



DISPLAYS: MOTOMASTER

MOTOMETER

powered by solutions



The MOTOMASTER with its central instrument and the individually usable satellites is the result of consistent further development of classic round displays into a modern and variable display system, which directly evaluates the digital data of a modern motor management, but at the same time allows analogue input signals to be represented and even to be made available to the CAN network.

In the course of development, value was placed on the state-of-the-art technology for all components.

Classic pointer-type displays are controlled by step motors, the face and pointers have LED backlighting, and the instrument functions are microprocessor controlled.

MOTOMASTER is designed for an operating voltage between 6 and 32 volts and is therefore suitable for a wide range of applications, from construction machinery or all types of service vehicles in the public service or agricultural sectors, to stationary motors or working equipment.

We may offer you customer specific multifunctional displays besides our listed standard products.

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The Central Instrument

The central instrument of MOTOMASTER is a round instrument with an installation diameter of 80 mm. It has a classic, analogue pointer-type display to represent velocity or engine speed (optionally any other value can be indicated), a multifunction LCD display, and a warning LED. A buzzer is also integrated.

For data exchange, it has 2 CAN inputs as well as 6 analogue inputs plus 2 switching outputs. To control the satellites, the central instrument is also equipped with a LIN interface. The MOTOMASTER is easy to configure over Windows-based PC software.



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Mechanical Data of Central Instrument

- 80 mm installation diameter and 55 mm installation depth
- analogue display, LCD display, warning LED, button, buzzer
- plastic housing
- glass or plastic lid, coated for antireflection
- backlight technology
- backlighting pointer
- front frame black, flat
- protection type: Front IP67; Rear IP50
- central plug: TYCO 1-174960-1, 20-pin

Analogue Display

- classic analogue display with pointer
- angle range between 0 and 210 degrees
- pointer motion is powered by a step motor
- face and pointer have backlighting with adjustable brightness

LCD Display

- monochrome, freely programmable graphic display
- resolution: 132 x 32 pixels
- display of numbers as well as text and graphics possible
- white LED backlighting in the standard version

Status-LED

- used to report different situations using two colours and various blinking patterns
- the input signal and the warning threshold can be defined and adjusted over the software

Button

- LCD display is controlled by using the button on the front
- pressing the button will display the various parameters
- button is also used to adjust the settings for the lighting and the clock, or to reset the daily odometer and daily operating hour counter respectively
- in addition to acknowledgement of alarm messages, a "wake-up" feature from standby mode is possible to show the time (operation with terminal 30)

CAN Interfaces

- 2 independent CAN interfaces (protocol standard 2.0B)
- makes the receipt of data, information, and error messages possible as well as the transmission of analogue measurement values
- transmission rate: up to 500 kbit/s

Analogue Interfaces

- can be configured as inputs
- 0 – 5 V (resolution 12 Bit)
- 0 – 10 V (resolution 12 Bit)
- 0 – 20 mA (resolution 12 Bit)
- 4 – 20 mA (resolution 12 Bit)
- 1 – 3.000 Hz (U_{ss} min = 100 mV; resolution 10 Bit)
- PWM Input (resolution min. 10 Bit)
- Resistance
- 0 – 120 Ohm (resolution 12 Bit)
- 0 – 300 Ohm (resolution 12 Bit)
- 0 – 2 kOhm (resolution 12 Bit)
- 0 – 30 kOhm (resolution 12 Bit)

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LIN Interface

- for communication with up to 15 satellite instruments
- specification 2.0
- max. transmission rate of up to 20 kbit/s

Diagnostic K-Line (com interface)

For configuration, the central instrument has a single-wire interface in accordance with the K-Line standard (com interface), which operates according to the RS232 standard. In addition to the configuration, it also serves in updating of software as well as for diagnostics for the MOTOMASTER.



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Switched Outputs

The central instrument also has 2 short-circuit proof outputs (open collector).

Buzzer

When errors occur, an integrated buzzer can be addressed, which can output different signals depending on the event (max. volume 85 dB/m). The buzzer is reset over the button.

Real Time Clock

A real time clock function is integrated in the central instrument. It can be displayed in the LCD display – during operation, as well in "standby mode" on request. The clock time is set over the button and can be transferred to the CAN bus. The CAN bus can also provide the clock time.

Odometer

An integrated odometer records both total kilometres as well as daily kilometres, which can be reset individually over the button. The two CAN inputs or the frequency input (conversion to distance) serve as signal source.

