

The CAN Bus System Solution for mobile hydraulics



motion and progress

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1 General

1.1 Product description

The CAN Bus system enables flexible processing of control- and sensor information; from this information it generates the electrical signals required to control the valves. The entire wiring requirement is reduced to a bus cable and a power supply line. All input- and output control signals are carried by the bus cable whereas previously a complex wiring harness was required. Set-up and machine-specific configuration are carried out with the help of an input unit or a PC.

1.2 Advantage

- increased system safety
- lower wiring costs resulting from simple cable arrangements
- greater ease of control

- range and scope of functions can be increased at a later date
- diagnostic programmes
- modular build simplifies component replacement

2 The system

The Bucher system consists of an input unit (terminal) and an output unit (Master), the latter being the interface to the valves.

Commands are sent from the terminal to the Master, where they are further processed and then sent on to the valves. Using the software, both the terminal and the Master can be adapted to particular customer requirements.

Sensor signals can either be feedback directly into the Master as analogue or digital signals or they can be routed through the CAN Bus as digital signals.

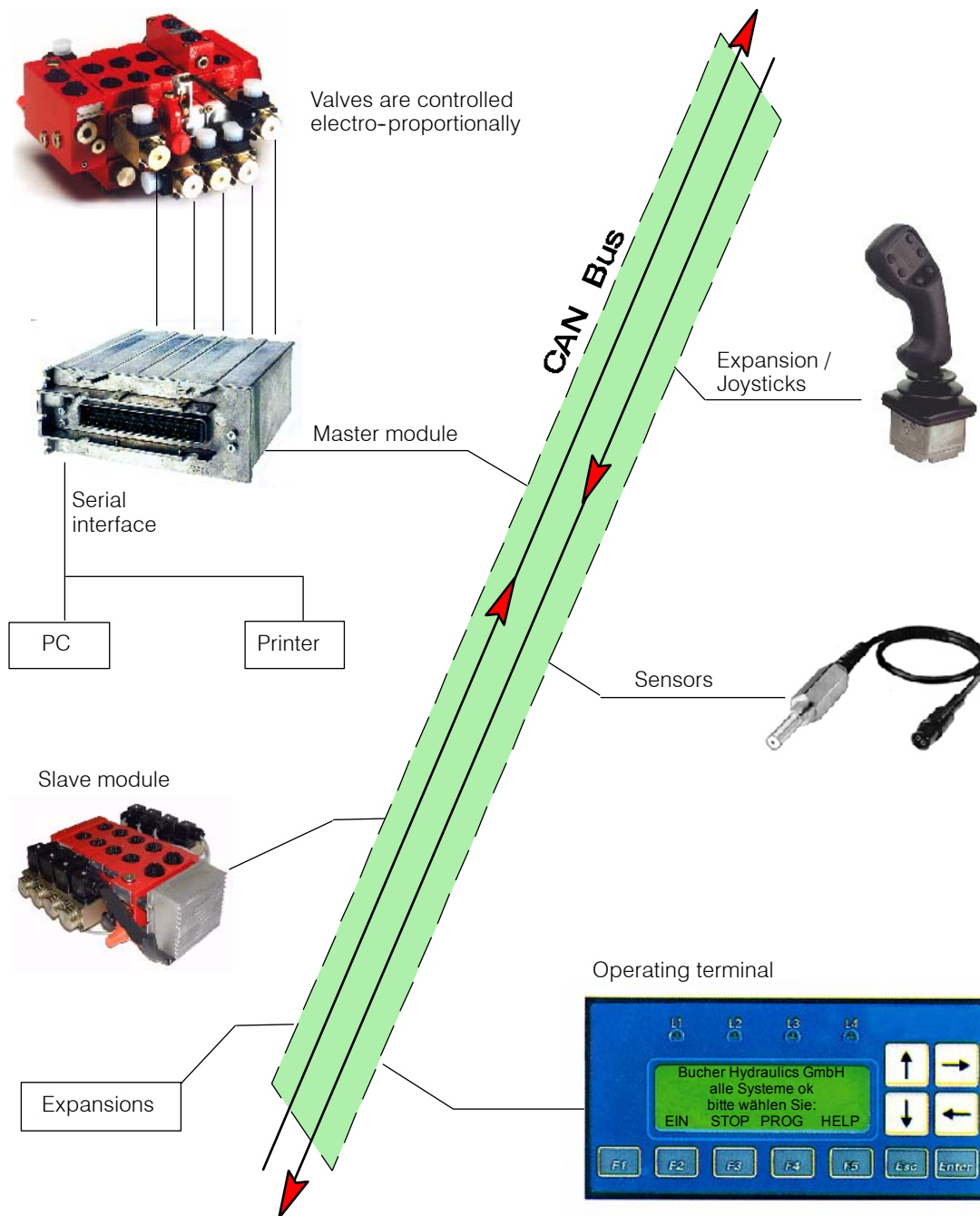
3 The applications

The CAN Bus system solution is used to control electrically actuated valves in mobile hydraulic systems.

Target application areas include local authority vehicles, harvesting-, forestry- and construction machinery as well as systems for lifting/lowering and boom/mast positioning. In these applications, the positions and speeds (linear, rotary) of hydraulic actuators are controlled in open- and/or closed-loop mode.

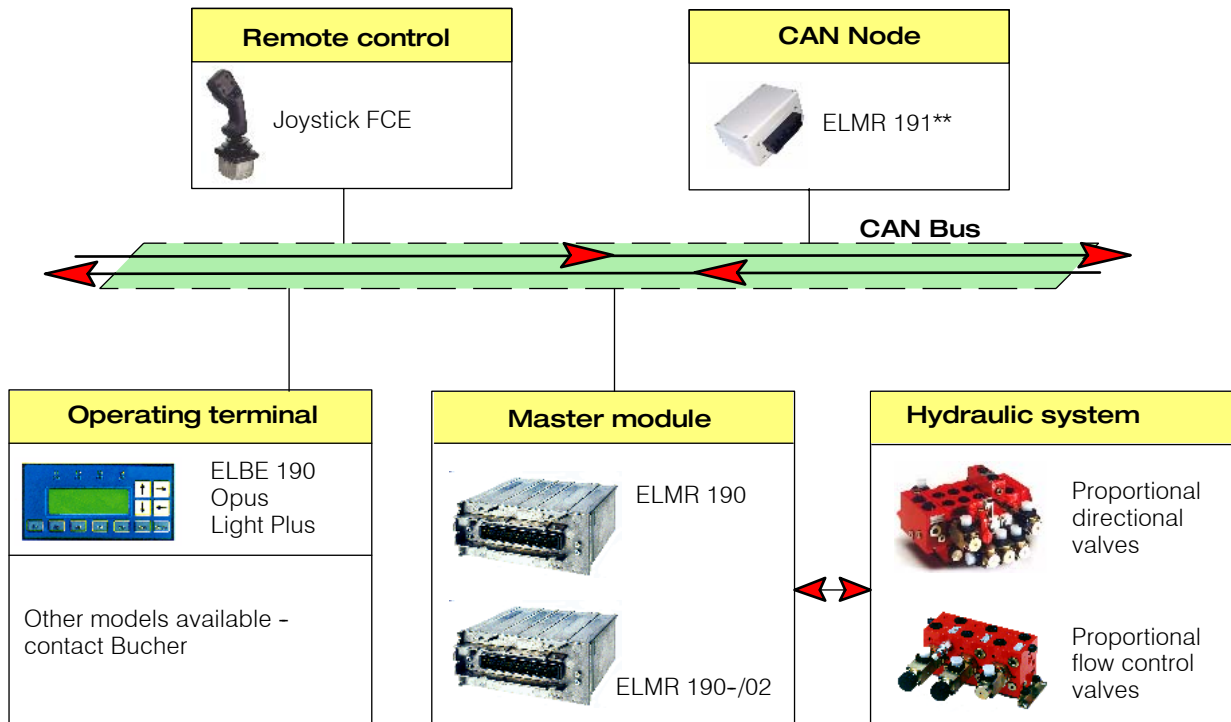
With the advantages described, the CAN Bus system represents an optimum solution for application-specific drive requirements.

