Danfoss DC2 Micro Controller User Guide

DC2
Microcontroller
BLN-95-9041-4
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Contents

DESCRIPTION

Danfoss DC2 Microcontroller is a multi-loop controller that is environmentally hardened for mobile off-highway control system applications. The DC2 Microcontroller has the response speed and capacity to control multiple electrohydraulic control systems either as a stand-alone controller or networked with other similar controllers via a high-speed Controller Area Network system.

The DC2 is ideally suited for dual-path hydrostatic propel systems incorporating closed-loop speed and horsepower control. Additionally, closed-loop position control systems using servovalves and proportional flow control valves are easily accomplished. Up to four bi-directional servo loops can be accomplished.
The controller can interface with a wide variety of analog and digital sensors such as potentiometers, Hall-effect sensors, pressure sensors, pulse pickups and encoders.
The use of the I/O features and the control actions performed are defined by firmware installed in the DC2's program memory. The firmware is typically installed by downloading the desired code from another computer via the RS232 port. Re-programmability provides a high level of flexibility of device function. Either factory or in-field programming is possible.
The DC2 controller consists of a circuit board assembly inside of a cast aluminum housing. Three connectors, designated as P1, P2 and P3 are provided for electrical connections. P1 (30 pin) and P2 (18 pin) are the main I/O and power connectors; together they mate to the 48 pin board-mounted header, which protrudes through the bottom of the enclosure. P3 is a circular connector for RS232 communications such as reprogramming, displays, printers and terminals.

FEATURES

- Multi-loop control capability for control of 4 bidirectional servo loops or 2 bidirectional and 4 unidirectional loops.
- Powerful 16-bit Intel 8XC196KC microcontroller:
  – fast
  – versatile
  – controls multiple machine functions with fewer parts.
- Controller Area Network (CAN) provides high speed serial communications with up to 16 other CAN compatible devices and meets the speed requirements of SAE network Class C specifications.
- Rugged cast aluminum housing withstands the environmental rigors typically found in mobile applications.
- Four-character LED display visible through the cast housing provides information for setup, calibration, and troubleshooting procedures.
- EEROM program memory accessible through a dedicated RS232 port. Allows programming without changing EPROMs.
- Hardened power supply operates over the full range of 9 to 36 Volts with reverse battery, negative transient, and load dump protection.
- Convenient RS232 port connector for data communication with other devices such as displays, printers, terminals, or personal computers.
- Expandable via an internal 50-pin connector for custom I/O boards.

ORDERING INFORMATION

- For complete hardware and software ordering information consult factory. The DC2 ordering number assigns both hardware and software.
- For product structure information see page 5.
- Mating I/O Connector: order Part Number K12674 (bag assembly)
- Mating RS232 Connector: order Part Number K13952 (bag assembly)

SOFTWARE FEATURES

PRE-PROGRAMMED CONTROLLERS

DC2 Controllers can be supplied with customer-specific application programs with software written by Danfoss. Application modules exist which can be made machine specific, such as:

- power management, such as anti-stall, automotive control, horsepower optimization and wheel assist
- speed control using PID, PI and pseudo-derivative control algorithms
- pressure control
- dual path control
- position control such as machine elevation, gravity reference and coordinated cylinder position
- steering control for auto steering and coordinated steering requirements
- application rate control
- controller networking

UN-PROGRAMMED CONTROLLERS

Software and programming kits are available to support programming of DC2 Controllers. The kits are:

- Basic programming kit, consisting of the DC2 User's Manual, the Intel Imbedded Controller Handbook, programming cables and the Field EEPROM Programming Software (FEPS)
- Library modules in C
- Graphic PC Interface (GPI)

Consult factory for further information.

TECHNICAL DATA

OUTPUTS

2 Low Current – bidirectional current drivers (±275 mA maximum into a 20 ohm load). Protected for shorts to ground.
4 High Current – 3 amp drivers, either ON/OFF or under PWM control.
These can be used to drive 12 or 24 Vdc on/off solenoids, servo valves or proportional valves. Short circuit limited to 5 amps.

