Foreword - Important notice regarding equipment servicing

All repair and maintenance work listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given, and using, whenever possible, the special tools.

Anyone who performs repair and maintenance operations without complying with the procedures provided herein shall be responsible for any subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages caused by parts and/or components not approved by the manufacturer, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages caused by parts and/or components not approved by the manufacturer.

The information in this manual is up-to-date at the date of the publication. It is the policy of the manufacturer for continuous improvement. Some information could not be updated due to modifications of a technical or commercial type, or changes to the laws and regulations of different countries.

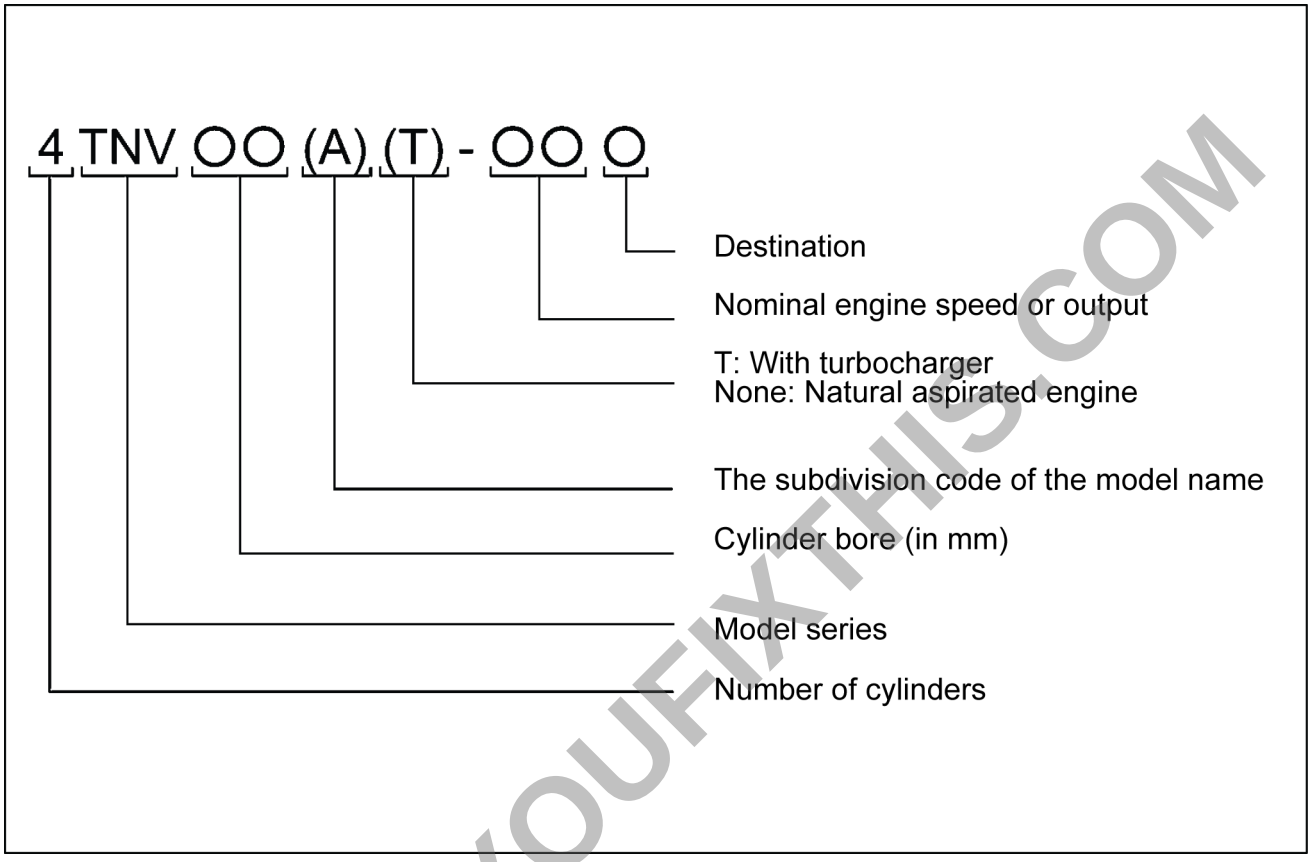
In case of questions, refer to your CASE CONSTRUCTION Sales and Service Networks.

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Engine - General specification

Engine nomenclature



TULI12EXN4778FA 1

Engine specification class

Classification	Load	Engine speed	Available engine speed
CL	Constant load	Constant speed	**1500 - 1800 RPM**
VL	Variable load	Variable speed	**2000 - 3000 RPM**

* The engine specification class (CL or VL) is described in the specifications table.

Engine specification

1. The information described in the engine specifications tables (the next page and after) is for standard engine. To obtain the information about the engine installed in each machine, refer to the manual provided by the Manufacturer.
2. Engine rating conditions are as follows (**SAE J1349**, **ISO 3046/1**)

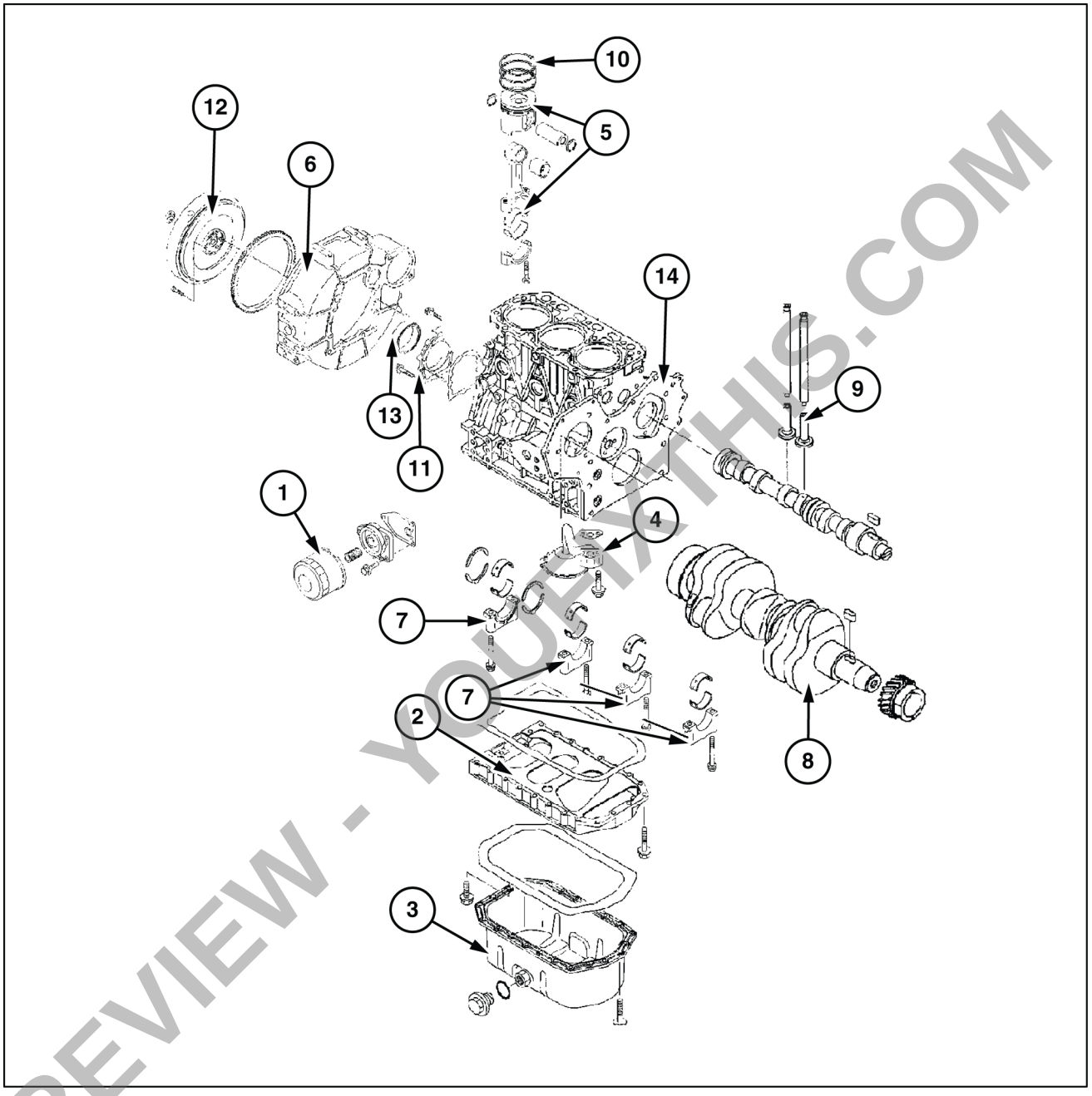
- Atmospheric condition: Ambient temperature **25 °C** (**77 °F**), atmospheric pressure **100 kPa** (**1 bar**), relative humidity 30%
- Fuel temperature: **25 °C** (**77 °F**) (fuel injection pump inlet)
- With cooling fan, air cleaner, exhaust silencer (**Yanmar** standard part)
- After running-in hours. Output allowable deviation: ± **3 %**

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Pan and covers - Component identification

NOTE: *This figure shows the* ***3TNV84****.*



TULI12EXN5012GB 1

1. Oil screen
2. Oil pan spacer
3. Oil pan
4. Oil suction pipe
5. Piston and connecting rod
6. Flywheel housing
7. Bearing cap
8. Crankshaft
9. Tappet
10. Piston ring
11. Oil seal case
12. Flywheel
13. Oil seal
14. Gear case flange

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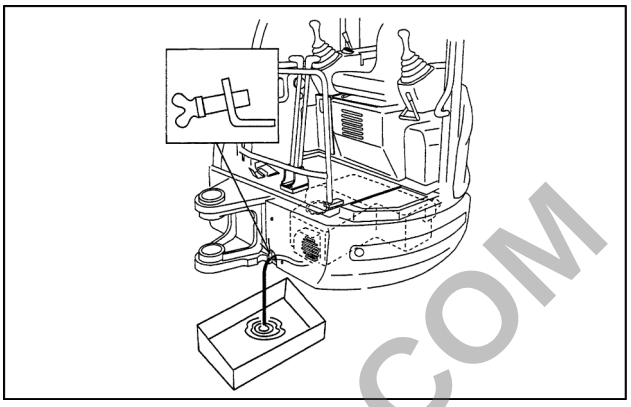
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Fuel tanks - Remove

