



TA 1510-0080

Technical Instruction

Adjustment instruction for Dungs gas trains for Type 9 engines



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The target recipients of this document are:

Service Partners, commissioning partners, subsidiaries/branches, Jenbach location

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1 Scope

This Technical Instruction (TA) applies to the following Jenbacher Gas Engines:

- Type 9 engines with gas trains with part numbers 1228760, 1228761, 1234888 and 1245803.

In the event of different part numbers, clarify with INNIO Jenbacher GmbH & Co OG Service whether this Instruction is applicable.

2 Purpose

This Technical Instruction (TI) describes the correct adjustment of the gas trains referred to in Point ⇒ Scope. They are delivered already set up and adjusted by the manufacturer.

Should the gas trains not fulfil their specified function for some reason, this Instruction allows incorrect settings to be identified and rectified.

3 Safety information

⚠ DANGER



Poisonous gases

Leaks in the gas train can result in injury to persons.

- Wear gas sensors and make sure the room is properly ventilated.
- Carry out a leak test in accordance with IW 8049 0 after any work on a gas train.



⚠ WARNING



Danger from unauthorised restarting

Serious injuries such as cutting, crushing, severing or shearing of body parts due to unintentional contact with rotating or moving machine parts.

- Shut down the engine as described in TA 1100-0105.
- Secure the engine against unauthorised restarting in accordance with TA 2300-0010.



⚠ WARNING



Personal injury

Failure to use personal protective equipment and comply with safety instructions or employee protection information may lead to personal injury.

- Wear the relevant personal protective equipment (PPE).
- Observe the safety instructions as per TA 2300-0005.
- Observe the employee protection information as per TA 2300-0001.

