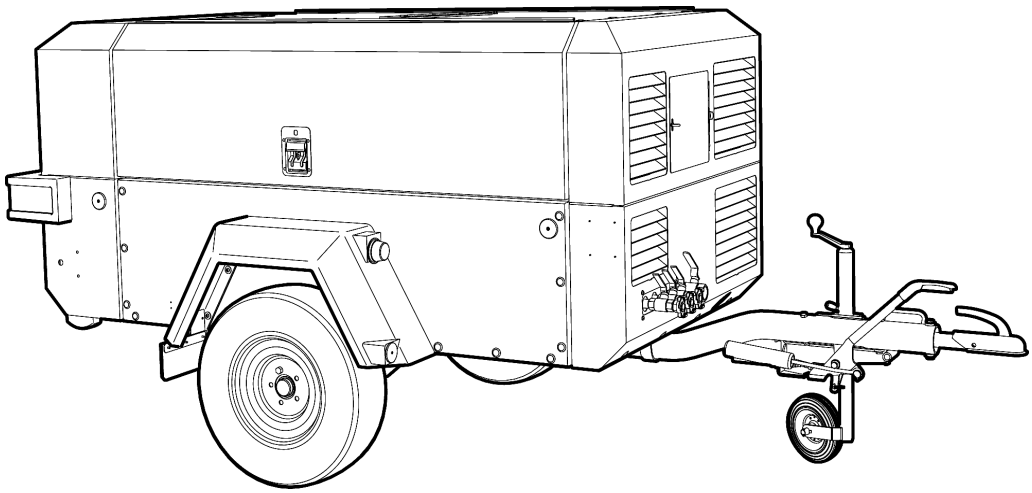
DOOSAN

Portable Power

7/73 - 10/53

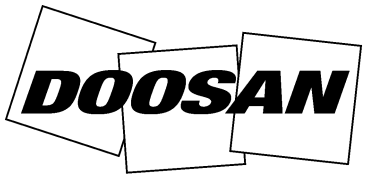
OPERATION AND MAINTENANCE MANUAL
Original Instruction



This manual contains important safety information and must be made available to personnel who operate and maintain this machine.

SERIAL No : 543500 -> 543999

46674184_en_C_09/18



Portable Power

Machine models represented in this manual may be used in various locations world-wide. Machines sold and shipped into European Union Territories require that the machine display the CE Mark and conform to various directives. In such cases, the design specification of this machine has been certified as complying with EC directives. Any modification to any part is absolutely prohibited and would result in the CE Certification and marking being rendered invalid. A declaration of that conformity follows:

CE

DOOSAN

1) EC Declaration of Conformity

2) Original declaration

3) **We:**
Doosan International USA, Inc
1293 Glenway Drive
Statesville
North Carolina 28625-9218
USA

4) **Represented in EC by:**
Doosan Trading Limited
Block B, Swords Business Campus
Swords
Co. Dublin
Ireland

5) **Hereby declare that, under our sole responsibility the product(s)**

6) Machine description: Portable Screw Compressor

7) Machine Model: 7/20; 7/26E; 7/31E; 7/41; 7/53; 7/53R; 7/73-10/53; 7/124-10/104; 10/124-14/114; 14/84; 7/204; 10/174; 10/204; 12/154; 14/144; 9/274; 9/304; 12/254; 17/244; 21/224

8) Commercial name: 7/20; 7/26E; 7/31E; 7/41; 7/53; 7/53R; 7/73-10/53; 7/124-10/104; 10/124-14/114; 14/84; 7/204; 10/174; 10/204; 12/154; 14/144; 9/274; 9/304; 12/254; 17/244; 21/224

9) VIN / Serial number: U N 5

10) **is (are) in conformity with the relevant provisions of the following EC Directive(s)**

11) 2006/42/EC The Machinery Directive
12) 2014/30/EU The Electromagnetic Compatibility Directive
13) 2000/14/EC The Noise Emission Directive
14) 2014/68/EU The Pressure Equipment Directive
15) 2014/29/EU The Simple Pressure Vessels Directive
16) 97/68/EC The emission of engines for no-road mobile machinery
31) 2014/35/EU The Low Voltage Equipment Directive
17) and their amendments

18) **Conformity with the Noise Emission Directive 2000/14/EC**

19) Directive 2000/14/EC, Annex VI, Part I
20) Notified body: AV Technology, Warrington, UK. Nr 1067

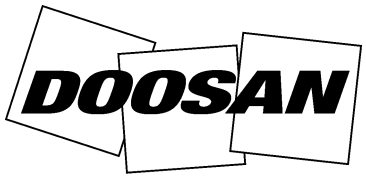
21)Machine		23)Measured sound power level	24)Guaranteed sound power level	21)Machine		23)Measured sound power level	24)Guaranteed sound power level
22)Type	kW			22)Type	kW		
7/20	17,5	**96L_{WA}**	**97L_{WA}**	**7/124-10/104**	97	**98L_{WA}**	**99L_{WA}**
7/26E	21,3	**97L_{WA}**	**98L_{WA}**	**10/124-14/114**	122		
7/31E	25,9	**97L_{WA}**	**98L_{WA}**	**14/84**	97		
7/41	35	**98L_{WA}**	**98L_{WA}**	**7/204; 10/174; 12/154; 14/144**	168	**98L_{WA}**	**99L_{WA}**
7/53; 7/53R	36	**97L_{WA}**	**98L_{WA}**				
7/73-10/53	55	**96L_{WA}**	**98L_{WA}**	**10/204**	186		
				9/274	226	**99L_{WA}**	**100L_{WA}**
				9/304; 12/254; 17/244; 21/224	247	**99L_{WA}**	**100L_{WA}**

25) **Conformity with the Pressure Equipment directive 2014/68/EU**

26) We declare that this product has been assessed according to the Pressure Equipment Directive 2014/68/EU and, in accordance with the terms of this Directive, has been excluded from the scope of this Directive. It may carry "CE" marking in compliance with other applicable EC directives.

Jan Moravec
27) Engineering Director
28) Issued at Dobris, Czech Republic
29) Date

30) **The technical documentation for the machinery is available from:**
Doosan Bobcat EMEA s.r.o. (DBEM), U Kodetky 1810, 263 12 Dobris, Czech Republic



Portable Power

ABBREVIATIONS & SYMBOLS

####	Contact the company for serial number
->####	Up to Serial No.
####->	From Serial No.
*****	Not illustrated
†	Option
AR	As required
F.H.R.G.	Fixed height running gear
V.H.R.G.	Variable height running gear
HA	High ambient machine
SECU	Small electronic control unit
bg	Bulgarian
cs	Czech
da	Danish
de	German
el	Greek
en	English
es	Spanish
et	Estonian
fi	Finnish
fr	French
hu	Hungarian
it	Italian
lt	Lithuanian
lv	Latvian, Lettish
mt	Maltese
nl	Dutch
no	Norwegian
pl	Polish
pt	Portuguese
ro	Romanian
ru	Russian
sk	Slovak
sl	Slovenian
sv	Swedish
zh	Chinese

2 FOREWORD

The contents of this manual are considered to be proprietary and confidential and should not be reproduced without the prior written permission of the company.

Nothing contained in this document is intended to extend any promise, warranty or representation, expressed or implied, regarding the products described herein. Any such warranties or other terms and conditions of sale of products shall be in accordance with the standard terms and conditions of sale for such products, which are available upon request.

This manual contains instructions and technical data to cover all routine operation and scheduled maintenance tasks by operation and maintenance staff. Major overhauls are outside the scope of this manual and should be referred to an authorised service department.

The design specification of this machine has been certified as complying with EC directives. As a result:

a) Any machine modifications are strictly prohibited, and will invalidate EC certification.
b) A unique specification for USA/Canada is adopted and tailored to the territory.

All components, accessories, pipes and connectors added to the compressed air system should be:

- of good quality, procured from a reputable manufacturer and, wherever possible, be of a type approved by the company.
- clearly rated for a pressure at least equal to the machine maximum allowable working pressure.
- compatible with the compressor lubricant/coolant.
- accompanied with instructions for safe installation, operation and maintenance.

Details of approved equipment are available from the company service departments.

The use of repair parts / lubricants / fluids other than those included within the approved parts list may create hazardous conditions over which the company has no control. Therefore the company cannot be held responsible for equipment in which non-approved repair parts are installed.

The company reserves the right to make changes and improvements to products without notice and without incurring any obligation to make such changes or add such improvements to products sold previously.

The intended uses of this machine are outlined below and examples of unapproved usage are also given, however the company cannot anticipate every application or work situation that may arise.

IF IN DOUBT CONSULT SUPERVISION.

This machine has been designed and supplied for use only in the following specified conditions and applications:

- Compression of normal ambient air containing no known or detectable additional gases, vapours. or particles
- Operation within the ambient temperature range specified in the *GENERAL INFORMATION* section of this manual.

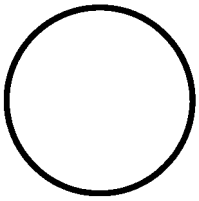
The use of the machine in any of the situation types listed in table 1:-

a) Is not approved,
b) May impair the safety of users and other persons, and
c) May prejudice any claims made.

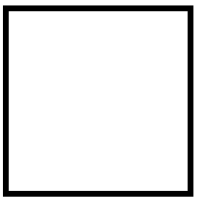
TABLE 1
Use of the machine to produce compressed air for: a) direct human consumption b) indirect human consumption, without suitable filtration and purity checks.
Use of the machine outside the ambient temperature range specified in the *GENERAL INFORMATION SECTION* of this manual.
This machine is not intended and must not be used in potentially explosive atmospheres, including situations where flammable gases or vapours may be present.
Use of the machine fitted with non approved components / lubricants / fluids.
Use of the machine with safety or control components missing or disabled.
Use of the machine for storage or transportation of materials inside or on the enclosure except when contained within the toolbox.

The company accepts no responsibility for errors in translation of this manual from the original English version.

GRAPHIC FORM AND MEANING OF ISO SYMBOLS



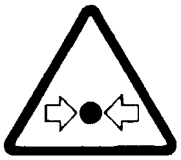
Prohibition / Mandatory



Information / Instructions

Warning

WARNING: Electrical shock risk



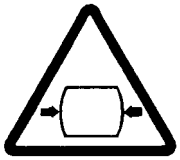
WARNING - Pressurised component or system.

WARNING - Hot surface.

WARNING - Pressure control.

WARNING - Corrosion risk.

WARNING - Air/gas flow or Air discharge.



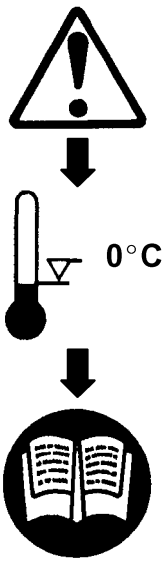
WARNING - Pressurised vessel.

WARNING - Hot and harmful exhaust gas.

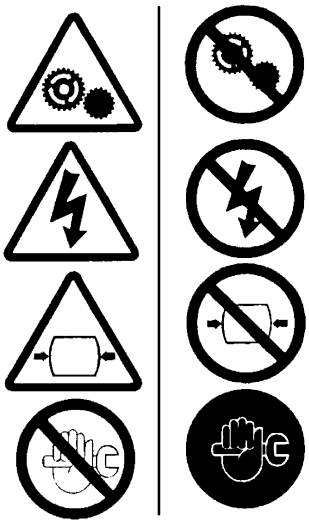
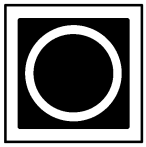
WARNING - Flammable liquid.

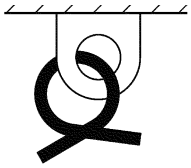
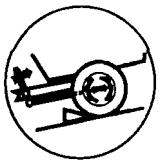
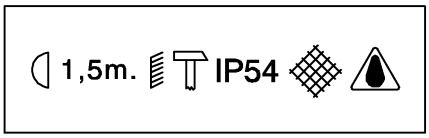
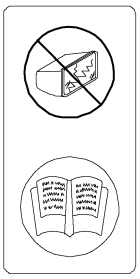
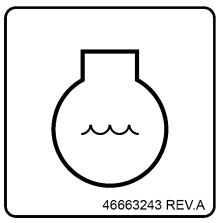
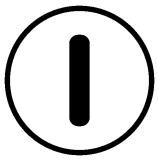
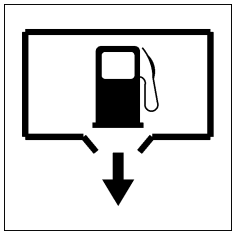
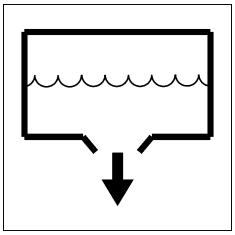
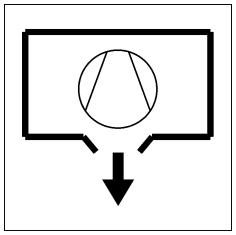
WARNING - Maintain correct tyre pressure. (Refer to the GENERAL INFORMATION section of this manual).

WARNING - Before connecting the tow bar or commencing to tow consult the operation and maintenance manual.

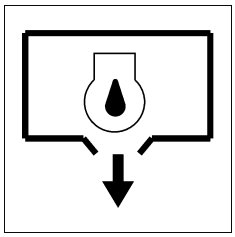
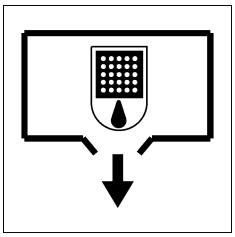


WARNING - For operating temperature below 0°C, consult the operation and maintenance manual.

 **WARNING - Maintenance work in progress.**	 **WARNING - Do not undertake any maintenance on this machine until the electrical supply is disconnected and the air pressure is totally relieved.**	 **WARNING - Consult the operation and maintenance manual before commencing any maintenance.**
 Do not breathe the compressed air from this machine.	 Do not remove the Operating and Maintenance manual and manual holder from this machine.	 Do not stack.
 Do not operate the machine without the guard being fitted.	 Do not stand on any service valve or other parts of the pressure system.	 Do not operate with the doors or enclosure open.
 Do not use fork lift truck from this side.	 Do not exceed the trailer speed limit.	 No naked lights.
 Do not open the service valve before the airhose is attached.	 Use fork lift truck from this side only.	 Emergency stop.

 Lashing point (Tie down).	 Lifting point.	 On (power).
 Off (power).	 Read the Operation and Maintenance manual before operation or maintenance of this machine is undertaken.	 When parking use prop stand, handbrake and wheel chocks.
 Compressor oil filling.	 Diesel fuel. No open flame.	 Parking brake.
 Rough Service Designation. Wet Location Operation.	 Replace any cracked protective shield.	 Coolant fill.
 Prohibition: Do not start	 Start and stop device.	 Mandatory action: Hearing protection must be worn.
 Diesel fuel drain.	 Engine coolant drain.	 Compressor oil drain.

6 DECALS

 Engine oil drain.	 Compressor oil drain.

Look for these signs on machines shipped to markets in North America, which point out potential hazards to the safety of you and others. Read and understand thoroughly. Heed warnings and follow instructions. If you do not understand, inform your supervisor.

⚠ DANGER

Red background
Indicates the presence of a hazard which WILL cause serious injury, death or property damage, if ignored.

⚠ CAUTION

Yellow background
Indicates the presence of a hazard which WILL or can cause injury or property damage, if ignored.

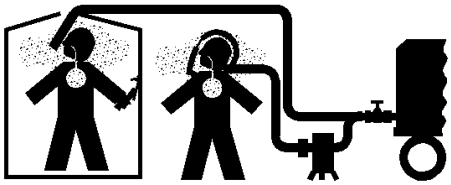
⚠ WARNING

Orange background
Indicates the presence of a hazard which CAN cause serious injury, death or property damage, if ignored.

NOTICE

Blue background
Indicates important set-up, operating or maintenance information.

⚠ DANGER



Air discharged from this machine can contain carbon monoxide or other contaminants which will cause serious injury or death.
Do not breathe this air.

⚠ WARNING

Trapped air pressure. Can cause serious injury or death.

Close service valve and operate tool to vent trapped air before performing any service.

⚠ WARNING

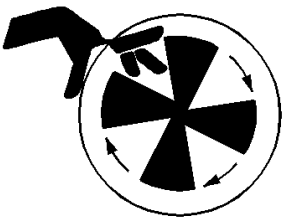
Hot pressurized fluid.
Can cause serious burns.

Do not open radiator while hot.

⚠ WARNING

Rotating Fan Blade.
CAN cause serious injury.

Do NOT operate with guard removed.



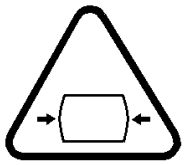
⚠ WARNING

Improper operation of this equipment. CAN cause serious injury or death.

Read Operator's Manual supplied with this machine before operation or servicing.

Modification or alteration of this machine. CAN cause serious injury or death.

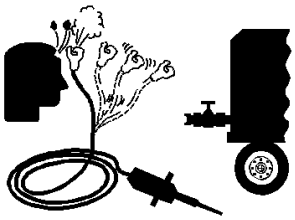
Do NOT alter or modify this machine without the express written consent of the manufacturer.



⚠ WARNING

Trapped air pressure. Can cause serious injury or death.

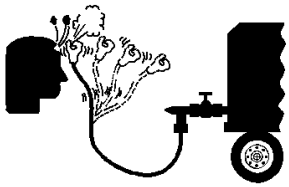
Close service valve and operate tool to vent trapped air before performing any service.



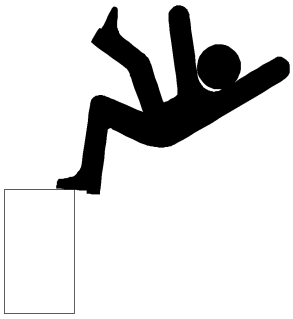
⚠ WARNING

Disconnected Air Hoses Whip. CAN cause serious injury or death.

When using air tools attach safety device (OSHA Valve) at source of air supply for each tool.



WARNING



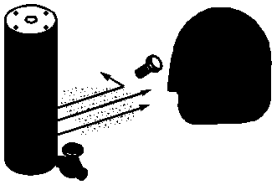
Falling off machine. CAN cause serious injury or death.

Access Lifting Bail from inside machine.

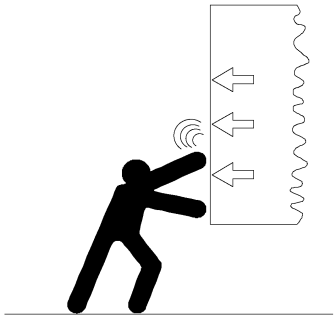
⚠ WARNING

High pressure air. Can cause serious injury or death.

Relieve pressure before removing filler plugs/ caps, fittings or covers.



WARNING



Door under pressure CAN cause serious injury.

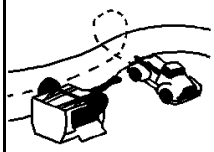
Use both hands to open door when machine is running.

XX
km/h

⚠ WARNING

Collapsing propstand.
Can cause serious injury..

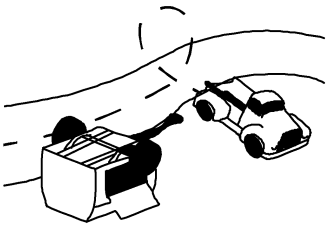
Clamp propstand securely



Excessive towing speed.
Can cause serious injury or death.
Do NOT exceed 65 mph (105 km/ hr)

For Highway Towable Units.

WARNING



WARNINGExcessive Towing Speed. CAN cause serious injury or death.

Do NOT Tow on Highway.
Do NOT exceed 20 mph (32 km/h)

For Non-Highway Towable Machines

WARNINGS

Warnings call attention to instructions which must be followed precisely to avoid injury or death.

CAUTIONS

Cautions call attention to instructions which must be followed precisely to avoid damaging the product, process or its surroundings.

NOTES

Notes are used for supplementary information.

General Information

Never operate unit without first observing all safety warnings and carefully reading the operation and maintenance manual shipped from the factory with this machine.

Ensure that the operator reads and *understands* the decals and consults the manuals before maintenance or operation.

Ensure that the Operation and Maintenance manual, and the manual holder, are not removed permanently from the machine.

Ensure that maintenance personnel are adequately trained, competent and have read the Maintenance Manuals.

Ensure that ice and snow do no block the cooling air inlets.

Use hearing protectors when the machine is running.

Make sure that all protective covers are in place and that the canopy/ doors are closed during operation.

The specification of this machine is such that the machine is not suitable for use in flammable gas risk areas. If such an application is required then all local regulations, codes of practice and site rules must be observed. To ensure that the machine can operate in a safe and reliable manner, additional equipment such as gas detection, exhaust spark arrestors, and intake *(shut-off)* valves may be required, dependant on local regulations or the degree of risk involved.

A weekly visual check must be made on all fasteners/fixing screws securing mechanical parts. In particular, safety-related parts such as coupling hitch, drawbar components, road-wheels, and lifting bail should be checked for total security.

All components which are loose, damaged or unserviceable, must be rectified without delay.

Air discharged from this machine may contain carbon monoxide or other contaminants which will cause serious injury or death. Do not breathe this air.

This machine produces loud noise with the doors open or service valve vented. Extended exposure to loud noise can cause hearing loss. Always wear hearing protection when doors are open or service valve is vented.

Never inspect or service unit without first disconnecting battery cable(s) to prevent accidental starting.

Do not use petroleum products (solvents or fuels) under high pressure as this can penetrate the skin and result in serious illness. Wear eye protection while cleaning unit with compressed air to prevent debris from injuring eye(s).

Rotating fan blade can cause serious injury. Do not operate without guard in place.

Use care to avoid contacting hot surfaces (engine exhaust manifold and piping, air receiver and air discharge piping, etc.).

Ether is an extremely volatile, highly inflammable gas. When it is specified as a starting aid, use sparingly. DO NOT USE ETHER IF THE MACHINE HAS GLOW PLUG STARTING AID OR ENGINE DAMAGE WILL RESULT.

Never operate unit with guards, covers or screens removed. Keep hands, hair, clothing, tools, blow gun tips, etc. well away from moving parts.

Compressed air

Compressed air can be dangerous if incorrectly handled. Before doing any work on the unit, ensure that all pressure is vented from the system and that the machine cannot be started accidentally.

Ensure that the machine is operating at the rated pressure and that the rated pressure is known to all relevant personnel.

All air pressure equipment installed in or connected to the machine must have safe working pressure ratings of at least the machine rated pressure.

If more than one compressor is connected to one common downstream plant, effective check valves and isolation valves must be fitted and controlled by work procedures, so that one machine cannot accidentally be pressurised / over pressurised by another.

Compressed air must not be used for a direct feed to any form of breathing apparatus or mask.

High Pressure Air can cause serious injury or death. Relieve pressure before removing filler plugs/caps, fittings or covers.

Air pressure can remain trapped in air supply line which can result in serious injury or death. Always carefully vent air supply line at tool or vent valve before performing any service.

The discharged air contains a very small percentage of compressor lubricating oil and care should be taken to ensure that downstream equipment is compatible.

If the discharged air is to be ultimately released into a confined space, adequate ventilation must be provided.

When using compressed air always use appropriate personal protective equipment.

All pressure containing parts, especially flexible hoses and their couplings, must be regularly inspected, be free from defects and be replaced according to the Manual instructions.

Avoid bodily contact with compressed air.

The safety valve located in the separator tank must be checked periodically for correct operation.

Whenever the machine is stopped, air will flow back into the compressor system from devices or systems downstream of the machine unless the service valve is closed. Install a check valve at the machine service valve to prevent reverse flow in the event of an unexpected shutdown when the service valve is open.

Disconnected air hoses whip and can cause serious injury or death.

Never allow the unit to sit stopped with pressure in the receiver-separator system.

Materials

The following substances *may* be produced during the operation of this machine:

- brake lining dust
- engine exhaust fumes

AVOID INHALATION

Ensure that adequate ventilation of the cooling system and exhaust gases is maintained at all times.

The following substances are used in the manufacture of this machine and *may* be hazardous to health if used incorrectly:

- anti-freeze
- compressor lubricant
- engine lubricant
- preservative grease
- rust preventative
- diesel fuel
- battery electrolyte

AVOID INGESTION, SKIN CONTACT AND INHALATION OF FUMES.

Should compressor lubricant come into contact with the eyes, then irrigate with water for at least 5 minutes.

Should compressor lubricant come into contact with the skin, then wash off immediately.

Consult a physician if large amounts of compressor lubricant are ingested.

Consult a physician if compressor lubricant is inhaled.

Never give fluids or induce vomiting if the patient is unconscious or having convulsions.

Safety data sheets for compressor and engine lubricants should be obtained from the lubricant supplier.

Never operate the engine of this machine inside a building without adequate ventilation. Avoid breathing exhaust fumes when working on or near the machine.

This machine may include such materials as oil, diesel fuel, antifreeze, brake fluid, oil/air filters and batteries which may require proper disposal when performing maintenance and service tasks. Contact local authorities for proper disposal of these materials.

Battery

A battery contains sulphuric acid and can give off gases which are corrosive and potentially explosive. Avoid contact with skin, eyes and clothing. In case of contact, flush area immediately with water.

DO NOT ATTEMPT TO SLAVE START A FROZEN BATTERY SINCE THIS MAY CAUSE IT TO EXPLODE.

Exercise extreme caution when using booster battery. To jump battery, connect ends of one booster cable to the positive (+) terminal of each battery. Connect one end of other cable to the negative (-) terminal of the booster battery and other end to a ground connection away from dead battery (to avoid a spark occurring near any explosive gases that may be present). After starting unit, always disconnect cables in reverse order.

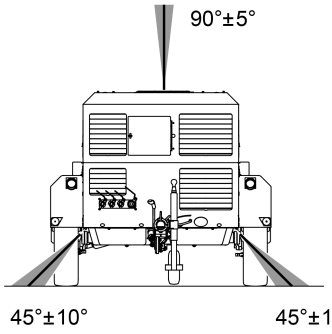
Radiator

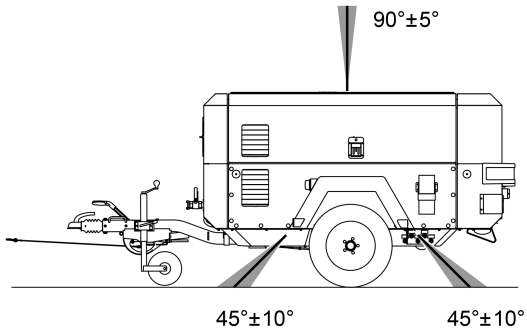
Hot engine coolant and steam can cause injury. Ensure that the radiator filler cap is removed with due care and attention.

