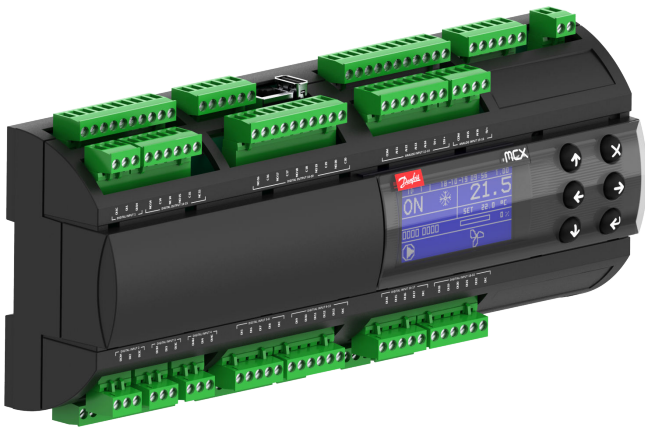


## Data Sheet

Programmable controller, 15 and 20 relays  
Type **MCX15B2** and **MCX20B2**

Electronic controller suitable for all HVAC/R software application needs.



MCX15B2 and MCX20B2 is an electronic controller that stands on 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 CANbus local network
- up to two Modbus RS485 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 connection for embedded Web server and IP protocols management. It is available in several models, with or without graphic LCD display and with 15 or 20 digital output.

## Features

- MCX20B2
  - 16 analog and 22 digital inputs
  - 6 analog and 20 digital outputs
- MCX15B2
  - 10 analog and 22 digital inputs
  - 6 analog and 15 digital outputs
- Ultra wide range power supply from 24 – 230 V AC
- USB connector for easy software upload and datalogging
- Ethernet with Web server feature and several IP protocols
- Remote access to data through CANbus connection for additional display and keyboard
- RTC clock for managing weekly time programs and data logging information with supercapacitor as temporary backup power
- Up to two Modbus RS485 opto-isolated serial interface
- Available with and without graphic LCD display
- Dimensions 16 DIN modules

## Portfolio overview

Table 1: Portfolio overview

MCX family	MCX06C	MCX06D	MCX061V	MCX08M2	MCX152V	MCX15B2	MCX20B2
Product image							
Power supply	24 V	24 V	24 V or 110/230 V	24 V or 110/230 V	24 V or 110/230 V	24/110/230 V	24/110/230 V
Built-in display (optional)	LED	LCD	LCD	LCD	LCD	LCD	LCD
Analog Inputs	4	4	7	8	14	10	16
Digital Inputs	6	8	8	8	18	22	22
Analog Outputs	2	3	3	4	6	6	6
Digital Outputs	6	6	6	8	15	15	20
EXV driver embedded			1		2		
RS485	1	1	1	1	2	1	2
CANbus	•	•	•	•	•	•	•
Ethernet / Web server			optional		optional	•	•
USB/Memory Card			•		•	•	•
Dimensions (1 DIN module = 17,5 mm)	33 x 75 mm	4 DIN	8 DIN	8 DIN	16 DIN	16 DIN	16 DIN

## Product specification

### General features

Table 2: General features

Features	Description
Power supply	21 – 265 V AC, 50/60 Hz 40 – 230 V DC  Maximum power consumption: 15 W Isolation between power supply and the extra-low voltage: reinforced
Plastic housing	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: $\geq$ 250 V according to IEC 60112
Operating conditions	CE: -20T60 / UL: 0T50, 90% RH non-condensing
Storage conditions	-30T80, 90% RH non-condensing
Integration	In Class I and / or II appliances
Index of protection	IP40 only on the front cover
Period of electric stress across insulating parts	Long
Resistance to heat and fire	Category D
Immunity against voltage surges	Category II Category III for versions without display
Software class and structure	Class A

### Input/Output

Table 3: Analog inputs

Type	Num	Specifications
		<b>Total number: 16 on MCX20B2; 10 on MCX15B2</b> 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.
NTC 0 / 1 V 0 / 5 V 0 / 10 V PT1000	16 (MCX20B2) 10 (MCX15B2)	<b>AI1 to AI16 on MCX20B2</b> <b>AI1 to AI10 on MCX15B2</b> NTC, default 10 k $\Omega$ at 25 °C, Beta 3435 0/xV type: impedance is greater than 1 M $\Omega$
ON/OFF 0 / 20 mA 4 / 20 mA	10 (MCX20B2) 6 (MCX15B2)	<b>AI1 to AI6, AI11 to AI14 on MCX20B2</b> <b>AI1 to AI6 on MCX15B2</b> 100 $\Omega$ as measuring resistance for current measurements. The inputs can be used to sense voltage free contacts with contact cleaning current 10 mA.
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.

