

Danfoss
MCX15B2
Electronic
Controller



Danfoss MCX15B2 Electronic Controller Instructions

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Danfoss MCX15B2 Electronic Controller



Product Specifications

- **Analog Input:** NTC, 0/1V, 0/5V, 0/10V PT1000
- **Digital Input:** Contact inputs / 24V AC, 24/230V AC optoisolated
- **Analog Outputs:** 0/10 V DC optoisolated
- **Power Supply:** 24-110-230 V AC / 40-230 V DC
- **Communication:** Modbus RS485, CANbus, Ethernet, USB
- **Dimensions:** MCX15B2 – 4 DIN modules, MCX20B2 – 6 DIN modules

Product Usage Instructions

Installation

1. Ensure proper power supply voltage (24-110-230 V AC / 40-230 V DC).
2. Connect the necessary analog and digital inputs and outputs as per your configuration.
3. Use appropriate communication interfaces like Modbus RS485, CANbus, Ethernet, or USB.

Configuration

1. Use the software to configure the input types (NTC, PT1000, etc.) and communication settings.
2. Set up the analog outputs and define their behavior (0/10 V, PWM, PPM).
3. Ensure proper power connections and check for any short circuits.

Operation

- Power on the device and monitor the display for any error messages.
- Verify the input readings and output responses according to your application requirements.
- Use the communication interfaces for data logging or firmware updates.

GENERAL FEATURES

- MCX15B2/MCX20B2 is an electronic controller that stands at the top of the MCX range, thanks to the large

number of its inputs and outputs, the enhanced CPU capabilities, and connectivity features.

- It holds all the typical functionalities of MCX controllers: programmability, connection to the CAN bus local network, up to two Modbus RS-485 serial interfaces with galvanic isolation.
- Furthermore, it is fitted with an ultra-wide range (24/110/230 V AC) power supply in the same product variant, with USB and Ethernet connections for an embedded Web server and IP protocols management.
- It is available in several models, with or without a graphic LCD and with 15 or 20 digital outputs.

	MCX15B2	MCX20B2
ANALOG INPUTS		
NTC, 0/1 V, 0/5 V, 0 / 10 V PT1000, selectable via software	4	6
Universal NTC, Pt1000, 0/1 V, 0/5 V, 0/10 V, ON/OFF, 0/20 mA, 4/20 mA, selectable via software	6	10
Total number	10	16
DIGITAL INPUTS		
Voltage free contact/24V AC sensing	18	18
24/230 V AC optoinsulated	4	4
Total number	22	22
ANALOG OUTPUTS		
0/10 V DC optoinsulated	6	6
0/10 V, PWM, PPM selectable via software	2	2
Total number	6	6
DIGITAL OUTPUTS		
SPDT relay 16 A (changeover contacts)	2	2
SPST relay 5 A (normally open contacts)	13	18
Total number	15	20
OTHERS		
Power supply 24-110-230 V AC / 40-230 V DC	•	•
Connection for programming key and for remote display and keyboard	•	•
Buzzer	-	-
RTC clock	•	•
Modbus RS485 serial interface	x1	x2
CANbus	•	•
Ethernet for Webserver/Modbus TCP	•	•
USB for firmware/application software update and datalogging	•	•
Dimensions (DIN modules)	16	16
Mounting	DIN rail	DIN rail

GENERAL FEATURES AND WARNINGS

PLASTIC HOUSING FEATURES

- DIN rail mounting complying with EN 60715
- Self-extinguishing V0 according to IEC 60695-11-10 and glowing/hot wire test at 960 °C according to IEC 60695-2-12
- Ball test: 125 °C according to IEC 60730-1. Leakage current: ≥ 250 V According to IEC 60112

OTHER FEATURES

- **Operating conditions CE:** -20T60, 90% RH non-condensing
- **Storage conditions:** -30T80, 90% RH non-condensing
- To be integrated in Class I and/or II appliances

- **Index of protection:** IP40 only on the front cover
- **Period of electric stress across insulating parts:** long
- Suitable for use in environments with a degree of pollution 2
- **Category of resistance to heat and fire:** D
- **Immunity against voltage surges:** category II, category III for versions without display
- **Software class and structure:** class A

COMPLIANCE

CE mark

This product is designed to comply with the following EU standards:

- **Low voltage directive LVD 2014/35/EU:**
 - **EN60730-1:** 2011 (Automatic electrical control for household and similar use. General requirements)
 - **EN60730-2-9:** 2010 (Particular Requirements for Temperature Sensing Controls)
- **Electromagnetic compatibility EMC directive 2014/30/EU:**
 - **EN 61000-6-3:** 2007 +A1: 2011 (Emission standard for residential, commercial and light-industrial environments)
 - **EN 61000-6-2:** 2005 (Immunity for industrial environments)
- **RoHS directive 2011/65/EU and 2015/863/EU:**
EN50581: 2012

GENERAL WARNINGS

- Every use that is not described in this manual is considered incorrect and is not authorised by the manufacturer.
- Verify that the installation and operating conditions of the device respect the ones specified in the manual, especially concerning the supply voltage and environmental conditions.
- This device contains live electrical components; therefore, service and maintenance operations must be performed by qualified personnel.
- The device can't be used as a safety device.
- Liability for injury or damage caused by the incorrect use of the device lies solely with the user.

GENERAL FEATURES AND WARNINGS

INSTALLATION WARNINGS

- Mounting position recommended: vertical
- The installation must be executed according to the local standards and legislations of the country
- Always operate on the electrical connections with the device disconnected from the main power supply
- Before carrying out any maintenance operations on the device, disconnect all the electrical connections
- For safety reasons, the appliance must be fitted inside an electrical panel with no live parts accessible
- Don't expose the device to continuous water sprays or relative humidity greater than 90%.
- Avoid exposure to corrosive or pollutant gases, natural elements, environments where explosives or mixes of flammable gases are present, dust, strong vibrations or shock, large and rapid fluctuations in ambient temperature that, in combination with high humidity, can condensate, strong magnetic and/or radio interference

(e.g., transmitting antennae)

- When connecting loads, beware of the maximum current for each relay and connector
- Use cable ends suitable for the corresponding connectors. After tightening the screws of connectors, slightly tug the cables to check their tightness
- Use appropriate data communication cables. Refer to the Installation Guide “MCX hardware network specification” for the kind of cable to be used and setup recommendations
- Reduce the path of the probe and digital input cables as much as possible, and avoid spiral paths enclosing power devices. Separate from inductive loads and power cables to avoid possible electromagnetic noise
- Avoid touching or nearly touching the electronic components fitted on the board to avoid electrostatic discharges
- The product is not suitable for being exposed directly to the Internet