Do not remove the pressure cap from a HOT radiator. Allow radiator to cool down before removing pressure cap.

Transport

When loading or transporting machines ensure that the specified lifting and tie down points are used and cables or chains are in safe limits.





When loading or transporting machines ensure that the towing vehicle, its size, weight, towing hitch and electrical supply are all suitable to provide safe and stable towing at speeds either, up to the legal maximum for the country in which it is being towed or, as specified for the machine model if lower than the legal maximum.

Ensure that the maximum trailer weight does not exceed the maximum gross weight of the machine (by limiting the equipment load), limited by the capacity of the running gear.

Note: Gross mass (on data plate) is for the basic machine and fuel only, excluding any fitted options, tools, equipment and foreign materials.

Before towing the machine, ensure that:

- the tyres and towing hitch are in a serviceable condition.
- the canopy is secure.
- all ancillary equipment is stored in a safe and secure manner.
- the brakes and lights are functioning correctly and meet necessary road traffic requirements.
- break–away cables/safety chains are connected to the towing vehicle.

The machine must be towed in a level attitude (the maximum permissible drawbar angle is between 0° and +5° from horizontal) in order to maintain correct handling, braking and lighting functions. This can be achieved by correct selection and adjustment of the vehicle towing hitch and, on variable height running gear, adjustment of the drawbar.

To ensure full braking efficiency, the front (towing eye) section must always be set level.

When adjusting variable height running gear:-

- Ensure front (towing eye) section is set level
- When raising towing eye, set rear joint first, then front joint.
- When lowering towing eye, set front joint first, then rear joint.

After setting, fully tighten each joint by hand and then tighten further to the next pin. Refit the pin.

When parking always use the handbrake and, if necessary, suitable wheel chocks.

Make sure wheels, tyres and tow bar connectors are in safe operating condition and tow bar is properly connected before towing.

Safety chains / connections and their adjustment

The legal requirements for the joint operation of the breakaway cable and safety chains are as yet unidentified by 71/320/EEC or UK regulations. Consequently we offer the following advice / instructions.

Where brakes only are fitted:

a) Ensure that the breakaway cable is securely coupled to the handbrake lever and also to a substantial point on the towing vehicle.

b) Ensure that the effective cable length is as short as possible, whilst still allowing enough slackness for the trailer to articulate without the handbrake being applied.

Where brakes and safety chains are fitted:

a) Loop the chains onto the towing vehicle using the towing vehicle hitch as an anchorage point, or any other point of similar strength.

b) Ensure that the effective chain length is as short as possible whilst still allowing normal articulation of the trailer and effective operation of the breakaway cable.

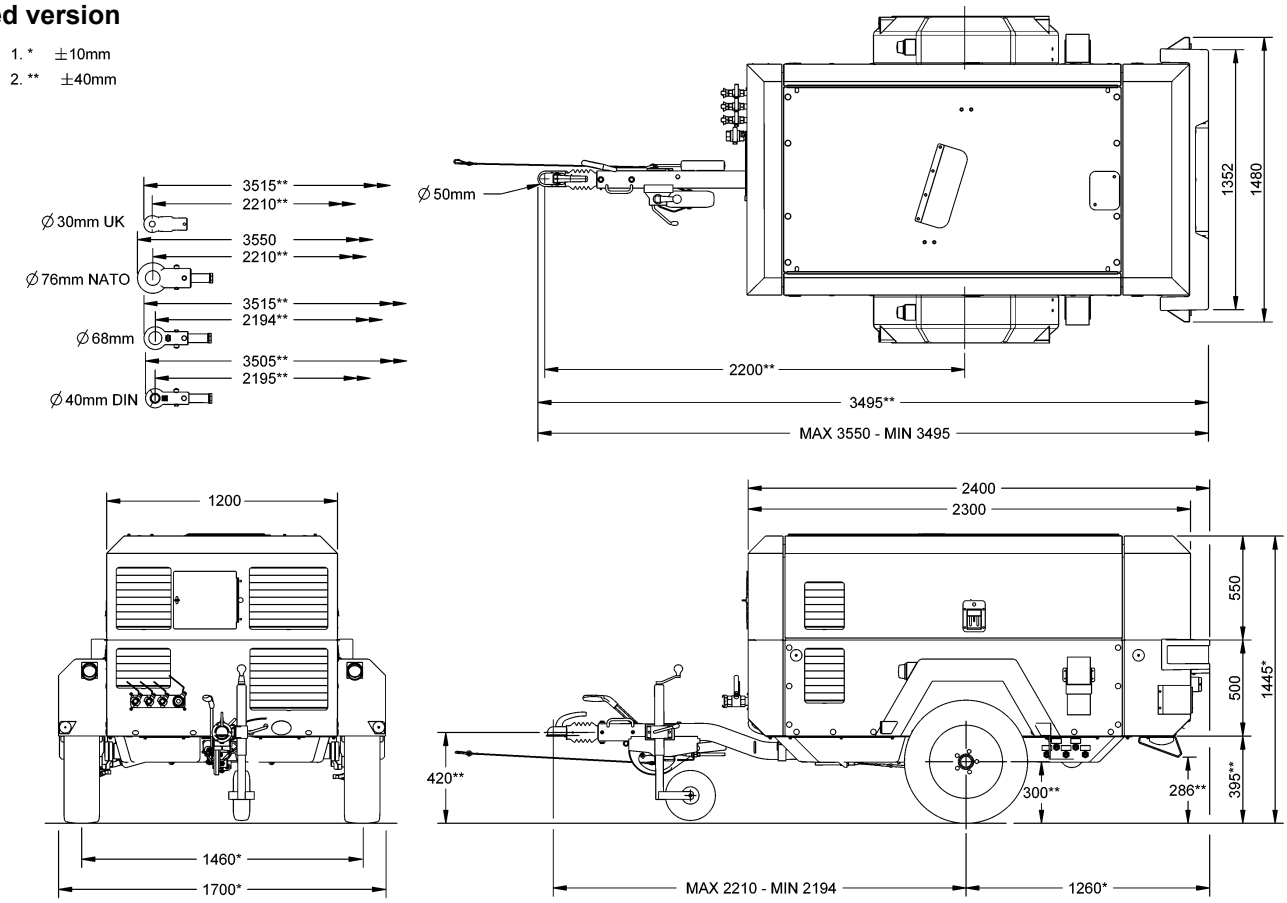
Where safety chains only are fitted:

a) Loop the chains onto the towing vehicle using the towing vehicle hitch as an anchorage point, or any other point of similar strength.

b) When adjusting the safety chains there should be sufficient free length in the chains to allow normal articulation, whilst also being short enough to prevent the towbar from touching the ground in the event of an accidental separation of the towing vehicle from the trailer.

7/73 - 10/53 FIXED HEIGHT RUNNING GEAR
Braked version

1. * ±10mm
2. ** ±40mm



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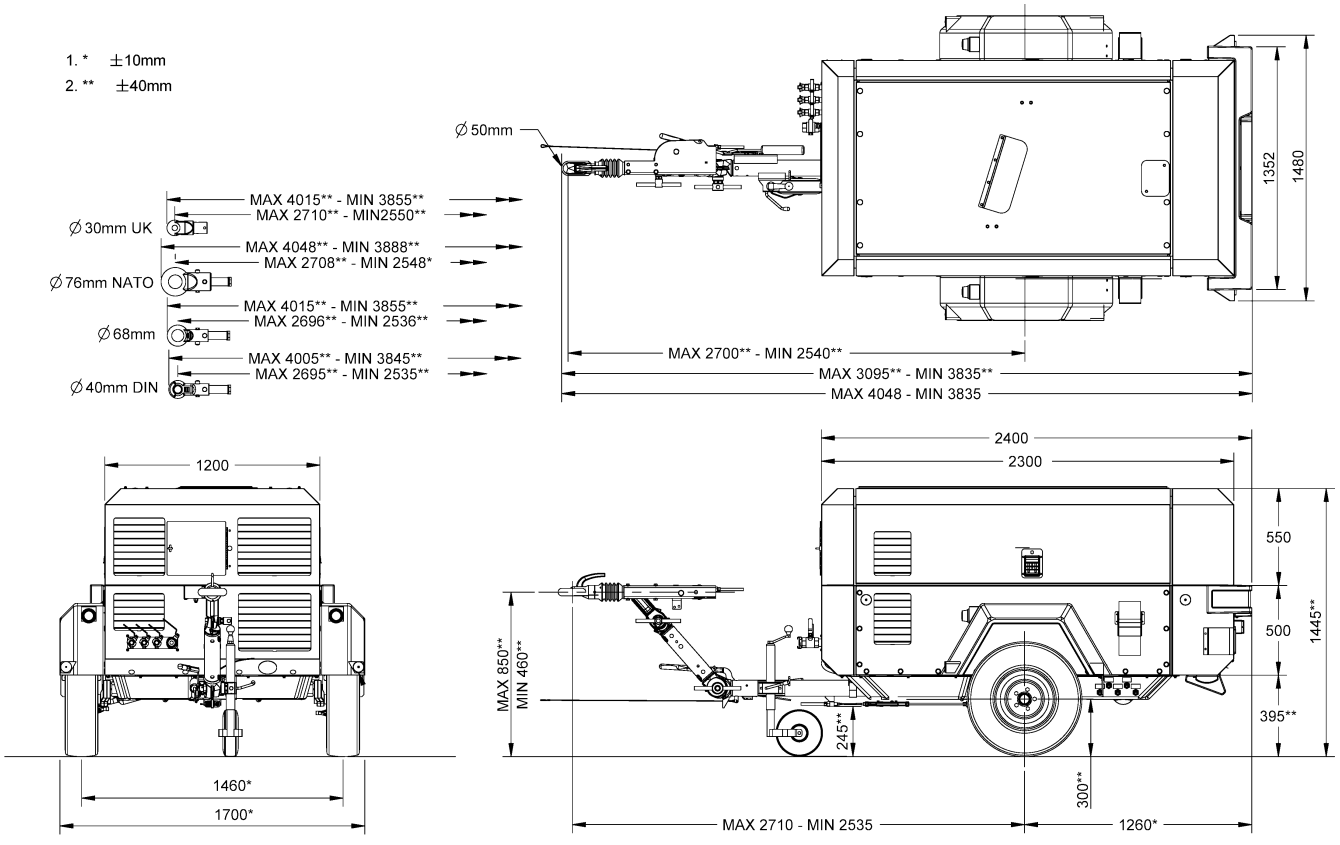
7/73 - 10/53 VARIABLE HEIGHT RUNNING GEAR
Braked version

1. * ±10mm
2. ** ±40mm



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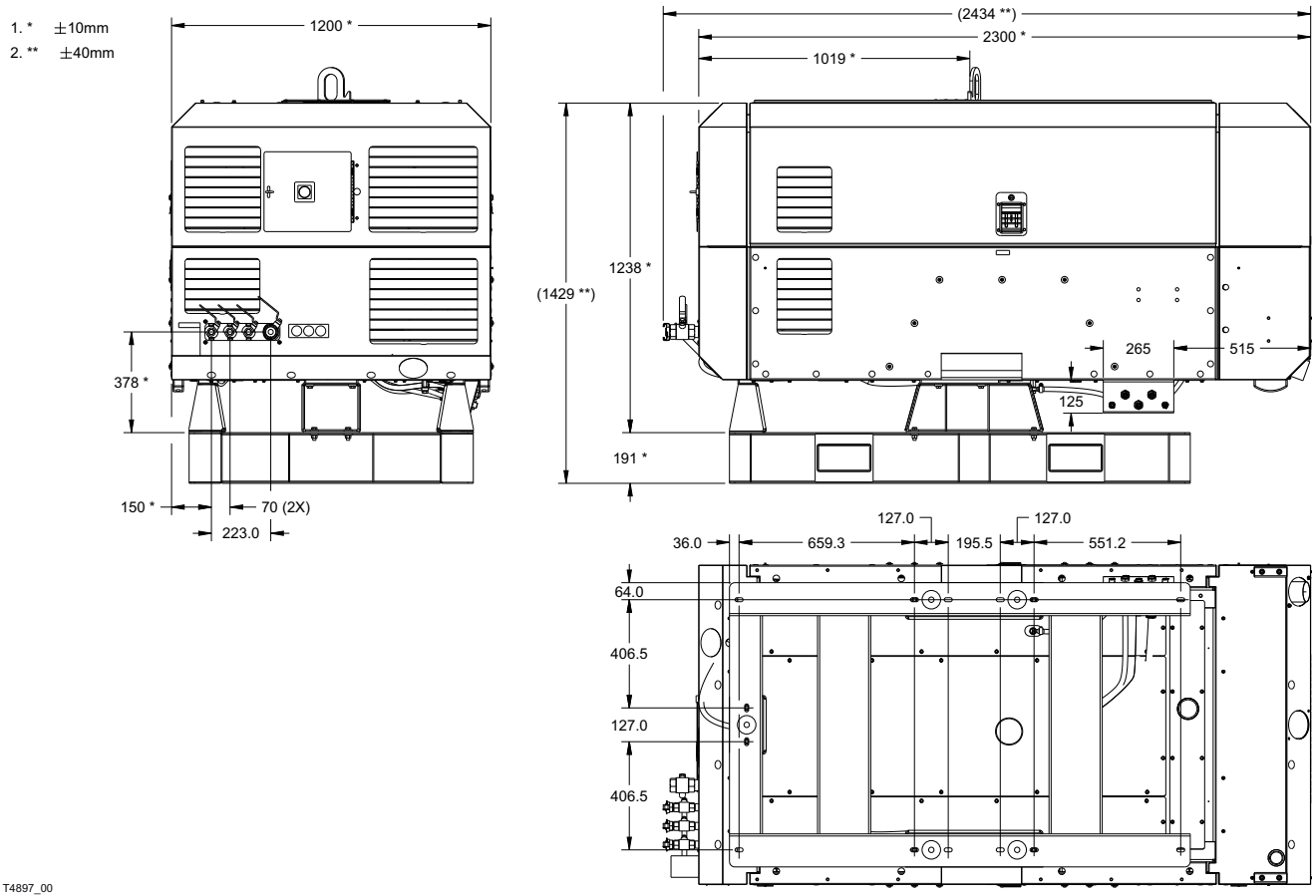
7/73 - 10/53 PERMANENT SKID MOUNTED



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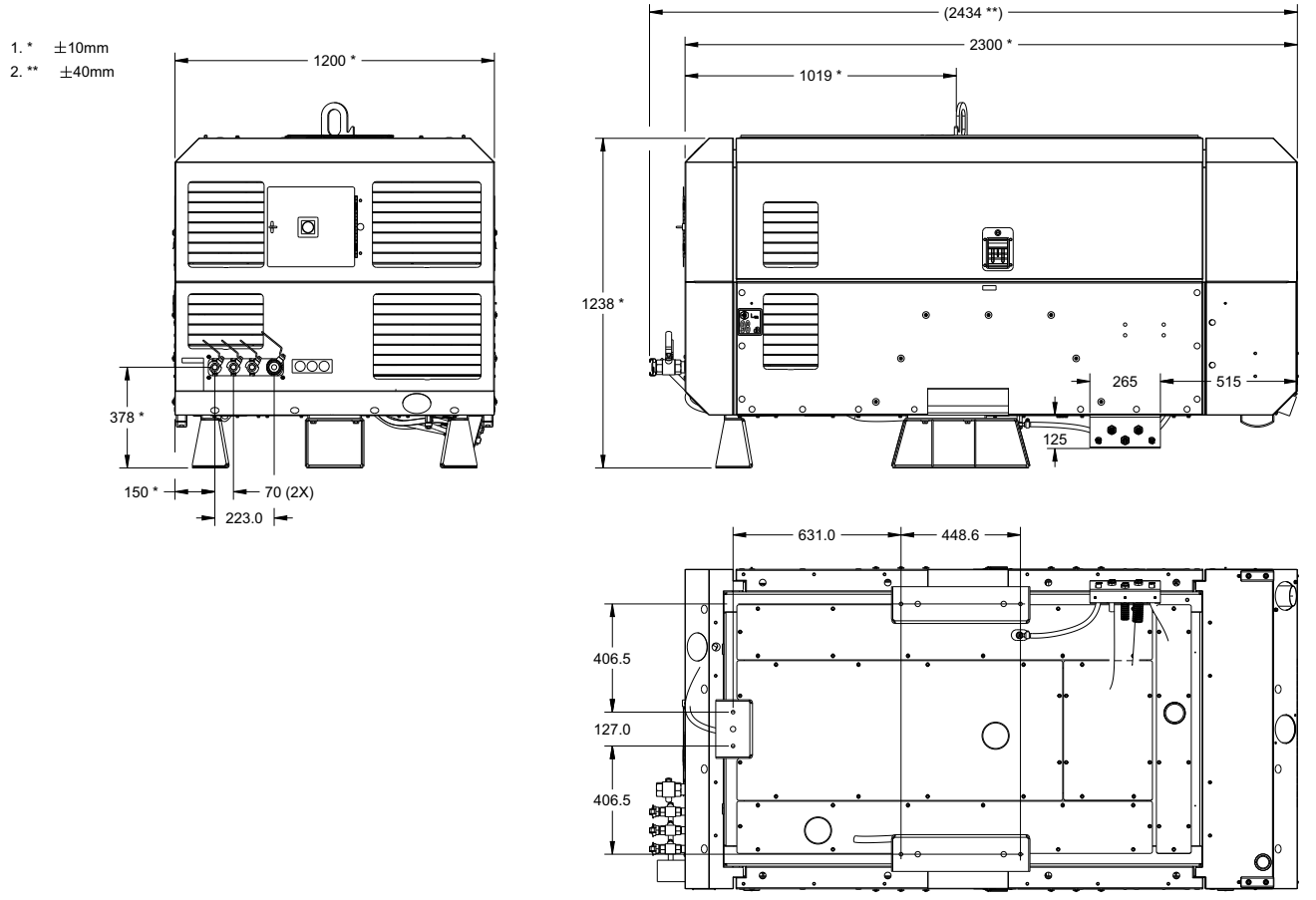
7/73 - 10/53 SHIPPING SKID MOUNTED



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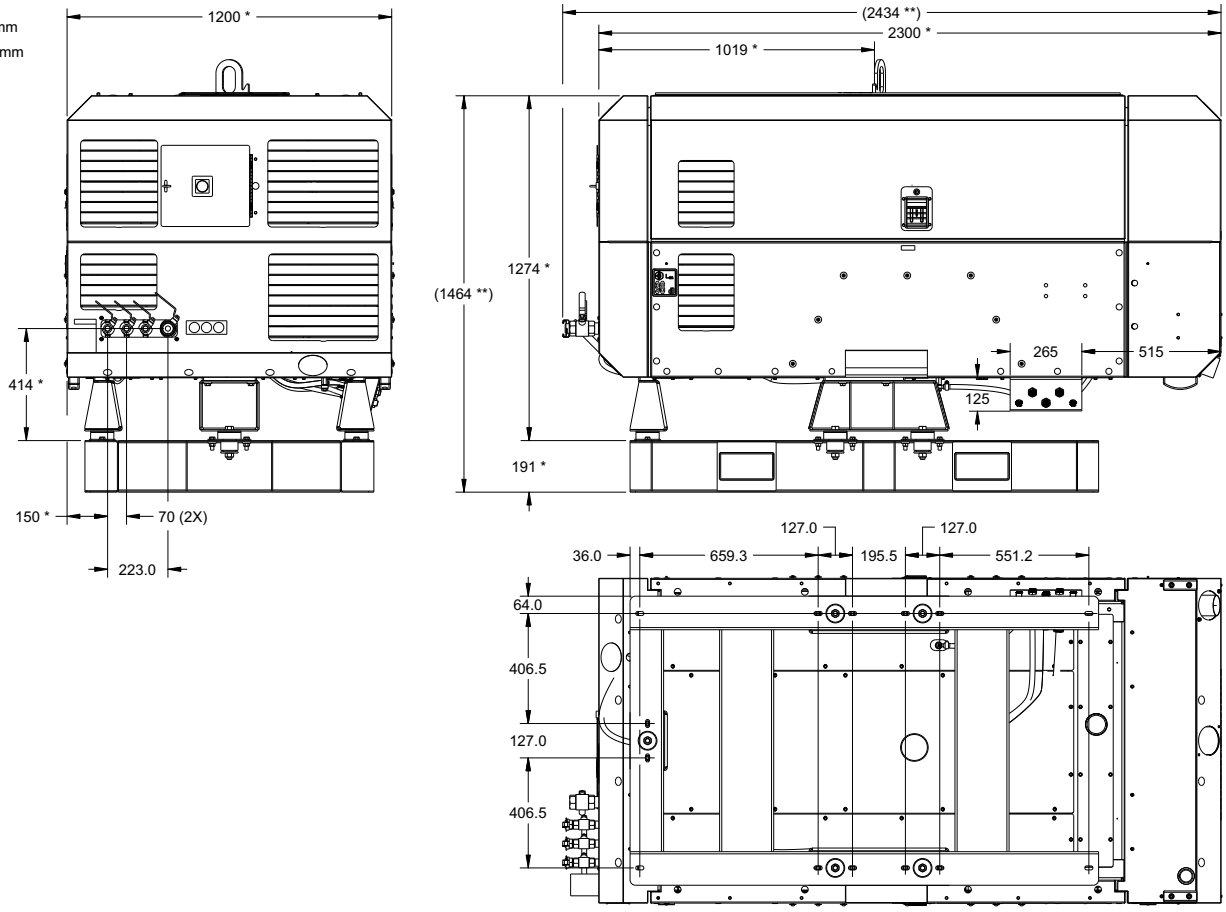
7/73 - 10/53 TRUCK SKID MOUNTED

1. * ±10mm
2. ** ±40mm



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COMPRESSOR - 7/73

Actual free air delivery.	7,0 m^3 min^{-1} (250 CFM)
Normal operating discharge pressure.	6,9 bar (100 PSI)
Maximum allowable pressure.	8,9 bar (129 PSI)
Safety valve setting.	13,8 bar (200 PSI)
Maximum pressure ratio (absolute).	7,5 : 1
Operating ambient temperature. CE regions -10°C TO +46°C (14°F TO 115°F) High ambient temp. -10°C TO +52°C (14°F TO 126°F)	
Maximum discharge temperature.	120°C (248°F)
Cooling system.	Oil injection
Oil capacity.	10 litres (2,6 US GAL)
Maximum oil system temperature.	120°C (248°F)
Maximum oil system pressure.	8,9 bar (129 PSI)

COMPRESSOR - 10/53

Actual free air delivery.	5,3 m^3 min^{-1} (190 CFM)
Normal operating discharge pressure.	10,3 bar (150 PSI)
Maximum allowable pressure.	12,0 bar (179 PSI)
Safety valve setting.	13,8 bar (200 PSI)
Maximum pressure ratio (absolute).	7,5 : 1
Operating ambient temperature. CE regions -10°C TO +46°C (14°F TO 115°F) High ambient temp. -10°C TO +52°C (14°F TO 126°F)	
Maximum discharge temperature.	120°C (248°F)
Cooling system.	Oil injection
Oil capacity.	10 litres (2,6 US GAL)
Maximum oil system temperature.	120°C (248°F)
Maximum oil system pressure.	8,9 bar (129 PSI)

LUBRICATING OIL SPECIFICATION

(for the specified ambient temperatures).

ABOVE -23°C(-9°F)

Recommended: PRO-TEC

Approved: SAE 10W, API CF-4/CG-4

PRO-TEC compressor fluid is factory-fitted, for use at all ambient temperatures above -23°C (-9°F).

NOTE: Warranty may be extended only by continuous use of PRO-TEC and Doosan oil filters and separators.

No other oil/fluids are compatible with PRO-TEC.

No other oils/fluids should be mixed with PRO-TEC because the resulting mixture could cause damage to the airend.

In the event that PRO-TEC is not available and / or the end user needs to use an approved single grade engine oil, the complete system including separator / receiver, cooler and pipework must be flushed clear of the first fill fluid and new Doosan oil filters installed.

When this has been completed, the following oils are approved:

for ambient temperatures above -23°C (-9°F),

SAE 10W, API CF-4/CG-4

Safety data sheets can be obtained on request from your Doosan dealership.

For temperatures outside the specified ambient range, consult the company.

ENGINE

Type/model. Number of cylinders.	Cummins QSF 2,8 4
Oil capacity.	7,0 litres (1,8 US GAL)
Speed at full load - **7/73** Speed at full load - **10/53**	2450 revs min^{-1} 1900 revs min^{-1}
Speed at idle.	1500 revs min^{-1}
Electrical system.	12V negative earth
Power available at 2350 revs min^{-1}	55kW (73,7 HP)
Fuel tank capacity	118 litres (31,2 US GAL)
Oil specification	Refer engine section
Coolant capacity	11,5 litres (3 US GAL)

INFORMATION ON AIRBORNE NOISE (CE regions)

- The A-weighted emission sound pressure level

. 83 dB(A), uncertainty 1 dB(A)

- The A-weighted emission sound power level

. 98 dB(A), uncertainty 1 dB(A)

The operating conditions of the machinery are in compliance with ISO 3744:1995 and EN ISO 2151:2004

FIXED HEIGHT RUNNING GEAR
Braked version

Shipping weight.	1272kg (2996 lbs)
Maximum weight.	1600kg (3520 lbs)
Maximum vertical coupling load (nose weight).	100 kgf (220 lbs)

VARIABLE HEIGHT RUNNING GEAR
Braked version

Shipping weight.	1325kg (3090 lbs)
Maximum weight.	1600kg (3520 lbs)
Maximum vertical coupling load (nose weight).	100 kgf (220 lbs)

WHEELS AND TYRES

Number of wheels.	2 x $5^1/_2$ J
Tyre size.	185 R14
Tyre pressure.	4,5 bar (65 PSI)

Further information may be obtained by request through the customer services department.

