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Distribution list
Jenbach, Subsidiaries, Service Providers

Service Technician Instruction	**ST-181**

Engine type **J312-C, J316-C, J320-C**

Subject **Engine version upgrade**
Conversion from J3xx-C to J3xx-C-SI (engine version D)

Service Technician Instruction ST-181 explains the conversion of Type 3 version C engines to version D.

PURPOSE OF THIS BULLETIN / NEED FOR ACTION

No need for proactive steps, i.e. if it is intended to upgrade Type 3 engines from version C to version D, this document is available as an aid when organising and carrying out the work.

AFFECTED ENGINES / SCOPE OF THIS BULLETIN

Type J312-C, J316-C and J320-C engines in mains parallel operation which are intended to be upgraded to version D. This conversion is not intended for engines in isolated operation.

Note:
ST-181 is not a basis for ordering the spare parts necessary for a conversion. Please contact Mr. Herbert Moser with any questions about this or about the modification in general.

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1 GENERAL/OVERVIEW

If a conversion is carried out from version C engines to version D, the following work as set out below is normally necessary. The scope of the field work varies depending on the circumstances (long block, generating set, conversion as part of minor overhaul).

Note: The terms long block, generating set etc. are explained later in this document.

J312-C:

- Core Package:
  - camshaft replacement
  - cylinder head replacement
  - exhaust gas turbocharger (option)
  - TecJet
  - crankcase ventilation (option)

- Optional Package:
  - electric water pump
  - ignition system upgrade (optional)

J316-C:

- Core Package:
  - camshaft replacement
  - cylinder head replacement
  - piston replacement if J316 C04/C05 (from Epsilon = 11.8 to Epsilon = 12.5).
  - exhaust gas turbocharger (option)
  - TecJet
  - crankcase ventilation (option)

- Optional Package:
  - ignition

J320-C:

- Core Package:
  - camshaft replacement
  - cylinder head replacement
  - Exhaust gas turbocharger
  - TecJet
  - crankcase ventilation (option)

- Optional Package:
  - ignition

As part of the continued development of engines from versions C to D, the following core components have been changed, among others:

- gas mixing by a gas proportioning valve (Tecjet) instead of the gas mixer
- camshaft optimised
- valve seat rings optimised
- on J312 engines, replacement of the mechanically-driven water pump by an electrical water pump
- larger oil cooler on the J312 and 316D
- more powerful MIC940/950 ignition system instead of IC922 (option)

See also **TI 1503-0049**.

2 CONVERSION OF J312-C ENGINES

This description assumes that the engine will be converted on site. As part of this conversion, a "long block" engine (basic engine consisting of the crankcase, crankshaft, conrods, pistons, cylinder heads, valve gear, air filter, including ignition box, gas mixer housing and exhaust gas turbocharger) is delivered to the plant as a replacement engine. In order to install this engine, all the components connecting the module frame to the engine (generator, ECW piping etc.) must be removed first.

ECW - engine cooling water

Shut down the engine in accordance with Technical Instruction No. 1100-0105 and secure it against inadvertent restarting in accordance with Technical Instruction No. 2300-0010.
Observe the safety and hazard advice in the safety instructions (TI 2300-0005) and wear the appropriate personal protective equipment.

Note:

The components must be individually adapted on site and subassemblies adapted to the prevailing conditions at the plant.

The following possibilities exist with this conversion:

- conversion with delivery of a long block
- conversion with delivery of a generating set
- conversion on site as part of a minor overhaul

2.1 Conversion with delivery of a long block

In this case, a basic engine (= long block) is delivered on site. The long block is an expansion of the short block. The "old" long block is dismantled and the "new" long block installed. Since parts such as air filters, connecting pipework, gas mixing valve hood etc. are not included in the long block, the already-existing parts are re-used.

Long block:

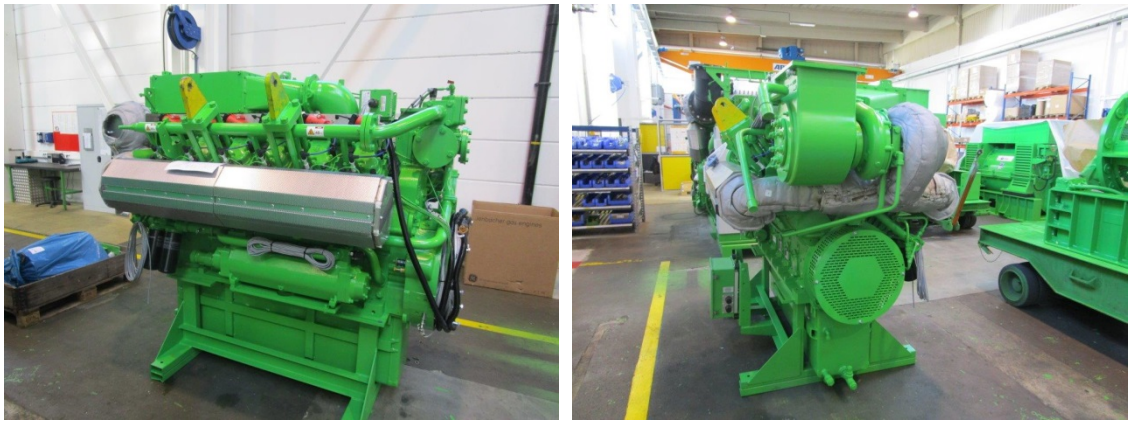


Figure 1: Long block

2.1.1 Dismantling and assembly of the long block

In order to install the long block delivered to the plant, a number of components must be removed first.

In the first step the air filter bracket, air filter housing, connecting pipework and gas mixing valve hood are removed (see Figure 2). **These components are re-used after the new long block has been installed.** The generator must be uncoupled to remove the long block. In addition, all the necessary components that connect the engine with other components (plate heat exchangers, oil tank etc.) must be removed to allow the "old" long block to be removed.

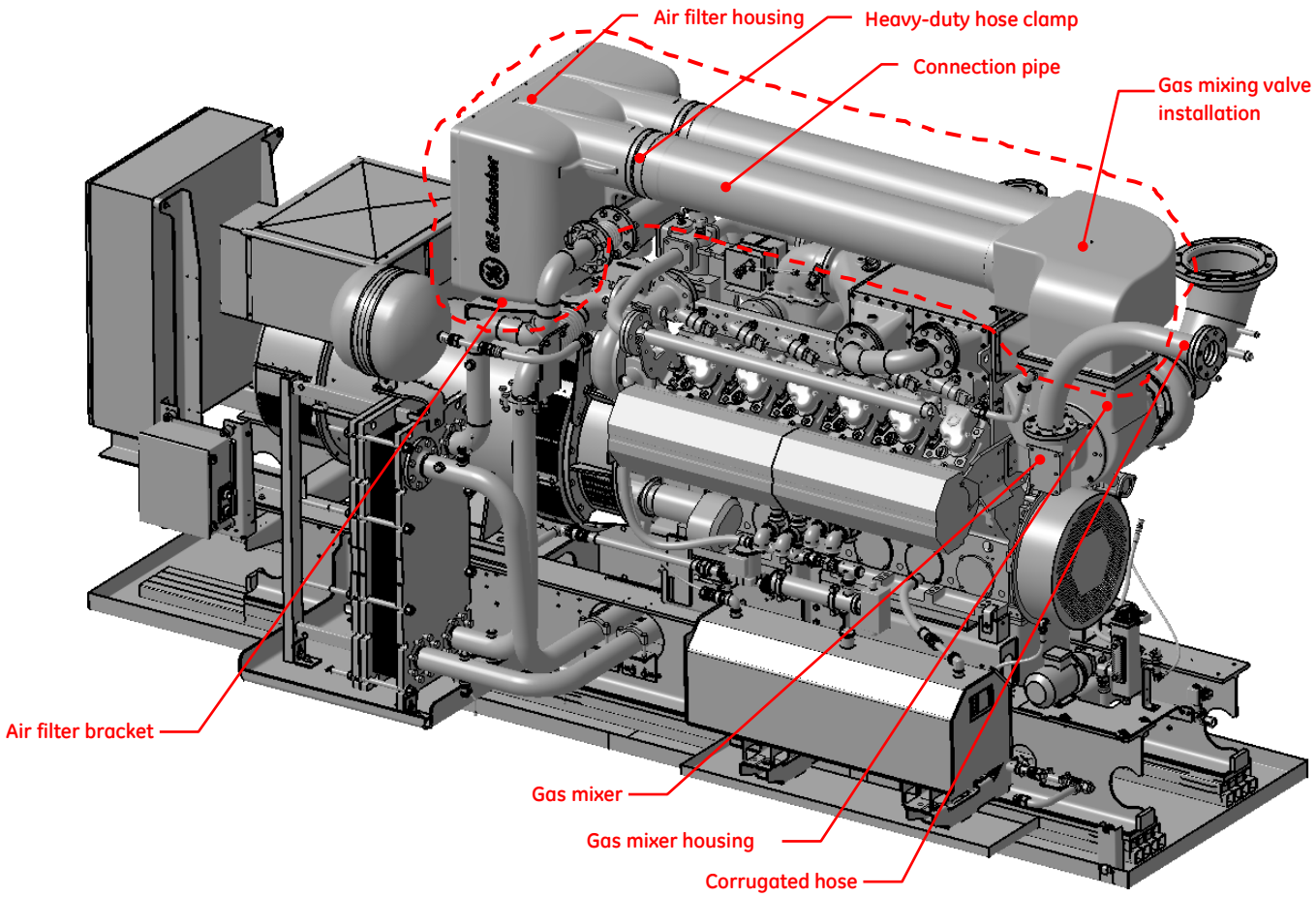


Figure 2: Removing the connecting pipe, air filter and air filter bracket

The heavy-duty hose clamps that connect the connecting piping to the air filter housing are removed. The bolted joints that secure the air filter housing to the air filter bracket are then undone. The air filter housing can then be removed. After the air filter housing has been removed, the connecting piping can be very easily pulled out of its seat in the gas mixer valve hood. The gas mixing valve hood is bolted to the gas mixer housing. These bolts are undone and the gas mixing valve hood can be removed.

Now all the necessary components for dismantling the long block must be removed.
When removing the water and oil piping, make sure that the piping is drained first!

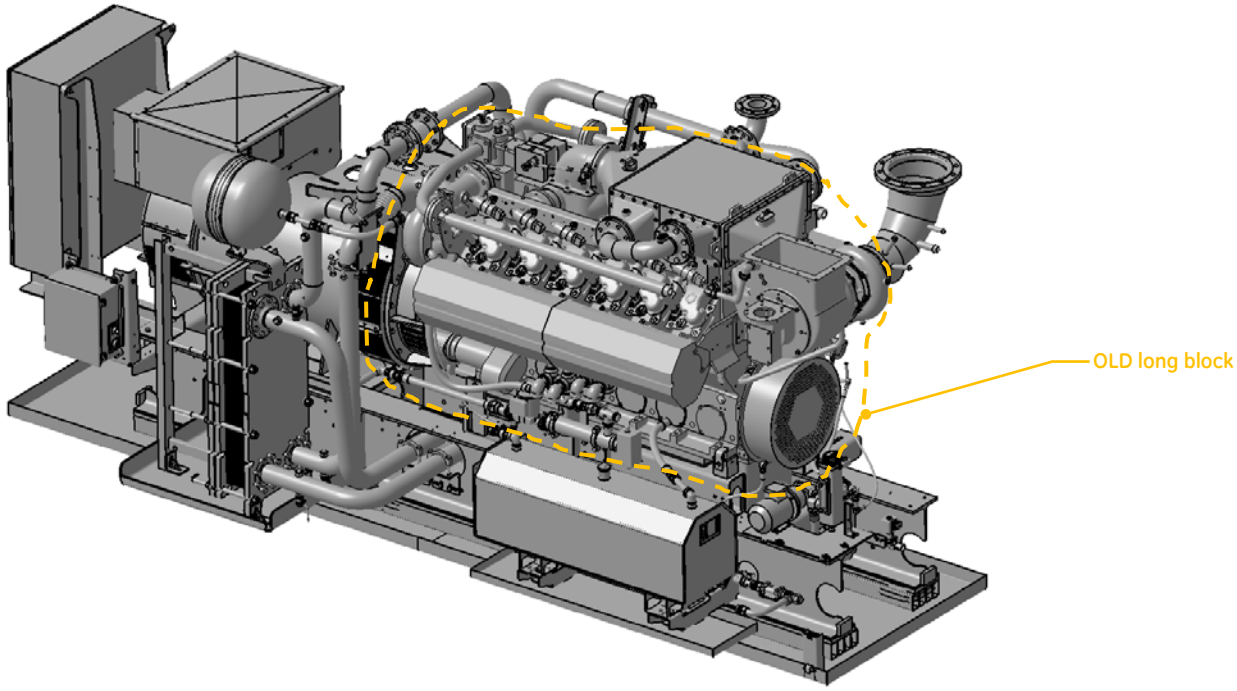


Figure 3: Dismantling the old long block

After the "old" long block has been dismantled, the "new" long block is assembled. In addition, the components previously removed such as the air filter housing, connecting piping and MC components are refitted.