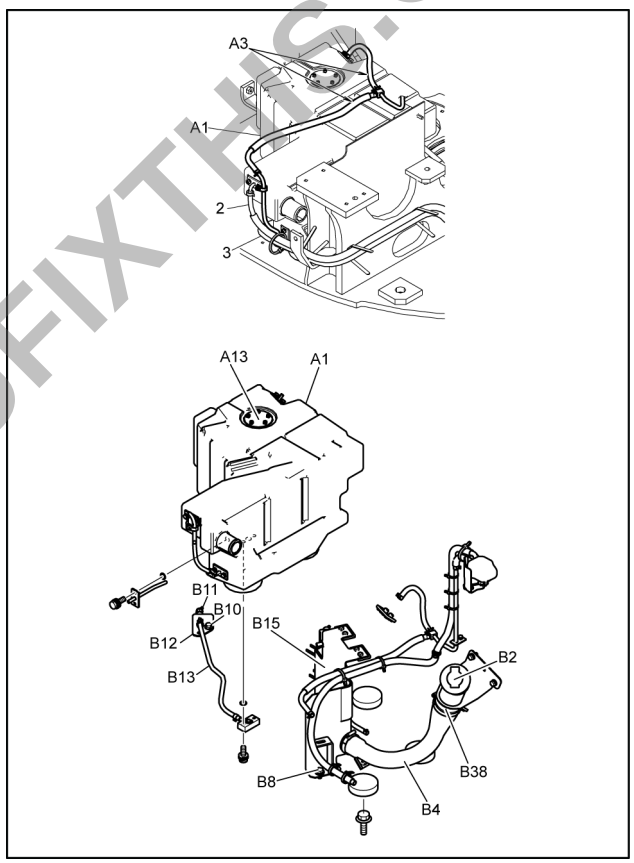
1. Open the fuel filler cap **(B2)** and loosen the drain cock **(B11)** to drain fuel.
   Tank capacity: **38 l** (**10.04 US gal**)
2. Disconnect the hoses **(2)** and **(3)** for the fuel inlet and outlet, the hose **(B4)** for the fuel supply port, and two air bleed hoses **(A3)**.
3. Loosen the **M10 x 20** sems-bolt **(B10)** to remove the flange **(B12)** together with the drain hose **(B13)**.

   : **17 mm**
4. Disconnect connector **(A13)** for the level sensor.
5. Remove two **M10 x 20** capscrews **(B8)**.

   : **17 mm**
6. Remove the fuel tank **(A1)** together with the bracket assembly **(B15)**.



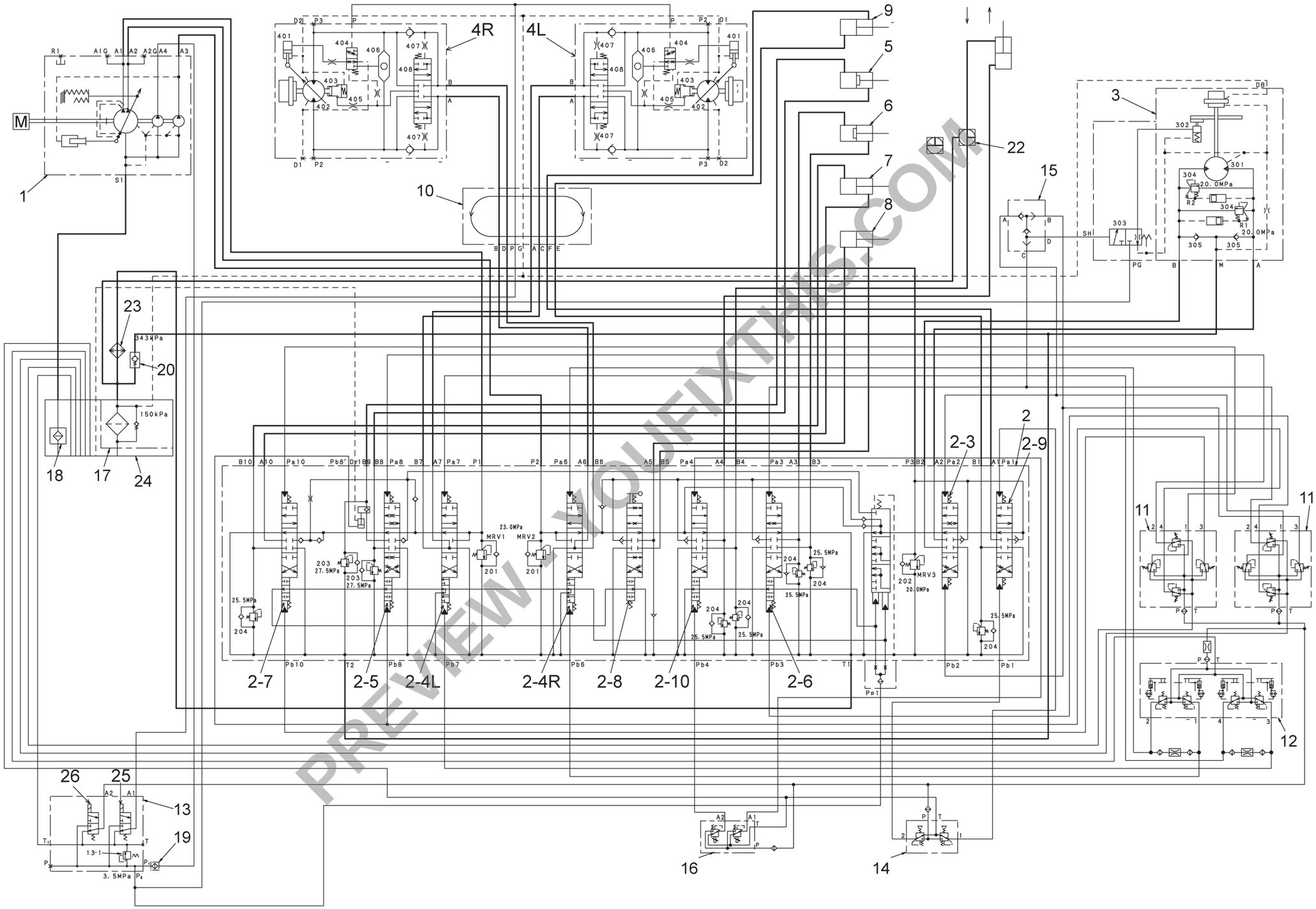
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TULI12EXN6307BA 2

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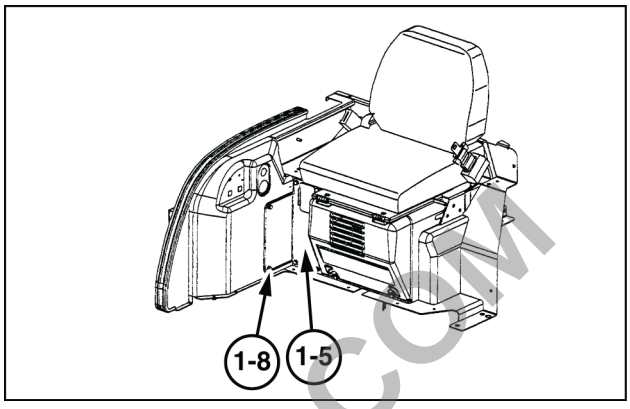
SMIL13MEX0293JB 1

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Oil reservoir - Prepare

1. Swing approximately **90 °** to the right to facilitate to remove the tank.
2. Unlock and open the right upper cover.
3. Remove the left right lower cover.
4. Remove the floor cover.
5. Remove the inspection cover **(1-5)** of the control stand. Six **M8 x 20** sems-bolts **(1-8)**

   : **13 mm**



TULI12EXN6308AB 1

6. Place an oil collecting container **(1)** under the hose **(2)**.
7. After releasing internal pressure of the hydraulic oil tank, gradually loosen the hose **(2)** to drain hydraulic oil.

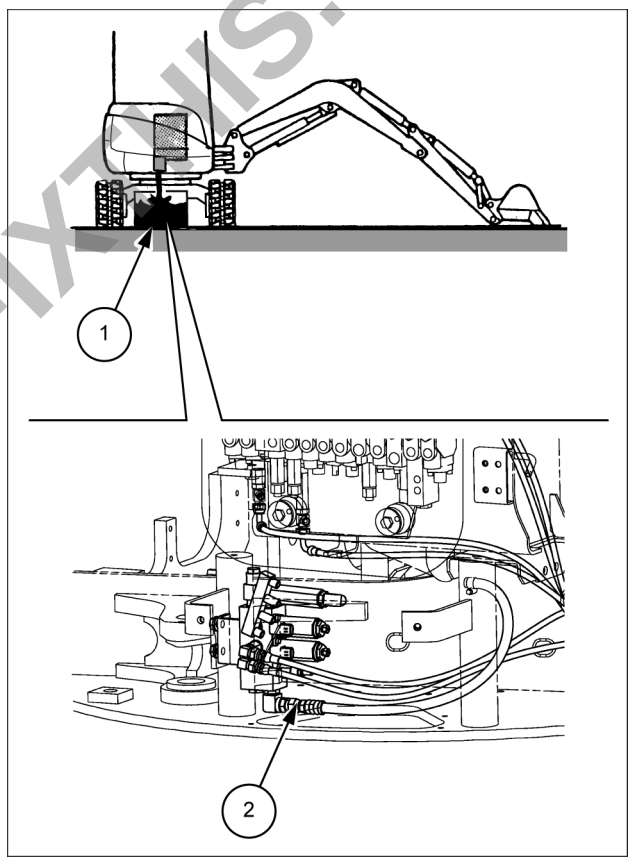
   : **22 mm**

   Tank capacity: **38 l** (**10 US gal**)

   - Spread a vinyl sheet under the solenoid valve to prevent contamination around the valve due to oil leakage.
   - Releasing tank pressure. Press the cap boot of breather assembly **(A15)** with a finger to release the internal pressure.

NOTE: *Press and hold the boot until air-relieving sound stops.*

8. Remove the control valve.
9. Remove the solenoid valve.
10. In addition, remove the harness and hose clamped on the tank.
    - Remove the multi-control valve (option) if it is equipped.

