MOTOMETER
powered by solutions

The MFA 10 (multi-function display unit with 10 displayable items) was developed as a flexible instrument for the application in vehicle construction and for stationary engines. On the basis of the distinct modular structure which requires the application of a MOTOMETER master module, an economical electronic platform for the adaptation to specific requirements was created. The MFA 10 is used in a great variety of applications, e.g. in construction machines, agricultural vehicles, light industrial vehicles, special vehicles, municipal vehicles, stationary engines, stationary and mobile processing machines.

The sturdy construction in combination with an attractive design allows for the application in almost every dashboard, even if no driver's compartment or other protection equipment against hard environmental conditions are available. Due to the sturdy design, the installation in vehicles and machines is easy, fast, economical and can be carried out without much wiring.

In addition to the listed standard multi-function display units, we can also offer you customised solutions.

Components of the MFA 10

Basic module

The basic module consists of a two-line LC Display and 8 keys. A red function identification (LED) is assigned to each key. A buzzer is installed inside the MFA 10, and the central plug is equipped with two switching outputs.
The basic module of the MFA 10 includes the intelligence for the processing of the input signals and the control of the analogous modules (speedometer/revolution meter).
The function of the MFA 10 can be configured by the software. The MFA 10 basic module is able to process 4 dynamic sensors and 7 analogous sensors as input signals, and to control 2 analogous modules. The MFA 10 is designed for the application in combination with 12 V and 24 V vehicle electric wiring. The instrument illumination can be switched on via terminal 58 (light switch). When the light is on, the connected analogous modules are also illuminated automatically. Additionally, the background behind the key cap symbols and the display of the basic module are illuminated.

Analogous modules

The analogous modules are available as revolution meters and speedometers with different scale end values and spread scales. The application of the analogous modules is possible only in combination with a master module.

Control light module

The control light module consists of up to 10 control lights with incandescent bulbs (1.2 W). The control lights are activated, if required, and inform the operator about a defect in the vehicle or warn of critical operating conditions.

The colour and the symbols of the control lights can be selected in compliance with customer requirements by inserting the appropriate symbol plates. The control light module is available in a 12 V and a 24 V version.

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Programming equipment

The programming equipment for the adaptation of the MFA 10 to customer-specific configurations and for diagnosis consists of a programming adapter PAD 10, the cable sets for the connection with MFA 10, and the programming software BEP 10. The software is compatible with the operating systems DOS 4.6,Windows 3.1 and Windows 95/98/ 2000 and XP. The programming is carried out via a serial interface.

Display

The MFA 10 master module is equipped with a two-line LC Display. The upper display line (line 1) has 4 digits with 1 decimal digit and one colon. Displaying range from 0 to 9999, 0.0 to 999.9 or 12:05. The following symbols or units are available in line 1: Volt, litre, temperature symbol, bar, km/h and rpm.

The lower display line (line 2) has 6 digits with 1 decimal digit and 1 colon. Displaying range from 0 to 9999, 0.0 to 999.9 or 12:05. The following symbols or units are available in line 2: Volt, litre, temperature symbol, bar, km/h, mph, rpm, km, mls and h.

Hardware variants

The 8-key MFA 10 basic module is available in these four hardware versions:

8 keys		**Hardware Version**		
Input type	**710.008.1101**	**710.008.1102**	**710.008.1103**	**710.008.1104**
Dynamic inputs	4	4	4	4
Coolant/Oil temperature	3	2	2	2
Outside termperature	1	—	—	—
Oil pressure/ Lever-type level sensor	2	4	5	2
Fuel tube sensor	1	1	—	1
0 – 20 mA ; 0 – 5 V	—	—	—	2

Display:

- 2 x Analogous instrument
- 8 x Function keys – data via display line 1 or 2

- 4 x background functions, e.g. operating hours via display line 2, time via display line 1

Warning point output

- Function identification LED static and display static
- Function identification LED static and display flashing
- Function identification LED flashing and display static
- Function identification LED flashing and display flashing

- Buzzer permanent sound or intermittent
- Switch output 1 and/or 2 activated
- Error storage record
- Alarm extension/switch-off timer

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Dynamic inputs and their measuring ranges

Limit frequencies

- maximum frequency per input: 3.5 kHz
- maximum total frequency: 12,0 kHz

Speedometer display in the MFA 10 master module

- Display range 1: 1 to 255 km/h or mph
- Display range 2: 1.0 to 25.5 km/h resp. mph (more than 25.5 km/h or mph solution from range 1)
- Solution range 1: 1 km/h or 1 mph
- Solution range 2: 0.1 km/h or 0.1 mph
- Impulse figure range: k-min. 4,000 imp./km to k max. 300,000 imp./km (k = vehicle travel impulse figure)
- Display in display line 1 and 2: yes
- Display in analogous module 1 and 2: yes

Revolution meter display in the MFA 10 master module

- Display range 1: 10 rpm to 9,990 rpm
- Display range 2: 10 rpm to 300 rpm (more than 300 rpm solution from range 1)
- Solution range 1: 10 rpm
- Solution range 2: 2 rpm
- Impulse figure range: min. 2 imp./min-1 to max. 140 imp./min-1

- Display in display line 1 and 2: yes
- Display in analogous module 1 and 2: yes

Analogous module revolution meter

The revolution meters are available with the following scale end values:

1,500 rpm, 2,500 rpm, 3,000 rpm, 4,000 rpm and 6,000 rpm.

