

ENGINEERING TOMORROW

Danfoss

Instruction sheet

Electronic Controller

MCX152V





AN17488642041101-001001



3106000511

www.danfoss.com/mcx

GENERAL FEATURES

MCX152V is a standard MCX electronic controller that stands on the top of MCX range thanks to its large number of input and output and two integrated electronic expansion valves drivers. It is available in the version with or without graphic LCD display, and 110/230 V AC or 24 V AC power supply. It holds all the typical functionalities of MCX controllers: programmability, connection to the CANbus local network and up to two Modbus RS485 serial communication interfaces. It is moreover fitted with the slot for SD/MMC memory card and Ethernet connector. The memory card assures SW download and the datalogging function; the Ethernet port allows the SW download, monitoring with web pages, datalogging and the alarms warning.

MCX152V	
ANALOG INPUTS	
NTC, Pt1000, 0/1 V, 0/5 V, 0/10 V, 0/20 mA, 4/20 mA, selectable via software	8
NTC, 0/1 V, 0/5 V, 0/10 V, 0/20 mA, 4/20 mA, selectable via software	6
Superheat S1: 0/1 V, 0/5 V, 0/10 V, 0/20 mA, 4/20 mA, selectable via software	2
Superheat S2: PT1000, 0/1 V, 0/5 V, 0/10 V, selectable via software	2
Total number	14
DIGITAL INPUTS	
Voltage free contact	16
24 V optoinsulated	2
230 V AC optoinsulated	2
Total number	18
ANALOG OUTPUTS	
0/10 V DC	6
0/10 V, PWM, PPM selectable via software	2
Total number	6
DIGITAL OUTPUTS	
SPST relay 5 A (normally open contacts)	12
SPDT relay 16 A (changeover contacts)	3
Total number	15
OTHERS	
Power supply 24 V AC	•
Power supply 110 V / 230 V AC	•
Connection for programming key	•
Connection for remote display and keyboard	•
CANbus	•
RTC clock	•
Modbus RS485 serial interface	•
Ethernet/Webserver	•
SD (Secure Digital) or MMC (Multi Media Card) expansion slot	•
Bipolar and unipolar motor output	•
Dimensions (DIN modules)	16
Mounting	DIN rail

Programmable

Protection degree

CAN bus

Mod connection

Graphic display

Multi language

Modbus RS485

Memory card

Ethernet

PRG

IP65

CAN

Mod

485

485

485

485

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TECHNICAL SPECIFICATIONS

POWER SUPPLY

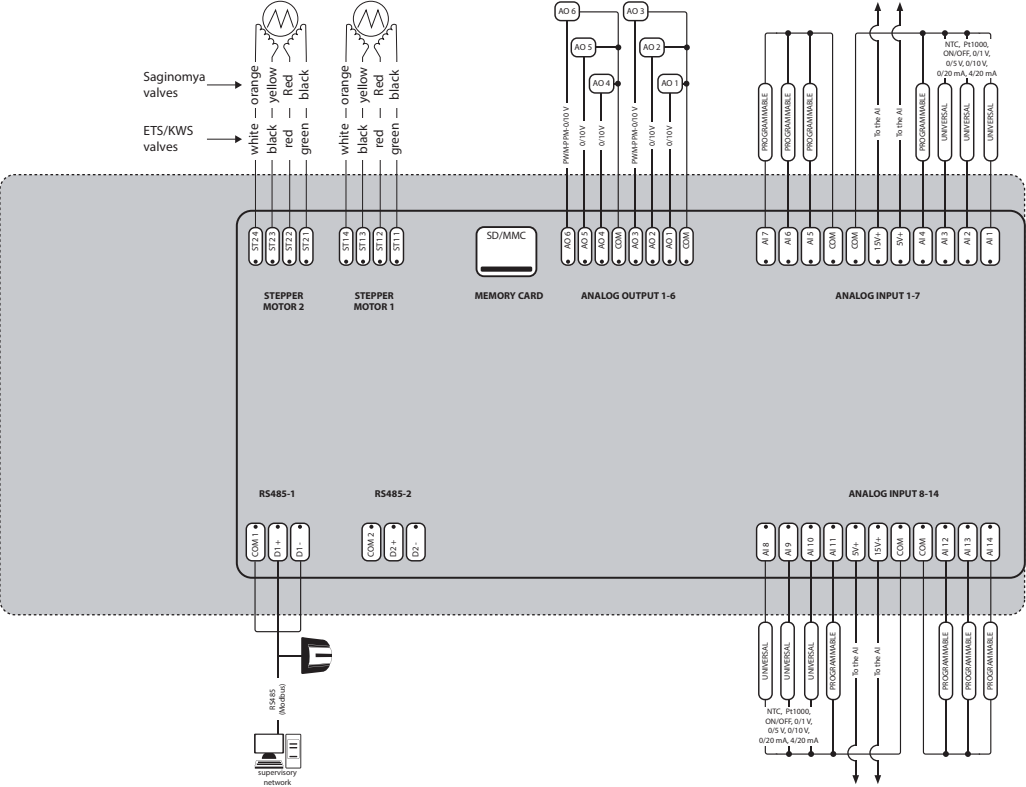
- 85 ~ 265 V AC, 50/60 Hz. Maximum power consumption: 30 W, 51 VA. Insulation between power supply and the extra-low voltage: reinforced
- 24 V AC $\pm$ 15% 50/60 Hz SELV. Maximum power consumption: 30 W, 47 VA. Insulation between power supply and the extra-low voltage: functional

