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Service Technician Instruction	ST-203	31 May 2017

Engine type **J412, J416 & J420**

Subject **Sensor Package**
Retrofitting various sensor modules

The Service Technician Instruction ST-203 describes how to retrofit the sensor modules for automated detection and utilisation of the crankcase pressure, blow-by filter differential pressure, air filter differential pressure, mixture cooler differential pressure, and the oil filter differential pressure.

PURPOSE OF THIS BULLETIN / NEED FOR ACTION

No proactive action is necessary, i.e. ST-203 can be used as an aid for organising and carrying out the work if the sensor package or one of the sensor modules are to be retrofitted to an engine.

AFFECTED ENGINES / SCOPE OF THIS BULLETIN

Type J412, J416 and J420 engines with the DIA.NE XT, DIA.NE XT3 or XT4 engine control system, which have not yet been fitted with the above-mentioned sensors and to which the complete sensor package or individual sensor modules are to be retrofitted.

If fitting the mixture cooler differential pressure module, at least the header (TL453496 [part. no]), must be installed as from July 2006 (this has connection threads for mixture cooler pressure sensors, see Section 1.2).

Note:

This document is not a basis for ordering the spare parts necessary for an upgrade. GE provides a complete conversion package for the products defined below. If interested, you can request this from your local GE customer service representative or seller.

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1 GENERAL / OVERVIEW

This Service Technician Instruction deals with the retrofitting of various sensors to J412, J416 and J420 engines.

The complete package consists of the following sensor modules:

- Crankcase pressure sensor module
- Blow-by filter differential pressure sensor module
- Air filter differential pressure sensor module
- Mixture cooler differential pressure sensor module
- Oil filter differential pressure sensor module

Advantages of the sensor package:

- Direct monitoring of pressures
- Individual components can be monitored better
- Improved alarm management
- Better maintenance prognoses

Each sensor module includes the necessary sensor(s), all mechanical and electrical parts for installation and connection, and any necessary software and parameter matching or activation, depending on the engine control system in question.

1.1 Overview of assembly and part numbers

The following Table shows the part numbers of the individual sensor modules and their use on engines with ROLF (in-line air filters) and air filter housings.

Module	Engine	Assembly	Possible sensor modules with ROLF	Possible sensor modules with air filter housings
Air filter differential pressure module	J412/J416/J420	8000657	✓	
Crankcase pressure module	J412/J416/J420	8000653	✓	✓
Mixture cooler differential pressure module	J412/J426/J420	8000658	✓	✓
Blow-by filter differential pressure module	J412/J416/J420	8000651	✓	
Oil filter differential pressure module	J412/J416/J420	9026811	✓	✓

Table 1: Assemblies and part numbers

Note:

A software modification is required after installing different sensor modules! This will be modified by the GE Service Requisition Team and made available on a suitable storage system.



1.2 Overview of the different headers

Table 2 shows the header versions with and without connection threads for fitting the pressure sensor. To be able to install the mixture cooler differential pressure module, a connection thread must be present on the header (TL453496 as from July 2006). If a header without a connection thread has been mounted on the engine, it must be replaced. In this case, the correct header will be supplied by GE.



Note:

On no account should a header be reworked to add a thread, as this can result in damage to the turbocharger and the engine!

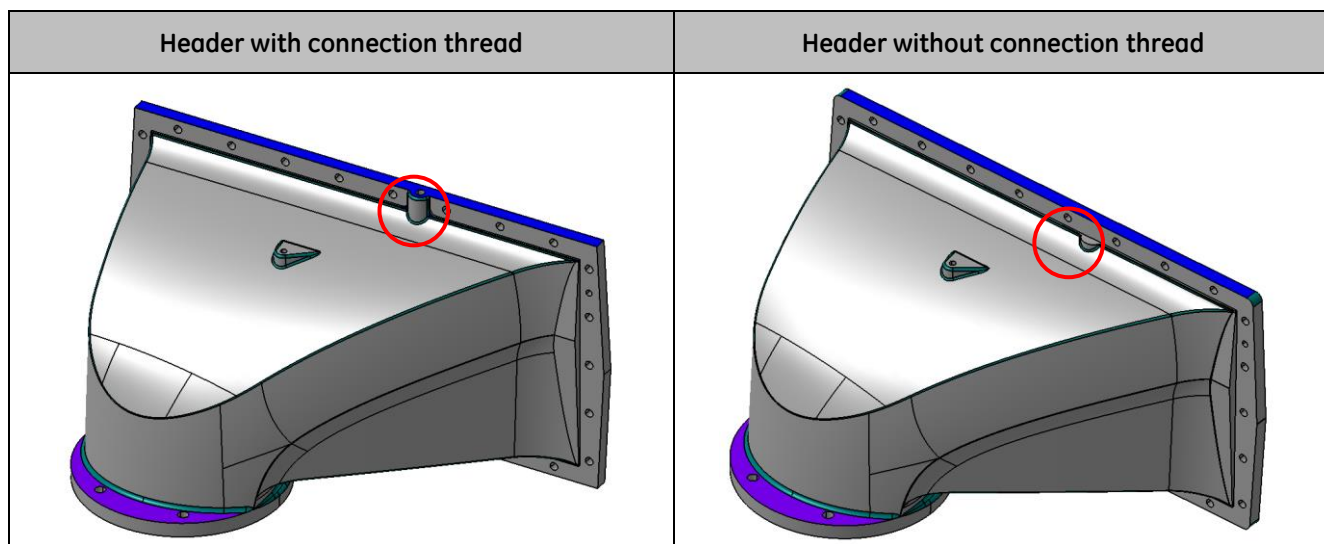


Table 2: Overview of the different headers

Procedure for replacing the header:

- Remove the **in-line air filter (ROLF)**
- Remove the **intake pipe**
- Replace the **header** (if necessary)
- Fit the intake pipe
- Fit the ROLF

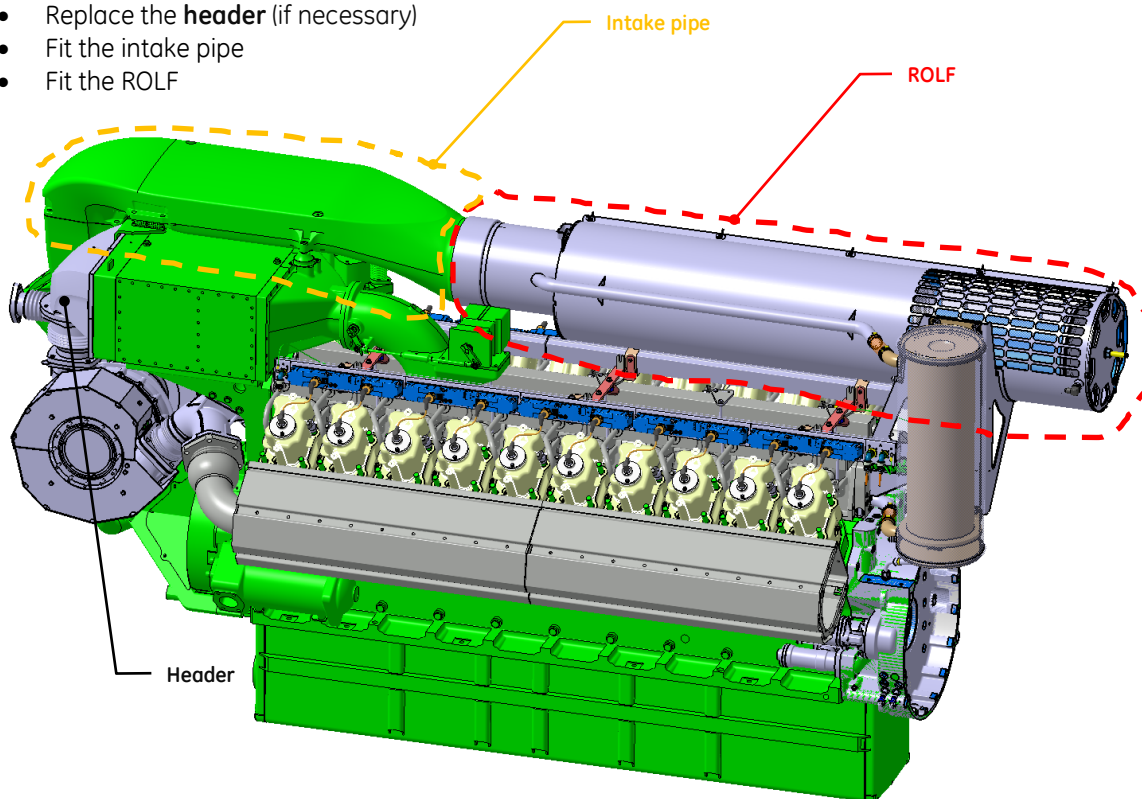


Figure 1: Procedure for replacing the header



1.3 General view of the sub-assemblies used

The following Table is intended to give an overview of the sensor modules used.