COMMISSIONING

Upon receipt of the unit, and prior to putting it into service, it is important to adhere strictly to the instructions given below in *PRIOR TO STARTING*.

Ensure that the operator reads and *understands* the decals and consults the manuals before maintenance or operation.

Ensure that the position of the *emergency stop* device is known and recognised by its markings. Ensure that it is functioning correctly and that the method of operation is known.

Running gear drawbar - Machines are shipped to some areas with the drawbar removed. Fitting involves four nuts / bolts to secure the drawbar to the axle and two bolts to fit the drawbar to the front of the machine with the saddle and spacer block.

Support the front of the machine, fit the wheel chocks to stop the machine moving and attach the drawbar. Refer to the torque value table in the *MAINTENANCE* section of this manual for the correct torque values.

CAUTION: *This is a safety critical procedure. Double check the torque settings after assembly.*

Fit the propstand and coupling. Remove the supports and set the machine level.

Before towing the unit, ensure that the tyre pressures are correct (refer to the *GENERAL INFORMATION* section of this manual) and that the handbrake is functioning correctly (refer to the *MAINTENANCE* section of this manual). Before towing the unit during the hours of darkness, ensure that the lights are functioning correctly (where fitted).

Ensure that all transport and packing materials are discarded.

Ensure that the correct fork lift truck slots or marked lifting / tie down points are used whenever the machine is lifted or transported.

When selecting the working position of the machine ensure that there is sufficient clearance for ventilation and exhaust requirements, observing any specified minimum dimensions (to walls, floors etc.).

Adequate clearance needs to be allowed around and above the machine to permit safe access for specified maintenance tasks.

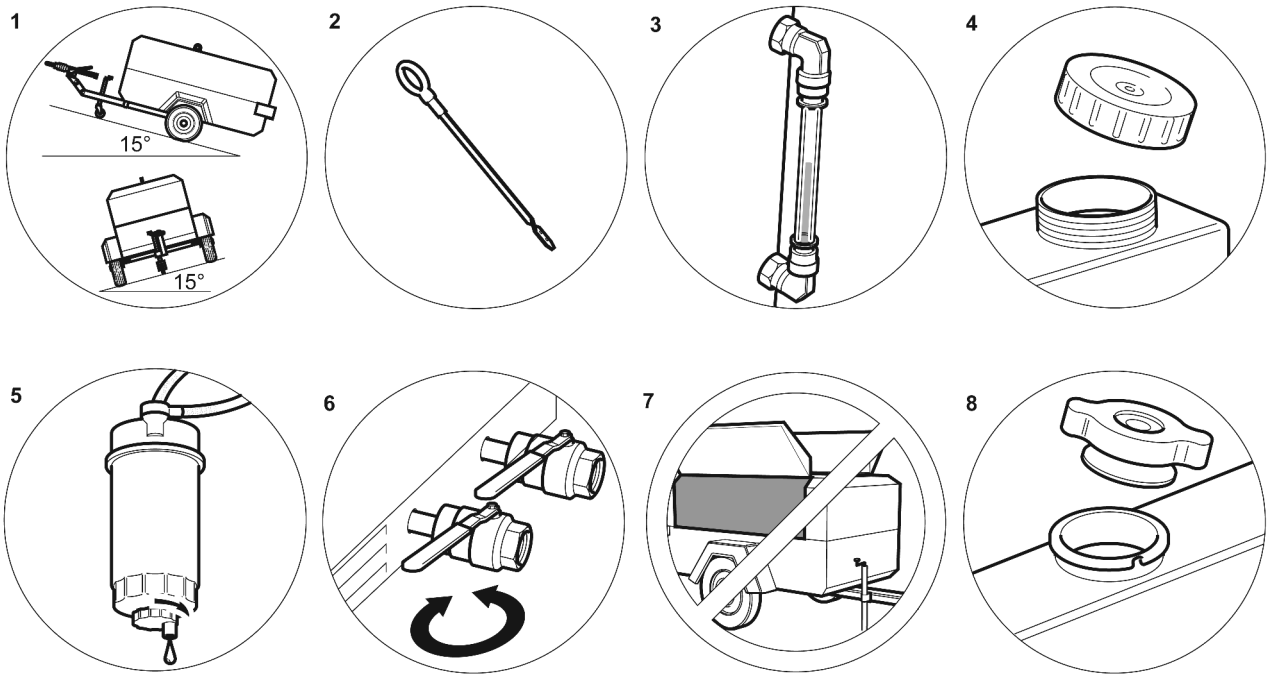
Ensure that the machine is positioned securely and on a stable foundation. Any risk of movement should be removed by suitable means, especially to avoid strain on any rigid discharge piping.

Attach the battery cables to the battery(s) ensuring that they are tightened securely. Attach the negative cable before attaching the positive cable.

WARNING: All air pressure equipment installed in or connected to the machine must have safe working pressure ratings of at least the machine rated pressure, and materials compatible with the compressor lubricant (refer to the *GENERAL INFORMATION* section).

WARNING: If more than one compressor is connected to one common downstream plant, effective check valves and isolation valves must be fitted and controlled by work procedures, so that one machine cannot accidentally be pressurised / over pressurised by another.

WARNING: If flexible discharge hoses are to carry more than 7 bar pressure then it is recommended that safety retaining wires are used on the hoses.



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PRIOR TO STARTING

1. Place the unit in a position that is as level as possible. The design of the unit permits a 15 degree lengthways and sideways limit on out of level operation. It is the engine, not the compressor, that is the limiting factor.

When the unit has to be operated out of level, it is important to keep the engine oil level near the high level mark (with the unit level).

CAUTION: *Do not overfill either the engine or the compressor with oil.*

2. Check the engine lubrication oil in accordance with the operating instructions in the *Engine Operator's Manual.*
3. Check the compressor oil level in the sight glass located on the separator tank.
4. Check the diesel fuel level. A good rule is to top up at the end of each working day. This prevents condensation from occurring in the tank.

CAUTION: *Use only a No. 2-D diesel fuel oil with a minimum octane number of 45 and a sulphur content not greater than 0,5%.*

CAUTION: *When refueling:-*
- *switch off the engine.*
- *do not smoke.*
- *extinguish all naked lights.*
- *do not allow the fuel to come into contact with hot surfaces.*
- *wear personal protective equipment.*

5. Drain the fuel filter water separator of water, ensuring that any released fuel is safely contained.
6. Open the service valve(s) to ensure that all pressure is relieved from the system. Close the service valve(s).

7. ***CAUTION:*** *Do not operate the machine with the canopy/doors in the open position as this may cause overheating and operators to be exposed to high noise levels.*

8. Check the radiator coolant level (with the unit level).

Check the air restriction indicator(s). Refer to the *MAINTENANCE* section of this manual.

When starting or operating the machine in temperatures below or approaching 0°C, ensure that the operation of the regulation system, the unloader valve, the safety valve, and the engine are not impaired by ice or snow, and that all inlet and outlet pipes and ducts are clear of ice and snow.

AIR HOSE RESTRAINT INSTALLATION

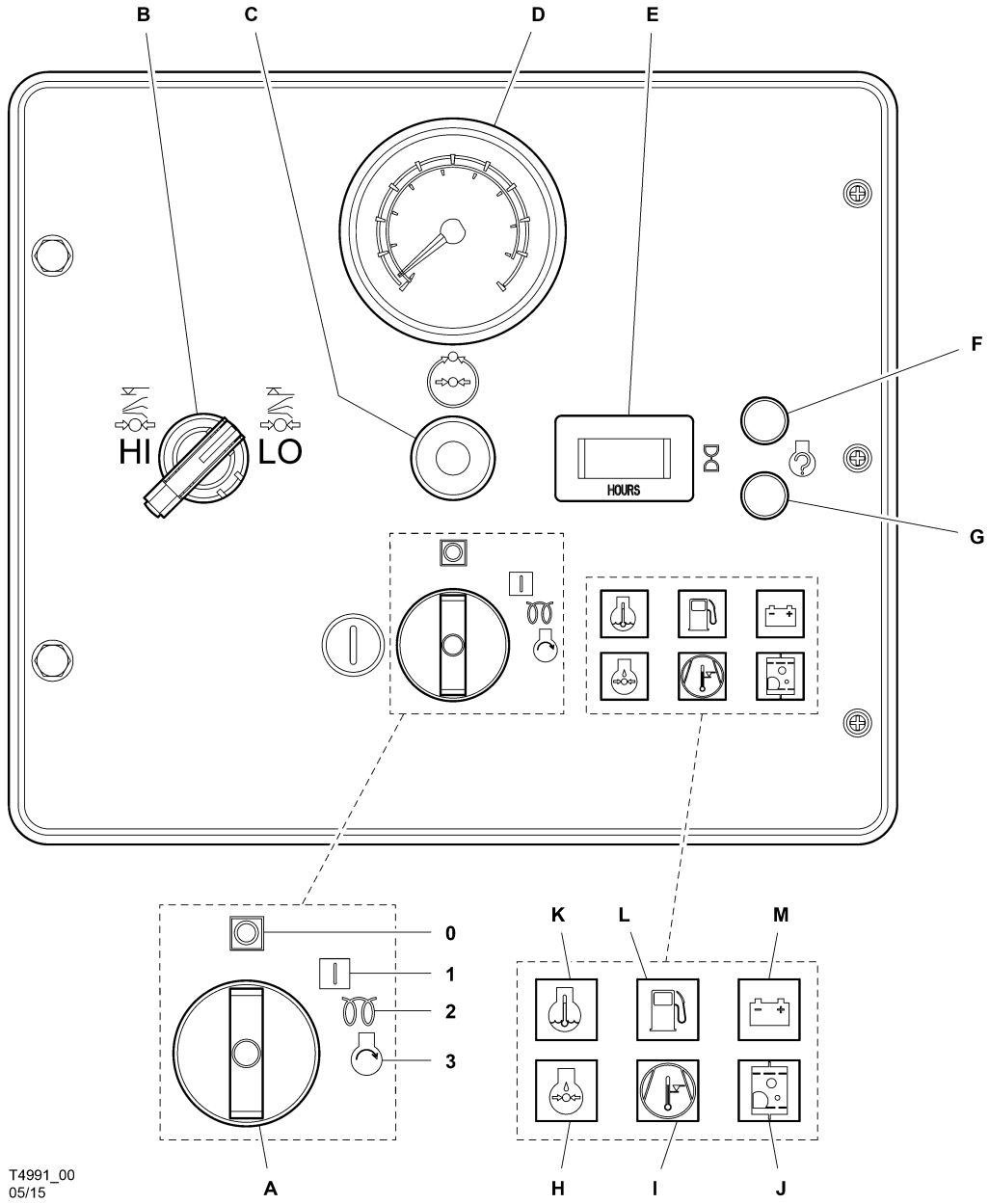
Safety devices such as hose restraints (whipchecks)must be used to prevent hose whipping if a connection fails. Whipchecks are to be constructed of woven stainless steel, galvanized steel wire rope or chain with aminimum strength adequate for the supplied pressure and hose diameter. Whipchecks must be fastened to suitable mounting points or shackles.

The mounts and/or shackles are to be of the same or greater strength as the whipchecks. An engineer should be consulted about suitability of whipchecks, mounts, mounting points, shackles and fittings as well as strength rating of materials. Whipchecks must be used at the hose origination, termination and each hose to hose connection.

Hoses can fail in areas other than at connecting points and require daily inspection of the hoses for:

- *Cuts, cracks or kinks*
- *Weakened clamps due to rust and corrosion*
- *Damaged connections*
- *Deformity*
- *Incorrect or incompatible components or fittings*
- *Any visual damage*

Hoses must be selected that are rated for the application as to the maximum pressure and temperature to be encountered as well as compatible with the materials being conveyed inside the hose. Hoses must be compatible with the compressor oil.



KEY

- **A.** Main switch
- **B.** High / Low pressure mode switch
- **C.** Service air button
- **D.** Air pressure gauge
- **E.** Hourmeter
- **F.** Diagnostic lamp, red
- **G.** Diagnostic lamp, yellow
- **H.** Warning lamp, low engine oil pressure
- **I.** Warning lamp, high airend oil temperature
- **J.** Warning lamp, dirty IQ filters (IQ filters option)
- **K.** Warning lamp, high engine coolant temperature
- **L.** Warning lamp, low engine fuel level
- **M.** Warning lamp, low battery voltage

STARTING THE MACHINE

WARNING: Under no circumstances should volatile liquids such as Ether be used for starting this machine.

- *Open the service valve fully, with no hose connected.*

All normal starting functions are incorporated in the key operated switch.

- *Turn the key switch to position 2 and hold for max 15 seconds to allow the air inlet heater to reach working temperature.*
- *Turn the key switch to position 3 (engine start position).*
- *Release to position 2 when the engine starts.*
- *Release to position 1 when the alternator charge light is extinguished.*

WARNING: The sum of cranking time should not exceed 30 seconds within an interval of 2 minutes. If this limit is exceeded the ECU will block cranking to protect the starter motor. Once cranking is blocked the machine control system has to be switched to diagnostic mode for at least 2 minutes. After this interval cranking is possible.

At temperatures below 0°C or is there is difficulty starting first time:

- *Complete starting sequence above.*
- *Close service valve as soon as engine runs freely.*
- *Do not allow machine to run for long periods with service valve open.*
- *Allow the engine to reach operating temperature. Then press button (A) when fitted.*
- *At this point in the operation of the machine it is safe to apply full load to the engine.*

NOTE: Wear hearing protection at all times when the engine is started with the service valve open and air is flowing from the valve.

TWO PRESSURE MODES OF OPERATION

1. The Low Pressure Mode is activated by turning the Hi/Lo Pressure Switch to Lo. In this mode, the compressor will regulate according to the air demand, between 0 and 7,0 m^3/min at 6,9 bar regulated set pressure. The regulated set pressure of this mode can be changed (see Pressure Regulating Adjusting Instructions) from 5,5-6,9 bar.
2. The High Pressure Mode is activated by turning the Hi/Lo Pressure Switch to Hi. In High Pressure Mode, the compressor will regulate according to air demand, between 0 and 5,3 m^3/min at 10,3 bar regulated set pressure. The regulated set pressure of this mode can be changed (see Pressure Regulating Adjusting Instructions) from 5,5-10,3 bar.

The mode of the compressor can be changed between the Low and High at anytime. Engine speed will be lower at the HI Pressure Mode setting.

Starting and stopping are unaffected by the selection and during normal running the selector switch may be safely operated. Precaution must be taken to ensure that downstream equipment is rated to suit the available pressure.

The pressure guage indicates which setting has been selected.

STOPPING THE MACHINE

- *Close the service valve.*
- *Allow the machine to run unloaded for a short period of time to reduce the engine temperature.*
- *Turn the start switch to the 0 (off) position.*
- *Do not turn off the battery switch (if fitted) sooner than 70 seconds after stopping the engine.*

NOTE: As soon as the engine stops, the automatic blowdown valve will relieve all pressure from the system.

If the automatic blowdown valve fails to operate, then pressure must be relieved from the system by means of the service valve(s).

CAUTION: *Never allow the machine to stand idle with pressure in the system.*

EMERGENCY STOPPING

In the event that the unit has to be stopped in an emergency, **TURN THE KEY SWITCH LOCATED ON THE INSTRUMENT PANEL TO THE *0* (OFF) POSITION.**

RE-STARTING AFTER AN EMERGENCY

If the machine has been switched off because of a machine malfunction, then identify and correct the fault before attempting to re-start.

If the machine has been switched off for reasons of safety, then ensure that the machine can be operated safely before re-starting.

Refer to the *PRIOR TO STARTING* and *STARTING THE UNIT* instructions earlier in this section before re-starting the machine.

MONITORING DURING OPERATION

Should any of the safety shut–down conditions occur, the unit will stop. These are:

- *Low engine oil pressure.*
- *High airend discharge temperature.*
- *High engine coolant temperature.*
- *Alternator drive belt failure (warning message only).*
- *Low engine fuel level.*

CAUTION: *To ensure an adequate flow of oil to the compressor at low temperature, never allow the discharge pressure to fall below 3,5 bar.*

DECOMMISSIONING

When the machine is to be permanently decommissioned or dismantled, it is important to ensure that all hazard risks are either eliminated or notified to the recipient of the machine. In particular:-

- *Do not destroy batteries or components containing asbestos without containing the materials safely.*
- *Do not dispose of any pressure vessel that is not clearly marked with its relevant data plate information or rendered unusable by drilling, cutting etc.*
- *Do not allow lubricants or coolants to be released into land surfaces or drains.*
- *Do not dispose of a complete machine without documentation relating to instructions for its use.*

COMPRESSOR MOUNTING

Portable compressors, which are modified to remove the running gear and mount the compressor directly to trailers, truck beds or frames, etc. may experience failure of the enclosure, frame, and/or other components.

It is necessary to isolate the compressor package from the carrier basewith a flexiblemounting system. Such a system must also prevent detachment of the package from the carrier base in the event the isolators fail.

Contact your Portable Power representative for flexible mounting kits.

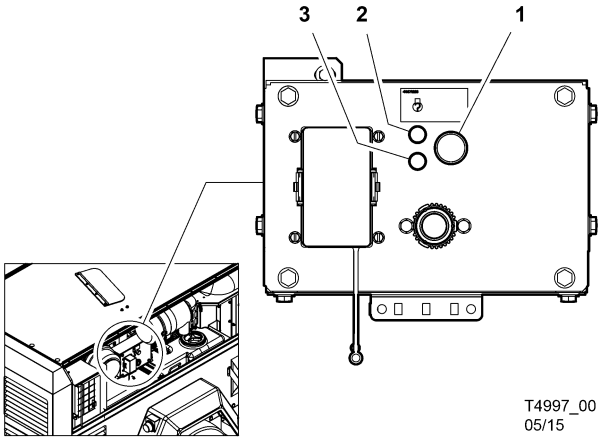
Warranty does not cover failures attributable to mounting of the compressor package to the carrier base unless it is a Portable Power provided system.

NOTE: The maintenance schedule in this manual describes the service intervals that should be followed for normalapplications of this compressor. This page may be reproduced and used as a checklist by service personnel.

In more severe applications such as sandblasting, quarry drilling, well drilling, and oil and gas drilling, more frequent service intervals will be required to ensure long component life.

Dust and dirt, high humidity, and high temperatures will affect lubricant life and service intervals for components such as inlet air filters, oil separation elements and oil filters.

ONBOARD ENGINE DIAGNOSTICS



1. Diagnostics activation button
2. Red lamp
3. Yellow lamp

FAULT DETECTION

Flash out of fault codes: Fault flash out mode can be entered through the use of a diagnostic switch located next to the fault lights. To enter the flash fault out mode, the keyswitch must be ON, with the engine not running. When a diagnostic switch is used to enter the mode, the ECM will automatically flash the first fault code after the code is turned on.

The diagram below depicts the pattern of the fault code flash out scheme as indicated by the stop lamp. A blink is equavalent to the stop lamp being ON for 0.5 seconds and OFF for 0.5 seconds. A pause between fault code digits has duration of 2 seconds.

Example: Diagnostic lamp diagrams
Fault Code 244

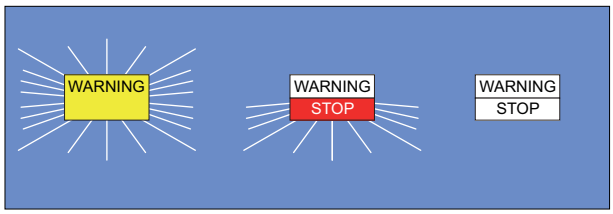
Yellow Lamp	Red Lamp	Red Lamp	Red Lamp
1 Blink	2 Blink	4 Blink	4 Blink

Fault Code 112

Yellow Lamp	Red Lamp	Red Lamp	Red Lamp
1 Blink	1 Blink	1 Blink	2 Blink

Fault lamps: If the keyswitch is turned ON, but the diagnostic switch remains OFF, the indicator lamps will illuminate for approximately 2 seconds and then go off, one after the other, to verify they are working and wired correctly.

In the illustration below, the indicator lamps are all on and then go off one at at time, at an interval of 0.5 seconds each.
Fault lamp sequence



- **Warning Lamp -** The warning lamp provides important operator messages. These messages require timely operator attention. The warning lamp is also used to delineate diagnostic fault codes.
- **Stop Lamp -** The stop lamp provides critical operator messages. These messages require immediate and decisive operator response. The stop lamp is also used to flash out diagnostic fault codes.

MAINTENANCE SCHEDULE

	Daily	Weekly	Monthly	6 months or 500 hrs	1 year or 1000 hrs	2000 hrs
Compressor Oil Level	C					
Engine Oil Level	C					
Coolant Level	C					
Gauges / Lamps	C					
Air Cleaner Service Indicators	C					
Fuel Tank	C					
Fuel / Water Separator	D					
Fluid Leaks	C					
Radiator Filler Cap	C					
Crankcase Breather Tube	C					
Air Cleaner Dust Ejector Valve		C				
Fan / Alternator Belts		C				
Battery Connections / Electrolyte		C				
Tyre Pressure and Surface		C				
Wheel Lug Nuts			C			
Hoses (Oil, Air, Intake, etc.)			C			
Automatic Shutdown System			C			
Air Cleaner System			C			
Coolers and Radiator			C			
Fasteners and Guards			C			
Primary Air Cleaner Elements					R/WI	
Seconday Air Cleaner Elements						R/WI
Fuel / Water Separator Element				R		
Final Fuel Filter				R		
Engine Oil Filter				R		
Engine Oil				R		
Engine Valve Lash						C/A
Compressor Oil Filter				R		
Compressor Oil				R		
Oil Separator Element					R	
Engine Coolant				C		R

C = Check (adjust, clean or replace as necessary)

T = Test

D = Drain

R = Replace

R/WI = Replace or when indicated earlier

CBT = Check before towing

G/C = Grease and check

C/A = Check and adjust if required

NOTE: 500 and 1000 hour intervals are meant to be repeated at every 500 or 1000 hours. Other intervals only to be performed at hours indicated.

NOTE: All fluid and filter intervals are valid for near perfect conditions only. High ambient temperatures - high dust concentration - high humidity as well as using lower grade oils and fuels will require a decrease in maintenance intervals.

Contact your Doosan Infracore Portable Power dealer for more information or assistance in determining the optimum intervals for your application.

	Daily	Weekly	Monthly	6 months or 500 hrs	1 year or 1000 hrs	2000 hrs
Wheels (Bearings, Seals, etc.)				C		
Fan Hub					C	
Cooling Fan Belt Tensioner					C	
Shutdown Switch Settings					T	
Scavenger Orifice & Related					C	
Lights (Brake, Running and Turn)	CBT					
Pintle Eye Bolts	CBT					
Brakes	C			C		
Brake Linkage	C					
Emergency Stop	T					
Fasteners	C					
Running Gear Linkage and Bolts			G/C			
Safety Valve				C		
Minimum Pressure Valve				C		
Pressure System					C	
Pressure Gauge					C	
Pressure Regulator					C	
Separator Tank Exterior					C	
Lubricator (Fill)	C					
Engine Air Inlet Shutdown Valve					C	

C = Check (adjust, clean or replace as necessary)

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Contact your Doosan Infracore Portable Power dealer for more information or assistance in determining the optimum intervals for your application.

ROUTINE MAINTENANCE

This section refers to the various components which require periodic maintenance and replacement.

The *SERVICE/MAINTENANCE CHART* indicates the various components' descriptions and the intervals when maintenance has to take place. Oil capacities, etc., can be found in the *GENERAL INFORMATION* section of this manual.

For any specification or specific requirement on service or preventative maintenance for the engine, refer to the *Engine Manufacturer's Manual*.

Compressed air can be dangerous if incorrectly handled. Before doing any work on the unit, ensure that all pressure is vented from the system and that the machine cannot be started accidentally.

If the automatic blowdown fails to operate, then pressure must be gradually relieved by operating the manual blowdown valve. Suitable personal protective equipment should be worn.

Ensure that maintenance personnel are adequately trained, competent and have read the Maintenance Manuals.

Prior to attempting any maintenance work, ensure that:-

- all air pressure is fully discharged and isolated from the system. If the automatic blowdown valve is used for this purpose, then allow enough time for it to complete the operation.
- the discharge pipe / manifold area is depressurised by opening the discharge valve, whilst keeping clear of any airflow from it.

MINIMUM PRESSURE VALVE - WHEN FITTED

NOTE: Pressure will always remain in the part of the system between the minimum pressure valve and the discharge valve after operation of the auto blowdown valve.

This pressure must be relieved by carefully:

a) Disconnecting any downstream equipment.

b) Opening the discharge valve to atmosphere.

c) (Use hearing protection if necessary).

- the machine cannot be started accidentally or otherwise, by posting warning signs and/or fitting appropriate anti-start devices.
- all residual electrical power sources (mains and battery) are isolated.

Prior to opening or removing panels or covers to work inside a machine, ensure that:-

- anyone entering the machine is aware of the reduced level of protection and the additional hazards, including hot surfaces and intermittently moving parts.
- the machine cannot be started accidentally or otherwise, by posting warning signs and/or fitting appropriate anti-start devices.

Prior to attempting any maintenance work on a running machine, ensure that:-

- the work carried out is limited to only those tasks which require the machine to run.
- the work carried out with safety protection devices disabled or removed is limited to only those tasks which require the machine to be running with safety protection devices disabled or removed.
- all hazards present are known (e.g. pressurised components, electrically live components, removed panels, covers and guards, extreme temperatures, inflow and outflow of air, intermittently moving parts, safety valve discharge etc.).
- appropriate personal protective equipment is worn.
- loose clothing, jewelry, long hair etc. is made safe.
- warning signs indicating that Maintenance Work is in Progress are posted in a position that can be clearly seen.

Upon completion of maintenance tasks and prior to returning the machine into service, ensure that:-

- the machine is suitably tested.
- all guards and safety protection devices are refitted.
- all panels are replaced, canopy and doors closed.
- hazardous materials are effectively contained and disposed of.

PROTECTIVE SHUTDOWN SYSTEM

Comprises:

- Low engine oil pressure switch.
- High airend discharge temperature switch.
- High engine coolant temperature switch.
- Alternator drive belt failure (warning message only).
- Low engine fuel level switch.