I/O	TYPE	NUMBER	SPECIFICATION
Analog inputs			Max 15 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
	0/1 V, 0/5 V, 0/10 V	14	A11, A12, A13, A14, A15, A16, A17, A18, A19, A10, A11, A12, A13, A14 impedance is 33K Ω (by software can be set greater than 1M Ω)
	NTC	14	A11, A12, A13, A14, A15, A16, A17, A18, A19, A10, A11, A12, A13, A14 NTC temperature probes, default: 10 k Ω at 25 °C
	0/20 mA; 4/20 mA Pt1000	8	A11, A12, A13, A15, A18, A19, A10, A12 A11, A12, A13, A17, A18, A19, A10, A14
	Differential input	2	A15(-), A16(+); A112(-), A113(+) Differential input, DM Voltage 0..300 mV; CM voltage max 14 V
	Auxiliary Supplies	2	15 V+ and 5 V+ 5 V+ max: 140 mA (total on all outputs) 15 V+ max: 200 mA (total on all outputs)
Digital inputs	Voltage free contacts	16	D1, D12 Frequency input: 200 Hz Max (pulse time about 2.5 ms) D13, D14, D15, D16, D17, D18, D10, D11, D12, D13, D14, D15, D16 Frequency input: 20Hz Max (pulse time about 25 ms)
	24 V optoinsulated	2	D17, D18 Digital Inputs optoinsulated 24 V AC 50/60 Hz o 24 V DC. Rated current: 5 mA
	230 V AC optoinsulated	2	D17, D18 Inputs optoinsulated, 230 V AC 50/60 Hz. Basic insulation. Rated current: 2 mA at 230 V AC; 1 mA at 110 V AC NOTE: when the 230 V AC D17H input is used, the corresponding 24 V D17 input is not available anymore; the same for the couple of inputs D118H and D118
	Analog outputs	4	AO1, AO2, AO3, AO4, AO5, AO6 Minimum load 1K Ω (10 mA)
	PWM, PPM	2	AO3, AO6 - pulse output, synchronous with mains, at modulation of impulse position (PPM) - or modulation of impulse width (PWM): 6.8 V open circuit - pulse output, PWM with range from 20 Hz to 1 kHz: 6.8 V open circuit