Hour Meter

In addition to the odometer, the function of an hour meter can be selected. It can also be addressed over the CAN inputs or over the real time clock. A record of the operating hours can be coupled to the achievement of a specific engine speed. Recording of total as well as daily operating hours is possible. The daily operating hours can be reset over the button.

Service-Interval-Alarm (SIA)

Programming and display of service intervals in dependence on the operating hours on the hourmeter or on any other analogue input is possible. The first interval can be different from the following.

Error Memory

The central instrument manages the error memory and displays errors for the defined event or sensor errors. Error codes provided by the CAN bus are displayed and partly translated in "clear text". Additional error messages can result from internal self-tests or be generated from the interpretation of the analogue input values. For example, sensor errors (limit value exceeded/not achieved, cable break, short circuit) can also be saved.

Additional Functions

Additional functions can be realised over the microprocessor-controlled central instrument. For example, attenuation of the pointer motion or the LCD display can be adjusted individually. The hysteresis of the warning thresholds can also be changed individually. Standard characteristic curves for the sensors are stored in the central instrument.

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Satellite Instruments

Satellite instruments are designed as a supplement to the central instrument and represent together with the central instrument the display system MOTOMASTER.

Central instrument and satellites thus result in a highly flexible system for adapting the information shown to the situation and the requirements in the cabin or cockpit of the

vehicle or machine.

The satellites are round instruments, which are configured and controlled from the central instrument, whereby the connection is over the LIN bus system. Up to 15 satellites can be connected to the central instrument.



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In addition to use as a MOTOMASTER satellite, they can also be used separately as a classic round instrument, if the input value of the standardised voltage value is 0 – 5 V (0.5 – 4.5 V).

In the basic version, instruments are available that can display the following parameters: velocity, engine speed, temperature, pressure, fill level, voltage, and current.

There are two types with different pointer deflection: 0 to 240 degrees and 0 to 90 degrees.

Mechanical Data of Satellites

- 52 mm installation diameter and 42 mm installation depth
- Analogue display
- two-tone warning LED
- Plastic housing
- Glass or plastic lid, coated for antireflection
- Backlight technology
- Backlighting pointer
- Front frame black, flat
- Protection type: Front IP67; Rear IP50
- maximum resolution: 1/12 angular degree
- lighting and attenuation of pointer motion possible
- 4-pin plug connection
- voltage supply of the satellites over central instrument

Electrical Specifications

- Supply voltage range (Ub)
Central instrument: 6 – 32 V
Satellite: 8 – 32 V
- Terminal connection reliability of the voltage supply connections:
Excess voltage: 36 V / 1 h at 40 °C
ambient air temperature
Test voltage: 13.6 V / 27.6 V
Nominal voltage: 12 V / 24 V
- Stand-by current only central instrument:
≈ 1 mA with clock display
≤ 1 mA without clock display
- Working current only central instrument: typ. 150 mA
- Operating current satellite: typ. 45 mA
(step motor controlled)
- Current illumination satellite: typ. 20 mA
- Current warning light satellite: typ. 20 mA
- CAN interface: 2 x CAN 2.0B max. 500 kbit/s
short-circuit resistant against +Ub and GND
- ESD resistance CAN: 4 - 8 kV
- LIN interface: max. 20 kbit/s
short-circuit resistant against +Ub and GND
- Inputs short-circuit resistant against ± Ub and excessive voltage resistant against other inputs of electrical connections (inputs, feeder, etc.)
- CE-conformity, CE-mark on the device

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Proof of EMC-compatibility with the following standards:

DIN 40839	EMC in road vehicles
EN 13309	EMC of construction machines with internal electric circuit
e1 homologation:	confirmed

Proof of operating safety in accordance with the following standards:

DIN EN-500-1	Mobile road construction machinery - Safety Part 1: Common requirements
DIN EN 500-4	Mobile road construction machinery - Safety
DIN EN 60204-1	Electrical equipment of machines Part 1: General requirements

Environmental Specifications:

Operating temperature:	-40 °C to +85 °C
Storage temperature:	-40 °C to +90 °C
Shock resistance:	Dropping (in packaging) from a height of 1 m on front of the display
Vibration resistance:	5 g at 30 Hz to 50 Hz (permanent resistance) in all 3 directions of space
Resistance to climate conditions:	DIN 50016 +23 °C rel. humidity 83 % + 40°C rel. humidity 92 % at three cycles
Resistance to tropic conditions:	DIN EN 60068-2-30 (humid heat)
Resistant to oils, hydraulic oils, grease, fuels, as well as to all standard biological fuels.	
Permanent resistance to deformation, position effects, and aging against high UV radiation.	

All information is subject to technical changes.

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