MC ... mixture cooler

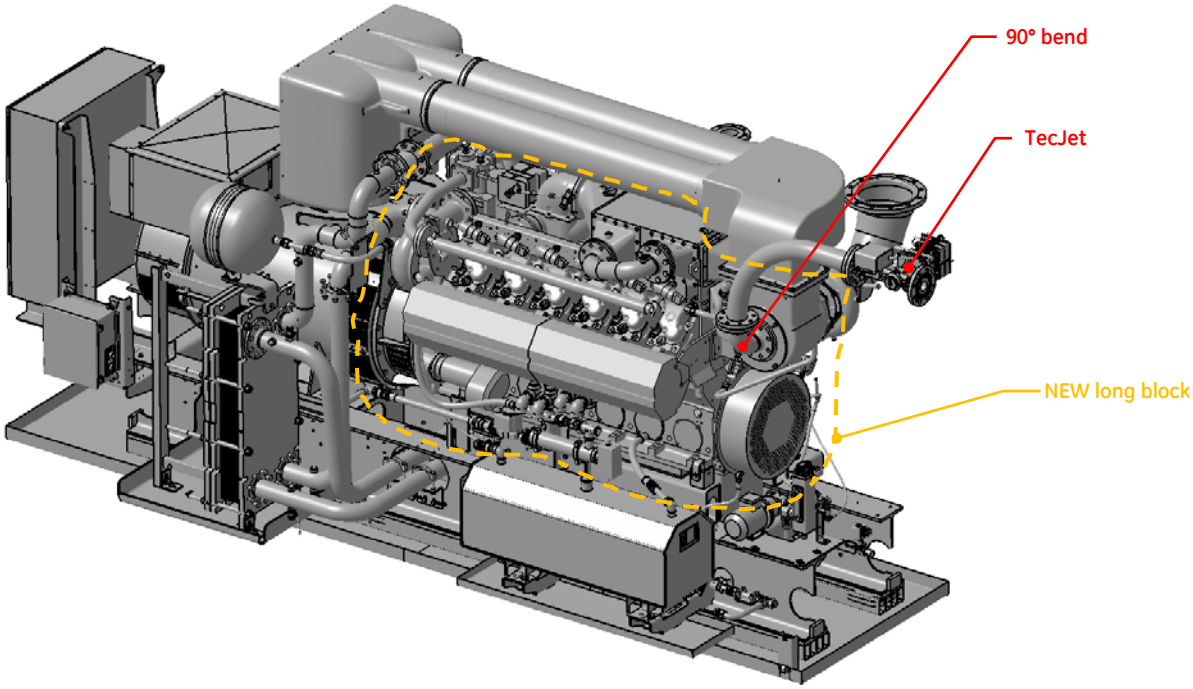


Figure 4: Module after assembly of the new long block

Figure 4 shows the engine with the new gas mixer housing and TecJet. The TecJet is joined to the gas mixer housing by a corrugated metal hose and a 90° bend.

Note: The piping and engine cooling water pump is not shown in either of the above two Figures.

2.1.2 Conversion to an electric water pump (without oil cooler)

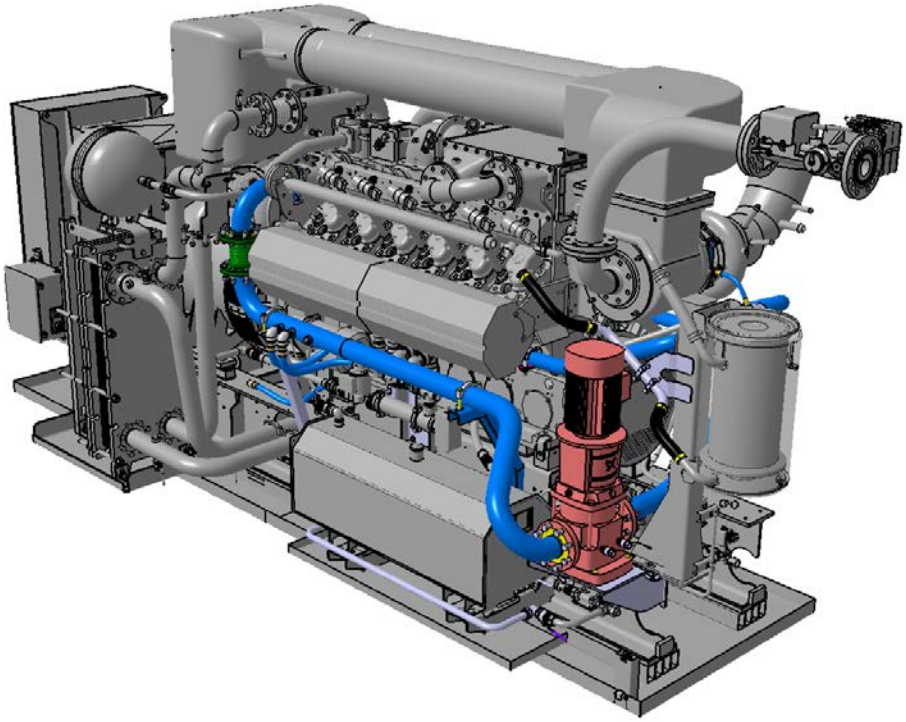


Figure 5: Engine cooling water pump including piping (1)

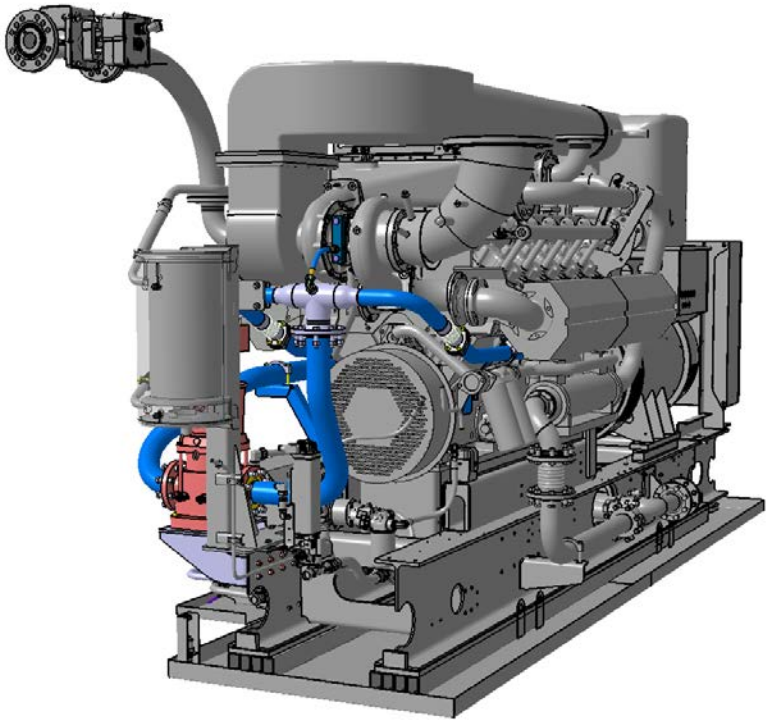


Figure 6: Engine cooling water pump including piping (2)

When converting to an electrically-powered engine cooling water pump, a few adaptations must be made (see Section 2.1.2.1). Figure 5 and Figure 6 show the engine cooling water pump after fitting, with its associated piping.

2.1.2.1 Fitting the bracket for the engine cooling water pump

Holes must be drilled in the module frame to mount the engine cooling water pump bracket. Test conversions have shown that for this work step the positions of these holes is best adapted to the prevailing circumstances at the individual plant by means of a template.

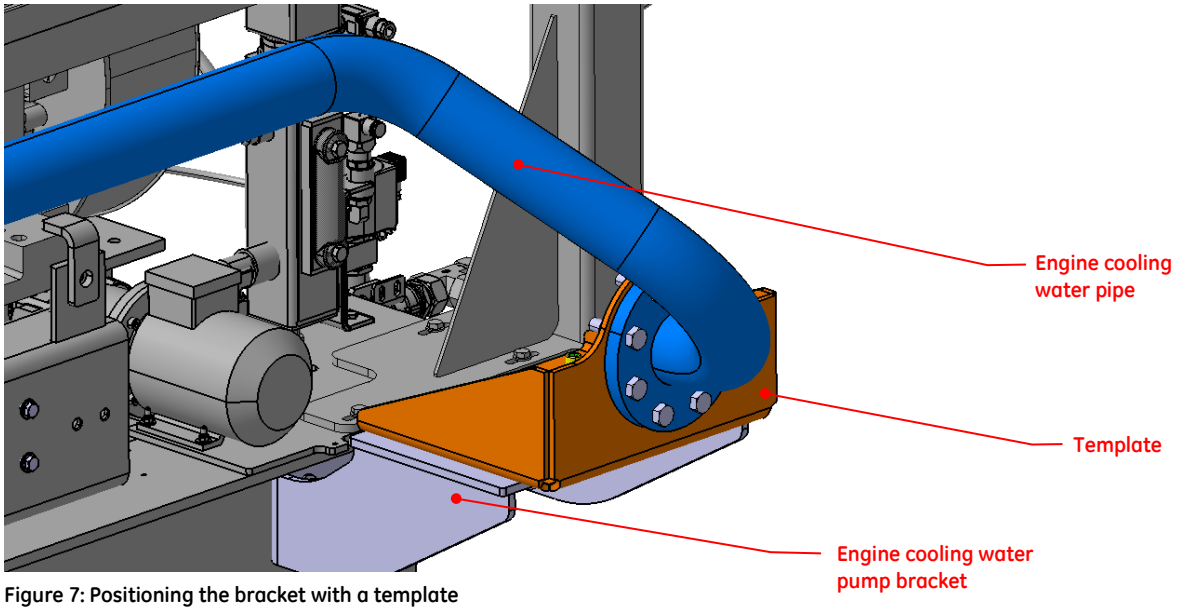


Figure 7: Positioning the bracket with a template

As stated above, the prevailing circumstances may vary slightly from plant to plant and the position of the engine cooling water pump bracket must be adapted individually. As the engine cooling water pump has a weight of 138 kg, it is advisable to work with the template provided (see Figure 7). This points out the connecting and mounting points of the engine cooling water pump.

The following course of action is advised:

1. Dismantle the engine cooling water piping on one side and suspend it from a hoist with lifting strops (see Figure 8).
2. Fit the template on the engine cooling water pump bracket
3. Align the template flange face to face with the cooling water pipe flange and bolt it in place → optimal position for the engine cooling water pump bracket on the module frame
4. Secure the engine cooling water pump bracket to the module frame with screw clamps
5. Mark the holes to be drilled (see Figure 9)
6. Drill the required holes (see Figure 10, right)

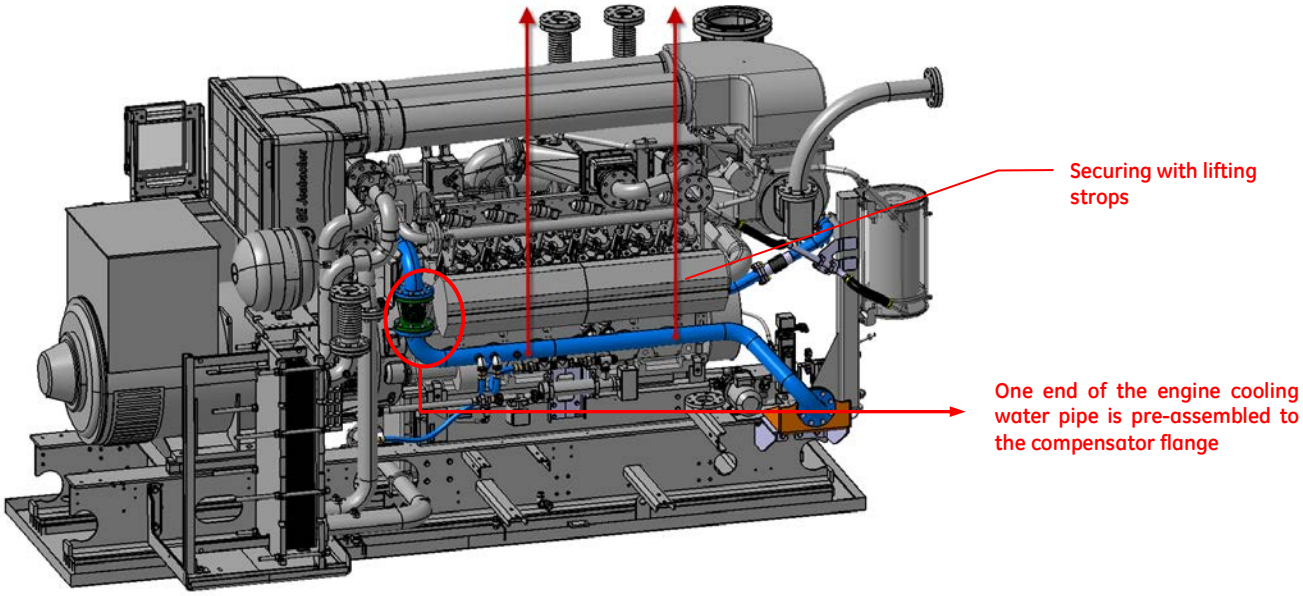


Figure 8: Securing the cooling water pipe with lifting strops

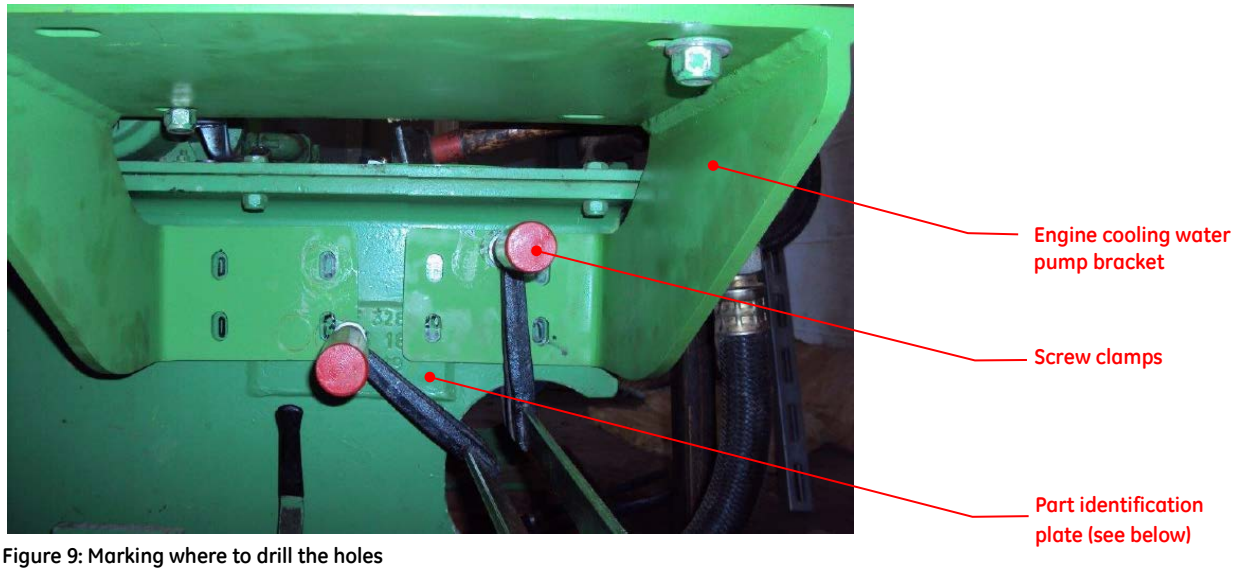


Figure 9: Marking where to drill the holes

As can be seen in Figure 9, the ECW pump bracket may have to be positioned at exactly the place where the module frame part identification plate is situated. In this case, the plate must be removed (see Figure 10).