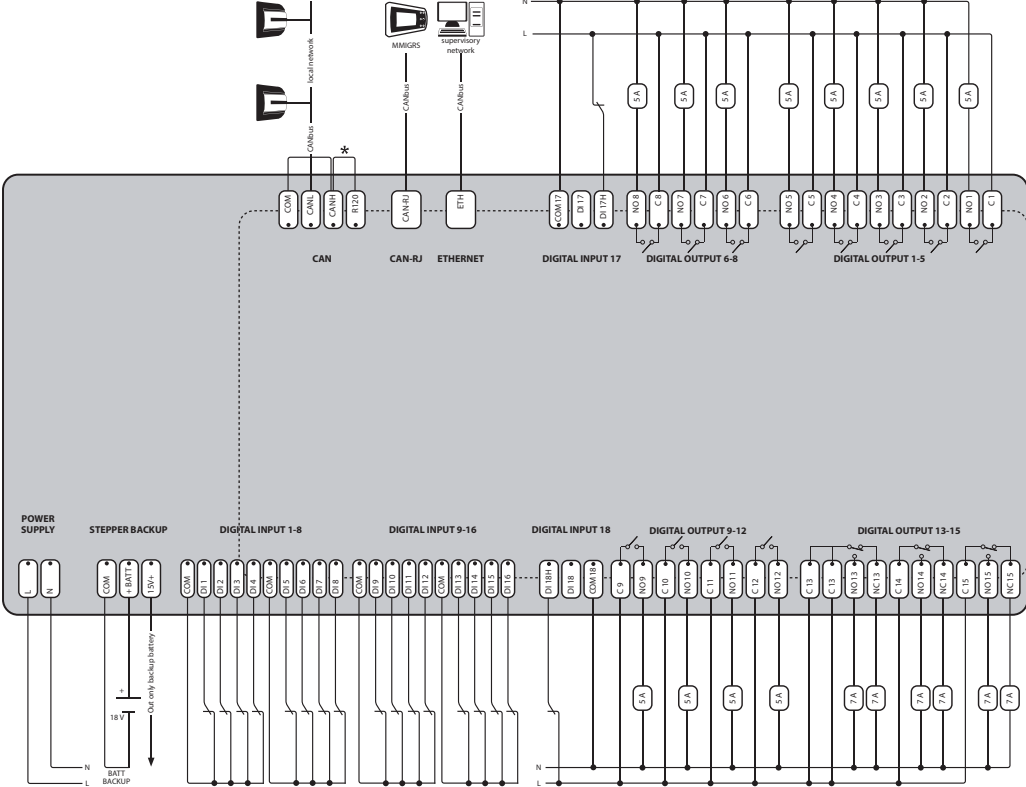
I/O	TYPE	NUMBER	SPECIFICATION
Digital output	Relay	15	Concerning the insulation distance there are three groups of relays: - group 1: relays 1 to 8 - group 2: relays 9 to 12 - group 3: relays 13 to 15 Insulation between relays: functional Insulation between relays of group 1 and 2 and 3: reinforced Insulation between relays and the extra-low voltage parts: reinforced C1-NO1 to C12-NO12 Normally open contact relays 5 A - characteristics of each relay: 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 UL: 1/8 hp, C300 pilot duty, 125/250 V AC, 30,000 cycles C13-NO13 to C15-NO15 Normally open contact relays 16 A - characteristics of each relay: 7 A 250 V AC for resistive loads - 100,000 cycles 3.5 A 250 V AC for inductive load - 230,000 cycles with cos(phi) = 0.4 UL: 6A resistive, 240 VA, 30,000 cycles, 1/2 hp, 470 VA pilot duty, 240 V AC, 30,000 cycles C1-NO1 to C3-NO3, C13-NO13 to C15-NO15 Optionally they can be solid state relays - characteristics of each relay: 15-280 Vrms, 1 A UL: 1 A resistive, 240 V AC, 30,000 cycles
			ST1, ST2, ST3, ST4 Bipolar and unipolar stepper motor output: - Danfoss ETS / KVS / ETSC Valves (green, red, black, white) - Saginomyia LKV/SKV/KV/PKV (black, red, yellow, orange) - other Valves: drive mode 1/8 microstep peak phase current: 650 mA (RMS 460 mA) max drive voltage 30 V max output power 6.5 W max speed 200 steps/sec Max distance between valve and MCX: 30 m (suggested: 10 m)
Stepper motor		2	
Battery backup		1	BATT 18-24 V DC: - leakage current max 12 μ A - max battery current: 0.85 A @18 V
			SD/MMC - for data logging make sure that the memory card is firm in place - avoid installations with vibrations

CONNECTION DIAGRAM

TOP BOARD



BOTTOM BOARD



MCX152V - TOP

MCX152V - BOTTOM

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

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: $\geq$ 250 V according to IEC 60112

