

Wiring diagram pages list

Pin configuration MCM

| Signal ID | J1 pin | Interface type | Input / Output | Description | Signal ID | J1 pin | Interface type | Input / Output | Description |
|-----------|--------|----------------|----------------|--------------------------|-----------|--------|--------------------|----------------|-------------------------------------|
| A1 | 1 | CAN0 High | Bus | Maximum speed 1Mbps/wake | B1 | 1 | Type 1 | In | LDI, HDI |
| A2 | 2 | CAN0 Low | Bus | Maximum speed 1Mbps/wake | B2 | 2 | Type 1 | In | LDI, HDI, Failure mode |
| A3 | 3 | Type 7 | Out | LDO, Failure mode | B3 | 3 | Type 2 | In | HDI |
| A4 | 4 | Type 7 | Out | LDO | B4 | 4 | Type 4a | In | HDI, Interrupt/Wake |
| A5 | 5 | Type 7 | Out | LDO | B5 | 5 | Type 3 | In | LDI, Interrupt/Wake |
| A6 | 6 | Type 8 | Out | LDO | B6 | 6 | Type 4a | In | HDI Failure mode, Interrupt/Wake |
| A7 | 7 | Type 8 | Out | LDO | B7 | 7 | RS232 TxD | Bus | Maximum speed 115,2kbps |
| A8 | 8 | GND | In | | B8 | 8 | RS232 RxD | Bus | Maximum speed 115,2kbps |
| A9 | 9 | Vbat | In | | B9 | 9 | Type 1 | In | LDI, HDI |
| A10 | 10 | Type 8 | Out | LDO | B10 | 10 | Type 1 | In | LDI, HDI |
| A11 | 11 | Type 10 | Out | HDO | B11 | 11 | Type 1 | In | LDI, HDI |
| A12 | 12 | Type 9B | Out | HDO | B12 | 12 | RS232 GND | In | |
| A13 | 13 | Type 9B | Out | HDO | B13 | 13 | Type 1 | In | LDI, HDI |
| A14 | 14 | Type 9A | Out | HDO | B14 | 14 | Type 1 | In | LDI, HDI |
| A15 | 15 | Type 9A | Out | HDO | B15 | 15 | Type 4B | In | Interrupt/Wake |
| A16 | 16 | Type 9A | Out | HDO, Failure mode | B16 | 16 | Type 1 | In | LDI, HDI |
| A17 | 17 | Type 10 | Out | HDO, Failure mode | B17 | 17 | Type 1 | In | LDI, HDI |
| A18 | 18 | Type 9A | Out | HDO | B18 | 18 | GND | In | |
| A19 | 19 | Type 13 | Out | C30 | B19 | 19 | MasterID Supply | In | |
| A20 | 20 | Network ID 1 | In | | B20 | 20 | NC | | |
| A21 | 21 | Network ID 2 | In | | B21 | 21 | Type 1 | In | LDI, HDI |
| A22 | 22 | EOL enable | In | | B22 | 22 | Type 1 | In | LDI, HDI |
| A23 | 23 | Network ID 3 | In | | B23 | 23 | Type 1 | In | LDI, HDI |
| A24 | 24 | Type 11 | Out | HLDO | B24 | 24 | RS232 CTS | In | |
| A25 | 25 | Type 11 | Out | HLDO | B25 | 25 | Type 6 | In | HAI |
| A26 | 26 | Type 5 | In | HDI | B26 | 26 | Type 6 | In | HAI |
| A27 | 27 | CAN2 High | Bus | Maximum speed 1Mbps/wake | B27 | 27 | RS232 RTS | Out | |
| A28 | 28 | CAN2 Low | Bus | Maximum speed 1Mbps/wake | B28 | 28 | Type 12 | Out | HDO 5V |
| A29 | 29 | GND | In | | B29 | 29 | Type 9 | Out | HDO |
| A30 | 30 | Vbat | In | | B30 | 30 | NC | | |