Low engine oil pressure switch.

At three month intervals, test the engine oil pressure switch circuit as follows:

- Start the machine.

NOTE: Do not press the load button.

- Remove a wire from one terminal of the switch. The machine should shutdown.

At twelve month intervals, test the engine oil pressure switch as follows:-

- Remove the switch from the machine.
- Connect it to an independent low pressure supply (either air or oil).
- The switch should operate at 1,0 bar.
- Refit the switch.

Temperature switch(es).

At three month intervals, test the temperature switch circuit(s) as follows:

- Start the machine.

NOTE: Do not press the load button.

- Disconnect each switch in turn. The machine should shutdown.
- Re-connect the switch.

High airend discharge temperature switch(es).

At twelve month intervals, test the airend discharge temperature switch(es) by removing it from the machine and immersing in a bath of heated oil. The switch should operate at 120°C. Refit the switch.

High coolant temperature switch.

At twelve month intervals, test the coolant temperature switch by removing it from the machine and immersing in a bath of heated oil. The switch should operate at 105°C. Refit the switch.

Alternator/drive belt failure circuit.

At twelve month intervals test the alternator drive belt failure circuit as follows:

- Remove the drive belt from the machine.
- Turn the key switch to position 1, the alternator charge light will illuminate.
- Turn the key switch to position 3 (engine start position).
- The machine will start and alternator charge light / battery light will illuminate.

Low engine fuel level switch.

At three month intervals, test the low engine fuel level switch circuit as follows:

- Start the machine.

NOTE: Do not press the load button.

- Disconnect the switch, the machine should shutdown.
- Re-connect the switch.

At twelve month intervals, test the low engine fuel level switch by removing and operating the float manually.

CAUTION: *Never remove or replace switches when the machine is running.*

SCAVENGE LINE

The scavenge line runs from the spin-on filter housing to the orifice fitting located in the airend.

Examine the orifice, check valve and hoses at every service or in the event of oil carryover into the discharge air.

It is good preventative maintenance to check that the scavenge line and tube are clear of any obstruction each time the compressor lubricant is changed as any blockage will result in oil carryover into the discharge air.

COMPRESSOR OIL FILTER

Refer to the *MAINTENANCE CHART* in this section for the recommended servicing intervals.

Removal

WARNING: Do not remove the filter(s) without first making sure that the machine is stopped and the system has been completely relieved of all air pressure. (Refer to *STOPPING THE UNIT* in the *OPERATING INSTRUCTIONS* section of this manual).

Clean the exterior of the filter housing and remove the spin-on element by turning it in a counter-clockwise direction.

Inspection

Examine the filter element.

CAUTION: *If there is any indication of the formation of varnishes, shellacs or lacquers on the filter element, it is a warning that the compressor lubricating and cooling oil has deteriorated and that it should be changed immediately. Refer to LUBRICATION later in this section.*

Reassembly

Clean the filter gasket contact area and install the new element by screwing in a clockwise direction until the gasket makes contact with the filter housing. Tighten a further $^{1}/_{2}$ to $^{3}/_{4}$ of a revolution.

CAUTION: *Start the machine (refer to PRIOR TO STARTING and STARTING THE UNIT in the OPERATING INSTRUCTIONS section of this manual) and check for leakage before the machine is put back into service.*

COMPRESSOR SPIN-ON OIL SEPARATOR FILTER ELEMENT

See Maintenance Schedule.

Removal

WARNING: Do not remove the filter(s) without first making sure that the machine is stopped and the system has been completely relieved of all air pressure. (Refer to *STOPPING THE UNIT* in the *OPERATING INSTRUCTIONS* section of this manual).

Remove the spin-on separator element by turning the element counter-clockwise.

Reassembly

Check the spin-on filter base for contamination and clean as required.

Replace the compressor oil (refer to *LUBRICATION* later in this section).

CAUTION: *Start the machine (refer to PRIOR TO STARTING and STARTING THE UNIT in the OPERATING INSTRUCTIONS section of this manual) and check for leakage before the machine is put back into service.*

COMPRESSOR OIL COOLER AND ENGINE RADIATOR

When grease, oil and dirt accumulate on the exterior surfaces of the oil cooler and radiator, the efficiency is impaired. It is recommended that each month the oil cooler and radiator be cleaned by directing a jet of compressed air, (carrying if possible a non-flammable cleaning solvent) over the exterior core of the cooler/radiator. This should remove any accumulation of oil, grease and dirt from the exterior core of the cooler so that the entire cooling area can radiate the heat of the lubricating and cooling oil/water into the air stream.

WARNING: Hot engine coolant and steam can cause injury. When adding coolant or antifreeze solution to the engine radiator, stop the engine at least one minute prior to releasing the radiator filler cap. Using a cloth to protect the hand, slowly release the filler cap, absorbing any released fluid with the cloth. Do not remove the filler cap until all excess fluid is released and the engine cooling system fully depressurised.

WARNING: Follow the instructions provided by the antifreeze supplier when adding or draining the antifreeze solution. It is advisable to wear personal protective equipment to prevent skin and eye contact with the antifreeze solution.

AIR FILTER ELEMENTS

The air filter should be inspected regularly (refer to the *SERVICE/ MAINTENANCE CHART*) and the element replaced every 1 Year (1000 hours). The dust collector box(es) should be cleaned daily (more frequently in dusty operating conditions) and not allowed to become more than half full.

Removal

CAUTION: *Never remove and replace element(s) when the machine is running.*

Clean the exterior of the filter housing and remove the filter element by releasing the nut.

Inspection

Check for cracks, holes or any other damage to the element by holding it up to a light source, or by passing a lamp inside.

Check the seal at the end of the element and replace if any sign of damage is evident.

Reassembly

Assemble the new element into the filter housing ensuring that the seal seats properly.

Reset the restriction indicator by depressing the rubber diaphragm.

Assemble the dust collector box parts, ensuring that they are correctly positioned.

Before restarting the machine, check that all clamps are tight.

VENTILATION

Always check that the air inlets and outlets are clear of debris etc.

CAUTION: *NEVER clean by blowing air inwards.*

COOLING FAN DRIVE

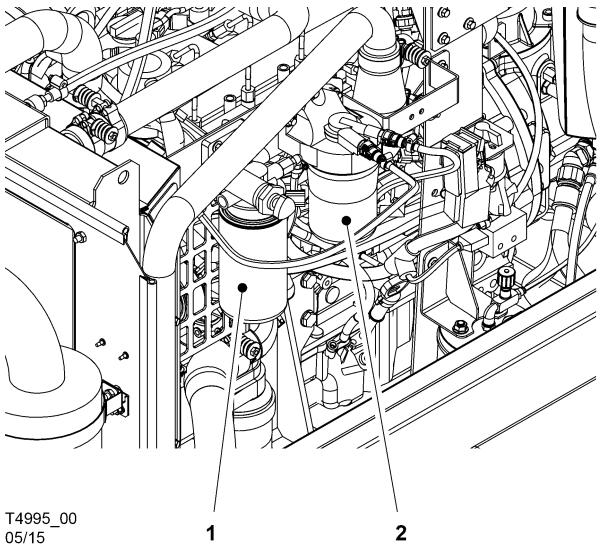
Periodically check that the fan mounting bolts in the fan hub have not loosened. If, for any reason, it becomes necessary to remove the fan or re-tighten the fan mounting bolts, apply a good grade of commercially available thread locking compound to the bolt threads and tighten to the torque value shown in the *TORQUE SETTING TABLE* later in this section.

The fan belt(s) should be checked regularly for wear and correct tensioning.

FUEL SYSTEM

The fuel tank should be filled daily or every eight hours. To minimise condensation in the fuel tank(s), it is advisable to top up after the machine is shut down or at the end of each working day. At six month intervals drain any sediment or condensate that may have accumulated in the tank(s).

FUEL FILTER MAINTENANCE



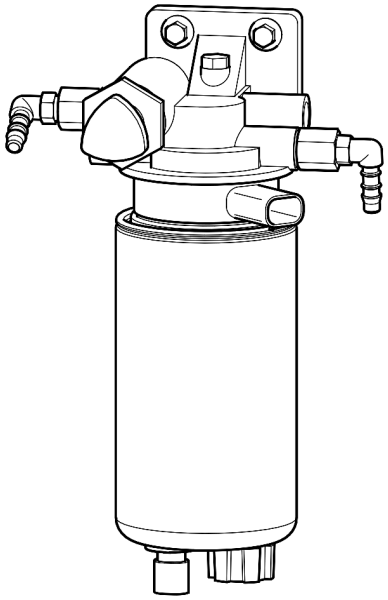
1. Primary fuel filter / water separator (30 microns)
2. Secondary fuel filter (10 microns)

General Information

The engine uses a dual filter system.

1. The pressure-side fuel filter is used for filtration **only** and is pressurised by the gear pump mounted on the fuel pump.
2. The suction-side fuel filter is a fuel / water separator and is located between the gear pump, mounted on the engine's fuel pump, and the original equipment manufacturer (OEM) fuel supply tank. This filter is **not** pressurised, but operates under a vacuum.

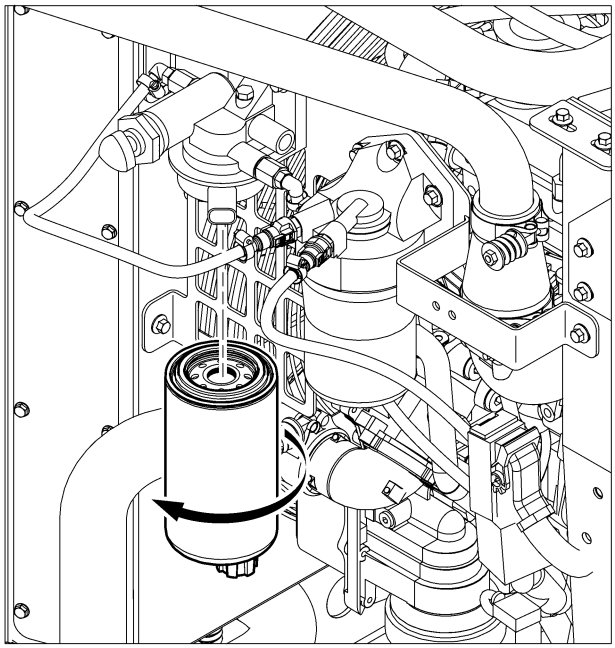
Fuel System Priming



A certain amount of air becomes trapped in the fuel system when fuel system components on the supply and/or highpressure side are serviced or replaced. Fuel system priming is accomplished using a manual priming pump. For priming procedures, see the Prime step of this procedure.

- Disconnect the batteries. See equipment manufacturer service information.
- Clean the area around the fuel filter.
- If required, disconnect the wiring harness from the water-in-fuel sensor.

Removal

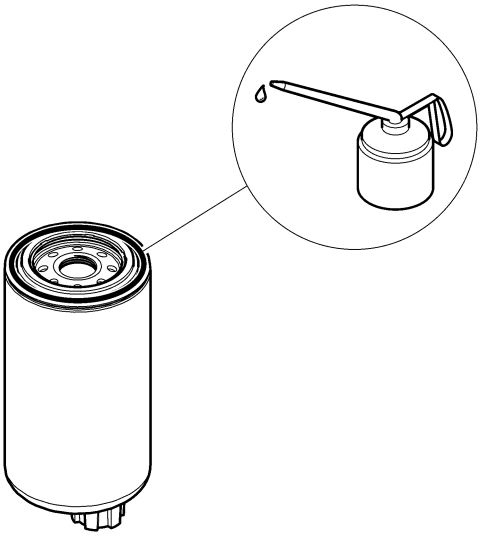


Loosen and remove the fuel filter.

Make sure the o-ring does **not** stick to the fuel filter head. Remove the o-ring with an o-ring pick, if necessary.

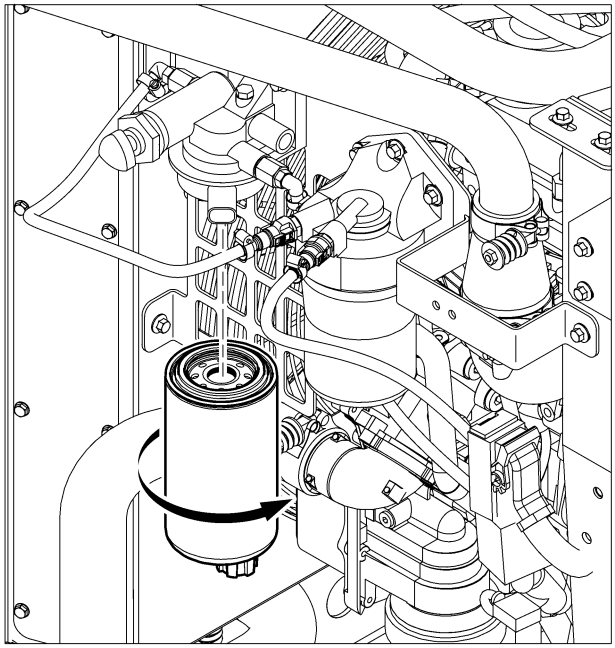
Remove the filter carefully. Use the drive feature on the bottom of the filter to remove the canister.

Installation



CAUTION: *The system must be primed after the fuel filter is installed. Pre-filling the pressure-side fuel filter can result in debris entering the fuel system and damaging fuel system components.*

Lubricate the fuel filter o-ring with clean lubricating oil.



CAUTION: *Mechanical over-tightening can distort the threads as well as damage the filter element seal or filter body.*

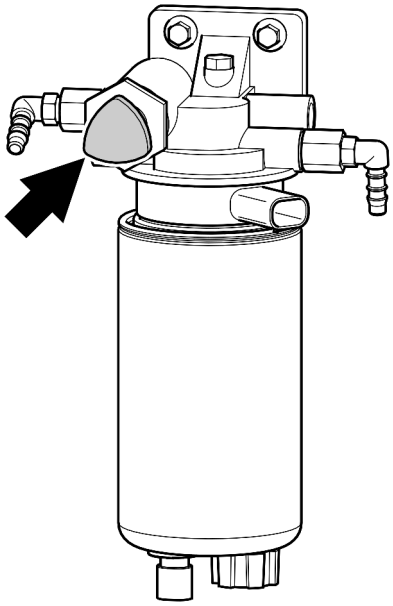
Install the filter on the filter head:

- Install to the point of first contact for the filter and head.
- Use the drive feature on the bottom. Tighten the canister.

Torque value: 28 Nm (248 in lb).

- If required, connect the wiring harness to the water-in-fuel sensor.
- Connect the batteries. See equipment manufacturer service information.

Prime



WARNING: The fuel pump high-pressure lines and fuel rail contain very high-pressure fuel. Never loosen any fittings while the engine is running. Personal injury and property damage can result.

CAUTION: *Do not engage the starter motor for more than 30 seconds at a time. Allow two minutes between cranking intervals.*

NOTE: To prevent damage to the hand pump priming seals, clean the fuel pump head and priming pump with Quick Dry Spray Cleaner, Part Number 3824510, or equivalent, and compressed air prior to priming the fuel system.

After a filter change or running the fuel tank dry, make sure there is fuel in the vehicle fuel tank.

NOTE: It is not necessary to vent air from the high pressure fuel system before starting the engine. Cranking the engine will prime the fuel system.

Unlock the manual priming pump handle by turning it counter-clockwise. Pump the primer handle until resistance is felt and the handle can not be pumped anymore (approximately 140 to 150 strokes for dry filters, or 20 to 60 strokes for pre-filled filters).

Lock the manual priming pump handle.

Crank the engine. If the engine does not star after 30 seconds, turn the key to the OFF position.

Pump the priming pump again, repeating the previous steps until the engine starts.

When the engine does start, it may operate erratically and with increased noise levels for a few minutes. This is a normal condition as air is being removed from the system.

NOTE: It is possible that Fault Code 559 may become active after fuel filter replacement, due to air introduced in the system. Ensure that the engine is run until the air is purged.

Operate the engine and check for leaks.

HOSES

All components of the engine cooling air intake system should be checked periodically to keep the engine at peak efficiency.

At the recommended intervals, (see the *SERVICE/MAINTENANCE CHART*), inspect all of the intake lines to the air filter, and all flexible hoses used for air lines, oil lines and fuel lines.

Periodically inspect all pipework for cracks, leaks, etc. and replace immediately if damaged.

ELECTRICAL SYSTEM

WARNING: Always disconnect the battery cables before performing any maintenance or service.

Inspect the safety shutdown system switches and the instrument panel relay contacts for evidence of arcing and pitting. Clean where necessary.

Check the mechanical action of the components.

Check the security of electrical terminals on the switches and relays i.e. nuts or screws loose, which may cause local hot spot oxidation.

Inspect the components and wiring for signs of overheating i.e. discolouration, charring of cables, deformation of parts, acrid smells and blistered paint.

BATTERY

Keep the battery terminals and cable clamps clean and lightly coated with petroleum jelly to prevent corrosion.

The retaining clamp should be kept tight enough to prevent the battery from moving.

PRESSURE SYSTEM

At 500 hour intervals it is necessary to inspect the external surfaces of the system (from the airend through to the discharge valve(s)) including hoses, tubes, tube fittings and the separator tank, for visible signs of impact damage, excessive corrosion, abrasion, tightness and chafing. Any suspect parts should be replaced before the machine is put back into service.

TYRES/TYRE PRESSURE

See the *GENERAL INFORMATION* section of this manual.

RUNNING GEAR/WHEELS

Check the wheel nut torque 20 miles (30 kilometres) after refitting the wheels. Refer to the *TORQUE SETTING TABLE* later in this section.

Lifting jacks should only be used under the axle.

The bolts securing the running gear to the chassis should be checked periodically for tightness (refer to the *SERVICE/MAINTENANCE CHART* for frequency) and re-tightened where necessary. Refer to the *TORQUE SETTING TABLE* later in this section.

BRAKES

Check and adjust the brake linkage at 500 miles (850Km) then every 3000 miles (5000Km) or 3 months (whichever is the sooner) to compensate for any stretch of the adjustable cables. Check and adjust the wheel brakes to compensate for wear.

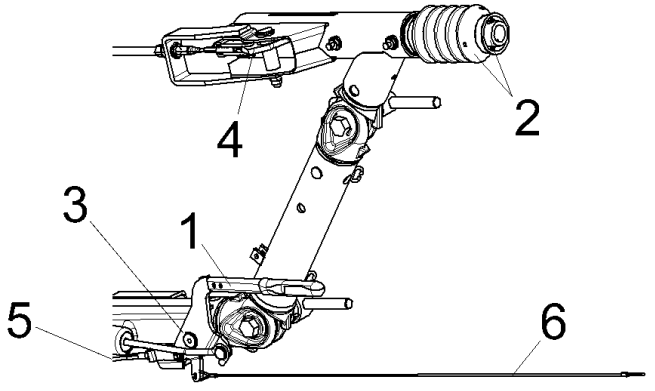
Adjusting the overrun braking system (KNOTT Running Gear)

1. Preparation

Jack up the machine

Disengage the handbrake lever [1].

Fully extend the draw bar [2] on the overrun braking system.



1. Handbrake lever
2. Draw bar and bellows
3. Handbrake lever pivot
4. Transmission lever
5. Brake cable
6. Breakaway Cable

Requirements:

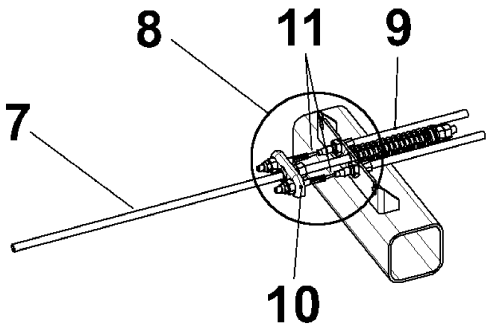
During the adjustment procedure always start with the wheel brakes.

Always rotate the wheel in the direction of forward movement.

Ensure that an M10 safety screw is fitted to the handbrake pivot.

The brake actuators must not be pre-tensioned - if necessary loosen the brake linkage [7] on the brake equalisation assembly [8].

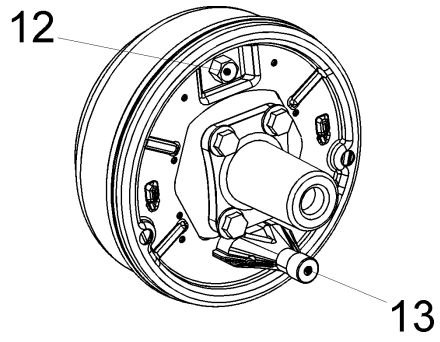
Check that brake actuators and cables [11] operate smoothly.



7. Brake linkage
8. Equalisation assembly
9. Compression spring
10. Equaliser plate
11. Cable

CAUTION: *The compression spring [9] must only be lightly pre-tensioned and when operating must never touch the axle tube.*
Never adjust the brakes at the brake linkage [7].

2. Brake Shoe Adjustment



12. Adjusting screw
13. Cable entry

Width across flats of adjusting screw [12]

Brake size	**Key width**
160x35 / 200x50	SW 17
250x40	SW 19
300x60	SW 22

Tighten adjusting screw [12] clockwise until the wheel locks.

Loosen adjusting screw [12] anti-clockwise (approx. ½ turn) until the wheel can be moved freely.

Slight dragging noises that do not impede the free movement of the wheel are permissible.

This adjustment procedure must be carried out as described on both wheel brakes.

When the brake has been adjusted accurately the actuating distance is approximately 5-8mm on the cable [11]

3. Compensator assembly adjustment

Variable Height model

Fit an M10 safety screw to the handbrake pivot.

Disconnect the handbrake cable [5] at one end.

Pre-adjust brake linkage [7] lengthways (a little play is permissible) and re-insert the cable [5], adjusting it to give a small amount of play.

Remove the M10 safety screw from the handbrake pivot.

All Models

Engage the handbrake lever [1] and check that the position of the equaliser plate [10] is at right angles to the pulling direction. If necessary correct the position of the equaliser plate [10] on the cables [11].

The compression spring [9] must only be slightly pre-tensioned and when engaged must not touch the axle tube.

4. Brake linkage adjustment

Adjust the brake linkage [7] lengthways without pre-tension and without play in the transmission lever [4].

Readjustment

Engage the handbrake lever [1] forcefully a number of times to set the brake.

Check the alignment of the equalisation assembly [8], this should be at right angles to the pulling direction

Check the play in the brake linkage [7]

If necessary adjust the brake linkage [7] again without play and without pre-tensioning

There must still be a little play in cable [5] (Variable Height Only)

Check the position of the hand brake lever [1]. The start of resistance should be approximately 10-15mm above the horizontal position.

Check that the wheels move freely when the handbrake is disengaged.

Final test

Check the fastenings on the transmission system (cables, brake equalisation system and linkage).

Check the handbrake cable [5] for a small amount of play and adjust if necessary (Variable height only)

Check the compression spring [9] for pre-tensioning.

Test run

If necessary carry out 2-3 test brake actions.

Test brake action

Check the play in brake linkage [7] and if necessary adjust the length of brake linkage [7] until there is no play.

Apply the handbrake while rolling the machine forward, travel of the handbrake lever up to 2/3 of maximum is allowed.

Re-adjusting the overrun braking system (KNOTT Running Gear)

Re-adjustment of the wheel brakes will compensate for brake lining wear. Follow the procedure described in 2: Brake Shoe Adjustment.

Check the play in the brake linkage [7] and re-adjust if necessary.

Important

Check the brake actuators and cables [11]. The brake actuators must not be pre-tensioned.

Excessive operation of the handbrake lever, which may have been caused by worn brake linings, must not be corrected by re-adjusting (shortening) the brake linkage [7]

Re-adjustment

The handbrake lever [1] should be engaged forcefully several times to set the braking system.

Check the setting of the brake equalisation assembly [8], which should be at right angles to the pulling direction.

Check the play in the brake linkage [7] again, ensuring that there is no play in the brake linkage and that it is adjusted without pre-tension

Check the position of the hand brake lever [1], cable [5] (with little play) and the compression spring [9] (only slight pre-tension). The start of resistance of the handbrake lever should be approximately 10-15mm above the horizontal position.

Final test

Check the fastenings on the transmission system (cables, brake equalisation system and linkage)

Apply the handbrake while rolling the machine forward, travel of the handbrake lever up to 2/3 of maximum is allowed.

Check the handbrake cable [5] for a small amount of play and adjust if necessary (Variable height only)

Check the compression spring [9] for slight pre-tensioning.

CAUTION: *Check the wheel nut torque 20 miles (30 kilometres) after refitting the wheels (Refer to the TORQUE SETTING TABLE later in this section).*

LUBRICATION

The engine is initially supplied with engine oil sufficient for a nominal period of operation (for more information, consult the Engine section of this manual).

CAUTION: *Always check the oil levels before a new machine is put into service.*

If, for any reason, the unit has been drained, it must be re-filled with new oil before it is put into operation.

ENGINE LUBRICATING OIL

The engine oil should be changed at the engine manufacturer's recommended intervals. Refer to the Engine Manual supplied with this machine.

ENGINE LUBRICATING OIL SPECIFICATION

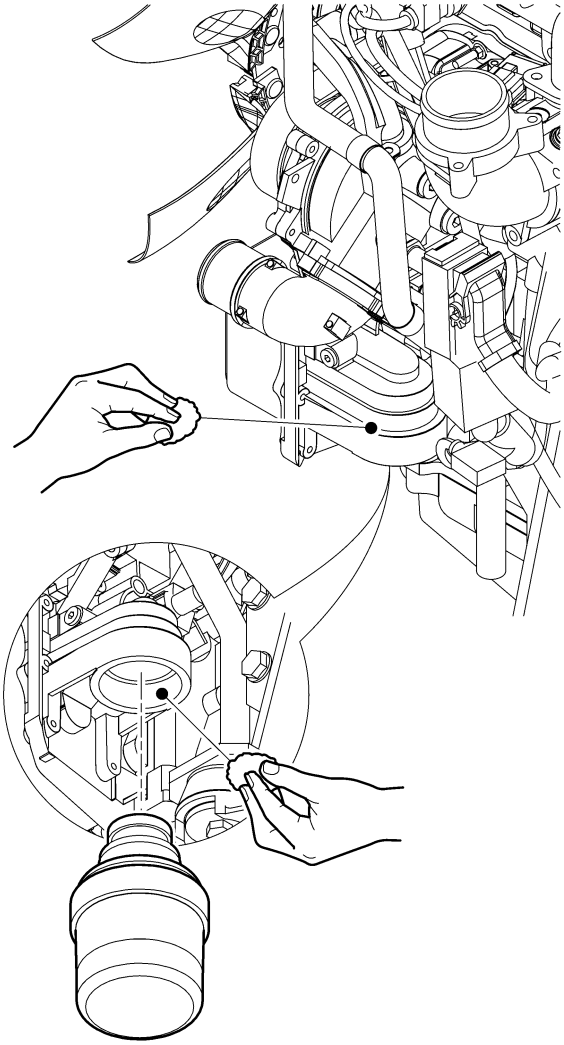
Refer to the Engine Manual supplied with this machine.

