Danfoss AS-CX06 Programmable Controller Installation Guide

Contents

Danfoss AS-CX06 Programmable Controller

Specifications

- **Model**: Programmable controller Type AS-CX06
- **Dimensions**: 105mm x 44.5mm x 128mm (Without LCD display)
- **Max. Nodes RS485:** Up to 100
- **Max. Baudrate RS485:** 125 kbit/s
- **Max. Nodes CAN FD:** Up to 100
- **Max. Baudrate CAN FD:** 1 Mbit/s
- **Wire Length RS485:** Up to 1000m
- **Wire Length CAN FD:** Up to 1000m

Product Usage Instructions

System Connections

The AS-CX06 controller can be connected to various systems and devices, including:

- RS485 to BMS (BACnet, Modbus)
- USB-C for built-in Stepper Driver connections
- PC connection via Pen drive
- Direct Cloud connection
- Internal bus to I/O expansions
- Ethernet ports for various protocols including Web, BACnet, Modbus, MQTT, SNMP, etc.
- Connection to additional AS-CX controllers or Alsmart remote HMI

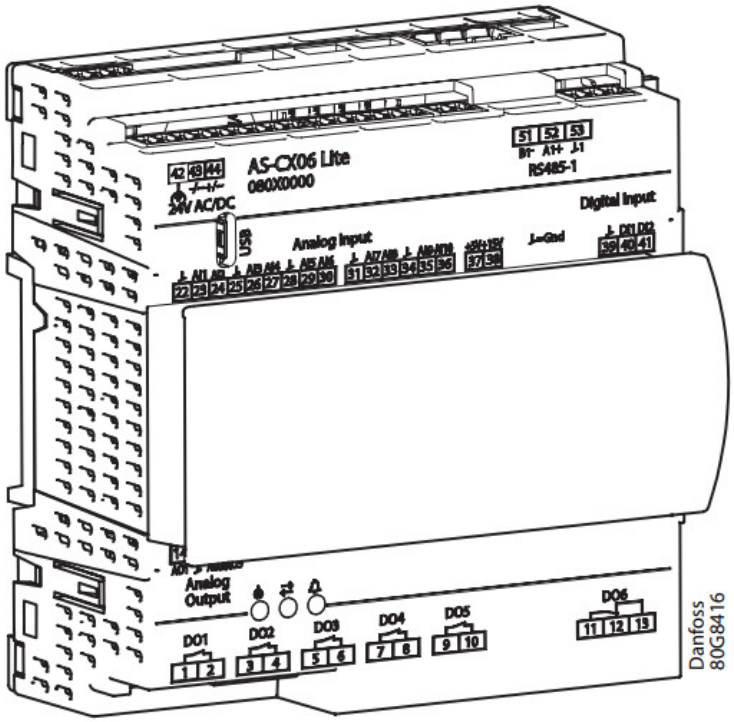
RS485 and CAN FD Communication

The RS485 and CAN FD ports are used for communication with fieldbus systems, BMS, and other devices. Key details include:

- RS485 bus topology should have line termination with external 120 Ohm resistors on both ends in a disturbed environment.
- Max. number of nodes for RS485: Up to 100
- CAN FD communication is used for device-to-device communication with similar topology requirements as RS485.
- Max. number of nodes for CAN FD: Up to 100

Input and Output Boards
The AS-CX06 features top and bottom boards for various inputs and outputs including analog and digital signals, Ethernet connections, battery back-up module inputs, and more.

