---|------------------|
| ① | Filter head | ④ | Drain plug |
| ② | Fuel supply line | ⑤ | Fuel outlet line |
| ③ | Water trap | ⑥ | Bleed screw |

Check the water trap:

The water trap container ③ is semitransparent so the fuel level can be seen from the outside.

- Water, being denser than diesel fuel, sinks to the bottom of the water trap.
- The presence of water can be verified by its different color than the fuel.

A check should be made daily as to whether water and dirt has accumulated.

1. Raise the canopy.
2. Check the fuel in the water trap.
The water trap should be emptied when dirty.
3. Close the canopy.

Emptying the water trap

1. Place a receptacle under the drain plug ④.
2. Unscrew the drain plug and allow water and dirt to drain out into the receptacle.
3. Catch the liquid mixture in the receptacle.
4. Tighten the drain plug ④ again.
5. Reconnect the negative battery terminal.
6. Close the canopy.



Dispose of fuel and any materials contaminated with it in accordance with environmental protection regulations.

Bleeding the fuel system

Precondition Negative cable to the battery connected.

- Bleed the fuel system, see bleeding process window, chapter 10.3.3.

Starting the machine and carrying out a test run

1. Start the machine and allow it to idle for about 1 minute.
2. Visually check the fuel system for leaks.
3. Shut down the machine.
4. Tighten all fittings.

10.3.4 Changing the engine oil

The engine oil should be changed:

- according to the maintenance schedule,
- according to the degree of contamination of the intake air,
- at least once a year.

Material New engine oil, see chapter 2.6.5 for engine oil filling quantity.

Receptacle

Hose coupling

Cleaning cloth

Funnel

Precondition The machine is shut down.

The machine is standing level.

The machine is fully vented, the pressure gauge reads 0 psig.

Engine at operating temperature.

All compressed air consumers are disconnected and the air outlet valves are open.

The negative cable to the battery is disconnected.

⚠ CAUTION

Danger of burns from hot components and escaping engine oil!

- *Wear long-sleeved clothing and protective gloves.*

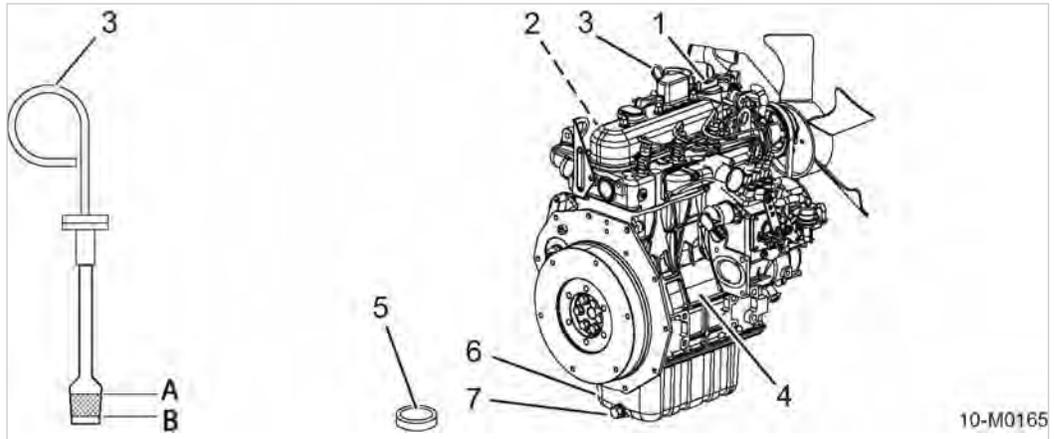


Fig. 36 Changing the engine oil

- ① Oil filler cap
- ② Oil filter
- ③ Oil dipstick
- ④ Engine block
- ⑤ Oil-tight plug
- ⑥ Engine oil sump
- ⑦ Oil drain valve

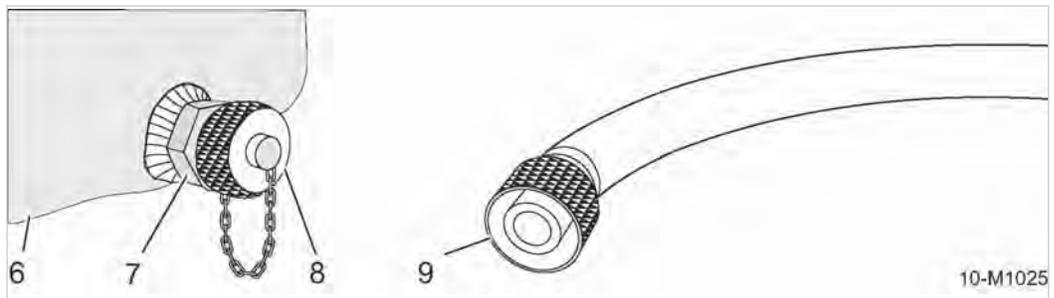


Fig. 37 Detail oil drain valve

- ⑥ Engine oil sump
- ⑦ Oil drain valve
- ⑧ Protective cap
- ⑨ Hose coupling

Draining the engine oil:

The engine oil sump is equipped with an oil drain valve. The oil drain valve is positioned next to the engine oil sump and the cooler. Drain the oil by screwing the hose coupling on the oil drain valve.

	Machine status	Oil drain valve status	Protective cap	Hose coupling
1	Mode (machine runs)	closed	connected	removed
2	Oil drain (machine does not run)	open	removed	connected

Tab. 64 Oil drain valve

1. Unscrew and remove the oil-tight plug ⑤.
2. Place the oil receptacle below the corresponding drain hole in the floor pan.
3. Pass the loose end of the drain hose through the opening in the floor pan.
4. Place the end of the hose in a suitable container.

5. Unscrew and remove the oil filler cap ①.
6. Loosen and remove the locking lever ⑧.
7. Screw the hose coupling ⑨ onto the valve.
Engine oil drains.
8. Unscrew and remove the hose coupling.
The oil drain valve is again closed.
9. Replace the protective cap.
10. Re-insert the oil-tight plug and tighten.



Dispose of old oil and oil-soaked working materials according to environmental protection regulations.

Further information See engine service manual for oil change under dusty conditions.

Filling the engine oil

Precondition The oil drain valve is closed.
Unscrew the protective cap from the drain valve.

1. Pour in the specified volume of fresh oil into the oil filler.
2. Screw on the filler cap ①.

Checking the engine oil level



It takes a few minutes for oil to reach the sump.
Wait 5 minutes then use the dipstick ③ to check the oil level.
The level must be between marks A and B.

1. Pull out the dipstick ③, wipe it clean and reinsert it.
2. Pull out the dipstick once more and read off the oil level.
3. Top up if the level is too low.
4. Reconnect the negative cable to the battery.

Starting the machine and performing a test run:

1. Start the machine and allow it to idle for at least 5 minutes.
2. Check the engine oil level.
Top up as necessary.
3. Visually inspect for leaks.
4. Shut down the machine.

10.3.5 Changing the engine oil filter

Material Spares
Common tools
Cleaning cloth
Receptacle

Precondition The machine is shut down.
The machine is fully vented, the pressure gauge reads 0 psig.
The engine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.

⚠ CAUTION

Danger of burns from hot components and escaping engine oil!

➤ *Wear long-sleeved clothing and protective gloves.*

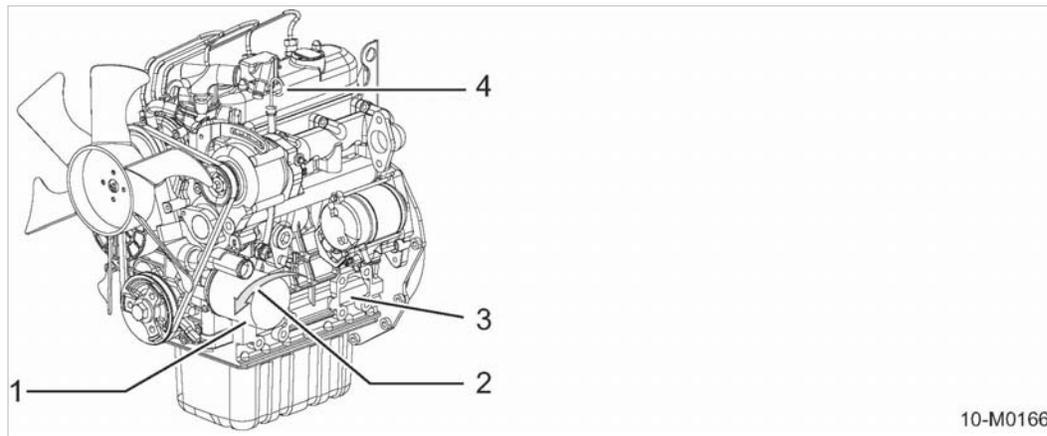


Fig. 38 Changing the engine oil filter

- | | |
|---|----------------|
| ① Engine oil filter | ③ Engine |
| ② Direction of rotation to unscrew the filter | ④ Oil dipstick |

1. Open the canopy.
2. Prepare a receptacle.
3. Note the direction of rotation ② to unscrew the filter.
4. Unscrew the filter ①. Catch any escaping oil.
5. Carefully clean sealing surfaces using lint-free cloth.
6. Lightly oil the new filter's gasket.
7. Turn the oil filter clockwise by hand to tighten.
8. Check the engine oil level.
Low oil level: Replenish engine oil.
9. Close the canopy.

Further information The engine service manual gives further information on oil filter changing.



Dispose of old oil filters, old oil and materials contaminated with oil according to environmental protection regulations.

10.3.6 Drive belt maintenance

The life of the drive belts is influenced by belt tension.

- Slack belts can slip and become damaged and may result in engine overheating.
- Over-tight belts stretch and wear quicker. Over-tight belts also place unnecessary stress on bearings and shorten their life.

Material V-belt tension measuring device

Spares

Precondition The machine is shut down.

The machine is fully vented, the pressure gauge reads 0 psig.

