

## HCB - The Hardware

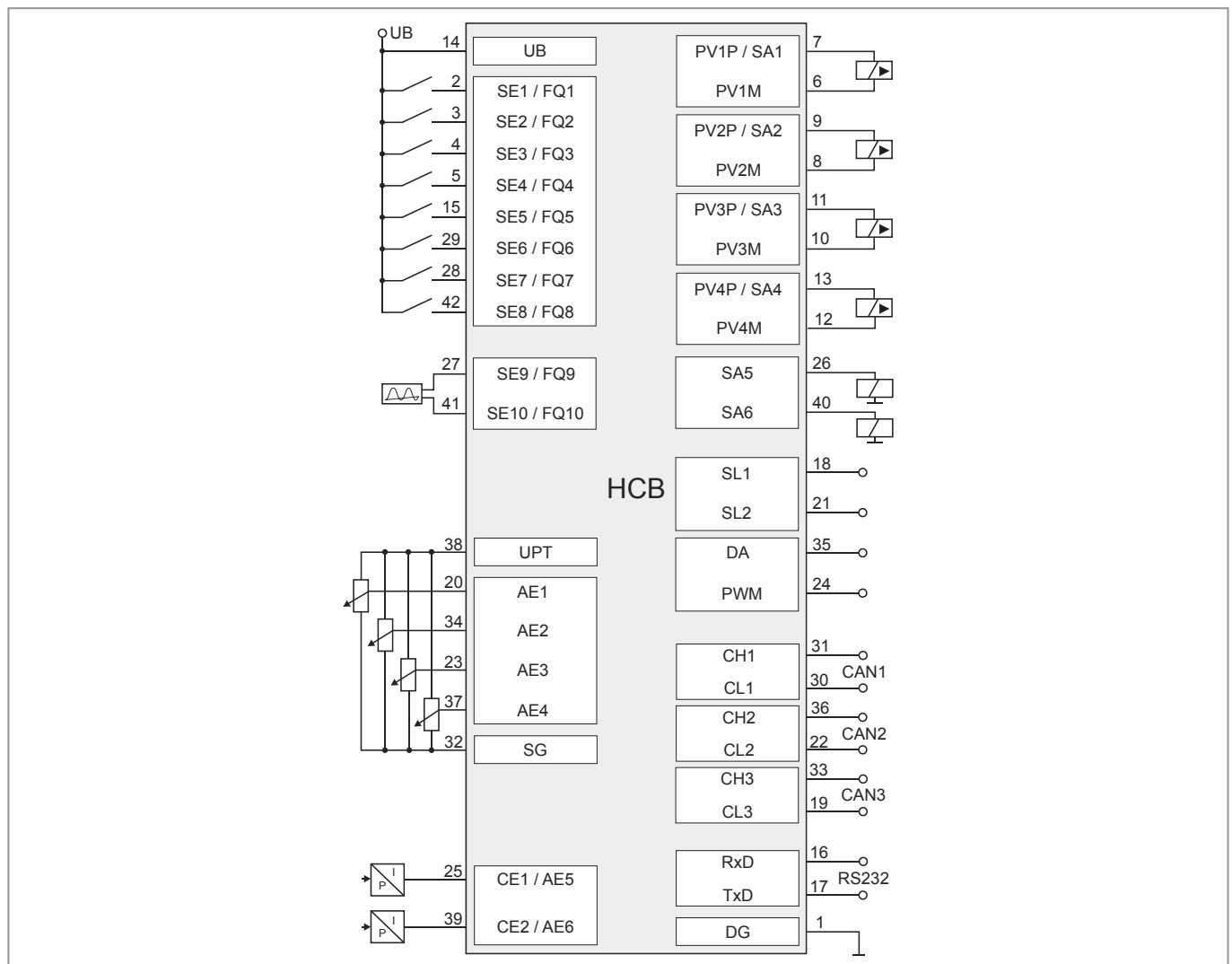
HCB is a universal controller for mobile hydraulic applications. It is equipped with two microcontrollers with mutual monitoring and a safety shutdown for the outputs. The serial flash memory (2MB) allows the extensive logging of various machine states.

Specific applications are flexibly configured via software. To customize and enter the individual data the PC program ConDoc - Control & Document® is used.