ENGINE OIL FILTER ELEMENT

The engine oil filter element should be changed at the engine manufacturer's recommended intervals. Refer to the Engine Manual supplied with this machine.

LUBRICATING OIL FILTER (SPIN-ON)

Removal

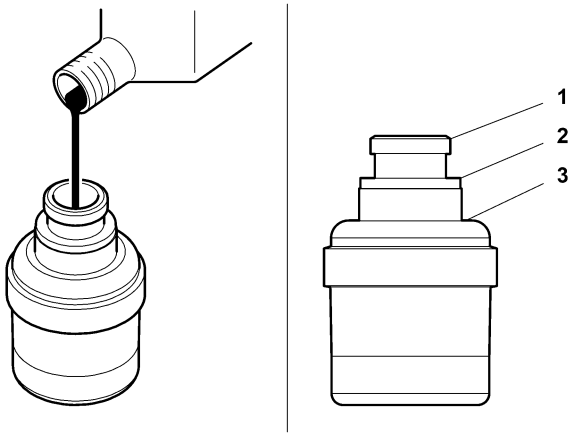


Clean the area around the lubricating oil filter head.

Use an oil filter wrench, or a 1/2 inch drive (bottom of the oil filter) to remove the filter.

Clean the sealing surface of the filter head.

Installation

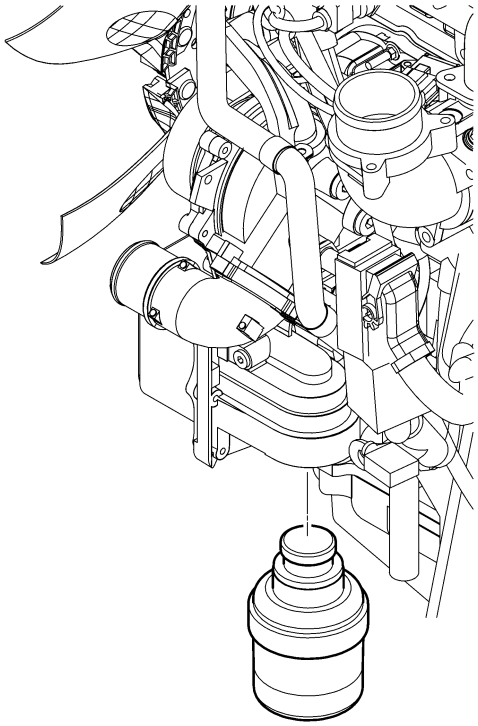


CAUTION: *The lack of lubrication during the delay until the filter is pumped full of oil at start-up can damage the engine.*

Make sure that the o-ring and two gasket seals are installed on the filter, that they are clean and free of debris. Use clean lubricating oil to lightly lubricate the o-ring seal (1) and primary gasket seal (2) **only**.

Make sure that the secondary gasket (3) remains clean and dry. Do **not** lubricate.

Fill the filter with clean lubricating oil. Use the following procedure to select the appropriate oil grade and specification.



CAUTION: *Mechanical overtightening of the filter can distort the threads or damage the filter element seal.*

Install the filter on the filter head. Hand tighten the filter until the secondary gasket contacts the filter head surface.

Use a 1/2 drive at the bottom of the filter and tighten to the following specification:

Torque value: 40 Nm (30 ft lb).

CAUTION: *If the engine does not produce oil pressure in 15 seconds after starting the engine, shut off the engine to reduce the possibility of component damage.*

- Operate the engine and check for leaks.
- Shut the engine off and check the oil level.

LUBRICATION - GENERAL INFORMATION

Lubrication is an essential part of preventive maintenance, affecting to a great extent the useful life of the compressor. Different lubricants are needed and some components require more frequent lubrication than others. Therefore, it is important that the instructions regarding types of lubricants and the frequency of their application be explicitly followed. Periodic lubrication of the moving parts reduces to a minimum the possibility of mechanical failures.

The Maintenance Schedule shows those items requiring regular service and the interval in which they should be performed. A regular service program should be developed to include all items and fluids. These intervals are based on average operating conditions. In the event of extremely severe (hot, cold, dusty or wet) operating conditions, more frequent lubrication than specified may be necessary.

All filters and filter elements for air and compressor oil must be obtained through Portable Power to assure the proper size and filtration for the compressor.

Compressor Oil Change

These compressors are normally furnished with an initial supply of oil sufficient to allow operation until the first service interval indicated in the Maintenance Schedule. If a compressor has been completely drained of all oil, it must be refilled with new oil before it is placed in operation. Refer to specifications in the Portable Compressor Fluid Chart.

NOTE: Some oil types are incompatible when mixed and result in the formation of varnishes, shellacs, or lacquers which may be insoluble. Such deposits can cause serious troubles including clogging of the filters.

Where possible, do NOT mix oils of different types and avoid mixing different brands. A type or brand change is best made at the time of a complete oil drain and refill.

If the compressor has been operated for the time/hours indicated in the Maintenance Schedule, it should be completely drained of oil. If the compressor has been operated under adverse conditions, or after long periods in storage, an earlier change may be necessary as oil deteriorates with time as well as by operating conditions.

CAUTION: *In most severe applications such as sandblasting, quarry drilling, well drilling, and oil and gas drilling, more frequent service intervals will be required to ensure long component life.*

WARNING : High pressure air can cause severe injury or death from hot oil and flying parts. Always relieve pressure before removing caps, plugs, covers or other parts from pressurized air system. Ensure that the air pressure gauge reads zero (0) pressure and ensure there is no air discharge when opening the manual blowdown valve.

An oil change is good insurance against the accumulation of dirt, sludge, or oxidized oil products.

Completely drain the separator tank, piping, and cooler. If the oil is drained immediately after the compressor has been run for some time, most of the sediment will be in suspension and, therefore, will drain more readily. However, the oil will be hot and care must be taken to avoid contact with the skin or eyes.

After the compressor has been completely drained of all old oil, close the drain valves and/or plugs and install new oil filter elements. Add oil in the specified quantity at the filler plug. Tighten the filler plug and run the compressor to circulate the oil. Check the oil level. DO NOT OVERFILL.

NOTE: Portable Power provides compressor oil specifically formulated for Portable Compressors and requires the use of these fluids in order to obtain extended limited airend warranty.

COMPRESSOR OIL FILTER ELEMENT

Refer to the *SERVICE / MAINTENANCE CHART* in this section for service intervals.

RUNNING GEAR WHEEL BEARINGS

Wheel bearings should be packed with grease every 6 months. The type of grease used should conform to specification *MIL-G-10924*.

ENGINE STORAGE - LONG TERM

WARNING: Do not remove the pressure cap from a hot engine. Wait until the coolant temperature is below 50°C (120°F) before removing the pressure cap. Heated coolant spray or steam can cause personal injury.

WARNING: Coolant is toxic. Keep away from children and pets. If not reused, dispose of in accordance with local environmental regulations.

CAUTION: *After 24 months in storage, the engine cooling system must be drained and flushed with a suitable solvent or a hot, lightweight mineral oil. Repeat flushing procedure a second time before being put back into service.*

This procedure describes the proper method for the long-term (more than 6 months) storage of an engine that is currently in running condition. This procedure applies to this engine either remaining in chassis -or being removed out of chassis upon completion of the steps below.

Prepare the Engine for Long Term Storage

- Operate the engine at high idle until the coolant temperature is 70°C [158°F].
- Turn the engine off.
- Drain the oil.
- Install the drain plugs.
- Fill the engine oil pan sump to the high mark using TectylTM 910 or equivalent engine preservative oil. This will provide long term engine rust protection. The oil must meet military specification MIL-PRF-21260, Type P-10, Grade 2, SAE 30.

Internal Preservation of the Fuel System with Mechanically and Electronically Actuated Injectors

CAUTION: *DO NOT use diesel fuel containing bio components for internal preservation of fuel system for engine storage. Fuel properties degradation may cause damages and lead to premature failure of fuel system components.*

- Disconnect the fuel lines to the engine fuel filter and the injector return line.
- Use Diesel Pump and Injector calibration fluid that meets ISO 4113 standard, SAE J967d standard and Bosch VS 15665-0L standard.

NOTE: Using calibration fluid allows storage for up to 12 months. After 12 months the engine fuel system must be drained and flushed again with fresh calibration fluid. Repeat after each 12-month period.

Alternatively you can use the diesel fuel with 0 percent bio components content for Internal Preservation of the Fuel System.

NOTE: Using diesel fuel with 0 percent bio components content allows storage for up to 6 months. After 6 months, the engine fuel system must be drained and be flushed again with fresh diesel fuel with 0 percent bio components content. Repeat after each 6-month period.

- Start the engine.
- After the engine is operating smoothly, transfer the fuel supply line to the container of calibration fluid or the container of diesel fuel with 0 percent bio components content.
- Let the engine run for approximately 25 minutes at low idle in order to ensure that the engine preservative oil (TectylTM 910 E or equivalent) is distributed around the engine and its internal components and that the calibration fluid or the diesel fuel with 0 percent bio components content flows out of the injector return line.
- Turn the engine "OFF".
- Connect the fuel lines to the fuel filter and the injector return line.
- Drain all the preservative oil from the engine oil pan sump, the air compressor (if applicable), and drain all the oil filters and all the fuel filters.
- Install the drain plugs.

CAUTION: *Before starting another Internal Preservation of the Fuel System procedure again (after passing a storage period) it is required to fill the engine oil pan sump to the high mark using TectylTM 910 or equivalent engine preservative oil.*

- If the engine is being stored as a loose engine, drain the engine coolant and cover all cooling system openings with plastic and tape.
- If the engine is **not** being removed from chassis and the engine has an extended life coolant with rust inhibitor, then coolant does **not** need to be drained.
- If the engine will remain in storage for over 24 months, the engine cooling system **must** be drained and flushed with a suitable solvent or a hot, lightweight mineral oil. Repeat after each 24-month period.
- Remove the intake and exhaust manifolds.
- Spray preservative oil into the intake and exhaust ports in the cylinder heads and in the exhaust manifolds **only**. Do **not** use preservative oil on the intake manifold or any fuel system components as this may permanently damage sensors or valves.
- Spray preservative oil in the inlet port on the air compressor (if applicable).
- Remove the rocker lever covers.
- Spray the rocker levers, the valve stems, the springs, the valve guides, the crossheads, and the push rods with preservative oil.
- Install the rocker lever covers, intake and exhaust manifolds.
- Brush or spray the preservative oil on all the exposed metal surfaces that are **not** painted. Preservative oil should **not** be applied to any plastic, rubber, or similar surfaces. Make sure to coat the flywheel, flywheel housing and all other unpainted machined surfaces with this preservative oil. Use a rust preservative oil compound that meets military specification MIL-C-16173C, type P-2, Grade 1 or 2.
- For components containing exposed bearings that are **not** easily accessible e.g. Fan Hubs, remove the component to aid access. Brush or spray preservative oil on all surfaces that are **not** painted and refit the component. Use a rust preservative oil compound that meets military specification, MIL-C-16173C, type P-2, Grade 1 or 2.
- Cover all the openings (engine and components) with heavy paper and tape to prevent dirt and moisture from entering the engine. Cover the entire engine with plastic.
- Put a warning tag on the engine. The tag **must** indicate:
  - Do **not** operate the engine.
  - Do **not** bar the crankshaft.
  - The engine has been treated with preservatives.
  - The coolant has been removed.
  - The date of treatment.
  - The date of the 6 week inspection if required.

CAUTION: *The engine must be stored in an area that is dry and has uniform temperature.*

- Remove any external drive belts to prevent localized stretching and deformation.
- If the engine can be stored inside a designated storage facility isolated from the external environment, ignore the following step.
- Excluding the crankshaft, ensure that all external dynamic engine components are rotated every 6 weeks. Ensure parts are free from corrosion, debris and water ingress. Record and date this on the engine tag created.

Remove the Engine from Long Term Storage

To remove the engine from long term storage, follow the following steps:

CAUTION: *To reduce the possibility of personal injury, avoid direct contact of hot oil with your skin.*

- Flush the engine preservative oil out of the engine by removing the plug from the main engine oil rifle and pumping a hot, lightweight mineral oil through it. Make sure that the engine crankshaft is barred at least three to four revolutions during this flushing procedure.
- Drain all the mineral oil that was used to flush the engine clean of the engine preservative oil.
- Install the drain plugs.
- Install new oil, fuel and coolant filters.
- Fill the engine to the high mark with engine oil.
- If the engine has been in storage for less than 24 months and if the cooling system was drained, fill the cooling system with coolant. See the Coolant Recommendations and Specifications procedure in Section V of the corresponding owners and/or operation and maintenance manual for antifreeze, water, and SCA specifications.
- If the engine has been in storage for 24 months, every 24 months the engine cooling system **must** be drained and flushed with a suitable solvent or a hot, lightweight mineral oil. Fill the cooling system with coolant. See the Coolant Recommendations and Specifications procedure in Section V of the corresponding owners and/or operation and maintenance manual for antifreeze, water, and SCA specifications.
- If the engine has been in storage for less than 24 months and the engine has an extended life coolant with a rust inhibitor, drain the cooling system. Fill the cooling system with coolant. See the Coolant Recommendations and Specifications procedure in Section V of the corresponding owners and/or operation and maintenance manual for antifreeze, water, and SCA specifications.
- Adjust the engine brake (if applicable) and valve clearances. Reference the Overhead Set procedure in the corresponding base Troubleshooting and Repair Manual or Service Manual for the engine being serviced.
- Tighten the intake and exhaust manifold mounting capscrews.
- Prime the lubricating system.
- Reinstall any external drive belts that were removed.
- Replace all spark plugs. Reference the Spark Plugs procedure in the corresponding base Troubleshooting and Repair Manual or Service Manual for engine being serviced (if applicable).
- Make sure all fuel lines are securely tightened and all fuel shutoff valves are open prior to attempting to start the engine.
- Start the engine.

Note that it might take multiple cranking attempts to start the engine. Do **not** crank the engine more than 30 seconds at a time as this might cause the starter to overheat and fail.

Note that the engine might run rough until the fuel system is completely primed or until all residual fuel system preservative oil is completely flushed out of the fuel system (if the fuel has been treated with fuel system preservative oil).

- Install the exhaust aftertreatment components (if applicable).
- Force an active regeneration (if applicable).

DECOMMISSIONING

When the machine is to be permanently decommissioned or dismantled, it is important to ensure that all hazard risks are either eliminated or notified to the recipient of the machine. In particular:-

- Do not destroy batteries or components containing asbestos without containing the materials safely.
- Do not dispose of any pressure vessel that is not clearly marked with its relevant data plate information or rendered unusable by drilling, cutting etc.
- Do not allow lubricants or coolants to be released into land surfaces or drains.
- Do not dispose of a complete machine without documentation relating to instructions for its use.

LONG TERM STORAGE RECOMMENDATIONS (6 months or more)

Spare Airends

- Long-term storage of airends should include filling the airend with the standard compressor fluid, PRO-TEC, XHP605 or XHP405. Upon installation of the airend, drain the storage oil from the airend and proceed with the installation, assuring fresh oil is poured into the intake prior to start up.

Portable Compressors

- Airend – Remove the intake connection and pour the airend intake full with Doosan compressor fluid PRO-TEC, XHP605 or XHP405. Reconnect the intake connection.
- Engine cooling system – Treat with rust inhibitor and drain. Checkwith engine dealer for further recommendations.
- Compressor Oil Filter/s- fill with Doosan compressor fluid PROTEC, XHP605 or XHP405.
- Seal all opening with waterproof tape.
- Place a desiccant in the exhaust pipes, engine and compressor air intake pipes.
- Loosen tension on belts, fan, airend, etc.
- Block axles so tyres are off ground and do not support any weight.
- Disconnect battery cables.
- Drain fuel system.

SHORT TERM STORAGE

Machines that stand idle for extended periods of time greater than 30 days:

- Start and operate the machine every 30 days. Operate long enough to allow the engine and compressor to reach operating temperature.
- Open and close the service valve to exercise machine from full load to idle RPM.
- Drain fuel tank to remove any water.
- Drain water from fuel water separator.

COMPRESSOR MOUNTING

Portable compressors, which are modified to remove the running gear and mount the compressor directly to trailers, truck beds or frames, etc. may experience failure of the enclosure, frame, and/or other components.

It is necessary to isolate the compressor package from the carrier base with a flexible mounting system. Such a system must also prevent detachment of the package from the carrier base in the event the isolators fail.

Contact your Portable Power representative for flexible mounting kits.

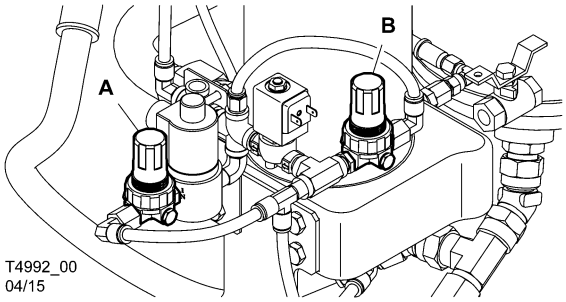
Warranty does not cover failures attributable to mounting of the compressor package to the carrier base unless it is a Portable Power provided system.

NOTE: The maintenance schedule in this manual describes the service intervals that should be followed for “normal” applications of this compressor. This page may be reproduced and used as a checklist by service personnel.

In more severe applications such as sandblasting, quarry drilling, well drilling, and oil and gas drilling, more frequent service intervals will be required to ensure long component life.

Dust and dirt, high humidity, and high temperatures will affect lubricant life and service intervals for components such as inlet air filters, oil separation elements and oil filters.

SPEED AND PRESSURE REGULATION ADJUSTMENT



Normally, regulation requires no adjusting, but if correct adjustment is lost, proceed as follows:

Before Starting

1. Select Low Pressure Mode by turning HI/LO Pressure Switch on control panel.
2. At the Low Pressure Regulator (A), pull the plastic cap upwards to unlock and turn counter clockwise until tension is relieved. Proceed to turn the cap clockwise one full turn.
3. If high pressure regulation needs adjustment, repeat Step 2 at High Pressure Regulator (B).
4. Close Service Valves.

After Starting Unit

5. Push the Service Air Button on the Control Panel. The unit should speed up and then unload (and drop back to IDLE). With the unit unloaded, turn the adjusting cap on the Low Pressure Regulator (A) clockwise until the discharge pressure gauge indicates 8,6-9 bar. Push the plastic cap downwards to lock.
6. To adjust the high pressure regulation, repeat Step 5 on High Pressure Regulator (B) except adjust pressure at idle to 12,1-12,4 bar while in High Pressure Mode.

NOTE: The High Pressure Regulator (B) must be set at a higher pressure than the Low Pressure Regulator (A).

TORQUE VALUES

Part	ft. lbf	N.m
Airend (main body) to engine	29-34	39-47
Coupling element to engine flywheel	35-38	48-52
Air filters to brackets	18-21	24-28
Cooling baffle to frame	18-21	24-28
Exhaust clamps to baffle	18-21	24-28
Discharge manifold to frame	35-38	48-52
Engine to brackets	63-70	85-95
Engine brackets to silentblocks	35-38	48-52
Engine silentblock to frame	18-21	24-28
Airend to bracket	153-156	207-212
Airend bracket to frame	18-21	24-28
Fan guards	18-21	24-28

Part	ft. lbf	N.m
Discharge hose to Airend-Separator (-24 JIC)	158-167	214-226
Fan clutch to adapter on engine	1033-1047	1400-1420
Lifting bail to frame	63-70	85-95
Oil Hose Separator-Airend (-12 JIC)	71-88	96-119
Radiator/cooler to baffle	18-21	24-28
Radiator/cooler to baffle	18-21	24-28
Running gear to chasis	60-69	82-93
Separator tank to frame	35-38	48-52
Pipe, Separator-Spin-on manifold (-20 JIC)	127-133	172-180
Pipe, Spin-on manifold-Service manifold (-20 JIC)	127-133	172-180
Wheel nuts	63-70	85-95

COMPRESSOR LUBRICATION

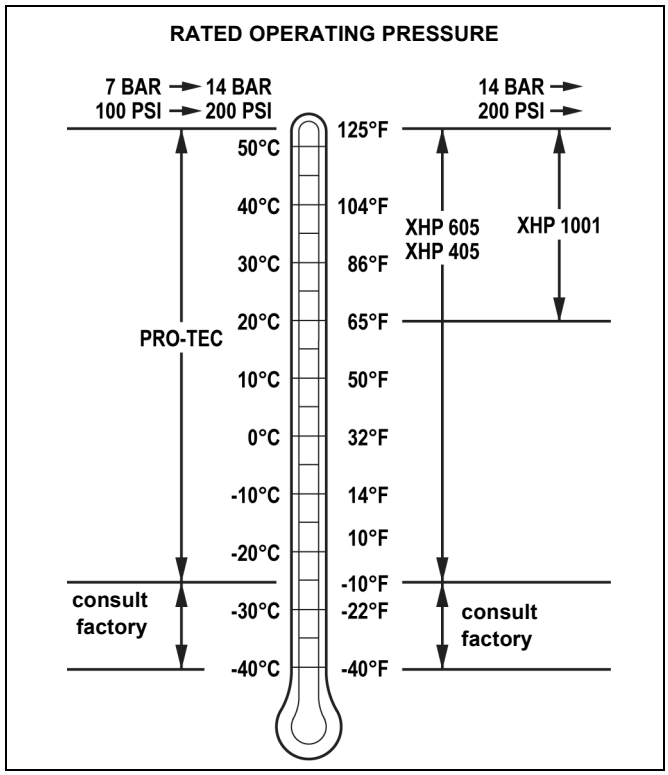
Portable Compressor Fluid Chart

Refer to these charts for correct compressor fluid required. Note that the selection of fluid is dependent on the design operating pressure of the machine and the ambient temperature expected to be encountered before the next oil change.

Note: Fluids listed as "preferred" are required for extended warranty.

Compressor oil carryover (oil consumption) may be greater with the use of alternative fluids.

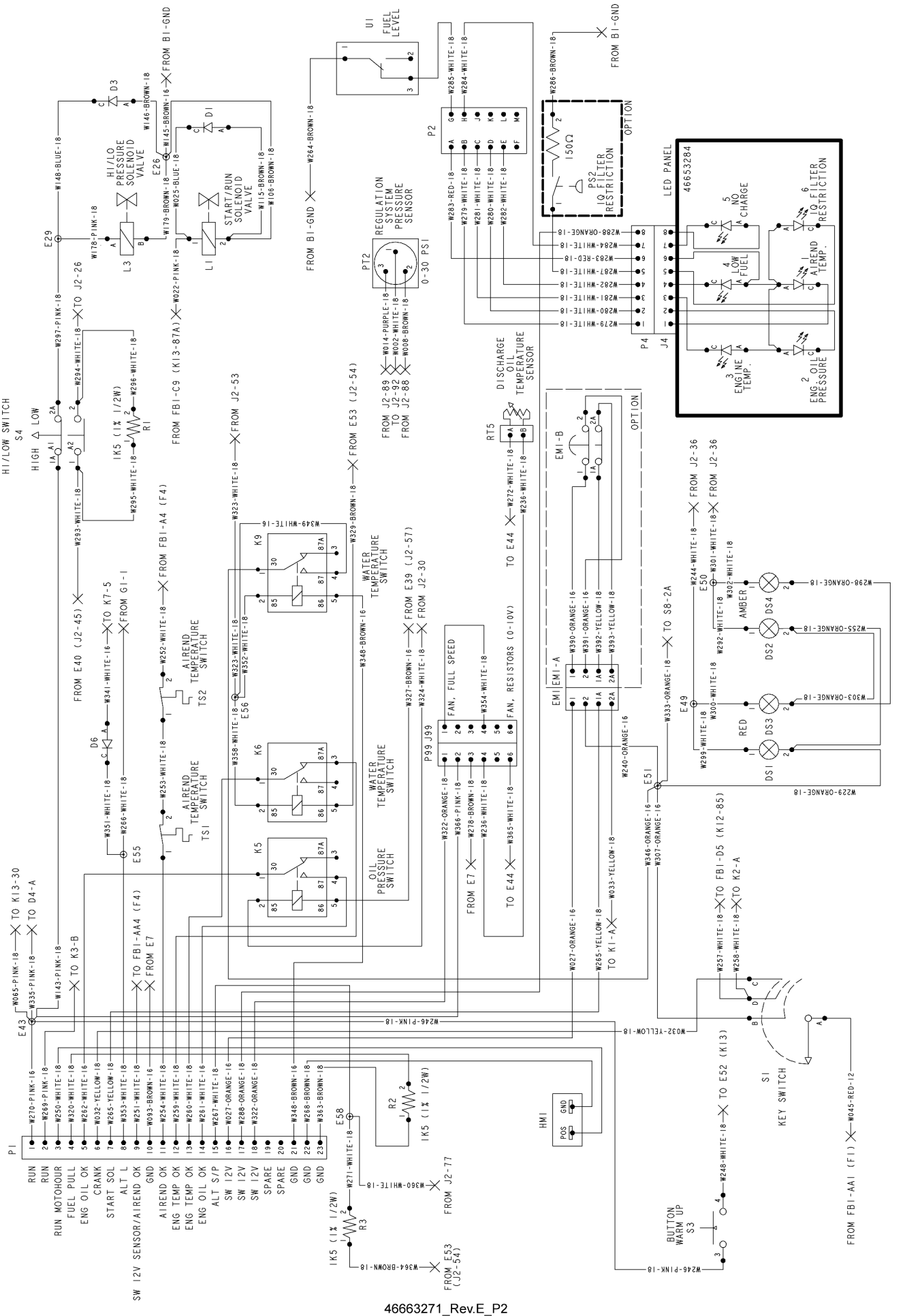
Design operating pressure	Ambient temperature	Compressor oil specification
7 bar to 14 bar (100 psi to 200 psi)	-23°C to 52°C (-10°F to 125°F)	Preferred: **PRO-TEC** Alternate: ISO Viscosity Grade 46 with rust and oxidization inhibitors, designed for air compressor service.
14 bar and above (200 psi and above)	-23°C to 52°C (-10°F to 125°F)	Preferred: **XHP 605** Alternate: **XHP 405** ISO Viscosity Grade 68 Group 3 or 5 with rust and oxidization inhibitors, designed for air compressor service.
	18°C to 52°C (65°F to 125°F)	Preferred: **XHP 605** **XHP 1001**



Doosan preferred fluids - the use of these fluids with original Doosan branded filters can extend airend warranty. Refer to operator's manual warranty section for details or contact your Portable Power representative.