**Table 4: Digital inputs**

Type	Num	Specifications
		<b>Total number: 22</b> Digital Input type selectable via software between 24 V AC or voltage free
Voltage free contacts or 24 V AC	18	<b>DI5 to DI22</b> 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 16.6 Hz (30 ms minimum pulse time).
24 V opto-insulated	4	<b>DI1, DI2, DI3, DI4</b> Inputs opto isolated, 24 V AC 50/60 Hz or 24 V DC Rated current: 5 mA @24 V AC
230 V opto-insulated	4	<b>DIH1, DIH2, DIH3, DIH4</b> Inputs opto isolated, 86 – 265 V AC / 50/60 Hz Reinforced isolation Rated current: 2,5 mA @ 265 V AC  <b>i NOTE:</b> When the 230 V AC DH1 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.

**Table 5: Analog outputs**

Type	Num	Specifications
		<b>Total number: 6</b>
0 / 10 V	6	<b>AO1, AO2, AO3, AO4, AO5, AO6</b> Analog Outputs 0/10 V, galvanically isolated, minimum load 1K $\Omega$ (10 mA) for each output.
PWM-PPM	2	<b>AO5, AO6</b> <b>Asynchronous PWM</b> Voltage output: max $V_{LO}$ = 0.6 V, min $V_{HI}$ = 6.5 V Frequency range 15 Hz...1 kHz <b>Synchronous PWM and PPM</b> Voltage output: max $V_{LO}$ = 0.6 V, min $V_{HI}$ = 6.5 V Frequency: Mains frequency x2

**Table 6: Digital outputs**

I/O	Type	Num	Specifications
Digital output	Relay	20 (MCX20B2) 15 (MCX15B2)	Concerning the insulation distance there are three groups of relays: <ul style="list-style-type: none"> <li>• group 1: relays 1 to 8</li> <li>• group 2: relays 9 to 13</li> <li>• group 3: relays 14 to 20</li> </ul> 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 <b>C1-NO1 to C13-NO13, C16-NO16 to C20-NO20 on MCX20B2</b> <b>C1-NO1 to C13-NO13 on MCX15B2</b> Normally open contact relays 5 A Characteristics of each relay: <ul style="list-style-type: none"> <li>• 5 A 250 V AC for resistive loads - 100,000 cycles</li> <li>• 3 A 250 V AC for inductive loads - 100,000 cycles with <math>\cos(\phi) = 0.4</math></li> <li>• UL: 3 A resistive, 250 V AC, 100,000 cycles; 1/8 hp, 125/250 V AC, 30,000 cycles; C300 pilot duty, 125/250 V AC, 30,000 cycles</li> </ul> <b>C14-NO14-NC14, C15-NO15-NC15</b> Changeover contact relays 16 A Characteristics of each relay: <ul style="list-style-type: none"> <li>• 5 A 250 V AC for resistive loads - 100,000 cycles</li> <li>• 3.5 A 250 V AC for inductive loads - 230,000 cycles with <math>\cos(\phi) = 0.4</math></li> <li>• UL: NO contact: 6 A resistive, 240 V AC, 30,000 cycles; 1/2 hp, 240 V AC, 30,000 cycles; 470 VA pilot duty, 240 V AC, 30,000 cycles. NC contact: 6 A resistive, 6,000 cycles</li> </ul> <b>C3 NO3 to C6 NO6</b> Optionally they can be solid state relays Characteristics of each relay: <ul style="list-style-type: none"> <li>• 15 – 280 Vrms, 0.5 A</li> <li>• UL: 0.5 A resistive, 240 V AC, 30,000 cycles</li> </ul>

## Communication interface

Table 7: 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 (MCX20B2 only)	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)

