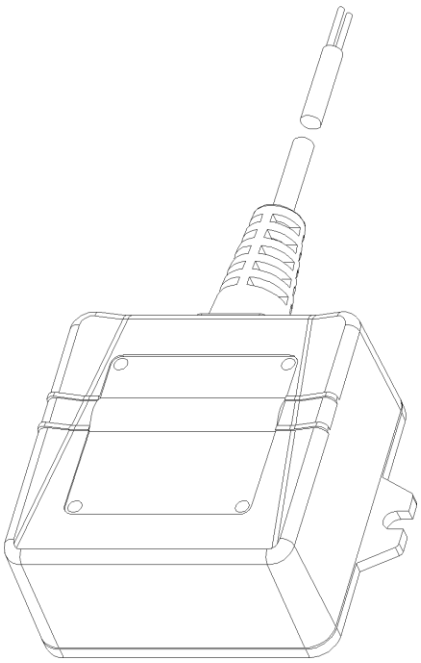
Fuel counter DFM



Operation manual

Versions
1.0./3.0

Mass Flow ONLINE

TECHNOTON

Content

1. Main data and technical characteristics 5
1.1 Purpose of use 5
1.2 Models 5
1.3 Exterior view and delivery set 5
1.4 Technical characteristics 6
1.4.1. Main characteristics 6
1.4.2. Characteristics of input signal 6
1.4.3. Information on display 7
1.4.4. Operating modes for the fuel consumer 9
1.4.5. Power supply modes 9
2. Installation and set-up of fuel counter DFM 10
2.1 Exterior examination before starting of works 10
2.2 Choosing an installation place 10
2.3 Mounting kit 10
2.4 Connection 11
3. Packing 12
4. Storage 13
5. Transportation 13
6. Utilization/re-cycling 13
Contact information 15
Appendix 1. Dimensional drawings of fuel counter DFM 15

Introduction

Recommendations and regulations given in the operation manual are related to fuel counters DFM. This document defines the procedure for installation and connection of fuel counters, as well as provides guidance/recommendations on the operation.

Fuel counter DFM is designed to record and show information on the display about fuel consumption and operating time of the engine or any other fuel consumer.

Fuel counter DFM is designed to be used with fuel flow meters with pulse output signal that has characteristics in accordance with the requirements given in paragraphs 1.4.2 of this guide.

Fuel counter can be installed in the driver's cab or another location that is suitable for data reading. The fuel counter is applied when it is not comfortable to read data directly from the fuel flow meter or if it is not possible at all.

It is recommended to use fuel counters DFM with fuel flow meters DFM AK, D and CK series.

Fuel counters DFM are applied for:

recording the actual fuel consumption;

recording the actual operational time;

rate setting of fuel consumption;

detection of fuel thefts;

engine tests in fuel consumption.

Distinctive features of fuel counters DFM:

lightweight and compact design;

stand-alone power supply from the built-in battery*;

compatibility with different fuel flow meters;

recording function of engine running time: general and in various operating modes.

Fuel counter DFM can be installed on cars, tractors, fixed machines and other units that are used in temperate and cold climates.

* DFM i with firmware version 3.0 and higher can be powered from the external power supply as well.

During operation of fuel counter it is necessary strongly to follow the manufacturer's recommendations mentioned in this manual.

The manual is for the professional users who are familiar with the rules for repair and installation works on vehicles and who have professional knowledge in the field of electrical and electronic equipment of various transport vehicles, who are experienced and qualified to work with fuel devices of transport vehicles.

To ensure the proper functioning of the fuel counter, its installation and set-up should be carried out by certified professionals trained by the manufacturer.

The manufacturer guarantees that the fuel counters correspond to requirements of technical normative legal acts provided that conditions of storage, transportation and usage, as well as recommendations on the use given in the manual will be followed.

1. Main data and technical characteristics

1.1 Purpose of use

Fuel counter DFM is designed to record and show information on the display about fuel consumption and operating time of the engine or any other fuel consumer.

1.2 Models

Three models of the fuel counters DFM are produced that differ in their pulse value and registered consumption limits.