INPUTS

4 Analog (typical range 0 to 5 Vdc) -intended for sensor inputs (10 bit resolution). Protected for shorts to ground.
4 Speed Sensors (dc-coupled) -for use with solid state zero speed pulse pickups and encoders, any of which can be configured as general purpose analog inputs.
1 Speed Sensor (ac-coupled) -for use with alternators or variable reluctance pulse pickups.
8 Digital Inputs -for monitoring external switch position status for pull up (to 32 Vdc) or pull down (to <1.6 Vdc).
4 Optional Membrane Switches -located on housing face.

COMMUNICATION

Controller Area Network (CAN) for communications with other CAN compatible devices. Programmable bit rate to 1 Mbit/s at a distance of 40 meters.
RS232 port connected through a 6-pin MS connector.

POWER SUPPLY

Voltage 9 to 32 Vdc.
5 Vdc regulator for external sensor power (up to 0.5 amp) which is short-circuit protected.

MEMORY

56K program memory plus 8K RAM with 256 byte nonvolatile serial E data memory.
EEROM can accept 10,000 erase/program cycles.

LEDs

4-character alpha/numeric LED display; each character is a 5×7 dot matrix.
2 LED indicators, one LED used as a power indicator, the other LED under software control for use as fault or status indication.

ELECTRICAL CONNECTIONS

48-pin board-mounted Metri-Pak I/O connector mates with a 30-pin and 18-pin cable connector.
6-pin circular MS connector for RS232 communication.

ENVIRONMENTAL

OPERATING TEMPERATURE

-40°C to +70°C

MOISTURE

Protected against 95% relative humidity and high pressure washdowns

VIBRATION

5 to 2000-Hz with resonant dwell for 1 million cycles for each resonant point run from 1 to 10 gs