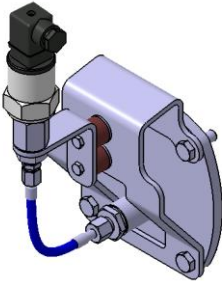

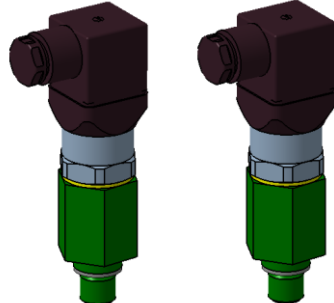
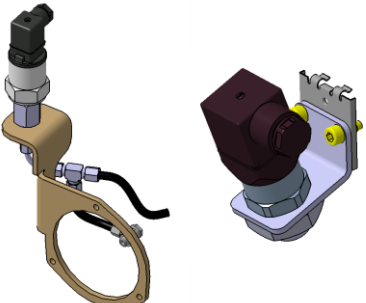
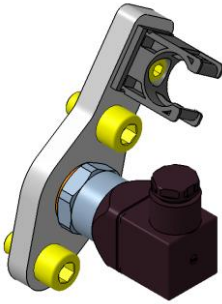
Assemblies	J412/J416/J420
Crankcase pressure module (TL8000653) (P&ID tag : E.00-PI-025)	
Blow-by filter differential pressure module (TL8000651) (P&ID tag : E.00-PI-011, E.00-PI-012)	
Mixture cooler differential-pressure module (TL8000658) (P&ID tag : E.08-PI-002, E.08-PI-003)	
Air filter differential pressure module (TL8000657) (P&ID tag : M.05-PI-100, M.05-PI-001)	
Oil filter differential pressure module (TL9026811) (P&ID tag : M.03-PI-002)	

Table 3: Overview of the assemblies/sensors used in the J412, J416 and J420 engines