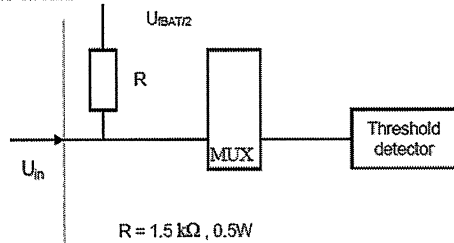
Wiring diagram pages list

Pin configuration MCM

Interface Circuit type 1, General purpose digital input

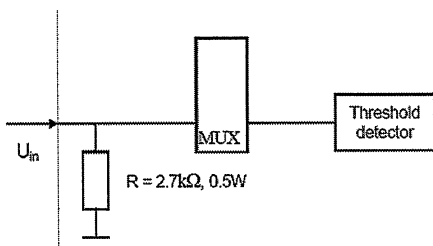
The input can be used as a general input circuit interfacing to switches closing to ground and to battery (LDI/HDI). It can also be used to interface with resistive switches and sensors.

DC model of this circuit:



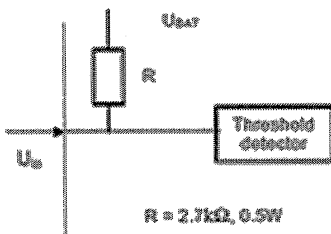
Input circuit type 2, High side digital input

DC model of input circuit type 2. The input is used to interface with switches closing to battery voltage (HDI).



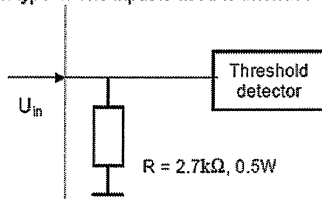
Input circuit type 3, Low side digital input, interrupt

DC model of input circuit type 3. The input is used to interface with switches closing to ground voltage (LDI).



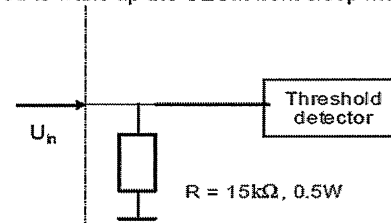
Input circuit type 4a, High side digital input, interrupt

DC model of input circuit type 4. The input is used to interface with switches closing to battery voltage (HDI)



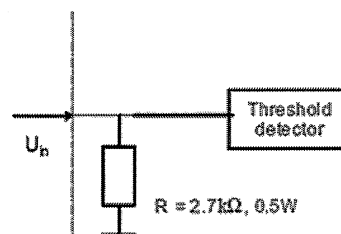
Input circuit type 4b, High side digital input, interrupt

The input is used to wake up the CECM from sleep mode.



Input circuit type 5, High side digital input

DC model of input circuit type 5. the inputs is used to interface with switches closing to battery voltage

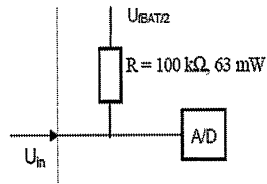


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Pin configuration MCM

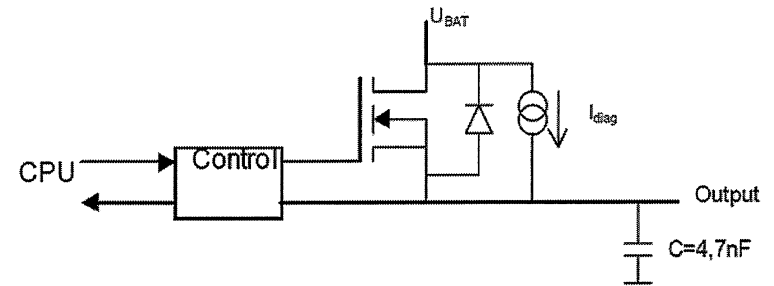
Input circuit type 6, Analogue input

The circuit is used as interface to variable voltage sources such as potentiometers and analogue sensors (HAI).
DC model of input circuit type 6:



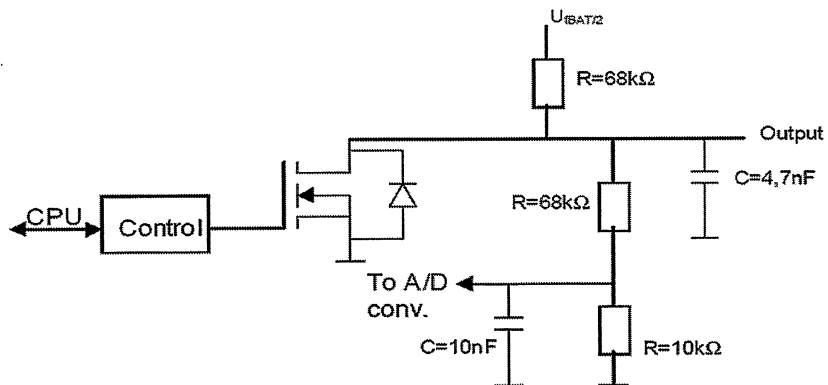
Output circuit type 9 a/b, HDO.

The figure below gives a schematic overview of the output type 9 a/b.



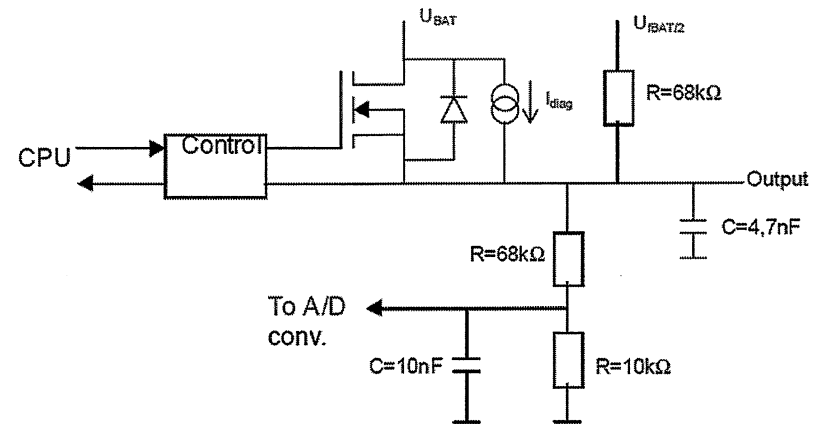
Output circuit type 7, LDO.

The figure below gives a schematic overview of the output type 7.



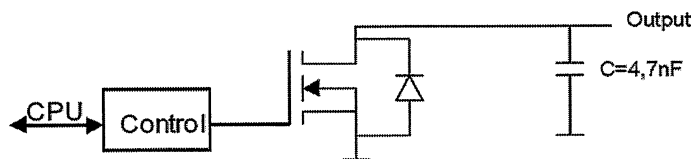
Output circuit type 10, HDO.

The figure below gives a schematic overview of the output type 10.



Output circuit type 8, LDO.

The figure below gives a schematic overview of the output type 8.