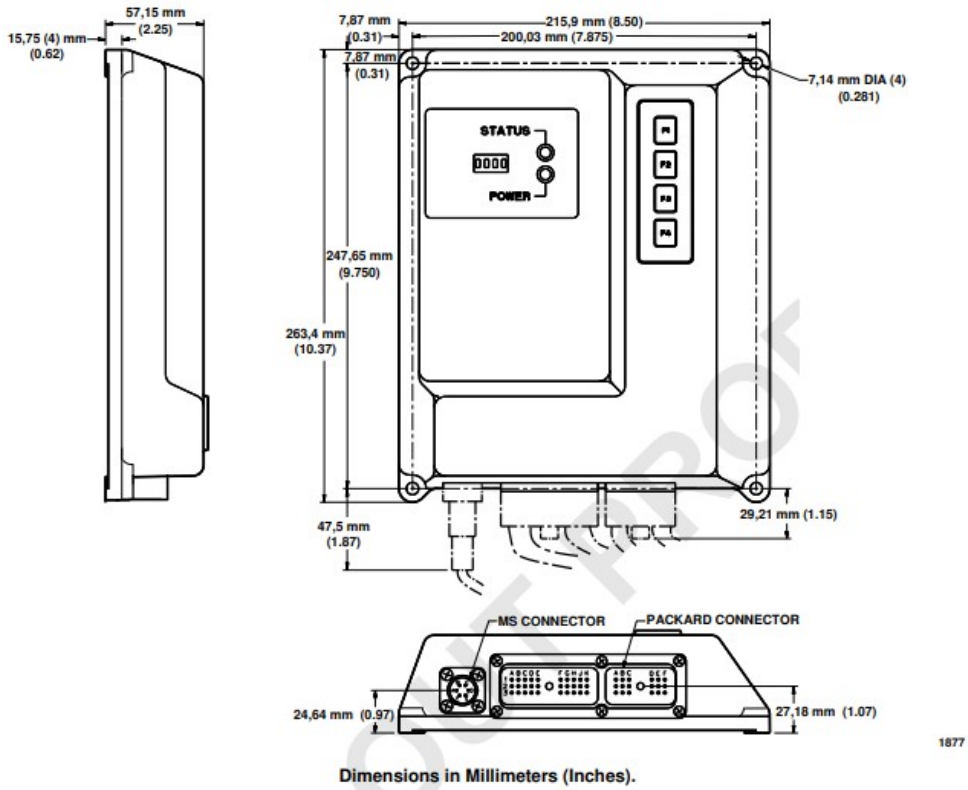
SHOCK

50 gs for 11 ms in all 3 axes for a total of 18 shocks

ELECTRICAL

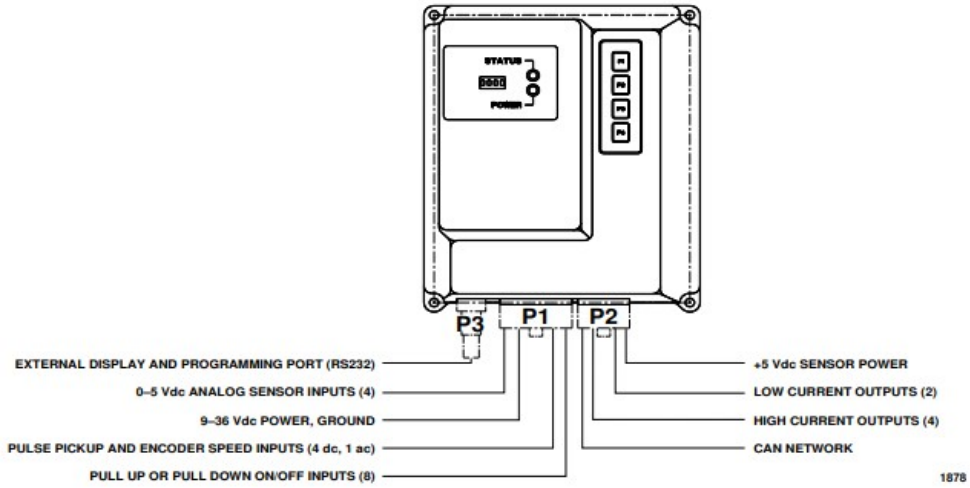
Withstands short circuits, reverse polarity, over voltage, voltage transients, static discharges, EMI/RFI and load dump.

DIMENSIONS

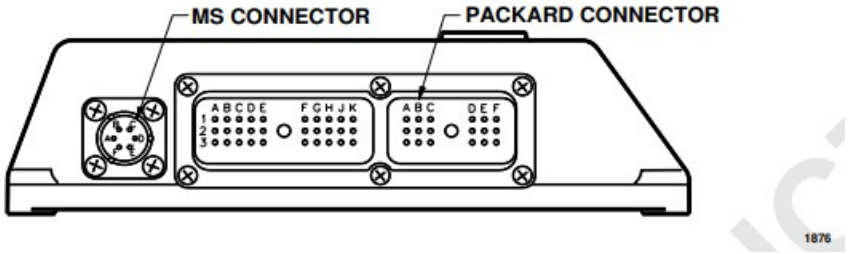


Dimensions in Millimeters (Inches).

CONNECTION DIAGRAM



CONNECTOR PINOUTS



I/O Connectors
– 30 PIN Metri-Pack (P1)

A1	+ 5 V Sensor Power	A2	Sensor 1	A3	Sensor Gnd
B1	+ 5 V Sensor Power	B2	Pulse Pickup 5	B3	Sensor Gnd
C1	+ 5 V Sensor Power	C2	Sensor 4	C3	Sensor Gnd
D1	+ 5 V Sensor Power	D2	Sensor 2	D3	Sensor Gnd
E1	+ 5 V Sensor Power	E2	Digital Input 8	E3	Sensor Gnd
F1	+ 5 V Sensor Power	F2	Sensor 3	F3	Sensor Gnd
G1	+ 5 V Sensor Power	G2	Pulse Pickup 4	G3	Sensor Gnd
H1	+ 5 V Sensor Power	H2	Pulse Pickup 1	H3	Sensor Gnd
J1	Servo Out 1 (+)	J2	Pulse Pickup 2	J3	Servo Out 1 (-)
K1	Servo Out 2 (+)	K2	Pulse Pickup 3	K3	Servo Out 2 (-)