4 The main components of a CAN Bus control system

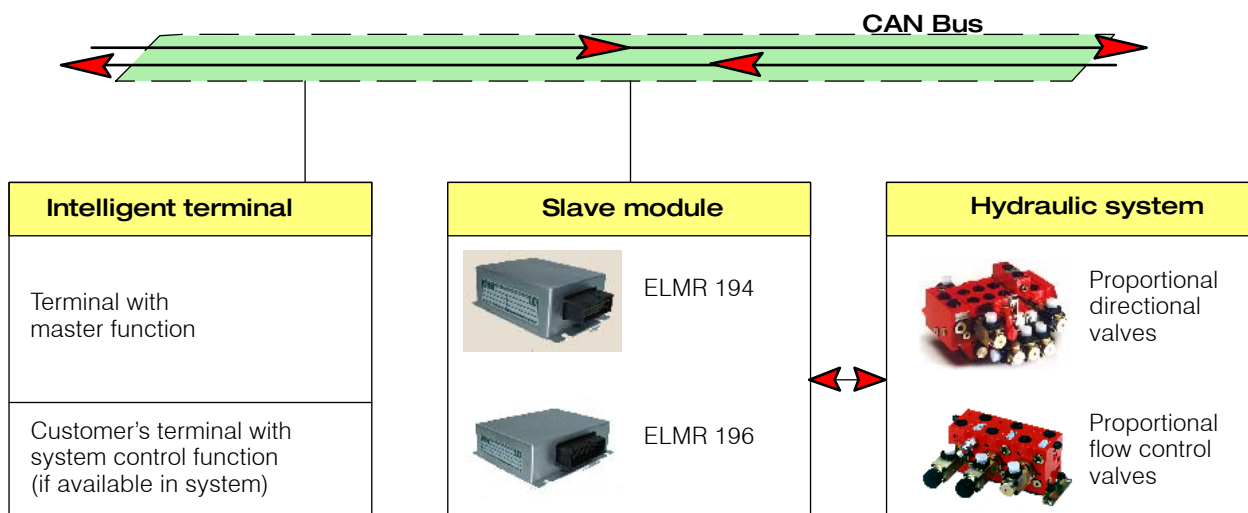


5 Possible system configurations

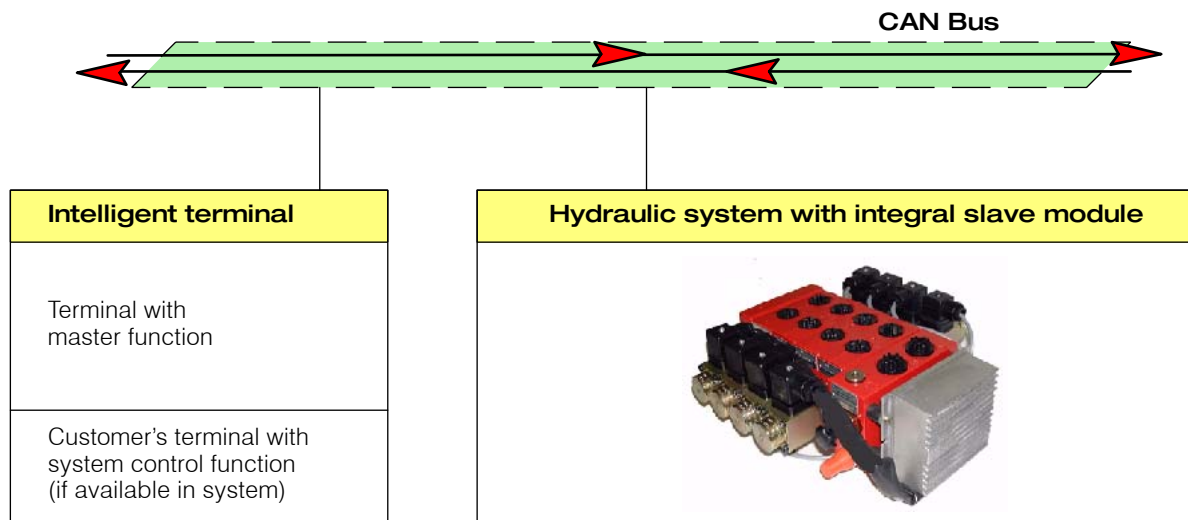
5.1 With distributed control elements



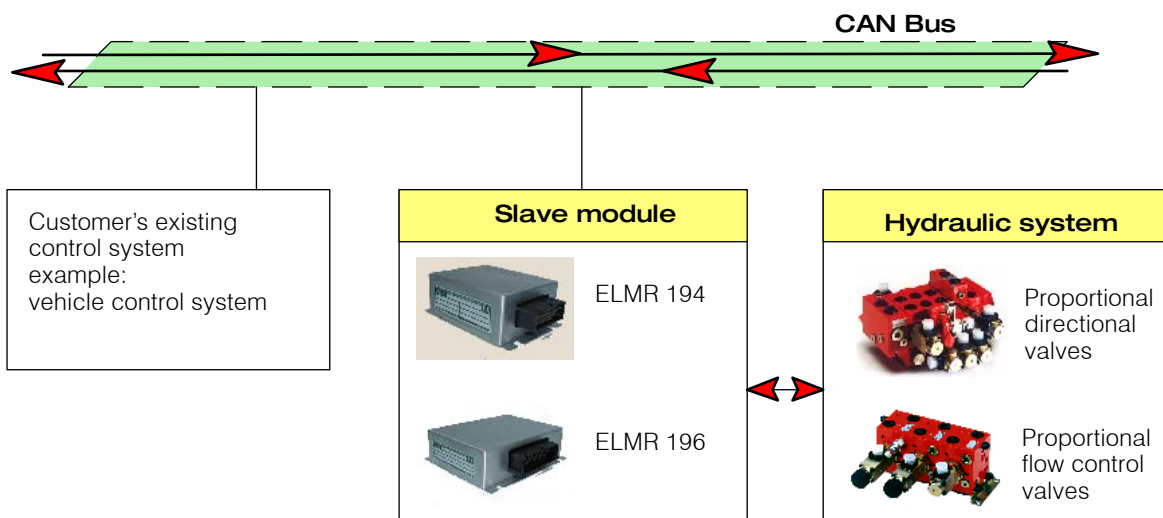
5.2 With intelligent system control via terminal



5.3 With intelligent system control via terminal, slave module on hydraulic unit



5.4 With intelligent system control via terminal, slave module on hydraulic unit



