Technical brochure

Programmable controller MCX20B

Danfoss' range of universal MCX programmable controllers offers the functionality and reliability you need to get the best out of your heating, ventilation, air-conditioning and refrigeration (HVAC/R) equipment. With the MCX range, Danfoss is widening the concept of programmability and applying it to as many environments as possible

MCX20B is fitted with or without graphic LCD display. It is an electronic controller that stands on the top of the MCX range, thanks to the large number of its inputs and outputs. It holds all the typical functionalities of MCX controllers: programmability, connection to the CANbus local network and up to two Modbus RS485 opto-insulated serial interface.
Furthermore it is available in two models, powered at 110-230 Vac or 24 Vac

Features MCX20B

- 16 analog and 22 digital inputs
- 6 analog and 20 digital outputs
- Power supply 24 Vac/20-60 Vdc and 110 V/230 Vac
- Remote access to data through CANbus connection for additional display (LCD available) and keyboard
- RTC clock for managing weekly time programs and data logging information

- Up to two Modbus RS485 opto-insulated serial interface
- Available with graphic LCD display and without display for showing the desired information
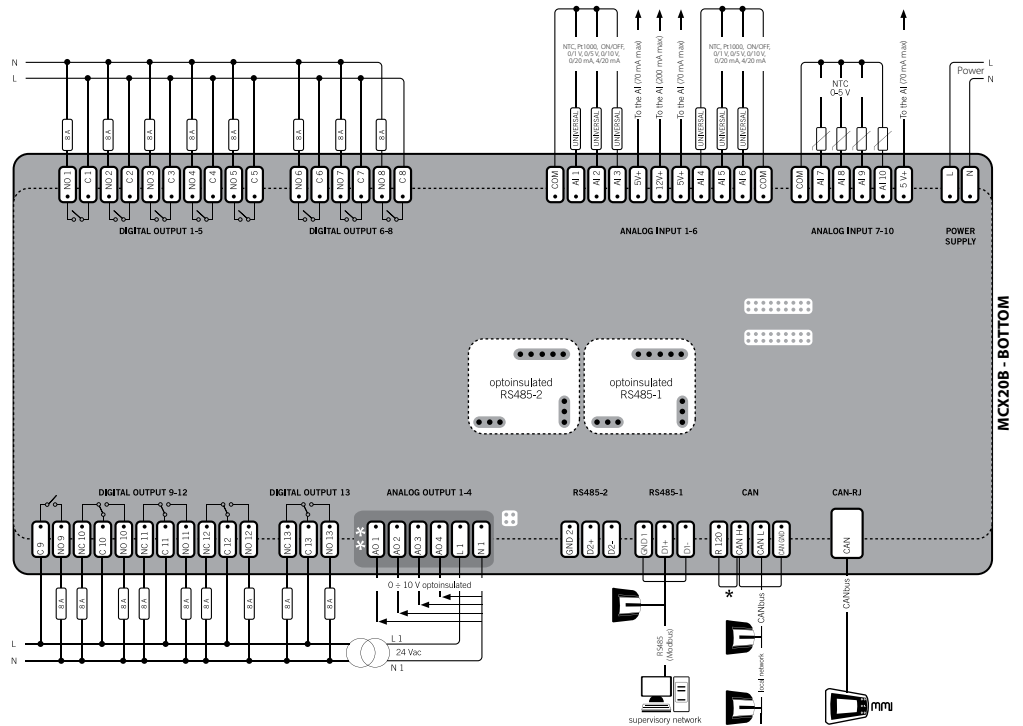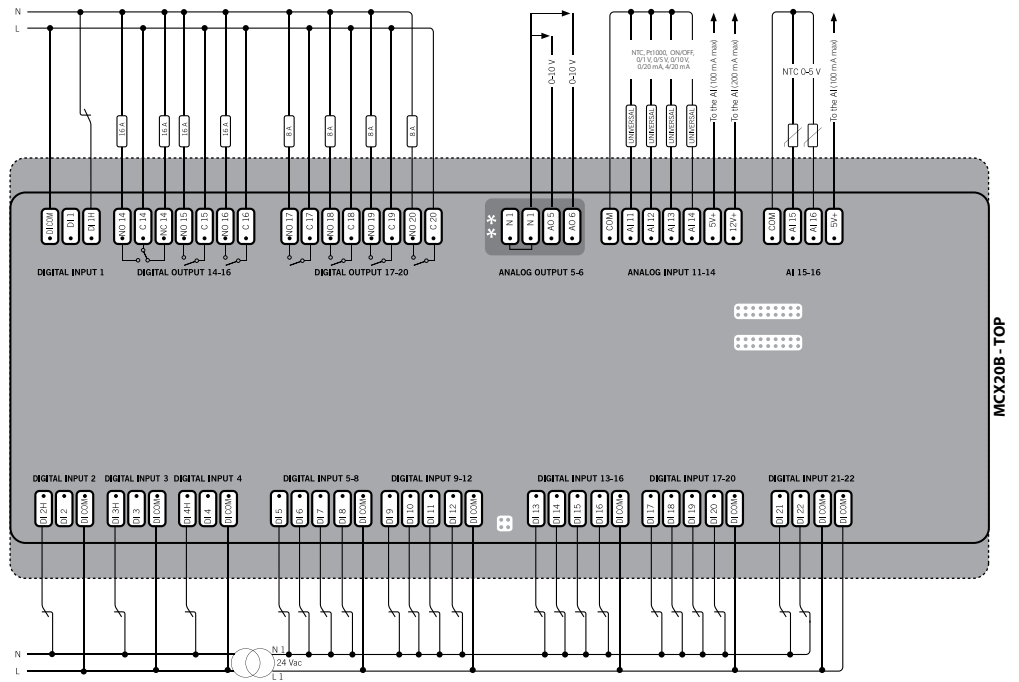- Dimensions 16 DIN modules