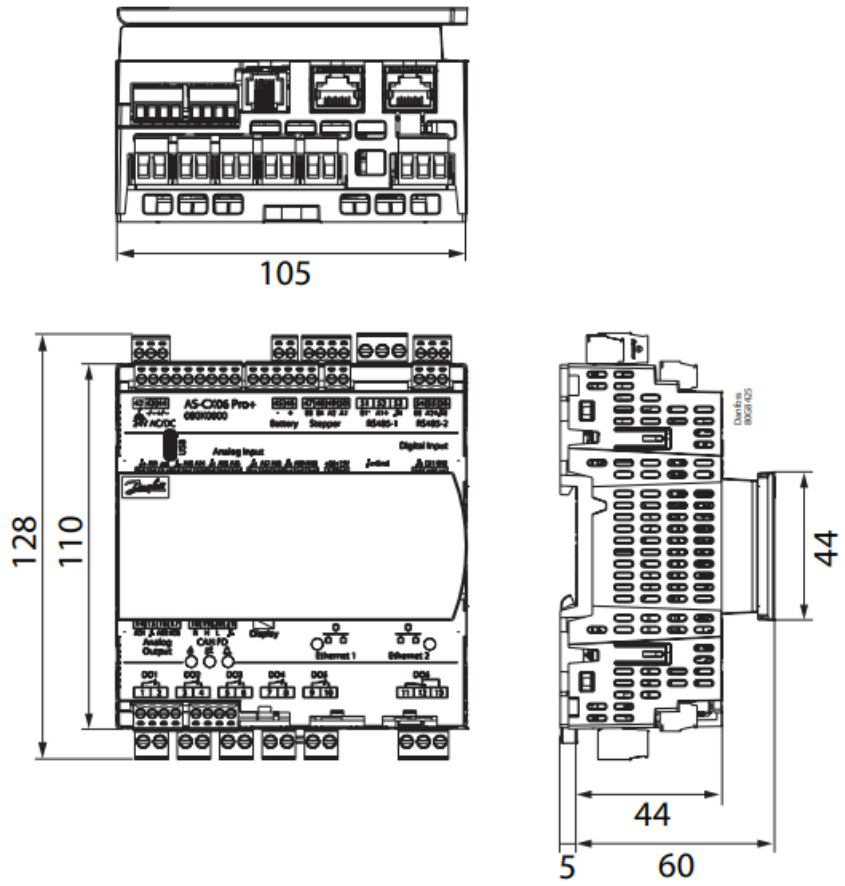
Identification



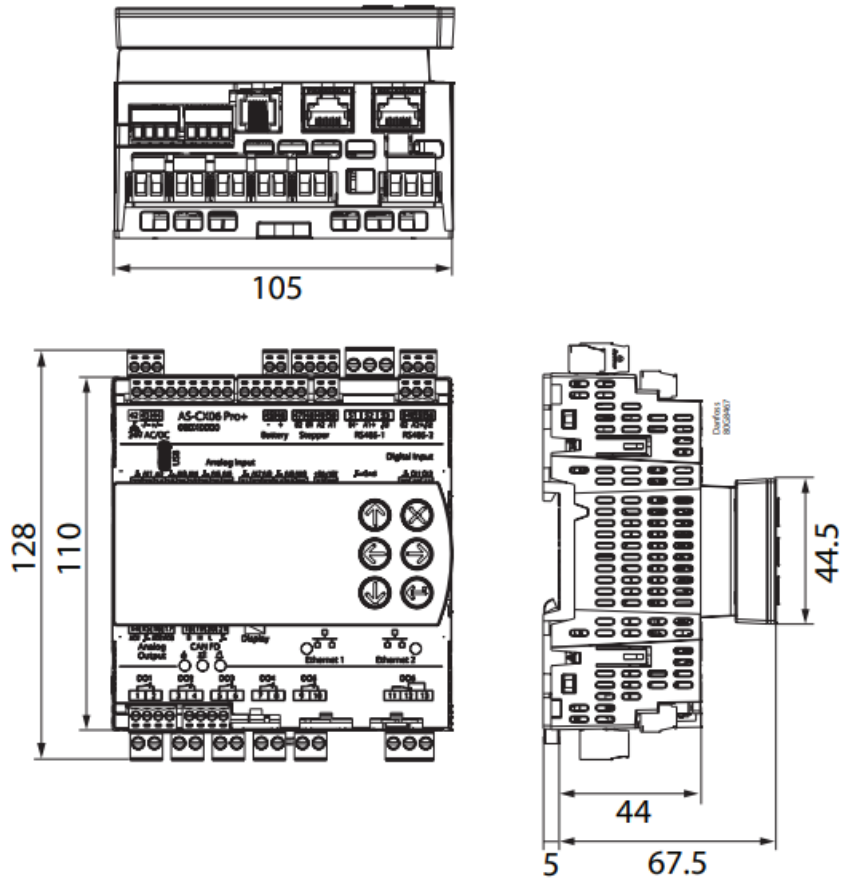
AS-CX06 Lite	080G6008
AS-CX06 Mid	080G6006
AS-CX06 Mid+	080G6004
AS-CX06 Pro	080G6002
AS-CX06 Pro+	080G6000