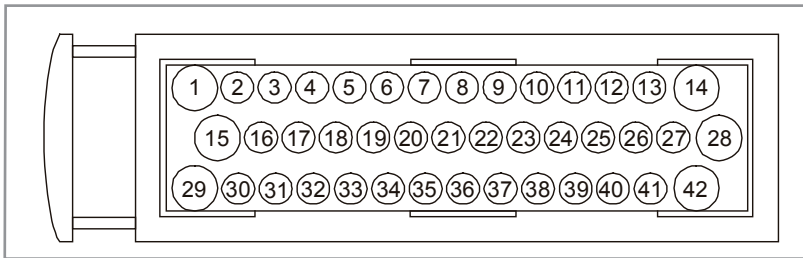
HCB-controllers can be interconnected to form a larger system via the CAN fieldbus. CAN also enables communication with other electronic components.



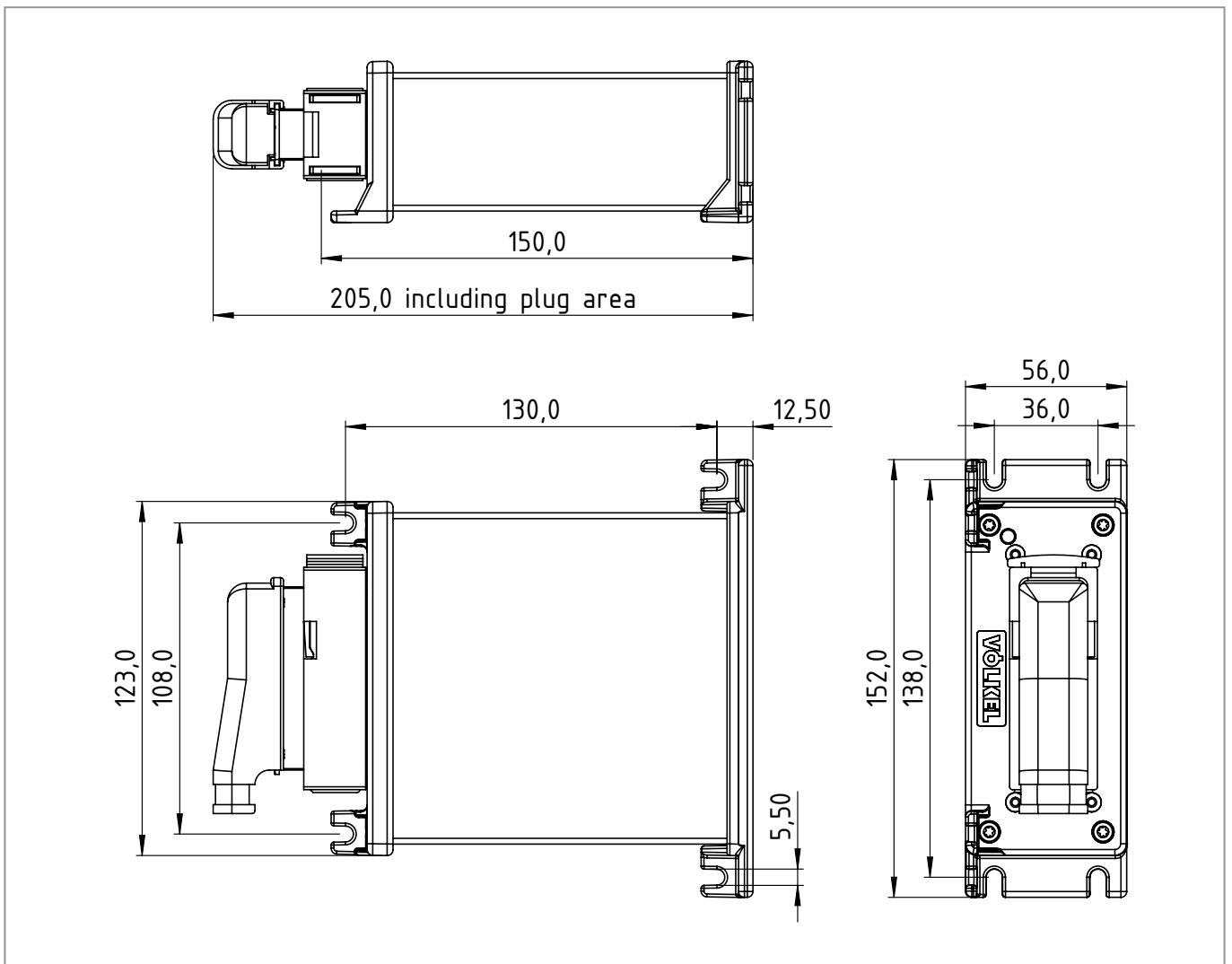
## HCB - Connection diagram



**HCB - Connector**



**HCB - Housing dimensions**



## HCB - Pin assignment

1	DG	Supply, minus
14	UB	Supply, plus
32	SG	Signal ground
2	SE1 / FQ1	Switch input 1 / frequency input 1 (0...10kHz)
3	SE2 / FQ2	Switch input 2 / frequency input 2 (0...10kHz)
4	SE3 / FQ3	Switch input 3 / frequency input 3 (0...10kHz)
5	SE4 / FQ4	Switch input 4 / frequency input 4 (0...10kHz)
15	SE5 / FQ5	Switch input 5 / frequency input 5 (0...10kHz)
29	SE6 / FQ6	Switch input 6 / frequency input 6 (0...10kHz)
28	SE7 / FQ7	Switch input 7 / frequency input 7 (0...10kHz)
42	SE8 / FQ8	Switch input 8 / frequency input 8 (0...10kHz)
27	SE9 / FQ9 (FQ10P)	Switch input 9 / frequency input 9 / pickup H / clamp W
41	SE10 / FQ10 (FQ10M)	Switch input 10 / frequency input 10 / pickup L
20	AE1	Analogue input 1 (0...10V)
34	AE2	Analogue input 2 (0...10V)
23	AE3	Analogue input 3 (0...10V)
37	AE4	Analogue input 4 (0...10V)
25	CE1 / AE5	Current input 1 (4...20mA) / Analogue input 5 (0...10V)
39	CE2 / AE6	Current input 2 (4...20mA) / Analogue input 6 (0...10V)
7	PV1P/ SA1	Proportional output 1 plus / Switch output 1
6	PV1M	Proportional output 1 minus
9	PV2P / SA2	Proportional output 2 plus / Switch output 2
8	PV2M	Proportional output 2 minus
11	PV3P / SA3	Proportional output 3 plus / Switch output 3
10	PV3M	Proportional output 3 minus
13	PV4P / SA4	Proportional output 4 plus / Switch output 4
12	PV4M	Proportional output 4 minus
26	SA5	Switch output 5
40	SA6	Switch output 6
18	SL1	Switch Low Side 1
21	SL2	Switch Low Side 2
35	DA	Analogue output (0...10V)
24	PWM	PWM output
38	UPT	Output sensor supply
31	CH1	CAN1 line H
30	CL1	CAN1 line L
36	CH2	CAN2 line H
22	CL2	CAN2 line L
19	CL3	CAN3 line L
33	CH3	CAN3 line H
16	RXD	RS232 receive cable
17	TXD	RS232 send cable

## HCB - Technical data

Dimensions	(W/H/D) 152mm x 150mm x 56mm
Housing	Aluminium housing with ventilation membrane Protection category IP69 (DIN EN 60529)
Weight	0.65kg