6 The components

6.1 The CAN 190 Master module - description and technical data

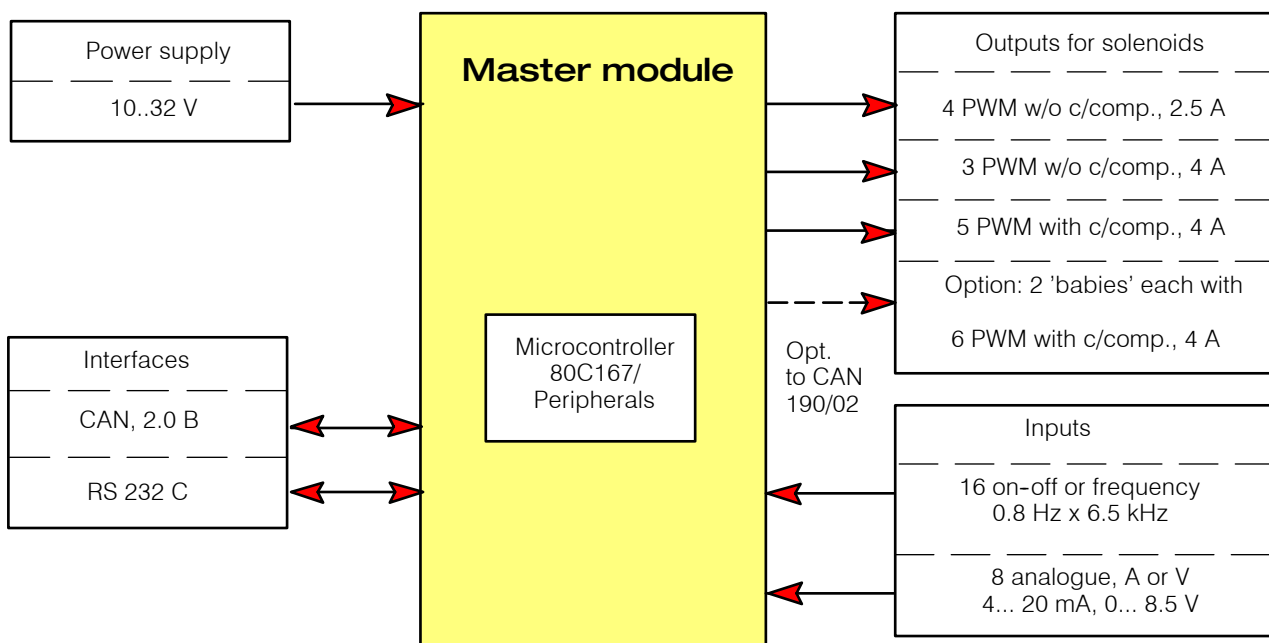
In addition to the microcontroller and peripherals that are necessary for data processing, the processor is provided with 7 non-current-compensated PWM outputs for controlling on/off solenoids, for example. These can also be used for controlling proportional solenoids but without any current compensation, however.