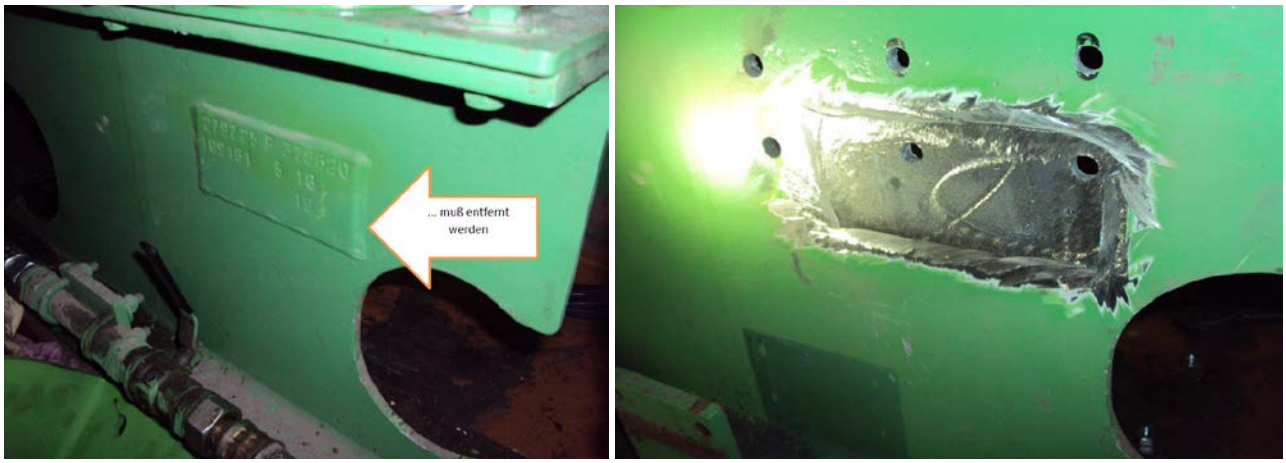


Figure 10: Removing the part identification plate on the module frame

Figure 11 shows the cooling water piping assembly including the cooling water pump. The areas marked in red show the positions of the holes that need to be drilled. The hole diameters and spacing are shown in the detailed drawings in Figure 11. The drawing will be made available together with this Service Technician Instruction (e.g. on the Jenbacher web portal) so that it can be printed out in a larger format. The dimensions on site may vary from those on the drawing, depending on the circumstances at the individual plant. It is therefore recommended that the positions of the required holes in the frame be ascertained using a template, as described above.

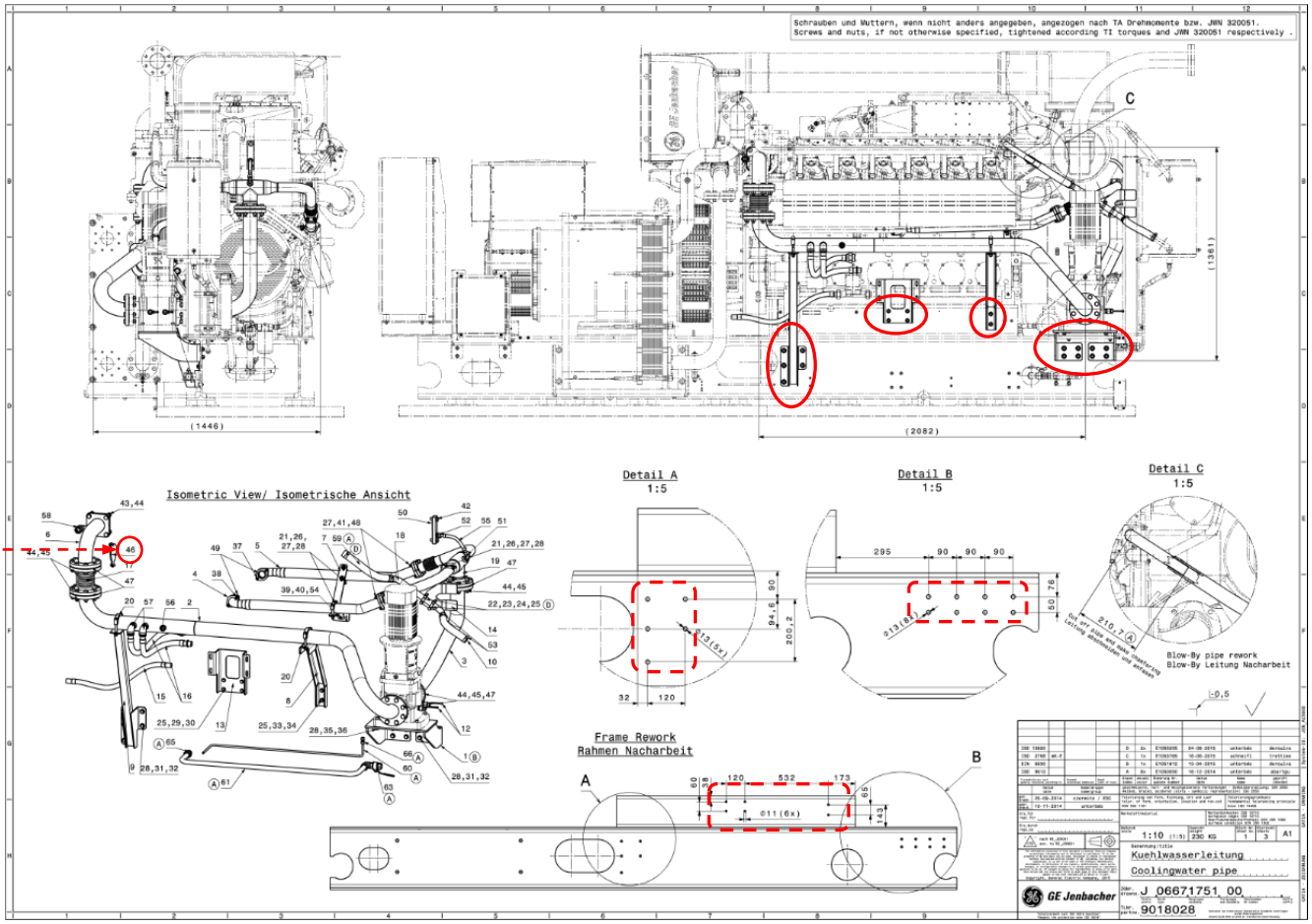


Figure 11: Drawing - cooling water pipe for electric engine cooling water pump (1)

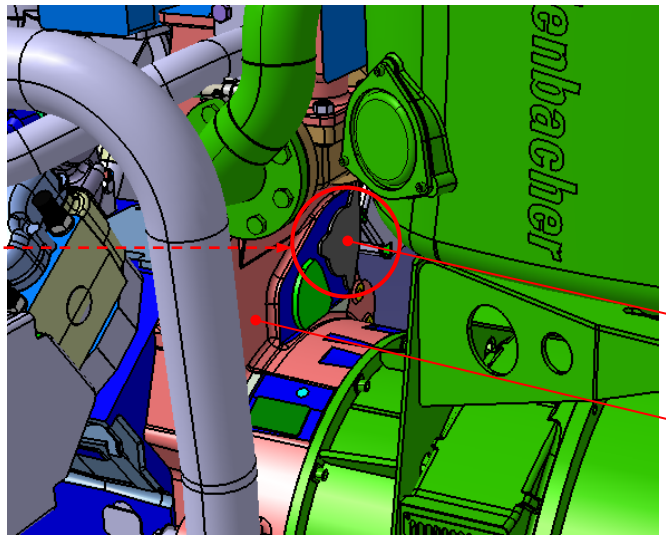


Figure 12: Closing off the gear train housing

After removing the mechanical water pump, there is an opening in the gear train housing (see Figure 12). This must be closed off by a blanking plate (no. 46 in Figure 11).

2.1.2.2 Moving the oil sight glass and pressure transducer

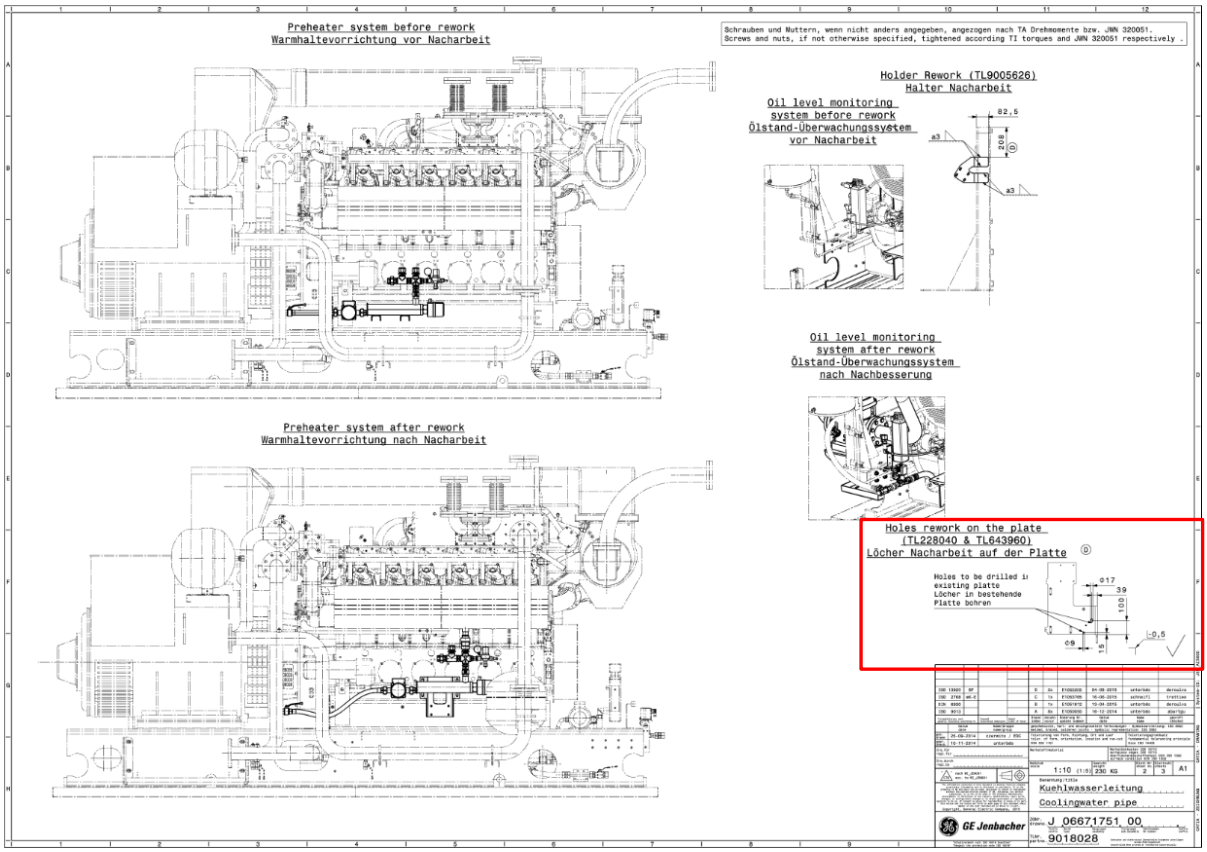


Figure 13: Drawing - cooling water pipe for electric engine cooling water pump (2)

The cooling water piping assembly including the cooling water pump is mounted as shown in drawing part no. 9018028. The drawing is available as a separate file (Jenbacher web portal, together with ST-181).