1.4 Positions and locations of the installed sensor modules

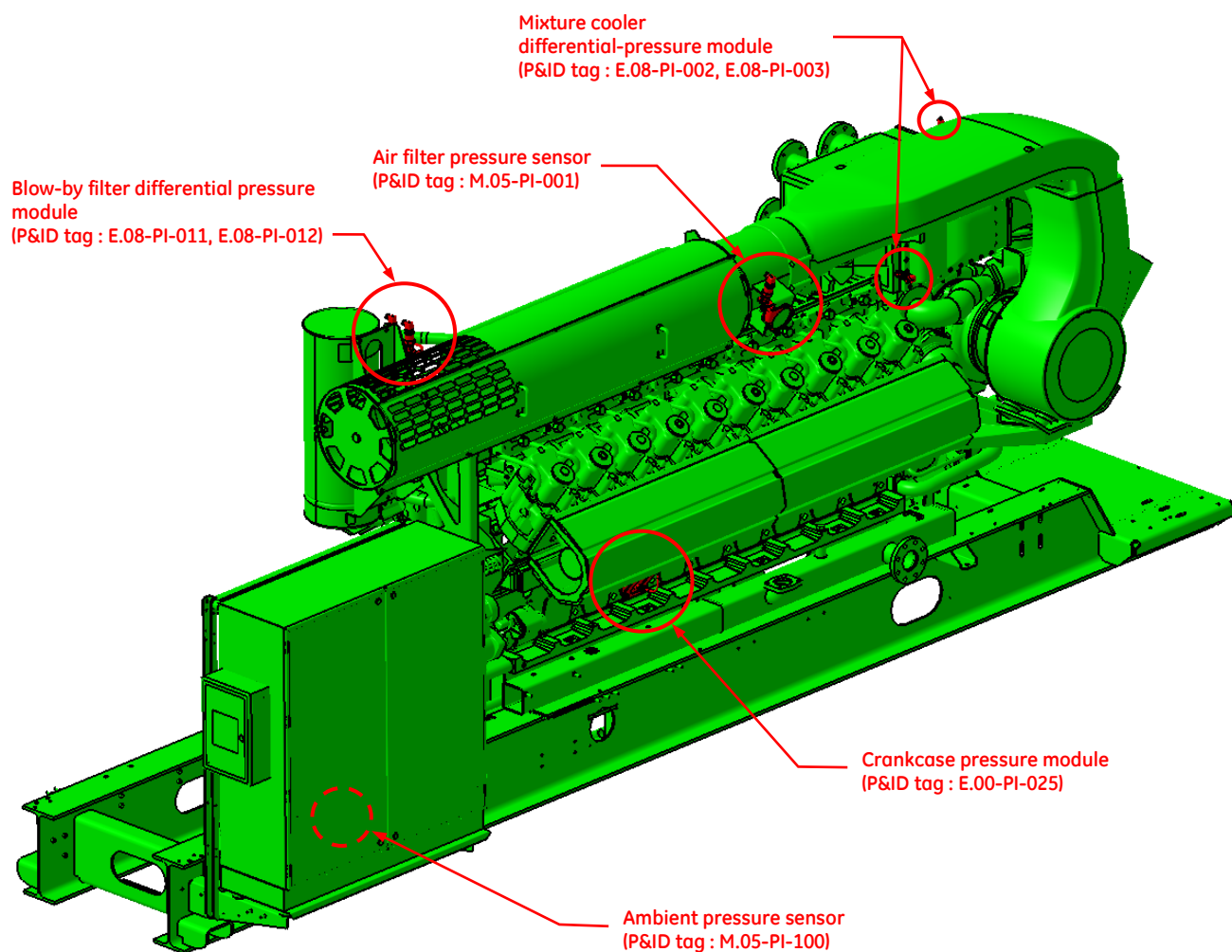


Figure 2: Overview of all the sensor modules - 1

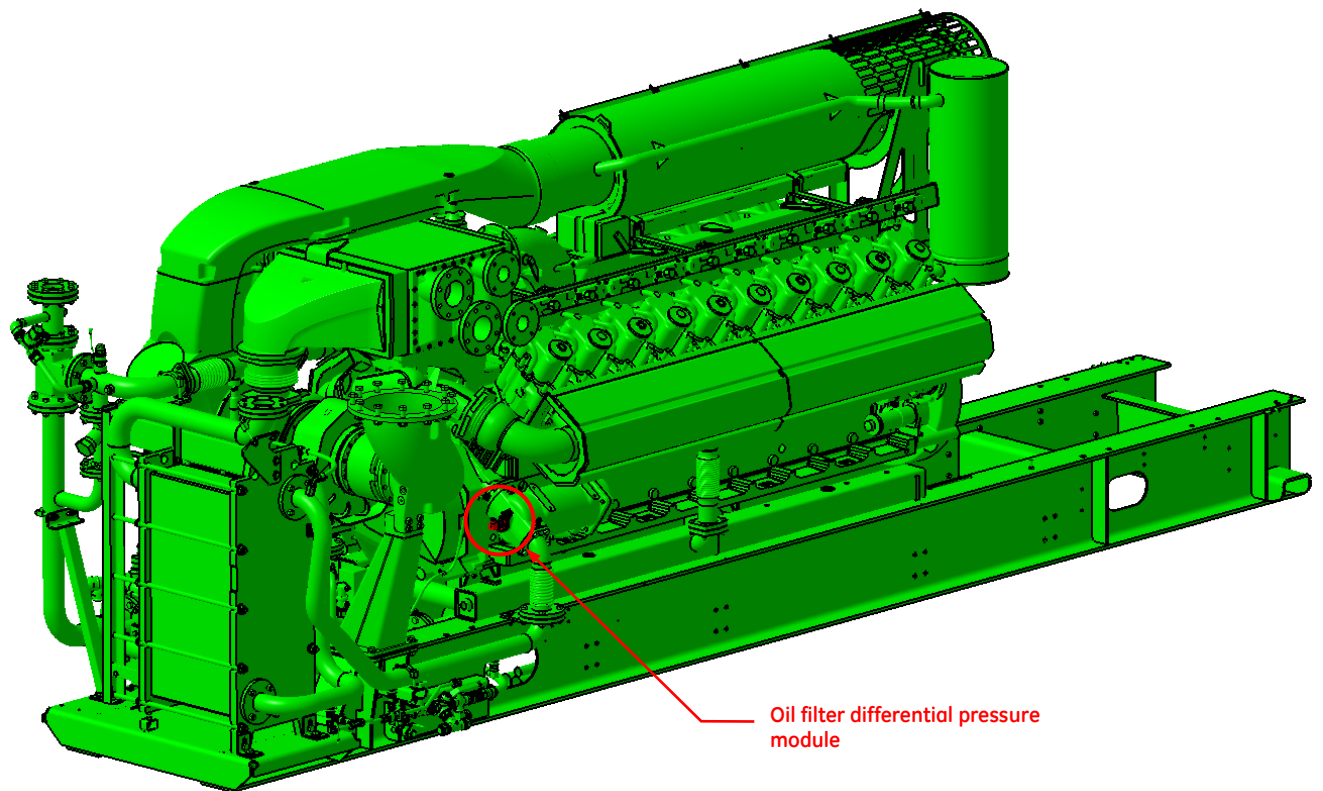


Figure 3: Overview of all the sensor modules - 2



2 PROCEDURE FOR RETROFITTING

The retrofitting of the various sensor modules is described in more detail in the following sections.

2.1 Retrofitting the crankcase pressure module



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

2.1.1 Basic description

The purpose of the crankcase pressure sensor is to measure the pressure in the crankcase. This allows the crankcase pressure to be ascertained continuously, which gives an indication of the condition of the system as whole.

2.1.2 Fitting the new crankcase pressure module

Figure 4 shows the crankcase pressure module when installed. A bracket is mounted on the crankcase cover, and a rubber buffer and an angle bracket for the sensor adapter are mounted on this bracket. The crankcase cover is provided with an connection sleeve, into which an adapted is screwed. A straight cutting ring union connecting the crankcase to the sensor by means of a hose is screwed into this adapter.

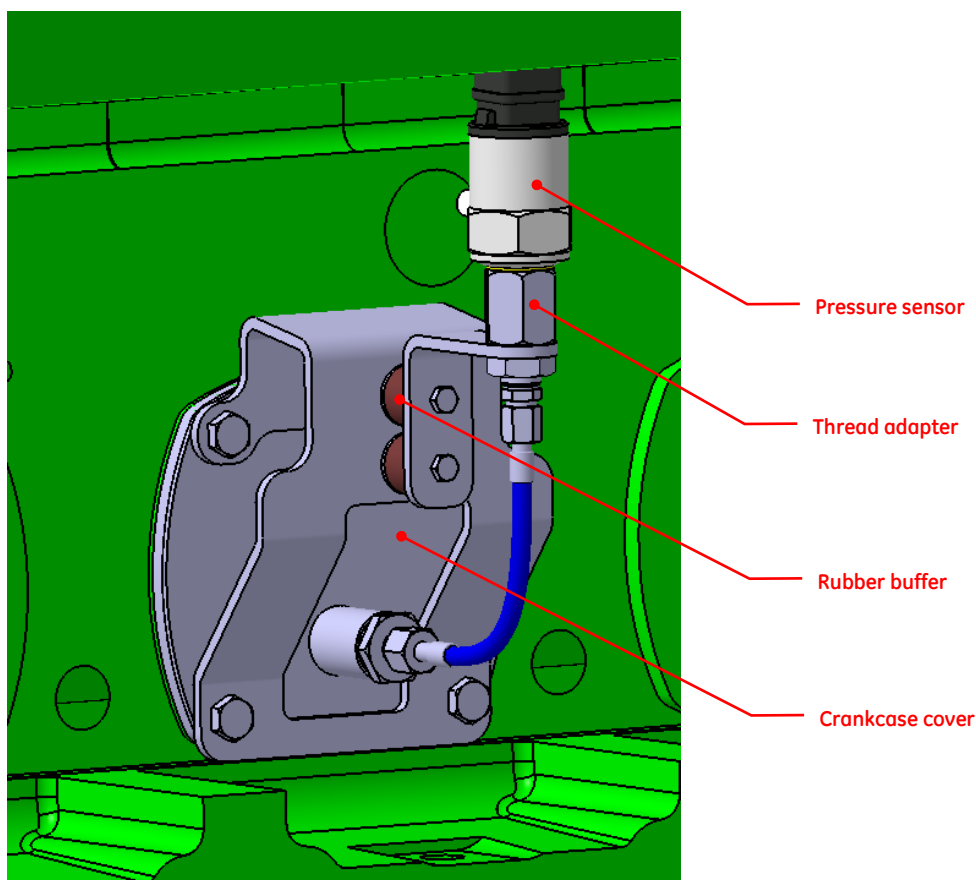


Figure 4: Fitting the new crankcase pressure module



Note:



When fitting the individual components, make sure that the threads on the components are wrapped in Teflon tape before screwing in **if no sealing ring is used (to seal the thread)**.



Figure 5: Pressure sensor

Figure 5 shows the pressure sensor to be used.

Note:



Group the pressure sensor cables to give a single cable run. It is advisable to bundle these cables with other existing cables (using cable ties).