TECHNICAL SPECIFICATIONS

POWER SUPPLY

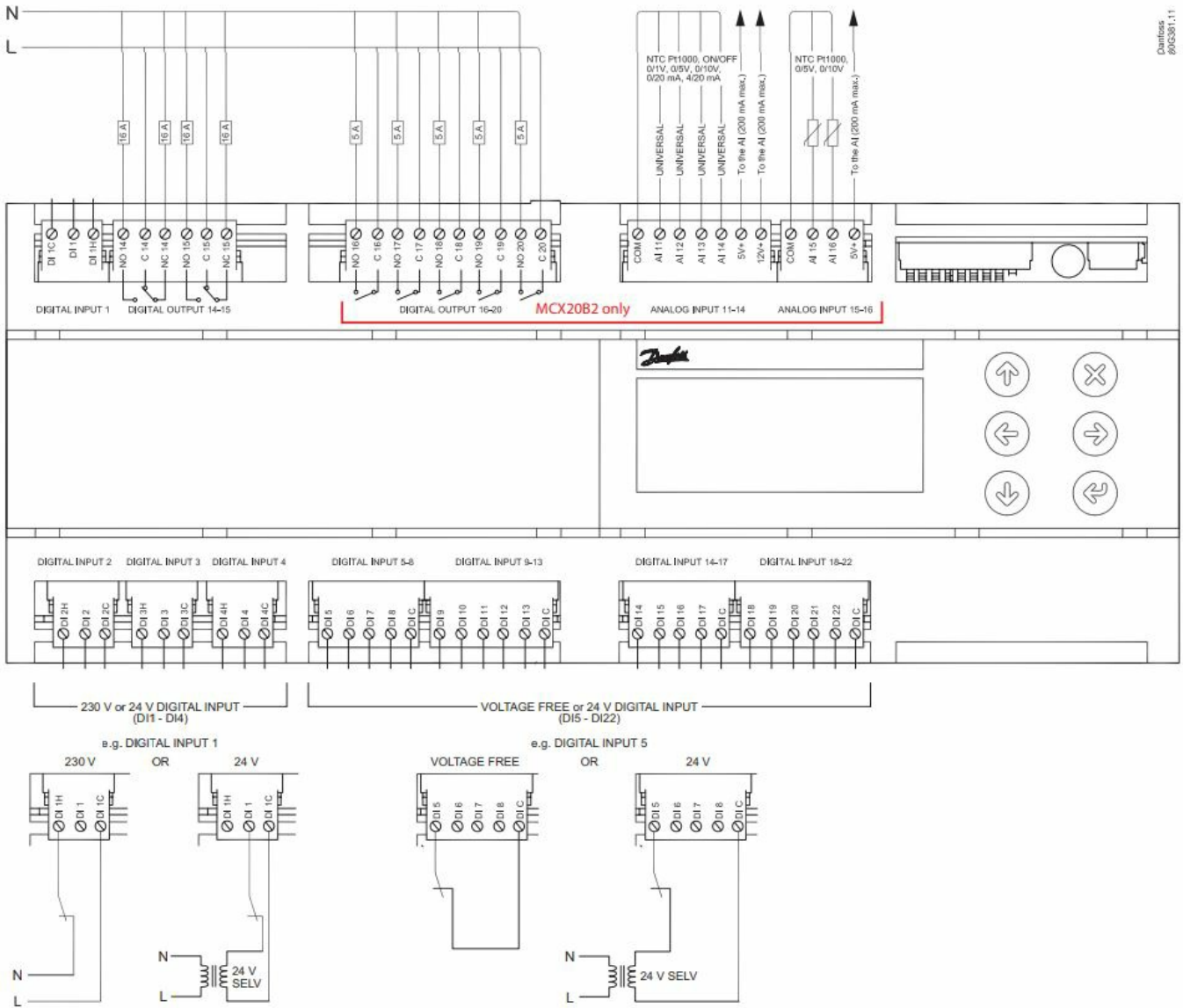
- 21 – 265 V AC, 50/60 Hz. Maximum power consumption: 15 W. Insulation between the power supply and the extra-low voltage: reinforced
- 40 – 230 V DC

I/O	TYPE	NUMBER	SPECIFICATIONS
Digital output	Relay	20 (MCX20B2) 15 (MCX15B2)	<p>Concerning the insulation distance there are three groups of relays:</p> <ul style="list-style-type: none">• group 1: relays 1 to 8• group 2: relays 9 to 13• group 3: relays 14 to 20 <p>Insulation between relays of the same group: functional Insulation between relays of different groups: reinforced Insulation between relays and the extra-low voltage parts: reinforced Total current load limit: 65 A C1-NO1 to C13-NO13, C16-NO16 to C20-NO20 C1-NO1 to C13-NO13 on MCX15B2 Normally open contact relays 5 A Characteristics of each relay:</p> <ul style="list-style-type: none">– 5 A 250 V AC for resistive loads - 100,000 cycles– 3 A 250 V AC for inductive load - 100,000 cycles with $\cos(\phi) = 0.4$ <p>C14-NO14-NC14, C15-NO15-NC15 Changeover contact relays 16 A Characteristics of each relay:</p> <ul style="list-style-type: none">– 7 A 250 V AC for resistive loads - 100,000 cycles– 3.5 A 250 V AC for inductive loads - 230,000 cycles with $\cos(\phi) = 0.4$ <p>C1-NO1 to C4-NO4 Optionally they can be solid state relays Characteristics of each relay:</p> <ul style="list-style-type: none">– 15-280 Vrms, 1 A <p>Analog Input type selectable via software. Max 13.5 V input voltage Do not connect voltage sources without current limitation (overall 80 mA) to analog inputs while unit is not powered Open circuit HW diagnostics available for all analog inputs</p>