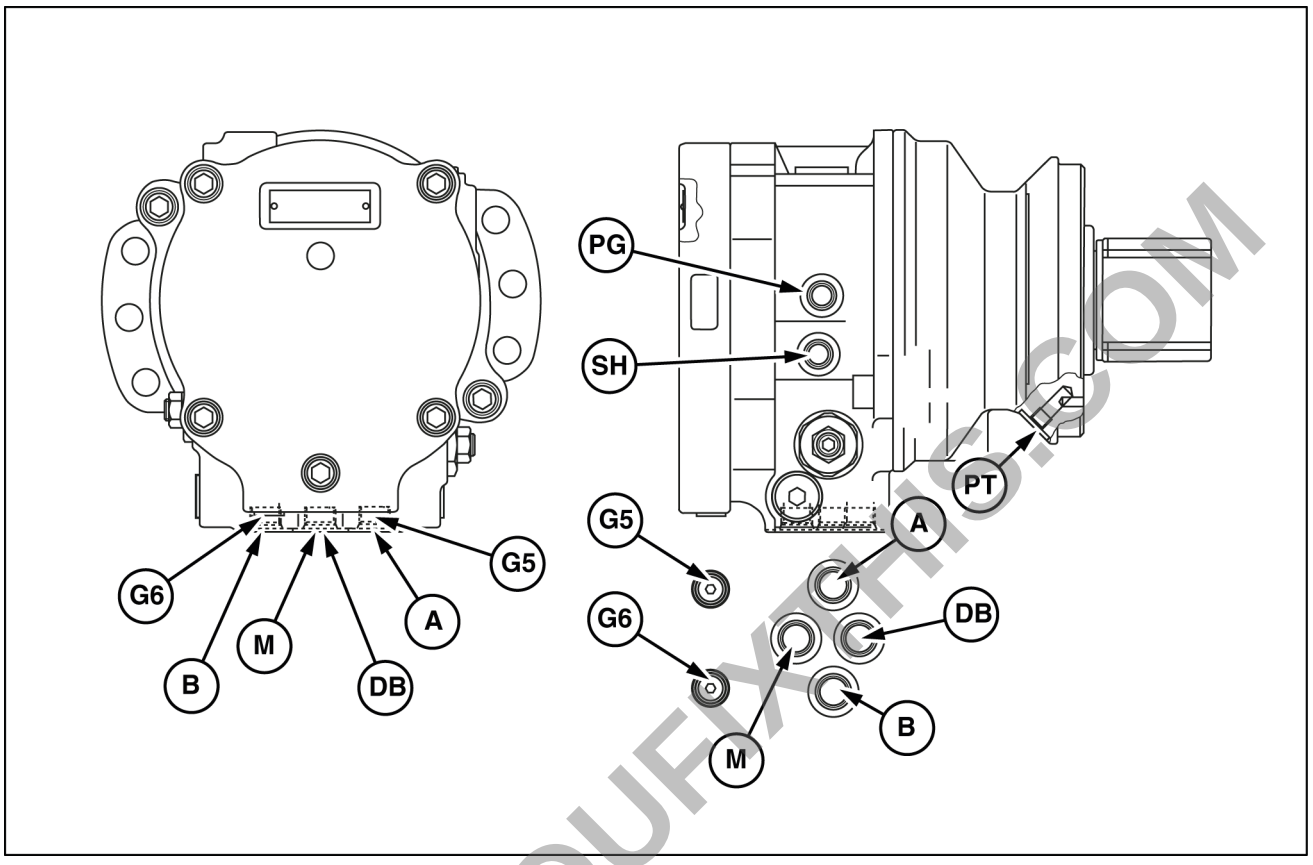


SMIL13MEX0068BB 2

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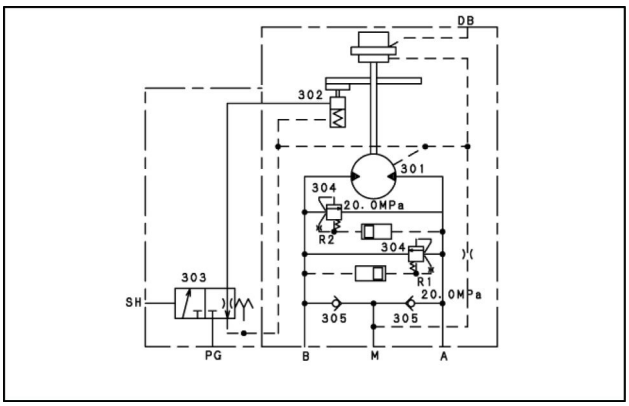
Hydraulic swing system - General specification



TULI12EXN6163FB 1

Hydraulic diagram

Port	Name	Dimensions
A	Main port	**PF 3/8**
B	Main port	
M	Make up port	
DB	Discharge port	
PG	Slewing parking brake release port	**PF 1/4**
SH	Slewing parking brake pilot port	
G5	Indicator port	**PF 1/8**
G6		
PT	Port for grease piping	**PT 1/8**



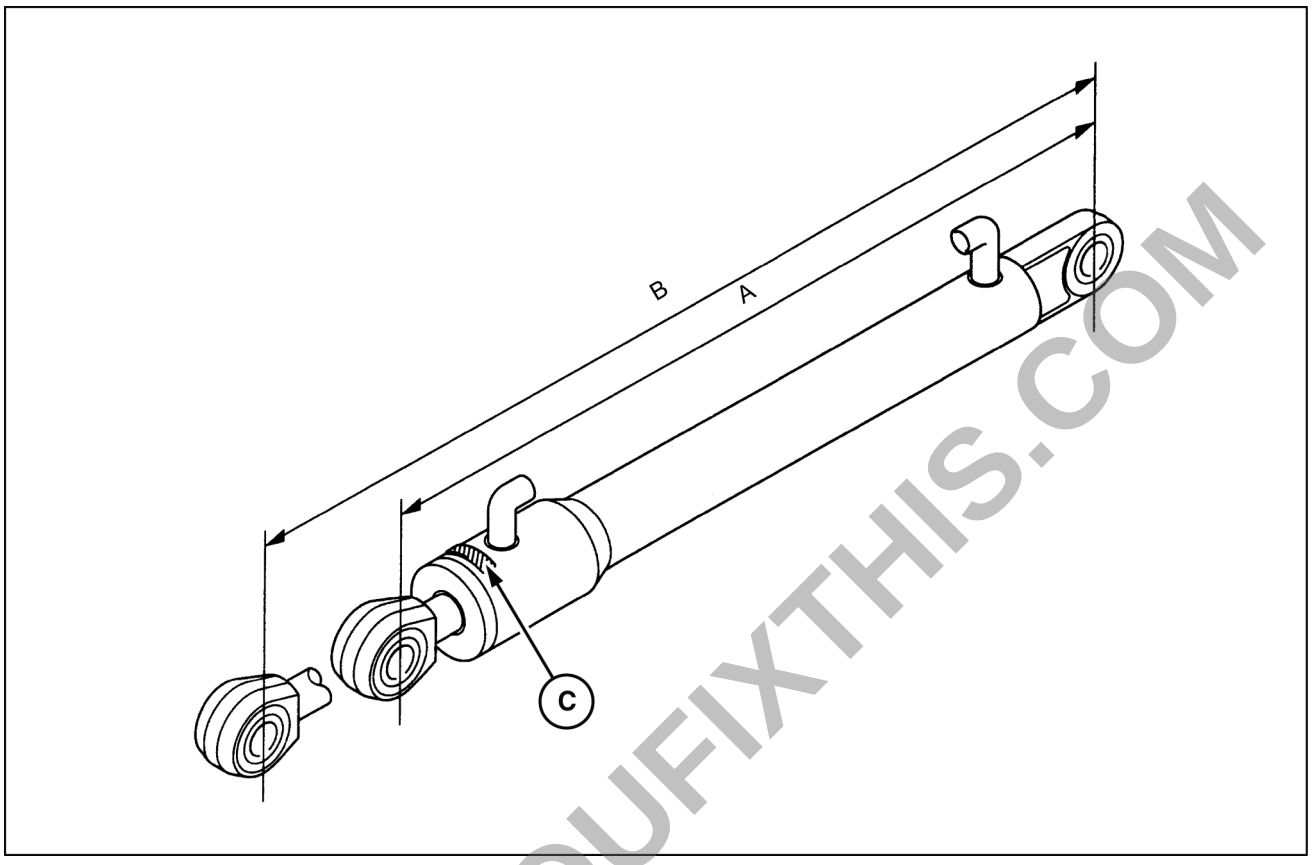
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Rotational direction: Inlet **A** port: **CW**
Inlet **B** port: **CCW**
(View from shaft end)

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Boom cylinder - General specification



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A. Fully retracted length
B. Fully extended length
C. Part no. and manufacturing no. stamp position