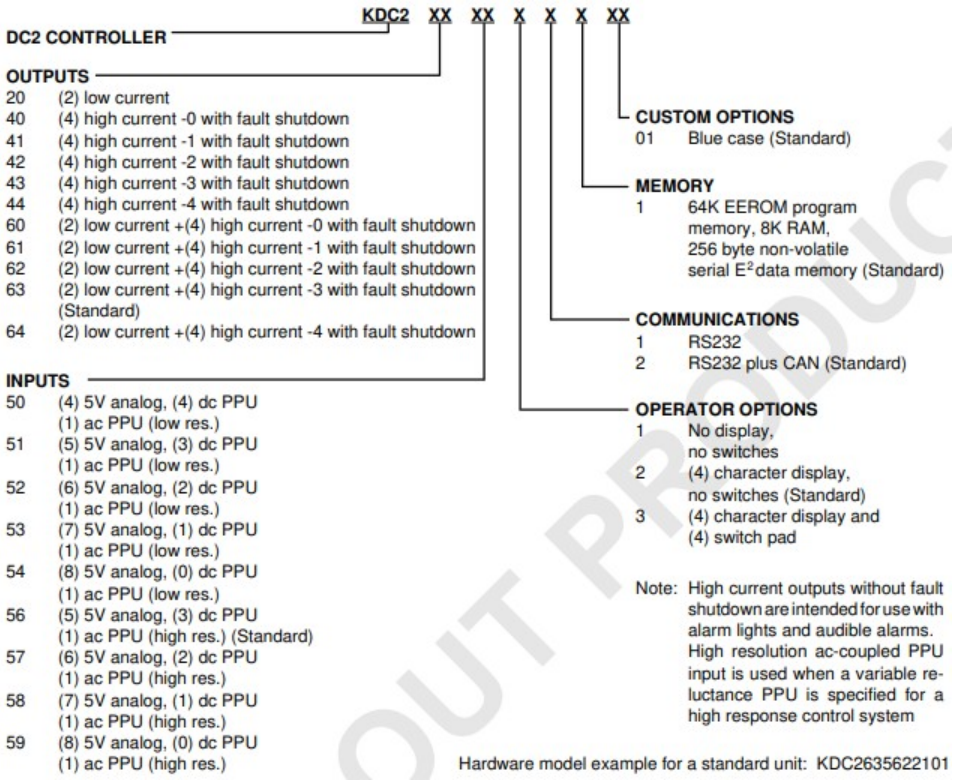
– 18 PIN Metri-Pack (P2)

A1	Digital Input 3	A2	CAN BUS (+)	A3	CAN BUS (+)
B1	Digital Input 6	B2	Chassis	B3	CAN BUS (-)
C1	Digital Input 4	C2	Digital Input 1	C3	CAN BUS (-)
D1	Digital Input 5	D2	3A Digital Out 2	D3	Digital Input 2
E1	Battery (-)	E2	Digital Input 7	E3	3A Digital Out 4
F1	Battery (+)	F2	3A Digital Out 3	F3	3A Digital Out 1

RS232 Connector (P3)

A	Transmit Data (TXD)
B	Receive Data (RXD)
C	+ 5 V
D	Ground – Out
E	EEPROM / Boot
F	Ground – Out

HARDWARE STRUCTURE



CUSTOMER SERVICE

NORTH AMERICA
ORDER FROM
Danfoss (US) Company
Customer Service Department

3500 Annapolis Lane North
Minneapolis, Minnesota 55447
Phone: (7632) 509-2084
Fax: (763) 559-0108

DEVICE REPAIR

For devices in need of repair, include a description of the problem, a copy of the purchase order and your name, address and telephone number.

RETURN TO

Danfoss (US) Company
Return Goods Department
3500 Annapolis Lane North
Minneapolis, Minnesota 55447

EUROPE

ORDER FROM

Danfoss (Neumünster) GmbH & Co.
Order Entry Department
Krokamp 35
Postfach 2460
D-24531 Neumünster
Germany
Phone: 49-4321-8710
Fax: 49-4321-871-184

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Documents / Resources

	Danfoss DC2 Micro Controller [pdf] User Guide DC2 Micro Controller, DC2, Micro Controller

References

- User Manual