Doosan preferred fluids		
PRO-TEC engine oil	46652105 (20.0 Litres)	46652106 (208.0 Litres)
Stage 3B and 4 engine oil	46551222 (20.0 Litres)	46551223 (208.0 Litres)
PRO-TEC compressor oil	89292973 (20.0 Litres)	89292981 (208.0 Litres)
XHP 605 compressor oil	22252076 (19.0 Litres)	22252050 (208.2 Litres)
XHP 1001 compressor oil	-	35300516 (208.2 Litres)
XHP 405 compressor oil	22252126 (19.0 Litres)	22252100 (208.2 Litres)

Note: Stage 3B & Stage 4 engines are required to use CJ-4/ACEA E9 engine oil only, failure to do so will result in engine after treatment damage. Please read the engine manual for more details.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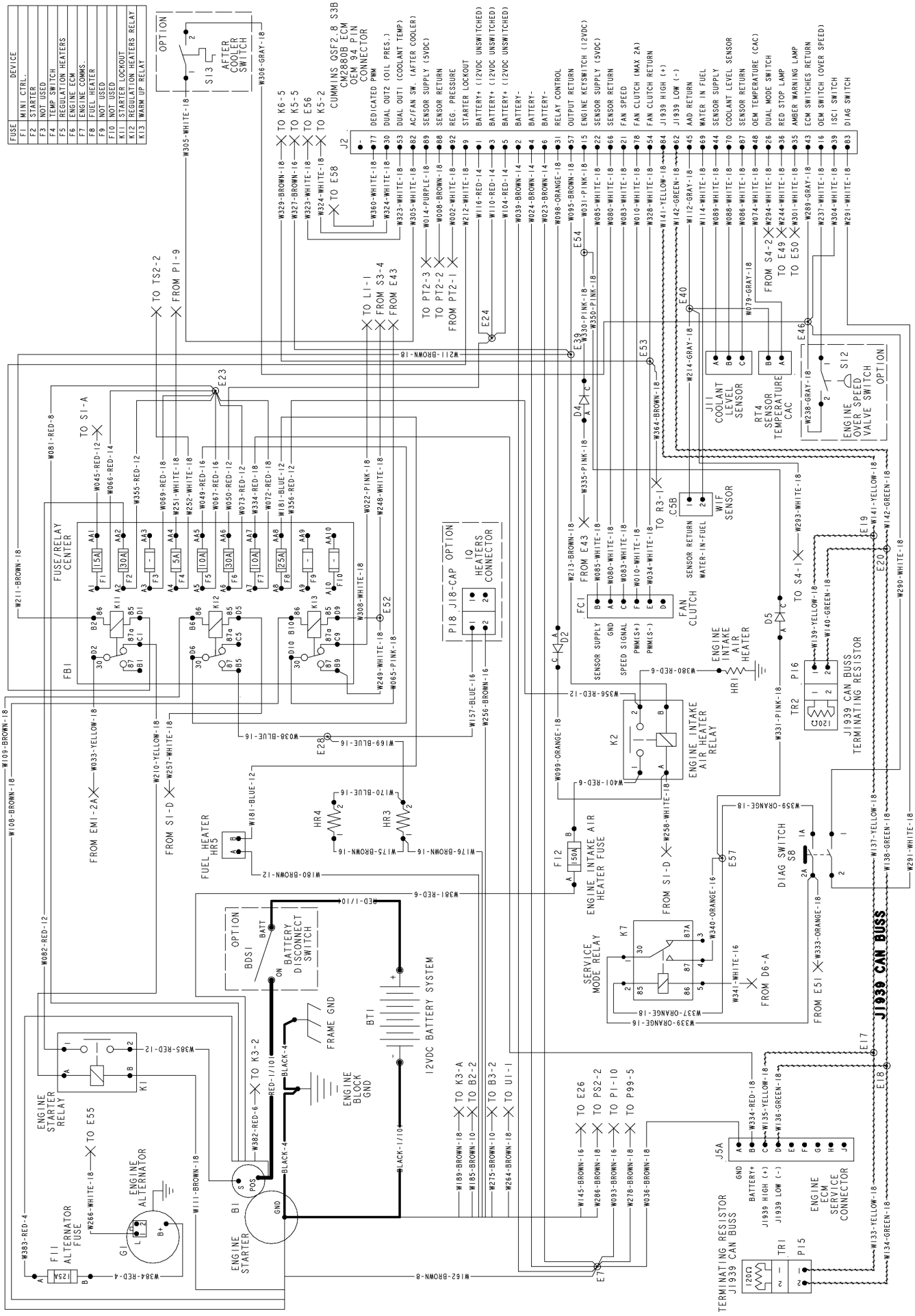
KEY

J99	Fan, Full Speed
K5	Switch, Oil Pressure
K6	Switch, Water Temperature
K9	Switch, Water Temperature
L1	Valve, Start / Run Solenoid
L3	Valve, Hi / Lo Pressure Solenoid
PS2	IQ Filter Restriction
PT2	Sensor, Regulation System Pressure (0-30 PSI)
RT5	Sensor, Discharge Oil Temperature
S1	Keyswitch
S3	Button, Warm-Up
S4	Switch, Hi / Lo
TS1	Switch, Airend Temperature
TS2	Switch, Airend Temperature
U1	Fuel Level

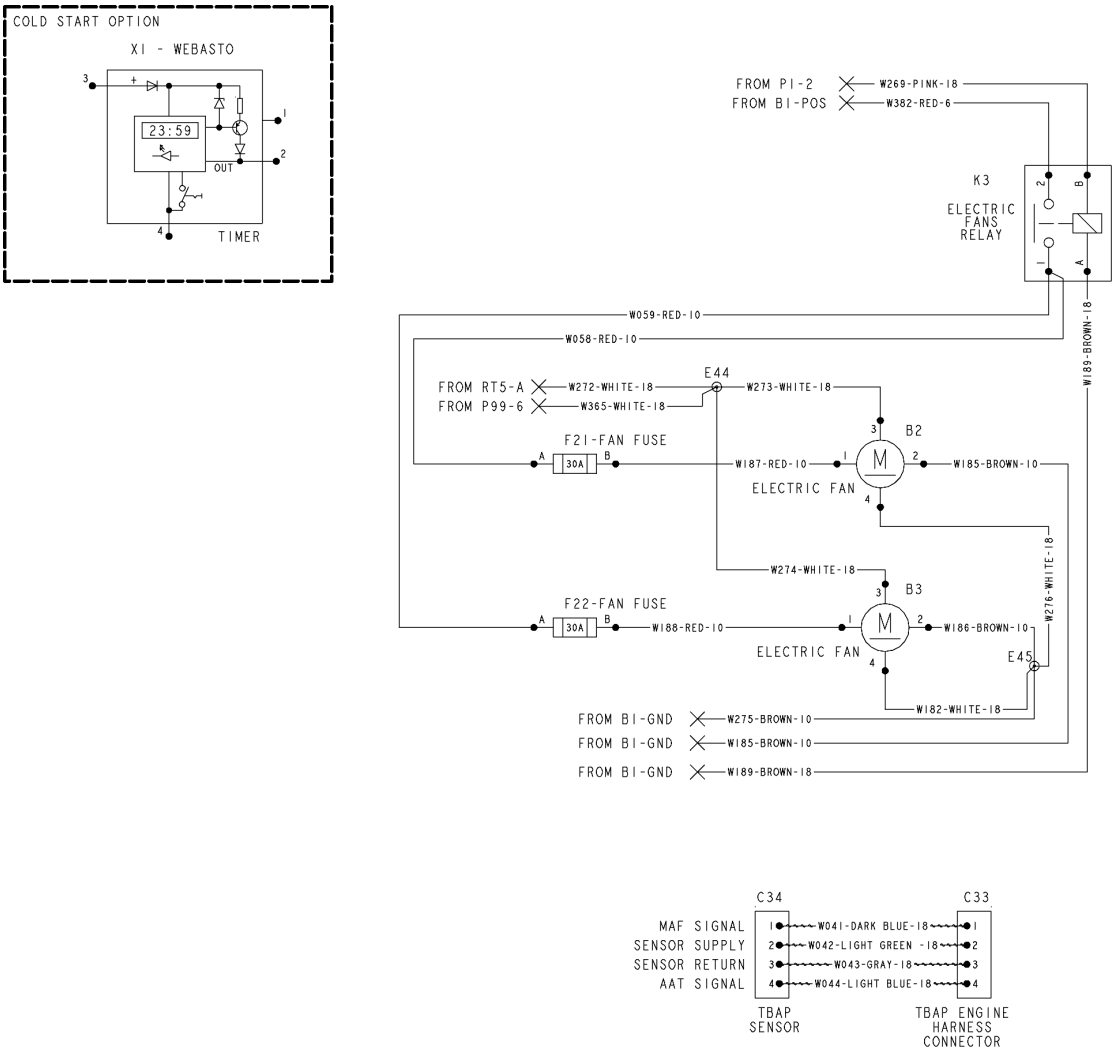
1	Airend Temperature
2	Engine Oil Pressure
3	Engine Temperature
4	Low Fuel
5	No Charge
6	IQ Filter Restriction


FUSE DEVICE
F1 MINI CTRL.
F2 STARTER
F3 NOT USED
F4 TEMP SWITCH
F5 REGULATION HEATERS
F6 ENGINE ECM
F7 ENGINE COMMS.
F8 FUEL HEATER
F9 NOT USED
F10 NOT USED
K11 STARTER LOCKOUT
K12 REGULATION HEATERS RELAY
K13 WARM UP RELAY
OPTION
AFTER COOLER SWITCH
CUMMINS QSF2.8 S3B CM2880B ECM OEM 94 PIN CONNECTOR
FUSE/RELAY CENTER
FBI
ENGINE STARTER RELAY
ENGINE ALTERNATOR
ALTERNATOR FUSE
ENGINE STARTER
BATTERY DISCONNECT SWITCH
12VDC BATTERY SYSTEM
FRAME GND
ENGINE BLOCK GND
FUEL HEATER HR5
ENGINE INTAKE AIR HEATER FUSE
ENGINE INTAKE AIR HEATER RELAY
SERVICE MODE RELAY
DIAG SWITCH
IQ HEATERS CONNECTOR
FAN CLUTCH
WIF SENSOR
COOLANT LEVEL SENSOR
RT4 SENSOR TEMPERATURE CAC
ENGINE OVER SPEED VALVE SWITCH
J1939 CAN BUSS
J1939 CAN BUSS TERMINATING RESISTOR
TERMINATING RESISTOR J1939 CAN BUSS
ENGINE ECM SERVICE CONNECTOR
TO TS2-2
FROM PI-9
TO SI-A
FROM EMI-2A
FROM SI-D
TO E58
TO LI-1
FROM S3-4
FROM E43
TO PT2-3
TO PT2-2
FROM PT2-1
TO K6-5
TO K5-5
TO E56
TO K5-2
TO K3-A
TO B2-2
TO B3-2
TO UI-1
TO E26
TO PS2-2
TO PI-10
TO P99-5
TO E55
TO K3-2
FROM S4-2
TO E49
TO E50
TO S4-1
FROM E51
FROM D6-A
46663271_Rev.E_P3

KEY

BDS1	Switch, Battery Disconnect (Option)
BT1	Battery System, 12VDC
B1	Starter, Engine
C5B	Sensor, Water-In-Fuel
FB1	Centre, Fuse / Relay
FC1	Clutch, Fan
F11	Fuse, Alternator
F12	Fuse, Engine Intake Air Heater
G1	Alternator, Engine
HR1	Heater, Engine Intake Air
HR5	Heater, Fuel
J2	Connector, Cummins QSF2.8 S3B CM2880B ECM OEM 94 PIN
J11	Sensor, Coolant Level
J5A	Connector, Engine ECM Service
K1	Relay, Engine Starter
K2	Relay, Engine Intake Air Heater
K7	Relay, Service Mode
P18	Connector, IQ Heaters (Option)
RT4	Sensor, Temperature CAC
S8	Switch, Diag.
S12	Switch, Engine Overspeed Valve (Option)
S13	Switch, Aftercooler
TR1	Resistor, Terminating J1939 CAN BUSS
TR2	Resistor, Terminating J1939 CAN BUSS

FUSE	DEVICE
F1	Mini Controller
F2	Starter
F3	Not Used
F4	Temperature Switch
F5	Regulation Heaters
F6	Engine ECM
F7	Engine COMMS.
F8	Fuel Heater
F9	Fan
F10	Fan
K11	Starter Lockout
K12	Regaultion Heaters Relay
K13	Warm-Up Relay



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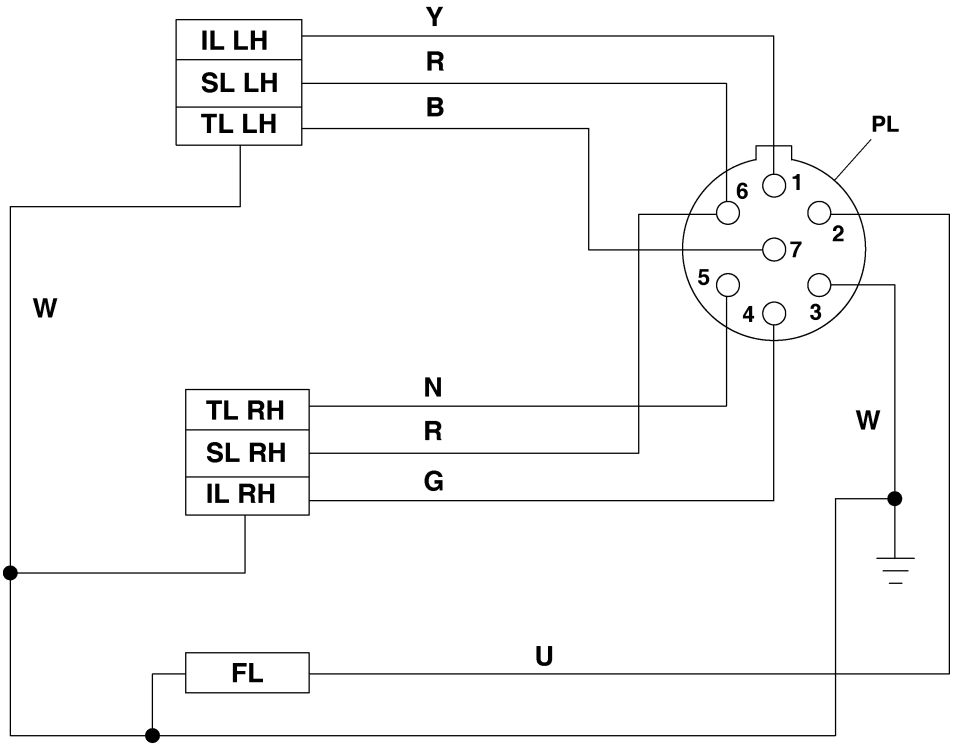
KEY

B2	Fan, Electric
B3	Fan, Electric
CS	Cold Start (Option)
C33	Connector, TBAP Engine Harness
C34	Sensor, TBAP
K3	Relay, Electric Fans



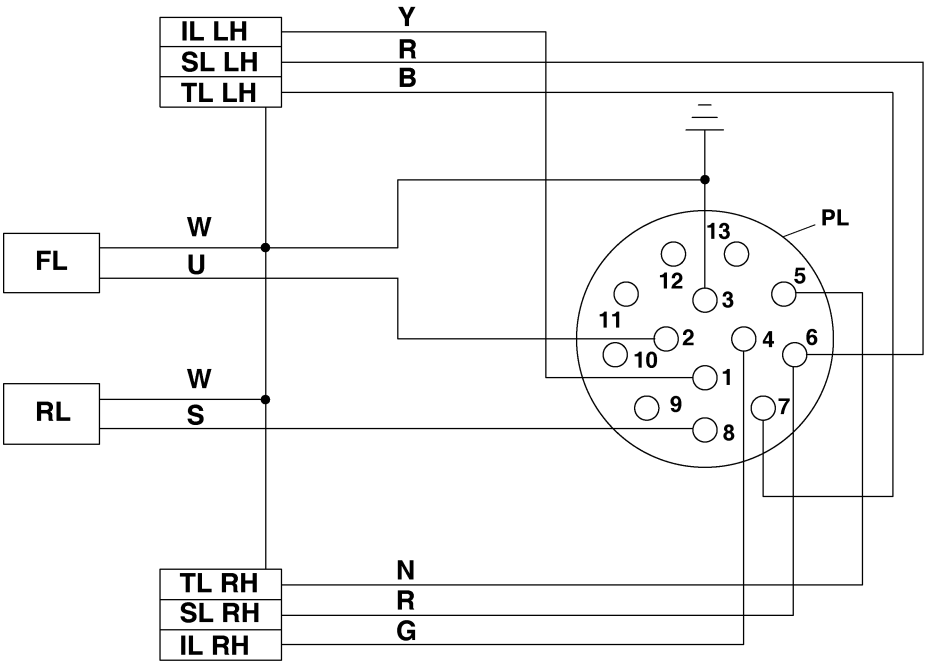
T2404
Revision 00
09/08

SCHEMATIC DIAGRAM FOR EUROPEAN CE LIGHTING SYSTEM - 7 PINS

KEY

IL LH	Indicator light - left hand
IL RH	Indicator light - right hand
FL	Fog light
SL LH	Stop light - left hand
SL RH	Stop light - right hand
TL LH	Tail light - left hand
TL RH	Tail light - right hand
PL	Plug

B	Black
G	Green
K	Pink
N	Brown
O	Orange
P	Purple
R	Red
S	Grey
U	Blue
W	White
Y	Yellow



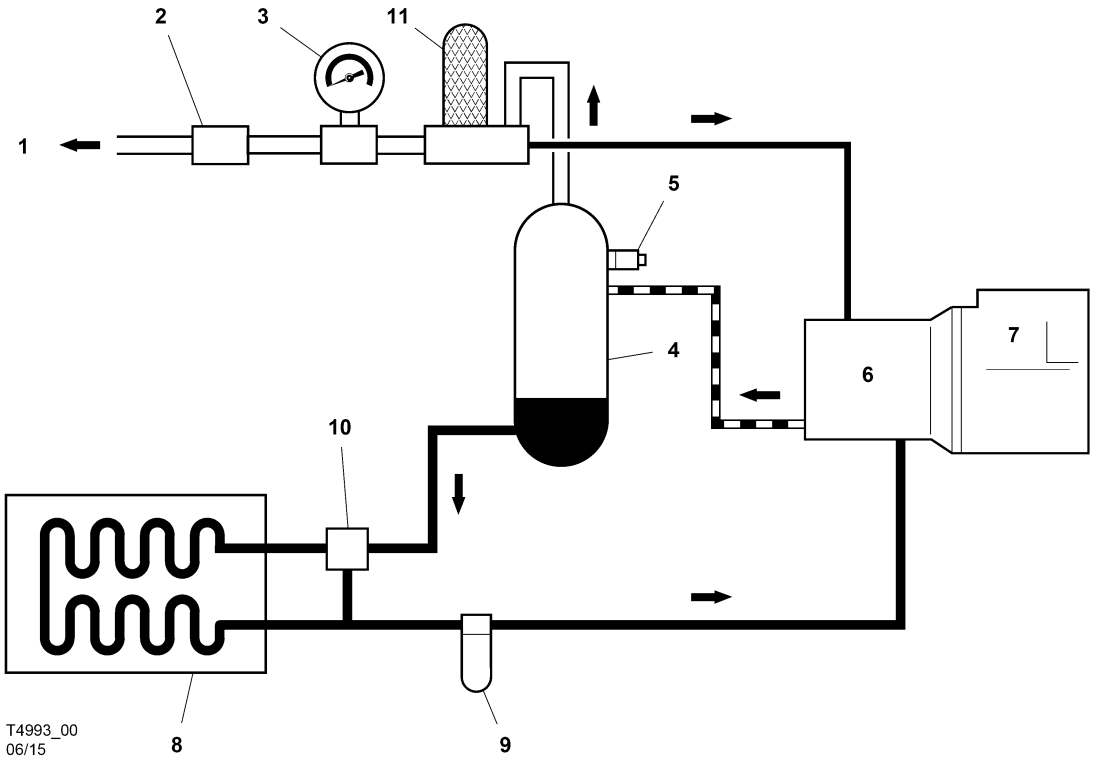
T2405
Revision 00
09/08

SCHEMATIC DIAGRAM FOR EUROPEAN CE LIGHTING SYSTEM - 13 PINS REVERSE LIGHT

KEY

IL LH	Indicator light - left hand
IL RH	Indicator light - right hand
FL	Fog light
RL	Reverse light
SL LH	Stop light - left hand
SL RH	Stop light - right hand
TL LH	Tail light - left hand
TL RH	Tail light - right hand
PL	Plug

B	Black
G	Green
K	Pink
N	Brown
O	Orange
P	Purple
R	Red
S	Grey
U	Blue
W	White
Y	Yellow



KEY

1	Air discharge
2	Sonic orifice (restricts flow)
3	Pressure gauge
4	Separator tank
5	Safety valve
6	Compressor
7	Engine
8	Oil cooler
9	Oil filter
10	Thermostatic valve (when fitted)
11	Separator filter assembly (spin-on)

Air
Oil
Air/oil

FAULT	CAUSE	REMEDY
Engine fails to start.	*Low battery charge.*	Check the fan belt tension, battery and cable connections.
	Bad earth connection.	Check the earth cables, clean as required.
	Loose connection.	Locate and make the connection good.
	Fuel starvation.	Check the fuel level and fuel system components. Replace the fuel filter if necessary.
	Relay failed.	Replace the relay.
	Engine control not in 'run' position.	Check the pressure transducer.
Engine starts but stalls when the switch returns to position *I*.	*Electrical fault*	Test the electrical circuits.
	Low engine oil pressure.	Check the oil level and the oil filter(s).
	Faulty relay	Check the relays.
	Faulty key-switch	Check the key-switch.
Engine starts but will not run or engine shuts down prematurely.	*Electrical fault.*	Test the electrical circuits.
	Low engine oil pressure.	Check the oil level and oil filter(s).
	Safety shut–down system in operation.	Check the safety shut–down switches.
	Fuel starvation.	Check the fuel level and fuel system components. Replace the fuel filter if necessary.
	Switch failure.	Test the switches.
	High compressor oil temperature.	Check the compressor oil level and oil cooler. Check the fan drive.
	Water present in fuel system.	Check the water separator and clean if required.
	Faulty relay.	Check the relay in the holder and replace if necessary.
Engine Overheats.	*Reduced cooling air from fan.*	Check the fan and the drive belts. Check for any obstruction inside the cowl.
Engine speed too high.	*Faulty regulator valve.*	Check the regulation system.
Engine speed too low.	*Incorrect throttle arm setting.*	Check the throttle setting.
	Blocked fuel filter.	Check and replace if necessary.
	Blocked air filter.	Check and replace the element if necessary.
	Faulty regulator valve.	Check the regulation system.
	Premature unloading.	Check the regulation and the operation of the pressure transducer.
Excessive vibration.	*Engine speed too low.*	See "*Engine speed too low*"
Refer also to the engine section of this manual and the engine diagnostic codes.		

FAULT	CAUSE	REMEDY
Air discharge capacity too low.	*Engine speed too low.*	Check the pressure transducer and air filter(s).
	Blocked air cleaner.	Check the restriction indicators and replace the element(s) if necessary.
	High pressure air escaping.	Check for leaks.
	Incorrectly set regulation system.	Reset the regulation system. Refer to *SPEED AND PRESSURE REGULATION ADJUSTMENT* in the *MAINTENANCE* section of this manual.
Compressor overheats.	*Low oil level.*	Top up the oil level and check for leaks.
	Dirty or blocked oil cooler.	Clean the oil cooler fins
	Incorrect grade of oil.	Use Doosan recommended oil.
	Recirculation of cooling air.	Move the machine to avoid recirculation.
	Faulty temperature switch.	Check the operation of the switch and replace if necessary.
	Reduced cooling air from fan.	Check the fan and the drive belts. Check for any obstruction inside the fan cowl.
Excessive oil present in the discharge air.	*Blocked scavenge line.*	Check the scavenge line, drop tube and orifice. Clean and replace.
	Perforated separator element.	Replace the separator element.
	Pressure in the system is too low.	Check the minimum pressure valve or sonic orifice.
Safety valve operates.	*Operating pressure too high.*	Check the setting and operation of the regulator valve piping.
	Incorrect setting of the regulator.	Adjust the regulator.
	Faulty regulator.	Replace the regulator.
	Inlet valve set incorrectly.	Refer to *SPEED AND PRESSURE REGULATION ADJUSTMENT* in the *MAINTENANCE* section of this manual.
	Loose pipe/hose connections.	Check all pipe/hose connections.
	Faulty safety valve.	Check the relieving pressure. Replace the safety valve if faulty. **DO NOT ATTEMPT A REPAIR.**
Oil is forced back into the air filter.	*Incorrect stopping procedure used*	Always employ the correct stopping procedure. Close the discharge valve and allow the machine to run on idle before stopping.
	Faulty inlet valve.	Check for free operation of the inlet valve(s).
	Faulty discharge check valve.	Remove the valve from the discharge pipe and check the operation.
Machine goes to full pressure when started.	*Inlet valve set incorrectly.*	Refer to *SPEED AND PRESSURE REGULATION ADJUSTMENT* in the *MAINTENANCE* section of this manual.
Machine fails to load when the load button is pressed.	*Faulty load solenoid.*	Replace the solenoid. Check the electrical circuit by feeling for movement whilst depressing the load button.

