

Data Sheet

# PLUS+1<sup>®</sup> Controllers

## MC038-010 and MC038-012

PLUS+1

### Mobile machine management

Danfoss PLUS+1<sup>®</sup> controllers are elements of the flexible, powerful, expandable, and affordable family of mobile machine management products. These devices are general-purpose controllers that are equally suited for use as a member of a distributed machine control system, with intelligence in every node, or as a stand-alone controller.



### Product highlights

Both controllers employ a Digital Signal Processor (DSP), providing the controller with extremely fast single cycle processing speed and 128K internal flash.

### Application development

The MC038-012 employs an application key that enables the use of Danfoss developed PLUS+1<sup>®</sup> GUIDE machine control solutions. The same PLUS+1<sup>®</sup> GUIDE HWD file is used with both controllers.

Users develop MC038-010 and MC038-012 applications with PLUS+1<sup>®</sup> GUIDE. This Microsoft Windows based development environment features a user-friendly, field proven, icon-based graphical programming tool, application downloader, and service/diagnostic tool.

### Features

- User-programmable with PLUS+1<sup>®</sup> GUIDE
- Support of unlimited read-write FRAM, 2MB flash vault memory
- 38 pins: (1) DEUTSCH DRC connector
- 32 bit fixed-point DSP running at 150 MHz
- 12 bit analog-to-digital converter
- 15 inputs
- 13 outputs
- 9 to 36 V<sub>DC</sub> power supply, monitored internally
- 2 CAN 2.0 B ports, the fixed range analog input can be configured as the shield pin
- 1 independent ECU power supply, 6 V<sub>DC</sub> to 36 V<sub>DC</sub>, and regulated internally
- 3 independent power supplies for powering output pins, 9 to 36 V<sub>DC</sub>
- 1 CAN 2.0B port. The fixed range analog (AIN/CAN Shield) pin may be configured as a shield pin
- 5 V<sub>DC</sub> power supply for external sensors rated at 150 mA, monitored and regulated internally
- 2 LEDs under application software control
- CE compliant

**15 Inputs**

- (3 universal (DIN/AIN/FreqIN) that are user-defined as either:
  - *Analog*: with configurable ranges 0 to 5.25 V<sub>DC</sub> (with over range protection) or 0 to 36 V<sub>DC</sub>
  - *Digital*: pull up (5 V<sub>DC</sub>), pull down (0 V<sub>DC</sub>) or pull to center (2.5 V<sub>DC</sub>)
  - *Frequency* (timing): 1 Hz to 10 kHz
- (2) digital (DIN) configurable as pull up (5 V<sub>DC</sub>), pull down (0 V<sub>DC</sub>)
- (9) digital/analog (DIN/AIN) that are user-defined as either:
  - *Digital*: pull up (5 V<sub>DC</sub>), pull down (0 V<sub>DC</sub>) or pull to center (2.5 V<sub>DC</sub>)
  - *Analog*: 0 to 5.25 V<sub>DC</sub> or 0 to 36 V<sub>DC</sub>
- (1) fixed range analog (AIN/CAN shield) 0 to 5.25 V<sub>DC</sub> or CAN shield pin

**13 Outputs**

- (2) DOUT (2 A) configurable as source only
- (3) HDOUT (6 A) configurable as source only
- (3) HPWMOUT/DOUT (6 A), configurable as source only
- (4) HPWMOUT/DOUT (10 A) configurable as source only, can be used as bi-directional pairs, (see Dimensions and Pin Assignments, back page for pair assignments)
- (1) HPWMOUT/DOUT (10A) configurable as source only
- Outputs are powered by three independent power supply pins (see Dimensions and Pin Assignments, back page for output pin power supply assignments and maximum allowable current per power supply pin)
- All PWM outputs operate as open loop. The output is a constant voltage.

Comprehensive technical literature is online at [www.danfoss.com](http://www.danfoss.com)