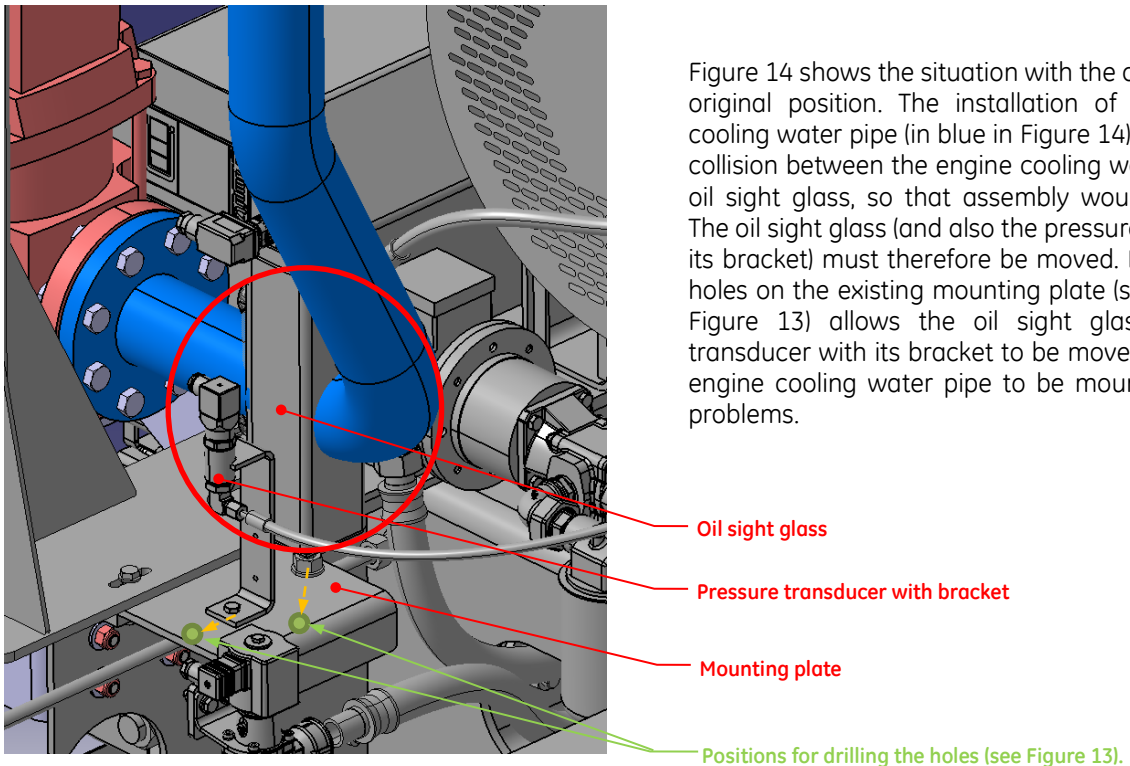


Figure 14: Collision between the ECW pipe and the oil sight glass

Figure 14 shows the situation with the oil sight glass it its original position. The installation of the new engine cooling water pipe (in blue in Figure 14) would result in a collision between the engine cooling water pipe and the oil sight glass, so that assembly would be impossible. The oil sight glass (and also the pressure transducer with its bracket) must therefore be moved. Drilling additional holes on the existing mounting plate (see the red box in Figure 13) allows the oil sight glass and pressure transducer with its bracket to be moved. This allows the engine cooling water pipe to be mounted without any problems.

2.1.2.3 Rotating the oil filter differential pressure sensor

When fitting the oil filter differential pressure sensor, note that the pressure sensor must be rotated into a specific position to avoid a collision with the new cooling water pipe.

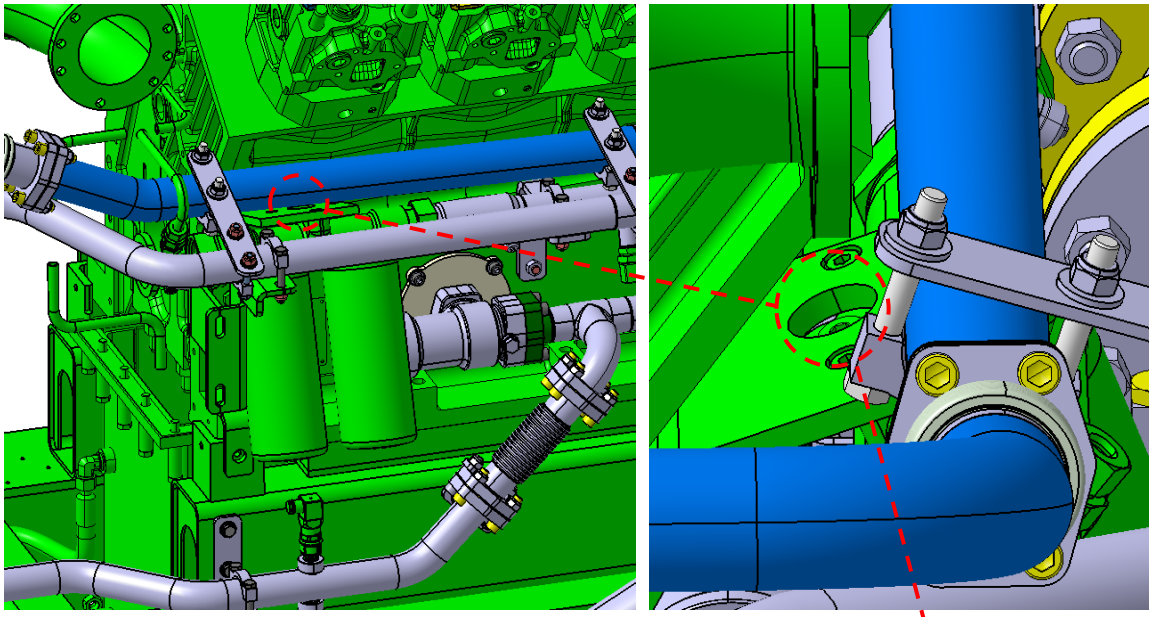


Figure 15: Position of the oil filter differential pressure sensor

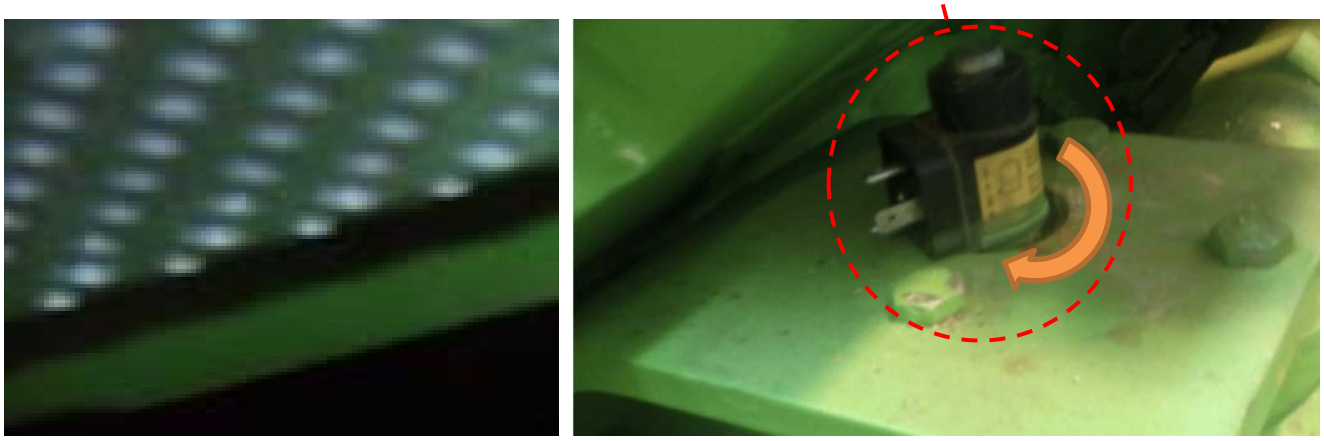


Figure 16: Fitting the oil filter differential pressure sensor

Figure 16 shows the installation of the oil filter differential pressure sensor. The photo on the left shows the cable connection in the direction of the ECW pipe, which causes a collision. However, if the pressure sensor is rotated clockwise as shown in Figure 16, this problem is solved.

2.1.2.4 Oil tank modification on J312 engines (option)

The oil tank may be mounted directly on the module frame (Figure 17). If this is the case, a collision - or assembly problems - would result during the conversion. The oil tank would collide with the ECW pump or its bracket, as shown in Figure 17. The oil tank must therefore be rotated through 180° before the bracket and ECW pump are mounted. Since the oil tank feet are welded asymmetrically, this problem can be solved by rotating the oil tank (see Figure 17 and Figure 18).

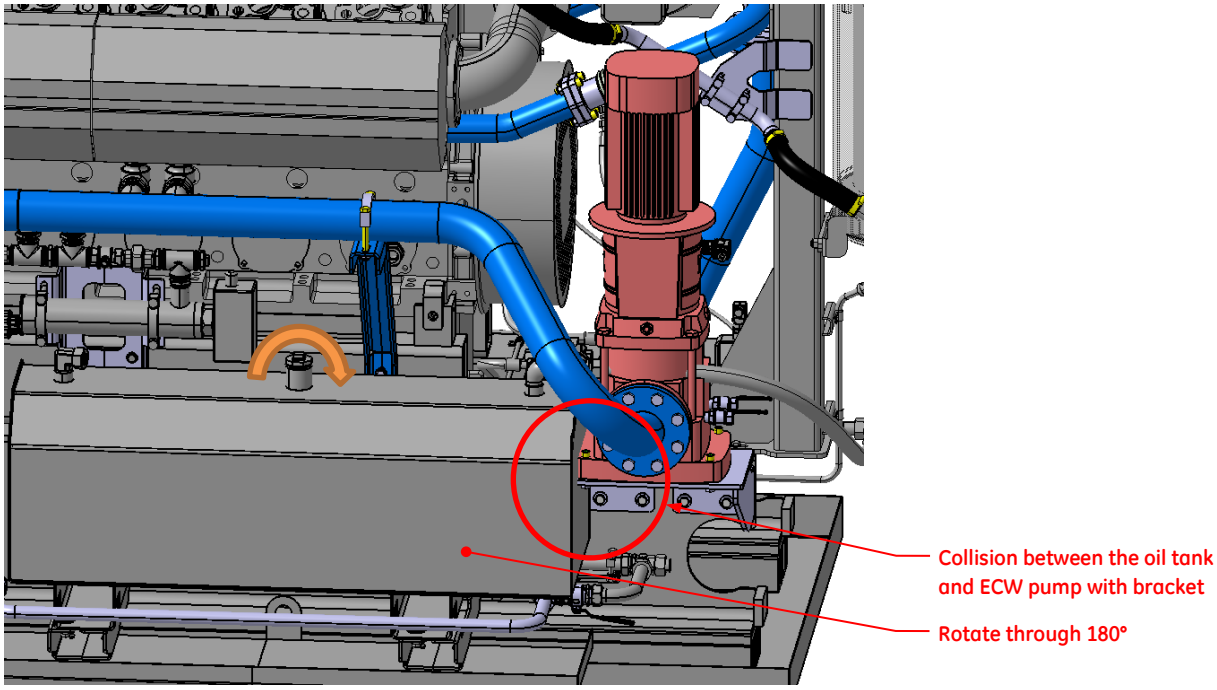


Figure 17: Collision between the oil tank and ECW pump with bracket

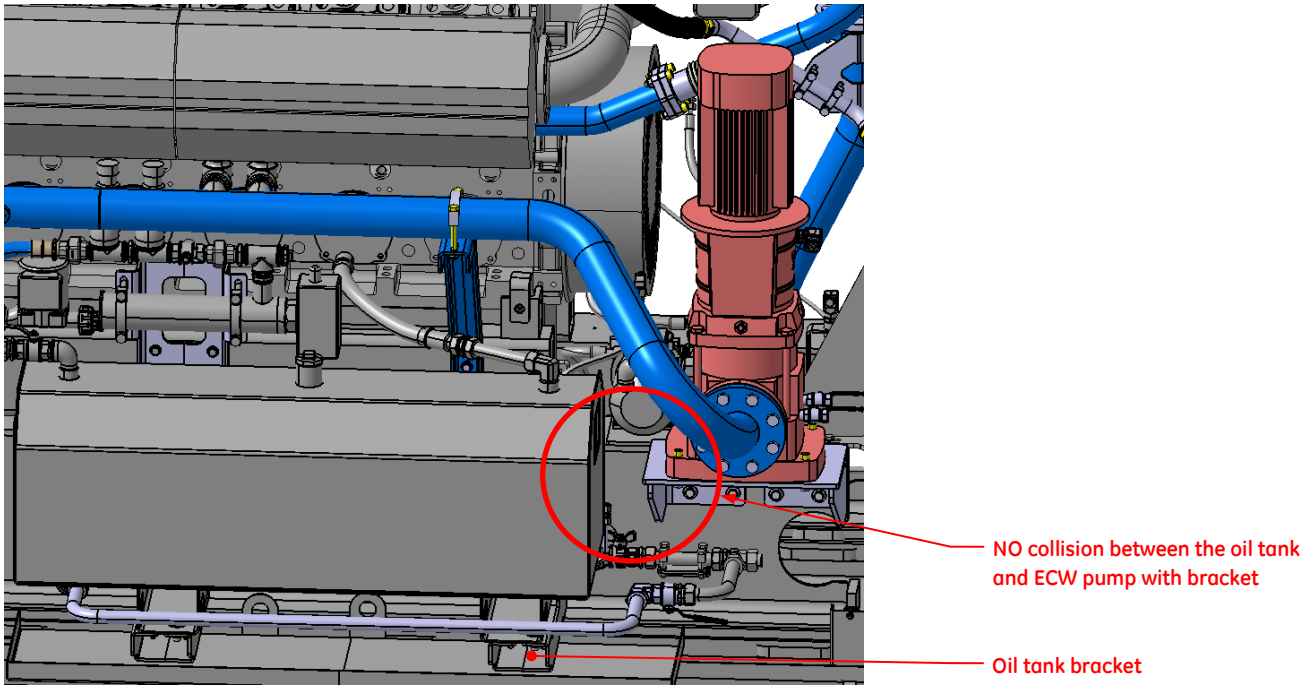


Figure 18: Mounting the oil tank after the conversion

Figure 18 shows the oil tank after it has been rotated (through 180°). A collision between the oil tank and the ECW pump with its bracket has been avoided by rotating the oil tank. The positions of the brackets (upon which the oil tank is mounted) remain the same, only the oil tank has been rotated.

2.1.2.5 Mounting the engine cooling water pump and engine cooling water piping

The engine cooling water pump and engine cooling water piping are now mounted. The assembly of the entire subassembly is shown in Figure 11. The drawing is available in the Jenbacher web portal as a PDF file. This allows it to be printed out in enlarged form in various formats.

2.1.3 Conversion to an electric water pump (with oil cooler)

If an engine with an oil cooler is being converted, the module frame must be extended. This is necessary to be able to mount both the cooling water pump and the oil cooler on the module frame. The module frame only needs to be extended for J312 engine with an oil cooler.

To do this, an adapter plate (no. 192, Figure 19) must be welded to each longitudinal member of the module frame.