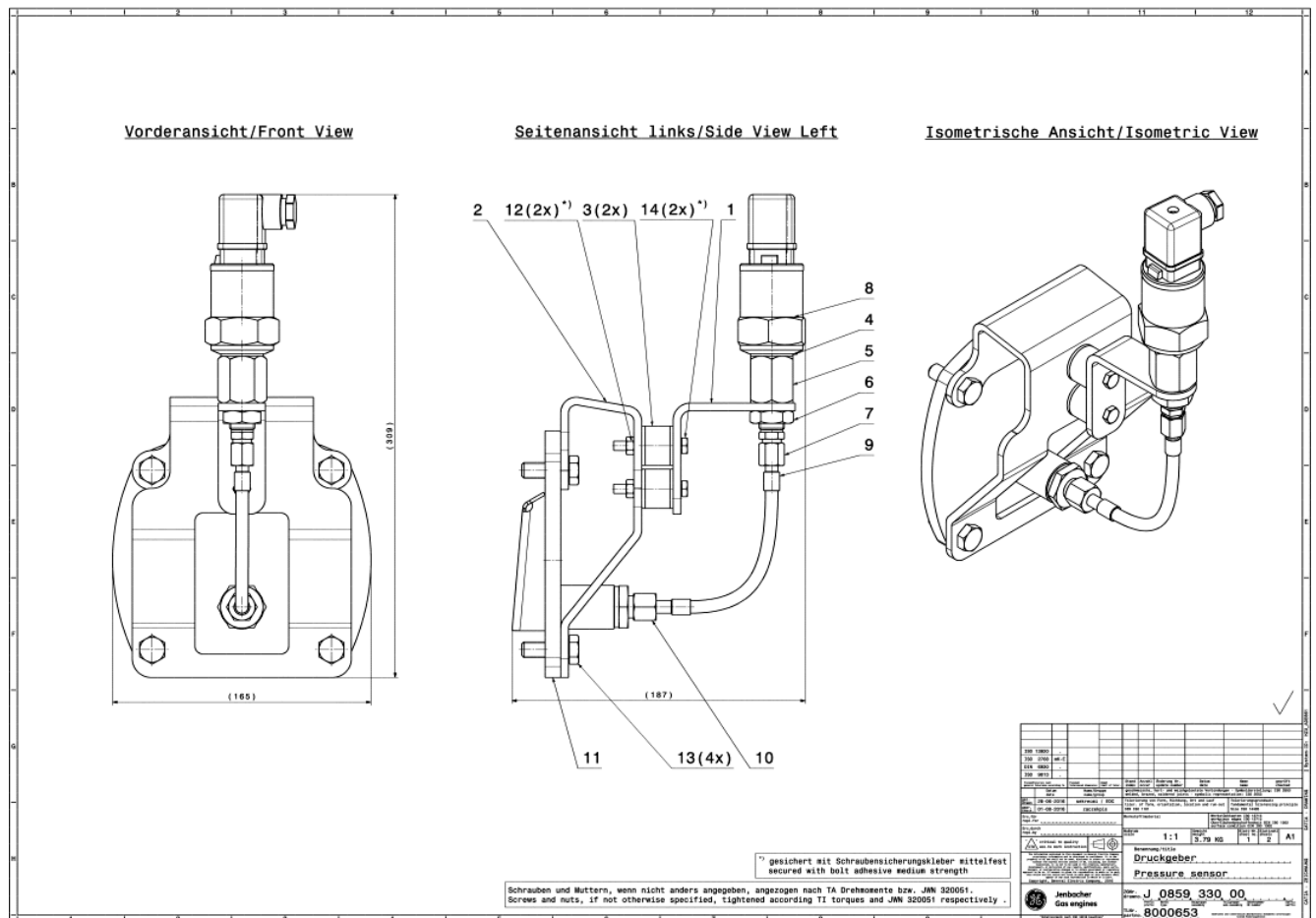


Figure 6: Drawing – Crankcase pressure module – TL8000653

Note: The drawing will be made available on the DP Portal together with this document.

Figure 6 shows the drawing for the crankcase pressure module for J4xx- engines. This is intended to act as an aid during installation. The parts list for this module can be found in the Appendix.



2.2 Retrofitting the blow-by filter differential pressure module

2.2.1 Basic description

The two sensors of the blow-by filter differential pressure module measure the pressures upstream and downstream of the blow-by filter. The differential pressure across the blow-by filter can be measured from these two pressures and gives an indication of the condition of the filter element.

Note:

An in-line air filter (ROLF) complete with crankcase ventilation must be fitted before this sensor module can be fitted.

2.2.2 Fitting the blow-by filter differential pressure module

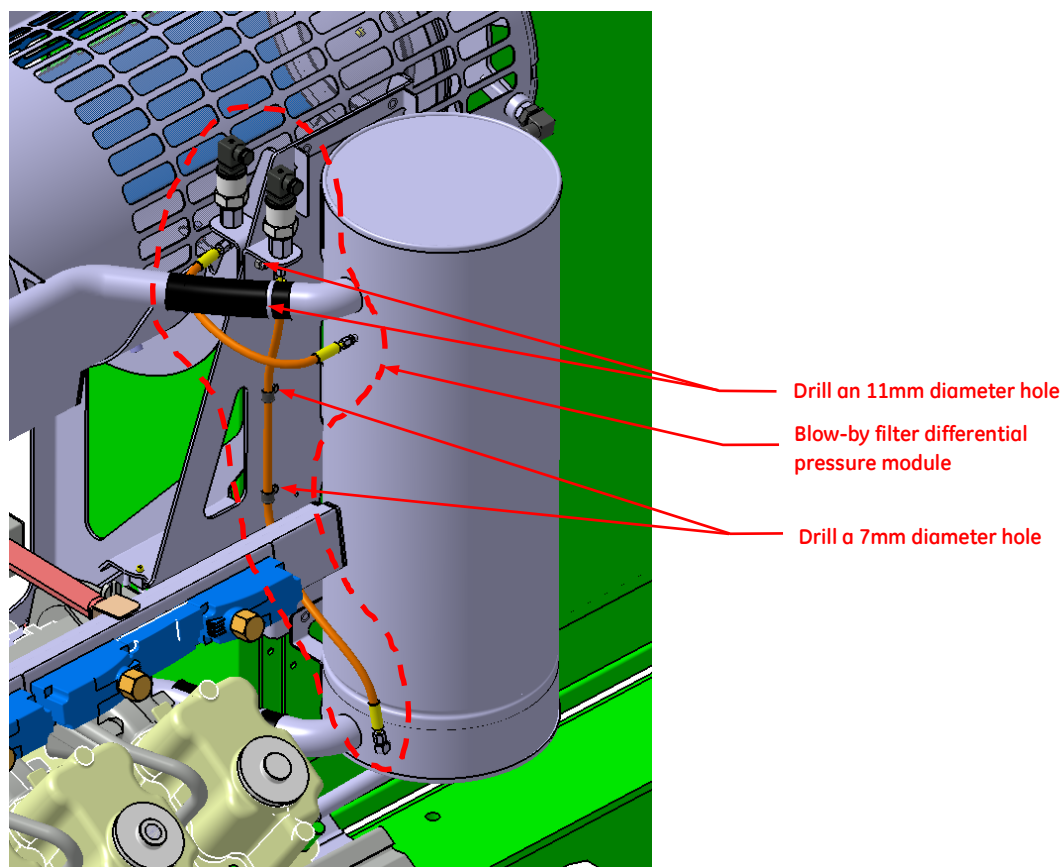


Figure 7: Blow-by filter differential pressure module

Figure 7 shows the installation of the blow-by filter differential pressure module on a J4xx engine. The pressure sensors are bolted on to the blow-by filter console using the brackets provided. Suitable holes (11mm diameter) must be drilled for this. 7mm diameter holes must also be drilled for mounting the hose clips (see Figure 8). Additional Information on drilling the holes can be found in drawing J 0859 230 00 (blow-by filter differential pressure module assembly, TL8000651).

Note:

The drawing of the assembly TL8000651 with the drawing number J 0859 230 00 is available with this document on the DP Portal as a PDF file.

Note:

The cabling for the pressure sensors should be grouped together on the engine with other cables or protective cable sleeves to obtain a single cable or sleeve run.

