



# **DFM / DPT flow meters measurement accuracy checking technique.**

**Version 1.0**

This technique regulates requirements and operations of measurement accuracy control procedure. It helps to calculate inaccuracy of fuel consumption measurement with flow meters installed on a vehicle.

You should learn DFM operating documentation and explore "DFM Installation instruction» and User Manual of tracking device before carrying out the tests.

### 1. Test conditions

Representatives of interested parties should attend the tests.

Only persons who have studied operating documentation are allowed to carry out the tests. They also should have an experience of working with test equipment.

Tests are made on a properly functioning vehicle.

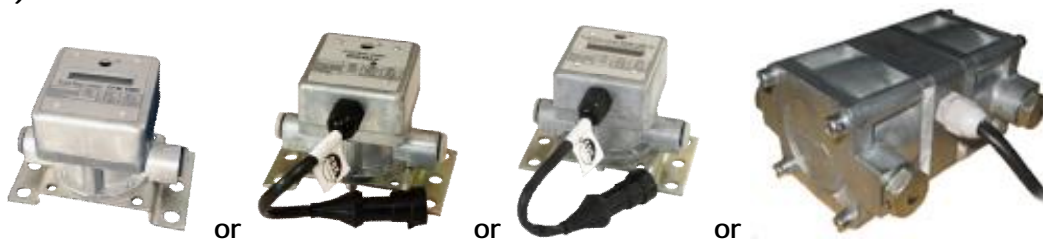
Terms of control procedure:

- a) Engine operating time - at least 1 hour;
- b) The engine should operate on average speed;
- c) It is not allowed to stop the engine during the control procedure;
- d) Only calibrated measuring vessels should be used to control the fuel volume.

### 2. Preparing the tests

Equipment:

- a) DFM flow meter



- b) Tracking device / fuel counter



- c) Calibrated measuring vessel



- d) Some containers for fuel (more than 10 liters) – 3 pcs



Install the meter on the vehicle and connect it to the tracking device.  
Configure the equipment if needed.  
Operations should be done according to Installation instructions.

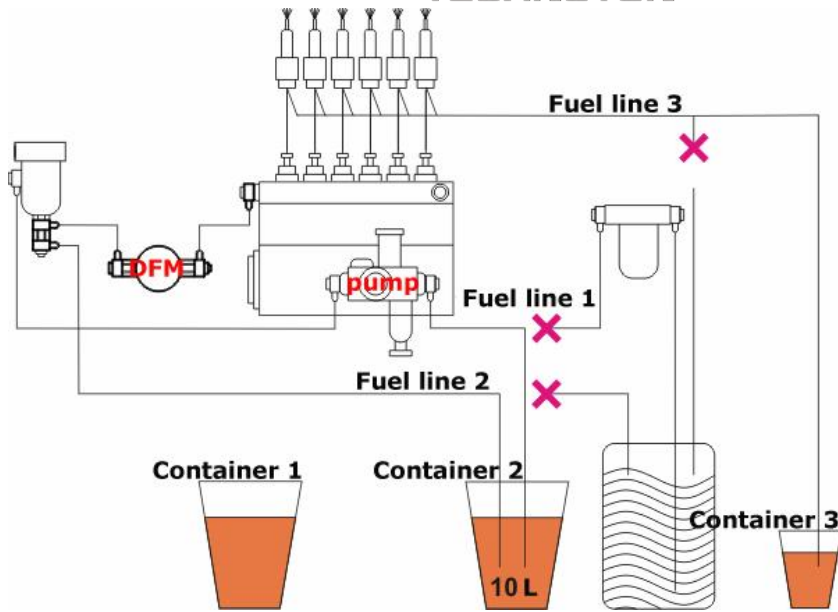
### 3. Carrying out the tests

1. Fill the container 1 (Pic. 1) with the fuel in a volume, sufficient for air removal from the fuel system and engine warming up.
2. Measure 10 liters of fuel (reference volume) using calibrated vessel and fill into container 2.
3. Connect the fuel line 1 to the input of fuel pump. Place the other end of the fuel line 1 to container 1.
4. Place the return line 2 to container 1 (not applicable for "on depression" scheme).
5. Disconnect the injectors return line from a tank (filter) and place it to container 1.
6. Pump over the fuel system using manual pump to remove the air from it.
7. Start the engine and allow it to warm up by operating temperature. There should be no air occurring from the fuel return line 2.
8. Close simultaneously inlet openings of fuel lines 1 and 2 and stop the engine.
9. Move the fuel lines 1 and 2 from container 1 to container 2 (the air should not enter into lines).
10. Close the outlet of fuel line 3 and move it from container 1 to container 3.
11. Record the **total fuel consumption initial value** using the indications of tracking device or indicator.
12. Record the starting time of control procedure.
13. Start the engine and set the average engine speed.
14. Let the engine to spend the maximum fuel from container 2. It is not allowed that the air enters into the fuel line 1.
15. Stop the engine.
16. Measure the fuel remaining in container 2.
17. Determine the "**Actual fuel consumption**" = 10 liters - "the rest in container 2".
18. Determine the "**Measured fuel consumption**" by the difference in initial and final total fuel consumption readings.
19. Calculate the **relative inaccuracy of measurement** =  
$$\frac{(\text{"Measured fuel consumption"} - \text{"Actual fuel consumption"})}{\text{"Actual fuel consumption"}} \times 100\%$$
20. Define the "**Volume of injectors return line**" using the calibrated measuring vessel (fuel volume in container 3).
21. Define the "**Quota of injectors return line in the total fuel consumption**" for the tested vehicle =  $\frac{\text{"Volume of injectors return line"}}{\text{"Actual fuel consumption"}} \times 100\%$
22. Protocol the test results. Protocol form is given in Annex 1.