CX35B

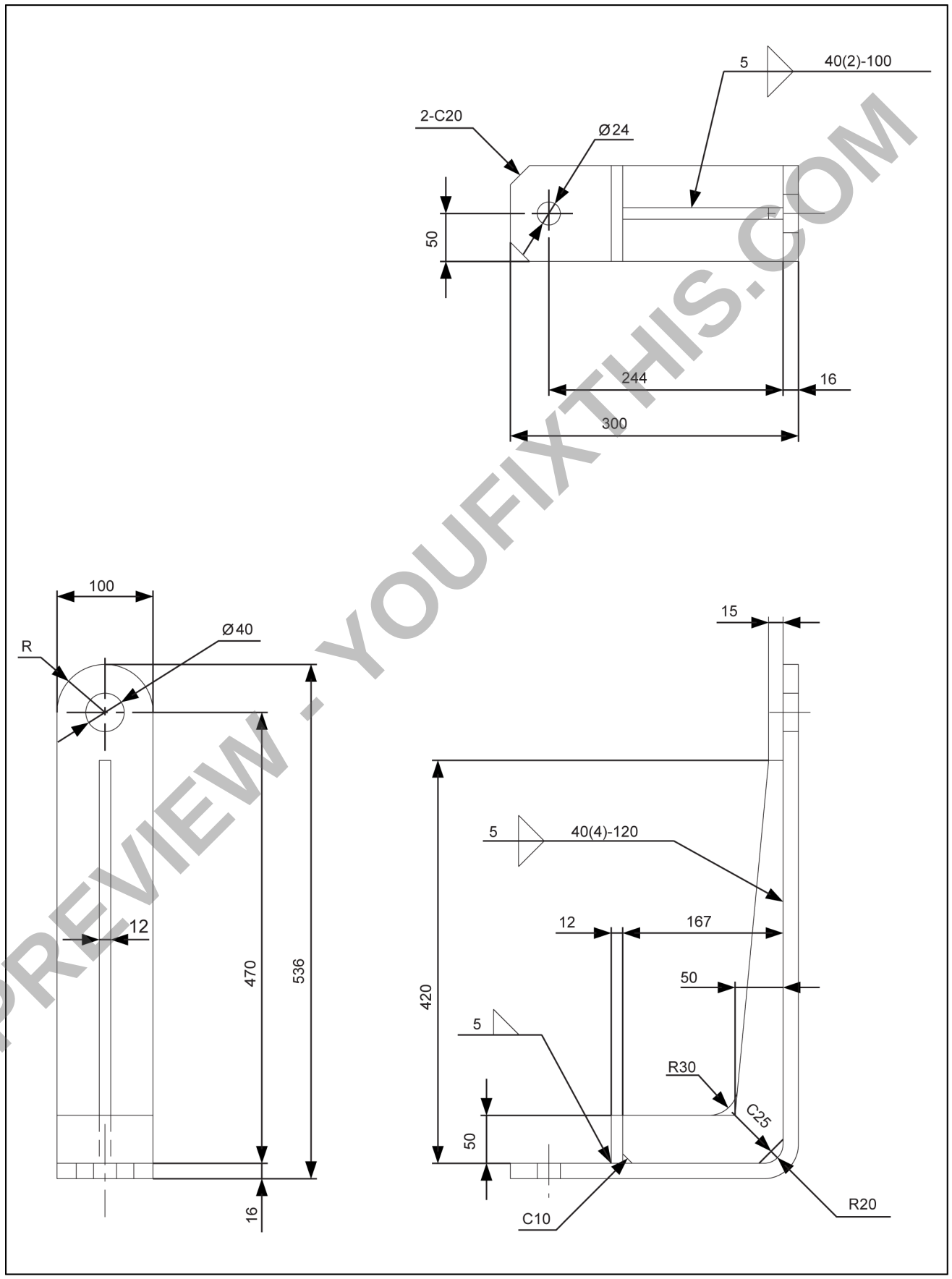
Cylinder	Cylinder bore / Rod diameter	Stroke	Centre distance of mounting pins Full extend B / Full retract A	Cushion	Dry weight
Boom (canopy)	**ø 80 mm (3.15 in) / ø 45 mm (1.77 in)**	**585 mm (23.03 in)**	**1500 mm (59.06 in) / 915 mm (36.02 in)**	Rod side	**35 kg (77 lb)**
Boom (cab)	**ø 80 mm (3.15 in) / ø 45 mm (1.77 in)**	**559 mm (22.01 in)**	**1474 mm (58.03 in) / 915 mm (36.02 in)**		**35 kg (77 lb)**
Boom (cab with front guard)	**ø 80 mm (3.15 in) / ø 45 mm (1.77 in)**	**540 mm (21.26 in)**	**1455 mm (57.28 in) / 915 mm (36.02 in)**		**35 kg (77 lb)**

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Upper frame - Special tools - Lifting jig

Quantity: 2 set. Material: mild steel. Unit: mm



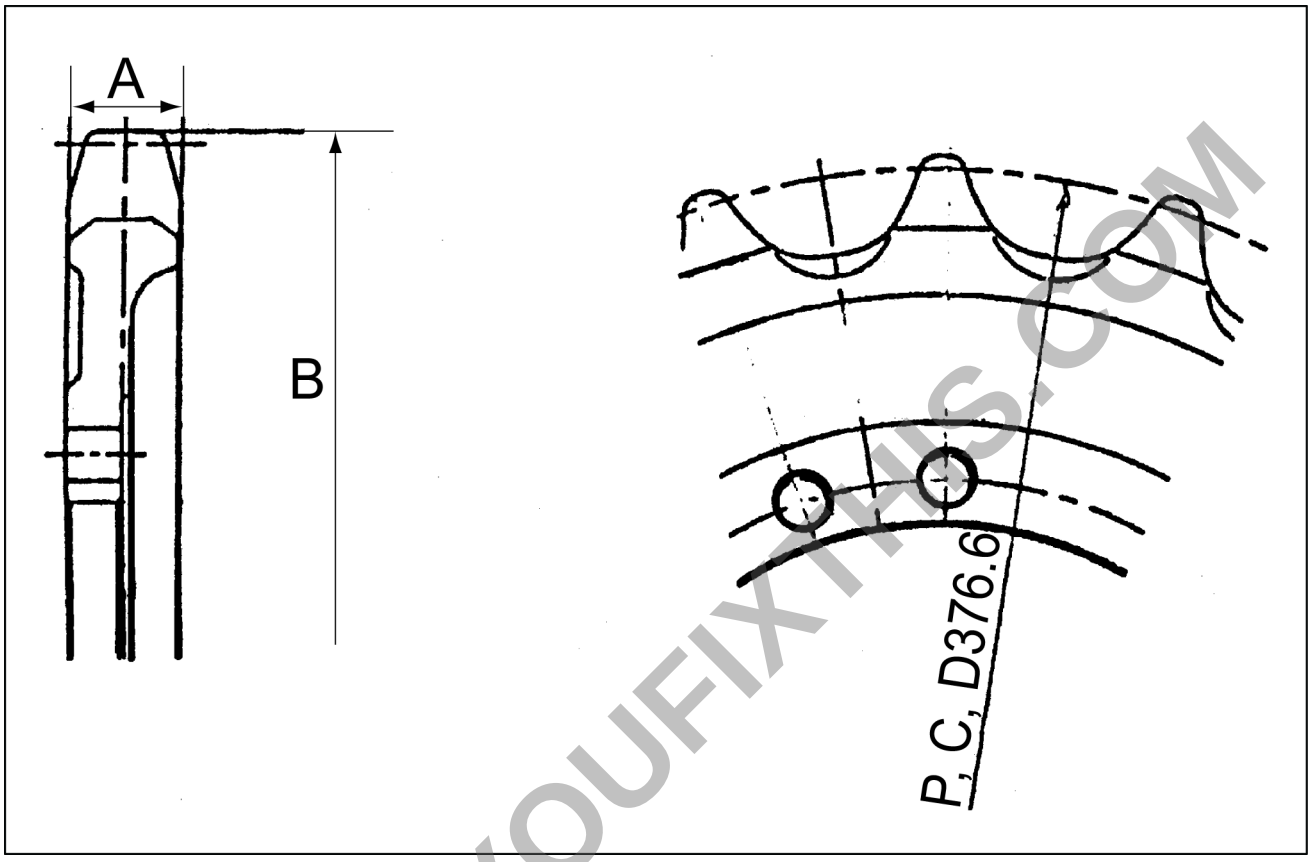
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Driving wheel - Service limits

Maintenance standard



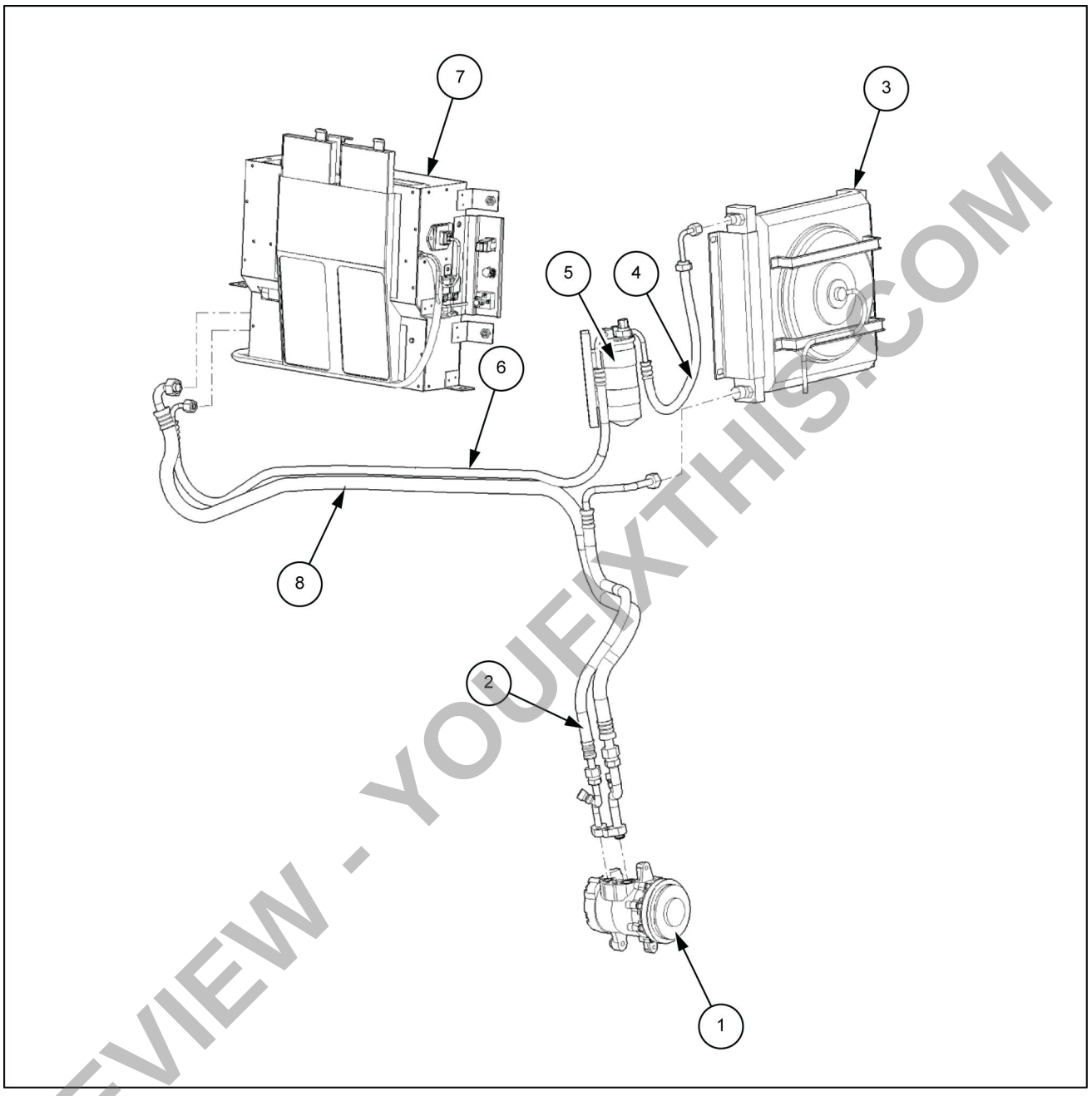
TULI12EXN4485FA 1

Code	Item	Standard value	Repairable level	Service limit	Remedy
A	Width of sprocket teeth	**24 mm** (**0.9 in**)	**21 mm** (**0.8 in**)	**20 mm** (**0.8 in**)	Replace
B	Sprocket outer diameter	**ø 385.6 mm** (**15.2 in**)	**ø 380 mm** (**15 in**)	**ø 378 mm** (**15 in**)	Welding repair or replacement