For controlling proportional solenoids, 5 current-compensated PWM outputs are available. Optionally, the system can be expanded with two 'baby boards', each having 6 PWM outputs with current compensation.

To receive sensor- or switch signals, 8 analogue current or voltage inputs and

16 on-off or rpm-frequency inputs are provided.

The following schematic and tables give an overview of the significant characteristics of the processor.



Technical data ELMR 190

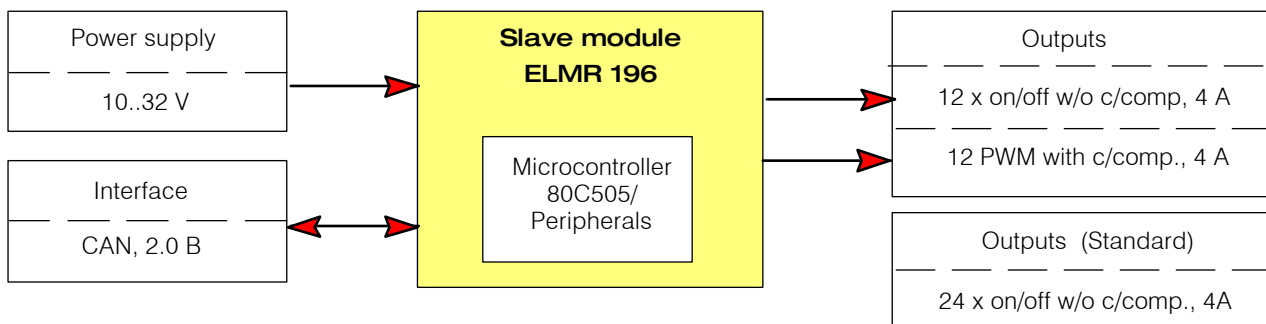
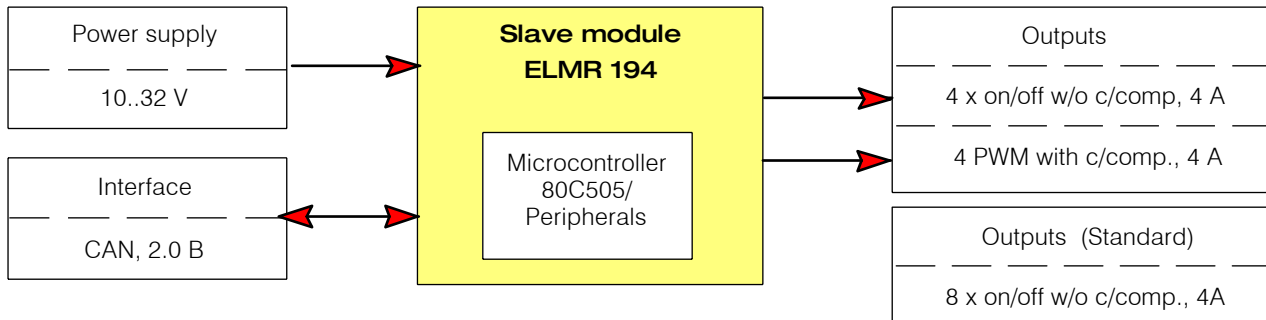
	ELMR 190
On off or RPM inputs	16, high-/low active frequency to 6.5 kHz, short circuit-protected
Analogue inputs	8, 10 bit, frequency < 1 kHz, short circuit-protected
PWM outputs PWM outputs for direct control of proportional solenoids	3x4 A & 4x2.5 A, 0 to 100%, high-side switch, short circuit-protected 5x4 A, 0 to 100%, high-side switch, short circuit-protected
CAN Bus interface	CAN 2.0B, full CAN, low-/high speed to 1 Mbit/s
Processor system	Siemens C167, 16 bit, 20 MHz, RAM - 256 kByte max., Flash - 256 kByte max., EEPROM - 8 kByte max.
Power supply	10 ... 32 V DC continuous operating voltage
Current draw	Approx. 0.5 A, combined max. 30 A, stand-by < 1 mA
Plug	68-pole AMP plug, suitable for mobile service, with latch
Dimensions	Approx. 170 x 195 x 72 mm
Weight	Approx. 2 kg
RS 232 C interface	Programmable Baud rate (max. 19,200 Baud)
Reference voltage output	1 x 8.5 V, stabilised voltage supply, short circuit-protected
Housing	IP65, aluminium die casting with pressure equalisation membrane
Operating temperature range	- 40 ... + 85°C