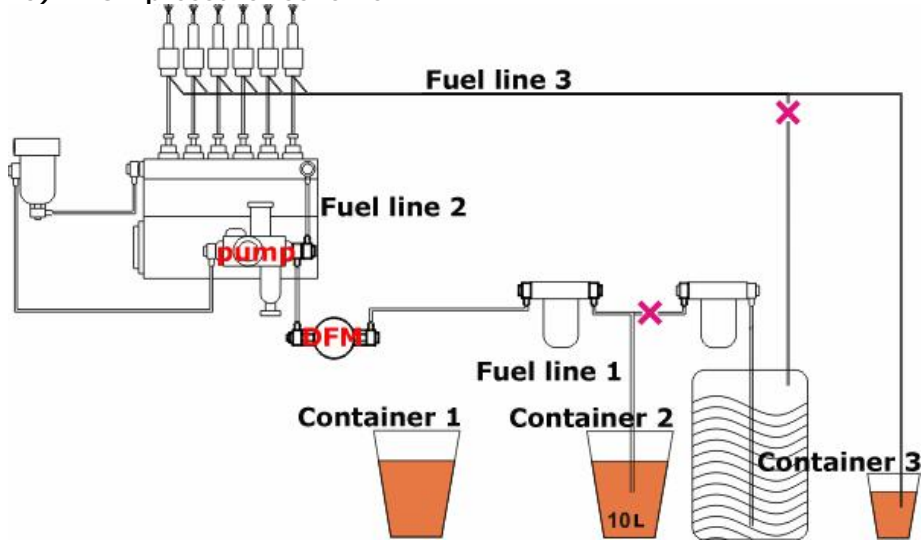
### 4. Registration of test results

The test results are filled in protocol. The protocol signed by a responsible person.

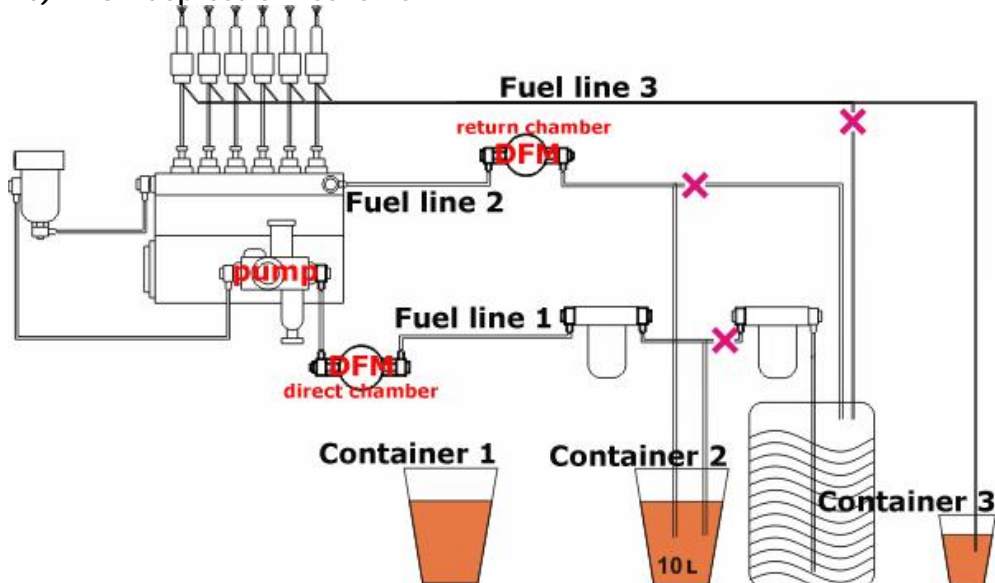
Corrections and erasures are not allowed in the protocol. An addition to approved protocol should be issued in case of necessity to put some changes.



a) "On pressure" scheme



b) "On depression" scheme



c) "Differenial" scheme

**Pic. 1. Control procedure fuel schemes**

Measurement accuracy control procedure protocol

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Vehicle mark, model, registration number	
DFM model, serial number	

Fuel consumption	<b>Actual fuel consumption.</b> According to measuring vessel indications $V_A$ , liters	
	<b>Measured fuel consumption.</b> According to DFM (indicator or tracking device) readings $V_M$ , liters	
The relative inaccuracy of fuel consumption measurement	$(V_M - V_A) / V_A * 100\%$	
The volume of injectors return line according to the measuring cap indications	$V_R$ , liters	
Quota of injectors return line in the total fuel consumption	$V_R / V_A * 100\%$	

**Conclusions:**

The result of fuel consumption measurement meets / does not meet to technical requirements.

**Comments:** \_\_\_\_\_

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Customer's representative \_\_\_\_\_ / \_\_\_\_\_ /

Contractor's representative \_\_\_\_\_ / \_\_\_\_\_ /