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Air conditioning - Overview



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1. Compressor
2. Flexible hose
3. Condenser
4. Flexible hose
5. Receiver (dryer)
6. Flexible hose
7. Cooler unit/Evaporator
8. Flexible hose

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Group	Code	Part Name
Switch	**SW-1**	(Key) starter switch
	SW-2	Working lights switch
	SW-3	2nd Speed selector switch
	SW-4	Wiper washer switch
	SW-5	Engine coolant temperature switch
	SW-6	Engine oil pressure switch
	SW-7	Horn switch
	SW-9	Lever lock switch
	SW-10	Heater switch (opt)
	SW-11	Deceleration switch
	SW-28	Swing selector switch
	SW-35	Hydraulic nibbler activation slider
	SW-39	Overload pressure switch
	SW-40	Overload switch

Electrical equipment specifications

D-1, 2, 3, 4, 12÷14, 18

Diode

Horn

Engine stop solenoid

Engine stop relay

Travel 1, 2 speed

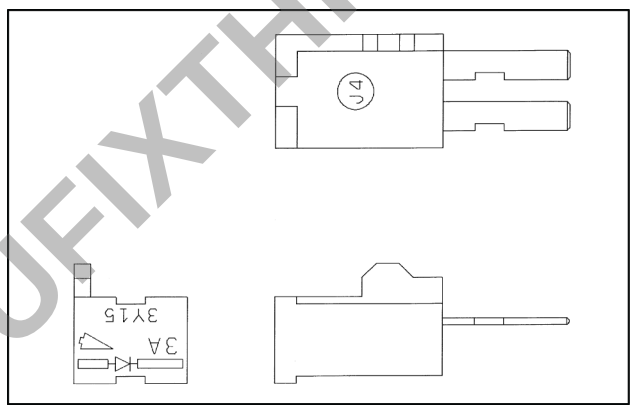
solenoid

Battery relay

Slewing / swing

Select relay

Engine stop solenoid



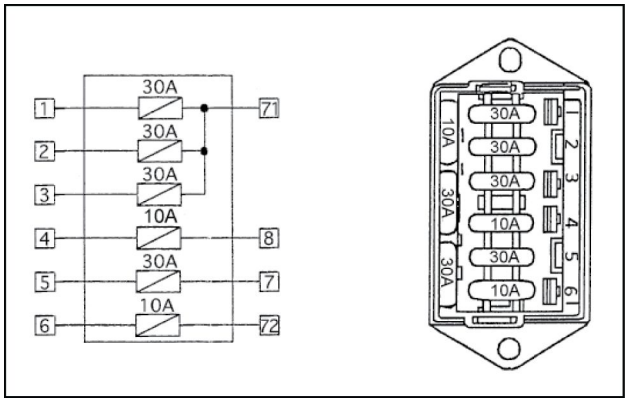
TULI12EXN4636AA 1

Max rated	Current	**3 A**
	Breakdown	**400 V**

E-1

Fuse box

F1 **30 A**	Wiper Heater
F2 **10 A**	Relay Solenoid
F3 **30 A**	Working light
F4 **30 A**	Horn Cab light
F5 **30 A**	Solenoid Engine stop
F6 **10 A**	Battery relay Gauge cluster

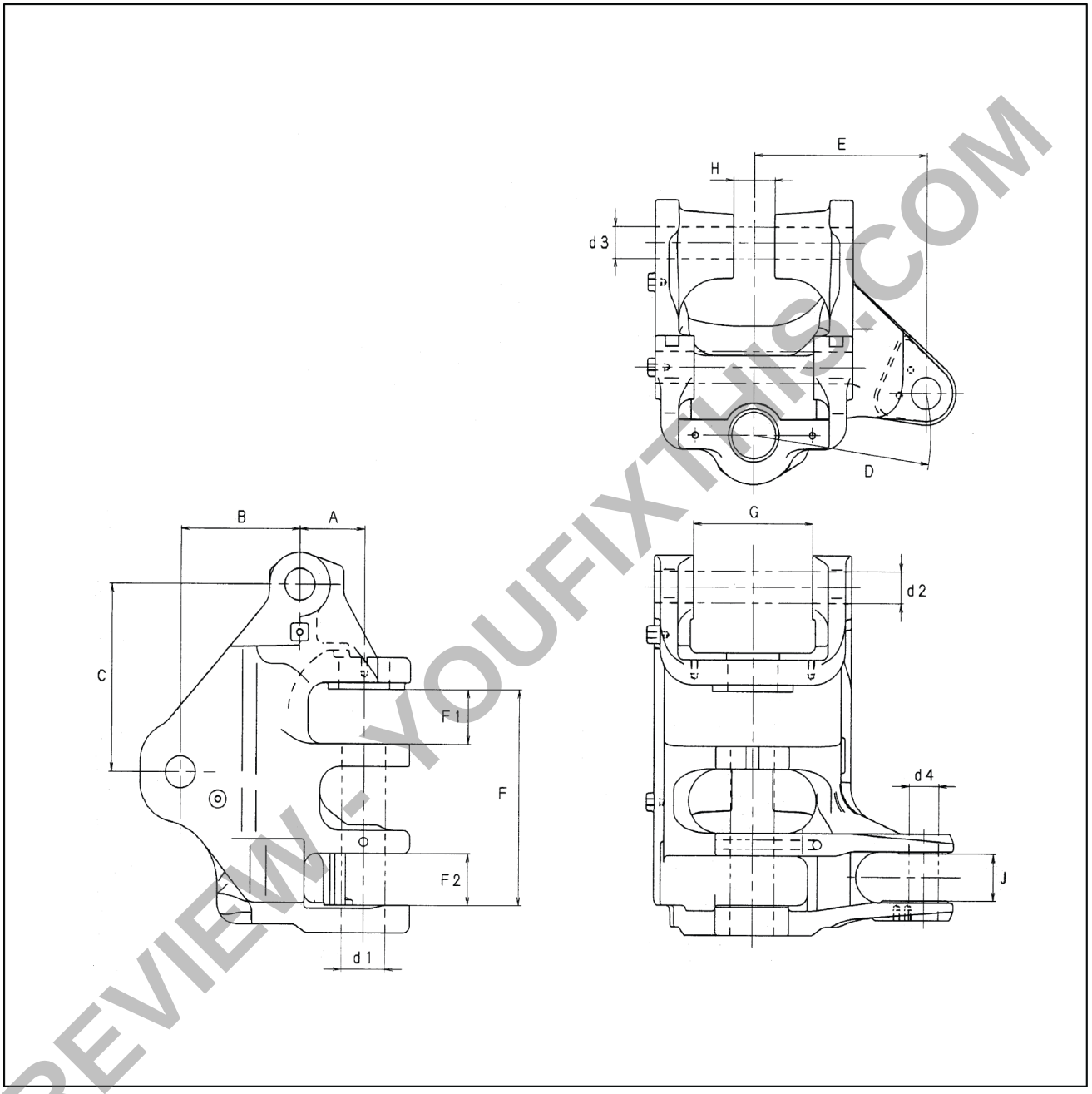


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Boom pivoting support - Dimension