Dimensions

Without LCD display

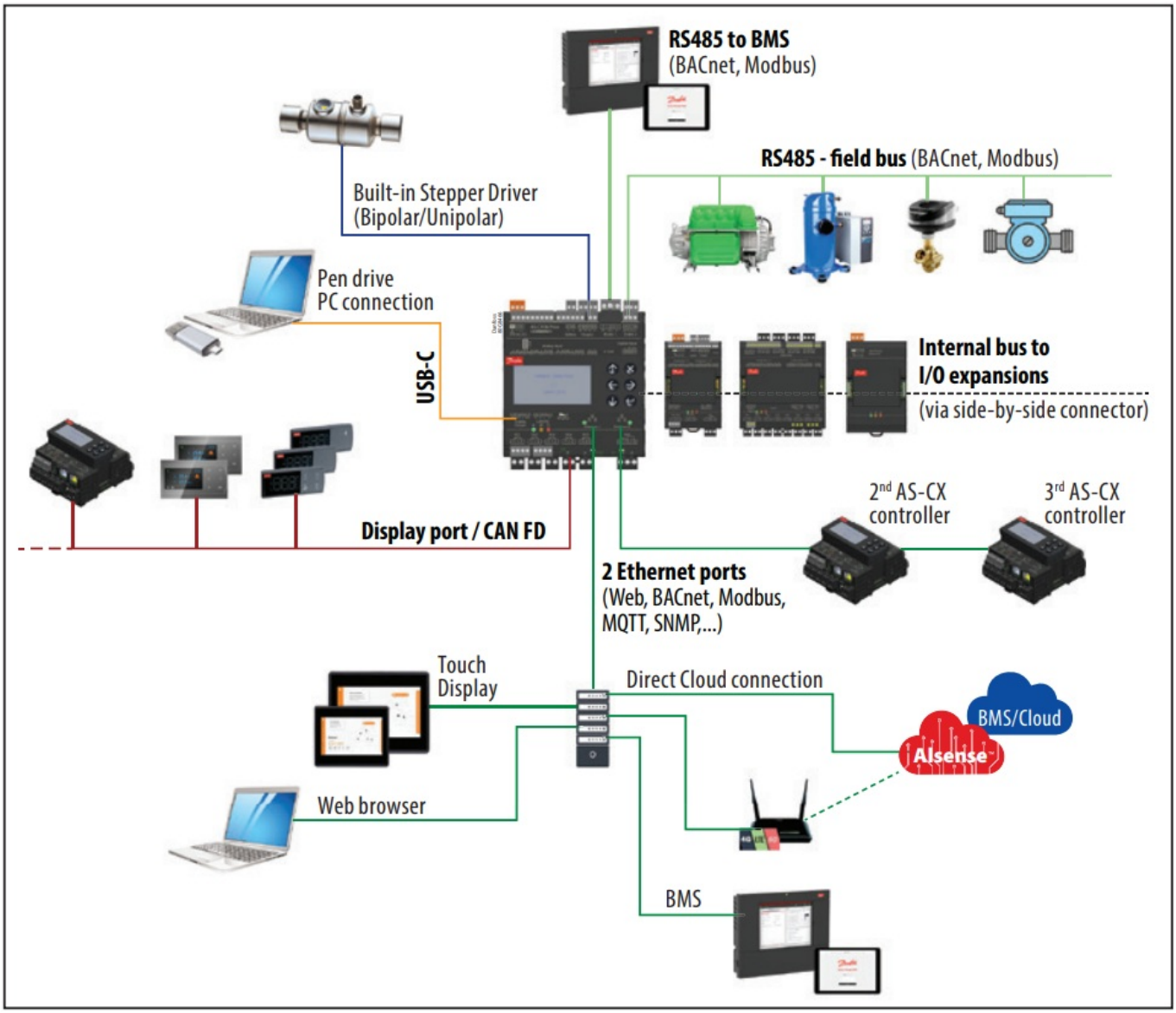


With Snap-on LCD display: 080G6016

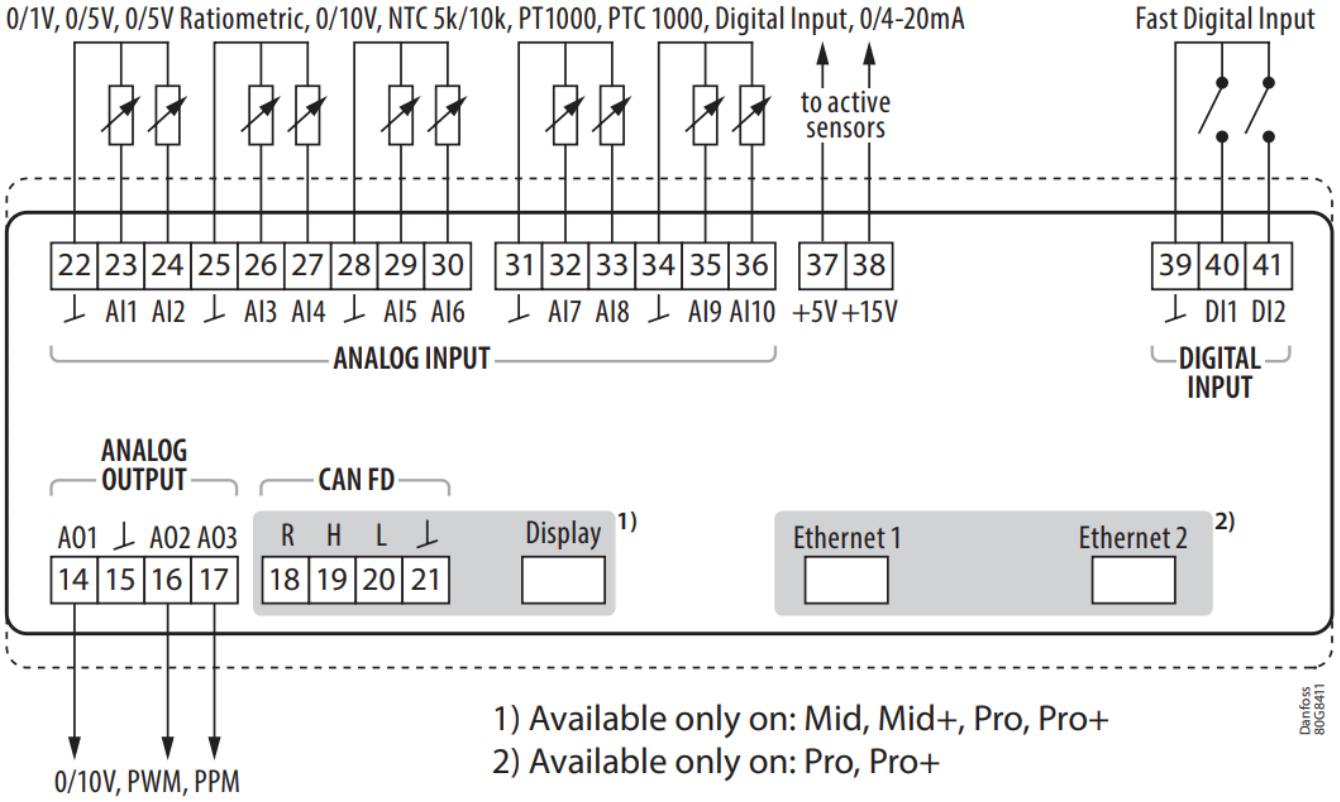


Connections

System connections

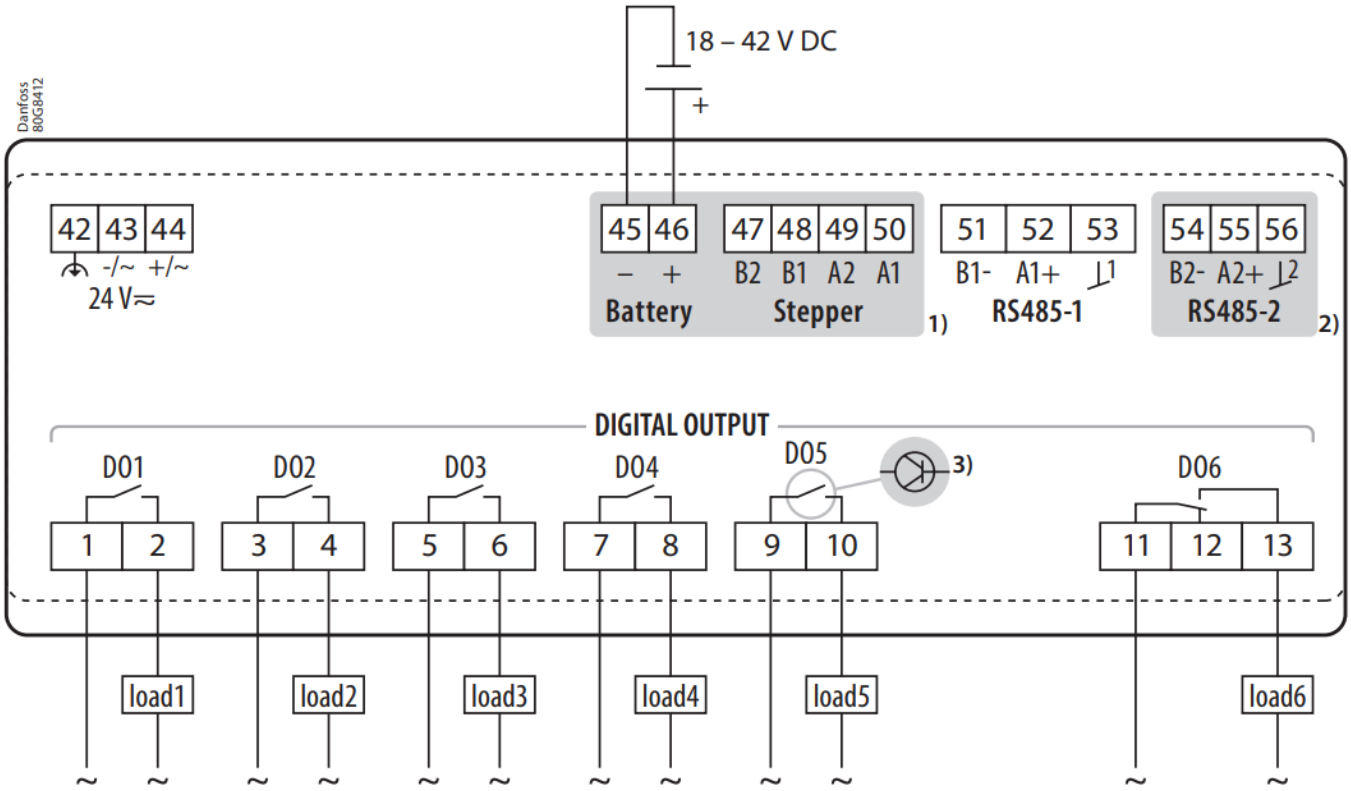


Top Board



Bottom Board

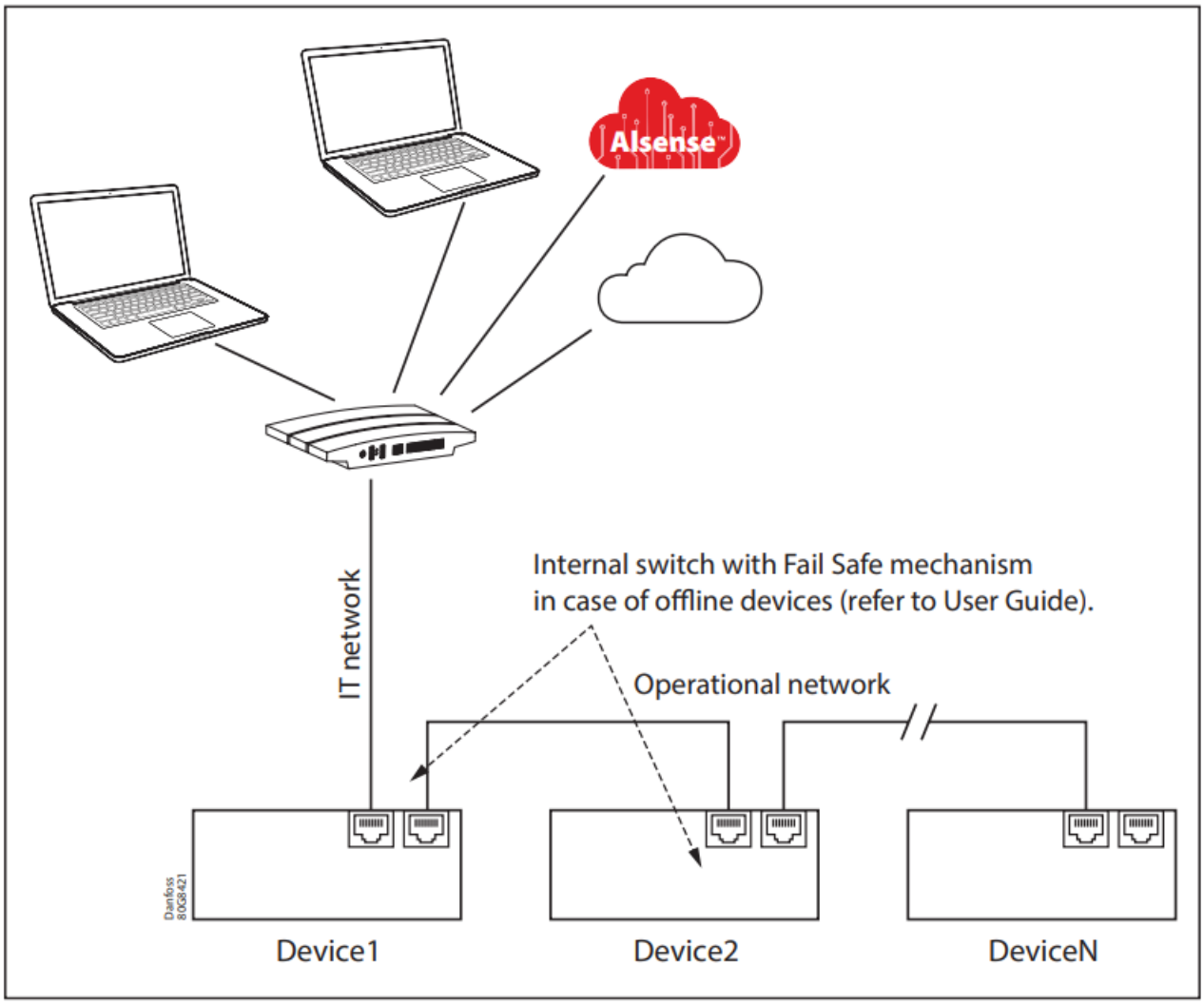
input for battery back-up modules to secure closure of electronic stepper valves (e.g. EKE 2U)



1. **Available only on:** Mid+, Pro+
2. **Available only on:** Mid, Mid+, Pro, Pro+
3. SSR is used in the place of SPST relay on Mid+

Data communication

Ethernet (only for Pro and Pro+ versions)



Point to point star topology with network hubs/switches. Each AS-CX device incorporates a switch with fail-safe technology.

- **Ethernet type:** 10/100TX auto MDI-X
- **Cable type**: CAT5 cable, 100 m max.
- **Cable type connecto**r: RJ45

First access information
The device automatically acquires its IP address from the network via DHCP.

To check the current IP address, press ENTER to access the default settings menu and select Ethernet Settings.

