Data sheet

# Program. controller, 15/20 relays

# MCX15B2 / MCX20B2

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

# Description

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 & Benefits

- 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

# Ordering

## Product code numbers

| Type | Material Description | Packing format | Quantity per packing format | Code number |
|---|---|---|---|---|
| MCX15B2 | MCX15B2 Elec. Control, RS485, S | Single pack | 1 | 080G0327 |
| MCX15B2 | MCX15B2 Elec. Control, LCD, RS485, S | Single pack | 1 | 080G0328 |
| MCX20B2 | MCX20B2 Elec. Control, 2RS485, I | Industrial pack | 12 | 080G0329 |
| MCX20B2 | MCX20B2 Elec. Control, LCD, 2RS485, S | Single pack | 1 | 080G0330 |
| MCX20B2 | MCX20B2 Elec. Control, LCD, 2RS485, I | Industrial pack | 12 | 080G0331 |
| MCX20B2 | MCX20B2 Elec. Control, LCD,4SSR,2RS485,S | Single pack | 1 | 080G0332 |

**Note:** Single pack codes include standard kit connectors, industrial pack codes don't include standard kit connectors.

## Accessories code numbers

080G0404

**Electron. control accessories, Connector Kit for MCX20B2, MCX series**

Connector Kit for MCX20B2, Used for product: MCX series, Packing format: Multi pack, Quantity per packing format: 50

Related products

080G0327 | 080G0328 | 080G0329 | 080G0330 | 080G0331 | 080G0332

# Overview

## Product portfolio

**Table: 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 details

## General data

### Table: Technical features

| Features | Description |
|---|---|
| Power supply | 21 – 265 V AC, 50/60 Hz<br>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: ≥ 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<br>Category III for versions without display |
| Software class and structure | Class A |

## Input/Output

### Table: Analog inputs

| Type | Num | Specifications |
|---|---|---|
| | | **Total number: 16 on MCX20B2; 10 on MCX15B2**<br>Analog Input type selectable via software.<br>Max 13.5 V input voltage.<br>Do not connect voltage sources without current limitation (overall 80 mA) to analog inputs while unit is not powered.<br>Open circuit HW diagnostics available for all analog inputs. |
| NTC<br>0 / 1 V<br>0 / 5 V<br>0 / 10 V<br>PT1000 | 16 (MCX20B2)<br>10 (MCX15B2) | **AI1 to AI16 on MCX20B2**<br>**AI1 to AI10 on MCX15B2**<br>NTC, default 10 kΩ at 25 °C, Beta 3435<br>0/xV type: impedance is greater than 1 MΩ |
| ON/OFF<br>0 / 20 mA<br>4 / 20 mA | 10 (MCX20B2)<br>6 (MCX15B2) | **AI1 to AI6, AI11 to AI14 on MCX20B2**<br>**AI1 to AI6 on MCX15B2**<br>100 Ω as measuring resistance for current measurements.<br>The inputs can be used to sense voltage free contacts with contact cleaning current 10 mA. |
| Auxiliary Supplies | | 15 V+ and 5 V+<br>5 V+ max: 200 mA (total on all outputs)<br>15 V+ max: 200 mA (total on all outputs)<br>All power outputs are protected against short circuit and have an automatic recovery from overload condition. |

### Table: Digital inputs

| Type | Num | Specifications |
|---|---|---|
| | | **Total number: 22**<br>Digital Input type selectable via software between 24 V AC or voltage free |
| Voltage free contacts or 24 V AC | 18 | **DI5 to DI22**<br>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 | **DI1, DI2, DI3, DI4**<br>Inputs opto isolated, 24 V AC 50/60 Hz or 24 V DC<br>Rated current: 5 mA @24 V AC |
| 230 V opto-insulated | 4 | **DIH1, DIH2, DIH3, DIH4**<br>Inputs opto isolated, 86 – 265 V AC / 50/60 Hz<br>Reinforced isolation<br>Rated current: 2.5 mA @ 265 V AC<br>**Note:** 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: Analog outputs