Swing bracket

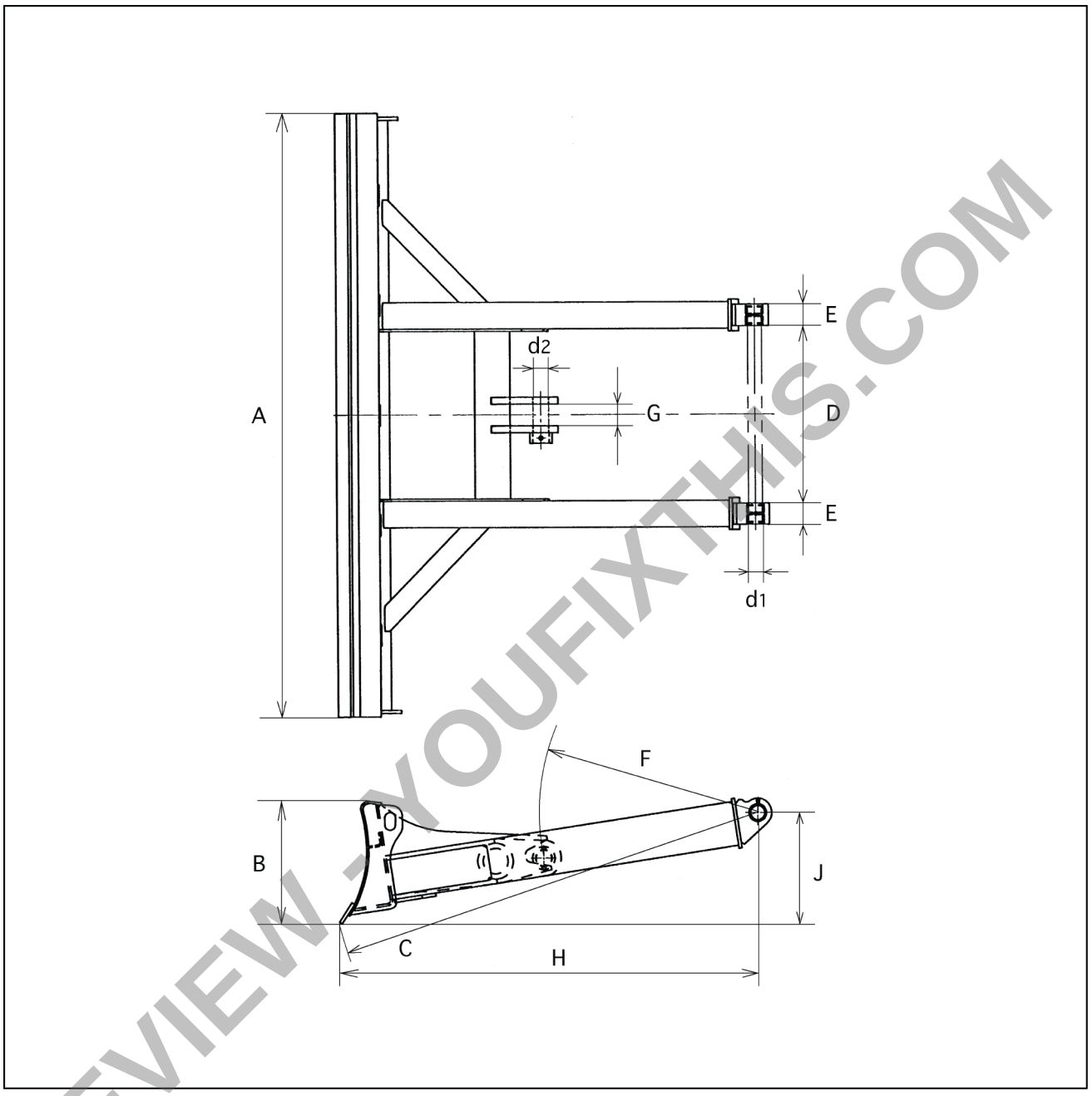


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Dozer blade - Dimension



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Cab and platform - Remove

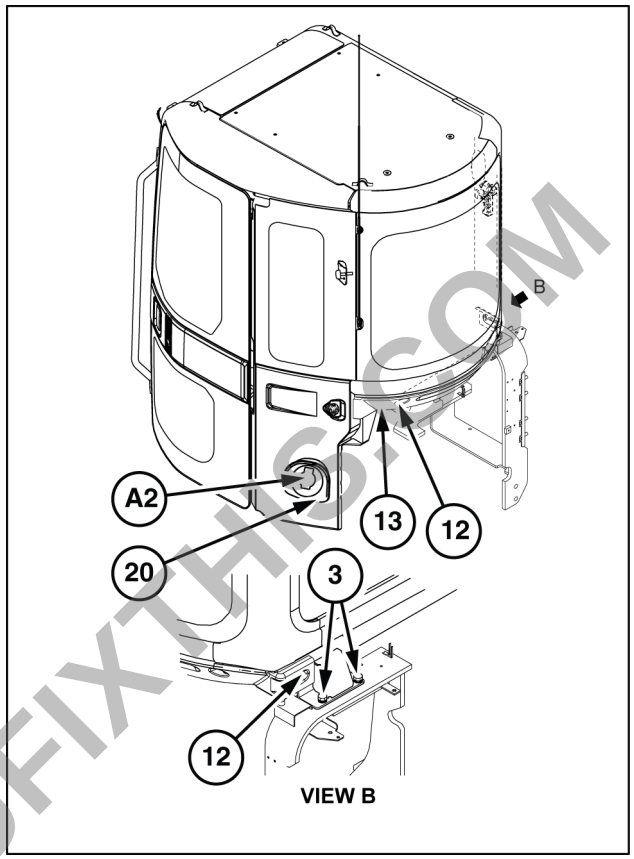
1. Remove the fuel filler cap **(A2)** and rubber cover **(20)**.
2. Removing cover installed on rear of cab. Loosen three sems-screws **M6 x 25 (12)** for installing the cover **(13)**.

   : plus screwdriver
3. Removing cab mounting screws. Loosen six cap-screws for mounting the cab.

Two capscrews **(1) M16 x 100**
One capscrew **(2) M16 x 50**
Three capscrews **(3) M12 x 50**

: **19 mm** and **24 mm**

An extension tool about **1 m** (**3.28 ft**) long is required for removing the capscrew item **(1)** (with mark *).



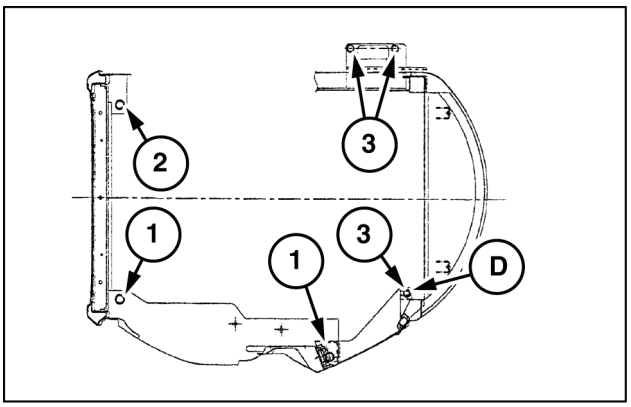
TULI12EXN6278BB 1

Lifting cab

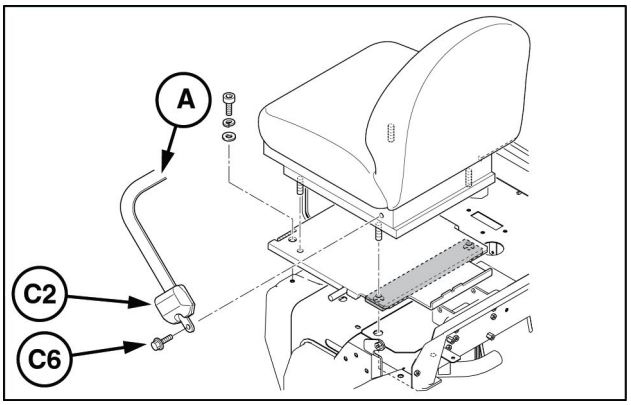
1. Loosen the sems-screws **M10 x 20 (C6)** to remove the seat belt assembly **(C2)** in advance to prevent it from interfering with the cab during lifting.

   : **17 mm**
2. Put slings through the lifting eyes on the cab top and lift up.
   Cab weight: **220 kg** (**485 lb**)

D. Adjust the clearance between guard and cab rear bracket with shims (t1.2, 2.0, 3.2).



TULI12EXN8289AB 2



TULI12EXN4205AB 3

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Cause	Trouble symptom	Starting failure				Insufficient engine output			Strange exhaust gas colour		High knocking sound during combustion	Abnormal engine sound	Uneven combustion sound	Hunting		Corrective action
		Engine does not start.	Engine starts but stops soon			Exhaust colour			During work					During idling	During work	
			Exhaust smoke													
			None	Little	Much	Normal	White	Black	White	Black						
Cooling Water System	Excessive cooling effect of radiator								O							Defective thermostat (kept closed)
	Insufficient cooling effect of radiator							O								Defective thermostat (kept opened) or slipping fan belt
	Insufficient coolant water level							O								Water leak check in cooling water system
	Cracked water jacket							O								Repair or replace.
	Slackened fan belt							O								Adjust the belt tension.
	Faulty thermostat							O	O							Check or replace.
Lubricating system	Improper properties of lubricating oil	O	O			O										Use proper lubricating oil.
	Leakage from lubricating oil piping system															Repair.
	Insufficient delivery from trochoid pump															Check and repair.
	Clogged lubricating oil filter															Clean or replace.
	Defective pressure regulating valve															Clean, adjust or replace.
	Insufficient lubricating oil level		O													Add proper lubricating oil.
Fuel system	Too early timing of fuel injection								O	O	O					Check and adjust.
	Too late timing of fuel injection pump						O	O	O	O						Check and adjust.
	Improper properties of fuel oil					O	O	O	O	O			O			Use proper fuel oil.
	Water entrance in fuel system	O			O		O		O				O	O	O	Perform draining from the fuel filter.
	Fuel filter clogged	O	O			O										Clean or replace.
	Air entrance in fuel system	O	O			O										Bleed air.
	Clogged or cracked fuel pipe	O	O			O										Clean or replace.
	Insufficient fuel supply to fuel injection pump	O	O			O										Check the fuel tank cock, fuel filter, fuel pipe and fuel feed pump.
	Uneven injection volume of fuel injection pump						O	O	O	O			O	O	O	Check and adjust.
	Excessive fuel injection volume									O						Check and adjust.
	Poor spray pattern from fuel injection nozzle						O	O	O	O			O	O	O	Check and adjust.
	Priming failure	O														Foreign matter trapped in the valve inside the priming pump. (Disassemble and clean).
	Clogged strainer at feed pump inlet					O										Clean the strainer.

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Radial bearing
A floating bearing is adopted. Since the bearing moves with the turbine shaft as the oil films are formed both inside and outside the bearing, the bearing sliding speed is slower than the turbine shaft speed, resulting in higher dynamic stability.

4. Compressor side sealing mechanism
To prevent the intake air and oil form leaking, a seal ring and a seal plate are provided to form a double wall structure on the rear side of the compressor impeller.

5. Exhaust valve
When the blower side pressure (intake air pressure) exceeds the specified level, the exhaust gas at the turbine inlet is partially bypassed to the exhaust discharge side to control the turbine RPM so as to maintain the intake pressure at the specified level for improving the response to load variation in the low to medium speed range and to minimize black smoke generation. It consists of a control assembly separated from the turbocharger and a valve assembly installed in the turbine impeller chamber.

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MEASURING TRAVEL PERFORMANCES

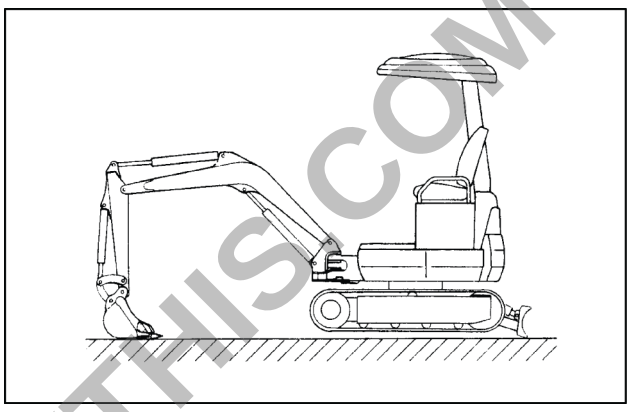
Test procedures

Measure 3-time each.