The machine is cooled down.

All compressed air consumers are disconnected and the air outlet valves are open.

Negative cable to the batteries disconnected.

⚠ WARNING

Beware of rotating pulleys and moving belts.

There is danger of serious injury from pinching.

- *Never check the drive belts unless the engine is at standstill.*
 - *Never run the machine without a belt guard.*
- Open the cover.

10.3.6.1 Visual inspection

Precondition Belt guard is removed

1. Check the belts thoroughly for cracks, fraying or stretching.
When damaged or worn: Replace the drive belt immediately.
2. Replace the belt guard.
3. Reconnect the negative battery terminal.
4. Close the cover.

10.3.6.2 Checking belt tension

Check belt tension when the belts are warm, not hot, to avoid length variations through temperature.

The engine manufacturer recommends a tension measuring device for belts. See the engine service manual.

The belt tension may also be checked by hand if no tension measuring device is available.

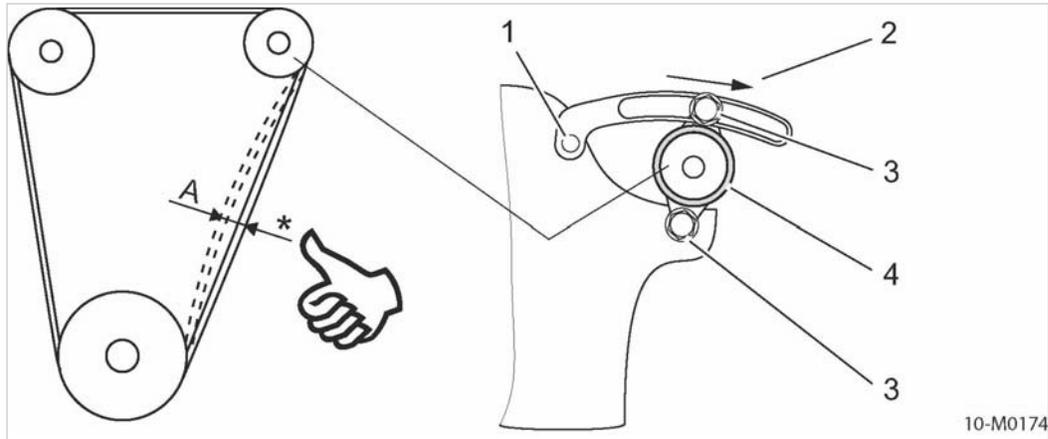


Fig. 39 Belt tension checking by hand

- | | | | |
|---|---|---|-------------------------|
| Ⓐ | Permissible deflection of the belt | Ⓐ | Direction of arrow |
| * | Approximate pressure exerted: 22 lb
Permissible movement: 10 – 15 inches | Ⓑ | Engine alternator screw |
| ① | Engine block mounting | Ⓒ | Engine alternator |

Checking and resetting belt tension with tension measuring device:	Checking and resetting belt tension manually:
<ol style="list-style-type: none"> 1. Remove the belt guard. 2. Check belt tension with the tension measuring device. 3. Tensioning a loose belt: <ul style="list-style-type: none"> ■ Loosen both securing screws ③ on the engine alternator ④. ■ Using a suitable lever, pull the engine alternator ② in the direction of the arrow until the correct belt tension is achieved. ■ Retighten both securing screws ③. 4. Replace the belt guard. 5. Reconnect the negative battery terminal. 	<ol style="list-style-type: none"> 1. Remove the belt guard. 2. Using your thumbs, push the belt between the belt pulleys (see illustration 39). 3. Tensioning a loose belt: <ul style="list-style-type: none"> ■ Loosen both securing screws ③ on the engine alternator ④. ■ Using a suitable lever, pull the engine alternator ② in the direction of the arrow until the correct belt tension is achieved. ■ Retighten both securing screws ③. 4. Replace the belt guard. 5. Reconnect the negative battery terminal.

Changing the belt

1. Loosen both screws ③ at the engine generator ④.
2. Press the engine generator in opposite direction of the arrow.
The drive belt is free of tension.
3. Pull the drive belt.
4. Check the pulleys for dirt and wear.
 - Dirty pulley: Clean pulley.
 - Worn pulley: Change the pulley.
5. Manually route the new drive belt over the pulleys without using force.
6. Using a suitable lever, pull the engine alternator ② in the direction of the arrow until the correct belt tension is achieved.
7. Retighten both securing screws ③.



A belt that has been replaced may not be used again.
Check the belt tension after running for approximately 15 minutes.



Old belts should be disposed of in accordance with the latest environmental regulations.

Putting in operation:

1. Replace the belt guard.
2. Reconnect the negative battery terminal.
3. Close the cover.

Further information For replacement and tensioning of the drive belts, see also the engine manufacturer's service manual.

10.3.7 Battery maintenance

- Check the charging system if the battery discharges without a reason.

10.3.7.1 Safety

⚠ WARNING

Danger of acid burns from escaping electrolyte!

- *Wear appropriate protective clothing including acid-proof rubber gloves.*
- *Always wear eye and face protection.*
- *Do not tip the battery. Electrolyte may run out of the vent holes.*
- *Work with caution.*

When working on the battery comply with the following safety signs:

A warning label with safety signs is attached to the battery.



Fig. 40 Safety signs - warning stickers on the battery.

10-M0167

- Take heed of any safety signs on the battery warning labels.
The individual safety signs have the following meaning:
 - ① – Fire, sparks, open flame and smoking are forbidden!
 - ② – Eye and face protection must be worn. Danger of acid burns!
 - ③ – Keep children well away from batteries and electrolyte.
 - ④ – Wear protective gloves, batteries are filled with caustic electrolyte!
 - ⑤ – Observe the battery manufacturer's instructions!
 - ⑥ – Follow safety rules, explosion hazard!

Further instructions on working with batteries:

- Do not remove battery terminal covers unnecessarily.
- Do not lay tools on the battery. This can lead to short circuits, overheating, and battery bursting.
- Take particular care when the battery has been in service for a long time or has just been charged as highly explosive gas is emitted!
Ensure adequate ventilation!

10.3.7.2 Battery checking and care

Even "maintenance-free" batteries need a degree of care to maintain their maximum operational life.



The outside of the battery and the terminals should be cleaned regularly with a soft cloth. This avoids current leaks and minimizes the discharge rate.

Material Terminal grease
Distilled water
Cleaning cloth
Protective gloves
Eye protection

Precondition The machine is shut down.
The machine is standing level.
The machine is fully vented, the pressure gauge reads 0 psig.
The machine is cooled down.

- Open the canopy.
 1. Clean the casing and terminals. Do not use a wire brush!
 2. Lightly grease the terminals to prevent corrosion.
 3. Check that the batteries and cable connections are properly seated and tighten if necessary.

Check the battery electrolyte level

The fluid is generally sufficient for the life of the battery. Nevertheless, the fluid level should be checked annually. The level should be up to the mark, 0.4 inches above the plates.



Replace the battery immediately if the casing leaks.

1. **NOTICE** Battery destruction!

Topping off with pure acid will increase the electrolyte concentration and can destroy the battery.

➤ *Top off only with distilled water.*

2. Check the electrolyte level.



If the level does not reach the mark -

➤ Top off with distilled water.

➤ Close the canopy.

Winter operation

Batteries are particularly stressed in winter. Only a fraction of the normal starting energy is available at low temperatures.

1. **NOTICE** *Danger of batteries freezing!*

Discharged batteries are subject to frost damage and can freeze at 14°F.

➤ *Check battery charge with a specific gravity tester.*

➤ *Recharge the battery.*

➤ *Clean the battery terminals and wipe with grease.*

2. Check the battery charge weekly.

Recharge as necessary.

3. If the machine is to be unused for a number of weeks, remove the battery and store in a frost-proof room.



In extreme cases, the use of heavy-duty cold-start batteries and/or additional batteries is recommended.

10.3.7.3 Battery removal and installation

Precondition The machine is shut down.
 The machine is standing level.
 The machine is fully vented, the pressure gauge reads 0 psig.
 The machine is cooled down.

1. **WARNING** *There is danger of batteries bursting!*

If a battery short circuits it will overheat and can burst.

➤ *Never short circuit a battery (e.g. with a hand tool).*

➤ *Wear protective gloves and eye protection.*

2. **NOTICE** *Excessive voltage produced by the alternator.*

Voltage peaks can destroy the alternator regulator and diodes.

➤ *The battery serves as a buffer and must not be disconnected while the engine is running.*

➤ *Carry out work on batteries only with the machine shut down.*

3. Open the canopy.
4. Disconnect the negative cable first, then the positive cable.
5. Unscrew the battery fixing clamp.
6. Replace in the reverse order.
7. Make sure the battery is properly secured.
8. Close the canopy.

Battery replacement

If the battery is to be replaced, the new battery should have the same capacity, current rating and shape as the original battery.

- Always replace a battery with one of the same type.



Old batteries are hazardous waste and must be disposed of correctly in accordance with local environment protection regulations.

10.4 Compressor Maintenance

- Perform maintenance tasks according to the schedule in chapter 10.2.2.1.

10.4.1 Checking cooling oil level

The oil level is checked at the oil separator tank filling port. Oil should be visible in the port when the filler plug is removed.

Material Wrench
Cleaning cloth

Precondition The machine is shut down.
The machine is standing level.
The machine is fully vented, the pressure gauge reads 0 psig.
All compressed air consumers are disconnected and the air outlet valves are open.