Analog inputs	NTC 0 / 1 V 0 / 5 V 0 / 10 V PT1000	16 (MCX20B2) 10 (MCX15B2)	AI1-AI16 on MCX20B2 AI1 - AI10 on MCX15B2 NTC, default 10 k Ω at 25 °C, Beta 3435 0/xV type: impedance is greater than 1M Ω
	ON/OFF 0 / 20 mA 4 / 20 mA	10 (MCX20B2) 6 (MCX15B2)	AI1-AI6, AI11-AI14 on MCX20B2 AI1-AI6 on MCX15B2 100 Ω s as measuring resistance for current measurements The inputs can be used to sense voltage free contacts with contact cleaning current 10 mA
Digital inputs	Auxiliary Supplies		15 V+ and 5 V+ 5 V+ max: 200 mA (total on all outputs) 15 V+ max: 200 mA (total on all outputs) All power outputs are protected against short circuit and have an automatic recovery from overload condition.
	Voltage free contacts or 24 V AC (SELV)	18	DI5 to DI22 As the inputs are not isolated caution has to be used when applying 24 V AC: the same polarity of the supply MUST always be used on COM/GND connection. Counting function with max frequency of 16.6Hz (30ms minimum pulse time)
	24 V opto-insulated	4	DI1, DI2, DI3, DI4 Inputs opto isolated, 24 V AC 50/60 Hz or 24 V DC Rated current: 5 mA @24 V AC
	230 V AC opto-insulated	4	DIH1, DIH2, DIH3, DIH4 Inputs opto isolated, 86-265V AC / 50/60 Hz Reinforced isolation Rated current: 2,5 mA @ 265V AC NOTE: when the 230 V AC DIH1 input is used, the corresponding 24 V DI1 input is not available anymore; the same for the couple of inputs DIH2 and DI2, DIH3 and DI3, DIH4 and DI4
Analog outputs	0/10 V	6	AO1 to AO6 Analog Outputs 0/10V, galvanically isolated, minimum load 1K Ω (10 mA) for each output
	PWM/PPM	2	AO5, AO6 Asynchronous PWM Voltage output: max V_{LO} = 0.6V, min V_{HI} = 6.5V Frequency range 15Hz ... 1kHz Synchronous PWM and PPM Voltage output: max V_{LO} = 0.6V, min V_{HI} = 6.5V Frequency: Mains frequency x2

