Data Sheet

PLUS+1® **Controllers**
MC038-020

Mobile machine management

Danfoss PLUS+1® 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

Product functionality includes features that enhance machine control safety including redundant E-stop inputs and one 20A digital output with redundant hardware shutdown paths. Also included are two 19A PWM outputs and a dedicated sleep mode input.

Application development

Users develop MC038-020 applications with PLUS+1® 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® GUIDE (Graphical User Integrated Development Environment)
- 38 pins: (1) DEUTSCH DRC26-38SA connector
- 32 bit fixed-point DSP running at 150 MHz
- 12 bit analog-to-digital converter
- 16 inputs
- 5 outputs
- Independent power supplies for the HDOUT and HPWM outputs
- 1 CAN 2.0B port. The fixed range analog (AIN/CAN Shield) pin may be configured as a shield pin

- 5 V_{DC} power supply for external sensors rated at 150 mA, monitored and regulated internally
- 2 LEDs under application software control
- CE compliant

Comprehensive technical literature is online at *www.danfoss.com*

16 Inputs

- 1 DIN-NO (digital) E-Stop
- 1 DIN-NC (digital) E-Stop
- 1 DIN (digital) Sleep Mode enable/disable
- (4) digital (DIN) configurable as pull up (5 V_{DC}), pull down (0 V_{DC})
- (8) digital/analog (DIN/AIN) that are user-defined as either:
  - *Digital*: pull up (5 V_{DC}), pull down (0 V_{DC}) or pull to center (2.5 V_{DC})
  - *Analog*: 0 to 5.25 V_{DC} or 0 to 36 V_{DC}
- (1) fixed range analog (AIN/CAN shield) 0 to 5.25 V_{DC} or CAN shield pin

5 Outputs

- (1) DOUT (3 A digital) configurable as source only
- (1) DOUT (8 A digital) configurable as source only
- (1) HDOUT (20 A digital) configurable as source only
  - Redundant 2-stage output path with diagnostic current feedback
- (2) HPWM (19 A proportional) configurable as source or sink
  - Both PWM outputs operate as open loop
  - The output is a constant voltage
 - Diagnostic current feedback is available

Characteristics

Specifications

Supply voltage, device	9 to 36 Vdc
Operating temperature, ambient	-40°C to 70°C (-40°F to 158°F)
Storage temperature	-40°C to 85°C (-40°F to 185°F)
Programming temperature	0°C to 70°C (32°F to 158°F)
IP rating **(with mating connector attached)**	IP 67
EMI/RFI rating	100 V/m
Weight	0.53 kg (1.16 lb)
Vibration	IEC 60068-2-64
Shock	IEC 60068-2-27 test Ea
Device maximum current, sourcing	70 A
Device maximum current, sinking	31 A
Maximum current, power pins:	
C1-P2, C1-P34	10 A per pin
C1-P36, C1-P37, C1-P38	25 A per pin

Dimensions and pin assignments

Mounting dimensions in mm
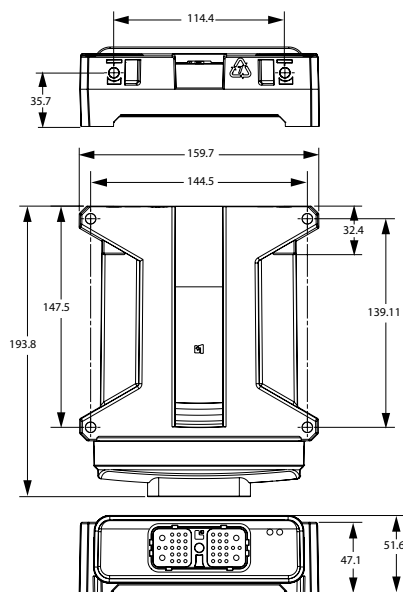
Each set of HPWM pins must be terminated at a common junction.

All four 20A HDOUT pins must be terminated at a common junction.

⚠ 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.

Pin connector
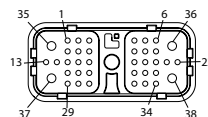
Pin	Function	Pin	Function
C1-P1	System power ground -	C1-P20	HPWM2 (19 A—Must pair with C1-P21—Pwr = C1-P28, 34, 38)
C1-P2	System power supply +	C1-P21	HPWM2 (19 A—Must pair with C1-P20—Pwr = C1-P28, 34, 38)
C1-P3	CAN0 +	C1-P22	HDOUT (3 A—Pwr = C1-P2, 36, 37)
C1-P4	CAN0 -	C1-P23	HDOUT (20 A—Must pair with C1-P15, 29, 30—Pwr = C1-P2, 36, 37)
C1-P5	AIN/CAN shield	C1-P24	DIN (Sleep Mode Input)
C1-P6	DIN/AIN	C1-P25	ESTOPIN (Disables C1-P15, 23)
C1-P7	HPWM1(19A—Must pair with C1-P14—Pwr = C1-P28, 34, 38)	C1-P26	DIN/AIN
C1-P8	5 V_{DC} sensor power +	C1-P27	DIN/AIN
C1-P9	Sensor power ground -	C1-P28	HPWM power supply +
C1-P10	DIN	C1-P29	HDOUT (20 A—Must pair with C1-P15, 23, 30—Pwr = C1-P2, 36, 37)
C1-P11	DIN	C1-P30	HDOUT (20 A—Must pair with C1-P15, 23, 29—Pwr = C1P2, 36, 37)
C1-P12	DIN/AIN	C1-P31	DIN/AIN
C1-P13	DOUT (8 A—Pwr = C1-P2, 36, 37)	C1-P32	DIN/AIN
C1-P14	HPWM1 (19 A—Must pair with C1-P7—Pwr = C1-P28,34,38)	C1-P33	DIN/AIN
C1-P15	DOUT (20 A—Must pair with C1-P23, 29, 30—Pwr = C1P2, 36, 37)	C1-P34	HPWM power supply +
C1-P16	DIN/AIN	C1-P35	System power ground -
C1-P17	DIN	C1-P36	System power supply +
C1-P18	DIN/AIN	C1-P37	System power supply +
C1-P19	ESTOPIN	C1-P38	HPWM power supply +

Product part number

MC038-020	11093209

Related products part numbers

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

Comprehensive information

MC0XX-0XX Controller Family Technical Information, **520L0719**
MC038-020 Application Program Interface (API) document