Table 1. Models of the fuel counters DFM

Model	Pulse value, ml/imp	Minimal consumption, l/h	Maximal consumption, l/h
DFM i5	5	1	100
DFM i12.5	12.5	5	250
DFM i20	20	10	500

1.3 Exterior view and delivery set

Delivery set of fuel counters DFM includes:

1) fuel counter DFM – 1 pce;
2) magnet key – 1 pce;
3) mounting kit – 1 pce;
4) Signal cable (2 m) – 1 pce;
5) specification – 1 pce.

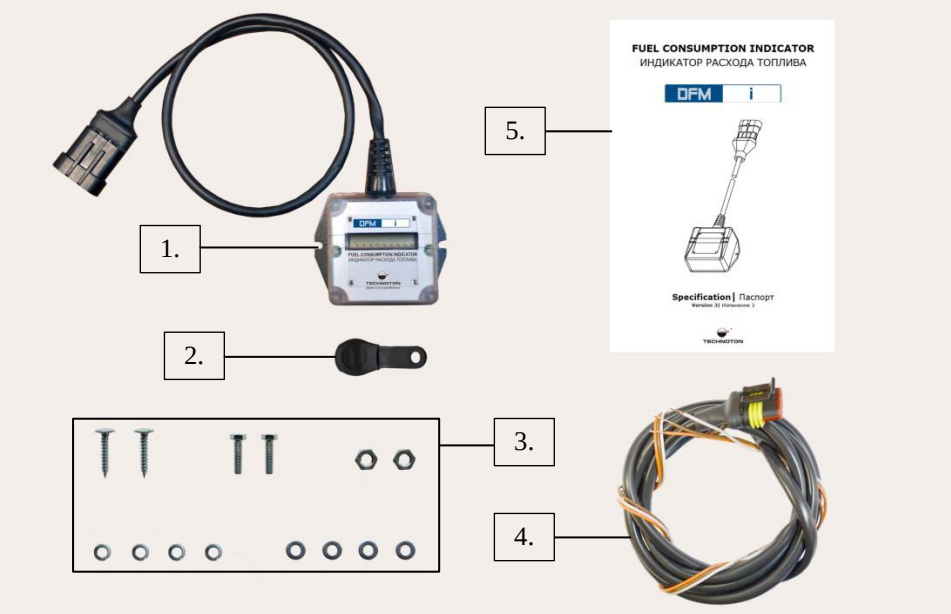


Fig. 1. Delivery set of fuel counters DFM

1.4 Technical characteristics

1.4.1. Main characteristics

Table 2. Main characteristics of fuel counter DFM

Input resistance of the measuring input, kOhm, not less	50
Temperature range, ºC	-20 … +60
Overall dimensions (without harness), mm, not more than	75x60x30
Weight, kg, not more	0.3
Power supply mode	see 1.4.5.

1.4.2. Characteristics of input signal

Fuel counters DFM can operate with fuel flow meters that have an output pulse signal corresponding to the characteristics given below.

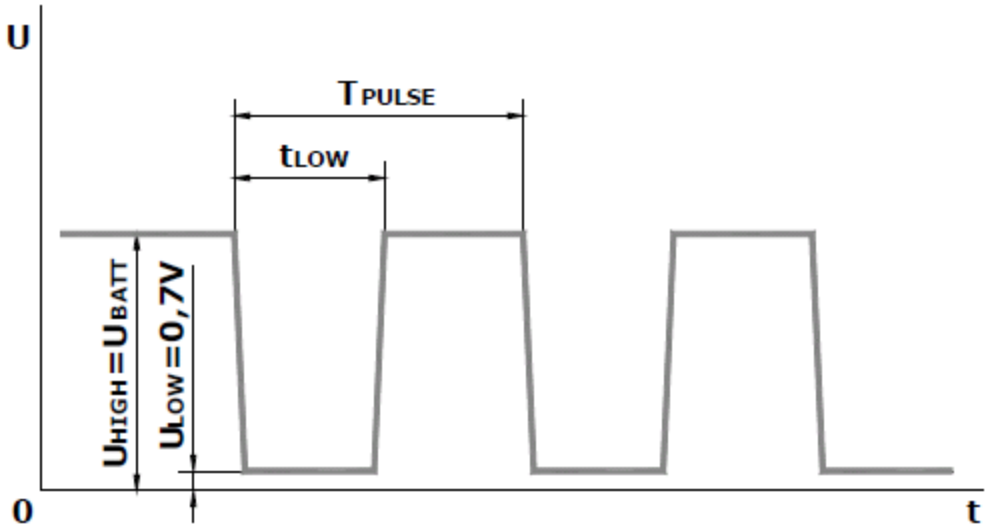


Fig. 2. Pulse signal

Based on the received signals from the fuel flow meters, fuel counter DFM calculates instant fuel consumption, the amount of consumed fuel, operating time of the fuel consumer.