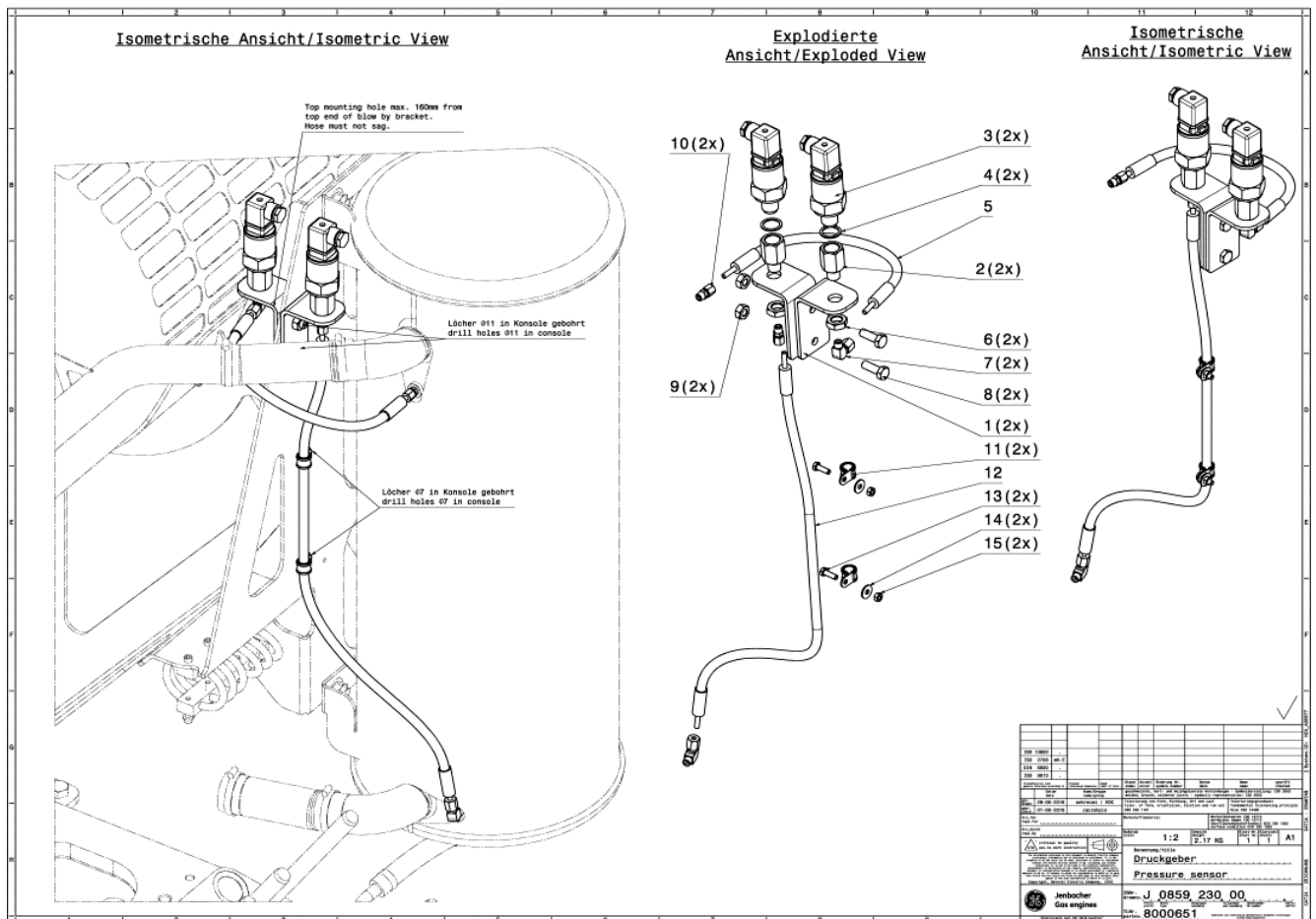


Figure 8: Drawing - Blow-by filter differential pressure sensor - TL8000651

Note: The drawing will be made available on the DP Portal together with this document.

Note:



When connecting the ribbed hoses make sure that the hoses are not kinked and are not in contact with other components, such as filter housings or blow-by hoses, as this can lead to chafing in operation resulting in possible failure of the components!

Note:



When fitting the individual components, make sure that the threads on the components are wrapped in Teflon tape before screwing in **if no sealing ring is used (to seal the thread)**.



2.3 Retrofitting the mixture cooler differential pressure module

2.3.1 Basic description

The two sensors of the mixture cooler differential pressure module measure the pressures upstream and downstream of the mixture cooler. The differential pressure across the mixture cooler can be calculated from these two pressures and gives an indication of the condition of the mixture cooler.

2.3.2 Fitting the mixture cooler differential pressure module

The pressure sensors are screwed into adapters, which have matching connection threads for screwing into the designated threads upstream and downstream of the mixture cooler respectively.

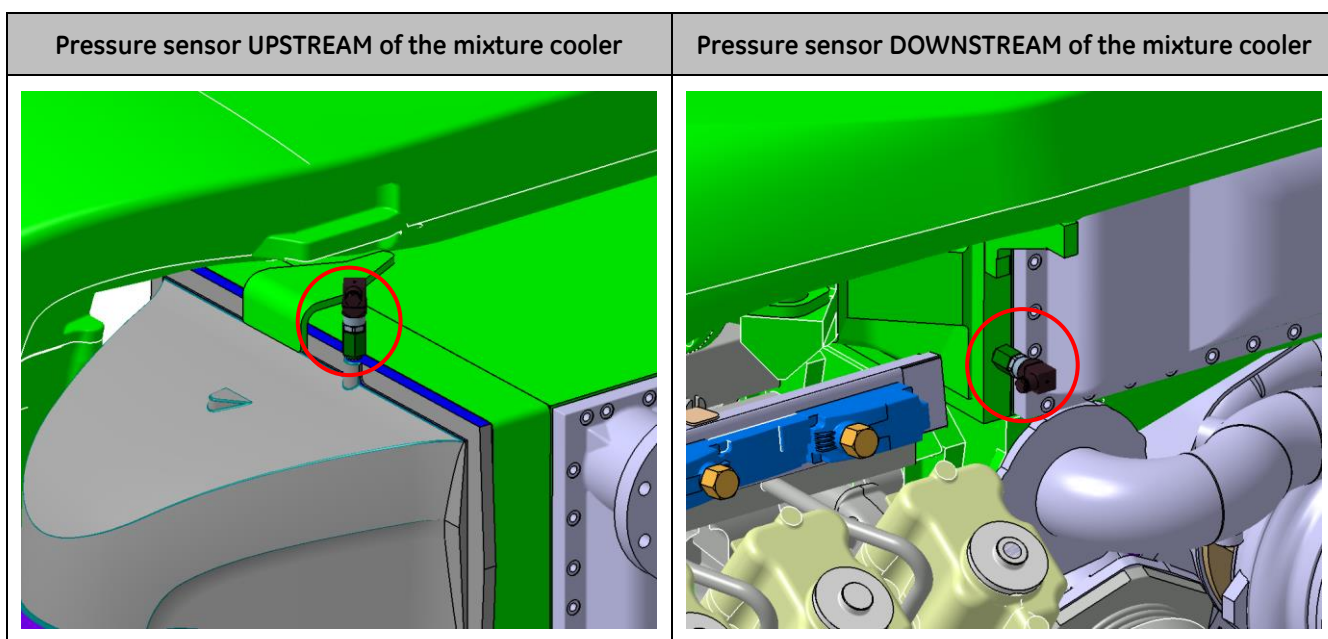


Table 4: Fitting the pressure sensors upstream and downstream of the mixture cooler

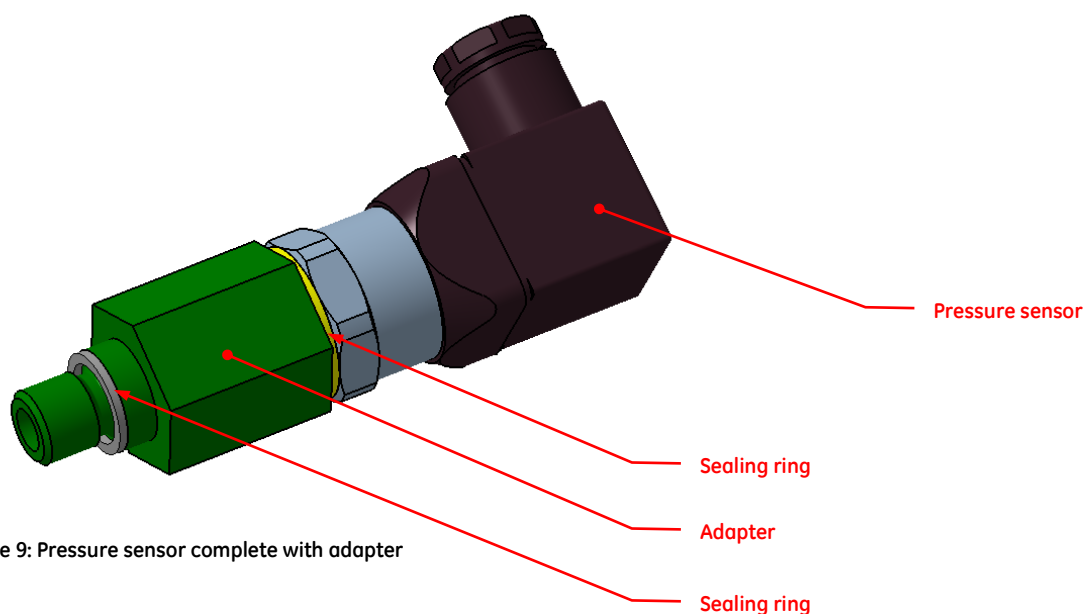


Figure 9: Pressure sensor complete with adapter

Note:



When fitting the individual components, make sure that the threads on the components are wrapped in Teflon tape before screwing in if no sealing ring is used (to seal the thread).

