MAKING MODERN LIVING POSSIBLE

Technical Information

MC400
Microcontroller

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Table of contents

Front cover illustrations: 2232

Description

The Danfoss MC400 microcontroller is a multi-loop controller that is environmentally hardened for mobile off-highway open and closed loop control system applications. A powerful 16-bit embedded microprocessor allows the MC400 to control complex systems as either a stand alone controller or as a member of a Controller Area Network (CAN) system

With 6-axis output capability, the MC400 has enough power and flexibility to handle many machine control applications. These could include hydrostatic propel circuits, open and closed loop work functions and operator interface control. Controlled devices may include electrical displacement controllers, proportional solenoid valves and Danfoss PVG series control valves.

The controller can interface with a wide variety of analog and digital sensors such as potentiometers, Hall-effect sensors, pressure transducers and pulse pickups. Other control information can also be attained via CAN communications.

Actual I/O functionality of the MC400 is defined by application software that is loaded into the controller's flash memory. This programming process can occur at the factory or in the field via a laptop computer's RS232 port. WebGPI™ is the Danfoss communication software that facilitates this process, and allows for various other user interface features.

The MC400 controller consists of a state-of-the-art circuit board assembly inside an aluminum die-cast housing. Two connectors designated P1 and P2 provide for electrical connections. These individually keyed, 24-pin connectors provide access to the controller's input and output functions as well as power supply and communication connections. An optional, on board 4-character LED display and four membrane switches can provide additional functionality.

Features

- Robust electronics operates over a range of 9 to 32 Vdc with reverse battery, negative transient and load dump protection.
- Environmentally hardened design includes coated die-cast aluminum housing that withstands harsh mobile machine operating conditions including shock, vibration, EMI/RFI, high pressure wash down and temperature and humidity extremes.
- High performance 16-bit Infineon C167CR microprocessor includes on board CAN 2.0b interface and 2Kb of internal RAM.
- 1 MB of controller memory allows for even the most complex software control applications. Software is downloaded to the controller, eliminating the need to change EPROM components to change software.
- Controller Area Network (CAN) communication port meets the 2.0b standard. This high speed serial asynchronous communication allows for information exchange with other devices equipped with CAN communications. The baud rate and data structure are determined by the controller software allowing support for protocols such as J-1939, CAN Open and the Danfoss S-net.
- The Danfoss standard four LED configuration provides system and application information.

Features (continued)

- An optional 4-character LED display and four membrane switches provide for easy setup, calibration and troubleshooting information.
- The six PWM valve driver pairs offer up to 3 amps of closed loop controlled current.
- Optional valve driver configuration for up to 12 Danfoss PVG valve drivers.
- WebGPI™ user interface.
- Robust electronics operates over a range of 9 to 32 Vdc with reverse battery, negative transient and load dump protection.

Application Software

The MC400 is designed to run control solution software engineered for a specific machine. There are no standard software programs available. Danfoss has an extensive library of software objects to help facilitate the software development process. These include control objects for functions such as anti-stall, dual-path control, ramp functions and PID controls. Contact Danfoss for additional information or to discuss your specific application.

Ordering Information

- For complete hardware and software ordering information, consult the factory. The MC400 ordering number designates both hardware configuration and application software.
- Mating I/O connectors: Part number K30439 (bag assembly contains two 24-pin Deutsch DRC23 series connectors with pins), Deutsch crimp tool: model number DTT-20-00
- WebGPI™ communication software: Part number 1090381.

Technical Data

POWER SUPPLY
- 9-32 Vdc
- Power consumption: 2 W + load
- Device maximum current rating: 15 A
- External fusing recommended

SENSOR POWER SUPPLY
- Internal regulated 5 Vdc sensor power, 500 mA max

COMMUNICATION
- RS232
- CAN 2.0b (protocol is application dependent)

STATUS LEDs
- (1) Green system power indicator
- (1) Green 5 Vdc power indicator
- (1) Yellow mode indicator (software configurable)
- (1) Red status indicator (software configurable)

OPTIONAL DISPLAY
- 4 character alphanumeric LED display located on the face of the housing. Display data is software dependent.