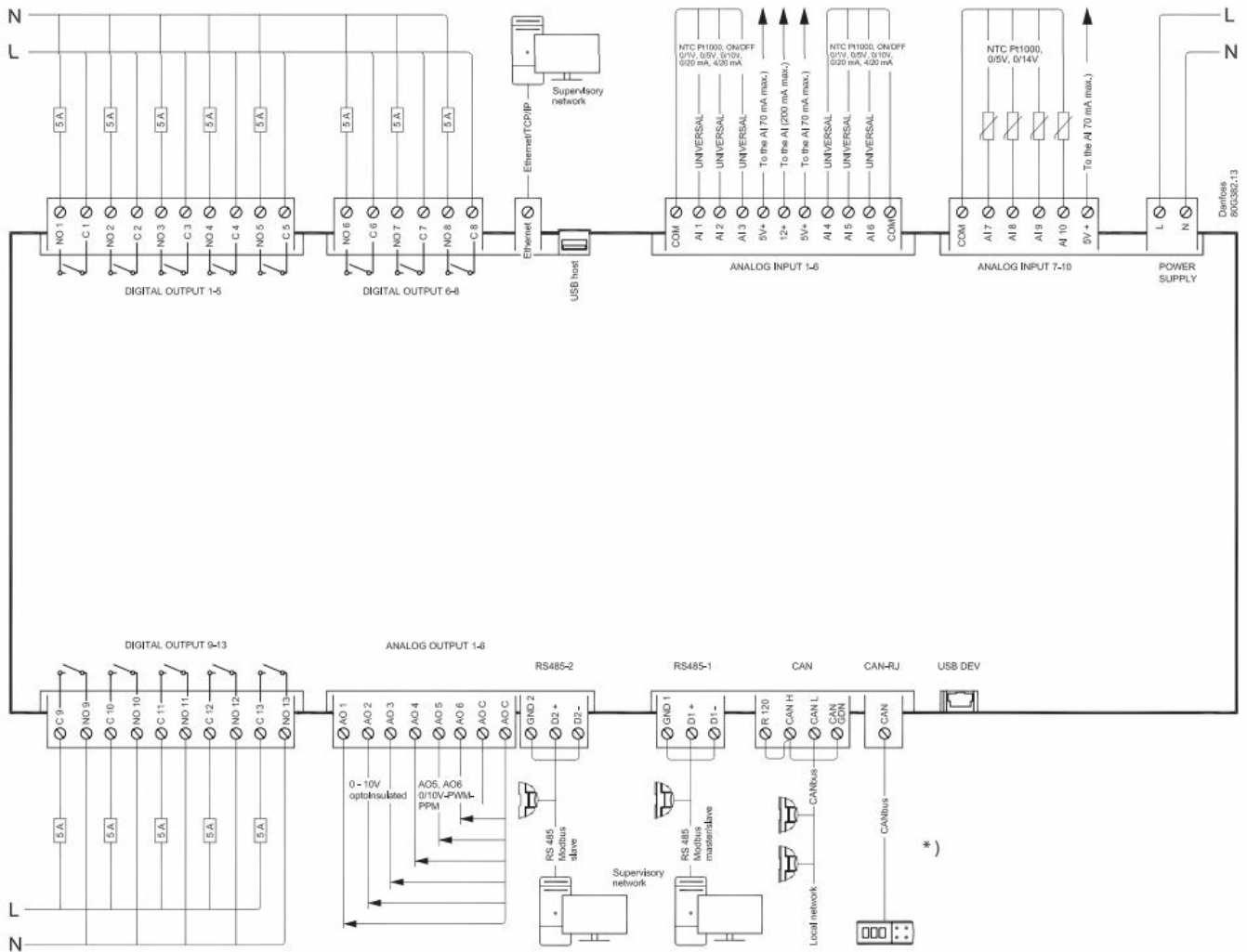
CONNECTION DIAGRAM

TOP BOARD



*) NOTE: connection has to be made on the first and last local network units, make the connection as close as possible to the connector

BOTTOM BOARD



CONNECTIONS

• TOP BOARD

- **Digital input 1 connector**
3 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- **Digital output 14-15 connector (MCX20B2)**
6 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- **Digital output 16-20 connector (MCX20B2)**
10 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- **Analog input 11-14 connector (MCX20B2)**
7 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- **Analog input 15-16 connector**
4 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- **Digital input 2 connector**
3 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- **Digital input 3 connector**
3 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- **Digital input 4 connector**
3 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- **Digital input 5-8 connector**
5 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **Digital input 9-13 connector**

6 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **Digital input 14-17 connector**

5 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **Digital input 18-22 connector**

6 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **BOTTOM BOARD**

- **Digital output 1-5 connector**

10 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **Digital output 6-8 connector**

6 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **Ethernet connector**

8/8 way RJ45

- **Analog input 1-6 connector**

11 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **Analog input 7-10 connector**

6 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **Power supply connector**

2 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **Digital output 9-13 connector**

10 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **Analog output 1-6 connector**