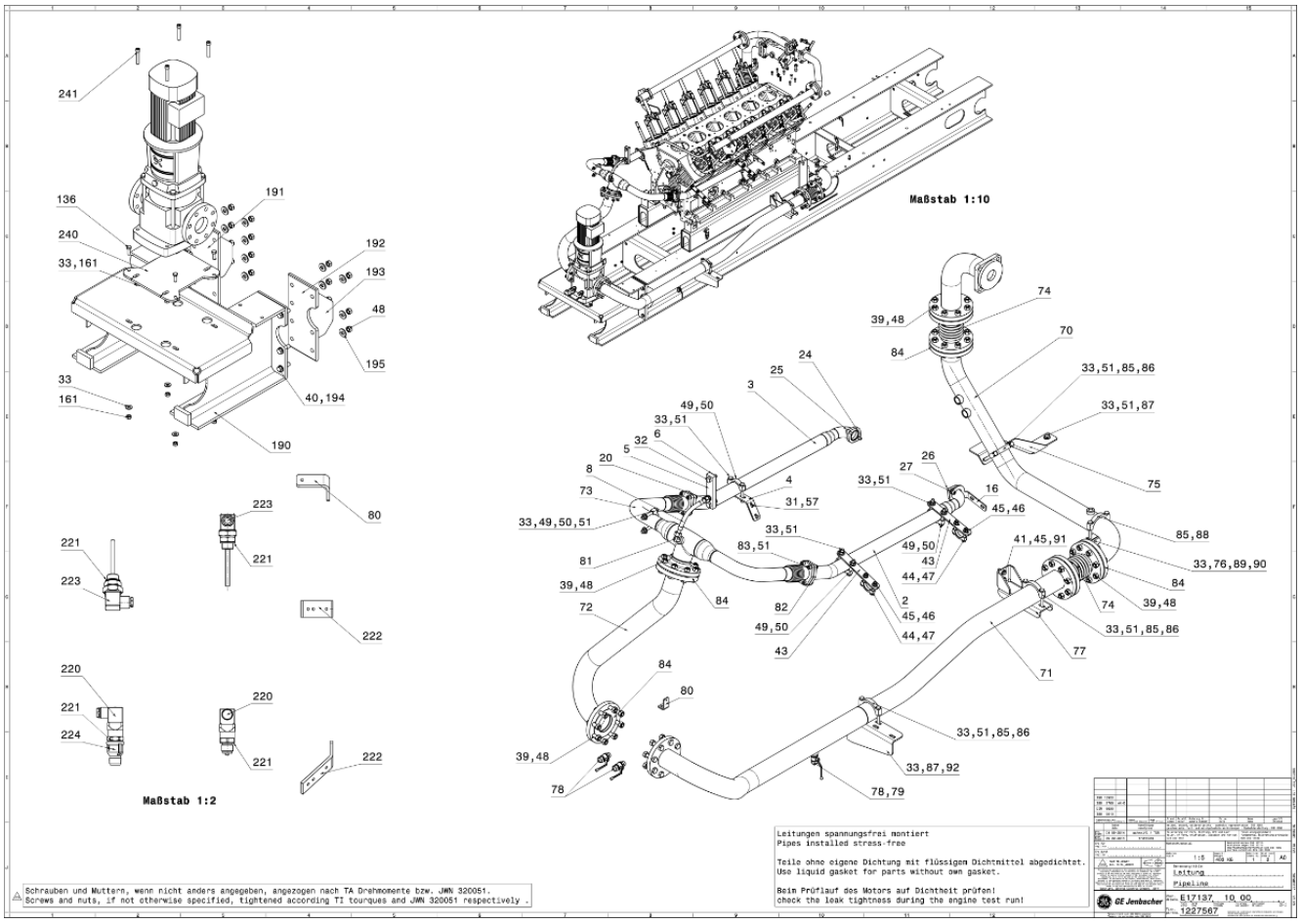


Figure 19: Drawing - electric engine cooling water pump with cooling water pipe and frame extension (1)

Caution:

In the event a conversion of this kind necessitating extending the frame, the necessary welding work must be carried out by a qualified welder!

2.1.3.1 Extending the module frame

See Figure 19.

2.1.3.2 Rotating the oil filter differential pressure sensor

See Section 2.1.2.3.

2.1.3.3 Mounting the engine cooling water pump

See Figure 19.

2.1.3.4 Mounting the engine cooling water piping

See Figure 19.

2.1.3.5 Mounting the oil cooler

See Figure 20.

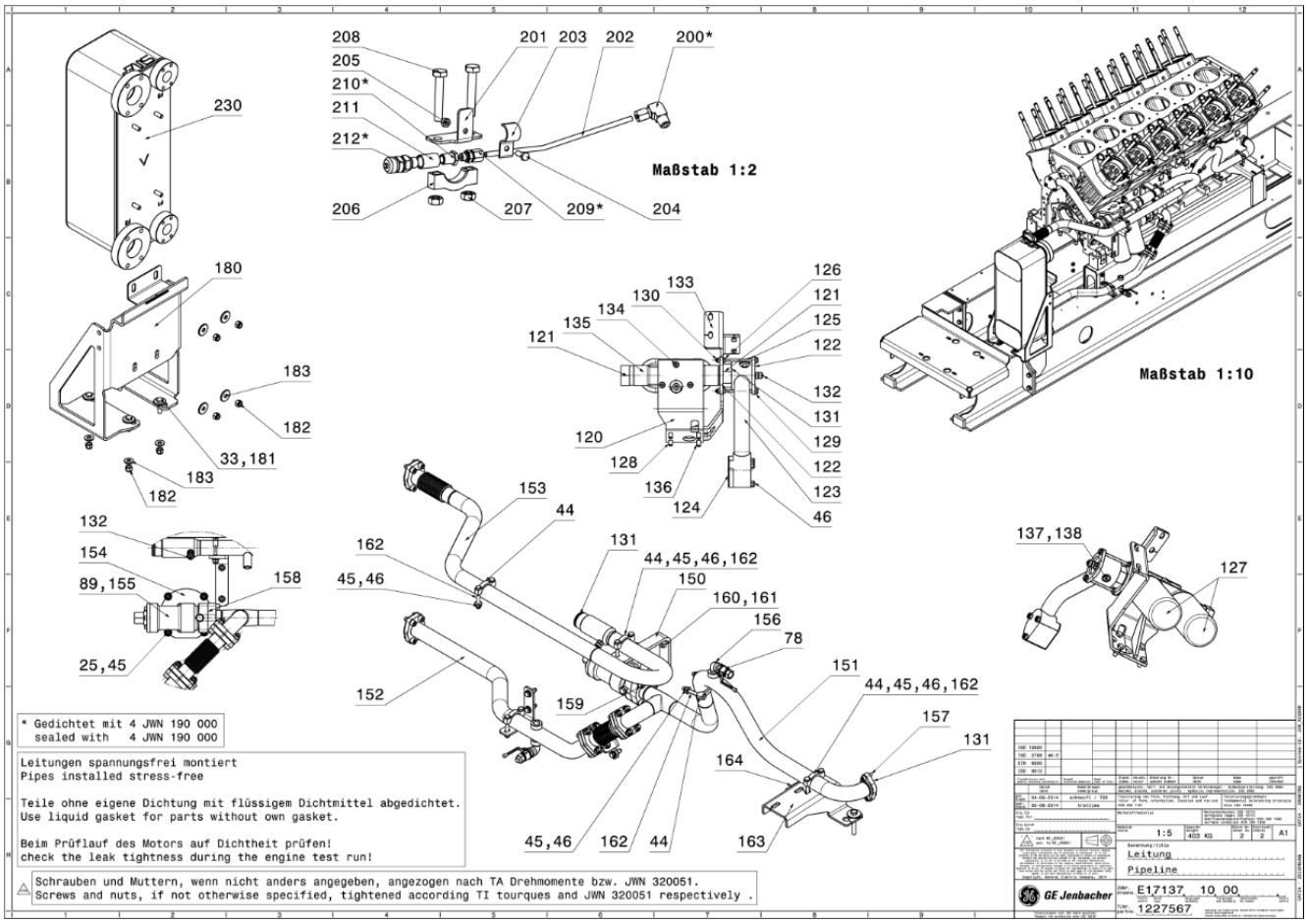


Figure 20: Drawing - electric engine cooling water pump with cooling water pipe and frame extension (2)

The cooling water piping assembly including the electric ECW pump is mounted as shown in drawing part no. 1227567. The drawing in Figure 20 is attached to ST-181 in the Jenbacher web portal.

2.1.4 Fitting the new ignition box

The scope of supply of the long block also includes a new ignition box. Installation of the new ignition box is normally the same as for the old ignition box, i.e. the following installation positions are usual:

- **Installation position 1**

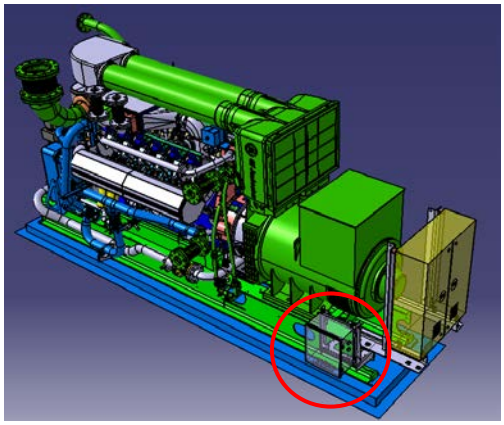


Figure 21: Ignition box position (1)

Interface cabinet is mounted transversely at the end. No exhaust gas heat exchanger.
→ Installation position of the ignition box as in Figure 21

- **Installation position 2**

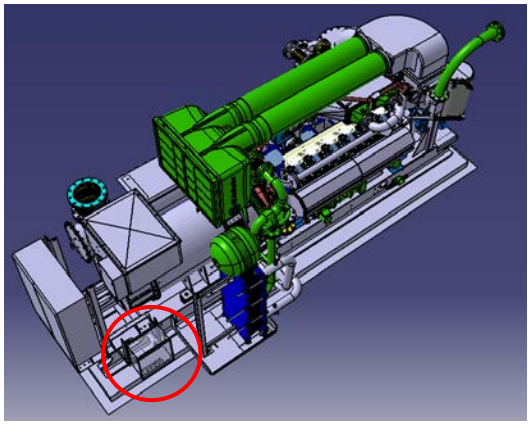


Figure 22: Ignition box position (2)

Interface cabinet is mounted transversely at the end. Exhaust gas heat exchanger present.
→ Installation position of the ignition box as in Figure 22

- **Installation position 3**

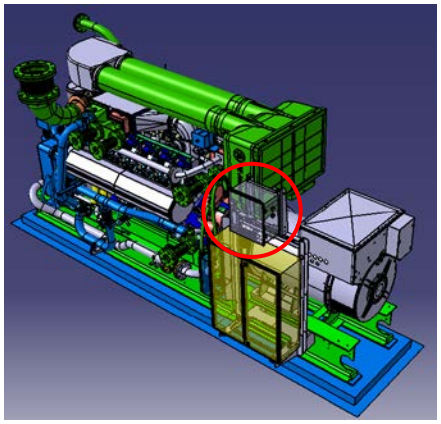


Figure 23: Ignition box position (3)

Interface cabinet is mounted on the side of the module frame.
→ Installation position of the ignition box as in Figure 23

- **Installation position 4**

A Unitrol box may need to be fitted as well. If this is the case, the procedure in Section 2.1.5 can be followed.

2.1.5 Fitting the Unitrol box (option)

A Unitrol box may need to be fitted. This depends on the generator used. If a Unitrol box has to be fitted, the ignition box can be removed and the Unitrol box mounted on the existing bracket for the ignition box. The ignition box must then be relocated accordingly. The new position of the ignition box does not depend on the module. Other additional components may be mounted on the module frame (e.g. oil tank), depending on the engine version. Consequently, no general position can be prescribed for the ignition box (+ bracket). The new position should always be chosen so that cable lengths are kept as short as possible and no collisions with other components can occur (e.g. when opening the ignition box door). The cables should be routed so that they cannot chafe against other components during operation (cables and cable protective sleeves can be damaged by vibration).

Figure 24: Ignition box position

Figure 24 shows the Unitrol box mounted on the side of the module frame (the interface cabinet is mounted transversely at the end). In this case, the console for the IC9xx ignition box is re-used. However, new holes must be drilled for the Unitrol box.

2.1.6 Affixing the new type plate

As this conversion changes the engine version, the type plate must also be changed accordingly. An "S" and "I" must be punched after the engine version designation. Roman numerals (I, II, III) are used for this as it allows any further changes to the type plate to be effected more easily (SI→SII, SII→SIII, etc.).

For example:

J 320 GS C25 - SI

Engine version

Figure 25: Type plate

Additional information:

- The "S" in SI, SII, SIII etc. stands for service.
- "I, II, III" ... stand for the respective upgrades. If there is a revision/change to the upgrade installed here and it is installed on this plant, the type plate must be modified accordingly (e.g. from SI to SII, etc.).

  - **J3xx-C:** Engines of type J312, J316 and J320, engine version C. Engine version C also as new plant.
  - **J3xx-D:** Engines of type J312, J316 and J320, engine version D. Engine version D also as new plant.
  - **J3xx-C-SI:** Engines of type J312, J316 and J320, engine version C, version upgrade SI. Engine is converted from the older version to this version.

2.1.7 Conversion to gas quantity controller (TecJet)

Conversion of an engine from version C to version D also entails fitting a gas quantity controller (TecJet) instead of a gas mixer as part of the conversion. The zero pressure controller and the gas mixer must be removed for this. The gas mixer housing shown in Figure 26 is already fitted to a long block when it is delivered. Figure 26 is intended to show the position of the inlet pipe clearly

When carrying out a conversion on site as part of a minor overhaul (in which case no long block is delivered), the gas mixer housing in Figure 26 must be fitted as part of the conversion.