Wiring diagram pages list

Pin configuration I/O-A+

| Signal ID | J1 pin | Interface type | Input / Output | Description | Max current average | Max current peak | Signal ID | J1 pin | Interface type | Input / Output | Description | Max current average | Max current peak |
|-----------|--------|----------------|----------------|--|---------------------|------------------|-----------|--------|----------------|----------------|---------------------|---------------------|------------------|
| J1-1 | 1 | 4c | Out | HDO, LDO, HLDO, HPO | 1A | 1A | J2-6 | 6 | 1a | In | HDI, LDI, HLDI, RAI | * | * |
| J1-2 | 2 | 1a, 1b, 1c | In | HDI, LDI, HLDI, RES, RES32K, AI5V, RAI, CNTR1, CNTR2 | * | * | J2-7 | 7 | 1a | In | HDI, LDI, HLDI, RAI | * | * |
| J1-3 | 3 | 4c | Out | HDO, LDO, HLDO, HPO | 1A | 1A | J2-8 | 8 | 1a | In | HDI, LDI, HLDI, RAI | * | * |
| J1-4 | 4 | 4c | Out | HDO, LDO, HLDO, HPO | 1A | 1A | J2-9 | 9 | 1a | In | HDI, LDI, HLDI, RAI | * | * |
| J1-5 | 5 | 1a, 1b, 1c | In | HDI, LDI, HLDI, RES, RES32K, AI5V, RAI, CNTR1, CNTR2 | * | * | J2-10 | 10 | 1a | In | HDI, LDI, HLDI, RAI | * | * |
| J1-6 | 6 | GND | In | Analog GND | * | * | J2-11 | 11 | 1a | In | HDI, LDI, HLDI, RAI | * | * |
| J1-7 | 7 | 4c | Out | HDO, LDO, HLDO, HPO | 1A | 1A | J2-12 | 12 | 1a | In | HDI, LDI, HLDI, RAI | * | * |
| J1-8 | 8 | Network ID | In | NI | * | * | J2-13 | 13 | 1a | In | HDI, LDI, HLDI, RAI | * | * |
| J1-9 | 9 | Network ID | In | NI | * | * | J2-14 | 14 | GND | Out | Analog GND | * | * |
| J1-10 | 10 | 4c | Out | HDO, LDO, HLDO, HPO | 1A | 1A | J2-15 | 15 | 3a, 5 | Out | HDO, REFCTL | 50mA | 50mA |
| J1-11 | 11 | Network ID | In | NI | * | * | | | | | | | |
| J1-12 | 12 | Network ID | In | NI | * | * | | | | | | | |
| J1-13 | 13 | 4c | Out | HDO, LDO, HLDO, HPO | * | * | | | | | | | |
| J1-14 | 14 | Network ID | In | NI | * | * | | | | | | | |
| J1-15 | 15 | Network ID | In | NI | * | * | | | | | | | |
| J1-16 | 16 | 4b | Out | HDO, LDO, HLDO, HPO, LPO | * | * | | | | | | | |
| J1-17 | 17 | 1a, 1c | In | HDI, LDI, HLDI, RES, RES32K, AI5V, RAI, CNTR1 | * | * | | | | | | | |
| J1-18 | 18 | GND | In | GND | * | * | | | | | | | |
| J1-19 | 19 | 4b | Out | HDO, LDO, HLDO, HPO, LPO | 1A | 1A | | | | | | | |
| J1-20 | 20 | 1a, 1c | In | HDI, LDI, HLDI, RES, RES32K, AI5V, RAI | * | * | | | | | | | |
| J1-21 | 21 | 1a | In | HDI, LDI, HLDI, RES, RES32K, AI5V, RAI | * | * | | | | | | | |

Wiring diagram pages list

Pin configuration I/O-B+

| Signal ID | J1 pin | Interface type | Input / Output | Description | Max current average | Max current peak |
|-----------|--------|----------------|----------------|--------------------------|---------------------|------------------|
| J1-1 | 1 | 4d | Out | HDO, LDO, HLDO, HPO, LPO | 16A | 20A |
| J1-2 | 2 | * | * | * | * | * |
| J1-3 | 3 | 4d | out | HDO, LDO, HLDO, HPO, LPO | 16A | 20A |
| J1-4 | 4 | 3c | Out | HDO | 10A | 20A |
| J1-5 | 5 | GND | * | * | * | * |
| J1-6 | 6 | GND | Out | Analogue GND | * | * |
| J1-7 | 7 | 3c | Out | HDO | 10A | 20A |
| J1-8 | 8 | NI | * | * | * | * |
| J1-9 | 9 | NI | * | * | * | * |
| J1-10 | 10 | 3c | Out | HDO | 10A | 20A |
| J1-11 | 11 | NI | * | * | * | * |
| J1-12 | 12 | NI | * | * | * | * |
| J1-13 | 13 | 3c | Out | HDO | 10A | 20A |
| J1-14 | 14 | NI | * | * | * | * |
| J1-15 | 15 | NI | * | * | * | * |
| J1-16 | 16 | 3c | Out | HDO | 10A | 20A |
| J1-17 | 17 | GND | * | * | * | * |
| J1-18 | 18 | GND | * | * | * | * |
| J1-19 | 19 | 3c | Out | HDO | 10A | 20A |
| J1-20 | 20 | 1a | In | HDI, LDI, HLDI, RAI | * | * |
| J1-21 | 21 | 1a | In | HDI, LDI, HLDI, RAI | * | * |