DIAGNOSTIC CODES

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	Cummins Description
111	629	12	Stop (Solid)	Engine Control Module Critical Internal Failure - Bad intelligent device or component.
115	612	2	Stop (Solid)	Engine Magnetic Speed/Position Lost Both of Two Signals - Data erratic, intermittent or incorrect.
122	102	3	Warning (Solid)	Intake Manifold 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source.
123	102	4	Warning (Solid)	Intake Manifold 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source.
131	91	3	Stop (Solid)	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source.
132	91	4	Stop (Solid)	Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source.
133	974	3	Stop (Solid)	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage above normal, or shorted to high source.
134	974	4	Stop (Solid)	Remote Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage below normal, or shorted to low source.
143	100	18	Warning (Solid)	Engine Oil Rifle Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level.
144	110	3	Warning (Solid)	Engine Coolant Temperature 1 Sensor Circuit - Voltage above normal, or shorted to high source.
145	110	4	Warning (Solid)	Engine Coolant Temperature 1 Sensor Circuit - Voltage below normal, or shorted to low source.
146	110	16	Warning (Solid)	Engine Coolant Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level.
147	91	1	Stop (Solid)	Accelerator Pedal or Lever Position 1 Sensor Circuit Frequency - Data valid but below normal operational range - Most Severe Level.
148	91	0	Stop (Solid)	Accelerator Pedal or Lever Position Sensor 1 - Data valid but above normal operational range - Most Severe Level.
151	110	0	Stop (Solid)	Engine Coolant Temperature - Data valid but above normal operational range - Most Severe Level.
153	105	3	Warning (Solid)	Intake Manifold 1 Temperature Sensor Circuit - Voltage above normal, or shorted to high source.
154	105	4	Warning (Solid)	Intake Manifold 1 Temperature Sensor Circuit - Voltage below normal, or shorted to low source.
155	105	0	Stop (Solid)	Intake Manifold 1 Temperature - Data valid but above normal operational range - Most Severe Level.
187	3510	4	Warning (Solid)	Sensor Supply 2 Circuit - Voltage below normal, or shorted to low source.
195	111	3	Warning (Solid)	Coolant Level Sensor 1 Circuit - Voltage above normal, or shorted to high source.
196	111	4	Warning (Solid)	Coolant Level Sensor 1 Circuit - Voltage below normal, or shorted to low source.
197	111	18	Warning (Solid)	Coolant Level - Data Valid But Below Normal Operating Range - Moderately Severe Level.
221	108	3	Warning (Solid)	Barometric Pressure Sensor Circuit - Voltage above normal, or shorted to high source.
222	108	4	Warning (Solid)	Barometric Pressure Sensor Circuit - Voltage below normal, or shorted to low source.
227	3510	3	Warning (Solid)	Sensor Supply 2 Circuit - Voltage above normal, or shorted to high source.
234	190	0	Stop (Solid)	Engine Crankshaft Speed/Position - Data valid but above normal operational range - Most Severe Level.

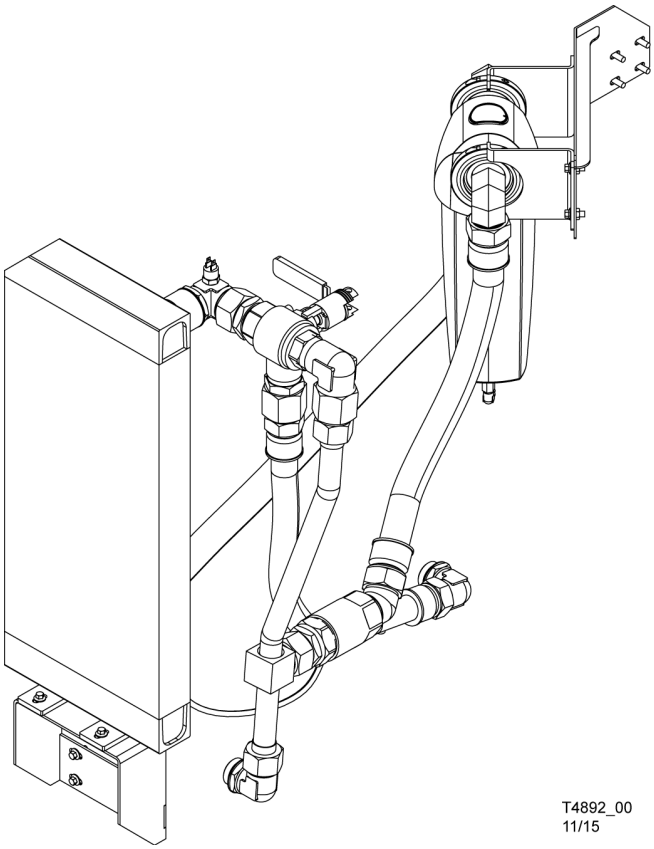
Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	Cummins Description
235	111	1	Stop (Solid)	Coolant Level - Data valid but below normal operational range - Most Severe Level.
238	3511	4	Warning (Solid)	Sensor Supply 3 Circuit - Voltage below normal, or shorted to low source.
239	3511	3	Warning (Solid)	Sensor Supply 3 Circuit - Voltage above normal, or shorted to high source.
241	84	2	Warning (Solid)	Wheel-Based Vehicle Speed - Data erratic, intermittent or incorrect.
242	84	10	Warning (Solid)	Wheel-Based Vehicle Speed Sensor Circuit tampering has been detected - Abnormal rate of change.
245	647	4	Warning (Solid)	Fan Control Circuit - Voltage below normal, or shorted to low source.
271	1347	4	Warning (Solid)	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage below normal, or shorted to low source.
272	1347	3	Warning (Solid)	Engine Fuel Pump Pressurizing Assembly 1 Circuit - Voltage above normal, or shorted to high source.
281	1347	7	Warning (Solid)	Engine Fuel Pump Pressurizing Assembly 1 - Mechanical system not responding or out of adjustment.
285	639	9	Warning (Solid)	SAE J1939 Multiplexing PGN Timeout Error - Abnormal update rate.
286	639	13	Warning (Solid)	SAE J1939 Multiplexing Configuration Error - Out of Calibration.
288	974	19	Stop (Solid)	SAE J1939 Multiplexing Remote Accelerator Pedal or Lever Position Sensor System - Received Network Data In Error.
292	441	14	Stop (Solid)	Auxiliary Temperature Sensor Input 1 - Special Instructions.
293	441	3	Warning (Solid)	Auxiliary Temperature Sensor Input 1 Circuit - Voltage above normal, or shorted to high source.
294	441	4	Warning (Solid)	Auxiliary Temperature Sensor Input 1 Circuit - Voltage below normal, or shorted to low source.
296	1388	14	Stop (Solid)	Auxiliary Pressure Sensor Input 2 - Special Instructions.
322	651	5	Warning (Solid)	Injector Solenoid Driver Cylinder 1 Circuit - Current below normal or open circuit.
324	653	5	Warning (Solid)	Injector Solenoid Driver Cylinder 3 Circuit - Current below normal or open circuit.
331	652	5	Warning (Solid)	Injector Solenoid Driver Cylinder 2 Circuit - Current below normal or open circuit.
332	654	5	Warning (Solid)	Injector Solenoid Driver Cylinder 4 Circuit - Current below normal or open circuit.
343	629	12	Warning (Solid)	Engine Control Module Warning Internal Hardware Failure - Bad intelligent device or component.
351	3597	12	Warning (Solid)	Injector Power Supply - Bad intelligent device or component.
415	100	1	Stop (Solid)	Engine Oil Rifle Pressure - Data valid but below normal operational range - Most Severe Level.
418	97	3	Warning (Solid)	Water in Fuel Indicator Sensor Circuit - Voltage above normal, or shorted to high source.
429	97	4	Warning (Solid)	Water in Fuel Indicator Sensor Circuit - Voltage below normal, or shorted to low source.
431	558	2	Warning (Solid)	Accelerator Pedal or Lever Idle Validation Switch - Data erratic, intermittent or incorrect.
432	558	13	Stop (Solid)	Accelerator Pedal or Lever Idle Validation Switch Circuit - Out of Calibration.
435	100	2	Warning (Solid)	Engine Oil Rifle Pressure - Data erratic, intermittent or incorrect.
441	168	18	Warning (Solid)	Battery 1 Voltage - Data Valid But Below Normal Operating Range - Moderately Severe Level.
442	168	16	Warning (Solid)	Battery 1 Voltage - Data Valid But Above Normal Operating Range - Moderately Severe Level.

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	Cummins Description
449	157	0	Stop (Solid)	Injector Metering Rail 1 Pressure - Data valid but above normal operational range - Most Severe Level.
451	157	3	Warning (Solid)	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage above normal, or shorted to high source.
452	157	4	Warning (Solid)	Injector Metering Rail 1 Pressure Sensor Circuit - Voltage below normal, or shorted to low source.
523	611	2	Warning (Solid)	Auxiliary Intermediate (PTO) Speed Switch Validation - Data erratic, intermittent or incorrect.
527	702	3	Warning (Solid)	Auxiliary Input/Output 2 Circuit - Voltage above normal, or shorted to high source.
528	93	2	Warning (Solid)	Auxiliary Alternate Torque Validation Switch - Data erratic, intermittent or incorrect.
529	703	3	Warning (Solid)	Auxiliary Input/Output 3 Circuit - Voltage above normal, or shorted to high source.
553	157	16	Warning (Solid)	Injector Metering Rail 1 Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level.
559	157	18	Warning (Solid)	Injector Metering Rail 1 Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level.
584	677	3	Warning (Solid)	Starter Relay Driver Circuit - Voltage above normal, or shorted to high source.
585	677	4	Warning (Solid)	Starter Relay Driver Circuit - Voltage below normal, or shorted to low source.
599	640	14	Stop (Solid)	Auxiliary Commanded Dual Output Shutdown - Special Instructions.
649	1378	31	Warning (Blinking)	Engine Oil Change Interval - Condition Exists.
689	190	2	Warning (Solid)	Engine Crankshaft Speed/Position - Data erratic, intermittent or incorrect.
691	1172	3	Warning (Solid)	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage above normal, or shorted to high source.
692	1172	4	Warning (Solid)	Turbocharger 1 Compressor Intake Temperature Circuit - Voltage below normal, or shorted to low source.
697	1136	3	Warning (Solid)	Engine ECU Temperature Sensor Circuit - Voltage above normal, or shorted to high source.
698	1136	4	Warning (Solid)	Engine ECU Temperature Sensor Circuit - Voltage below normal, or shorted to low source.
731	723	7	Warning (Solid)	Engine Speed / Position Camshaft and Crankshaft Misalignment - Mechanical system not responding or out of adjustment.
778	723	2	Warning (Solid)	Engine Camshaft Speed / Position Sensor - Data erratic, intermittent or incorrect.
778	723	2	Warning (Solid)	Engine Camshaft Speed / Position Sensor - Data erratic, intermittent or incorrect.
1117	3597	2	None	Power Supply Lost With Ignition On - Data erratic, intermittent or incorrect.
1239	2623	3	Warning (Solid)	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage above normal, or shorted to high source.
1241	2623	4	Warning (Solid)	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage below normal, or shorted to low source.
1242	91	2	Stop (Solid)	Accelerator Pedal or Lever Position Sensor 1 - Data erratic, intermittent or incorrect.
1515	91	19	Stop (Solid)	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Received Network Data In Error.
1539	1387	3	Warning (Solid)	Auxiliary Pressure Sensor Input 1 Circuit - Voltage above normal, or shorted to high source.
1621	1387	4	Warning (Solid)	Auxiliary Pressure Sensor Input 1 Circuit - Voltage below normal, or shorted to low source.
1695	3513	3	Warning (Solid)	Sensor Supply 5 - Voltage above normal, or shorted to high source.

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	Cummins Description
1696	3513	4	Warning (Solid)	Sensor Supply 5 - Voltage below normal, or shorted to low source.
1852	97	16	Warning (Solid)	Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Moderately Severe Level.
1866	411	2	Warning (Solid)	Exhaust Gas Recirculation Differential Pressure - Data erratic.
1893	2791	9	Warning (Solid)	EGR Valve Control Circuit - Abnormal update rate.
1896	2791	13	Warning (Solid)	EGR Valve Controller - Out of Calibration.
2182	1072	3	Warning (Solid)	Engine Brake Actuator Driver 1 Circuit - Voltage above normal, or shorted to high source.
2183	1072	4	Warning (Solid)	Engine Brake Actuator Driver 1 Circuit - Voltage below normal, or shorted to low source.
2185	3512	3	Warning (Solid)	Sensor Supply 4 Circuit - Voltage above normal, or shorted to high source.
2186	3512	4	Warning (Solid)	Sensor Supply 4 Circuit - Voltage below normal, or shorted to low source.
2271	27	3	Warning (Solid)	EGR Valve Position Circuit - Voltage above normal, or shorted to high source.
2272	27	4	Warning (Solid)	EGR Valve Position Circuit - Voltage below normal, or shorted to low source.
2273	411	3	Warning (Solid)	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage above normal, or shorted to high source.
2274	411	4	Warning (Solid)	Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage below normal, or shorted to low source.
2311	633	31	Warning (Solid)	Electronic Fuel Injection Control Valve Circuit - Condition Exists.
2321	190	2	None	Engine Crankshaft Speed/Position - Data erratic, intermittent or incorrect.
2322	723	2	None	Engine Camshaft Speed / Position Sensor - Data erratic, intermittent or incorrect.
2351	2791	4	Warning (Solid)	EGR Valve Control Circuit - Voltage below normal, or shorted to low source.
2352	2791	3	Warning (Solid)	EGR Valve Control Circuit - Voltage above normal, or shorted to high source.
2375	412	3	Warning (Solid)	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage above normal, or shorted to high source.
2376	412	4	Warning (Solid)	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage below normal, or shorted to low source.
2377	647	3	Warning (Solid)	Fan Control Circuit - Voltage above normal, or shorted to high source.
2442	651	13	Warning (Solid)	Injector Solenoid Driver Cylinder 1 - Out of Calibration.
2443	652	13	Warning (Solid)	Injector Solenoid Driver Cylinder 2 - Out of Calibration.
2444	653	13	Warning (Solid)	Injector Solenoid Driver Cylinder 3 - Out of Calibration.
2445	654	13	Warning (Solid)	Injector Solenoid Driver Cylinder 4 - Out of Calibration.
2448	111	17	Warning (Blinking)	Coolant Level - Data Valid But Below Normal Operating Range - Least Severe Level.
2555	729	3	Warning (Solid)	Engine Intake Air Heater 1 Circuit - Voltage above normal, or shorted to high source.
2556	729	4	Warning (Solid)	Engine Intake Air Heater 1 Circuit - Voltage below normal, or shorted to low source.
2557	697	3	Warning (Solid)	Auxiliary PWM Driver 1 Circuit - Voltage above normal, or shorted to high source.
2558	697	4	Warning (Solid)	Auxiliary PWM Driver 1 Circuit - Voltage below normal, or shorted to low source.
2961	412	15	None	Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Range - Least Severe Level.

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	Cummins Description
2962	412	16	Warning (Solid)	Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level.
2963	110	15	None	Engine Coolant Temperature - Data Valid But Above Normal Operating Range - Least Severe Level.
2964	105	15	None	Intake Manifold 1 Temperature - Data Valid But Above Normal Operating Range - Least Severe Level.
3136	5019	3	Warning (Solid)	Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage above normal, or shorted to high source.
3137	5019	4	Warning (Solid)	Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage below normal, or shorted to low source.
3186	1623	9	Warning (Solid)	Tachograph Output Shaft Speed - Abnormal update rate.
3213	1623	19	Warning (Solid)	Tachograph Output Shaft Speed - Received Network Data In Error.
3326	91	9	Stop (Solid)	SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Abnormal update rate.
3328	191	9	Warning (Solid)	Transmission Output Shaft Speed - Abnormal update rate.
3418	191	19	Warning (Solid)	Transmission Output Shaft Speed - Received Network Data In Error.
3525	84	19	Warning (Solid)	Wheel-Based Vehicle Speed - Received Network Data In Error.
3526	84	9	Warning (Solid)	Wheel-Based Vehicle Speed - Abnormal update rate.
3527	558	19	Stop (Solid)	Accelerator Pedal or Lever Idle Validation Switch - Received Network Data In Error.
3528	558	9	Stop (Solid)	Accelerator Pedal or Lever Idle Validation Switch - Abnormal update rate.
3555	1081	9	Warning (Solid)	Engine Wait to Start Lamp - Abnormal update rate.
3613	111	9	Warning (Solid)	Coolant Level Sensor - Abnormal update rate.
3614	111	19	Warning (Solid)	Coolant Level Sensor - Received Network Data In Error.
3641	748	9	Warning (Solid)	Transmission Output Retarder - Abnormal update rate.
3697	630	12	Stop (Solid)	Engine Control Module Calibration Memory - Bad intelligent device or component.
3727	5571	7	None	High Pressure Common Rail Fuel Pressure Relief Valve - Mechanical system not responding or out of adjustment.
3741	5571	0	Warning (Solid)	High Pressure Common Rail Fuel Pressure Relief Valve - Data valid but above normal operational range - Most Severe Level.
4642	97	0	Stop (Solid)	Water in Fuel Indicator - Data Valid But Above Normal Operating Range - Most Severe Level.
4734	701	14	Stop (Solid)	Auxiliary Input/Output 1 - Special Instructions.
4734	701	14	Stop (Solid)	Auxiliary Input/Output 1 - Special Instructions.
4789	1639	0	Warning (Solid)	Fan Speed - Data Valid but Above Normal Operational Range - Most Severe Level.
4791	1639	1	Warning (Solid)	Fan Speed - Data Valid but Below Normal Operational Range - Most Severe Level.

OPTION - AFTERCOOLER AND WATER SEPARATOR



DESCRIPTION

The compressed air exits the separator tank through the top cover piping, and will then travel into the aftercooler inlet side.

The aftercooler is cooled by the incoming compressor package air.

The compressed air and condensate (water with a small amount of compressor lubricant) exits the aftercooler and enters the moisture separator, where most of the condensate is removed.

At the bottom of the moisture separator a strainer and constant-bleed orifice is fitted, which are sized to allow the maximum flow of condensate while minimising compressed air loss.

A second condensate drain valve is mounted on the aftercooler body, this valve will open on machine shutdown thereby allowing any remaining condensate in the aftercooler to drain. This is to prevent cooler damage at freezing temperatures.

These drains are plugged through the compressor frame and will expel condensation to atmosphere. Should site contamination by this condensate be prohibited, the user can connect an additional section of drain hose and route into an allowed drain point.

MAINTENANCE

Daily Maintenance:

Verify, during full-load (maximum compressed air delivery) that condensate can be seen to drain from the water separator drain hose.

Weekly Maintenance:

- Verify that the piping from the orifice purge points are not clogged.
- Clean the inside of the water separator housing.

Water separator maintenance:

- With engine stopped, ensure pressure is relieved from air system.
- Remove any hose connected to the water separator housing. Inspect fittings and hoses for any blockage. Clean if necessary.
- Remove and clean the water separator float.

PRIMARY AND SECONDARY FILTER MAINTENANCE

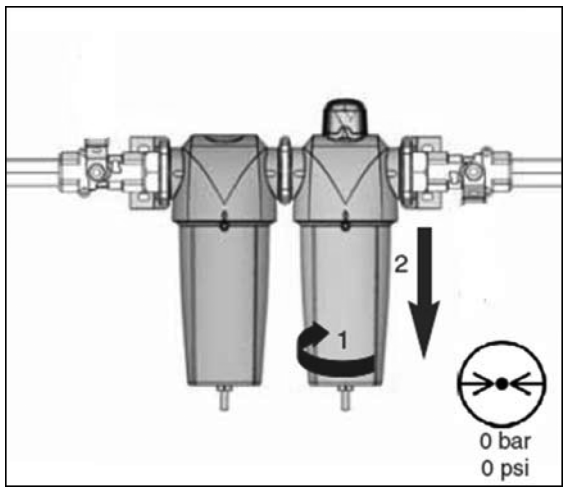


FIGURE 1.

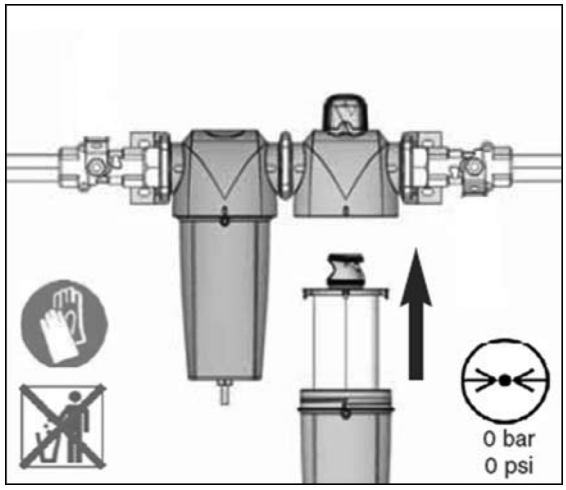


FIGURE 2.

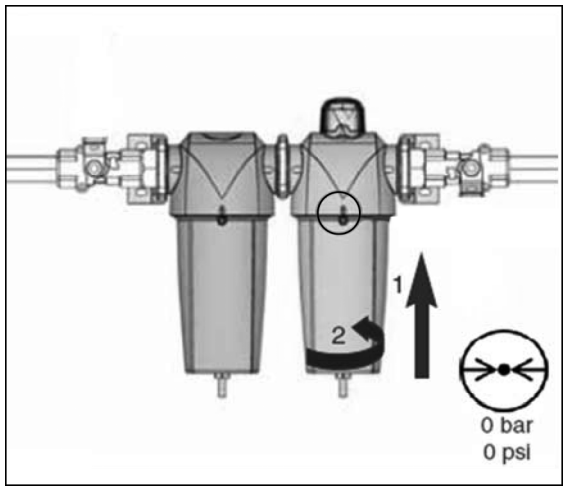


FIGURE 3.

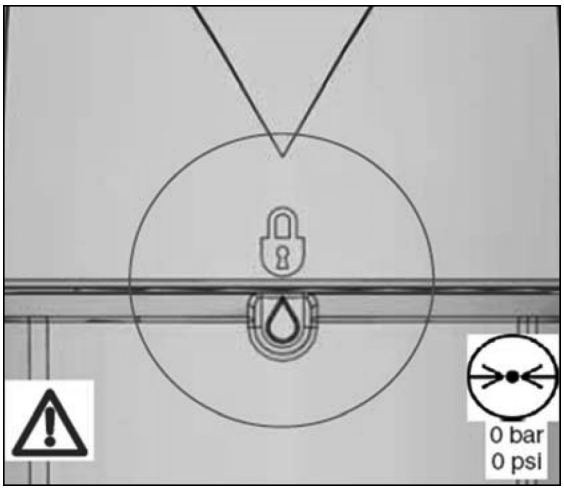


FIGURE 4.

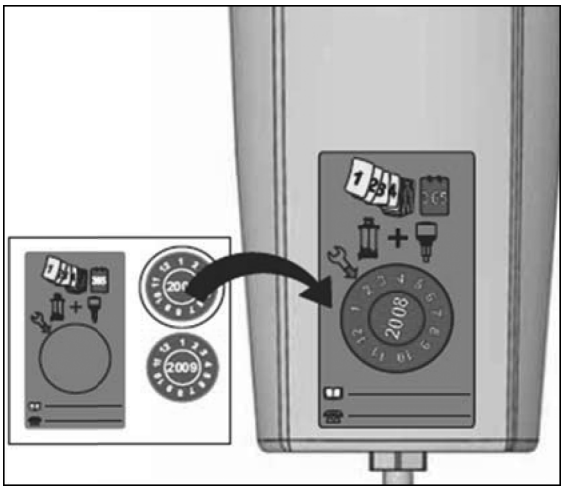


FIGURE 5.

WATER SEPARATOR MAINTENANCE

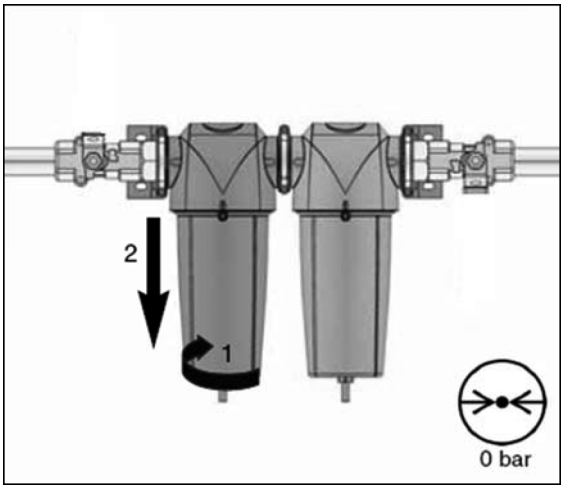


FIGURE 1.

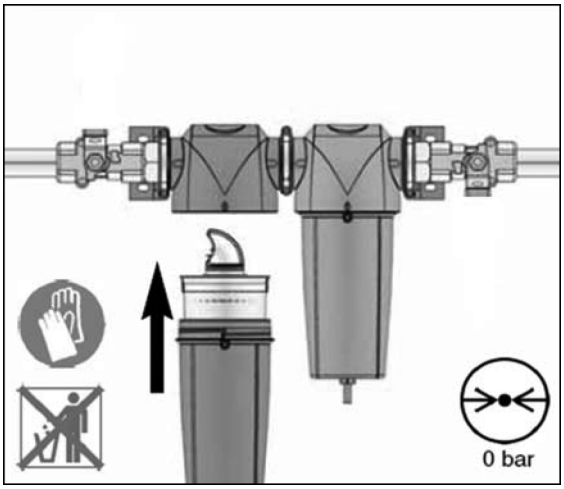


FIGURE 2.