Plug connections	Multipole connector, 42 contacts, AMP 1-0967280-1
Power supply	UB = 8...32V (data retention up to 5V)
Operation temperature	-40...85°C
Current consumption	Approx. 50mA at 24V (plus valve current)
Microcontroller	XC2289H / 100MHz
Safety microcontroller	ATTINY84
Program memory	1600kByte Flash EPROM
Data memory	138kByte RAM 2MB external serial Flash
Parameter memory	32kByte external EEPROM
Inputs	<p>2 Digital switch inputs with switchable 4.7k<math>\Omega</math> pull-down / pull-up resistors and adjustable switching thresholds (<math>U_{SS} \geq 5V</math>; <math>U_{Offset} = 2,5V</math>; duty cycle = 50%) in the range of 0...32V. Suitable as frequency inputs up to 10kHz with fixed switching thresholds: <math>U_{On} = \text{approx. } 2.8V</math>, <math>U_{Off} = \text{approx. } 1.5V</math>.</p> <p>6 Digital switch inputs with 4.7k<math>\Omega</math> pull-down resistors and adjustable switching thresholds (<math>U_{SS} \geq 5V</math>; <math>U_{Offset} = 2,5V</math>; duty cycle = 50%) in the range of 0...32V. Suitable as frequency inputs up to 10kHz with fixed switching thresholds: <math>U_{On} = \text{approx. } 2.8V</math>, <math>U_{Off} = \text{approx. } 1.5V</math>.</p> <p>1 Rotary frequency sensor input pickup, <math>f_{max} = 10kHz</math>, signal level: <math>U_{SS} = 400mV</math> at 1kHz, increasing tolerance with higher frequencies. Alternatively usable as additional digital switch input with 3.3k<math>\Omega</math> pull-down resistor and adjustable thresholds in the range of 0...32V.</p> <p>1 Terminal W, frequency input; <math>f_{max} = 2kHz</math>; Switching thresholds: <math>U_{On} = 75\%</math> of UB, <math>U_{Off} = 25\%</math> of UB. 4.4 k<math>\Omega</math> resistor to ground. Can also be used as a digital switch input, threshold adjustment range: 0...32V.</p> <p>4 Analogue inputs for voltage range of 0...10V with 10-bit resolution and &gt;100k<math>\Omega</math> input resistance.</p> <p>2 Current inputs, 4...20mA with 110<math>\Omega</math> load to earth and 10-bit resolution. Protected against overload. Switchable as analogue inputs with voltage range of 0...10V at 10-bit resolution and &gt;100k<math>\Omega</math> input resistance.</p>