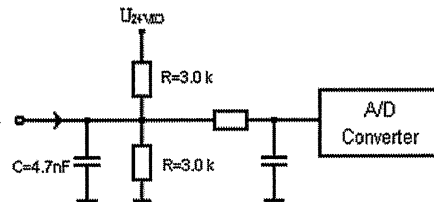
| Signal ID | J1 pin | Interface type | Input / Output | Description | Max current average | Max current peak |
|-----------|--------|----------------|----------------|---|---------------------|------------------|
| J2-1 | 1 | 4d | Out | HDO, LDO, HLDO, HPO, LPO | 10A | 20A |
| J2-2 | 2 | GND | * | * | * | * |
| J2-3 | 3 | GND | * | * | * | * |
| J2-4 | 4 | 4d | Out | HDO, LDO, HLDO, HPO, LPO | 10A | 20A |
| J2-5 | 5 | 1a, 2b, 6 | In | HDI, LDI, HLDI, RAI, AI5V, RES, RES32K, CNTR, wake-up | * | * |
| J2-6 | 6 | 1a, 2b, 6 | In | HDI, LDI, HLDI, RAI, AI5V, RES, RES32K, CNTR, wake-up | * | * |
| J2-7 | 7 | 4c | In | HDO, LDO, HLDO, HPO | 10A | 20A |
| J2-8 | 8 | 1a,1b,1c | In | HDI, LDI, HLDI, RAI, AI5V, RES, RES32K | * | * |
| J2-9 | 9 | 1a,1b,1c | In | HDI, LDI, HLDI, RAI, AI5V, RES, RES32K | * | * |
| J2-10 | 10 | 4c | Out | HDO, LDO, HLDO, HPO | 10A | 20A |
| J2-11 | 11 | 1b, 1c | In | AI5V, RES, RES32K | * | * |
| J2-12 | 12 | 1b, 1c | In | AI5V, RES, RES32K | * | * |
| J2-13 | 13 | 3e | Out | HDO, LDO, HLDO | 10A | 20A |
| J2-14 | 14 | GND | Out | Analogue GND | * | * |
| J2-15 | 15 | 5 | Out | REFMEA | < 50 mA | * |

Wiring diagram pages list

Pin configuration I/O-A+ and I/O-B+

Interface circuit 1a
 The input can be used for both digital and analogue signals that have U_{24VIO} as reference. The circuit shall sink 8 mA when connected to U_{24VIO} or source 8 mA when connected to GND. The input shall be converted from analog voltage to digital 10 bit resolution with scaling relative to U_{24VIO} . The input shall be regarded as a power line according to "Volvo Technical Regulation 15 79 908, EMC Requirements".

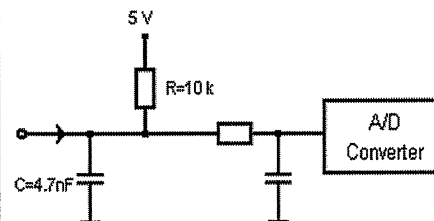
Model of the input circuit:



Interface circuit 1b

The input is used for resistive sensors. The circuit shall supply 5 V through a resistor of 10 kΩ. When used to measure temperature, the output current to the sensor shall then be minimised to avoid internal power dissipation in the sensor.

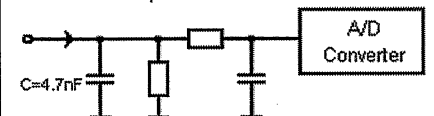
Model of the input circuit:



Interface circuit 1c

The input can be used for both digital and analogue signals. The total input resistance, $R_{tot} = R // R_{A/D}$, shall be $100\text{ k}\Omega < R_{tot} < 500\text{ k}\Omega$.

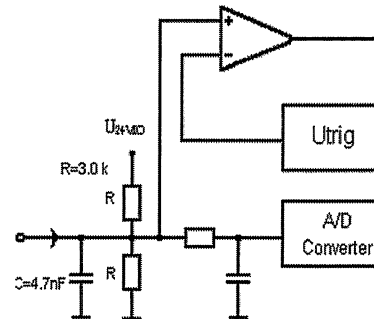
Model of the input circuit:



Interface circuit 2b

Pulse input circuit. The input can be used for both digital and analogue signals and as pulse counter input with fixed trigger level. The circuit shall sink or source 8 mA at $U_{24VIO} = 28\text{ V}$ when connected to U_{24VIO} or GND.