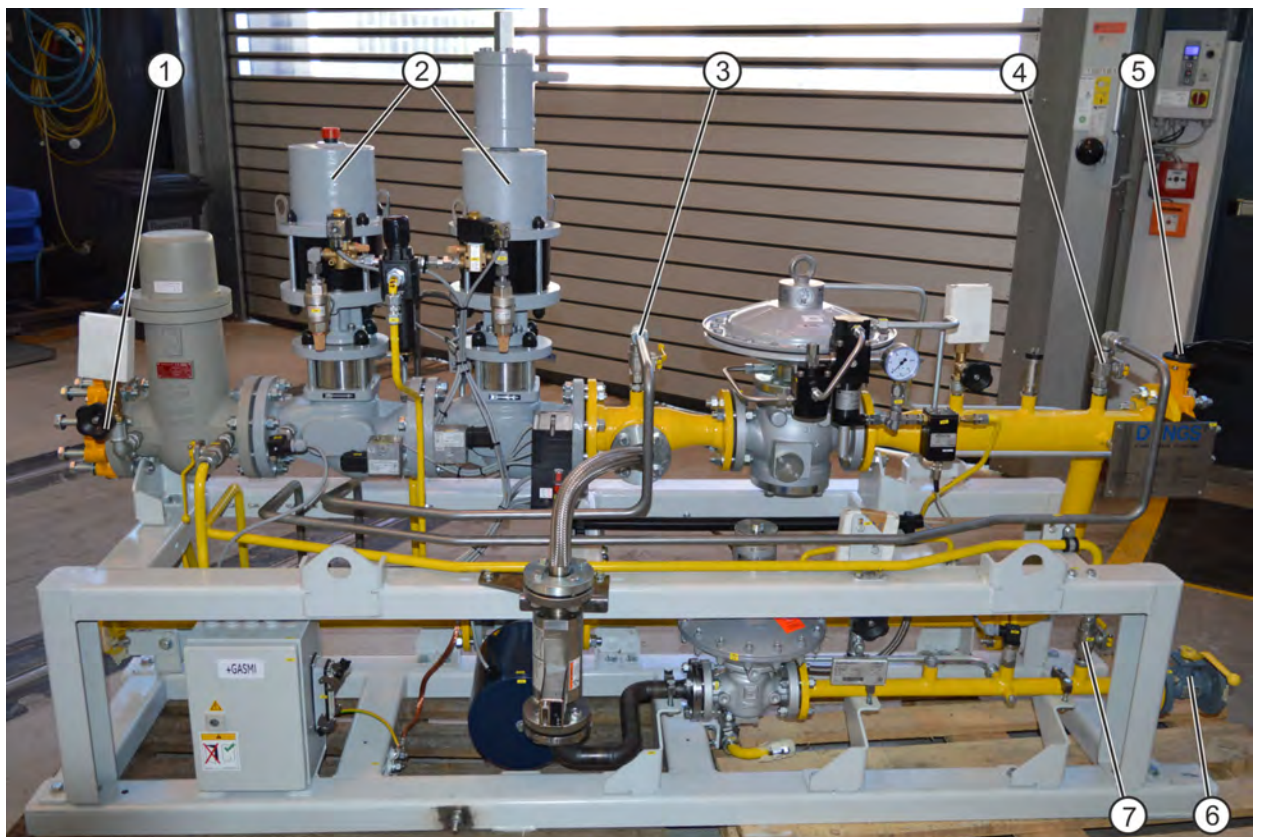
4 Additional information

Required tools, equipment and materials:

Designation	Note
Manual precision pressure manometer with hose and connection to M16 x 2 pressure measurement connection (e.g.: Thommen HM35)	Measurement range: 0-16 bar (gauge) Measuring accuracy: 0.1%
mA transmitter	Output current from 4 - 20 mA

Designation	Note
Open-ended wrench	10 AF
Open-ended wrench	17 AF
Open-ended wrench	18 AF
Open-ended wrench	22 AF
Allen key	5 AF
Allen key	6 AF
Allen key	17 AF
Slotted screwdriver	

General view of the gas train



① Main gas supply inlet valve	⑤ Main gas train outlet valve
② Main gas valves	⑥ Prechamber gas train outlet ball valve
③ Compressed air connection point (for simulating gas pressure with compressed air)	⑦ Ball valve (for simulating gas consumption at the prechamber gas train)
④ Ball valve (for simulating gas consumption at the main chamber gas train)	

Use either gas or compressed air for testing the gas train:

Applying pressure using gas

- Close the shut-off valves ③, ④, ⑤, ⑥ and ⑦.

- Open the shut-off valve ① (gas pressure before the inlet: 7 to 16 bar).
- Open the main gas valves ②.

Applying pressure when using compressed air

- Close the shut-off valves ①, ③, ④, ⑤, ⑥ and ⑦ and the main gas valves ②.
- Remove the outlet line at shut-off valve ③ and connect compressed air instead (pressure: 7 to 16 bar).

Refitting the measurement connections

After completion of the gas train tests, remove the required precision pressure manometers again and restore the gas train to its original condition.

Relevant documents:

IW 8049 0 – Leak testing of all pipes and components carrying fuel gas and mixtures

TA 1100-0105 – Engine shut-down

TA 2300-0001 – Employee protection

TA 2300-0005 – Safety instruction

TA 2300-0010 – Guidelines for using the LOTO kit

5 Prechamber gas train**5.1 Checking the damper element at the control line inlet****Requirement:**

- Remove the control line from the prechamber pressure regulator (22 AF open-ended wrench).

**Procedure:**

- Check visually whether the pressure regulator at the control line inlet has an orifice with a 3 mm bore.