Programmable	Protection degree	CAN bus	Graphic display	Multilanguage	MYK connection	Modbus RS485
PRG	IP40	CAN				485

www.danfoss.com/mcx

General features

FEATURES	DESCRIPTION
Power supply	85-265 Vac, 50-60 Hz. Maximum power consumption: 31 VA Insulation between power supply and the extra-low voltage: reinforced
	20-60 Vdc or 24 Vac ± 15%, 50/60 Hz. Maximum power consumption: 17 W, 25 VA Insulation between power supply and the extra-low voltage: functional
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: 0T55, 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
Software class and structure	Class A

Approvals	CE compliance:
	This product is designed to comply with the following EU standards:
	- Low voltage guideline: 73/23/EEC
	- Electromagnetic compatibility EMC: 89/336/EEC and with the following norms:
	  • EN61000-6-1, EN61000-6-3
	    (immunity for residential, commercial and light-industrial environments)
	  • EN61000-6-2, EN61000-6-4
	    (immunity and emission standard for industrial environments)
	  • EN60730 (Automatic electrical controls for household and similar use)

	UL approval: - UL file E31024

Inputs/outputs

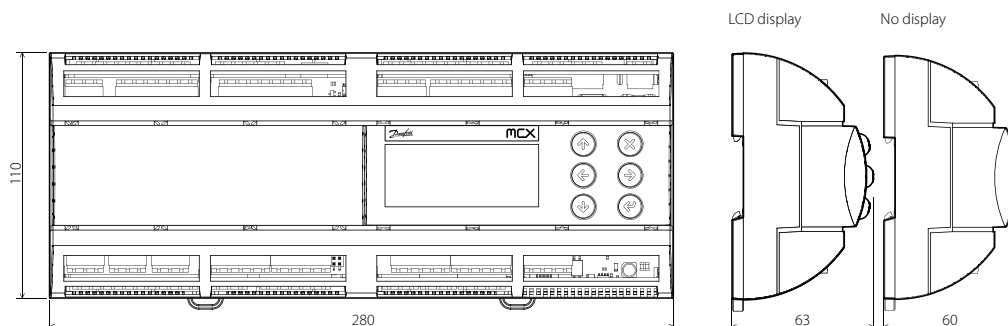| I/O	TYPE	NUM	SPECIFICATIONS
Analog inputs	NTC, 0/1 V, 0/5 V	6	AI7, AI8, AI9, AI10, AI15, AI16 Inputs selectable via software between: - NTC temperature probes, default: 10 kΩ at 25 ℃ - pressure transducers with 0/5 V output
	Universal	10	AI1, AI2, AI3, AI4, AI5, AI6, AI11, AI12, AI13, AI14 Universal analog inputs selectable via software between: - ON/OFF (current: 20 mA) - 0/1 V, 0/5 V, 0/10 V - 0/20 mA, 4/20 mA - NTC (10 kΩ at 25 ℃) - Pt1000 12 V+ power supply 12 Vdc, 400 mA max for 4/20 mA transmitter (total on all outputs) 5 V+ power supply 5 Vdc, 410 mA max for 0/5 V transmitter (total on all outputs)
Digital inputs	24 V optoins.	22	DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8, DI9, DI10, DI11, DI12, DI13, DI14, DI15, DI16, DI17, DI18, DI19, DI20, DI21, DI22 Inputs optoinsulated, 24 Vac 50/60 Hz or 24 Vdc Rated current: 5 mA
	230 Vac optoins.	4	DIH1, DIH2, DIH3, DIH4 Inputs optoinsulated, 230 Vac 50/60 Hz. Basic insulation Rated current: 2 mA at 230 Vac; 1 mA at 110 Vac - NOTE: when the 230 Vac 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
Analog outputs	0/10 V	6	AO1, AO2, AO3, AO4, AO5, AO6 Analog outputs optoinsulated 0/10 Vdc 10 mA max for each output: – 40 mA max totally on 6 outputs External power supply 24 Vac/Vdc