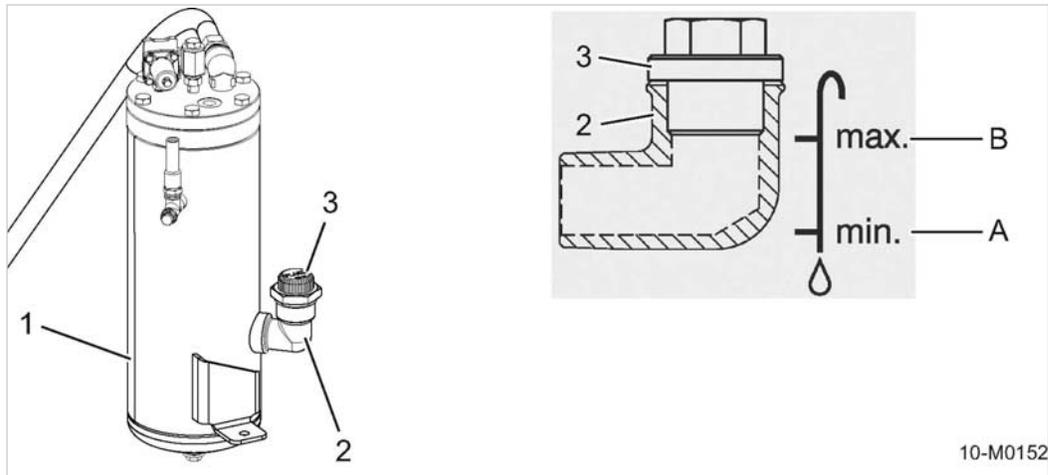


Fig. 41 Checking cooling oil level

- ① Oil separator tank
- ② Oil filler port
- ③ Filler plug
- Ⓐ Mark for minimum oil level
- Ⓑ Mark for maximum oil level

1. Open the canopy.
2. Slowly unscrew and withdraw the plug from the oil filler port.
3. Check the cooling oil level.
Top up if no oil is visible.

4. Replace the plug in the filler port.
5. Close the canopy.

10.4.2 Filling or topping off the cooling oil

Material Cooling oil
Funnel
Cleaning cloth
Wrench

Precondition The machine is shut down.
The machine is standing level.
The machine is fully vented, the pressure gauge reads 0 psig.
Machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.
The negative cable to the battery is disconnected.

Filling with cooling oil

A sticker on the oil separator tank specifies the type of oil used.

1. **NOTICE** *The machine could be damaged by unsuitable oil.*
 - *Never mix different types of oil.*
 - *Never top off with a different type of oil than that already used in the machine.*
2. Open the canopy.
3. Slowly unscrew and withdraw the plug from the oil filler port.
4. Top off the cooling oil to the maximum level (B) with the help of a funnel.
5. Check the oil level.
6. Check the filler plug gasket for damage.
Change a damaged gasket.
7. Replace the plug in the filler port.
8. Reconnect the negative battery terminal.
9. Close the canopy.

Starting the machine and performing a test run:

1. Start the machine and run in IDLE until the operating temperature is reached.
2. Close the outlet valves.
3. Shut down the machine.
4. Wait until the machine has automatically vented.
Pressure gauge reads 0 psig!
5. Open the outlet valves.
6. Open the canopy.
7. Check the oil level after about 5 minutes.
Top up if necessary.
8. Carry out a visual check for leaks.
9. Close the canopy.

10.4.3 Changing the cooling oil



Drain the oil completely from the following components:

- Airend
 - Oil separator tank
 - Oil cooler
 - Oil pipes
- Always change the oil filter when changing the oil.

Material See chapter 10.4.3 for oil filling volume.

Receptacle

Hose coupling is disconnectedly laying at the machine.

Funnel

Cleaning cloth

Precondition The machine is shut down.

The machine is standing level.

The machine is fully vented, the pressure gauge reads 0 psig.

The machine is at operating temperature.

All compressed air consumers are disconnected and the air outlet valves are open.

The negative cable to the battery is disconnected.

⚠ CAUTION

Risk of burns from hot components and escaping oil!

- *Wear long-sleeved clothing and protective gloves.*

- Open the cover.

10.4.3.1 Draining the cooling oil

All cooling oil is drained via the oil discharge valve. The oil discharge valve is positioned on the airend and closed with a sealing cap to prevent contamination. This sealing cap must be removed prior to draining the oil.

The oil can be drained when the hose nozzle has been screwed onto the oil discharge valve.

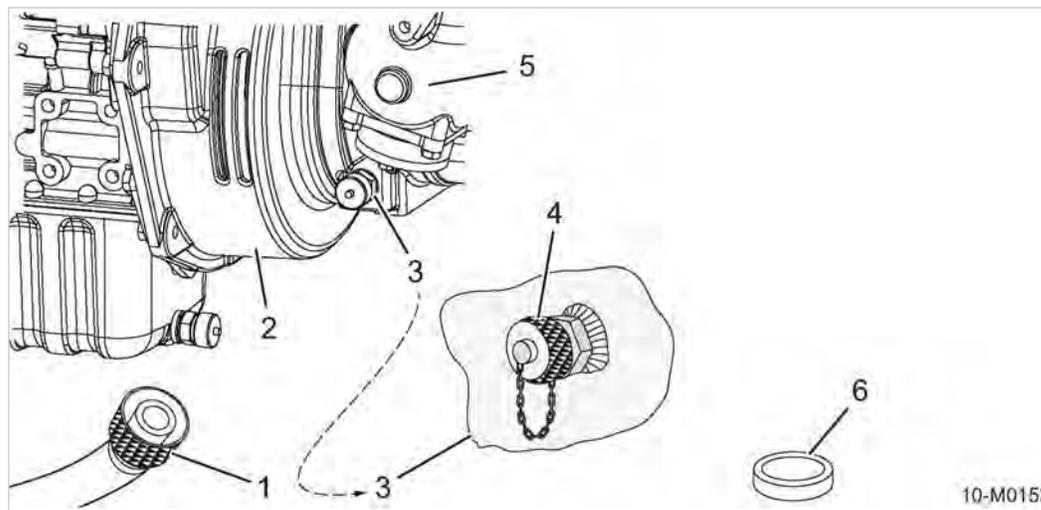


Fig. 42 Draining the compressor cooling oil

- | | | | |
|---|-----------------|---|------------------|
| ① | Hose coupling | ④ | Protective cap |
| ② | Airend | ⑤ | Inlet valve |
| ③ | Oil drain valve | ⑥ | Bung (Option oe) |

Draining the cooling oil:

	Machine status	Protective cap	Hose coupling	Oil drain valve status
1	Mode (machine runs)	connected	is supplied with the machine as accessory.	closed
2	Oil drain (Machine de- commissioned)	removed	connected	open

Tab. 65 Oil drain valve

1. Unscrew the filler plug in the oil separator tank.
2. In Option oe (sealed floor pan), the bung must be removed from the floor panel.
3. Position a receptacle beneath the airend (accessible through a hole in the floor panel).
4. Lead the hose through the hole in the floor panel and into the receptacle, securing it in place.
5. Loosen and remove the locking lever ⑥.
6. Screw the hose coupling ⑦ onto the oil drain valve ⑤.
Cooling oil drains.
7. Unscrew and remove the hose coupling.
The oil drain valve is again closed.
8. Close the oil discharge valve with the sealing cap.
9. In Option oe (sealed floor pan), you must also close the opening in the floor panel, using the bung.

Finish off the work steps

1. Replace the plug in the oil separator tank filling port.
2. Close the canopy.



Dispose of used oil and oil-contaminated working materials according to environmental protection regulations.

Further information See chapter 10.4.2 for oil filling.

10.4.4 Replace the compressor oil filter

- Material Spares
Tool
Receptacle
Cleaning cloth

Precondition The machine is shut down.
The machine is fully vented, the pressure gauge reads 0 psig.
The machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.
Negative cable to the batteries disconnected.

⚠ CAUTION

Risk of burns from hot components and escaping oil!

➤ *Wear long-sleeved clothing and protective gloves.*

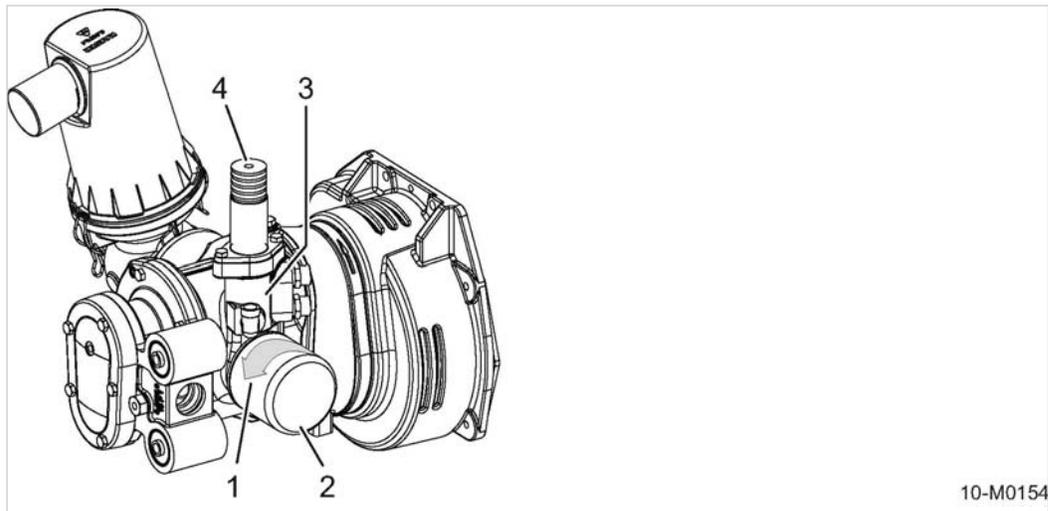


Fig. 43 Changing the oil filter

- | | |
|--|--|
| ① Oil filter | ③ Combination valve (integrated into airend) |
| ② Direction of rotation to unscrew the oil filter. | ④ Ambient temperature reading |

Changing the oil filter

1. Open the canopy.

2. Prepare a receptacle.
3. Loosen the filter by turning counterclockwise and catch any escaping oil.
4. Carefully clean sealing surfaces using lint-free cloth.
5. Lightly oil the new filter's gasket.
6. Turn the oil filter clockwise by hand to tighten.
7. Check the oil level in the oil separator tank.
Top up if necessary.
8. Reconnect the negative battery terminal.
9. Close the canopy.