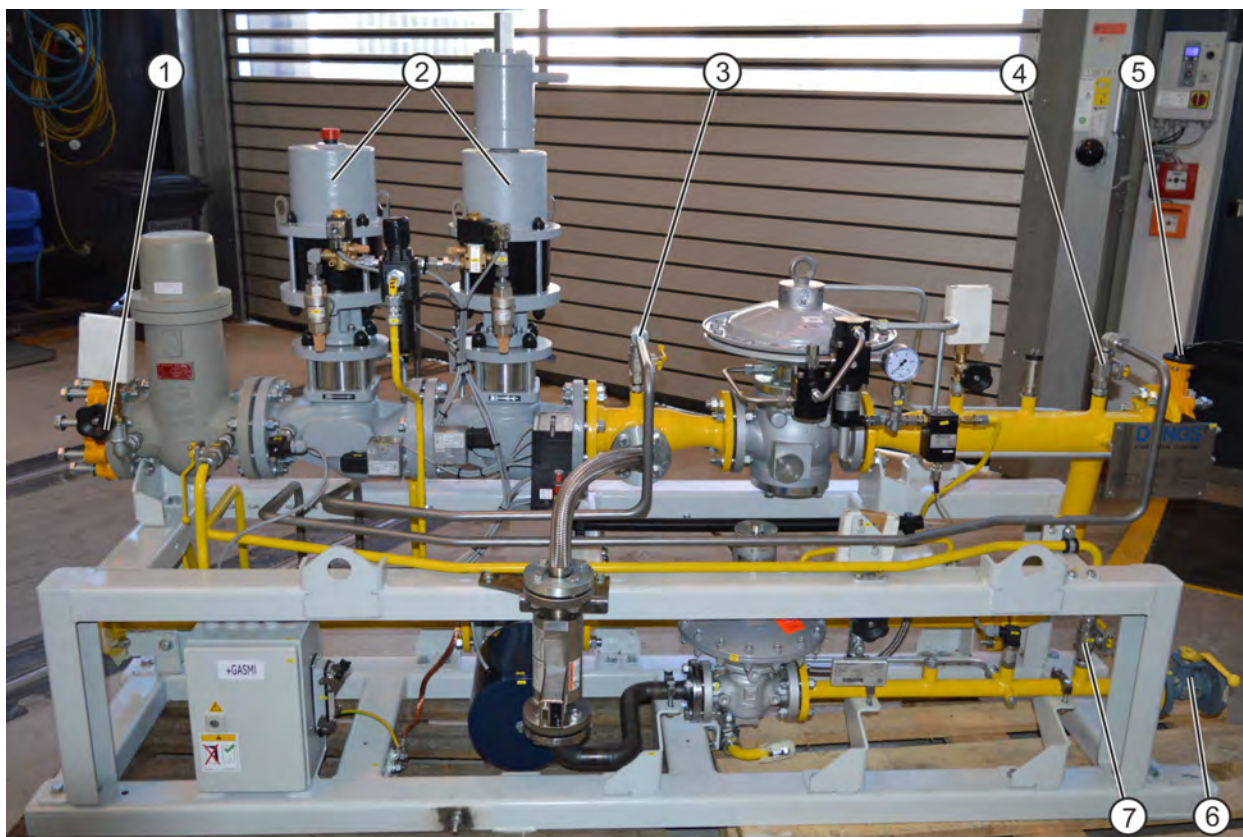
- The following elements must not be present:



- Correct orifice



5.2 Checking the central orifice (INNIO)

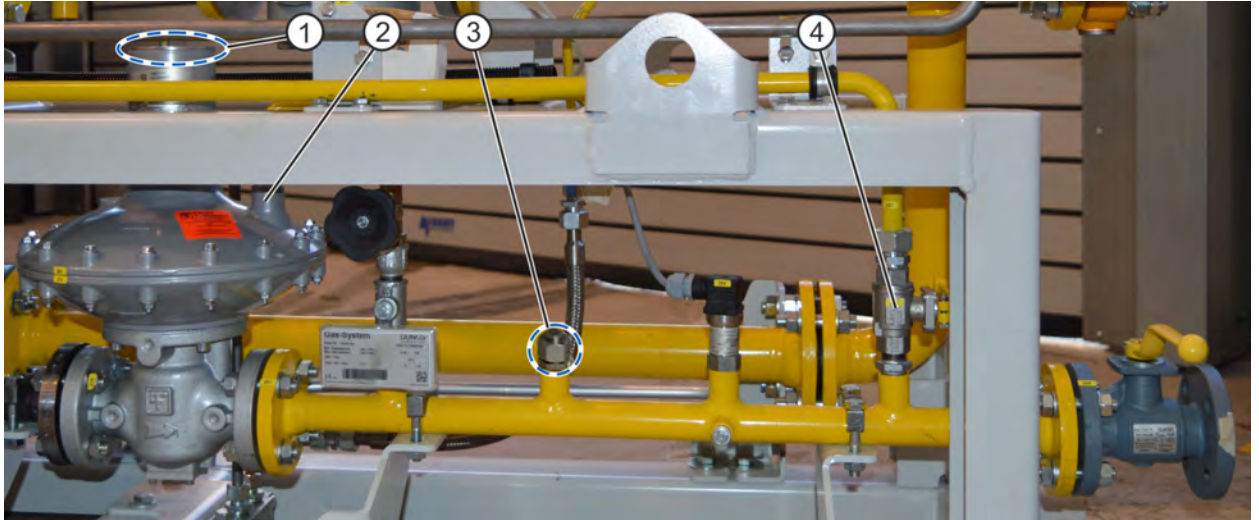


Requirement:

- Release the pressure in the prechamber gas rail with ball valve ⑦ when ball valve ⑥ is open.