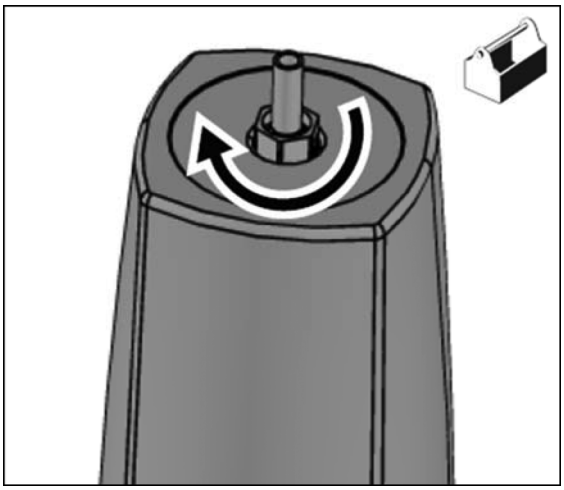


FIGURE 3.

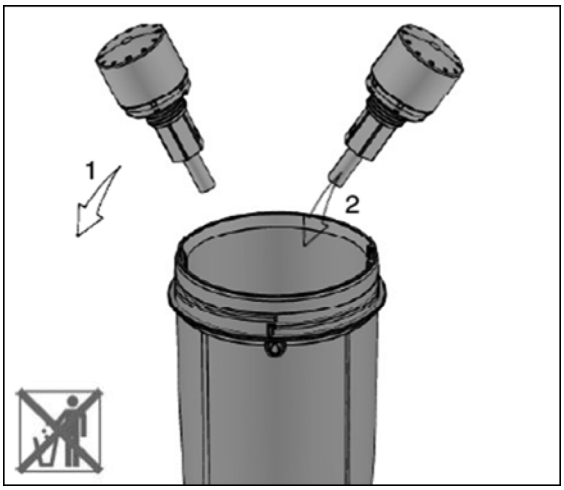


FIGURE 4.

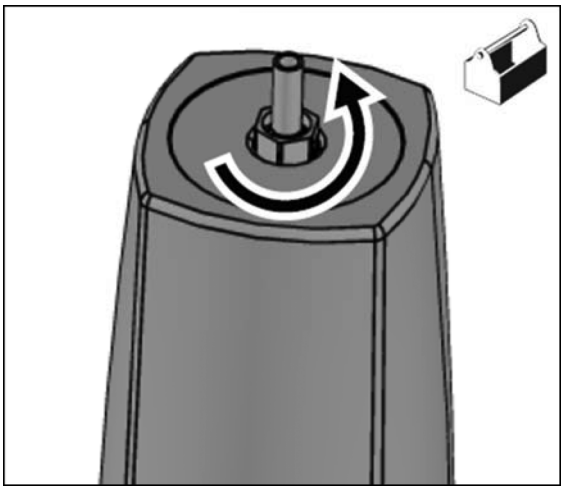


FIGURE 5.

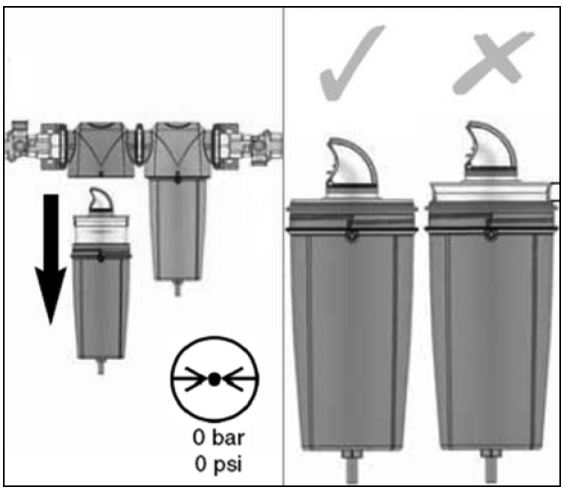


FIGURE 6.

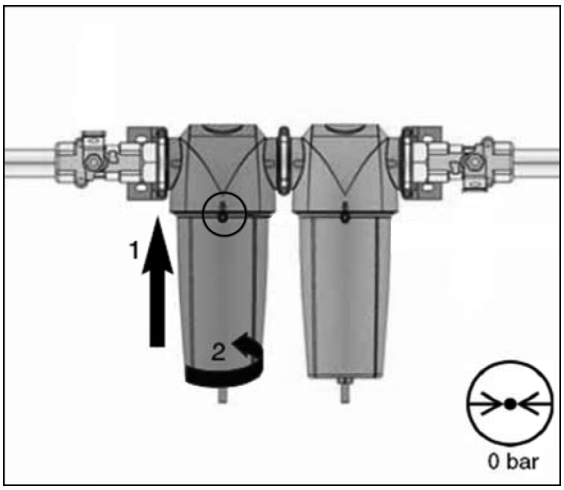


FIGURE 7.

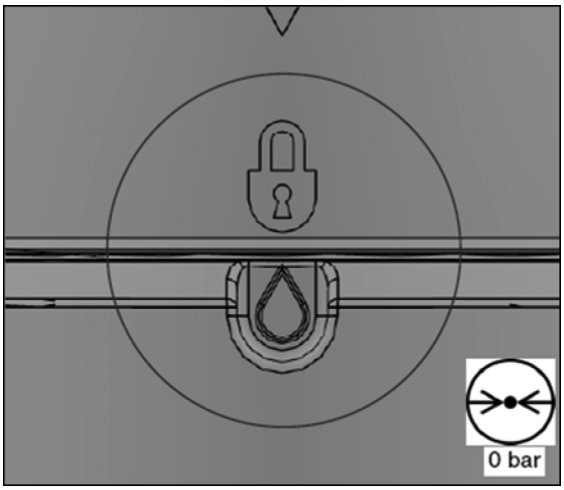


FIGURE 8.

SAFETY

CAUTION: *The compressor regulation system is adjusted to maintain regulated pressure at the separator tank. DO NOT adjust regulation to provide full regulation pressure at the service valve when the IQ System is enabled. This will result in operation at excessive horsepower levels, causing overheating, reduced engine life, and reduced airend life.*

CAUTION: *Excessively restricted filter elements may cause an increase in the amount of aerosol water and oil carryover, which could result in damage to downstream equipment. Normal service intervals should not be exceeded.*

CAUTION: *Blockage of the condensate will result in flooding of the vessels. If flooding occurs, excessive condensate may enter the air stream and could result in damage to downstream equipment.*

NOTE: Do not operate at temperatures less that 2°C (35°F).

OPTION - BUNDED BASE

DESCRIPTION

This machine can be fitted with bund equipment to contain leakages and spillages, which occur within the machine enclosure.

The bund will contain all fluids normally installed in the machine, plus an additional 10%.

OPERATING INSTRUCTIONS

When fitted with bund, the machine must only be operated when level.

Drains for engine coolant, engine oil, compressor oil and fuel tank are located on the left rear side of the machine.

The bunded base drain is located at the right rear side of the machine.

Bunded base must be drained daily.

DRAINING OF CONTAMINATED FLUIDS

Contaminated fluid must be removed by authorized personnel only.

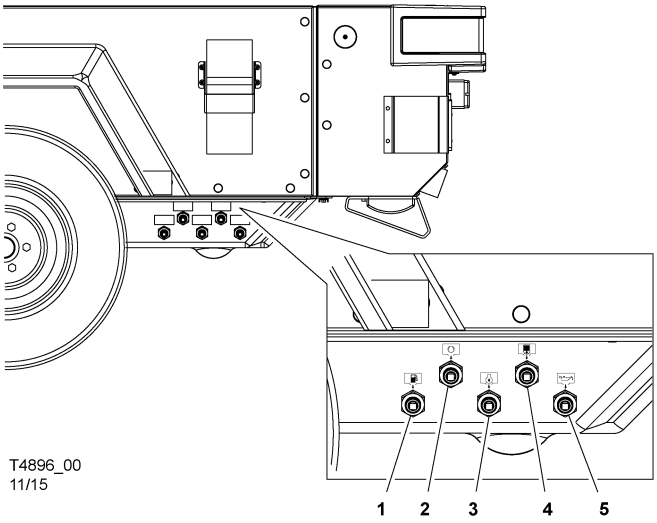
Captured fluids can be drained from the bund by removing the plug or uncoupling the flexible pipe secured at the right side of the machine. The plug must be re-sealed after draining. The flexible pipe must be re-secured after draining.

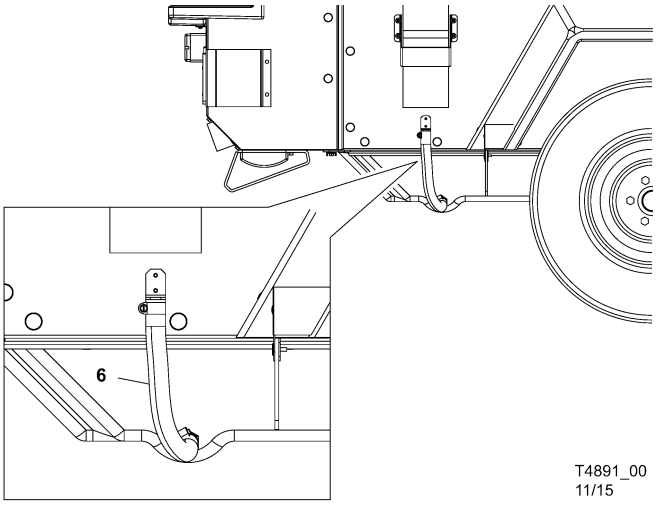
DRAINING OF MACHINE FLUIDS

During maintenance operations, drain machine fluids using the drain ports indicated.

WARNING: Major leakages or spillages must be drained before the machine is towed.

DRAIN LOCATIONS





1. Fuel tank drain.
2. Compressor coolant drain.
3. Engine oil drain.
4. Separator tank drain.
5. Engine coolant drain.
6. Bunded base drain.

OPTION - CENTRAL DRAINS

DESCRIPTION

This machine can be fitted with a central drains option. When this option is fitted, all drain ports are routed to one easily accessible point.

Each drain port consists of a valve, a safety plug and an identification decal.

OPERATING INSTRUCTIONS

The draining procedure is the same as on the standard unit.

Identify the correct port to be drained.

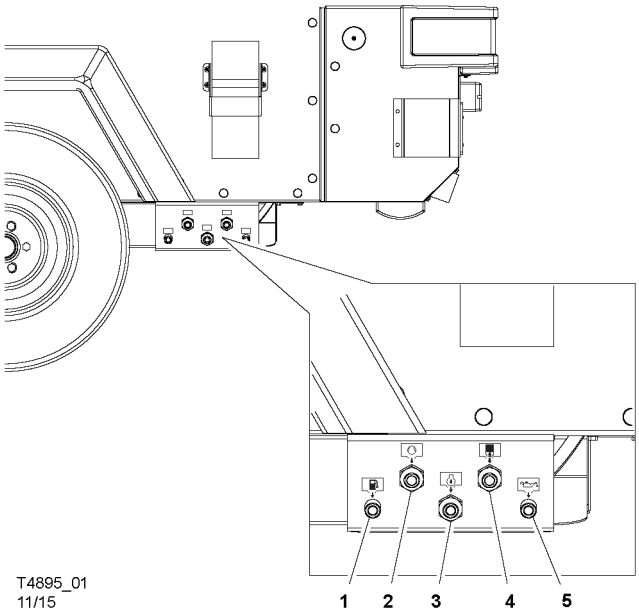
Remove the plug, connect the enclosed hose with coupling to the valve, then open valve and drain all volume of fluid into an appropriate container.

Repeat the procedure on each drain as required.

Close the valves and replace plugs before new fluid is filled.

Check all ports for leakage.

DRAIN LOCATIONS



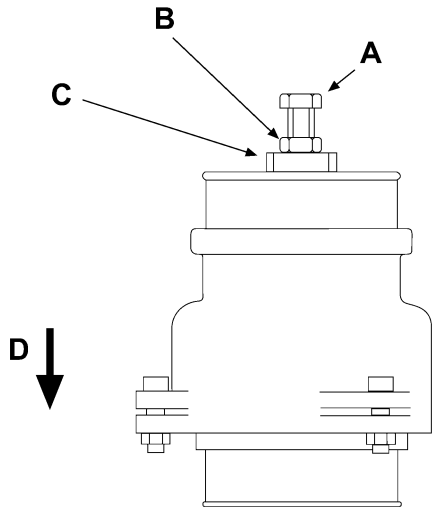
1. Fuel tank drain.
2. Compressor coolant drain.
3. Engine oil drain.
4. Separator tank drain.
5. Engine coolant drain.

OPTION - CHALWYN VALVE (Air intake shutdown valve)

DESCRIPTION

Chalwyn valves provide emergency overspeed shutdown protection for diesel engines and are the most effective way of preventing a runaway situation. The valves completely block the engine air intake system, cutting off an uncontrolled external fuel source and the air required to keep the engine running.

OPERATING INSTRUCTIONS



A. Adjuster

B. Locknut

C. Hold with spanner when adjusting

D. Air flow

Once the Chalwyn valve is installed, adjustment of the overspeed trip setting is carried out using the adjuster and locknut (refer to diagram). Basically rotating the adjuster clockwise will increase the engine speed at which automatic shut down occurs.

1. Start engine. Slowly accelerate. Note speed at which shut down occurs.
2. Remove hose at air inlet to Chalwyn valve to expose the adjuster and locknut (see diagram).
3. Release locknut. Turn adjuster clockwise one turn. Tighten locknut.
4. Refit inlet hose to Chalwyn valve.
5. Start engine. Slowly accelerate. Note speed at which shut down occurs.
6. Repeat the above steps ’2’ to ’5’ until the first setting at which the engine does not shut down at high idle speed (i.e. maximum throttle, no load).

Then either:

a) Use the results of shut down speed versus adjuster setting as a calibration check to make a final adjustment to give the required setting (typically 10% to 15% over high idle).

or

b) If a very precise setting is not required, turn the adjuster a further one turn clockwise to take the shutdown above high idle speed by a suitable margin. When using this setting procedure it may be found that the engine occasionally shuts down during the normal operation. If so, turn the adjuster clockwise by a further one half turn.

7. Ensure the adjuster locknut is fully tightened.
   (Use a thread lock adhesive on the locknut threads).

NOTES:

Turbocharged Engines - When setting up a valve on a turbocharged engine using the preceding method, it may be found that at high power outputs, the engine will shut down at a lower speed than required. If this occurs, further small adjustments in steps of one half turn clockwise should be made until the problem is eliminated.

Jammed Valve - If in the course of adjusting the valve it jams on its seat, release by turning CLOCKWISE viewed from adjuster end of valve.

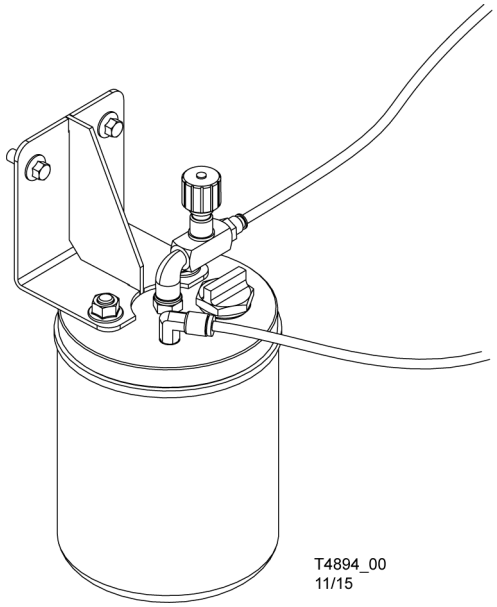
MAINTENANCE

Three monthly

1. Disconnect intake pipework and release the valve from any support brackets etc. to allow it to be removed.
2. Inspect the valve internally for cleanliness. If necessary, clean in paraffin or white spirit taking normal precautions. Dry the valve thoroughly.
3. Check there is no excessive wear and that the valve moves smoothly over its complete operating stroke. DO NOT LUBRICATE.
4. Refit valve. Check valve setting based on the ’Adjustment’ instructions given herein.

NOTE: The three monthly routine maintenance period requirement is dependent on the operating conditions to which the equipment is exposed and, by experience, may need to be varied.

OPTION - LUBRICATOR



DESCRIPTION

The internal air line lubricator is used to release a lubricant into the internal compressed air piping before it exits the compressor, from there the air/oil mixture will flow to the compressed air operated appliance; one that requires an external source of pneumatic oil for proper operation.

SAFETY

WARNING: Ensure that the lubricator filler cap is re-tightened correctly after replenishing with oil.

WARNING: Do not replenish the lubricator oil, or service the lubricator without first making sure that the machine is stopped and the system has been completely relieved of all air pressure (Refer to STOPPING THE UNIT in the OPERATING INSTRUCTIONS section of this manual).

CAUTION: *If the nylon tubes to the lubricator are disconnected then ensure that each tube is re-connected in its original location.*

GENERAL INFORMATION

Oil capacity: 2 litres

Oil specification: *Refer to the Tool Manufacturer's Manual.*

OPERATING INSTRUCTIONS

COMMISSIONING

Check the lubricator oil level and fill as necessary.

PRIOR TO STARTING

Check the lubricator oil level and replenish as necessary.

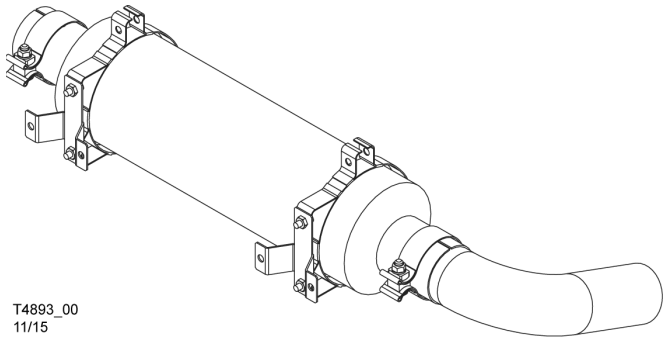
MAINTENANCE

Check the lubricator oil level and replenish as necessary.

FAULT FINDING

FAULT	CAUSE	REMEDY
No oil flow.	*Incorrect connection.*	Reverse the nylon tube connections to the lubricator.

OPTION - SPARK ARRESTOR



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DESCRIPTION

Diesel Engine exhaust spark arrestors are a key safety feature for both hazardous area and lower risk diesel engine applications where a stray spark may cause ignition of combustible material. Virtually all legislation regarding the operation of a diesel engine in a hazardous area includes a mandatory requirement to fit a tested and approved exhaust spark arrestor.

MAINTENANCE

Daily:

Examine the spark arrestor for any sign of gas leakage, cracks or significant areas of damage, i.e. dents of more than a few millimetres in depth.

Three Monthly:

Remove spark arrestor. Tap with a soft mallet to loosen any internal deposits and shake out. Also by shaking check for any loose internal baffles.

Six Monthly (or 1500 hours operation, whichever is sooner):

Examine the exhaust discharge in darkness whilst repeatedly loading and accelerating the engine. If any sparks are observed, the spark arrestor is not suitable for further use.

WARNING: Ensure adequate ventilation if this check is carried out in an enclosed area.

WARNING: The engine must not be put back into service until any problems identified by the above checks are rectified.

GENERAL

This publication, which contains an illustrated parts breakdown, has been prepared as an aid in locating those parts which may be required in the maintenance of the unit. All of the compressor parts, listed in the parts breakdown, are manufactured with the same precision as the original equipment. For the greatest protection always insist on genuine Doosan parts for your compressor.

NOTICE

Doosan can bear no responsibility for injury or damages resulting directly from the use of non-approved repair parts.

Doosan Infracore service facilities and parts are available worldwide.

There are Authorised Distributors or Company Sales offices in principal cities of many countries.

Special order parts may not be included in the manual. Contact Doosan Parts Department with the unit serial number for assistance with these special parts.

DESCRIPTION

The illustrated parts breakdown illustrates and lists the various assemblies, subassemblies and detailed parts which make up this particular machine. This covers the standard models and the more popular options that are available.

A series of illustrations show each part distinctly and in location relative to the other parts in the assembly. The part number, the description of the part and the quantity of parts required are shown on each illustration or on adjacent page. The quantities specified are the number of parts used per one assembly and are not necessarily the total number of parts used in the machine. Where no quantity is specified the quantity is assumed to be one.

Each description of a part is based upon the "noun first" method, i.e., the identifying noun or item name is always the first part of the description. The noun name is generally followed by a single descriptive modifier. The descriptive modifier may be followed by words or abbreviations such as upper, lower, inner, outer, front, rear, RH, LH, etc. when they are essential.

In referring to the rear, the front or to either side of the unit, always consider the **drawbar end** of the unit as the **front**. Standing at the rear of the unit facing the drawbar (front) will determine the right and left sides.

FASTENERS

Both SAE/inch, ISO/metric hardware have been used in the design and assembly of these units. In the disassembly and reassembly of parts, extreme care must be taken to avoid damaging threads by the use of wrong fasteners. In order to clarify the proper usage and for exact replacement parts, all standard fasteners have been identified by part number, size and description. This will enable a customer to obtain fasteners locally rather than ordering from the factory. These parts are identified in tables that will be found at the rear of the parts illustrations. Any fastener that has not been identified by both part number and size is a specially engineered part that must be ordered by part number to obtain the exact replacement part.

MARKINGS AND DECALS

NOTICE

Do not paint over safety warnings or instructional decals. If safety warning decals become illegible, immediately order replacements from the factory.

Part numbers for original individual decals and their mounting locations are shown within Parts List Section. These are available as long as a particular model is in production.

HOW TO USE PARTS LIST

a. Turn to Parts List.

b. Locate the area or system of the compressor in which the desired part is used and find illustration page number.

c. Locate the desired part on the illustration by visual identification and make note of part number and description.

HOW TO ORDER

The satisfactory ordering of parts by a purchaser is greatly dependent upon the proper use of all available information. By supplying your nearest sales office, autonomous company or authorised distributor, with complete information, you will enable them to fill your order correctly and to avoid any unnecessary delays.

In order that all avoidable errors may be eliminated, the following instructions are offered as a guide to the purchaser when ordering replacement parts:

a. Always specify the model number of the unit as shown on the general data decal attached to the unit.

b. Always specify the serial number of the unit. THIS IS IMPORTANT. The serial number of the unit will be found stamped on a plate attached to the unit. (The serial number on the unit is also permanently stamped in the metal of the frame side rail.)

c. Always specify the number of the parts list publication.

d. Always specify the quantity of parts required.

e. Always specify the part number, as well as the description of the part, or parts, exactly as it is given on the parts list illustration.

In the event parts are being returned to your nearest sales office, autonomous company or authorised distributor, for inspection or repair, it is important to include the serial number of the unit from which the parts were removed.

TERMS AND CONDITIONS ON PARTS ORDERS

Acceptance: Acceptance of an offer is expressly limited to the exact terms contained herein. If purchaser's order form is used for acceptance of an offer, it is expressly understood and agreed that the terms and conditions of such order form shall not apply unless expressly agreed to by Doosan Company ("Company") in writing. No additional or contrary terms will be binding upon the Company unless expressly agreed to in writing.

Taxes: Any tax or other governmental charge now or hereafter levied upon the production, sale, use or shipment of material and equipment ordered or sold is not included in the Company's price and will be charged to and paid for by the Purchaser.

Shipping dates shall be extended for delays due to acts of God, acts of Purchaser, acts of Government, fires, floods, strikes, riot, war, embargo, transportation shortages, delay or default on the part of the Company's vendors, or any other cause beyond the Company's reasonable control.

Should Purchaser request special shipping instruction, such as exclusive use of shipping facilities, including air freight when common carrier has been quoted and before change order to purchase order can be received by the Company, the additional charges will be honoured by the Purchaser.

Warranty: The Company warrants that parts manufactured by it will be as specified and will be free from defects in materials and workmanship. The Company's liability under this warranty shall be limited to the repair or replacement of any part which was defective at the time of shipment provided Purchaser notifies the Company of any such defect promptly upon discovery, but in no event later than three (3) months from the date of shipment of such part by the Company. The only exception to the previous statement is the extended warranty as it applies to the special airend exchange program.

Repairs and replacements shall be made by the Company F.O.B. point of shipment. The Company shall not be responsible for costs of transportation, removal or installation.

Warranties applicable to material and equipment supplied by the Company but wholly manufactured by others shall be limited to the warranties extended to the Company by the manufacturer which are able to be conveyed to the Purchaser.

Delivery: Shipping dates are approximate. The Company will use best efforts to ship by the dates specified; however, the Company shall not be liable for any delay or failure in the estimated delivery or shipment of material and equipment or for any damages suffered by reason thereof.

The company makes no other warranty or representation of any kind whatsoever, expressed or implied, except that of title, and all implied warranties, including any warranty of merchantability and fitness for a particular purpose, are hereby disclaimed.

Limitation of Liability:

The remedies of the Purchaser set forth herein are exclusive, and the total liability of the Company with respect to this order whether based on contract, warranty, negligence, indemnity, strict liability or otherwise, shall not exceed the purchase price of the part upon which such liability is based.

The Company shall in no event be liable to the Purchaser, any successors in interest or any beneficiary of this order for any consequential, incidental, indirect, special or punitive damages arising out of this order or any breach thereof, or any defect in, or failure of, or malfunction of the parts hereunder, whether based upon loss of use, lost profits or revenue, interest, lost goodwill, work stoppage, impairment of other goods, loss by reason of shutdown or non-operation, increased expenses of operation or claims of customers of Purchaser for service interruption whether or not such loss or damage is based on contract, warranty, negligence, indemnity, strict liability or otherwise.

AIREND EXCHANGE PROGRAM

Doosan offers an airend exchange program to benefit portable compressor users.

Your nearest sales office, autonomous company or authorised distributor must first contact the Parts Service Department at the factory at which your portable air compressor was manufactured for further instructions.

For parts, service or information regarding your local distributor (Europe, Middle East, Africa) please contact:

Facility:

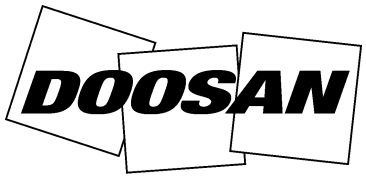
Doosan Bobcat EMEA s.r.o. (DBEM),

U Kodetky 1810, 263 12 Dobris,

Czech Republic

Website:

www.doosanportablepower.eu



Portable Power

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