Dispose of old cooling oil and any materials or parts contaminated with oil according to environmental protection regulations.

Starting the machine and performing a test run:

1. Start the machine and run in IDLE until the operating temperature is reached.
2. Close the outlet valves.
3. Shut down the machine.
4. Wait until the machine has automatically vented.
Pressure gauge reads 0 psig!
5. Open the outlet valves.
6. Open the canopy.
7. Check the oil level after about 5 minutes.
Cooling oil level too low: Top up cooling oil again.
8. Carry out a visual check for leaks.
9. Close the canopy.

10.4.5 Oil separator tank dirt trap maintenance

Material Cleaning cloth
Wrench
Small screwdriver
Maintenance kit, control valve
Petroleum ether or spirit

Precondition The machine is shut down.
The machine is fully vented, the pressure gauge reads 0 psig.
The machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.
Negative cable to the batteries disconnected.

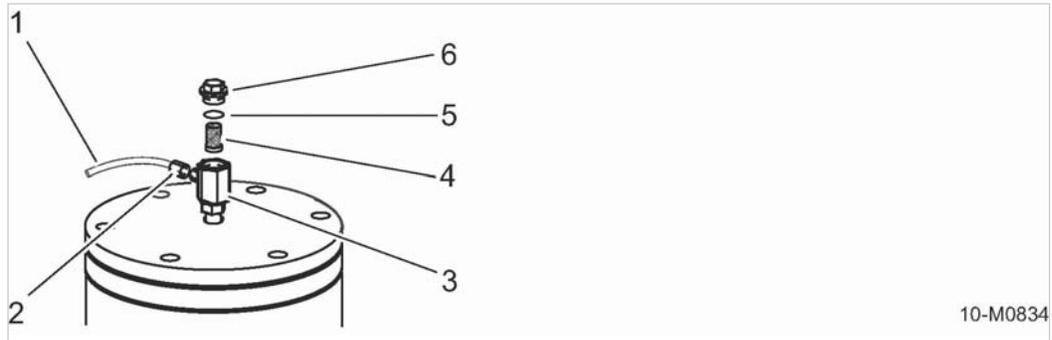


Fig. 44 Oil separator tank dirt trap maintenance

- | | |
|---------------------|-----------------|
| ① Oil return line | ④ Strainer |
| ② Union nut | ⑤ O-ring |
| ③ Dirt trap housing | ⑥ Screw fitting |

➤ Open the canopy.

Dirt trap maintenance:

1. Undo the union nut ② and bend the oil return line ① to one side.
2. Unscrew the dirt trap ③.
3. Remove and clean the strainer ④ and O-ring ⑤.
4. Check the strainer and O-ring for function and wear.
Replace components if they are heavily worn.
5. Clean the housing and fitting ⑥ of the dirt trap.
6. Re-insert the strainer and O-ring in the housing and close with the fitting.
7. Refit the oil return line and tighten the union nut.

Making operational:

1. Reconnect the negative battery terminal.
2. Close the canopy.



Dispose of old parts and contaminated materials according to environmental regulations.

Starting the machine and performing a test run:

1. Switch the machine on and run it in IDLE mode for approximately 5 minutes.
2. Shut down the machine.
3. Wait until the machine has automatically vented.
Pressure gauge reads 0 psig!
4. Open the outlet valves.
5. Open the canopy.
6. Carry out a visual check for leaks.
7. Shut down the machine.
8. Close the canopy.

10.4.6 Changing the oil separator cartridge



The oil separator cartridge cannot be cleaned.

The life of the oil separator cartridge is influenced by:

- contamination in the air drawn into the compressor,
- and adhering to the changing intervals for:
 - Cooling oil
 - Oil filter
 - Air filter

Material Spares
Cleaning cloth
Wrench

Precondition The machine is shut down.
The machine is fully vented, the pressure gauge reads 0 psig.
Machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.
The negative cable to the battery is disconnected.

➤ Open the canopy.

10.4.6.1 Changing the oil separator cartridge

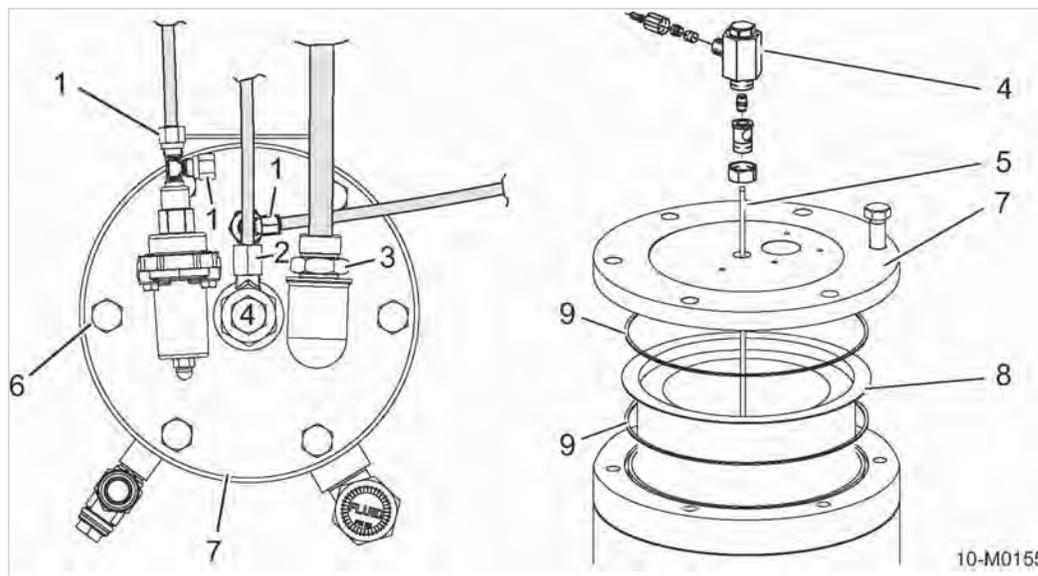


Fig. 45 Changing the oil separator cartridge

- | | |
|--|---------------------------|
| ① Control air line union nut | ⑥ Fixing screw |
| ② Oil scavenge pipe union nut | ⑦ Cover |
| ③ Compressed air hose union nut | ⑧ Oil separator cartridge |
| ④ Dirt trap | ⑨ Gasket or O-ring |
| ⑤ Oil scavenge pipe (screwed to the cover) | |

Changing the oil separator cartridge

1. Undo the union nuts ①, ② and ③.
2. Remove the control line, oil scavenge line and compressed air hose.
3. Unscrew the dirt trap ④.
4. Carefully draw out the dirt trap with the oil scavenge pipe ⑤ and lay them to one side.
5. Remove the fixing screws ⑥ and carefully lift the cover ⑦ and lay it to one side.
6. Take out the old cartridge ⑧ and gaskets ⑨.
7. Clean all sealing surfaces, taking care that no foreign bodies (dirt particles) fall into the oil separator tank.
8. Insert the new oil separator cartridge with gaskets and screw down the cover.
9. Replace and tighten all fittings.
10. Check the oil level in the oil separator tank.
Cooling oil level too low: Replenish the cooling oil.



Maintenance of the dirt trap must be carried out whenever the oil separator cartridge is changed.

Further information

Information on dirt trap maintenance is given in chapter 10.4.5.

Making operational

1. Reconnect the negative battery terminal.
2. Close the canopy.



Dispose of old parts and contaminated materials according to environmental regulations.

Starting the machine and performing a test run

1. Start the machine and run in IDLE until the operating temperature is reached.
2. Close the outlet valves.
3. Shut down the machine.
4. Wait until the machine has automatically vented.
Pressure gauge reads 0 psig!
5. Open the outlet valves.
6. Open the canopy.
7. Check the oil level after about 5 minutes.
Top off if necessary.
8. Carry out a visual check for leaks.
9. Close the canopy.

10.4.6.2 Option ba**Changing the oil separator (machine with low-temperature equipment)**

Changing the oil separator cartridge with the frost protector option is carried out as described above.

In addition, the frost protector must be emptied and its fittings undone.

Be careful of the frost protector control lines when removing the separator tank cover.

1. Empty the lower part of the frost protector. See chapter 10.8.3 on frost protector maintenance.

2. Remove the screws fixing the frost protector to the cover.
3. Lift the cover carefully and remove the frost protector control lines if necessary.

Making operational

1. Reconnect the negative cable to the batteries.
2. Close the canopy.



Dispose of old parts and contaminated materials according to environmental regulations.

Starting the machine and performing a test run

1. Start the machine and run in IDLE until the operating temperature is reached.
2. Close the outlet valves.
3. Shut down the machine.
4. Wait until the machine has automatically vented.
Pressure gauge reads 0 psig!
5. Open the outlet valves.
6. Open the canopy.
7. Check the oil level after about 5 minutes.
Top off if necessary.
8. Carry out a visual check for leaks.
9. Close the canopy.

10.4.7 Compressor air filter maintenance

Compressor air filter maintenance

- The filter element must be replaced at the latest when the corresponding maintenance indicator responds.
- As stipulated in the maintenance table, replace the filter element after two years.



- Using the machine without an air filter element is not permitted!
- Do not use filter elements with damaged surface or seals.
- The use of an unsuitable air filter can permit dirt to ingress into the pressure system and cause premature wear and damage to the machine.

Material Spares
Cleaning cloth

Precondition The machine is shut down.
The machine is fully vented, the pressure gauge reads 0 psig.
The machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.

NOTICE

Dirty air filter element
Loss of machine performance
➤ *Replace the filter element.*

- Open the cover.

Checking contamination of the air filter

Air filter maintenance is necessary when the yellow piston inside the maintenance indicator reaches the red zone.