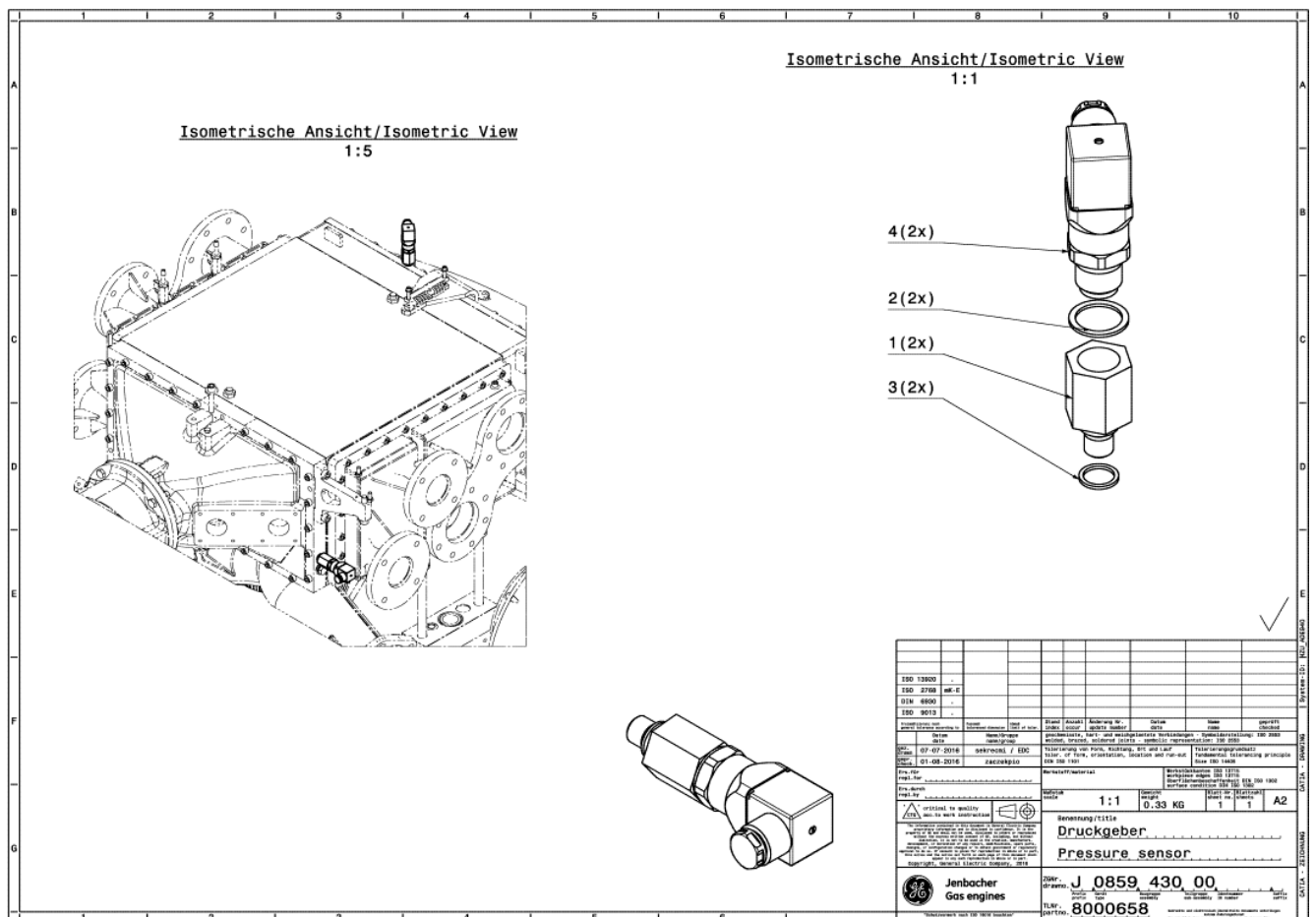


Figure 10: Drawing - mixture cooler differential pressure module - TL8000658

Note: The drawing will be made available on the DP Portal together with this document.

2.4 Retrofitting the air filter differential pressure module

2.4.1 Basic description

The pressure sensor downstream of the air filter and the ambient pressure sensor allow the differential pressure across the air filter to be ascertained. This allows the condition of the air filter to be calculated later.

2.4.2 Fitting the air filter pressure module

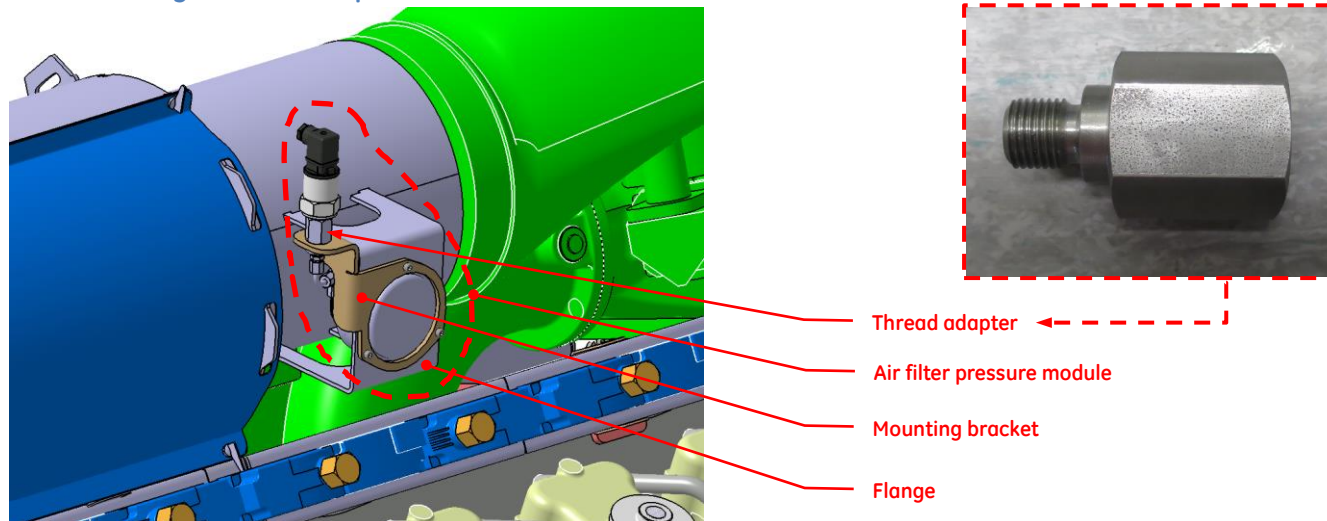


Figure 11: Fitting the air filter pressure module

Figure 11 shows the installation and position of the air filter pressure module. It is screwed into the designated flange on the in-line air filter using a thread adapter and a bracket. Make sure here as well that the cable protective sleeves are not kinked and do not contact other engine components.