1.4.3. Information on display

Useful information is shown on the display of the fuel counter DFM. Switching of the information screens (see Table 4) is performed by a light touch of the magnetic key (supplied) to the front part of the fuel counter.

Fig. 3. Magnetic key

In order to save the battery power, the fuel counter automatically turns the display into "Sleep mode" in 1 minute after the last touch of the magnetic key. As well, "dots" are shown on the display.

Fig. 4. Display view in "Sleep mode"

As soon as the key is brought close to the display, it "wakes up".

Information on the screen is displayed as follows:
-within 0.5 s service information is shown: screen № (in the left corner) and the units of measure or comments (in the right corner);
-within 1.5 s data (counter or parameter) are displayed.

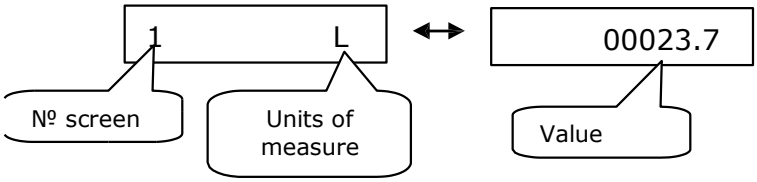


Fig. 5. Information presentation on the display of the fuel counter

Table 4. Information screens of fuel counter DFM

Displayed data	№ of screen	Units of measure
Counter "Total fuel consumption"	1	0.1 l
Counter "Total fuel consumption" of the increased imaging accuracy"	2	0.001 l
Counter "Operational engine time"	3	0.1 h
Counter "Operational engine time in "Idling" mode"	4	0.1 h
Counter "Operational engine time in "Optimal" mode"	5	0.1 h
Counter "Operational engine time in "Overload" mode"	6	0.1 h
Counter "Fuel consumption in artificial fuel overrating" mode	7	0.1 l
Instant fuel consumption	9	0.1 l/h
Battery charge in percentage of the maximum	10	10%
Temperature inside the fuel counter	11	1 °C
Firmware version	12	-

screen №1 displays the counter reading "The total fuel consumption" accumulated by the fuel counter since its release up to 0.1 liters;

screen №2 shows the counter "Total fuel consumption with increased accuracy" accumulated by the fuel counter since its release up to 0.001 l;

screen №3 displays the counter reading "The engine operational time" as the total time of the engine operation in all load ranges, including idling;

screens №4, 5 & 6 display the counter readings "Operational engine time" in "Idling", "Optimal" & "Overload" modes accordingly accumulated during the operating time of the engine in corresponding modes (see item 1.4.4);

screen №7 displays the counter reading "The fuel consumption" in "Artificial fuel overrating" mode, i.e. amount of fuel liters passing through the flow meter at a flow rate above the maximum. Value increase of this counter indicates the improper installation of the flow meter or possible facts of fuel thefts;

screen №9 "Instant fuel consumption" shows the current value of instant fuel flow rate and can serve as a visual diagnostic for device operability and accuracy of its installation on the engine;

screen №10 "The battery charge in percentage of the maximum" displays the residual charge of internal battery;

screen №11 "Temperature inside the fuel counter" shows the current value of the temperature;

screen №12 "Firmware version" displays the software version installed on the fuel counter.

1.4.4. Operating modes for the fuel consumer

Based on instant fuel flow, the fuel counter DFM defines the following user modes:

- **Idle** – when the consumer operates at idle;
- **Optimal** – at medium load of the consumer;
- **Overload** – at increased or maximal load of the consumer;
- **Tampering –** by fuel consumption above the maximum.