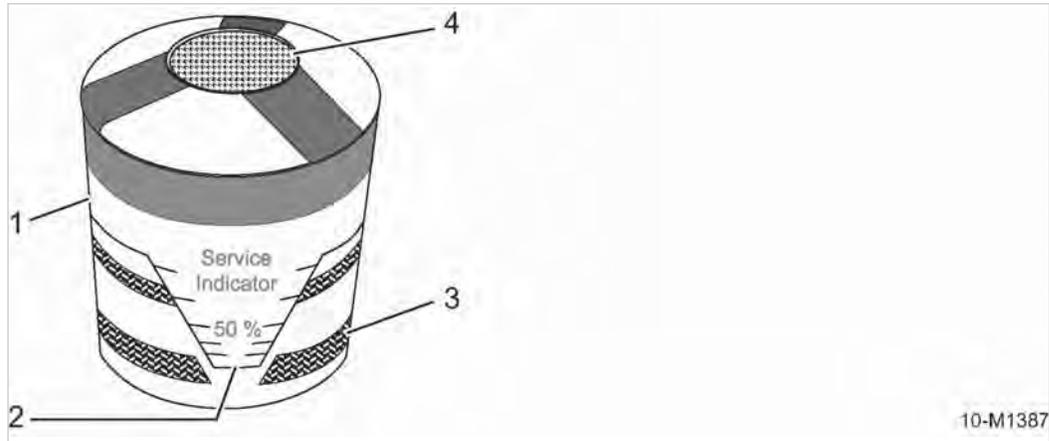


Fig. 46 Maintenance indicator

- | | |
|-------------------------|--|
| ① Maintenance indicator | ③ Red zone indicator scale |
| ② Indicator piston | ④ Reset knob for the maintenance indicator |

- Check the air filter maintenance indicator.
If the yellow piston reaches the red zone, renew the filter element.

Replacing the filter element

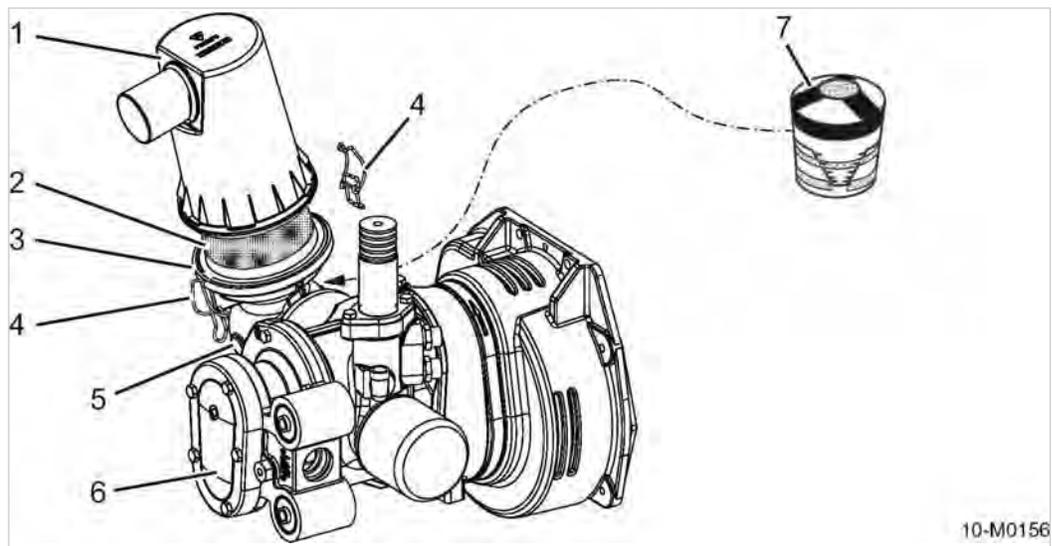


Fig. 47 Compressor air filter maintenance

- | | | | |
|---|----------------|---|-----------------------|
| ① | Filter cap | ⑤ | Inlet valve |
| ② | Filter element | ⑥ | Airend |
| ③ | Filter housing | ⑦ | Maintenance indicator |
| ④ | Retaining clip | | |

1. Release the retaining clip.
2. Remove the cover.
3. Draw out the filter element.
4. Carefully clean the inside of the housing, the cover and sealing faces with a damp cloth.
5. Insert a new filter element in the housing. Make sure it is properly in place and sealed by its gaskets.
6. Replace the cap with the two retaining clips.
7. Check the correct attachment of the filter cover.

Resetting the maintenance indicator:

- Press the reset knob on the maintenance indicator a number of times.
The yellow piston within the indicator is reset and the maintenance indicator is ready for use again.
- Close the cover.



Dispose of old parts and contaminated materials according to environmental regulations.

10.4.8 Checking safety relief valves

- Have safety relief valves checked by KAESER Service in accordance with the maintenance schedule.

10.5 Cleaning the cooler

The frequency of cleaning is mainly dependent on local operating conditions.

Heavy clogging of the cooler/radiator can cause oil overheating and overheating of the engine.

Check the cooler/radiator regularly for clogging.

Avoid creating dust eddies. Wear breathing protection if necessary.

Do not clean the cooler/radiator with a sharp instrument, otherwise it could be damaged.

A severely contaminated cooler/radiator should be cleaned by KAESER Service.

Material Compressed air
Face mask (as required)
Water or steam jet blaster

Precondition The machine is placed over a washing point equipped with an oil separator.
The machine is shut down.
The machine is cooled down.
The machine is fully vented, the pressure gauge reads 0 psig.
All compressed air consumers are disconnected and the air outlet valves are open.
The negative cable to the battery is disconnected.

NOTICE

Damage to the machine can be caused by water or steam jets.

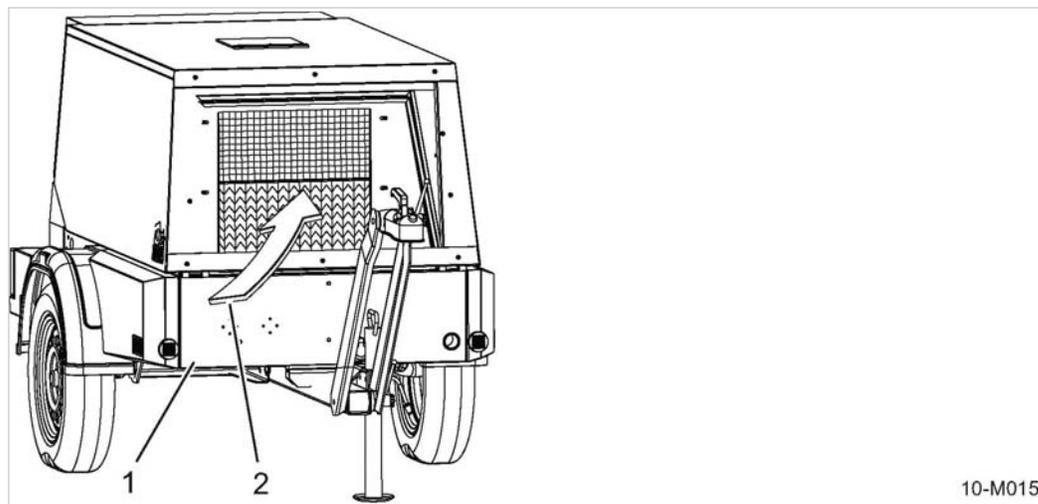
Direct water or steam jets can damage or destroy electrical components and indicating instruments.

- *Cover up electrical components such as the control cabinet, alternator, starter and instruments.*
- *Do **not** direct water or steam jets at sensitive components such as alternator, starter or indicating instruments.*
- *Deploy the extension pole of the pressure washer at a distance of at least 20 inches and at an approximate 90° angle to the cooler/radiator surface.*

- Open the canopy.

10.5.1 Cleaning the cooler / radiator

The compressor oil cooler and engine coolant radiator are combined in a single cooler block.



10-M0157

Fig. 48 Cleaning the cooler / radiator

- | | |
|---|--|
| <ul style="list-style-type: none"> ① Front end of machine, sound insulation (radiator grill) removed ② Direction of impacting water or steam jet (from outside to inside) | <ul style="list-style-type: none"> ③ Radiator (engine) ④ Compressor oil cooler |
|---|--|

Cleaning the cooler

1. Seal off the air intakes of the engine and compressor air filters before starting cleaning.
2. Remove the sound damping louver in front of the cooler/radiator.
3. Clean the cooling fins with compressed air, water or steam jet in the opposite direction to the cooling air flow (from inside to outside).
4. Replace the sound damping louver.
5. Remove the protective coverings from the air filters.
6. Reconnect the battery.
7. Close the canopy.
8. Start the machine and run up to operating temperature so that excess water is evaporated.

Check the cooler for leaks

1. Open the canopy.
2. Visually inspect for leaks. Does oil/cooling water flow out?



Is a cooler leaking?

- Have the defective cooler repaired immediately by KAESER Service.

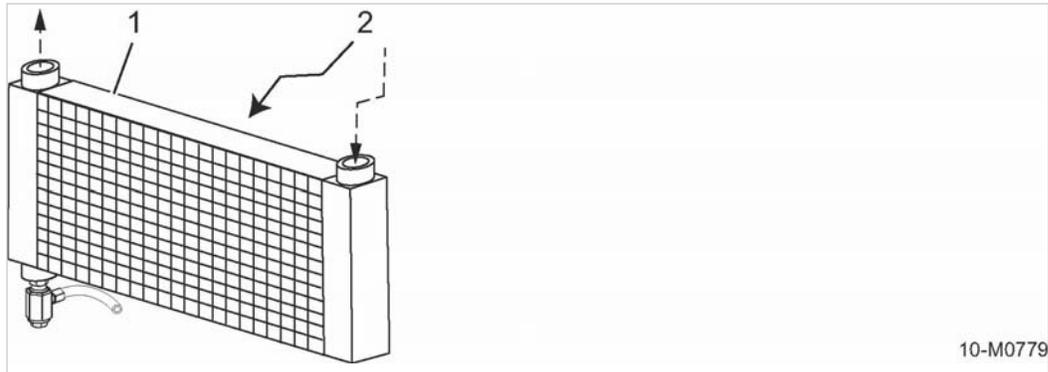
- Close the canopy.