6.2 The slave module - description and technical data

The slave module is a power amplifier with a CAN interface and is available with 4 (or 12) PWM outputs with current

compensation and 4 (or 12) on-off outputs without current compensation.

The following schematic and tables give an overview of the significant characteristics of the slave module.



Technical data ELMR 194 and ELMR 196

	ELMR 194		ELMR 196	
PWM-outputs (4A high side) 0-100% pulsed 100Hz or 200Hz (12bit resolution)	Standard	4 (option)	Standard	12 (option)
On-off outputs (4A high side)	8	4	24	12
Tri-state inputs for module coding	2 Pins (open, bridge to GND or V) int. voltage divider			
CAN Bus interface	CAN 2.0B, full CAN, low-/high-speed to 1 Mbit/s			
Processor system	Siemens C505CA (8 Bit)			
Power supply	9 ...32V continuous operating voltage			
Current draw	<0,2A total max. 30A		<0,4A total max. 70A	
Plug	16 poliger AMP vehicle plug		42 poliger AMP vehicle plug	
Dimensions	Approx. 97 x 125 x 45 mm		Approx. 154 x 169 x 52 mm	
Weight	ca. 0,5 kg		ca. 1 kg	
Housing	IP65, aluminium die casting with pressure equalisation			
Operating temperature range	- 40 ... + 85°C			

6.3 Operating terminal - description and technical data ELBE 190



CUSTOM CONFIGURATION

Can be fitted to all agricultural vehicles
custom configurations for OEMs

Technical data

CAN Bus interface: conforms to ISO/DIS 11898. Bus speed adjustable: 1 MB/s, 500 kB/s, 400 kB/s, 250 kB/s, 125 kB/s, 100 kB/s, 50 kB/s, 20 kB/s, 10 kB/s, 5 kB/s. Two basic addresses selected by DIP switches; 1600d and 1616d.

Display: 4 x 20 characters, 5 mm high LCD display, green backlighting, exceptionally wide viewing angles. Silicate glass panel in front of LCD. Backlighting and display can be switched off. Backlighting can be made to blink. Displayable character set: standard ASCII plus the special characters ä, ö, Ä, Ö, Ü, ß, ", ², ³, |, -, ¥, ¢, £, ÷.

Individual characters and words can be made to blink. Cursor is shown as a block.

Keyboard: foil keyboard with 11 keys with tactile feedback and raised edges. 7 keys can be labelled and have the following standard labelling; 5 function keys F1 - F5, Esc and Enter.

Soft LEDs: 4 LEDs above the display can be 'labelled' with appropriate text in a system message or a fault message.

Power supply:
12 VDC ± 20 % / 350 mA
24 VDC ± 20 % / 350 mA

Connections: Power supply and CAN Bus: 5-pole push-in female connector. RS 232 C interface (optional): 8-pole mini-DIN socket. System ground: 6.3 mm flat plug

Front panel: foil keyboard with polyester foil. 11 short-stroke keys with tactile feedback and raised edges. 4 green 'point' LEDs above the display.

Ambient temperature: operating: 0°...+50°C, storage: -20°...+60°C, Model with wider operating temperature range -20°...+70°C can be supplied.