Procedure:

An orifice must be installed at the outlet of the prechamber gas train after the manual shut-off valve ⑥, which is only fitted by INNIO at Jenbach (carry out the check on the test stand and on the plant).

5.3 Checking/setting the regulator set point spring setting**Requirement:**

- Pressure applied by means of gas or compressed air, see ⇒ Additional information.
- Screw in a pressure gauge (resolution in mbar) in position ③ after the pressure regulator in the prechamber gas train.

Procedure:

- Apply atmospheric pressure to the control line ② of the pressure regulator (this is generally the case during an engine standstill, as the charge line is depressurised).
- Simulate gas consumption by operating the ball valve ④ manually.
- Determine the pressure at position ③.

Set the pressure at position ③ while applying atmospheric pressure [mbar gauge]:	50 (tolerance 5 mbar)
Measured value position ③ while applying atmospheric pressure [mbar gauge]:	

If the measured value is not the same as the set pressure, adjust the pressure regulator as follows:

- Remove the cap ① (AF 22 open ended wrench). The adjusting screw is under the cap.
- Apply atmospheric pressure to the control line ② of the pressure regulator (this is generally the case during an engine standstill, as the charge line is depressurised).
- Simulate gas consumption (necessary in small quantities for the adjustment) by manually operating ball valve ④.
- Determine the pressure at position ③ and turn the adjusting screw (AF 17 Allen key) on the pressure regulator until the measured value is the same as the set value.

6 Main chamber gas train

6.1 Compressed air operation of the main gas valves: setting the filter pressure regulator

Requirements:

- Filter pressure regulator with pressure gauge ②
- Air supply pressure of 10 bar

Procedure:

- Pull the adjustment knob ① to release it.
- Rotate the knob to set the pressure to 4.5 bar.
- Push the adjustment knob ① down to lock it.



6.2 Main gas valve 2: checking/setting the opening delay

Requirement:

- Gas valve closed.

Default setting:

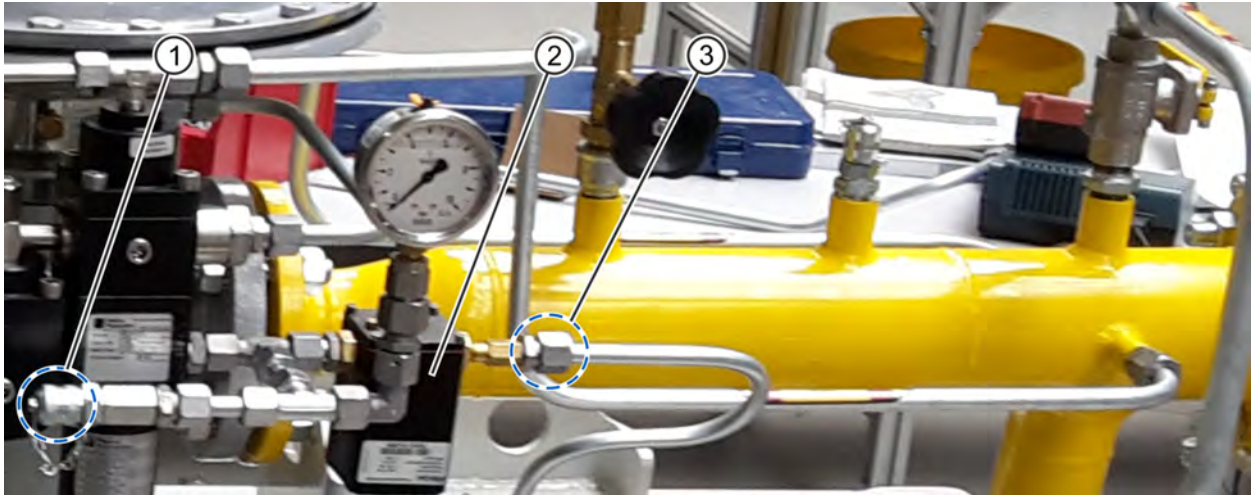
- Unscrew and remove the screw plug ① (6 AF Allen key).
- Carefully screw in the adjusting screw underneath as far as it will go (5 AF Allen key).
- Then turn the screw back through half a turn anticlockwise.