Clean the cooler blades only in a washing area equipped with an oil separator.

10.5.2 Option da Cleaning the compressed air aftercooler

The compressed air aftercooler is located near the air treatment devices.



10-M0779

Fig. 49 Cleaning the compressed air aftercooler

- ① Compressed-air aftercooler
- ② Direction of impacting water or steam jet (from inside to outside).

1. Seal off the air intakes of the engine and compressor air filters before starting cleaning.
2. Clean the aftercooler with compressed air, water or steam jet in the opposite direction to the cooling air flow (from inside to outside).
3. Remove the protective coverings from the air filters.
4. Reconnect the battery.
5. Close the canopy.
6. Start the machine and run up to operating temperature so that excess water is evaporated.



Clean the cooler blades only in a washing area equipped with an oil separator.

10.6 Maintenance of rubber sealing strips

The rubber sealing strips between the lower body and the canopy serve both as a soundproofing measure and to prevent ingress of rain water.

Care of the rubber sealing strips is especially necessary in winter to prevent the strips from sticking and tearing when the canopy is opened.

Material Cleaning cloth
Silicone or Vaseline

Precondition The machine is shut down.
The machine is fully vented, the pressure gauge reads 0 psig.
The machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.

1. Open the canopy.
2. Clean the rubber sealing strips with a lint-free cloth and check for cracks, holes and other damage.
Change a damaged gasket.
3. Grease the rubber strips.
4. Close the canopy.

10.7 Chassis maintenance

- Perform maintenance tasks according to the schedule in chapter 10.2.2.1.

10.7.1 Wheel checks

Check the wheels for tightness, visible damage and tire pressures:

- after the first 30 miles
- after every wheel change
- at least every six months

Material Torque wrench
tire pressure gauge

Precondition Machine shut down and secured against restarting.

1. Check/adjust for wheel fixing torques.
2. Check the tires and wheels for any defect.
Replace any damaged or worn tires.
3. Check the tire treads for sufficient depth.



According to local roadworthy regulations, at least 63 mil in most countries.

Profile depth too low: change tires.

4. Check the tire pressures.

Result tire pressure too low: pump tires.

Further information See chapter 2.4.3 for wheel fixing torques.
See chapter 2.4.2 for tire pressures.
A sticker is found on each wheel arch giving the recommended tire pressure.

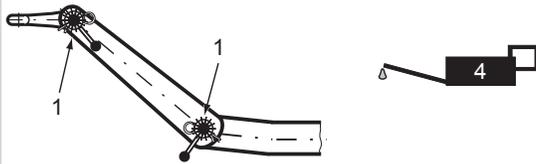
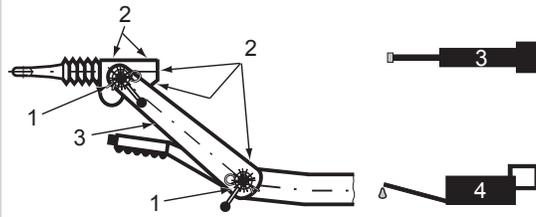
10.7.2 Towbar maintenance

Clean and lubricate all sliding and rotating bearings as necessary but at least every 6 months.

Material Lithium enriched multipurpose grease
Acid-free oil
Cleaning cloth

Precondition The machine is shut down.
The machine is disconnected from the towing vehicle and safely parked.

10.7.2.1 Check the towbar

Greasing points	
Option	Illustration
sa	 <p>Diagram showing a towbar assembly with two greasing points labeled '1' and one grease nipple labeled '4'.</p>
sb	 <p>Diagram showing a towbar assembly with greasing points labeled '1', '2', '3', and '4'. Point '2' is a grease gun nozzle, and point '3' is a nipple.</p>

Tab. 66 Lubricating points of the towbar

1. Check the towbar for correct function and movement.
2. Clean and oil (4) all serrated joints (1), sliding and rotating bearings of the height adjustment.
3. Use a grease gun (2) on all nipples (3) until grease flows from the bearing points.

Option sa, sb Check the height setting of the towbar

- Check the towbar height adjustment function.



The locking teeth on the towbar height adjustment joint are corroded and jammed and the towbar height cannot be adjusted.

- If necessary, free the teeth by jerking the towbar horizontally and vertically.
- Clean the toothed coupling and smear with water-repellent grease.

Further information See chapter 6.4 for towbar height adjustment.

Option sb, sd, se Maintaining the parking brake

- Lightly lubricate the pins and adjustment joints.

10.7.2.2 Overrun device maintenance

Greasing the overrun device

- Pump fresh grease into the nipple until old grease is squeezed out.

Further information See table 66 for the lubricating points (option sb).

Checking the shock absorber:

1. Loosen the transfer cable (3) one side.

2. Press in the shock absorber against its damping force.
Have the shock absorber replaced by a specialist workshop if:
 - There is little resistance to pushing in,
 - Air has entered the device,
 - there is little resistance to pulling out the shock absorber.
 - Oil leaks out.

10.7.2.3 Ball coupling maintenance

Option sa, sb, sd, se

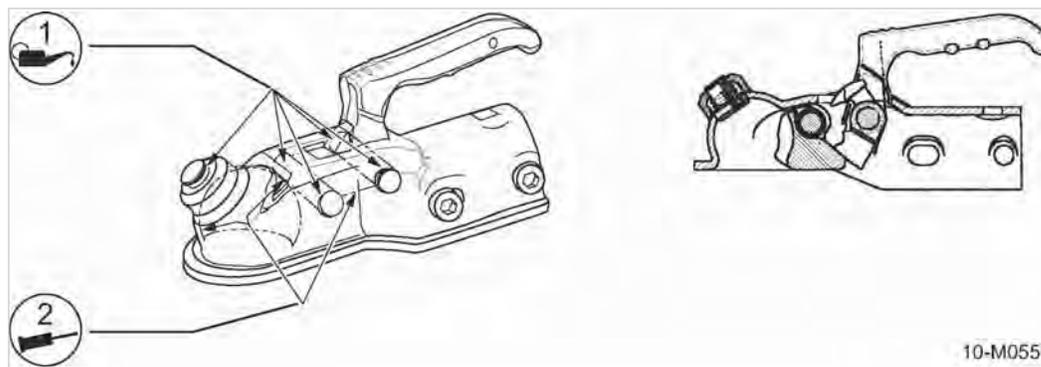


Fig. 50 Ball coupling (EC version)

- ① Lubricating points
- ② Greasing points

Option sh

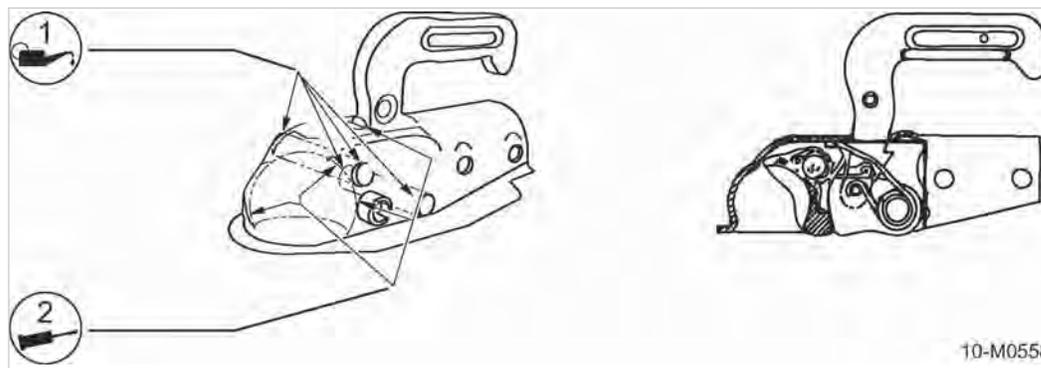


Fig. 51 Ball coupling (USA version)

- ① Lubricating points
- ② Greasing points

1. Check the ball coupling for correct function and movement.
2. Clean the ball coupling. Grease or oil the ball cup, joints, and bearings.

10.7.3 Brake system maintenance

The brake adjusting procedure ensures even wear on the brake linings by adjusting the brake shoes.

The following points must be observed:

- Carry out the adjustment procedure on all wheel brakes, one after the other.
- During adjustment, turn the wheel in the “forward” direction only.

Material Screwdriver
 Wrench
 Torch
 Cleaning cloth
 Lithium-enriched multi-purpose grease

Precondition The machine is switched off.

1. Jack up the machine and lower it onto supports.
2. Release the parking brake and completely pull out the overrun braking mechanism.
 The brake cables are not tensioned.

10.7.3.1 Checking the brake system settings

1. Pull up the parking brake to first notch.
2. Turn the wheels in the forward direction.
3. Check that there is the same braking resistance on both wheels.
 Adjust the braking system if the resistance is not the same.
4. Release the parking brake.