Detailed description of operating modes of fuel consumer is shown in Table 5, where:
Q – actual fuel consumption;
Qmax – maximal fuel consumption (acc to the fuel counter's specification);
Qmin – minimal fuel consumption (acc to the fuel counter's specification);
Q_1 – estimated value of fuel consumption equal to 2.5Qmin;
Q_2 – estimated value of fuel consumption equal to 0.75Qmax.

Table 5. Operating modes for the fuel consumer

Normal consumption (flow) $0<Q\leq Qmax$			**Artificial overrating** $Q>Qmax$
Idle running $0<Q<Q_1$	**Optimal** $Q_1\leq Q<Q_2$	**Overload** $Q_2\leq Q\leq Qmax$	

Separation of modes is particularly useful when DFM operates with automotive and vessel engines because it is possible to take into account the actual engine wear, as well as to save on maintenance, without fear of sudden breakdown.

1.4.5. Power supply modes

DFM i operates in a combined power supply mode.*
DFM operates autonomously being powered from the built-in lithium-silicon battery (3.6V). It can be powered from vehicle power supply if connected to vehicle onboard power supply network (4…50V). DFM i will automatically switch into stand-alone power supply mode if the voltage of the vehicle supply system is less than 4V.
Estimated DFM operation time until full battery discharge is not less than 24 months

* Only for DFM i version 3.0 and higher.
DFM i with firmware version lower than 3.0 operate only in stand-alone mode.

2. Installation and set-up of fuel counter DFM

2.1 Exterior examination before starting of works

Before you start, you should make external check of fuel counter for any possible defects that occurred during transportation, storage or careless handling:

1) visible damage of the housing, connecting parts, display and/or signal cable;

2) play of the constituent fuel counter parts in relation to each other or gaps between them.

By discovering any defects, please, contact the product supplier.

2.2 Choosing an installation place

To install the fuel counter you should choose a dry place protected from aggressive environmental influences. The best place to install the fuel counter is a driver's cab. Fuel counter should be mounted away from heating and cooling elements (for example, climate control systems). If you lay the signal cable, you should avoid sharp bends and possible locations of its abrasion.

2.3 Mounting kit

Delivery set for the fuel counters DFM includes a mounting kit to simplify its installation. The kit parts are given below in Table 6.

Table 6. Mounting kit for the fuel counters DFM

Name	Amount
Screw 2-4.2x25	2
Screw M4-6gx25	2
Nut M4	2
Washer 4.65.019	2
Washer 4.04.019	4

2.4 Connection

Fuel counter cable contains two wires or three wires. Designation and marking of the wires are shown in
Table 7.

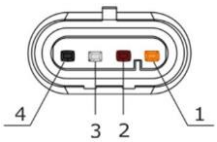
Table 7. Pin assignment of fuel counters DFM (unit firmware version lower than 3.0)

Wire colour	Pin assignment	Marking
Brown	«-» ACB (ground)	GND
White	Pulse signal of the fuel flow meter	T701

To connect the fuel counter you need to connect the corresponding wires (pins) of the flow meter with wires of the fuel counter, then the fuel counter will start operating automatically.

Electrical connection of DFM i with firmware version 3.0 and higher is done according to wire assignment shown in Table 8.

Table 8. DFM i pinout (unit firmware version 3.0 and higher)

View	Pin number	Pin assignment	Marking
	1	Power supply (orange)	VBAT
	2	«-» ACB (ground) (brown)	GND
	3	Pulse signal of the fuel flow meter	T701
	4	Serial, ISO9141 standard	KLIN

3. Packing

Fuel counter DFM is delivered in the carton box.

Fig. 6. Packing of fuel counter DFM

On one side of the box there is a sticker with information about the product, production date and factory control marks.

Fig. 7. Sticker on the box with fuel counter DFM

4. Storage

Fuel counter DFM is recommended to be stored in closed dry areas.

Fuel counter storage is allowed only in original packaging at temperature range from -50 to +40 °C and relative humidity up to 100% at 25 °C.

Do not store the fuel counter in the same room with substances that cause metal corrosion and /or contain aggressive impurities.

5. Transportation

Transportation of fuel counter DFM is recommended in closed transport that provides protection from mechanical damage and no access of precipitation.

During transportation by air, the fuel counter must be placed in heated sealed compartments.