## Wire lengths

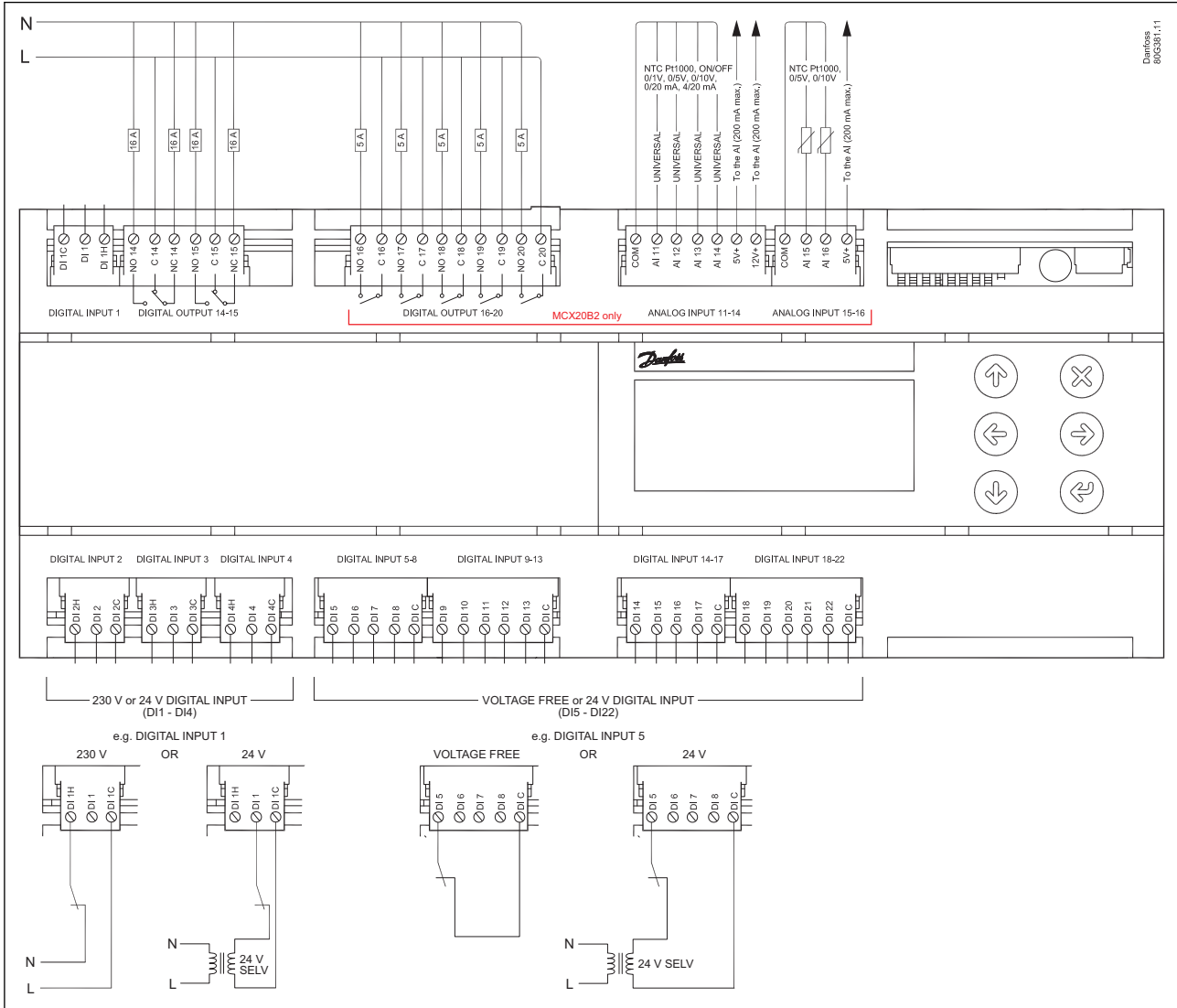
Table 8: Wire lengths

Interface	Max wire length (m)	Max. baudrate (bps)	Min. wire size
Ethernet	100	10/100 M	
CANbus	1000	50 K	AWG18
	520	125 K	AWG22
	250	250 K	AWG24
	80	500 K	AWG26
	30	1 M	AWG26
RS485	1000	125 K	AWG22
Signal wiring	30		