Apply average data of the above for judgement.

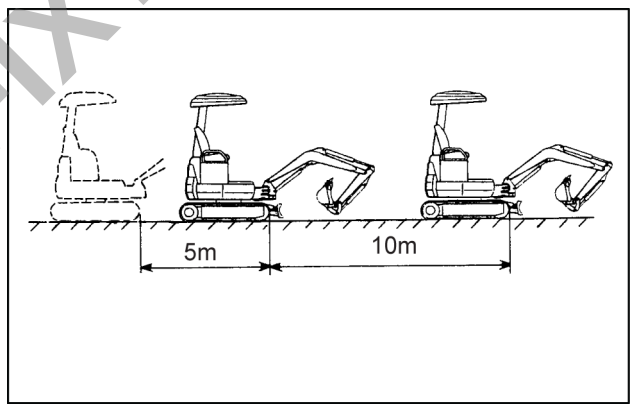
Travel

1. Travel speed (5 revolutions)
   - Engine: high idling
   - Hydraulic oil temperature: **50 - 60 °C** (**122 - 140 °F**)
   - Measurement position: raise the machine using both attachment and dozer blade.
   - Set the crawlers in motion. After one full revolution, measure the time required for 5 full revolutions.

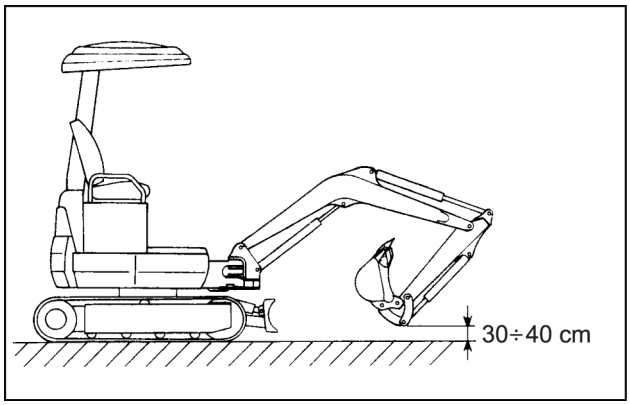


TULI12EXN4125AA 12

2. Travel speed (**10 m** (**33 ft**))
   - Engine: rated rpm
   - Hydraulic oil temperature: **50 - 60 °C** (**122 - 140 °F**)
   - Measurement position: travel position
   - Set machine in motion. Starting after a running of **5 m** (**16 ft**), measure the time required to travel **10 m** (**33 ft**). Do this on level and hard ground.
   - Travel position:
     Fully extend the arm and bucket cylinders and place the hoe attachment so that its lowest part is even with the machine's minimum ground clearance level. The hoe attachment must be in a no-load and the dozer blade must not touch the ground.



TULI12EXN4126AA 13



TULI12EXN4127AA 14

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Relief valve - Troubleshooting

NOTE: *The relief valve is essential for the performance and the safety, and it is difficult to reset the pressure other if there is no facility in service shop, so when abnormality occurs, don't fail to replace the assembly. The handling method is for reference, replace the assembly as a rule.*

Problem	Possible Cause	Correction
Pressure does not rise	The pressure adjusting valve of each relief valve, poppet and piston are stuck, kept open, or got caught dust in the seat section of the valve	• Check that the engagement valve of respective valve doesn't get matters caught in it • Each part slides freely • Clean all parts completely
Relief pressure is unstable	The adjusting valve of respective valve is damaged, or the piston is stuck to the poppet	• Replace the damaged part • Clean all parts completely • Remove flaw on the surface
The relief pressure is not within the limit of set values	Wear due to dust	Disassemble and clean it
	Lock nut and adjusting screw are loose • Breakage and permanent set in fatigue of spring	Adjusting pressure • Replace spring
	Malfunction of (RV) and (ORV)	Measure the pressure of RV and ORV
Oil leakage	Damage on each seat section. Wear of O-ring	Replace the worn or damaged part. Check that respective part move smoothly before installing
	Respective part is stuck due to dust entered	Check that it is free from scratch, score and foreign matter before installing

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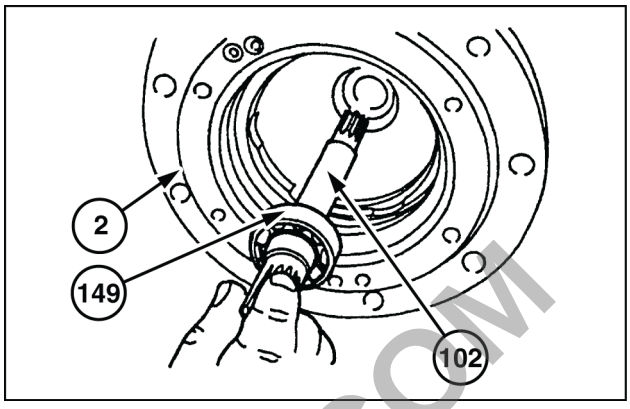
2. Pull the drive shaft **(102)** out of the spindle **(2)**. Then the ball bearing **(149)** is removed together.
   - Be careful to lightly strike the tip of the shaft on the reduction side using a plastic hammer to allow the shaft to come off easily. Otherwise the shaft may pop out.
3. Remove two pivots **(167)** and two the parallel pins **(177)** from the spindle **(2)**.
4. Take out the 2-speed switching piston kit (piston assembly and seal ring) and the spring **(190)** from the spindle **(2)**.
   Piston assembly:
   piston **(161)**, crawler **(162)**, seal ring **(163)**.

16. Removing ball bearing.
   - Remove the ball bearing, only when its replacement is necessary.

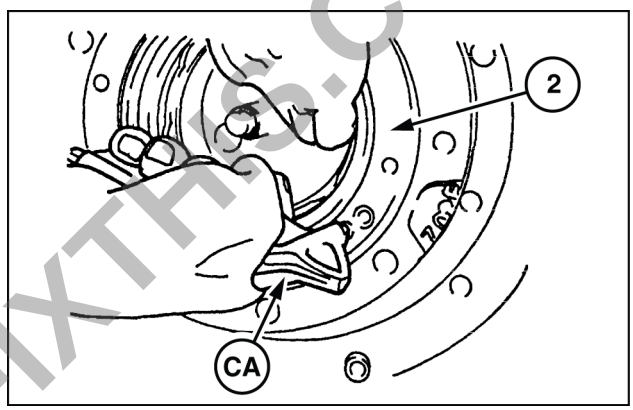
   1. Place the retainer bushing **(RM2)** on the press bench and insert the drive shaft **(102)**.
   2. Hold down the tip of the drive shaft **(102)** by a press and remove the bearing **(149)** from the shaft.

   - Do not reuse the ball bearing.

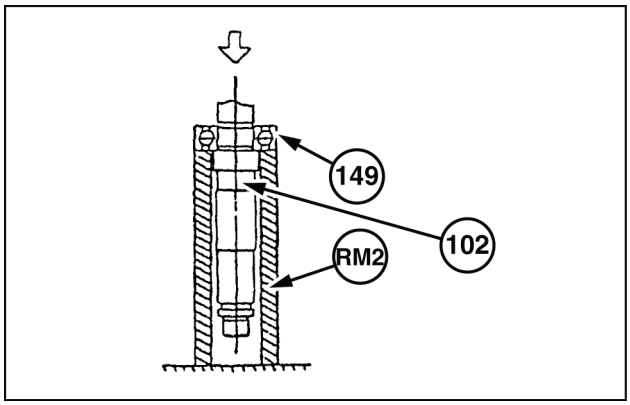
CA.Compressed air (Air gun).



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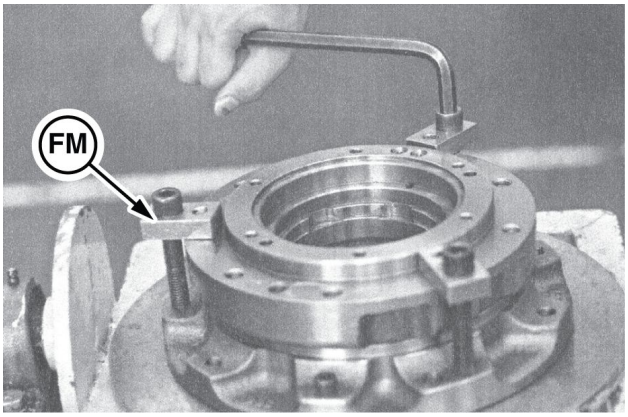


TULI12EXN6673AB 45



TULI12EXN6674AB 46

17. Removing engine.
   1. Apply the clamp plates **(FM)** to the spindle **(2)** in the equally spaced positions, and fasten three **M16 x 2.0 x 150** (approximately) to the workbench.
      Tightening torque: **39 - 79 N·m** (**29 - 58 lb ft**)
   2. Turn over the travel motor. (Direct the reduction unit side upward).