OTHER FEATURES

- Operating conditions CE -20T55; 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 degree of pollution 2
- Category of resistance to heat and fire: D
- Immunity against voltage surges: category II
- Software class and structure: class A

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: 2010 (Particular Requirements for Temperature Sensing Controls)
- Electromagnetic compatibility EMC directive 2014/30/EU;
- EN 61000-6-4: 2007 +A1: 2011 (Emissions standard for industrial environments)
- EN 61000-6-2: 2005 (Immunity for industrial environments)
- RoHS directive 2011/65/EU and 2015/863/EU;
- EN50581: 2012

UL APPROVAL

UL file: E31024

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, specially concerning the supply voltage and environmental conditions
- This device contains live electrical components therefore all the 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

INSTALLATION WARNINGS

- Mounting position recommended: vertical
- The installation must be executed according the local standards and legislation 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 to 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 inputs cables as much as possible, and avoid spiral paths enclosing power devices. Separate from inductive loads and power cables to avoid possible electromagnetic noises
- Avoid touching or nearly touching the electronic components fitted on the board to avoid electrostatic discharges
- Ethernet: 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)

DISCLAIMER: Professional Use Only

This product is not subject to the UK PSI1 regulation, as it is for supply to and use only by professionals with the necessary expertise and qualifications. Any misuse or improper handling may result in unintended consequences. By purchasing or using this product, you acknowledge and accept the professional-use-only nature of its application. Danfoss does not assume any liability for damages, injuries, or adverse consequences (damages) resulting from the incorrect or improper use of the product and you agree to indemnify Danfoss for any such damage resulting from your incorrect or improper use of the product.

DISPOSAL INSTRUCTION



- Equipment containing electrical components may not be disposed together with domestic waste. It must be separately collected with electrical and electronic waste according to local and valid legislation.

CONNECTIONS

TOP BOARD

- Stepper motor connector 2
- 4 way spring-cage screw plug-in connector type pitch 2.5 mm: section cable 0.2-0.5 mm²
- Stepper motor connector 1
- 4 way spring-cage screw plug-in connector type pitch 2.5 mm: section cable 0.2-0.5 mm²
- Memory card connector
- SD/MMC card slot
- Analog output 1-6 connector
- 8 way screw plug-in connector type pitch 2.5 mm: section cable 0.2-1.5 mm²
- Analog input 1-7 connector
- 11 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
- RS485-2 connector
- 3 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- Analog input 8-14 connector
- 11 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

BOTTOM BOARD

- 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 plug type
- Ethernet connector
- 8/8 way RJ45 plug type
- Digital input 17 connector
- 3 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
- Digital output 1-5 connector
- 10 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
- Stepper backup connector
- 3 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- Digital input 1-8 connector
- 10 way spring-cage screw plug-in connector type pitch 2.5 mm: section cable 0.2-0.5 mm²
- Digital input 18 connector
- 3 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- Digital input 9-12 connector
- 10 way spring-cage screw plug-in connector type pitch 2.5 mm: section cable 0.2-0.5 mm²
- Digital input 18 connector
- 3 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- Digital input 9-12 connector
- 8 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²
- Digital input 13-15 connector
- 10 way screw plug-in connector type pitch 5 mm: section cable 0.2-2.5 mm²

USER INTERFACE

LCD DISPLAY

- display mode: STN blue transmissive
- backlight: white LED backlight adjustable via software
- display format: 128x64 dots
- active visible area : 58x29 mm
- contrast: adjustable via software

KEYBOARD

- Number of keys: 6
- Keys function is settled by the application software

DISPLAY SETTINGS ADJUSTMENT

- Setting of the LCD display like contrast and brightness might need to be adjusted due to external ambient factors. Press and release simultaneously the Enter and X key after power ON to access the BIOS menu and select the DISPLAY menu. Use UP and DOWN arrow keys to adjust the contrast or the brightness of the display at the desired level.

PRODUCT PART NUMBERS

CODE	DESCRIPTION
080G0284	MCX152V, 24V, LCD, 2 RS485, ETH, Single Pack
080G0285	MCX152V, 230V, LCD, 2 RS485, ETH, Single Pack
080G0313	MCX152V, 24V, 2 RS485, Single Pack