10.7.3.2 Checking wheel brake lining wear

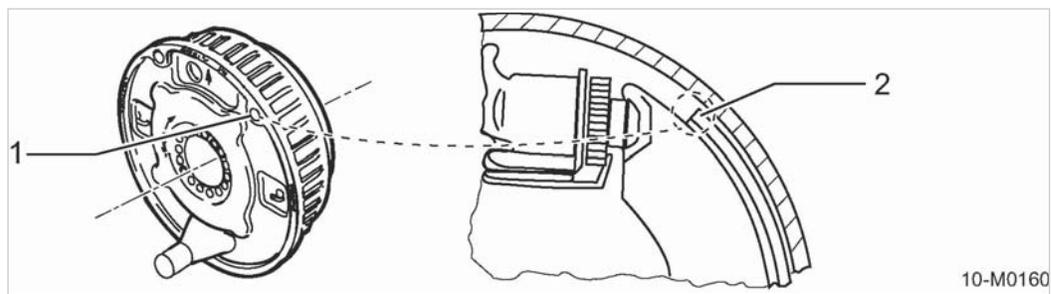


Fig. 52 Checking the brake lining thickness

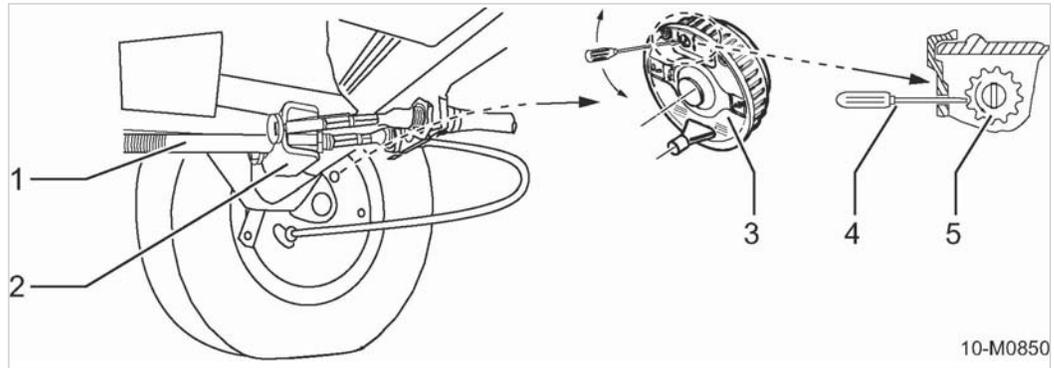
- ① Inspection hole
- ② Brake linings

1. Remove the plug from the inspection hole.
2. With the aid of a torch, check the brake lining thickness.
 Brake linings less than 0.1 inch thick should be replaced by a specialized workshop.
3. Replace the plug in the inspection hole.

10.7.3.3 Brake system adjustment

There is an arrow pressed into the brake back plate near the adjustment hole.

- Turning in the direction of the arrow increases brake force.
- Turning in the opposite direction to the arrow releases brake force.



10-M0850

Fig. 53 Brake system adjustment

- | | | | |
|---|---------------|---|-------------------------------|
| ① | Brake rod | ④ | Screwdriver as adjusting tool |
| ② | Equalizer | ⑤ | Adjusting wheel |
| ③ | Brake support | | |

1. Remove the plug from the inspection hole.
2. Use a screwdriver to turn the adjusting wheel ⑤ until the wheels no longer turn in the forward direction.
3. Apply the parking brake a number of times to centre the brake linings.
4. Use the screwdriver to turn the adjusting wheel back (3 to 5 notches) until there is no more braking resistance to the wheels turning forward.
5. Pull up the parking brake.
6. Check the position of the equalizer ② on the brake rod ①.
If the equalizer is perpendicular to the brake rod, the brake clearance is the same on each wheel.
If the equalizer is not perpendicular, adjust the brakes again.
7. Pull the parking brake lightly on and compare the braking force on the wheels.
If the braking force on the wheels is not equal, the brakes must be adjusted again.
8. Replace the plug in the inspection hole.



A light rubbing sound when the wheels turn is permissible if it does not affect free turning.

Brake rod adjustment:

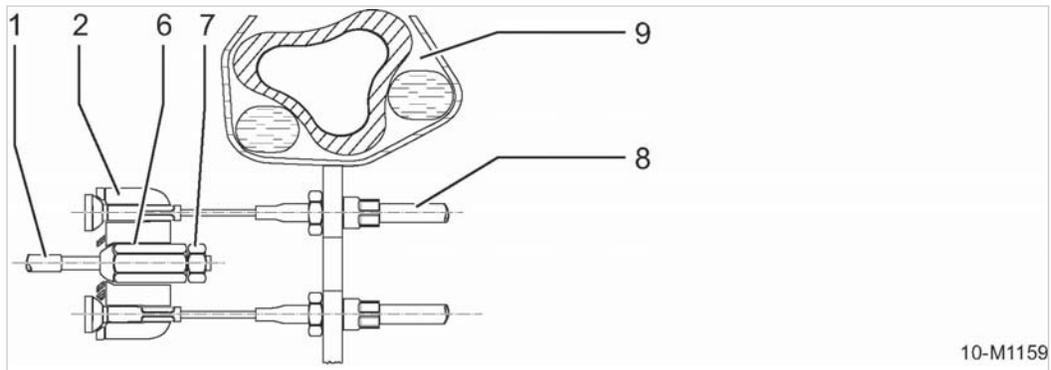


Fig. 54 Brake rod adjustment

- | | |
|-------------|------------------------|
| ① Brake rod | ⑦ Hexagon nut |
| ② Equalizer | ⑧ Brake cable (Bowden) |
| ⑥ Ball nut | ⑨ Axle (cross-section) |

1. To free the brake rod, remove the hexagon nut ⑦ at the equalizer ② and loosen the ball nut ⑥.
2. Clean and grease the brake rod threads.
3. Tighten the ball nut without using a power tool.
4. Pull and release the parking brake three times.
5. Turn the wheel in forward direction and simultaneously tighten the ball nut up to a clearly experienced braking resistance.



You must still be able to manually turn the wheel in forward driving direction.

6. Screw the hexagon nut onto the brake rod and lock the ball nut.
 - Test by applying the brake a number of times.

10.7.3.4 Greasing the brake rods

Grease the brake rods when necessary (stiff movement) but at least annually.

Material Lithium-enriched multi-purpose grease
Cleaning cloths

Precondition The machine is shut down.
The machine is disconnected from the towing vehicle and safely parked.

- Clean and grease the brake rod's sliding and adjustment joints.

10.8 Maintenance for Optional Items

- Perform maintenance tasks according to the schedule in chapter 10.2.2.2.

10.8.1 Option ea
Tool lubricator maintenance

Material Tool oil (special lubricant for road breakers)
 Funnel
 Cleaning cloth

Precondition The machine is shut down.
 The machine is standing level.
 The machine is fully vented, the pressure gauge reads 0 psig.
 The machine is cooled down.
 All compressed air consumers are disconnected and the air outlet valves are open.

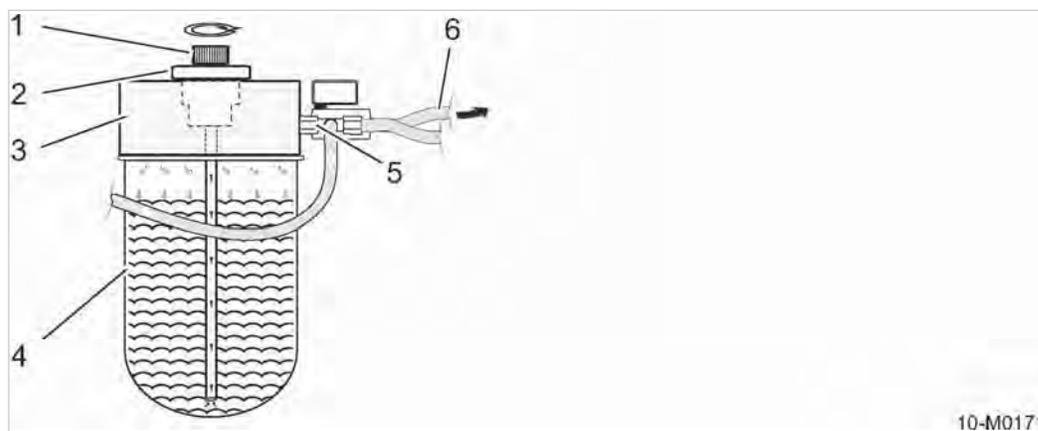


Fig. 55 Tool lubricator maintenance

- | | | | |
|---|---|---|----------------------|
| ① | Metering knob | ④ | Oil tank |
| ② | Filler plug with dipstick and integrated riser tube | ⑤ | Compressed air inlet |
| ③ | Tool lubricator upper part with oil filling port | ⑥ | Tool oil outlet |

➤ Open the canopy.

Checking the tool lubricator oil level

Check the oil level daily.

A dip stick is attached to the underside of the oil filler plug with which to measure the oil level.

The oil level should be in the upper third of the dipstick.

1. Slowly unscrew and withdraw the oil filler plug.
2. Wipe off the dipstick with a lint-free cloth or rag and screw the plug fully in again.
3. Unscrew and withdraw the plug once more and read off the oil level on the dipstick.
 Oil level at the upper third of the dip stick: OK.
 Top up if the oil does not reach this level.
4. Close the canopy.

Filling and topping up with tool lubricator oil

1. Slowly unscrew and withdraw the oil filler plug.
2. Use a funnel to pour in the oil to the maximum level (0.4 - 0.6 inches below the top of the tank).
3. Check the oil level.
4. Check the filler plug O-ring for external damage.
Change a damaged O-ring.
5. Insert the plug in the filler port.
6. Close the canopy.

Further information See chapter 2.7.1 for suitable oil grade and volume.

**10.8.2 Option da
Compressed air water separator maintenance**

If the amount of water in the compressed air is too high, the dirt trap of the compressed air water separator requires cleaning. The compressed air water separator ② is integrated in the compressed air aftercooler ①.

- Material
- Cleaning cloth
 - Wrench
 - Small screwdriver
 - Dirt trap maintenance kit
 - Petroleum ether or spirit

- Precondition
- The machine is shut down.
 - The machine is cooled down.
 - The machine is fully vented, the pressure gauge reads 0 psig.
 - All compressed air consumers are disconnected and the air outlet valves are open.
 - The negative cable to the battery is disconnected.