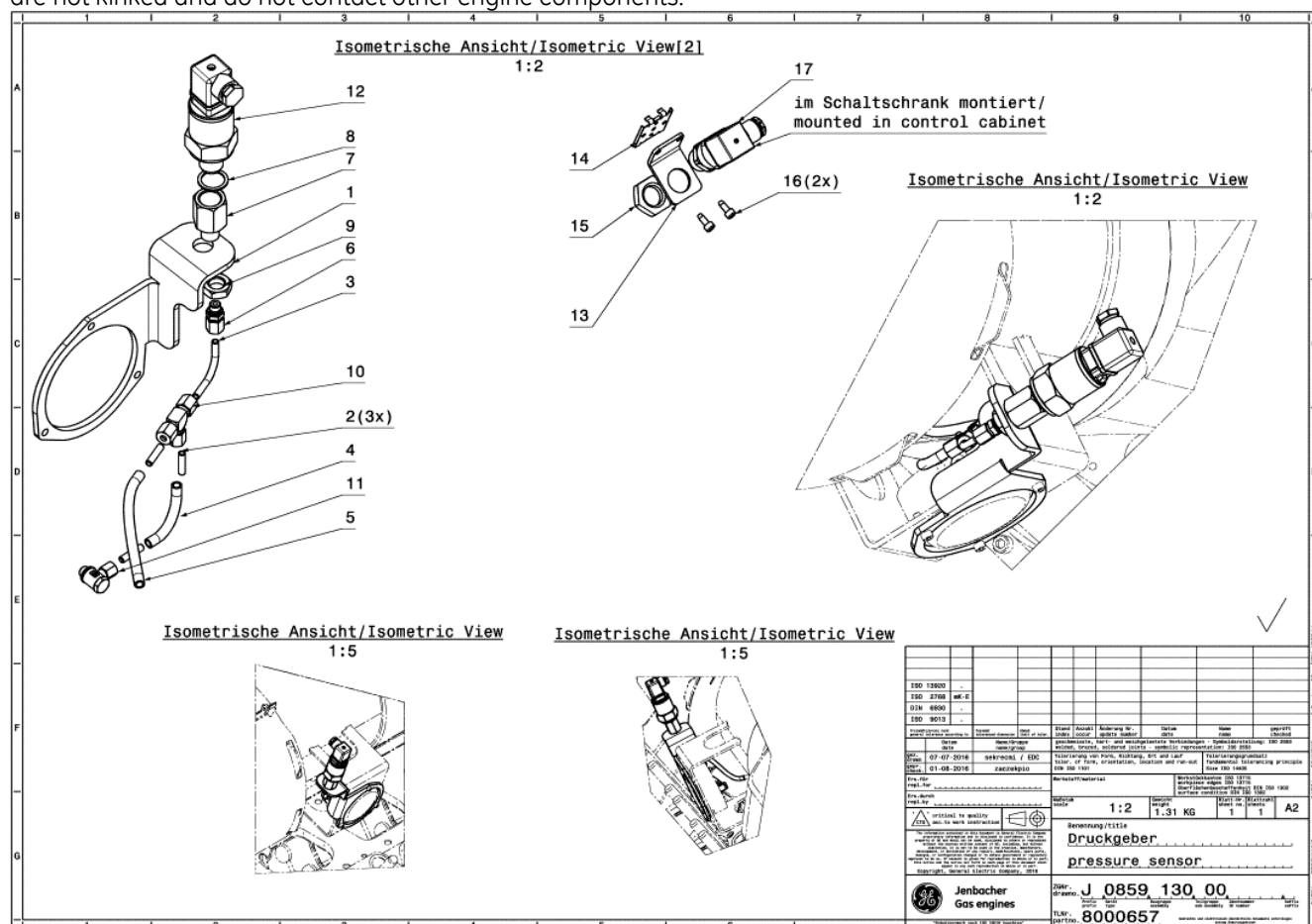


Figure 12: Drawing – air filter pressure module – TL8000657

Note: The drawing will be made available on the DP Portal together with this document.



Note:



When fitting the individual components, make sure that the threads on the components are wrapped in Teflon tape before screwing in if no sealing ring is used (to seal the thread).

Note:

The differential pressure indicator already present (Figure 13) on the filter is retained.



Figure 13: Existing differential pressure indicator on the filter



2.4.3 Fitting the ambient pressure sensor

The ambient pressure is measured by a pressure sensor installed in the switchgear cabinet.

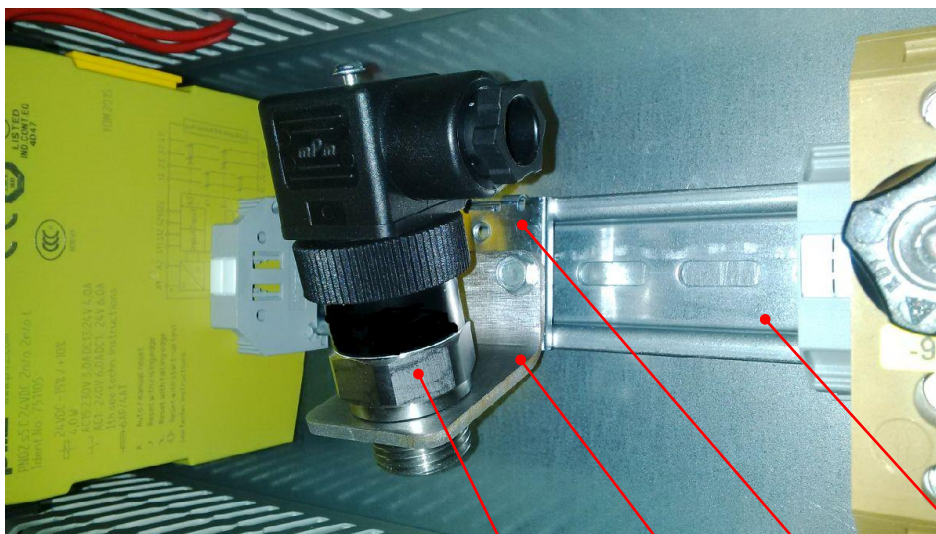


Figure 14: Ambient pressure sensor installation

Pressure sensor Mounting bracket Rittal clip Mounting rail

The ambient pressure sensor is mounted on the rail in the switchgear cabinet by means of a bracket bolted to a Rittal clip. The cabling must be connected directly to the PLC without Wago terminals.

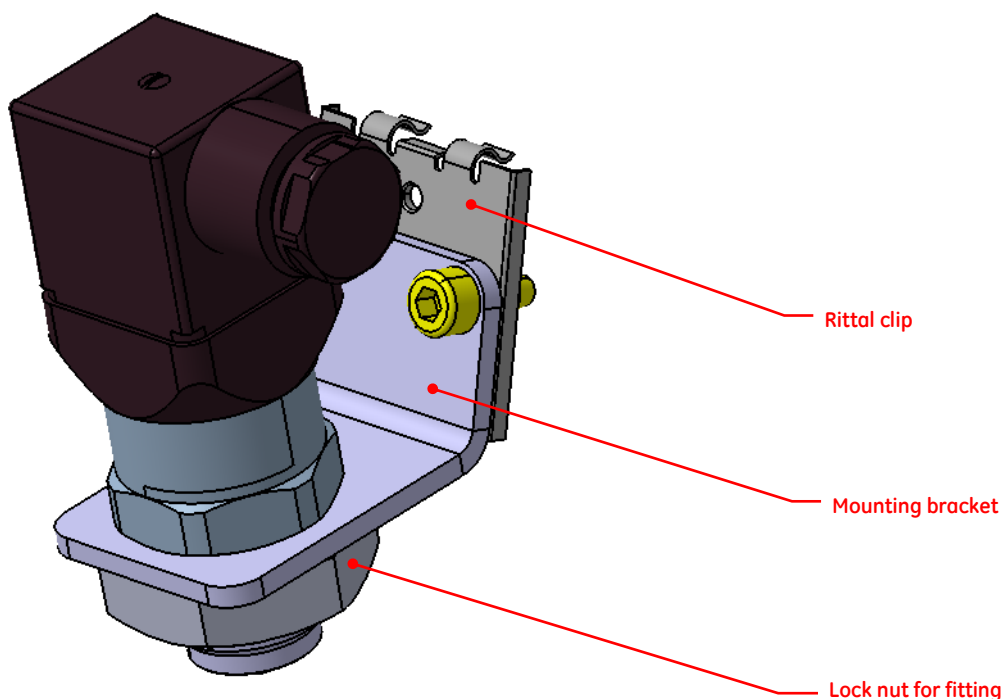


Figure 15: Ambient pressure sensor with bracket

Figure 15 shows how the pressure sensor is fastened to the bracket by means of the lock nut for the fitting. The bracket is mounted on the Rittal clip with the screws provided.

Note:



Group the pressure sensor cables to give a single cable run. It is advisable to bundle these cables with other existing cables (using cable ties).



2.5 Retrofitting the oil filter differential pressure module

2.5.1 Basic description

The additional installation of a pressure sensor (Figure 16) allows the differential pressure across the oil filter to be measured. This gives an indication of the condition of the oil filter.