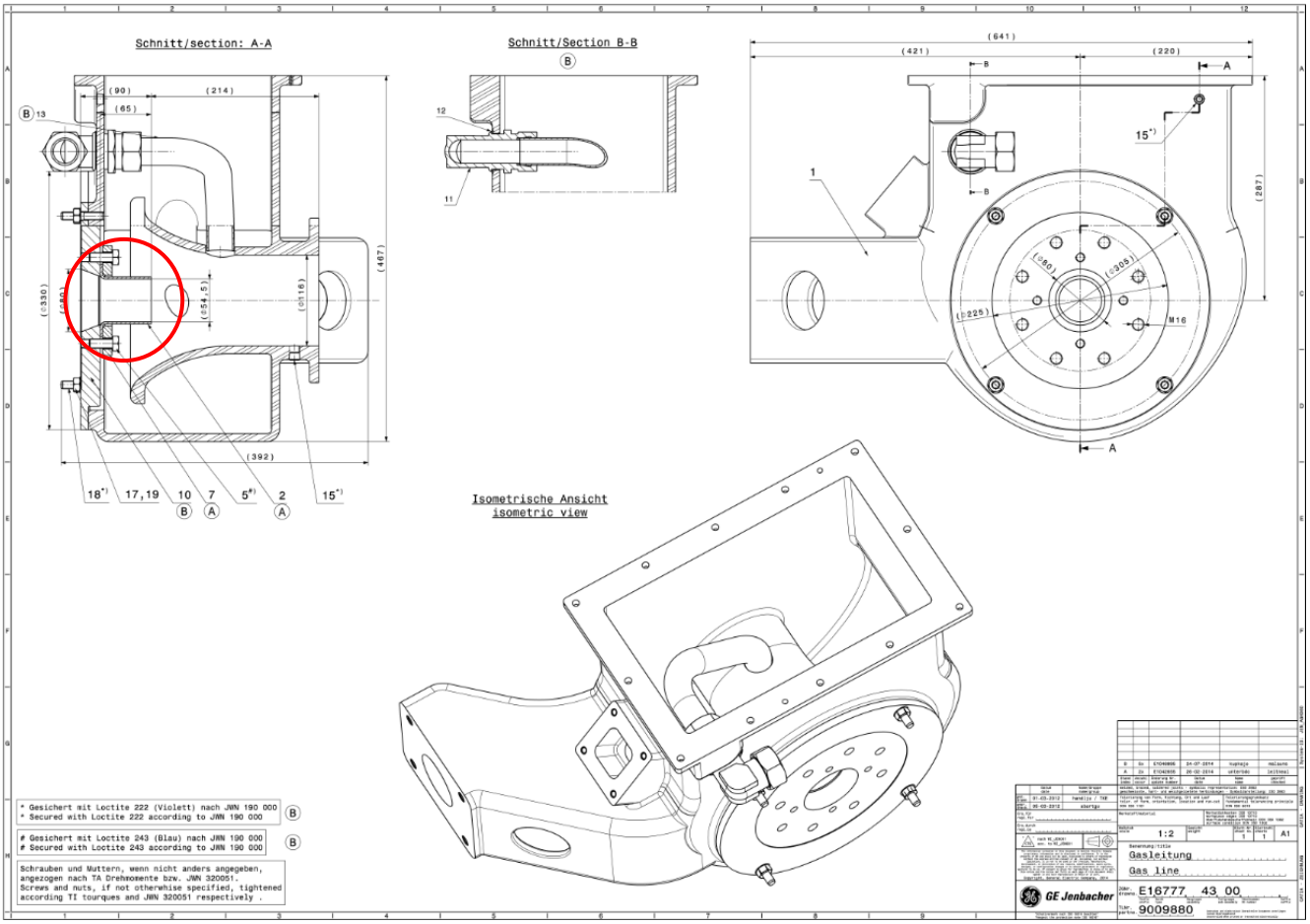


Figure 26: Gas mixer housing

Additional information:

Figure 26 shows the gas mixer housing when using a TecJet. A piece of piping (marked zone in Figure 26) is used for adjusting the crankcase vacuum in this case. The length of the piping depends on the engine version and type of gas.

More precise details on fitting the gas quantity controller (TecJet) and the selection of the inlet pipe and orifice can be found in Technical Instructions **TI 1503-0049** and **TI 1510-0064.**

2.1.8 Conversion to the new crankcase ventilation

The conversion to the new crankcase ventilation is described in detail in the Service Technician Instruction "**ST-092 – Conversion to the new crankcase ventilation**". If the new crankcase ventilation has already been fitted, this step is omitted.

2.1.9 Cabling for various components

The following components must be connected:

- TecJet
- Oil filter differential pressure sensor
- ECW pump
- Protective motor switch for ECW pump

2.1.10 Fitting the boost pressure sensor

It is essential that the charge pressure sensor p2' is an absolute pressure sensor, which may mean the sensor has to be replaced. This sensor is already fitted in the long block which is supplied. If conversion is being done on site (as part of a 30,000 hour overhaul), this sensor must be retrofitted as part of the conversion.

2.1.11 Software & Parameters

The software package is provided. The parameters provided must be imported into the control system.

2.1.11.1 DIANE XT / XT3

It is essential to change the following parameters:

Number of gas mixers	0 ...
Number of gas proportioning valves	1

Gas proportioning valve	-1

Gas proportioning valve\Gas type 1

vcFldParaText	Value	EuUnit
Oil temperature point 1	30	°C
Lambda point 1	1.4	
Oil temperature point 2	75	°C
Lambda point 2	1.4	
Lambda offset net parallel operation	0.3	
Lambda offset isolated operation	0.3	
Calorific value	9.971	kWh/
Minimal air requirement	9.54	l/l
Standard gas density	720 ...	g/m3

Gas proportioning valve\Gas type 2

vcFldParaText	Value	EuUnit
Oil temperature point 1	30 ...	°C
Lambda point 1	1.4	
Oil temperature point 2	75	°C
Lambda point 2	1.4	
Lambda offset net parallel operation	0.3	
Lambda offset isolated operation	0.3	
Calorific value	9.971	kWh/
Minimal air requirement	9.54	l/l
Standard gas density	720	g/m3

Gas proportioning valve\Gas type 3

vcFldParaText	Value	EuUnit
Oil temperature point 1	30	°C
Lambda point 1	1.4	
Oil temperature point 2	75	°C
Lambda point 2	1.4	
Lambda offset net parallel operation	0.3	
Lambda offset isolated operation	0.3 ...	
Calorific value	9.971	kWh/
Minimal air requirement	9.54	l/l
Standard gas density	720	g/m3

Gas proportioning valve\Gas type 4

vcFldParaText	Value	EuUnit
Oil temperature point 1	30 ...	°C
Lambda point 1	1.4	
Oil temperature point 2	75	°C
Lambda point 2	1.4	
Lambda offset net parallel operation	0.3	
Lambda offset isolated operation	0.3	
Calorific value	9.971	kWh/
Minimal air requirement	9.54	l/l
Standard gas density	720	g/m3

Gas proportioning valve

vcFldParaText	Value	EuUnit
Volumetric efficiency	0.76	

2.1.11.2 DIANE BLUE

CONFIG

10	*	VISIBILITY TECJET		1	

MIXTURE

18	*	SKALPUNKT p2' 4mA Skalierung Ladedruck bei 4mA scale boost-pressure at 4mA	0	[bar]	[X]
19	*	SKALPUNKT p2' 20mA Skalierung Ladedruck bei 20mA scale boost-pressure at 20mA	6	[bar]	[X]

MOT_DAT

23	*	ANZAHL GASMISCHER No. of gasmixers	0	1	[X]

LOX_PARA

4	*	ZZP LADEDRUCKKOMP.		1	
11	*	t2' LADEDRUCKKOMP.		1	

TecJet:

10	*	TOEL P1 GAS 1 Öltemperatur 1 bei Start oiltemperature 1 at cranking	**30** [°C]
11	*	TJ P1 GAS 1 Gemischlambda für Öltemperatur 1 bei Start mixture lambda for oiltemperature 1 at cranking	**1,4**
12	*	TOEL P2 GAS 1 Öltemperatur 2 bei Start oiltemperature 2 at cranking	**75** [°C]
13	*	TJ P2 GAS 1 Gemischlambda für Öltemperatur 2 bei Start mixture lambda for oiltemperature 2 at cranking	**1,4**
14	*	TJ MIN/MAX DP GAS 1 Regelbereich Gemischlambda für optimale Drosselklappenposition control range mixture lambda for optimized throttle valve position	**0,1**
15	*	DR SOLL GAS 1 Drosselklappensollposition throttle valve position	**10** [%]
16	*	TJ OFFSET NETZ GAS 1 Offset Gemischlambda für Netzparallelbetrieb mixture lambda offset for mains parallel operation	**0,3**
17	*	TJ OFFSET INSEL GAS 1 Offset Gemischlambda für Inselbetrieb mixture lambda for island mode	**0,3**
18	*	HEIZWERT G1 Heizwert des Treibgases caloric value of fuel gas	**9,971** [kWh/Nm3]
19	*	NORMGASDICHTE G1 normierte Dichte des Treibgases normalized specific gravity of fuel gas	**720** [g/m3]
20	*	MIN. LUFTBEDARF G1 Gaskenngröße des Treibgases (notwendige Menge Luft für Lambda=1 Verbrennung) characteristic parameter of fuel gas (air demand for lambda=1 burning)	**9,54** [l/l]

The parameter values for the gas proportioning valves for gas types 2 - 4 can be taken directly from gas type 1 (parameters 14-20).

58	*	ANZAHL TECJET Anzahl der verbauten Gasdosierventile Tecjet am Motor number of Tecjet valves at the engine	**1**	**[X]**
59	*	LIEFERGRAD Volumetrischer Liefergrad volumetric effiency	**0,76**	

Conversion to MIC 940/950 ignition:

If an MIC is fitted instead of the IC9xx as part of the update from engine version C to D, the setting should be changed to 5 ignition pulses.

Engine version J3xx-D:

- same ignition system (MIC950 on the J316 and J320; MIC940 on the J312)
- All that has to be done is to change from **IC922** mode to **IC925** mode.
- IC925 mode: five ignition pulses per period – longer combustion durations are achieved

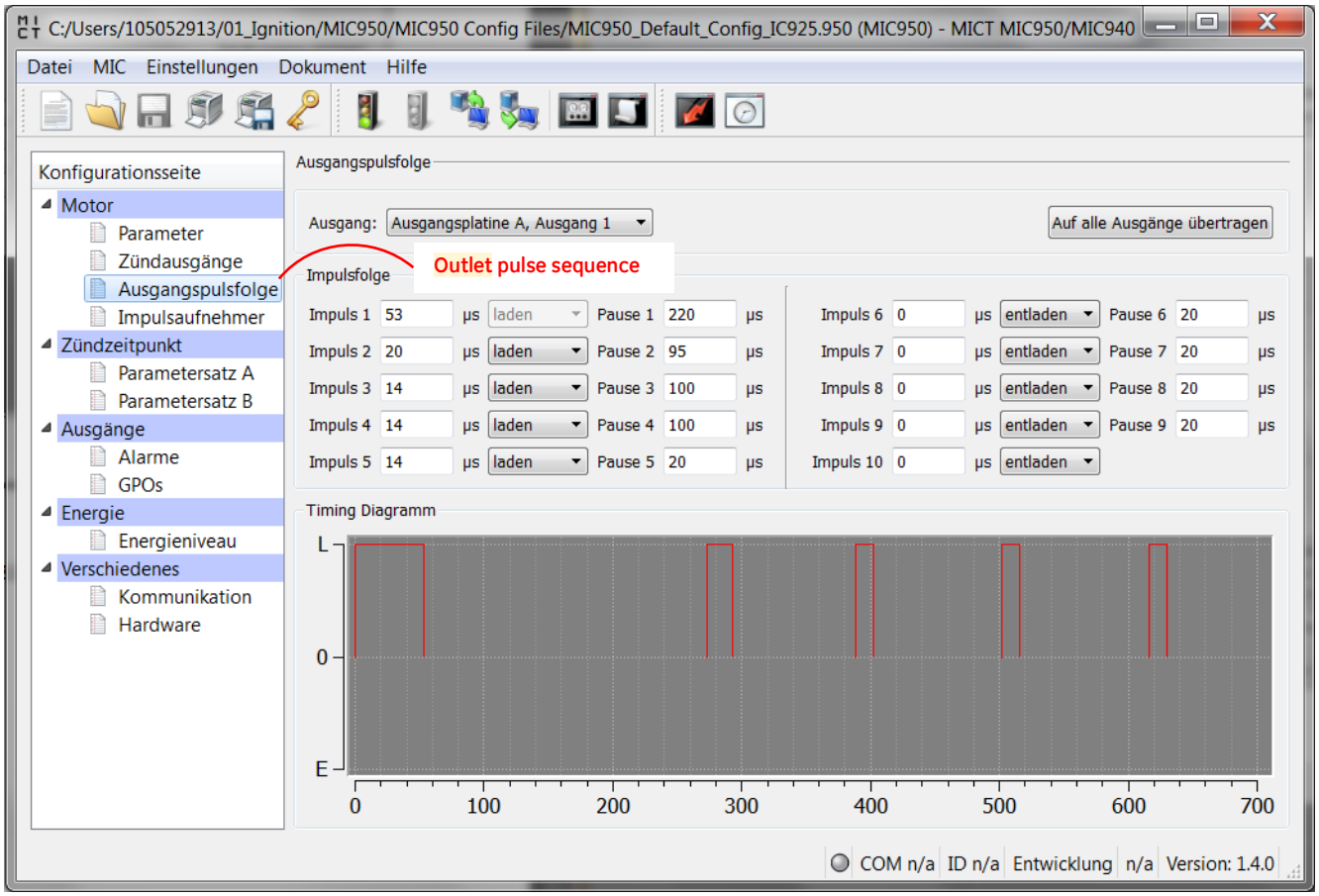


Figure 27: Setting the ignition modes (2)