Model of input circuit:



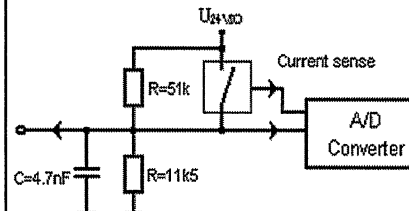
Interface circuit 3a

Model of high side output stage circuit same as interface circuit 3b in Chapter 2.3.1.5.2, but without PWM capability and no biasing resistors for open circuit detection.

Interface circuit 3c

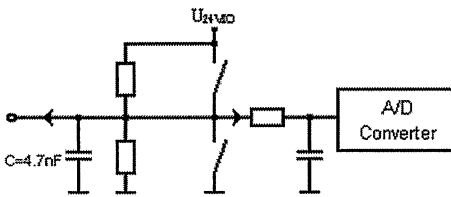
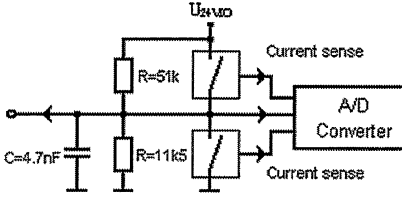
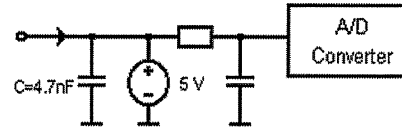
High side output circuit. The switch provides current sense signal to an A/D converter. To detect open circuit when the switch is open the interface shall sink approximately 2 mA when connected to $U_{24VIO} = 28\text{V}$ or source approximately 0.5 mA when connected to GND. The voltage shall be converted to digital 10 bit resolution with scaling relative to U_{24VIO} . The interface shall not be regarded as a power line according to "Volvo Technical Regulation 15 79 908, EMC Requirements".

Model of the output circuit:



Wiring diagram pages list

Pin configuration I/O-A+ and I/O-B+

| | |
|---|---|
| <p>Interface circuit 3e Model of high side, low side output stage. This circuit is similar to circuit 4b but without PWM drive capabilities.</p> <hr/> <p>Interface circuit 4b Totem pole output stage may be used as high side, low side or high/low switch. Capable of low frequency PWM driving high side or low side switch but not both synchronously. Open circuit voltage shall be approximately $9,2 V / U_{24VIO=28V}$. When the switch is open the interface shall sink approximately 2 mA if connected to $U_{24VIO=28V}$ or source 0.5 mA when connected to GND. The voltage shall be converted to digital 10 bit resolution with scaling relative to U_{24VIO}. The interface shall <u>not</u> be regarded as a power line according to "Volvo Technical Regulation 15 79 908, EMC Requirements".</p> <p>Model of the output circuit:</p>  | <p>Interface circuit 4d Totem pole output stage may be used as high side, low side or high/low switch. Capable of low frequency PWM driving high side or low side switch but not both synchronously. Both switches provide current sense signal to an A/D converter. To detect open circuit when the switches are open the interface shall sink approximately 2 mA when connected to $U_{24VIO = 28V}$ or source approximately 0.5 mA when connected to GND. The voltage shall be converted to digital 10 bit resolution with scaling relative to U_{24VIO}. The interface shall <u>not</u> be regarded as a power line according to "Volvo Technical Regulation 15 79 908, EMC Requirements".</p> <p>Model of the output circuit:</p>  |
| <p>Interface circuit 4c Model of high side, low side output stage. This circuit is similar to circuit 4b but without low side PWM drive capabilities.</p> | <p>Interface circuit 5 Model of a 5 V reference voltage supply for potentiometers and pressure sensors. Supply current 20 mA, current limited to < 50 mA.</p> <p>Model of the output circuit:</p>  |
| | <p>Interface circuit 6 The pin is used for interrupt the ECU. Same interface as circuit 1a. The application software can initiate the interrupt function. The pin is used for waking-up the ECU from sleep mode.</p> |

Wiring diagram pages list

Radiator fans drive junction box