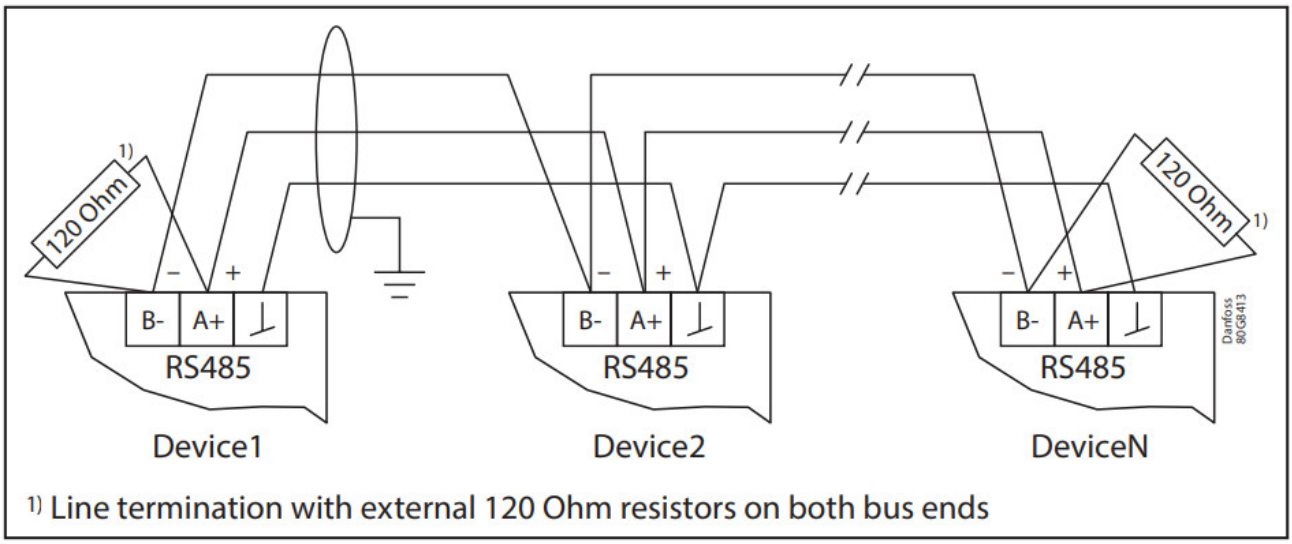
Enter the IP address in your preferred web browser to access the web front-end. You will be directed to a login screen with the following default credentials:

- **Default User:** Admin
- **Default Password:** Administrator
- **Default Numeric Password:** 12345 (to be used on LCD screen) You will be prompted to change your password after your initial successful login.

Note: there is not a way to retrieve a forgotten password.

RS485: Modbus, BACnet
RS485 ports are isolated and can be configured as client or server. They are used for fieldbus and BMS systems communication.

Bus topology



Cable type recommendations:

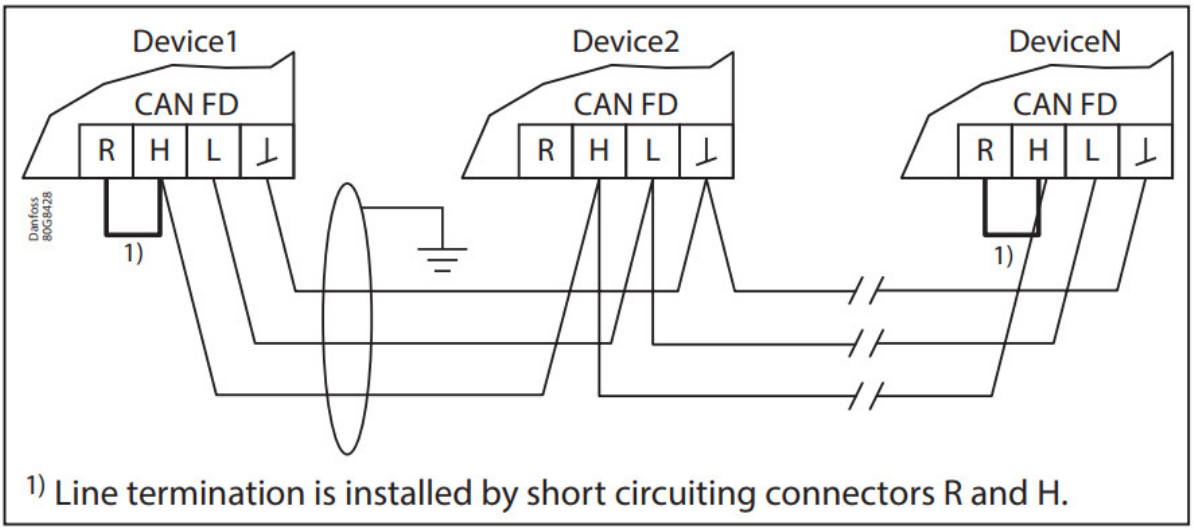
- **Twisted pair with ground:** short leads (i.e. <10 m), no power lines in proximity (min. 10 cm).
- **Twisted pair + ground and shield:** long leads (i.e. >10 m), EMC- disturbed environment.

Max.. number of nodes: up to 100

Wire length (m)	Max. baud rate	Min. wire size
1000	125 kbit/s	0.33 mm2 – 22 AWG

CAN FD
CAN FD communication is used for device-to-device communication. It is also used to connect Alsmart remote HMI via display port.

Bus topology



Cable type:

- **Twisted pair with ground:** short leads (i.e. <10 m), no power lines in proximity (min. 10 cm).