## HCB - Technical data

Outputs	<ul style="list-style-type: none"> <li>4 Proportional solenoid outputs, each for a maximum of 3A. Can be used as switch outputs for a maximum of 3A.</li> <li>2 Switch outputs for a maximum of 4A.</li> <li>2 Low side switches for a maximum of 4A.</li> <li>1 Power supply output with 5V...10V for sensors and potentiometers up to 400mA load.</li> <li>1 Safety switch to shut down jointly the switch and proportional outputs. The safety switch is controlled by the safety microcontroller.</li> <li>1 PWM output with an output voltage of 0 to 5V and adjustable frequency between 0...1000Hz. The output resistance is 100Ω, with switchable 4.7kΩ pull-down resistor.</li> <li>1 Analogue output with a controlled output voltage of 0...10V. The maximum load resistance is 2.5kΩ.</li> </ul>																
Interfaces	<ul style="list-style-type: none"> <li>3 CAN 2.0B (maximum baud rate: 1Mbit/s)</li> <li>1 RS232</li> </ul>																
Safety	<ul style="list-style-type: none"> <li>Two microcontrollers</li> <li>Mutual monitoring, each with</li> <li>Microcontroller watchdog</li> <li>Double voltage regulation</li> <li>Double cycle generation</li> <li>Safety shutdown of proportional solenoid and switch outputs</li> <li>Reverse polarity protection</li> </ul>																
MTTFd	115 years																
EMC																	
Road vehicles	Directives 2014/30/EU, UN/ECE-R10, ISO 10605, ISO 7637-1, ISO 7637-2, ISO 7637-3																
Construction machinery	DIN EN 13309, ISO 7637-3																
Agricultural, forestry vehicles	Directive 2009/64/EG, DIN EN ISO 14982, ISO 7637-3																
Industrial use	DIN EN 61000-6-2, DIN EN 61000-6-4																
Mechanical strength, Climatic resistance	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Cold:</td> <td style="width: 50%;">DIN EN 60068-2-1</td> </tr> <tr> <td>Dry heat:</td> <td>DIN EN 60068-2-2</td> </tr> <tr> <td>Vibrations:</td> <td>DIN EN 60068-2-6</td> </tr> <tr> <td>Temperature changes:</td> <td>DIN EN 60068-2-14</td> </tr> <tr> <td>Shock:</td> <td>DIN EN 60068-2-27</td> </tr> <tr> <td>Bump:</td> <td>DIN EN 60068-2-27</td> </tr> <tr> <td>Dry heat:</td> <td>DIN EN 60068-2-30</td> </tr> <tr> <td>Rough handling shocks:</td> <td>DIN EN 60068-2-31</td> </tr> </table>	Cold:	DIN EN 60068-2-1	Dry heat:	DIN EN 60068-2-2	Vibrations:	DIN EN 60068-2-6	Temperature changes:	DIN EN 60068-2-14	Shock:	DIN EN 60068-2-27	Bump:	DIN EN 60068-2-27	Dry heat:	DIN EN 60068-2-30	Rough handling shocks:	DIN EN 60068-2-31
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