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

**Table: Digital outputs**

| I/O | Type | Num | Specifications |
|---|---|---|---|
| Digital output | Relay | 20 (MCX20B2)<br>15 (MCX15B2) | Concerning the insulation distance there are three groups of relays:<br>• group 1: relays 1 to 8<br>• group 2: relays 9 to 13<br>• group 3: relays 14 to 20<br>Insulation between relays of the same group: functional<br>Insulation between relays of different groups: reinforced<br>Insulation between relays and the extra-low voltage parts: reinforced<br>Total current load limit: 65 A<br>**C1-NO1 to C13-NO13, C16-NO16 to C20-NO20 on MCX20B2**<br>**C1-NO1 to C13-NO13 on MCX15B2**<br>Normally open contact relays 5 A<br>Characteristics of each relay:<br>• 5 A 250 V AC for resistive loads - 100,000 cycles<br>• 3 A 250 V AC for inductive loads - 100,000 cycles with cos(phi) = 0.4<br>• 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<br>**C14-NO14-NC14, C15-NO15-NC15**<br>Changeover contact relays 16 A<br>Characteristics of each relay:<br>• 5 A 250 V AC for resistive loads - 100,000 cycles<br>• 3.5 A 250 V AC for inductive loads - 230,000 cycles with cos(phi) = 0.4<br>• 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<br>**C3 NO3 to C6 NO6**<br>Optionally they can be solid state relays<br>Characteristics of each relay:<br>• 15 – 280 Vrms, 0.5 A<br>• UL: 0.5 A resistive, 240 V AC, 30,000 cycles |

### Communication interface

#### Table Communication interface

| Interface | Use | Connector label | Technical data |
|---|---|---|---|
| CANbus | Fieldbus for connection to user interfaces, MCX controllers, service tools etc. | CAN<br>CAN-RJ | Physical layer according to ISO 11898-2 High Speed CAN bus.<br>Frame format according to CAN 2.0B specification.<br>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<br>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<br>RS485-2 | Physical layer according to EIA 485 Ref3 Provide 500 V 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). |