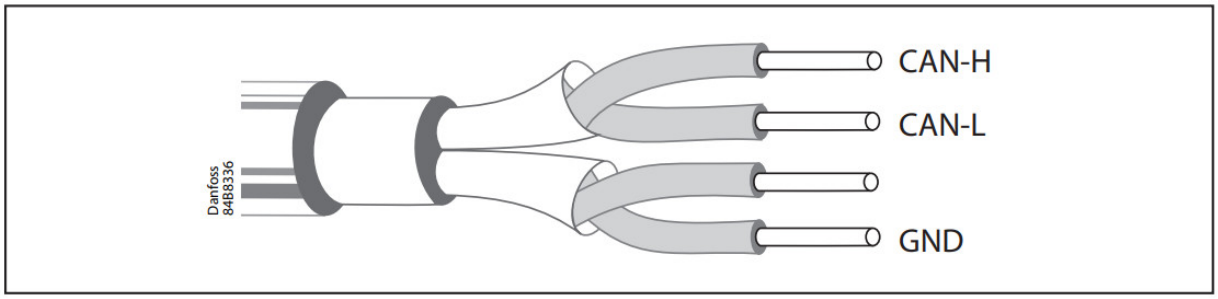
- **Twisted pair + ground and shield:** long leads (i.e. >10 m), EMCdisturbed environment

Max.. number of nodes: up to 100

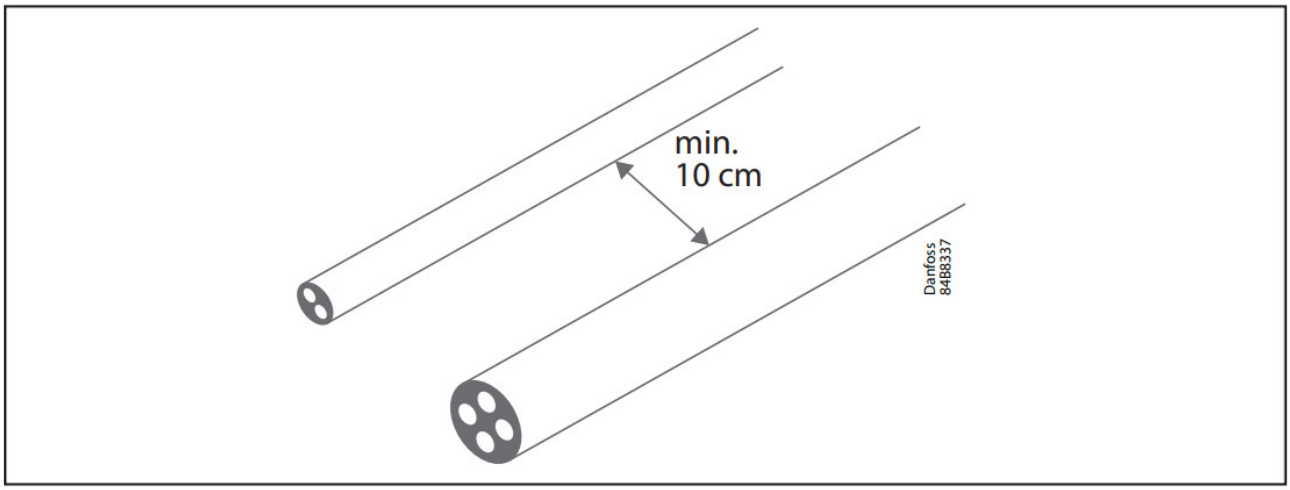
Wire length (m) 1000	Max. baudrate CAN	Min. wire size
1000	50 kbit/s	0.83 mm2 – 18 AWG
500	125 kbit/s	0.33 mm2 – 22 AWG
250	250 kbit/s	0.21 mm2 – 24 AWG
80	500 kbit/s	0.13 mm2 – 26 AWG
30	1 Mbit/s	0.13 mm2 – 26 AWG

Installation of RS485 and CAN FD

- Both fieldbuses are of two wire differential type, and it is fundamental for reliable communication to connect all the units in a network also with a ground wire.
  Use one twisted pair of wires for connecting the differential signals and use another wire (for example a second twisted pair) for connecting the ground. For example:

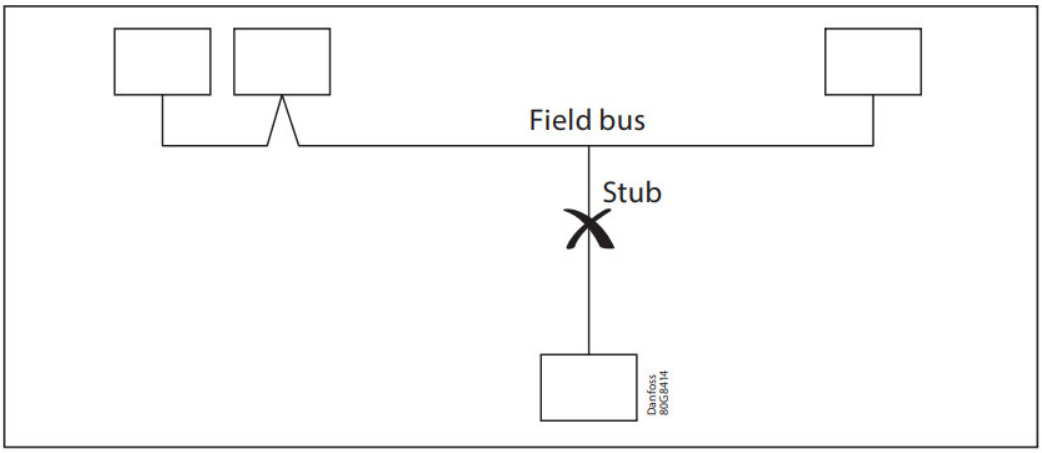


- The line termination must be present on both bus ends to ensure proper communication.
  The line termination can be installed in two different ways:
  1. Make a short circuit on CAN-FD H and R terminals (only for CANbus);
  2. Connect a 120 Ω resistor between CAN-FD H and L terminals for the CANbus or A+ and B- for RS485.
- The installation of the data communication cable must be performed correctly with sufficient distance to high voltage cables.