2.5.2 Fitting the oil pressure differential pressure module

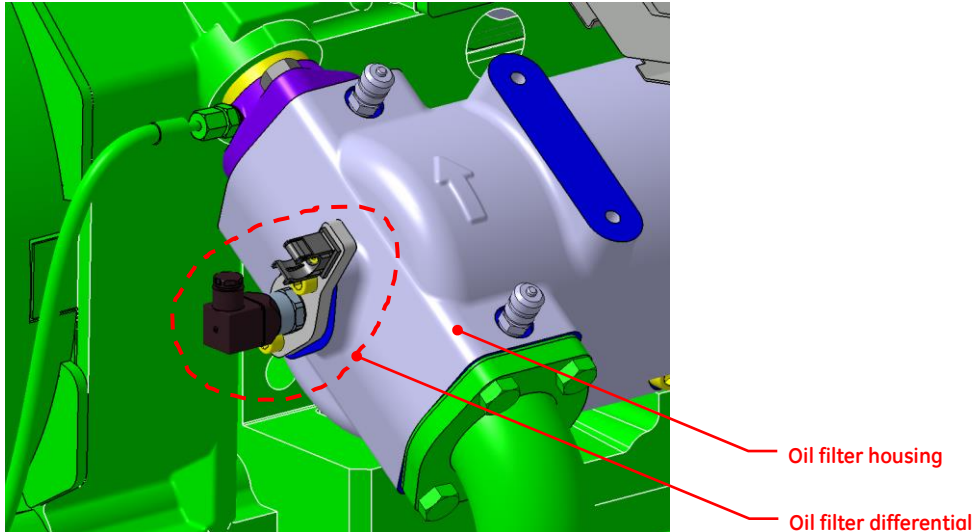


Figure 16: Fitting the oil pressure differential pressure module

Figure 16 shows the oil filter differential pressure module to be fitted. A pressure sensor is screwed into the oil filter housing at the flange.

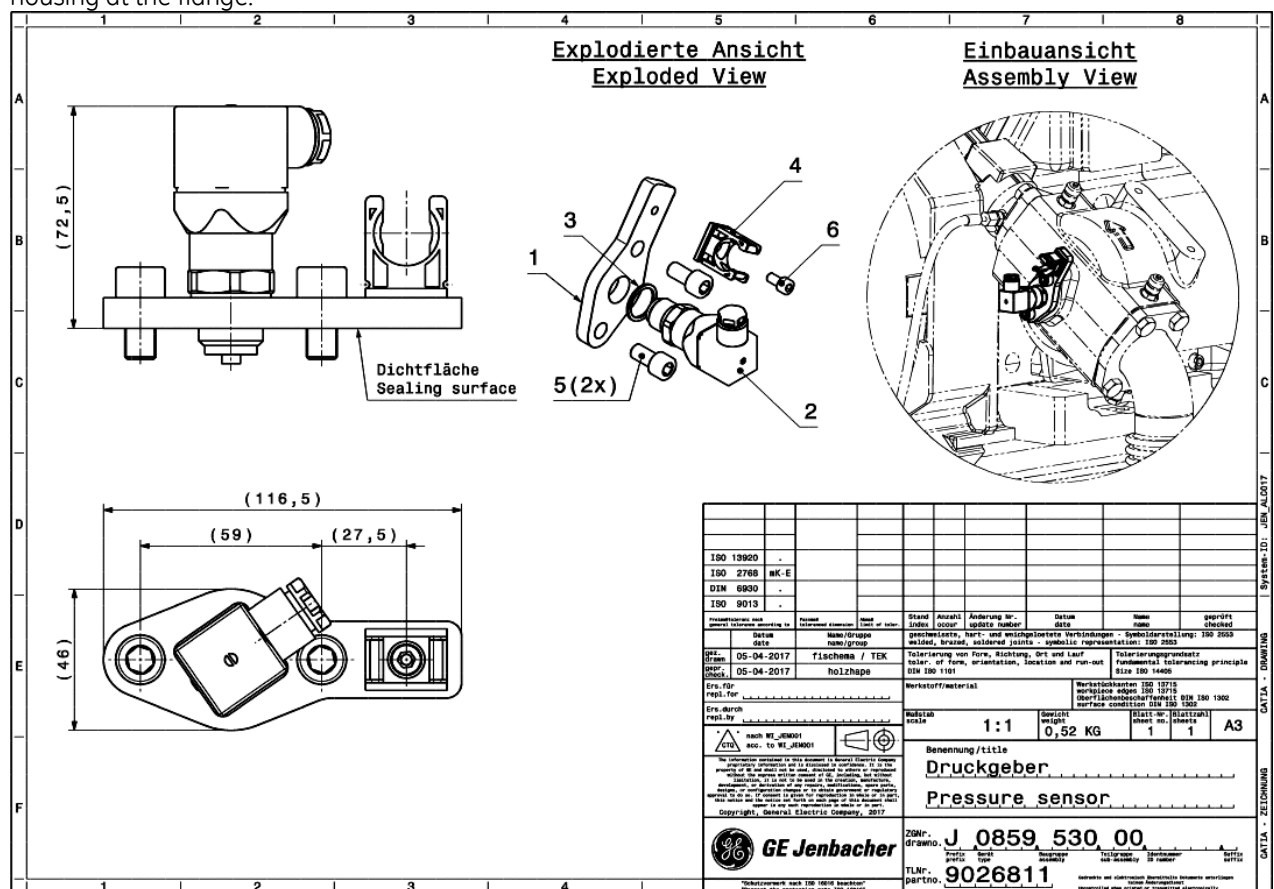


Figure 17: Drawing – oil filter differential pressure module – TL9026811

Note: The drawing will be made available on the DP Portal together with this document.



Note:



When fitting the individual components, make sure that the threads on the components are wrapped in Teflon tape before screwing in if no sealing ring is used (to seal the thread).

3 SOFTWARE

To be able to install the Sensor Package, at least DIA.NE XT, DIA.NE XT3 or DIA.NE XT4 must be installed.

DIA.NE XT:

If the Sensor Package is to be installed on engines equipped with DIA.NE XT, note that additional software must be installed. This will be made available on a suitable storage system.

DIA.NE XT3:

If the Sensor Package is to be installed on engines equipped with DIA.NE XT3, note that additional software must be installed. This will be made available on a suitable storage system.

DIA.NE XT4:

Additional software is still currently needed. However, activation of individual parameters for recording measured data will be all that is required in future.



4 MISCELLANEOUS

4.1 Filling in the initial commissioning data sheet

After the conversion, the commissioning check list must be filled in and returned to Jenbach.

4.2 Required time

The following table shows roughly how much time should be allowed for retrofitting the individual sensor modules for each J4xx engine.

ACTIVITY	ENGINE	REQUIRED TIME
Retrofitting the crankcase pressure module on 1 engine	J412, J416, J420	2 hours for 1 technician
Retrofitting the blow-by filter differential pressure module on 1 engine	J412, J416, J420	3 hours for 1 technician
Retrofitting the air filter differential pressure module on 1 engine	J412, J416, J420	2 hours for 1 technician
Replacing the header on the mixture cooler on 1 engine (if the existing header is TL453496 - version up to 2006 - without the connection thread for a pressure sensor); needs to be replaced if a mixture cooler differential pressure sensor is fitted	J412, J416, J420	1 day for 2 technicians
Retrofitting the mixture cooler differential pressure module on 1 engine	J412, J416, J420	1 hour for 1 technician
Retrofitting the oil filter differential pressure module on 1 engine	J412, J416, J420	1 hour for 1 technician

Table 5: Required time

4.3 Relevant documents

When working on GE Jenbacher modules, all applicable local regulations must of course be observed in addition to our documentation. In relation to this Service Technician Instruction we stress the fact that the following documents must also be observed:

- Technical Instruction TA 1100-0105: Engine shut-down
- Technical Instruction TA 1100-0111: General conditions - Operation & maintenance
- Technical Instruction TA 1902-0213: Screwing and tightening torques for Type 4 engines
- Technical Instruction TA 2300-0005: Safety regulations
- Technical Instruction TA 2300-0010: Guidelines for using the LOTO kit
- Technical drawing TL8000653: Crankcase pressure module
- Technical drawing TL8000651: Blow-by filter differential pressure module
- Technical drawing TL8000658: Mixture cooler differential pressure
- Technical drawing TL8000657: Air filter differential pressure module
- Technical drawing TL9026811: Oil filter differential pressure module

4.4 Revision history

INDEX	DATE	DESCRIPTION / REVISION SUMMARY
01	31/05/2017	First version of this document

Table 6: Revision history



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