## Connection diagram

### Top board

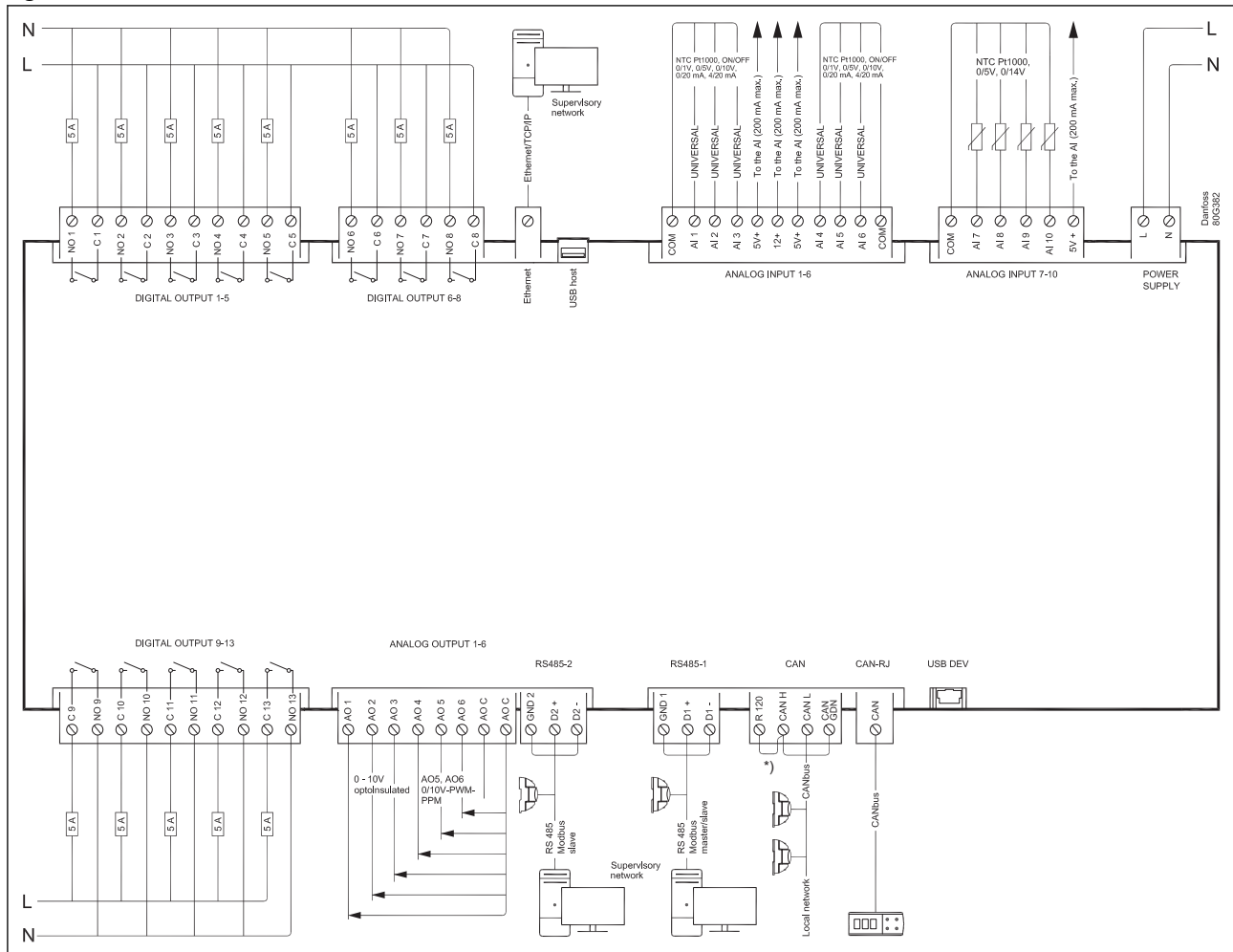
Figure 1: Top board



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Bottom board

Figure 2: Bottom 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.