Analogous module speedometer

The speedometers are available with the following scale end values:

40 km/h, 60 km/h, spread scale 60 km/h, 80 km/h, 100 km/h, 120 km/h, 140 km/h, double scale km/mph 140 km/h – 90 mph

Analogous inputs and measuring ranges
Temperature

Display range 1   -40 to +470 °C/-40 to +470 °F
- Solution: 1 °C/1 °F
- Warning point solution: 2 °C/2 °F

Display range 2   -40 to +980 °C/-40 to +980 °F
- Solution: > 2 °C/2 °F
- Warning point solution: 4 °C/4 °F

Display   Line 1 and 2

Sensors

- Outside temperature: 642.013.1007
- Oil temperature: 642.009.10xx; 642.010.10xx
- Coolant temperature: 642.007.10xx; 642.011.10xx
- Cooling air temperature: 642.017.1003

- Sensor with standardized output:	0 to 10 mA, 4 to 20 mA apparent ohmic resistance 240 Ω
	0 to 5 V, 1 to 5 V
	R i. > 1 kΩ

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Pressure

Display range 1	0 to 25.5 bar
- Solution:	0.1 bar
- Warning point solution:	0.1 bar
Display range 2	0 to 990 bar
- Solution:	> 2 bar
- Warning point solution:	10 bar
Display	Line 1 and 2

Sensors

- Low pressure 5 bar, 10 bar, 25 bar:	675.002.10xx, 675.003.10xx, 675.004.10xx
- Sensor with standardized output:	0 to 10 mA, 4 to 20 mA - apparent ohmic resistance 240 kΩ
	0 to 5 V, 1 to 5 V
	R i. > 1 kΩ

Tank Content

Display range 1	0 to 900 litres
- Solution:	1 litre
- Warning point solution:	4 litres
Display range 2	0 to 9,000 litres
- Solution:	> 2 litres
- Warning point solution:	40 litres
Display	Line 1 and 2

Sensors

- Fuel tube sensor:	608.001.10xx
- Lever-type level sensor:	608.010.10xx
- Tank Reed contact sensor:	608.020.10xx
- Sensor with standardized output: -	0 to 10 mA, 4 to 20 mA apparent ohmic resistance 240 Ω
	0 to 5 V, 1 to 5 V
	R i. > 1 kΩ

Vehicle electric wiring voltage

An internal tap-off from terminal 30 is applied for the monitoring of the supply voltage.
The central plug has no input for this function.

Display range	10 V to 32 V DC
- Solution:	0.2 V
- Warning point solution:	0.2 V
Display tolerance	< 2 % of the scale end value
Display	Line 1 and 2

Special functions

Total service hour counter

Display range	0.0 to 50,000.00 h
- Solution:	0.1 h (6 minutes)
Warning point for SID	Solution 20 h
Display	Line 2, as well as "off" with terminal 15

Daily service hour counter

Display range	0.0 to 999.9 h
- Solution:	0.1 h (6 minutes)
Display	Line 2, as well as "off" with terminal 15

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Total travel distance counter

Display range	0 to 500,000 km or mls
- Solution:	0.1 km/mls

Warning point for SID
- Solution:	200 km
Display	Line 2, as well as "off" with terminal 15

Daily travel distance counter

Display range	0.0 to 999.9 km or mls
- Solution:	0.1 km
Display	Line 2, as well as "off" with terminal 15

Time display/Clock

The clock can be displayed in the 12 h (a.m., p.m.) or 24 h mode.

Service Interval Display (SID)

If requested by the customer, the service interval display (SID – in German SIA) can be activated. In activated condition, it runs in the background and activates a flashing display message "S I A" on display 2 when the defined service interval has been exceeded. The quantities to activate the SID message are service hours, travel distance or switch inputs such as air filter pollution or brake lining wear.

Special functions

The following functions are default features of the master module and can be programmed any time, if necessary.
If the service period of the vehicle or the engine is less than 5 hours, or if the vehicle has travelled less than 50 km, a reset to zero is possible for one time. At every start, an autocheck is carried out, which checks the function of the device and the sensors. Any occurring failure will be displayed.

The integrated error and event memory allows for the storage of up to 255 events, which can be called and evaluated via the diagnosis interface. Simultaneously, the master module is programmed via the diagnosis interface by means of the programming feature. The connections are in the 25 pin plug.
The sensor characteristics can be selected according to customer specifications and their programming is easy.
The integrated buzzer gives a warning signal, if required due to especially critical conditions. The activation of up to two switching outputs (maximum 20 W each) allows for additional actions and warning options.

Configuration

All functions, the applied sensors, the key and display configuration,warning point activities and customer data are described in a configuration sheet. Every customer has the possibility of programming the MFA 10 himself by means of a programming feature.

Even in installed condition, a new programming process or the modification of an existing programming condition can be carried out any time by means of the installed diagnosis interface.

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Technical data

Operating data master and analogous module

Operating voltage:	10.5 V to 32 V
Operating temperature:	-25 °C to +70 °C
Storage temperature:	-40 °C to +85 °C
Stand-by current	
terminal 15 off:	(24V) max. < 6 mA,
	typ. < 4 mA
	< 1A (depending on the supply voltage and sensor equipment)

Operating data control light module

Operating voltage:	12 V or 24 V
Power:	10 x 1.2 W
Operating temperature:	-25 °C to +70 °C
Storage temperature:	-40 °C to +85 °C

Construction master and analogous module

Front frame:	100 mm x 100 mm
Recess in dashboard:	96 mm x 96 mm
Housing cup depth:	< 60 mm
Mounting:	Knurled plastic nut with metal bracket
Protection type front:	IP 64
Protection type rear:	IP 50
Glass screen:	Flat, de-reflected
Housing:	matt black

Construction control light module

Front frame:	100 mm x 50 mm
Recess in dashboard:	96 mm x 48 mm
Housing cup depth:	< 60 mm
Mounting:	Knurled plastic nut with metal bracket
Protection type front:	IP 64
Protection type rear:	IP 50
Glass screen:	Flat, de-reflected
Housing:	matt black

All data subject to technical changes.