7 I/P transducer

7.1 Checking the calibration

The I/P transducer is supplied with the parameters already set. If it is found that the calibration varies inadmissibly, replace the unit or contact DUNGS. The calibration can be checked and adjusted as follows:



Requirements:

- Pressure applied by means of gas or compressed air, see ⇒ Additional information.
- Pressure applied to the I/P transducer ② via interface ③ by means of compressed air (10 bar).
- Screw a pressure gauge (resolution in mbar) into the pressure measuring nozzle ① in the control air line.
- If only the I/P transducer is checked or adjusted, there is no need to apply pressure to pressure regulator (GRS).
- If the GRS or pilot regulator is depressurized, only a maximum of 12 bar may be applied to it.

Procedure:

- Apply a current of 5 mA to the I/P transducer.
- Read off the pressure measurement at the interface ① (pressure gauge) and compare the measured pressure with the set value from the calibration table below.
- If the I/P transducer output pressure is correct at 5 mA, run up to other operating points in the calibration table and compare the measured values.
- If the I/P transducer output pressure is not the same as the set values in the calibration table, the calibration can be adjusted, see Chapter ⇒ Adjusting the calibration, or in the case of minor deviations the parameters can be adapted, see Chapter ⇒ DIA.NE parameters.

Calibration table:

I/P transducer applied current		I/P transducer output	
[mA] (set)		[mbar] (set)	[mbar] (actual)
5		625 (tolerance 10 mbar)	
8		2500	
10		3750	
12		5000	
16		7500	

7.2 Adjusting the calibration

The rubber cap on the underside of the I/P transducer must be removed. This will reveal several potentiometers. The zero point and end value can be adjusted with the "Zero" and "Span" potentiometers. Turning the potentiometer clockwise increases the value. Turning the potentiometer anticlockwise decreases the value.

Adjusting the zero point "ZERO":

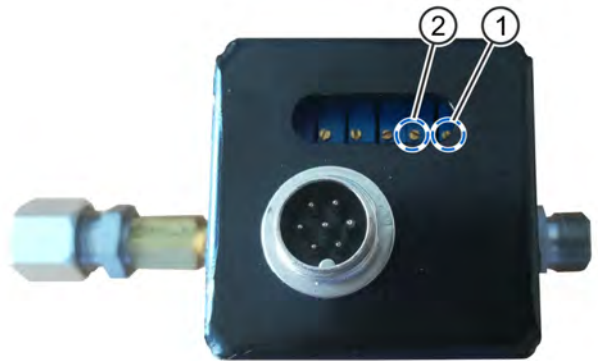
The zero point can be varied by up to 20% of the end value, e.g. on a 6 bar device from 0 bar up to 1.2 bar.

The adjustment is effected from outside on potentiometer Z ①

Adjusting the end value "SPAN":

The end value can be varied by up to 20% lower, e.g. from 6 bar to 4.8 bar.