In addition to the ignition pulse modification, as part of the conversion IC925 must be selected instead of IC922 in the "Miscellaneous - Hardware" drop-down menu:

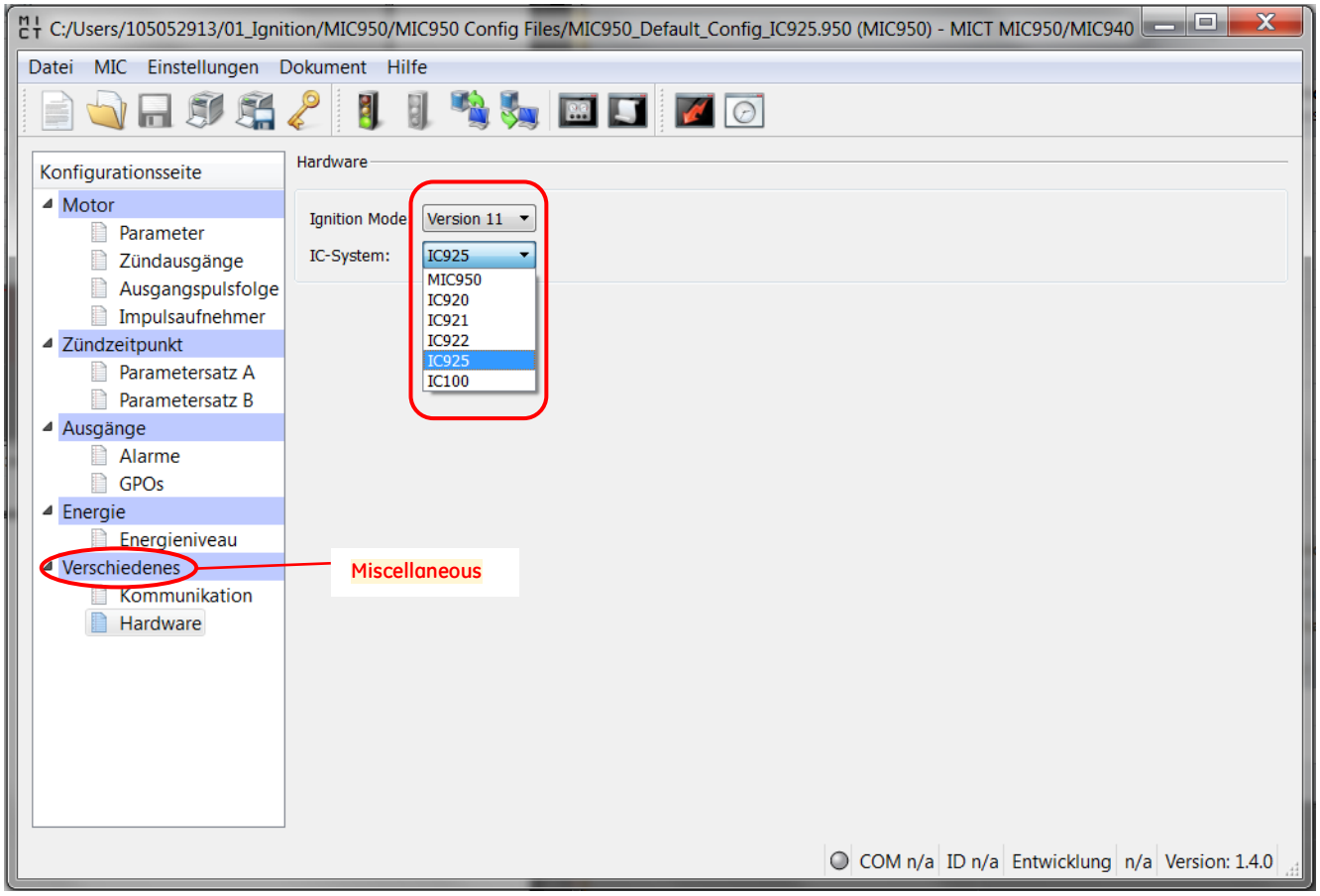


Figure 28: Setting the ignition modes (3)

2.2 Conversion as part of a minor overhaul

2.2.1 Procedure

A minor overhaul is carried out. In addition, the following list of items must be completed:

- cylinder head replacement if not included in the maintenance/overhaul
- camshaft conversion
- replacement of gas mixing housing (see Section 2.1.7)
- ignition (optional) - (see Section 2.1.9)
- exhaust gas turbocharger (optional)
- crankcase ventilation (optional)
- electric water pump (optional)
- ignition system (optional)

2.3 Conversion with delivery of a generating set

If a generating set is being supplied, only the TecJet needs be converted.

2.3.1 Procedure

In the first step the air filter housing, connecting pipes and gas mixing valve hood are removed. The gas mixer and corrugated metal hose are then also removed to allow the gas mixer housing to be removed.

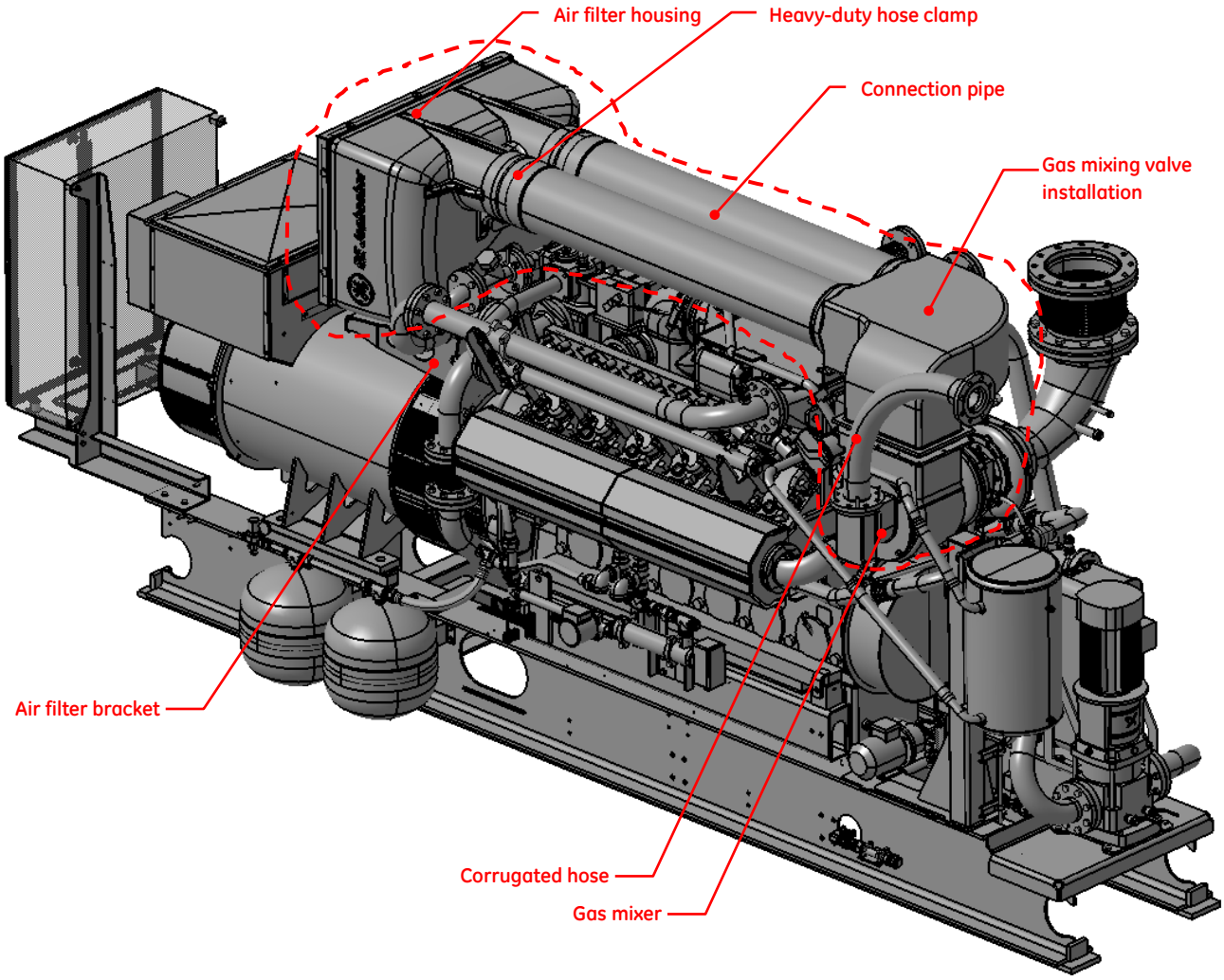


Figure 29: Removing the connecting pipe, air filter and air filter bracket

The heavy-duty hose clamps that connect the connecting piping to the air filter are removed. The bolted joints that secure the air filter to the air filter bracket are then removed. The air filter can then be removed. After the air filter housing has been removed, the connecting piping can be very easily pulled out of its seat in the gas mixer valve hood. The gas mixing valve hood is bolted to the gas mixer housing. These bolts are undone and the gas mixing valve hood can be removed.

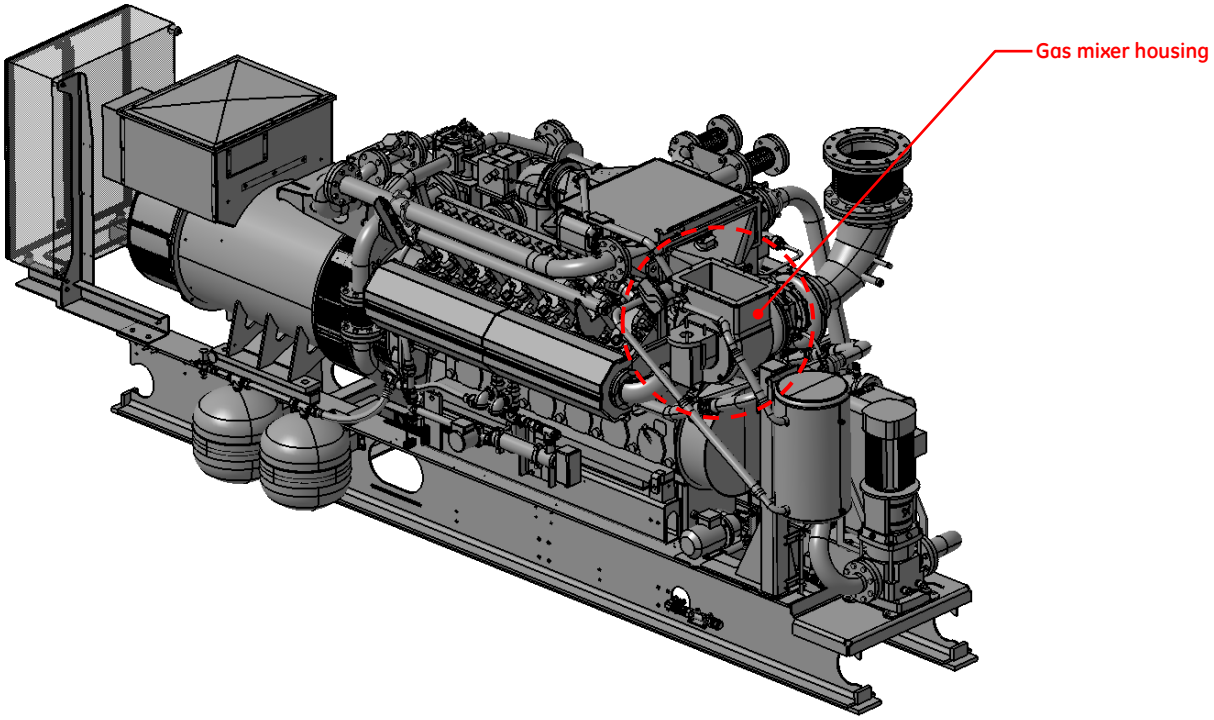


Figure 30: Removing the gas mixer housing

The "old" gas mixer housing can now be removed. The "new" gas mixer housing is then be fitted. After the gas mixing housing has been fitted, the components that were removed previously can be refitted (see Figure 31).
Finally, the camshaft can be changed and the optional new ignition system fitted.

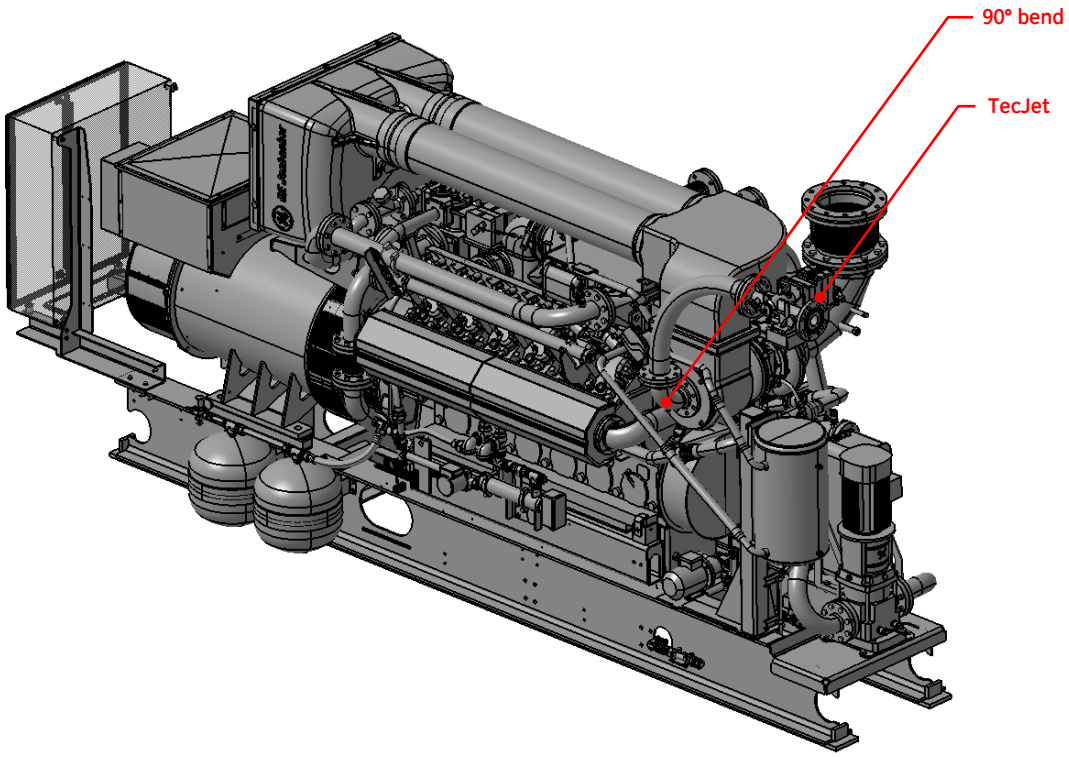


Figure 31: Engine after fitting the new gas mixer housing

Figure 31 shows the engine with the new gas mixer housing and TecJet. The TecJet is joined to the gas mixer housing by a corrugated metal hose and a 90° bend.