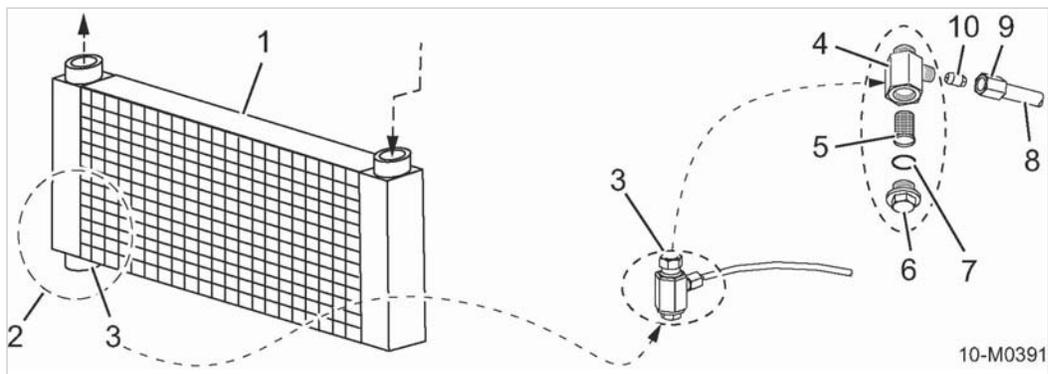


Fig. 56 Cleaning the dirt trap

- ① Compressed air aftercooler
- ② Compressed air water separator
- ③ Dirt trap
- ④ Dirt trap housing
- ⑤ Strainer

- ⑥ O-ring
- ⑦ Screw plug
- ⑧ Condensate drain hose
- ⑨ Condensate drain hose union nut
- ⑩ Nozzle

➤ Open the cover.

Cleaning the dirt trap

1. Unscrew the plug (7) and remove the strainer (5).
2. Loosen the union nut (9) and detach the condensate drain hose (8) from the dirt trap
3. Use the small screwdriver to unscrew the nozzle (10) from the dirt trap housing.
4. Clean the nozzle, strainer, screw plug, O-ring (6) and dirt trap housing (4) with cleaning solvent or spirit.
5. Check the nozzle, strainer and O-ring for wear.
Replace components if they are heavily worn.
6. Place the strainer on the screw plug.
7. Screw in the plug making sure the O-ring seats properly.
8. Screw in the nozzle and reattach the condensate drain hose.

Putting in operation:

1. Reconnect the negative battery terminal.
2. Close the cover.

Starting the machine and performing a test run:

1. Switch the machine on and run it in IDLE mode for approximately 5 minutes.
2. Shut down the machine.
3. Wait until the machine has automatically vented.
Pressure gauge reads 0 psig!
4. Open the outlet valves.
5. Open the cover.
6. Check the housing of the water separator and the hose line for leaks.
7. Close the cover.

**10.8.3 Option ba
Frost protector maintenance**

At temperatures under 40°F, the level of antifreeze in the protector must be checked daily before starting the compressor.

Material Antifreeze (Wabcothyl)
Cleaning cloth

Precondition The machine is shut down.
The machine is fully vented, the pressure gauge reads 0 psig.
The machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.

⚠ DANGER

Spontaneous ignition of antifreeze!

Danger of fire or explosion caused by the spontaneous ignition can result in serious injury.

➤ *Never top off antifreeze unless the machine is stopped and cooled down.*

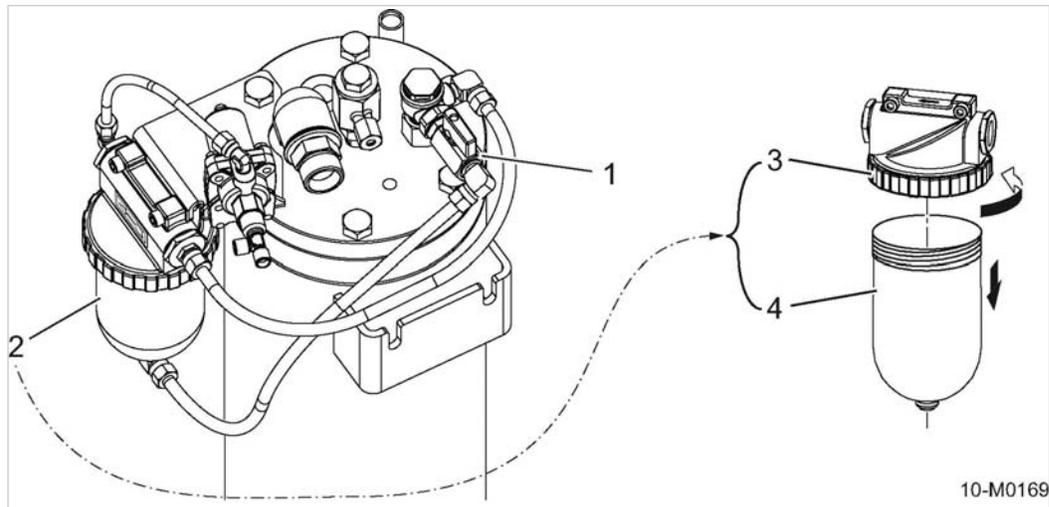
⚠ WARNING

Compressed air!

The frost protector is under pressure when operating; serious injury can result from loosening or opening components under pressure.

- *Depressurize the frost protector*

Option ba



10-M0169

Fig. 57 Filling the frost protector

- | | |
|-------------------|------------------------|
| ① Shut-off valve | ③ Bowl clamp ring |
| ② Frost protector | ④ Frost protector bowl |

1. Open the canopy.
2. Unscrew the clamp ring and remove the bowl.
3. Fill the bowl $\frac{3}{4}$ full with antifreeze.
4. Carefully screw the bowl back into place.
5. Close the canopy.

10.8.4 Option Ib Engine air intake shut-off valve maintenance

Material Compressed air for blowing out
Petroleum ether or spirit
Cleaning cloth

Precondition The machine is shut down.
The machine is fully vented, the pressure gauge reads 0 psig.
The machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.

NOTICE

Engine air intake shut-off valve

The engine air intake shut-off valve does not close when flammable gas is drawn into the engine:

The machine does not shut down? Destruction of the engine and explosion and/or fire are possible!

- Do not move the valve adjusting screw.
- Have the valve set by a specialized workshop or an authorized KAESER service representative.

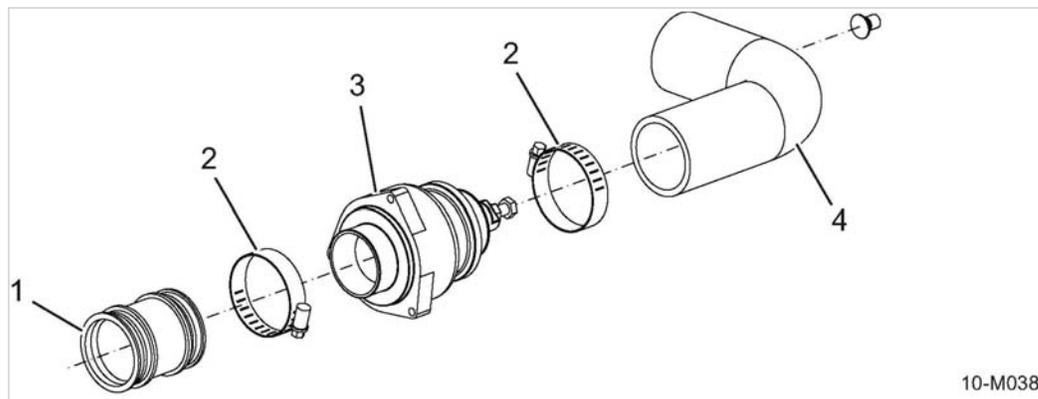


Fig. 58 Engine air intake shut-off valve maintenance

- | | |
|------------------------------|------------------------------------|
| ① Flexible hose (motor side) | ③ Engine air intake shut-off valve |
| ② Hose clamp | ④ Air intake hose (filter side) |

- Open the canopy.

Engine air intake shut-off valve cleaning

1. **NOTICE** *The engine air intake shut-off valve does not close fully. The machine does not shut down? Destruction of the engine and explosion and/or fire are possible!*

- Do not grease the valve, as this may cause a build up of dust and valve sticking.

2. Loosen the hose clamp on the filter side of the valve.
3. Turn the air intake hose to one side.
4. Loosen the hose clamp on the motor side of the valve.
5. Remove the valve from the flexible hose.
6. Check if the interior of the shut-off valve is clean.
Blow out any dirt with compressed air.



If necessary, clean the valve with petroleum ether or spirit and allow to dry.
Refer to a specialized workshop or KAESER Service if dirt cannot be removed.

Check the engine air intake shut-off valve for correct function and movement

1. Check the valve for signs of excessive wear.
2. Check that the valve plate closes fully and easily.

Result Have the engine air intake shut-off valve changed if it is heavily worn or malfunctions in any way.

1. Slide the valve onto the flexible hose.
2. Tighten the hose clamp on the motor side.
3. Reposition the air intake hose on the filter side and tighten the hose clamp.
4. Close the canopy.
5. Start the machine and switch to LOAD.

If the engine stops on switching to LOAD, have the valve adjusted by a specialized workshop or an authorized KAESER service representative.

10.8.5 Option oe Draining liquid accumulation within the machine

The so-called "closed floor pan" contributes to the protection of the environment by preventing a contamination of the soil in the event of leaking operating fluids.

Liquid accumulations within the machine's body can also cause corrosion or electrical faults. Liquid accumulations must be removed as quickly as possible in order to avoid potential machine faults.

For draining the liquid, maintenance openings have been added to the floor panel of the machine which are closed with bungs.

Material Receptacle
Cleaning cloth

Precondition The machine is shut down.
The machine is standing level.
The machine is secured against moving.
The machine is fully vented, the pressure gauge reads 0 psig.
The machine is cooled down.
All compressed air consumers are disconnected and the air outlet valves are open.

1. Place a receptacle underneath the maintenance opening(s).
2. Unscrew and remove the bung(s) from the maintenance openings.

The liquid will drain.

3. Clean the bungs and maintenance openings.
4. Close all maintenance openings with bungs.

The machine body is sealed.

5. Using the cleaning cloth, remove any dirt within the machine.



Dispose of collected liquid and contaminated working materials according to environmental protection regulations.