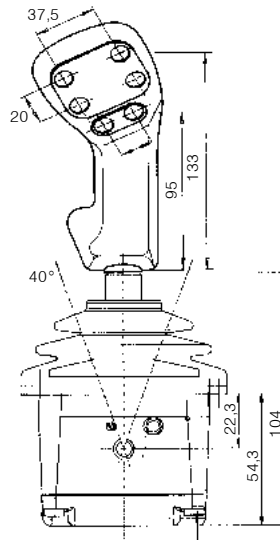
Weight: approx. 300 g

6.4 The CAN Bus Joystick (FCE) - description and technical data

The series FCE/JS3 Joystick is a CAN BUS-ready signal source for 2 axes. It is small, compact and robust. The handgrip is spring centred. Within its temperature range, the joystick is tem-

perature-compensated. There are several optional handgrip variants for this joystick. The CAN joystick is driven as a slave on the CAN Bus. After the power supply is switched on, the joystick

waits for the WAKE_UP message from the master. After receiving the WAKE_UP message, the joystick sends its data on a cyclic basis with a fixed cycle time.



Technical data FCE

	FCE
Supply voltage V_N	9 ... 30 V
Temperature range	-40 ... +85°C
Enclosure protection	Above the mounting plane, IP65 to DIN 40050
Weight	0.35 kg without handgrip
Actuation angle	$\pm 20^\circ$
Connection	4-pole M12 round plug
CAN protocol	Basic CAN 2.0 A, 11 bit identifier
Baud rate	125 kBaud
Connection resistance	120 Ω , with standard fittings
Identifier for joystick WAKE_UP	064h, as standard
Identifier for joystick data (JOYSTICK DATA)	100h, as standard
Cycle time	50 ms

6.5 The ELMR 191*** CAN node - description and technical data

Using the outputs, status displays can be controlled or analogue proportional amplifiers can be driven. The bus speed and the basic address can be set via the CAN Bus. These settings are permanently stored in a non-volatile

memory. The electronics are contained within a robust plastic housing.

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speed and the basic address can be set via the CAN Bus. These settings are permanently stored in a non-volatile memory. The electronics are contained within a robust plastic housing.



Technical data ELMR 191***

	ELMR 191***	
Supply voltage V_{Batt}	12 ... 30 V DC. Integral reverse polarity-protection	
Operating temperature	-20 ... +50°C	
Enclosure protection	IP65 with pressure equalisation membrane	
Dimensions	120 x 95 x 57 mm (l x w x h)	
Plug	42-pole AMP vehicle plug	
CAN Bus	Protocol 2.0B (11 or 29 bit identifier, low-/high speed to 1 Mbit/s)	
Reference voltage	Voltage	8V
	Max. current draw	10 mA
4 x analogue inputs	Voltage range	0 ... 8V
4 x on-off inputs	Voltage range	0V... V_{Batt} PNP active high
4 x outputs, with max. 3 analogue	Output voltage	0 ... 5V

6.6 The ESMR 193*** CAN node - description and technical data

The series ESMR 193*** CAN node is an input/output interface for the CAN BUS. This electronic unit is intended for installation in the customer's operating terminal. The 48 on-off inputs are used to scan keys and switches. Va-

rious potentiometers can be monitored by using the 8 analogue inputs.

Up to 32 outputs are available for status messages. Alternatively, each output can be used to drive an LED. It is possible to communicate with a dot matrix

LCD to generate text output. The bus speed and the basic address can be set via the CAN Bus. These settings are permanently stored in a non-volatile memory.



Technical data ESMR 193***

	ESMR 193***	
Supply voltage V_{Batt}	12 ... 30V DC	
Operating temperature	-20 ... +50°C	
Enclosure protection	IP 00	
Dimensions	200 x 160 x 30 mm (l x w x h)	
Connections	Supply voltage + CAN Bus: 6-pole female edge connector On-off inputs & outputs: 2 x 50 pole IDC plug, DIN 41651 Analogue inputs: 16 pole IDC plug, DIN 41651	
CAN Bus	Protocol 2.0B (11 or 29 bit identifier, low-/high speed to 1 Mbit/s)	
Reference voltage	Voltage	8V
	Max. current draw	20 mA
8 x analogue inputs	Voltage range	0 ... 8V
48 x on-off inputs	Voltage range	0V... V_{Batt} PNP active high
32 x on-off outputs	Open Collector	I_{max} 30mA

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