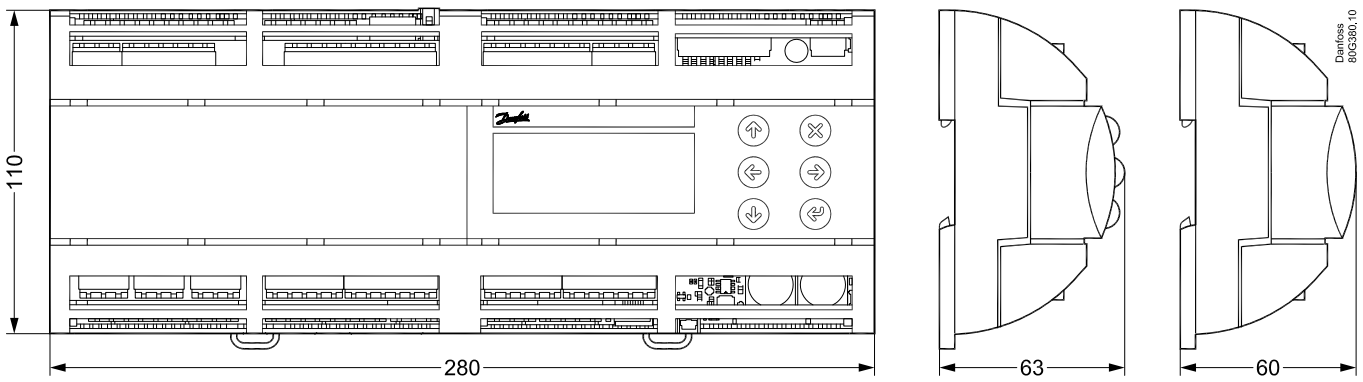
## Wire lengths

#### Table: 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 | | |

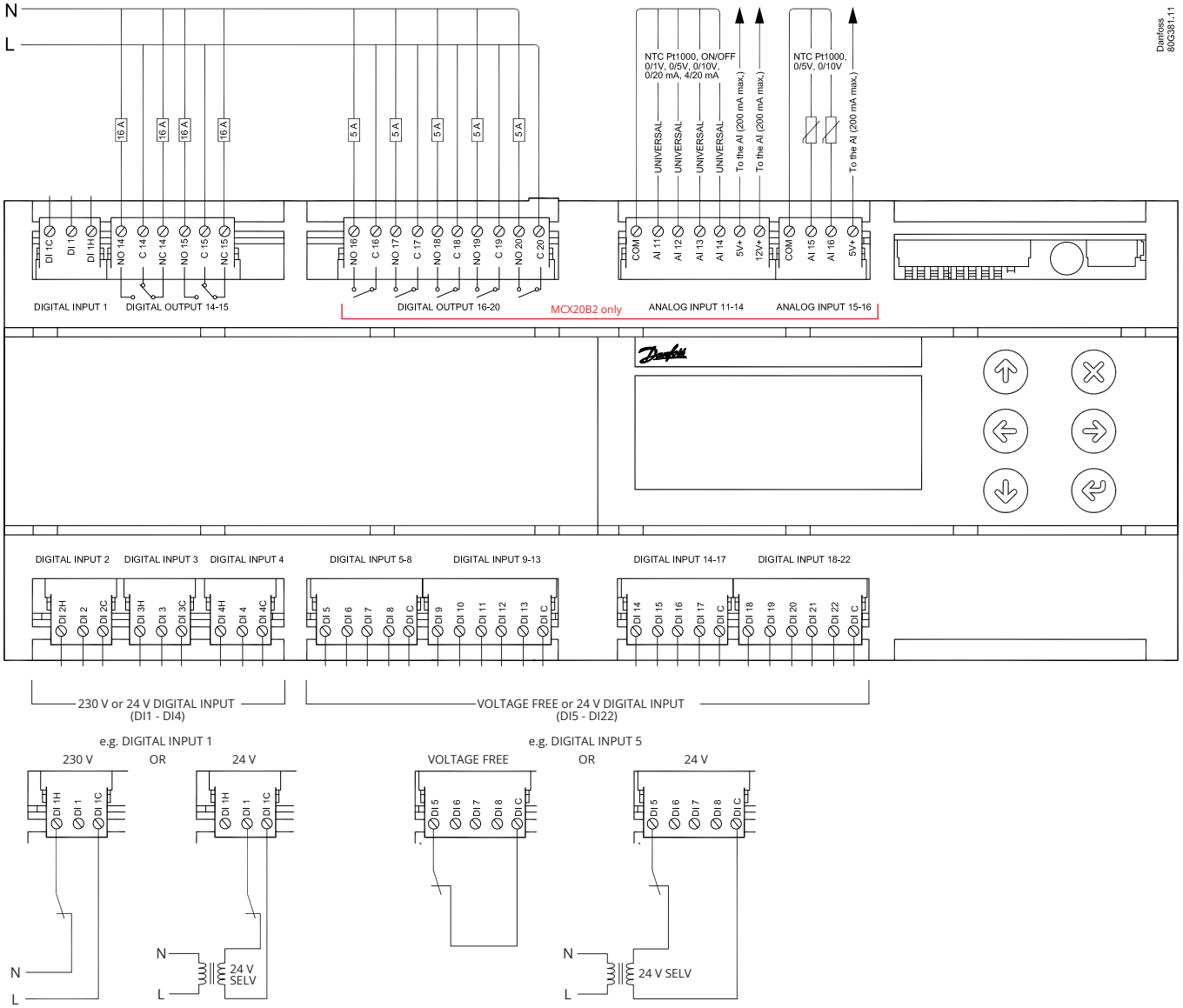
## Dimensions & weights

#### Figure: Dimensions

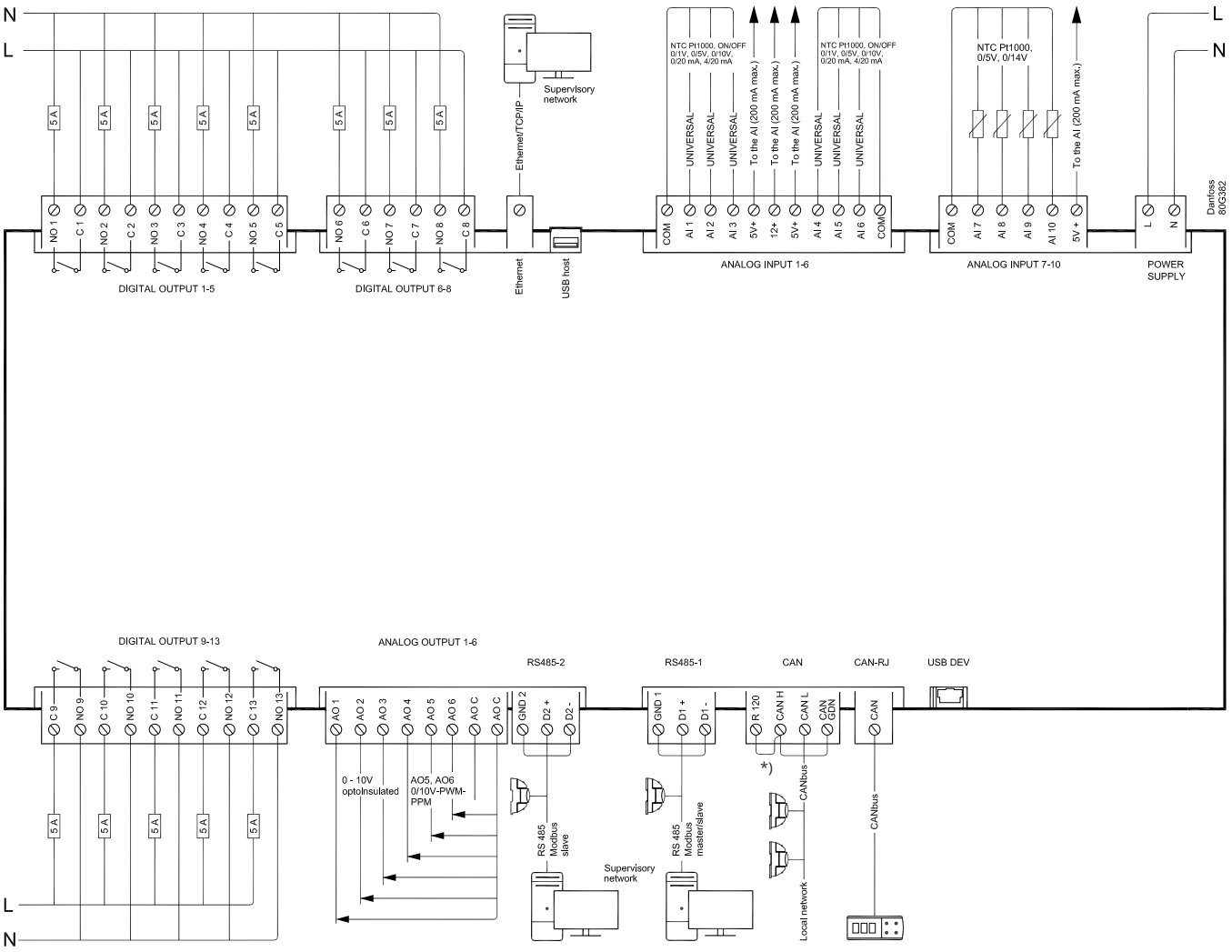


## Connections

### Figure: Top Board



### Figure: Bottom Board




### Table: Top board

| Connectors | Type | Dimensions |
|---|---|---|
| Digital input 1 connector | 3 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Digital output 14-15 connector | 6 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Digital output 16-20 connector (MCX20B2) | 10 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Analog input 11-14 connector (MCX20B2) | 7 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Analog input 15-16 connector (MCX20B2) | 4 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Digital input 2 connector | 3 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Digital input 3 connector | 3 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |

| | | |
|---|---|---|
| Digital input 4 connector | 3 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Digital input 5-8 connector | 5 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Digital input 9-13 connector | 6 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Digital input 14-17 connector | 5 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Digital input 18-22 connector | 6 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |

**Table: Bottom board**

| Connectors | Type | Dimensions |
|---|---|---|
