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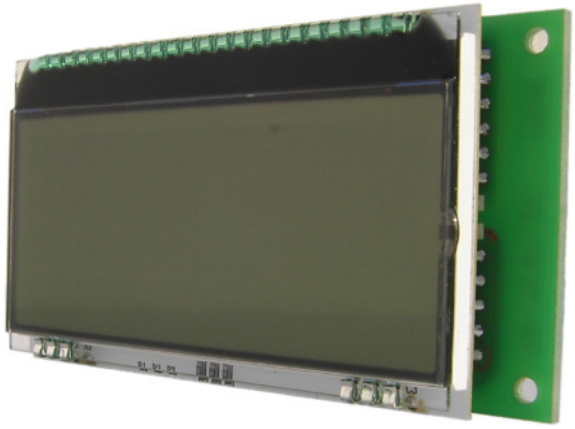
TR-TEXT_EC

Display module for use with the EMUS BMS from Elektromotus and motor controllers from Curtis Instruments



Special features

- showing data from battery management system and motor controller on only one display
- Reverse polarity protection of the supply voltage
- galvanic isolation of high-voltage system and chassis is fulfilled by the display module
- ± 15 kV ESD protection of data lines
- low energy consumption
- brightness of the backlight adjustable
- temperature compensated contrast
- switching input for a second brightness level of the backlight to dim at night
- brightness of the second brightness level adjustable
- monitoring of BMS and controller transmission interval with 10 s timeout
- additional function for automatically switching off the recuperation when reaching the final charge voltage (downhill with full battery)

Product description

The display module is used for easy visualization of key data that are provided by the EMUS battery management system from Elektromotus and by the motor controller from Curtis Instruments. On the controller at least the eCarBasic software must be installed.

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In three lines are shown the state of charge (State Of Charge), the power (with sign), the controller and engine temperature, as well as the minimum and maximum cell voltage as shown in Table 1 and Figure 1. In the fourth line the status, warnings and errors will be displayed. The warnings and errors from the BMS are only displayed if they are linked to an action *(Reduction* or *Cutoff*). This requires the appropriate action to be activated (ticked) in the BMS software under *Configuration / Battery Pack*. The transmission interval (*Data Transmission to Display Period - In Active State*) should preferably be set to 0.2 s. The messages of state as well as errors and warnings are shown in Tables 2 to 4.
The error messages of the Curtis controller are displayed as in the Curtis Model 840. The parameter *Parameter Display rate* should preferably be set to 50 ms. If the parameter *Fremd-Display* is available, it should be activated. So the toggle input has no function and it also do not need to be connected to the display. Under *Select Display Parameter* only *RPM*, *Controller Temp* and *Motor Temp* should be activated. If the parameter *Fremd-Display* is not available, the toggle input must be connected to the display. In this case only the *Controller Temp* and *Motor Temp* should be activated.
With a potentiometer on the back, the brightness of the backlight is adjustable. Via a 12V switch input the backlight can be switched to a brightness level (for example at night), which is also adjustable by a potentiometer.
To use the additional function to shut off the recuperation, the corresponding output of the display module must be connected to SW12 (pin 3) of the controller. When a cell reaches 3.65 V, the output is set to 12 V and reset at 3.45 V again. Furthermore, switching off the recuperation must be implemented in the software of the controller.
Showing of further or different values can be realized on request according to customer requirements.

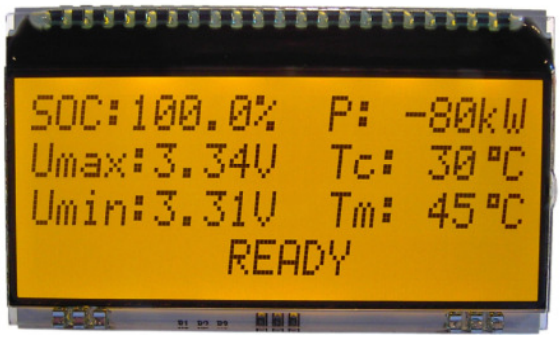

Figure 1

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Table 1

VALUE	ABBREVIATIONS IN THE DISPLAY	UNIT
State of charge	SOC	%
Power	P	kW
Controller temperature	Tc	°C
Engine temperature	Tm	°C
Max. cell voltage	Umax	V
Min. cell voltage	Umin	V

Table 2

ERROR	DISPLAY
Undervoltage (cell)	ERROR Undervoltage
Overvoltage	ERROR Overvoltage
Overcurrent during discharge	ERROR Overcurrent
Overcurrent during charging	ERROR Overcurrent
Overheating (cell module)	ERROR Overheat
Leakage	ERROR Leakage
No communication to the cells	ERROR Cell-Communic.
Overheating (cell)	ERROR Overheat
No current sensor	ERROR Current Sensor
Undervoltage (battery)	ERROR Undervoltage
No communication to BMS	ERROR BMS-Communica.
No communication to the controller	ERROR CURTIS-Commun.
No communication to the BMS and the controller	ERROR Communication

Table 3

WARNING	DISPLAY
Low voltage	WARNING Low voltage
High power	WARNING High current
High temperature (cell module)	WARNING High temper.
High temperature (cell)	WARNING High temper.

Table 4

STATE	DISPLAY
No warning / no error	READY

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Ordering information

TR-TEXT_EC-XX (XX stands for the colour design of the display, refer to Table 5 for details)

Thus, the display module colour also fits perfectly into its environment of use, it is available in different colour designs. This results partly from the background colour of the display (LCD) and, secondly, from the colour of the lighting (LED). This results in a total of 12 different combinations, which are shown in Table 5 and Figures 2 to 4.

Table 5

		LED LIGHTING			
		green	white	red	amber
LCD BACKGROUND	black	SG	SW	SR	SA
	blue	BG	BW	BR	BA
	white	WG	WW	WR	WA

Firgure 2

Figure 3

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Figure 4

Technical specifications

Voltage:	8 to 16 V
Current (at 12 V, depending on backlight):	29 to 38 mA
Temperature range:	-20 to 70 °C
Dimensions of display module:	79 x 40 x 18 mm
Displayed area:	59 x 22 mm
Font size (height):	4,8 mm

Scope of supply

Two 1.5 m connection cables with mounted coupling are included, see Figure 5.

Figure 5

Cable chassis potential (BMS) with 6-pin coupling
The cable has the following assignment:
Green wire: Data line (DISP. TX)
Black wire: Ground (vehicle)
Red wire: + 12V (ignition)
White wire: 12V switch input for the second brightness level (instrument lighting)

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Alternatively, the core for the 12V switch input can be configured as separate cores outside of the cable to simplify cable routing.

Cable high-voltage potential (Controller) with 5-pin coupling
The cable has the following assignment:

Green wire:	Data line (Serial TX) / pin 28 of the controller
Brown wire:	Ground controller / pin 7 of the controller
White wire:	+12 V controller / pin 25 of the controller
Grey wire:	optional: Toggle (SW1) / pin 24 of the controller (only if parameter *Fremd-Display* is not available)
Yellow wire:	Regen off (SW12) / pin 3 of the controller