The adjustment is effected from outside on potentiometer S ②

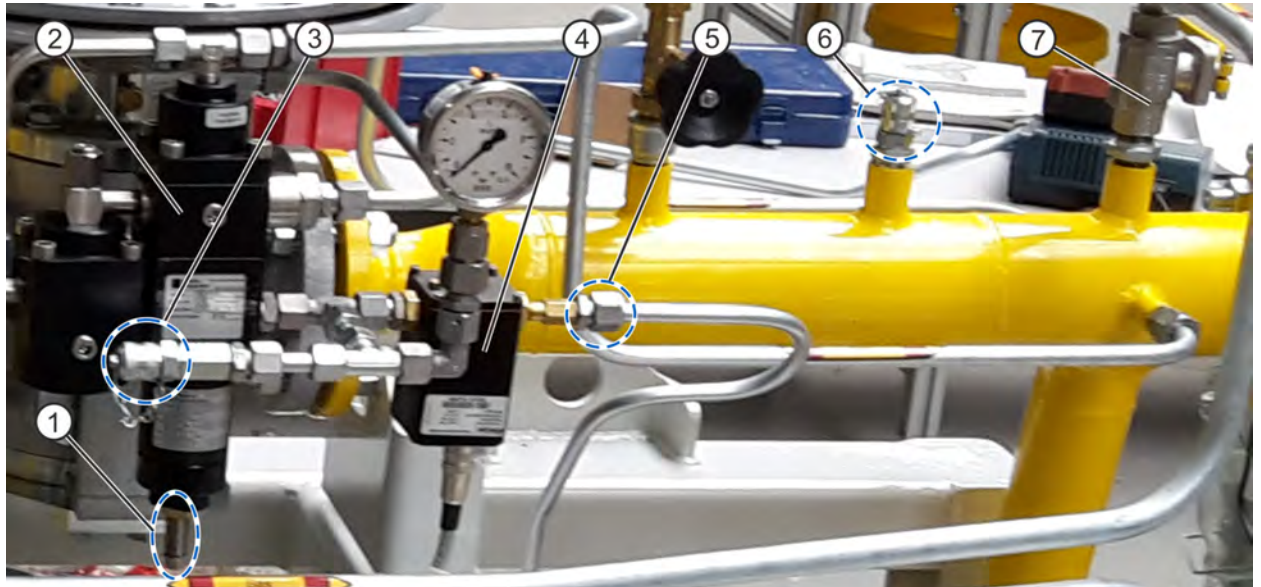


Adjustment procedure

- Apply a current of 5 mA to the I/P transducer.
- Adjust the Zero adjusting screw ① until the precision pressure manometer displays the necessary output value from the calibration table (625 mbar).
- Apply a current of 19 mA to the I/P transducer.
- Adjust the Span adjusting screw ② until the precision pressure manometer displays the necessary output value from the calibration table (9375 mbar).
- Repeat the above points until a stable result is achieved when switching over repeatedly with both 5 mA and 19 mA applied respectively.
 - The actual values that define the calibration curve must be entered in the DIA.NE by parameters 12466 and 12467, see Chapter ⇒ DIA.NE parameters
 - Parameter 12466 = actual value at 5 mA – 625 mbar
 - Parameter 12467 = actual value at 19 mA + 625 mbar

	I/P transducer applied current	I/P transducer output	
	[mA] (set)	[mbar] (set)	[mbar] (actual)
1st test run	5	625	
	19	9375	
2nd test run	5	625	
	19	9375	
3rd test run	5	625	
	19	9375	

7.3 Checking/setting the pilot set point spring

**Requirements:**

- I/P transducer ④ checked and correctly set.
- Pressure applied by means of gas or compressed air, see ⇒ Additional information.
- Pressure applied to the I/P transducer via interface ⑤ by means of compressed air (10 bar).
- Screw a pressure gauge (resolution in mbar) into the pressure measuring nozzle ③ in the control air line.
- Screw a pressure gauge (resolution in mbar) into the pressure measuring nozzle ⑥ in the gas line after the pressure regulator.
- Simulate gas consumption by operating the ball valve ⑦ manually.

Checking procedure:

- Apply a current of 5 mA to the I/P transducer.
- Check whether 625 mbar is present at the I/P transducer output (interface ③) and pressure regulator output (interface ⑥).
- If the I/P transducer setting is correct and a deviation is present downstream of the pressure regulator (interface 6), carry out the following adjustment.

Adjustment procedure:

- Remove the cover sleeve ① from the adjusting screw of the pilot regulator ②.
- Undo the lock nut on the adjusting screw of the pilot set point spring (18 AF open ended wrench).
- With a current of 5 mA applied to the I/P transducer, adjust the pilot set point spring adjusting screw (10 AF open ended wrench) until the pressure gauge at the gas train outlet (interface ⑥) shows 625 mbar.
- Tighten the lock nut on the adjusting screw.
- Check whether 625 mbar is still present at the pressure regulator output (pressure interface ⑥).
- If this is not the case, repeat the adjustment process.