Air environment in vehicles should not contain acid, alkaline and other aggressive impurities.

Shipping containers with packed fuel counters should be sealed.

6. Utilization/re-cycling

Fuel counter DFM does not contain harmful substances and ingredients that are dangerous to human health and environment during and after the end of life and recycling.

Fuel counter DFM does not contain precious metals in amount that should be recorded.

Contact information

Mass Flow ONLINE BV
www.massflow-online.com, support@massflow-online.com

MANUFACTURER

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DEVELOPMENT, TECHNICAL SUPPORT

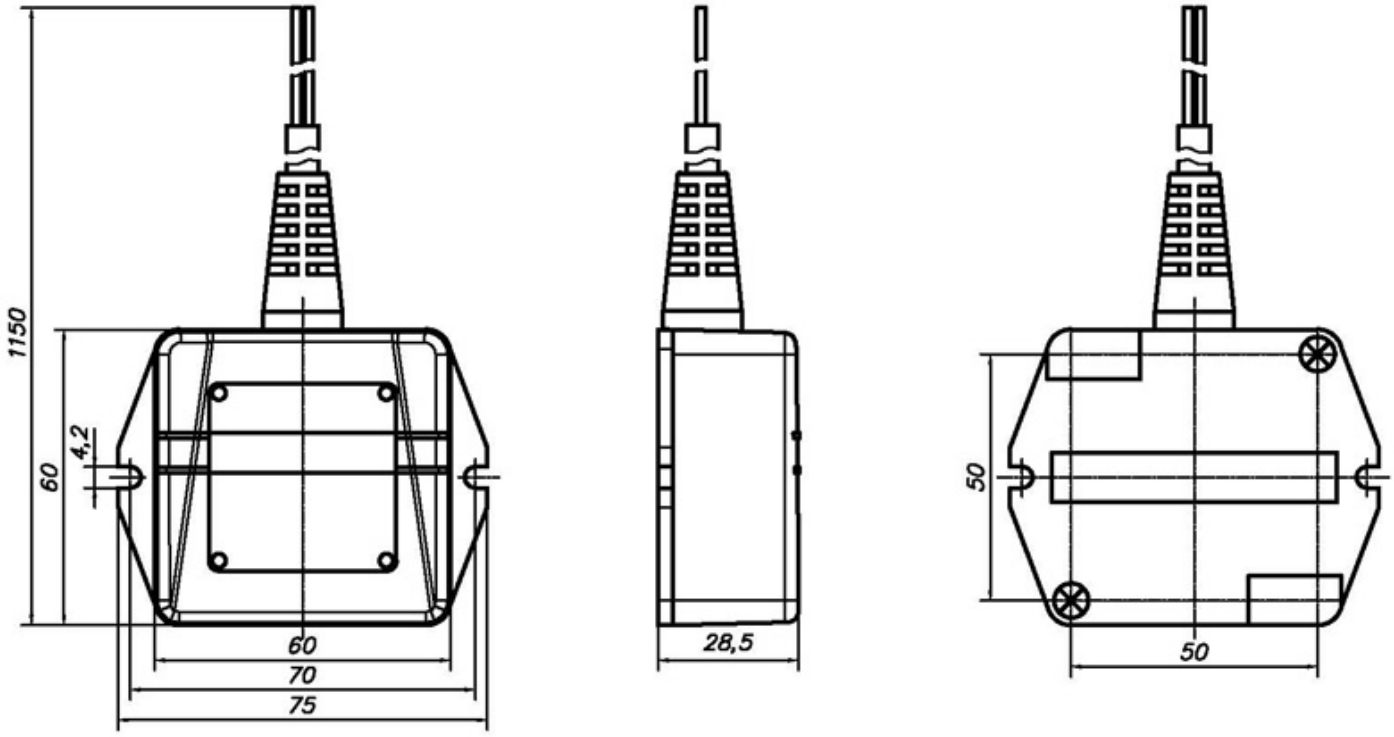
Technoton

220033, Republic of Belarus, Minsk, Partizanskiy av., 2/4

e-mail: support@technoton.by

www.jv-technoton.com

Appendix 1. Dimensional drawings of fuel counter DFM



Dimensional drawings of fuel counter DFM (dimensions are given in mm)