8 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **RS485-2 connector**

3 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **RS485-1 connector**

3 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

- **CAN connector**

4 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

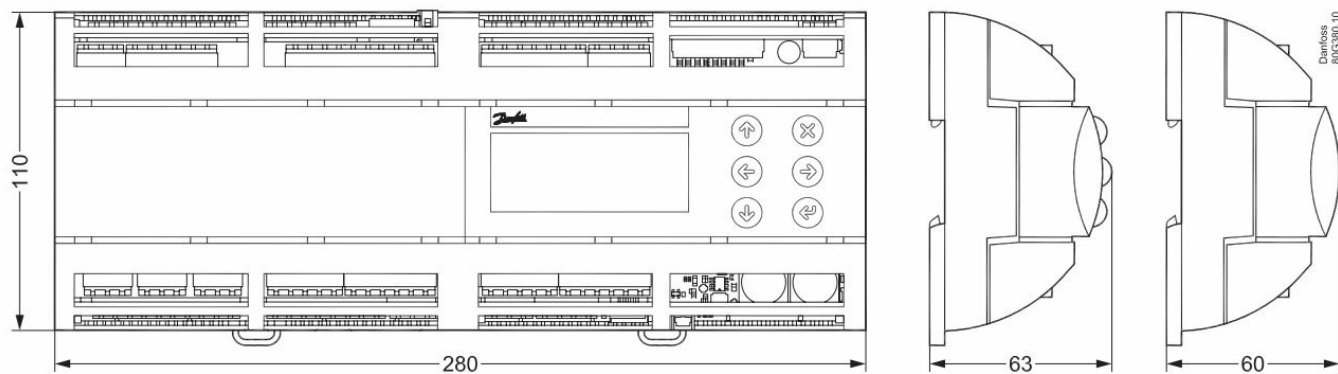
- **CAN-RJ connector**

6/6 way telephone RJ12

- **USB Connector**

USB mini B

DIMENSIONS



Wire lengths

Interface	Max wire length (m)	Max. baudrate (bps)	Min. wire size
Ethernet	100	10/100 M	
CANbus	1000 500 250 80 30	50 K 125 K 250 K 500 K 1 M	AWG18 AWG22 AWG24 AWG26 AWG26
RS485	1000	125 K	AWG22
Signal wiring	30		

USER INTERFACE

LCD DISPLAY

- **Display mode:** STN blue transmissive
- **back-light:** white LED back-light, adjustable via software
- **display format:** 128×64 dots
- **active visible area:** 58×29 mm
- **contrast:** adjustable via software

KEYBOARD

- **number of keys:** 6The
- Key's function is set by the application software

Communication Interface

Interface	Use	Connector Label	Technical data
CANbus	Fieldbus for connection to user interfaces, MCX controllers, service tools etc.	CAN CAN-RJ	Physical layer according to ISO 11898-2 High Speed CAN bus Frame format according to CAN 2.0B specification Transceiver not isolated (power supply has reinforced isolation)
USB device	Prepared for future use	USB-DEV	Plug: Type Mini B
USB host	For connection to Flash drive for application software update, datalogging and service	USB-H	Plug: Type A
RS485-1, RS485-2	Communication bus to BMS (e.g. Modbus slave), service tools, smart devices (e.g. Modbus master) RS485-1 can be polarized as master from the application	RS485-1 RS485-2	Physical layer according to EIA 485 Ref3 Provide 500V peak transient galvanic isolation
Ethernet	For web server functionality, integration (e.g. Modbus TCP) NOTICE! Do not route cable outside of buildings. Connect only to IT equipment compliant with EN 60950 or EN 62368 (Information technology equipment. Safety. General requirements)	ETHERNET	Interface type: 10 BASE-T and 100 BASE-TX, IEEE 802.3. MDI-X (Automatic medium-dependent interface crossover)

PRODUCT NUMBERS

CODE	DESCRIPTION
080G0327	MCX15B2, 1xRS485, S
080G0328	MCX15B2, LCD, 1xRS485, S
080G0329	MCX20B2, 2xRS485, I (12 pieces)
080G0330	MCX20B2, LCD, 2xRS485, I (12 pieces)
080G0331	MCX20B2, LCD, 2xRS485, S
080G0332	MCX20B2, LCD, 4xSSR, 2xRS485, S
Accessories	
080G0404	MCX20B2 CONNECTORS KIT

Note: single pack codes (S) include standard kit connectors, industrial pack codes (I) don't include standard kit connectors

ABOUT COMPANY

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FAQ

- **What is the maximum total current load for the digital outputs?**

The maximum total load is 65 A for MCX20B2 and varies from C1-NO1 to C13-NO13, C16-NO16 to C20-NO20.

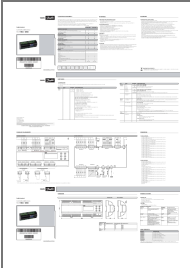

- **How many analog inputs are available for MCX15B2 and MCX20B2?**

MCX15B2 has 15 analog inputs, and MCX20B2 has 20 analog inputs.


- **What is the function of DIH1, DIH2, DIH3, and DIH4 inputs?**

These are optoisolated inputs with a nominal current of 2.5 mA @ 265V AC..

Documents / Resources

	<p>Danfoss MCX15B2 Electronic Controller [pdf] Instructions MCX15B2, MCX20B2, MCX15B2 Electronic Controller, MCX15B2, Electronic Controller, Controller</p>
	<p>Danfoss MCX15B2 Electronic Controller [pdf] Installation Guide MCX15B2, MCX20B2, MCX15B2 Electronic Controller, Electronic Controller, Controller</p>

References

-  [MCX controllers](#) | [MCX programmable controls](#) | [Danfoss](#)
- [User Manual](#)

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