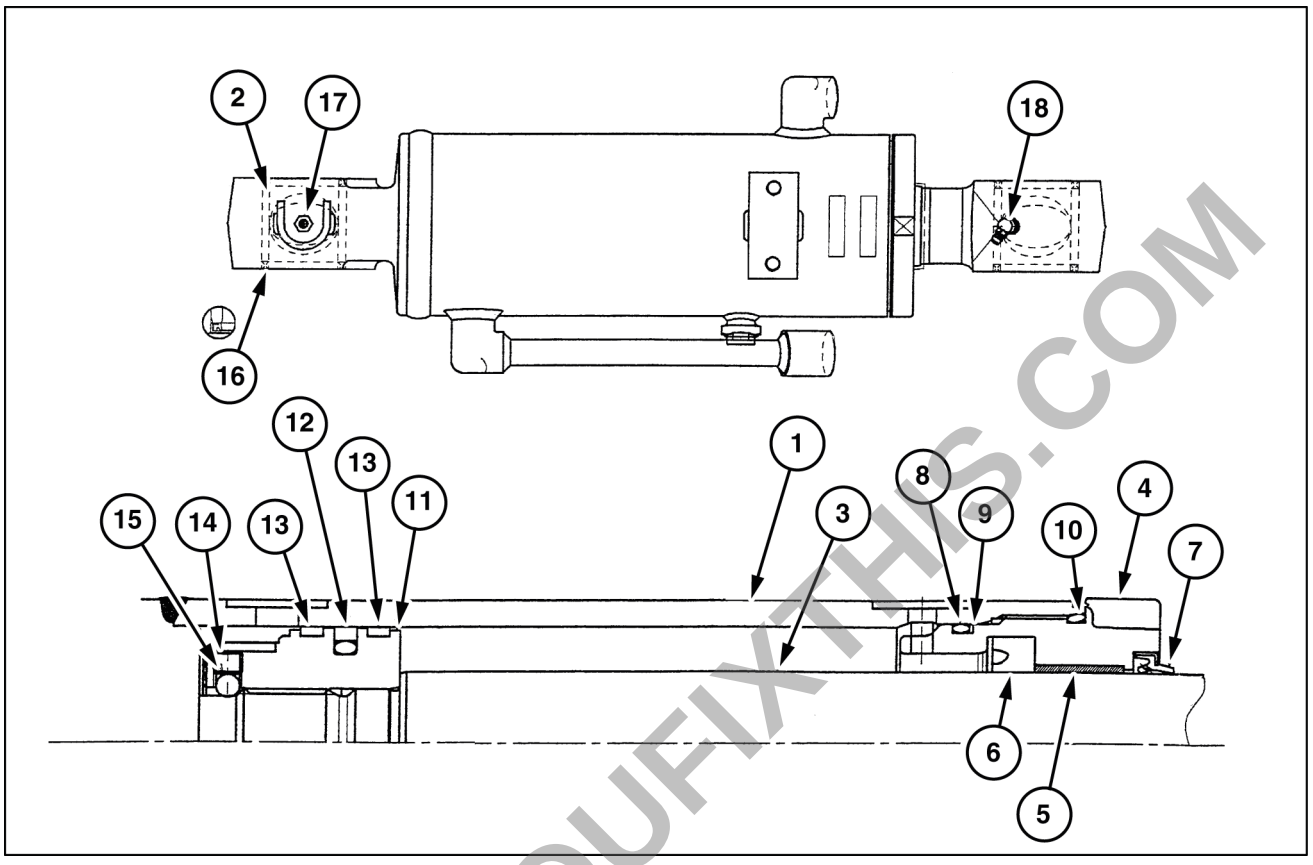


TUPH12EXN6675AB 47

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Blade lifting cylinder - Component identification



TULI12EXN6196FB 1

1. Cylinder liner (Qty. 1)
2. Pin bushing (Qty. 2)
3. Cylinder rod (Qty. 1)
4. Cylinder head (Qty. 1)
5. Bushing (Qty. 1)
6. U-ring (Qty. 1)
7. Wiper ring (Qty. 1)
8. O-ring (Qty. 1)
9. Backup ring (Qty. 1)
10. O-ring (Qty. 1)
11. Piston (Qty. 1)
12. Seal ring (Qty. 1)
13. Slide seal ring (Qty. 2)
14. Adjusting screw (Qty. 1)
15. Ball (Qty. 1)
16. Seal ring (Qty. 4)
17. Grease nipple (Qty. 1)
18. Grease nipple (Qty. 1)

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M-1

Starter motor

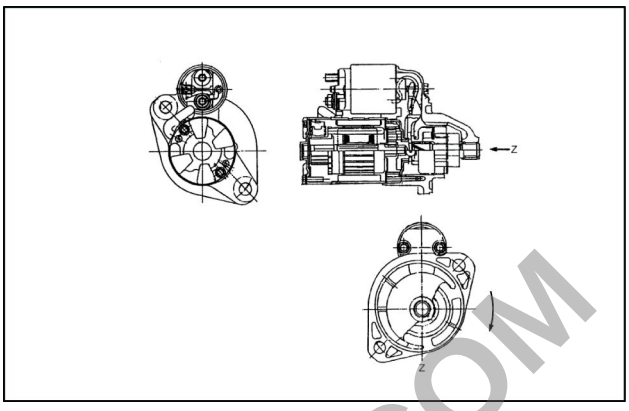
Rated voltage : **12 V** DC

Output : **1.7 kW** (**2.31 Hp**)

Nominal time : **30 s**

Rotation direction : Clockwise as seen from pinion

Weight : **3.4 kg** (**7 lb**)



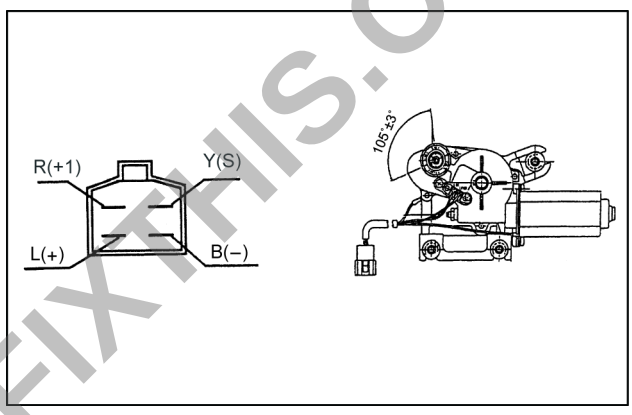
TULI12EXN4656AA 17

M-2

Windshield wiper motor

Rated voltage : **12 V**

Wiping angle : **102 °** - **108 °**

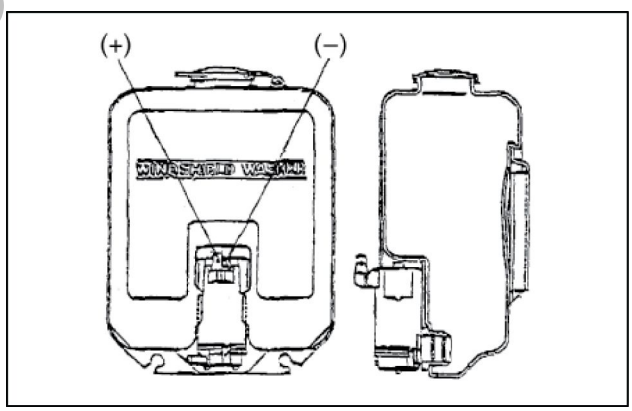


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M-3

Washer motor

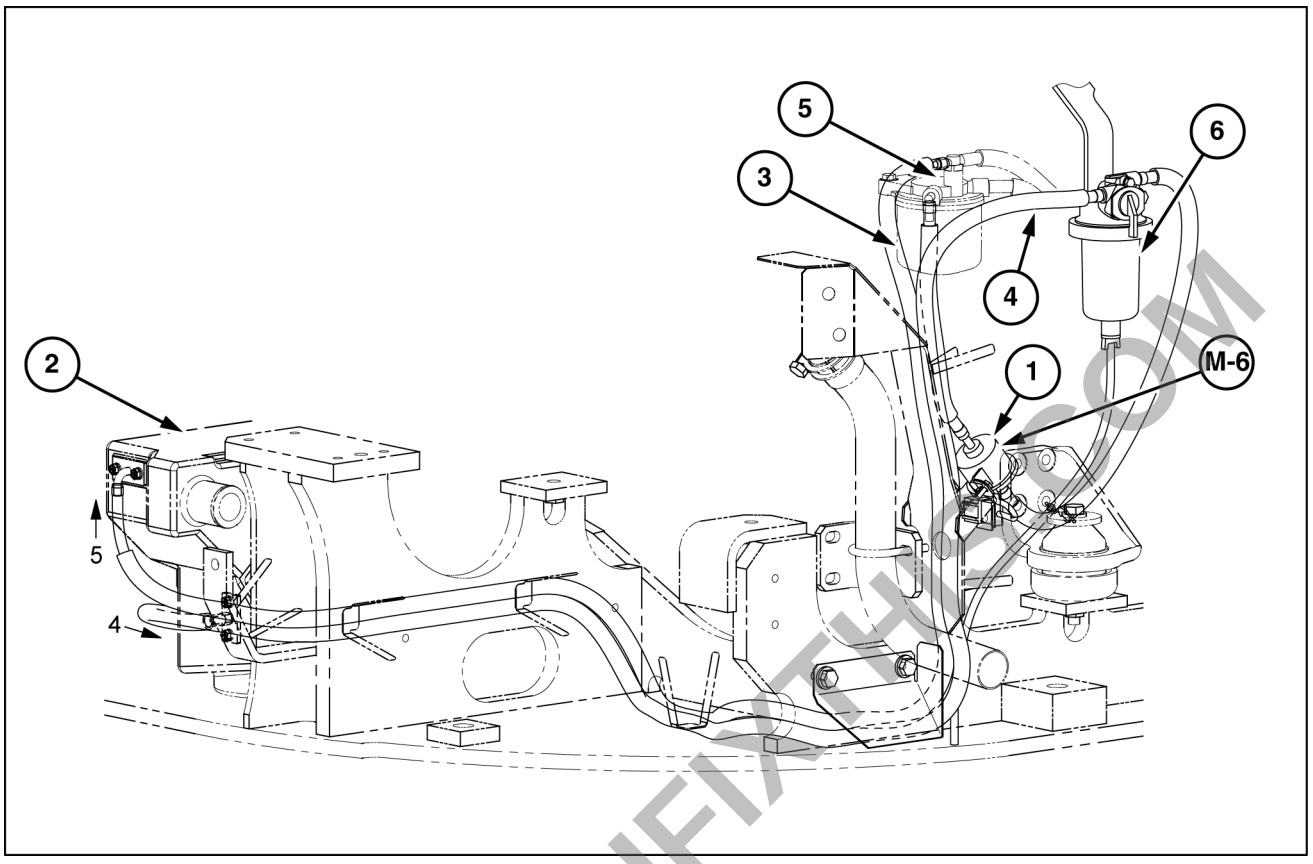
Rated voltage : **12 V** DC



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TULI12EXN6111FB 2

1. Fuel pump
2. Fuel tank
3. Fuel filter
4. Inlet
5. Return
6. Water separator

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