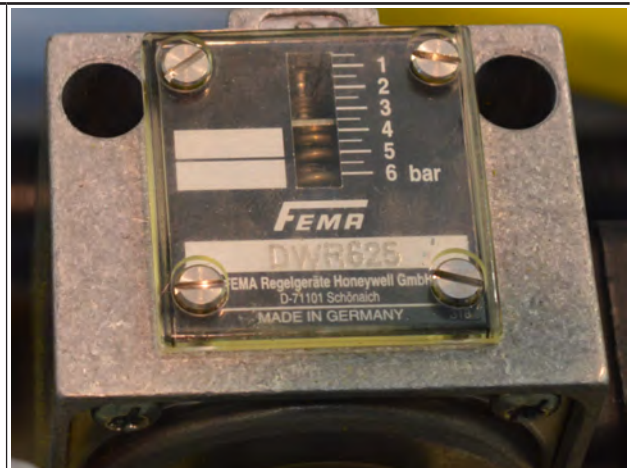
- Apply a current of 16 mA to the I/P transducer.
- Apply a current of 5 mA to the I/P transducer.
- Check whether 625 mbar is still present at the pressure regulator output (pressure interface ⑥).
- If this is not the case, repeat the adjustment process.
- Run up to different points in the calibration table below and check whether the values are plausible (some deviations are possible, as the gas consumption during the measurement is considerably less than that during real operation).
- If the values are plausible, screw the adjusting screw cover sleeve ① back on.

Calibration table:

I/P transducer applied current	I/P transducer output		Pressure regulator output	
[mA] (set)	[mbar] (set)	[mbar] (actual)	[mbar] (set)	[mbar] (actual)
5	625 (tolerance 10 mbar)		625 (tolerance 10 mbar)	
8	2500		2500	
10	3750		3750	
12	5000		5000	
16	7500		7500	

8 Main gas valves: leak test

The set pressure is shown on a scale on the pressure monitor.



The pressure can be corrected with a slotted screwdriver if necessary.



8.1 Test pressure monitor for the leak test on valve 1

Test pressure monitor setting:

Trip threshold at 0.5 (gauge)

8.2 Test pressure monitor for the leak test on valve 2

Test pressure monitor setting:

Trip threshold at 6.5 (gauge)

9 DIA.NE parameters

In order to show the transfer function of the main chamber gas train correctly with the above settings correctly in the DIA.NE, the following parameter settings must be made in the *Gas train* parameter menu:

- 12486: if a set-actual offset exists over the entire power range, this can be corrected with this parameter. Both arithmetical signs are possible.
- The slope of the calibration curve is defined with parameters 12466 and 12467.
- 12466: If this value is increased, a lower gas pressure is output for the same applied mA current.
Parameter = actual value at 5 mA – 625 mbar
- 12467: If this value is increased, a lower gas pressure is output for the same applied mA current.
Parameter = actual value at 19 mA + 625 mbar
- 12464 fixed value: Charge pressure point 1 set gas pressure – do not adjust
- 12465 fixed value: Charge pressure point 2 set gas pressure – do not adjust

Parameter			
HK GRS			
12486	Pressure offset due to the pilot regulator spring	0	mbar
12466	I/P transducer default of 4 mA at a control air set pressure of	0	mbar
12467	I/P transducer default of 20 mA at a control air set pressure of	10,000	mbar
12464	Set gas pressure – charge pressure at point 1	500	mbar
12465	Set gas pressure – charge pressure at point 2	7,000	mbar

The above parameters should not be used to adapt the output from the gas train to the engine requirements.

An adjustment of the engine gas requirement should be made using the following parameters:

Parameter			
HK GRS			
12462	Set gas pressure – differential pressure at point 1		
12463	Set gas pressure – differential pressure at point 2		

10 Revision code

Revision history

Index	Date	Description / Revision summary	Expert Auditor
3	28.02.2019	Detailliertere Beschreibungen; Kapitel 7.2 „Kalibrierung justieren“ hinzugefügt / More detailed descriptions; chapter 7.2 "Calibration adjustment" added	Burkhardt W. <i>Madl W.</i>

Revision history

2	28.09.2018	Kapitel 9 hinzugefügt / Chapter 9 added	Burkhardt W. <i>Madl W.</i>
1	16.06.2016	Erstausgabe / First issue	Burkhardt W. <i>Madl W.</i>