CONNECTORS
- Two Deutsch DRC23 series 24-pin connectors, individually keyed
- Rated for 100 connect/disconnect cycles
- Mating connectors available from Deutsch; one DRC26-24SA, one DRC26-24SB

ELECTRICAL
- Withstands short circuits, reverse polarity, over voltage, voltage transients, static charges, EMI/RFI and load dump

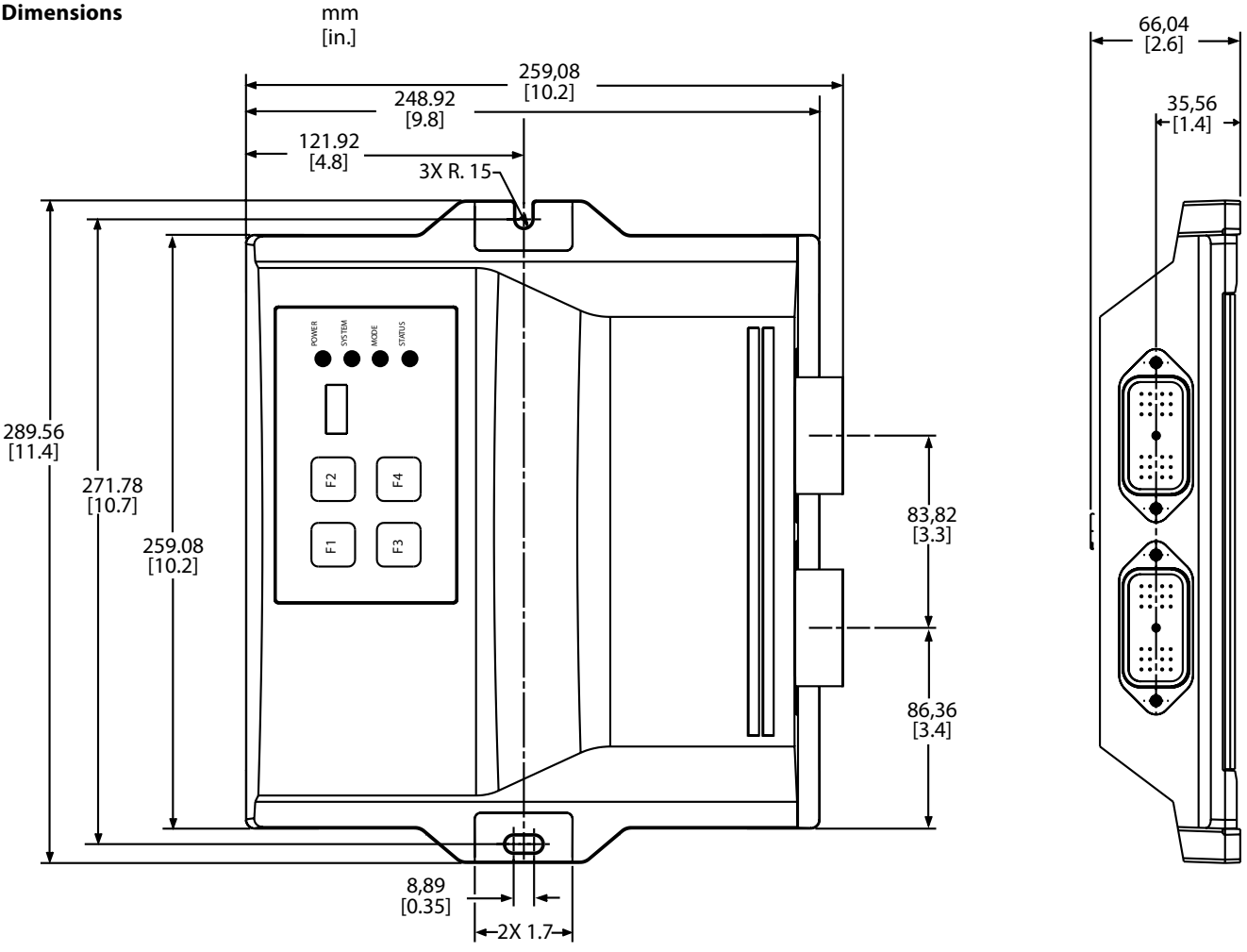
Technical Data (continued)