**Connection**

Table 9: Top board

Connectors	Type	Dimensions
Digital input 1 connector	3 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Digital output 14-15 connector	6 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Digital output 16-20 connector (MCX20B2)	10 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Analog input 11-14 connector (MCX20B2)	7 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Analog input 15-16 connector (MCX20B2)	4 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Digital input 2 connector	3 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Digital input 3 connector	3 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Digital input 4 connector	3 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Digital input 5-8 connector	5 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>

## Programmable controller, 15 and 20 relays, type MCX15B2 and MCX20B2

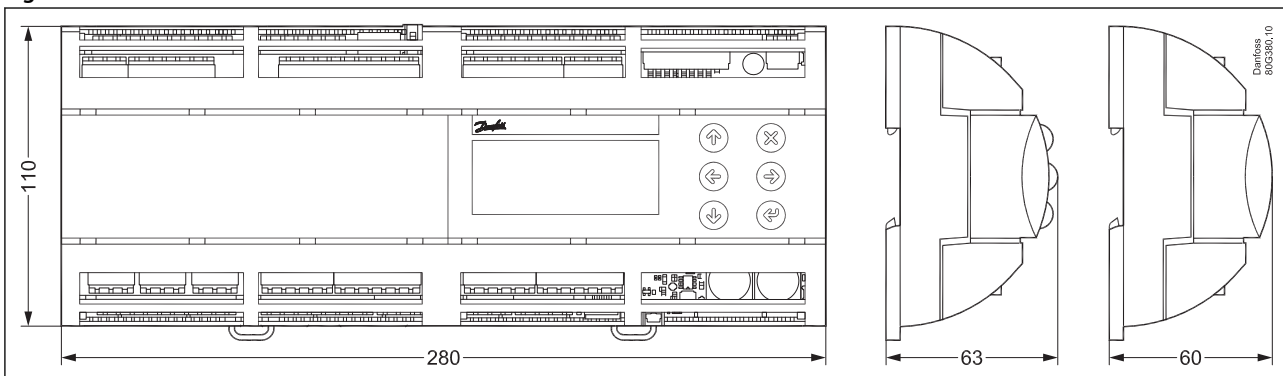
Connectors	Type	Dimensions
Digital input 9-13 connector	6 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Digital input 14-17 connector	5 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Digital input 18-22 connector	6 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>

**Table 10: Bottom board**

Connectors	Type	Dimensions
Digital output 1-5 connector	10 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Digital output 6-8 connector	6 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Ethernet connector	8 / 8 way RJ 45 plug type	
USB host connector	USB Type A	
Analog input 1-6 connector	11 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Analog input 7-10 connector	6 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Power supply connector	2 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Digital output 9-13 connector	10 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
Analog output 1-6 connector	8 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
RS485 -2 connector	3 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
RS485-1 connector	3 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
CAN connector	4 way screw plug-in connector type	<ul style="list-style-type: none"> <li>pitch 5 mm</li> <li>section cable 0.2 – 2.5 mm<sup>2</sup></li> </ul>
CAN-RJ connector	6/6 way telephone RJ12 plug type	
USB DEV connector	USB Mini B	

## Dimensions

**Figure 3: Dimensions**





## User interface

Table 11: User interface

Type	Features	Description
LCD display	Display	STN blue transmissive
	Backlight	White LED backlight adjustable via software
	Contrast	Adjustable via software
	Format	128 x 64 dots
	Active visible area	58 x 29 mm
Keyboard	Number of keys	6
	Keys function	Set by the application software

## Ordering

### Product part numbers

Table 12: Product part numbers

Description	Code No.
MCX15B2, RS485, S	080G0327
MCX15B2, LCD, RS485, S	080G0328
MCX20B2, 2xRS485, I (12 pieces)	080G0329
MCX20B2, LCD, 2xRS485, S	080G0330
MCX20B2, LCD, 2xRS485, I (12 pieces)	080G0331
MCX20B2, LCD, 4 SSR, 2xRS485, S	080G0332

#### **i** NOTE:

Single pack codes (S) include standard kit connectors, industrial pack codes (I) don't include standard kit connectors.

### Accessories part numbers

Table 13: Accessories part numbers

Description	Code No.
MCX20B2 Connectors Kit	080G0404

## Certificates, declarations, and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at [danfoss.com](http://danfoss.com) or contact your local Danfoss representative if you have any questions.

Table 14: Certificates, declarations, and approvals

File name	Document type	Document topic	Approval authority
080R1230.01	EU Declaration of conformity	<b>EMC directive 2014/30/EU:</b> EN61000-6-3: 2007 +A1: 2011 EN61000-6-2: 2005 <b>LVD directive 2014/35/EU:</b> EN60730-1: 2011 EN60730-2-9: 2010 <b>RoHS directive 2011/65/EU and 2015/863/EU:</b> EN 50581: 2012	Danfoss
UL E31024	Electrical - Safety Certificate	-	UL

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