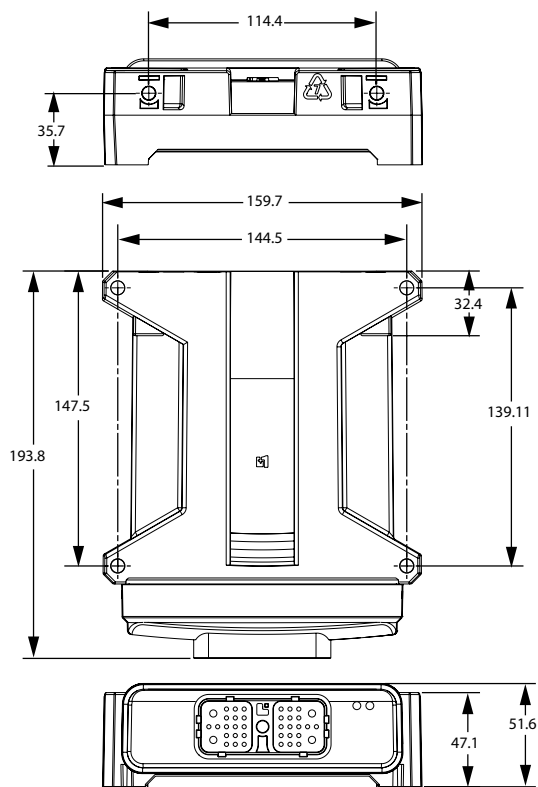
**Characteristics**

*Specifications*

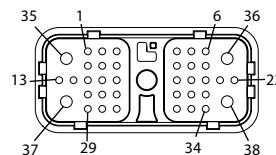
<b>Supply voltage</b>	9 to 36 V <sub>DC</sub>
<b>Operating temperature (ambient)</b>	–40 °C to +70 °C [–40 °F to +158 °F]
<b>Storage temperature</b>	–40 °C to +85 °C [–40 °F to +185 °F]
<b>Programming temperature</b>	0 °C to +70 °C [+32 °F to +158 °F]
<b>IP rating (with mating connector attached)</b>	IP 67
<b>EMI/RFI rating</b>	100 V/M
<b>Weight</b>	0.53 kg [1.16 lb]
<b>Vibration</b>	IEC 60068-2-64
<b>Shock</b>	IEC 60068-2-27 test Ea
<b>Max. current, sourcing</b>	70 A
<b>Max. current, sinking</b>	25 A
<b>Max. current, power pins: C1-P36, C1-P37, C1-P38</b>	25 A per pin

**Dimensions and pin assignments**

Mounting dimensions in mm



*Pin connector*



Pin	Function	Pin	Function
C1-P1	CPU power ground -	C1-P20	DIN/AIN
C1-P2	CPU power supply +	C1-P21	HPWM/DOUT (6A-Pwr = C1-P37, source only)
C1-P3	CAN0 +	C1-P22	HPWM/DOUT (10A-Pwr = C1-P37, source only)
C1-P4	CAN0 -	C1-P23	DOUT (2A-Pwr = C1-P38, source only)
C1-P5	AIN/CAN shield	C1-P24	DIN/AIN
C1-P6	DIN	C1-P25	DIN/AIN
C1-P7	DIN	C1-P26	DIN/AIN
C1-P8	5 V <sub>DC</sub> sensor power +	C1-P27	DIN/AIN
C1-P9	Sensor power ground -	C1-P28	DOUT (2A-Pwr = C1-P38, source only)
C1-P10	DIN/AIN/FreqIN	C1-P29	DOUT (2A-Pwr = C1-P38, source only)
C1-P11	DIN/AIN/FreqIN	C1-P30	DOUT (6A-Pwr = C1-P38, source only)
C1-P12	DIN/AIN/FreqIN	C1-P31	DOUT (6A-Pwr = C1-P38, source only)
C1-P13	HPWM/DOUT (10A-Pwr = C1P37, pair with C1-P15)	C1-P32	DOUT (6A-Pwr = C1-P38, source only)
C1-P14	DIN/AIN	C1-P33	HPWM/DOUT (6A-Pwr = C1-P36, source only)
C1-P15	HPWM/DOUT (10A-Pwr = C1P37, pair with C1-P13)	C1-P34	HPWM/DOUT (10A-Pwr = C1-P36, pair with C1-P29)
C1-P16	HDOUT (6A-Pwr = C1-P38, source only)	C1-P35	Output power ground -
C1-P17	DIN/AIN	C1-P36	Output power supply +
C1-P18	DIN/AIN	C1-P37	Output power supply +
C1-P19	DIN/AIN	C1-P38	Output power supply +

**! Caution**

PCB damage may occur.

To prevent damage to the module all module power supply + pins must be connected to the vehicle power supply to support advertised module maximum output current capacity. **DO NOT** use module power supply + pins to supply power to other modules on a machine.

**! Caution**

Warranty will be voided if device is opened.

Device is not field serviceable. Do not open the device.

Use care when wiring mating connector. Pinouts are for device pins.

*Product part number*

<b>MC038-010</b>	11035917
<b>MC038-012</b>	11076594

*Related products part numbers*

<b>CG150 CAN/USB Gateway</b>	11153051
<b>DEUTSCH mating connector bag assembly</b>	11027919 (16 to 20 AWG)
<b>PLUS+1<sup>®</sup> GUIDE Professional</b>	11179523

*Comprehensive information*

<i>MC0XX-0XX Controller Family Technical Information, <b>520L0719</b></i>
<i>MC038-010 and MC038-012 Application Program Interface (API) document</i>