3 CONVERSION OF J316-C ENGINES AND J320-C ENGINES

The conversion of the J316 and J320 engines differs mainly from that of the J312 engines by the absence of an electric water pump, modification of the oil sight glass and pressure transducer, and rotating of the extra oil tank. The work steps for the remaining procedures remain the same. Consequently, the following points only contain references to the sections already discussed.

Shut down the engine in accordance with Technical Instruction No. 1100-0105 and secure it against inadvertent restarting in accordance with Technical Instruction No. 2300-0010.
Observe the safety and hazard advice in the safety instructions (TI 2300-0005) and wear the appropriate personal protective equipment.

Note:

The components must be individually adapted on site and subassemblies adapted to the prevailing conditions at the plant.

The following possibilities exist with this conversion:

- conversion with delivery of a long block
- conversion with delivery of a generating set
- conversion on site as part of a minor overhaul

3.1 Conversion with delivery of a long block

As with J312 engines, a long block can be delivered on site. The following points must then be carried out:

3.1.1 Rotating the oil filter differential pressure sensor

See Section 2.1.2.3.

3.1.2 Fitting the new ignition box

See Section 2.1.4.

3.1.3 Affixing the new type plate

See Section 2.1.6.

3.1.4 Conversion to gas quantity controller (TecJet)

See Section 2.1.7.

3.1.5 Conversion to the new crankcase ventilation

See Section 2.1.8.

3.1.6 Software & Parameters

See Section 2.1.11.

3.2 Conversion as part of a minor overhaul

3.2.1 Procedure

➔ Only as an addition to a minor overhaul

- cylinder head replacement if not included in the maintenance/overhaul
- camshaft conversion
- gas mixer housing (see Section 2.1.7)
- ignition (optional) - (see Section 2.1.9)
- exhaust gas turbocharger (option)
- crankcase ventilation (option)
- electric water pump (optional)
- ignition system (option)

The procedure here is the same as in Section 2.2.

3.3 Conversion with delivery of a generating set

3.3.1 Procedure

If a generating set is being supplied, only the TecJet need be converted. This procedure has already been described in Section 2.3.

4 FILLING IN THE COMMISSIONING CHECK LIST

At the end of the conversion, the initial commissioning check list must be filled in. The parameter and log files must be backed up and sent back to Jenbach.

5 WEIGHTS OF THE COMPONENTS TO BE FITTED

The following table shows an overview of all the components with large weights (over 25 kg). Hoists (as and when available) should be used when fitting these components.

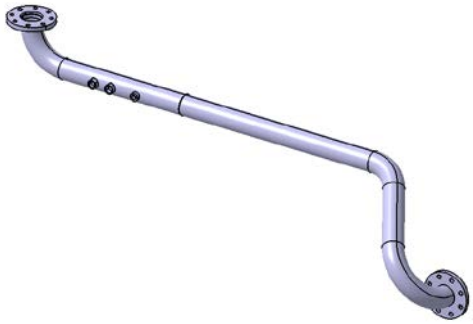
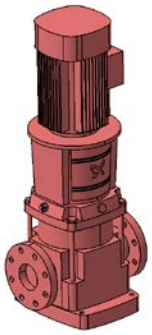
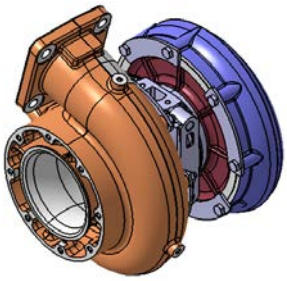
Description	Part No.:	Weight in kg	Illustration
Cooling water pipe	9018063	25	
ECW pump	402916	138	
Exhaust gas turbocharger	610319	65	

Table 1: Overview of the weights of the components

6 PARTS LISTS

6.1 Parts list for the cooling water pipe subassembly with electric engine cooling water pump (without oil cooler) - part no. 9018028

Item. No.	Part No.:	Qty.	Description
1	9019652	1	Bracket
2	9018063	1	Pipe
3	9018161	1	Pipe
4	9005914	1	Cooling water pipe
5	9005909	1	Cooling water pipe
6	9018130	1	Pipe
7	9018122	1	Bracket
8	9018215	1	Bracket
9	9018196	1	Bracket
10	612741	1	Hose
12	108191	2	Ball valve
13	637356	1	Bracket
14	9018149	1	Bracket
15	638909	1	Corrugated hose
16	632847	2	Metal hose
17	249011	1	Compensator
18	9018140	1	Pipe
19	9018145	1	Cooling water pipe
20	394695	2	Clamp
21	372318	3	Clamp
22	433930	2	Clamp
23	106825	4	Hexagon-head screw
24	101872	4	Lock nut
25	102162	12	Disc
26	100309	6	Hexagon-head screw
27	101874	14	Lock nut
28	101167	36	Disc
29	100452	4	Hexagon-head screw
30	636026	4	Blind rivet nut
31	100476	13	Hexagon-head screw
32	101536	13	Lock nut
33	101879	2	Lock nut
34	100446	2	Hexagon-head screw
35	101823	4	Hexagonal nut
36	115251	4	Cap screw
38	101244	4	Cap screw
39	100414	2	Hexagon-head screw
40	110966	2	Disc
41	101604	8	Cap screw
42	100495	2	Hexagon-head screw
43	100334	4	Hexagon-head screw
44	101829	44	Hexagonal nut
45	100331	40	Hexagon-head screw

46	9006088	1	Cover
47	101790	5	Seal
48	9007855	2	Seal
49	376483	4	O-ring
50	185948	1	Seal
51	100953	1	Elbow fitting
52	100897	1	Straight union
53	101709	4	Clamp
54	9005822	1	Bracket
55	659120	1	Corrugated hose
56	117650	1	Plug
57	106757	2	Elbow fitting
58	221149	2	Elbow fitting
59	9020762	1	Hose
60	9018823	1	Pipe
61	9018841	1	Pipe
63	101705	1	Ball valve
65	100924	1	Straight union
66	9018820	1	Straight union

Table 2: Parts list - part no. 9018028

6.2 Parts list for the cooling water pipe subassembly with electric engine cooling water pump (with oil cooler) - part no. 1227567

Item. No.	Part No.:	Qty.	Description
2	9005909	1	Cooling water pipe
3	9005914	1	Cooling water pipe
4	9005822	1	Bracket
5	185945	1	Flange
6	185948	1	Seal
8	659120	1	Corrugated hose
11	402916	1	Cooling water pump
16	9008833	1	Bracket
19	325138	1	Bend
20	100897	1	Straight union
24	376483	2	O-ring
25	101244	6	Cap screw
26	101384	2	Cap screw
27	9009533	2	Disc
31	100414	2	Hexagon-head screw
32	100495	2	Hexagon-head screw
33	101167	24	Disc
39	100587	56	Hexagon-head screw
40	100501	15	Hexagon-head screw
41	100452	6	Hexagon-head screw
43	9005820	2	Bracket
44	372411	7	Clamp
45	102162	24	Disc
46	101879	17	Lock nut
47	100286	4	Hexagon-head screw
48	101829	71	Hexagonal nut
49	372318	4	Clamp
50	100309	8	Hexagon-head screw
51	101874	32	Lock nut
57	110966	2	Disc
70	9005926	1	Pipe
71	9005928	1	Pipe
72	9005921	1	Pipe
73	9005917	1	Cooling water pipe
74	249011	2	Compensator
75	9006071	1	Bracket
76	9005931	1	Bracket
77	9005930	1	Bracket
78	108191	5	Ball valve
79	117650	2	Plug
80	479592	2	Bracket
81	100953	1	Elbow fitting
82	9007855	2	Seal
83	101604	14	Cap screw
84	101790	8	Seal
85	383350	4	Clamp

86	100311	6	Hexagon-head screw
87	100476	4	Hexagon-head screw
88	100310	2	Hexagon-head screw
89	100470	6	Hexagon-head screw
90	526559	2	Spacer plate
91	636026	6	Blind rivet nut
92	650106	1	Bracket
120	9008580	1	Bracket
121	265051	2	Hexagonal nut
122	265076	2	Flange
123	284428	1	Oil pipe
124	284868	1	Seal
125	114917	2	Hexagon-head screw
126	101812	2	Hexagonal nut
127	225125	2	Filter cartridge
128	100466	2	Hexagon-head screw
129	102040	2	Disc
130	101135	2	Lock nut
131	100019	3	O-ring
132	460138	2	Measuring connection
133	9005819	1	Bracket
134	9008589	3	Cap screw
135	9009329	1	Filter head
136	100473	2	Hexagon-head screw
137	448300	1	Sealing ring
138	419868	1	Screw plug
150	271689	1	Bracket
151	9005957	1	Oil pipe
152	9008100	1	Oil pipe
153	9005961	1	Oil pipe
154	194213	1	Crankcase cover
155	194462	1	Valve
156	106754	2	Elbow fitting
157	115239	2	Cap screw
158	221468	1	O-ring
159	115249	4	Cap screw
160	101057	2	Stud bolt
161	101823	2	Hexagonal nut
162	100462	10	Hexagon-head screw
163	9010059	1	Bracket
164	221476	1	Hexagon-head screw
180	9008330	1	Oil cooler bracket
181	100477	4	Hexagon-head screw
182	101536	8	Lock nut
183	102071	8	Disc
190	9006445	1	Frame extension
191	9006448	1	Plate
192	9006449	1	Plate
193	9006450	2	Plate
194	101940	15	Disc

195	114462	15	Disc
200	100957	1	Elbow fitting
201	9007357	1	Bracket
202	9007358	1	Pipe
203	507469	1	Clamp
204	100400	1	Hexagon-head screw
205	101807	1	Hexagonal nut
206	433930	1	Clamp
207	101817	2	Hexagonal nut
208	114926	2	Hexagon-head screw
209	658824	1	Fitting
210	110399	1	Reducing nipple
211	106622	1	Sleeve
212	463258	1	Measuring connection
220	285283	2	Pressure transducer
221	337550	4	Sealing ring
222	9011354	2	Bracket
223	607323	2	Resistance thermometer
224	405898	1	Sleeve
230	1209021	1	Plate heat exchanger
240	9006183	1	Plate
241	115251	4	Cap screw
250	9014754	1	Bracket
251	315270	2	Cap screw
252	9005965	1	Compensator
253	100307	1	Hexagon-head screw
254	101194	1	Disc
255	9005966	1	Bracket
256	101532	8	Cap screw
257	194227	4	Seal

Table 3: Parts list - part no. 1227567

7 MISCELLANEOUS

7.1 Painting of parts

All used parts in this upgrade, which are not painted, have to be painted in RAL 6018.

7.2 Required time

The following table shows how much time should be allowed for converting each J3xx-C engine.

The duration of such a conversion always depends essentially on the on-site circumstances (availability of hoists, e.g. a crane, etc.).

ACTIVITY	DELIVERY OF:	ENGINE	REQUIRED TIME
on 1 engine	Long block	J312-C	Approx. 10 days for 2 technicians
	Conversion on site as part of a 30,000 Oh overhaul		Approx. 15 days for 2 technicians
on 1 engine	Long block	J316-C	Approx. 6 days for 2 technicians
	Conversion on site as part of a 30,000 Oh overhaul		Approx. 11 days for 2 technicians
on 1 engine	Long block	J320-C	Approx. 6 days for 2 technicians
	Conversion on site as part of a 30,000 Oh overhaul		Approx. 11 days for 2 technicians

Table 4: Required time

7.3 Relevant documents

When working on GE Jenbacher modules, all applicable local regulations must of course be observed in addition to our documentation. We would like to draw particular attention in relation to this Service Technician Instruction to that the following documents must also be observed:

- **Technical Instruction TI 1100-0105: Engine shut-down**
- **Technical Instruction TI 1100-0111: General Conditions - Operation & Maintenance**
- **Technical Instruction TI 1503-0049: Engine adjustment instruction - Type 3, Version D**
- **Technical Instruction TI 1510-0064: Gas Quantity Controller (TecJet 110 and 50 Plus)**
- **Technical Instruction TI 2300-0005: Safety regulations**
- **Technical Instruction TI 2300-0010: Guidelines for using the LOTO kit**
- **Drawing part. no. 1227567, sheet 1 and sheet 2, ECW pump + oil cooler with frame extension**
- **Drawing part. no. 9009880, gas mixer housing**
- **Drawing part. no. 9018028, engine cooling water piping subassembly**
- **Maintenance Work W 8053 M0**
- **Service Technician Instruction ST-092**

7.4 Revision history

INDEX	DATE	DESCRIPTION / REVISION SUMMARY
01	30/11/2015	First version of this document

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