| Digital output 1-5 connector | 10 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Digital output 6-8 connector | 6 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| 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 | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Analog input 7-10 connector | 6 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Power supply connector | 2 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Digital output 9-13 connector | 10 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| Analog output 1-6 connector | 8 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| RS485 -2 connector | 3 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| RS485-1 connector | 3 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| CAN connector | 4 way screw plug-in connector type | • pitch 5 mm<br>• section cable 0.2 – 2.5 mm² |
| CAN-RJ connector | 6/6 way telephone RJ12 plug type | |
| USB DEV connector | USB Mini B | |

## User Interface

**Table: 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 |

# 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.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

| Approval type | Title | Certification body | Approval topic |
|---|---|---|---|
| EU-UK Declaration | Danfoss EU-UK 080R1226.02 | Danfoss | LVD |
| Manufacturer's Declaration | Danfoss MD 080R1240.00 | Danfoss | EU RoHS |
| Manufacturer's Declaration | Danfoss MD 080R4002.01 | Danfoss | China RoHS |
| EAC Declaration | EAC KZ 7100841.13.12.01062 | EAC - Eurasian Customs Union | EMC |
| Electrical Safety Certificate | EAC KZ 7100841.01.01.01245 | EAC - Eurasian Customs Union | LVD |
| UA Declaration | Danfoss UA 9032 | Danfoss | UA RoHS |
| UA Declaration | Danfoss UA 8537 | Danfoss | UA RoHS |
| Electrical Safety Certificate | UL E31024 | UL - Underwriters Laboratories inc. | |
| Export Control Declaration | MCX Programmable Controllers (w. WIFI/BT) | Danfoss | |
| Manufacturer's Declaration | Manufacturars declaration 080R2111.00 | Danfoss | China RoHS |

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