ENVIRONMENTAL

- Operating Temperature:
  -40° C to +70° C (-40° F to +158° F)
- Moisture:
  Protected against 95% relative humidity and high pressure washdown.
- Vibration:
  5-2000 Hz with resonance dwell for 1 million cycles for each resonant point from 1 to 10 Gs.
- Shock:
  50 Gs for 11 milliseconds. Three shocks in both directions of the three mutually perpendicular axes for a total of 18 shocks.
- Inputs:
  - 6 analog inputs:
    (0 to 5 Vdc). Intended for sensor inputs. 10-bit A to D resolution.
  - 6 frequency (or analog) inputs:
    (0 to 6000 Hz). Capable of reading both 2-wire and 3-wire style speed sensors or encoders. Inputs are hardware configurable to be either pulled high or pulled low. Also can be configured as general-purpose analog inputs as described above.
  - 9 digital inputs:
    Intended for monitoring switch position status. Hardware configurable for either high side or low side switching (>6.5 Vdc or <1.75 Vdc).
  - 4 optional membrane switches:
    Located on housing face.
- Outputs:
  12 current controlled PWM outputs:
  Configured as 6 high side switched pairs. Hardware configurable to drive up to 3 amps each. Two independent PWM frequencies are possible. Each PWM pair also has the option of being configured as two independent voltage reference outputs for use with Danfoss PVG series proportional control valves or as two independent PWM outputs with no current control.
- 2 high current 3 amp outputs:
  Either ON/OFF or under PWM control with no current feedback.

Dimensions

mm
[in.]



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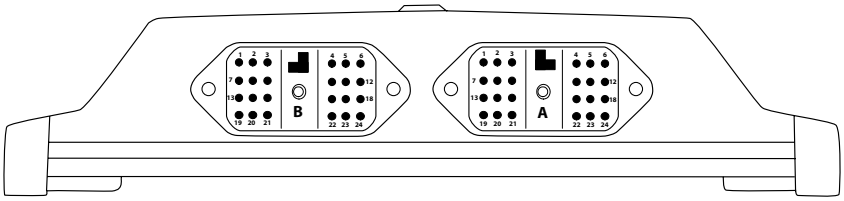
Danfoss recommends standard installation of the controller to be in the vertical plane with connectors facing down.

Connector Pinouts



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A1	Battery +
A2	Digital Input 1
A3	Digital Input 0
A4	Digital Input 4
A5	Valve Output 5
A6	Battery -
A7	Valve Output 11
A8	Valve Output 10
A9	Valve Output 9
A10	Digital Input 3
A11	Valve Output 6
A12	Valve Output 4
A13	Valve Output 3
A14	Valve Output 2
A15	Digital Output 1
A16	Valve Output 7
A17	Valve Output 8
A18	Battery +
A19	Digital Output 0
A20	Valve Output 1
A21	Digital Input 2
A22	Digital Input 5
A23	Battery -
A24	Valve Output 0

B1	Timing Input 4 (PPU 4)/Analog Input 10
B2	Timing Input 5 (PPU5)
B3	Sensor Power +5 Vdc
B4	RS232 Ground
B5	RS232 Transmit
B6	RS232 Receive
B7	CAN Low
B8	CAN High
B9	Bootloader
B10	Digital Input 6
B11	Digital Input 7
B12	Digital Input 8
B13	CAN Shield
B14	Timing Input 3 (PPU 3)/Annalog Input 9
B15	Analog Input 5
B16	Analog Input 4
B17	Analog Input 3
B18	Analog Input 2
B19	Timing Input 2 (PPU2)/Analog Input 8
B20	Timing Input 2 (PPU0)/Analog Input 6
B21	Timing Input 1 (PPU1)/Analog Input 7
B22	Sensor Gnd
B23	Analog Input 0
B24	Analog Input 1

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Danfoss Power Solutions is a global manufacturer and supplier of high-quality hydraulic and electronic components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market. Building on our extensive applications expertise, we work closely with our customers to ensure exceptional performance for a broad range of off-highway vehicles.

We help OEMs around the world speed up system development, reduce costs and bring vehicles to market faster.
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