Digital output	Relay	20	Concerning the insulation distance there are three groups of relays:
			- group 1: relays 1 to 8
			- group 2: relays 9 to 13
			- group 3: relays 14 to 20
			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: 123 A
			C1-NO1, C2-NO2, C3-NO3, C4-NO4, C5-NO5, C6-NO6, C7-NO7, C8-NO8, C9-NO9, C17-NO17, C18-NO18, C19-NO19, C20-NO20
			Normally open contact relays 8 A
			- characteristics of each relay:
			  • 6 A 250 Vac for resistive loads - 100.000 cycles
			  • 4 A 250 Vac for inductive loads - 100.000 cycles with cos(phi) = 0.6
			  • UL: 240 Vac - 4 A resistive - 3.6 FLA - 21.6 LRA - 346 VA pilot duty 30.000 cycles
			C10-NO10-NC10, C11-NO11-NC11, C12-NO12-NC12, C13-NO13-NC13
			Changeover contacts relay 8 A
			- characteristics of each relay:
			  • 6 A 250 Vac for resistive loads - 100.000 cycles
			  • 4 A 250 Vac for inductive loads - 100.000 cycles with cos(phi) = 0.6
			  • UL: 240 Vac - 4 A resistive - 3.6 FLA - 21.6 LRA - 346 VA pilot duty 30.000 cycles
			C15-NO15-NC15, C16-NO16-NC16
			High inrush current (80 A - 20 ms) normally open contact relays 16 A
			- characteristics of each relay:
			  • 7 A 250 Vac for resistive loads - 100.000 cycles
			  • 3.5 A 230 Vac for inductive loads - 230.000 cycles with cos(phi) = 0.5
			  • UL: 240 Vac - 6 A resistive - 4.9 FLA - 29.4 LRA - 470 VA pilot duty 30.000 cycles
			C14-NO14-NC14
			High inrush current (80 A - 20 ms) changeover contacts relay 16 A
			- characteristics of each relay:
			  • 7 A 250 Vac for resistive loads - 100.000 cycles
			  • 3.5 A 230 Vac for inductive loads - 230.000 cycles with cos(phi) = 0.5
			  • UL: 240 Vac - 6 A resistive - 4.9 FLA - 29.4 LRA - 470 VA pilot duty 30.000 cycles
			
			Using of device in case of Tamb = 70 ℃ has to be according to following requirements:
			- maximum load admitted for 8 A relay: 4 A 250 Vac
			- maximum load admitted for 16 A relay: 5 A 250 Vac

**Connection diagram:
top and 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
**NOTE: optoinsulated analog outputs voltages are referenced to contact N1

Connection

CONNECTORS	TYPE	DIMENSIONS
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 14-16 connector	7 way screw plug-in connector type	- pitch 5 mm - section cable 0.2-2.5 mm²
Digital output 17-20 connector	8 way screw plug-in connector type	- pitch 5 mm - section cable 0.2-2.5 mm²
Analog output 5-6 connector	4 way screw plug-in connector type	- pitch 5 mm - section cable 0.2-2.5 mm²
Analog input 11-14 connector	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 9-12 connector	5 way screw plug-in connector type	- pitch 5 mm - section cable 0.2-2.5 mm²
Digital input 13-16 connector	5 way screw plug-in connector type	- pitch 5 mm - section cable 0.2-2.5 mm²
Digital input 17-20 connector	5 way screw plug-in connector type	- pitch 5 mm - section cable 0.2-2.5 mm²
Digital input 21-22 connector	4 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
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 9-12 connector	11 way screw plug-in connector type	- pitch 5 mm - section cable 0.2-2.5 mm²
Digital output 13 connector	3 way screw plug-in connector type	- pitch 5 mm - section cable 0.2-2.5 mm²
Analog output 1-4 connector	6 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 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 RJ11 plug type	

Dimensions

LCD display   No display

110

280

63   60

User interface

TYPE	FEATURES	DESCRIPTION
LCD display	Display	STN blue transmissive
	Backlight	White LED backlight adjustable via software
	Contrast	Adjustable via software
	Format	128x64 dots
	Active visible area	58x29 mm
Keyboard	Number of keys	6
	Keys function	Settled by the application software

Ordering

DESCRIPTION	CODE NR.
MCX20B, 24V, LCD, RTC, S	080G0092
MCX20B, 230V, LCD, RTC, S	080G0093
MCX20B, 24V, LCD, RS485, RTC, S	080G0044
MCX20B, 230V, LCD, RS485, RTC, S	080G0045
MCX20B, 24V, LCD, 2XRS485, RTC, S	080G0057
MCX20B, 230V, LCD, 2XRS485, RTC, S	080G0058

MCX20B, 24V, RTC, S	080G0094
MCX20B, 230V, RTC, S	080G0095
MCX20B, 24V, RS485, RTC, S	080G0050
MCX20B, 230V, RS485, RTC, S	080G0051
MCX20B, 24V, 2XRS485, RTC, S	080G0059
MCX20B, 230V, 2XRS485, RTC, S	080G0060

(S): Single Pack
Note: Single pack include standard kit connectors
Industrial pack codes are avaliable on request (these do not include standard kit connectors)

Accessory

DESCRIPTION	CODE NR.
MCX20B CONNECTORS KIT	080G0182