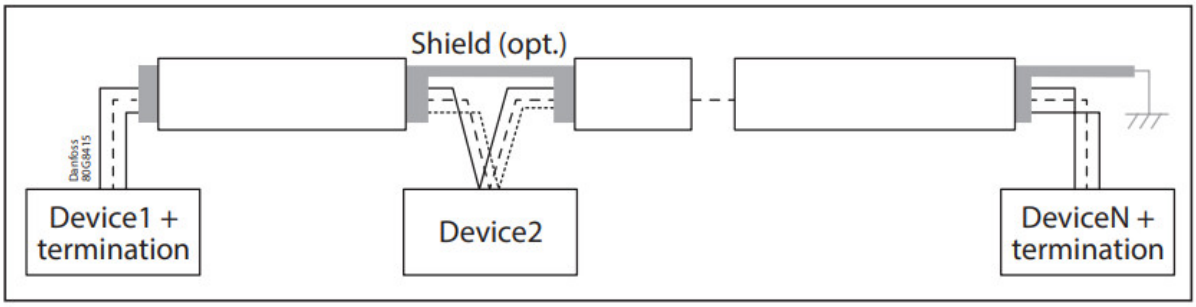


- The devices should be connected according to the “BUS” topology. That means that the communication cable is wired from one device to the next without stubs.

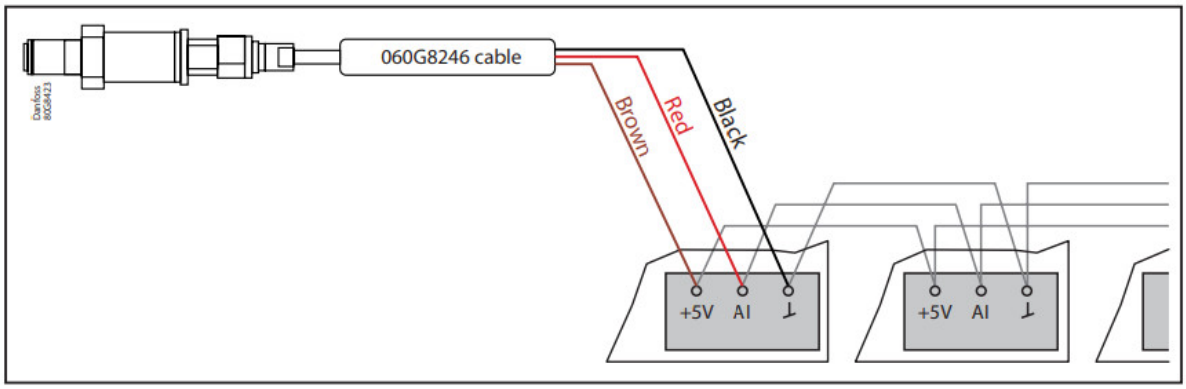
If stubs are present in the network, they should be kept as short as possible (<0.3 m at 1 Mbit; <3 m at 50 kbit). Note that remote HMI connected to the display port makes a stub.



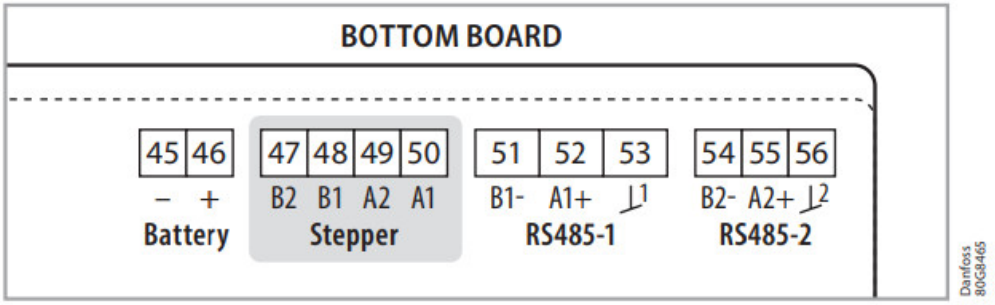
- There must be a clean (not disturbed) ground connection between all devices connected in the network. The units must have floating ground (not connected to earth), which is tied together between all units with the ground wire.
- In case of three three-conductor cable plus shield, the shield must be grounded in one location only.



Pressure transmitter info
Example: DST P110 with ratio-metric output



ETS Stepper Valve info



Valve cable connection
Maximum cable length: 30 m

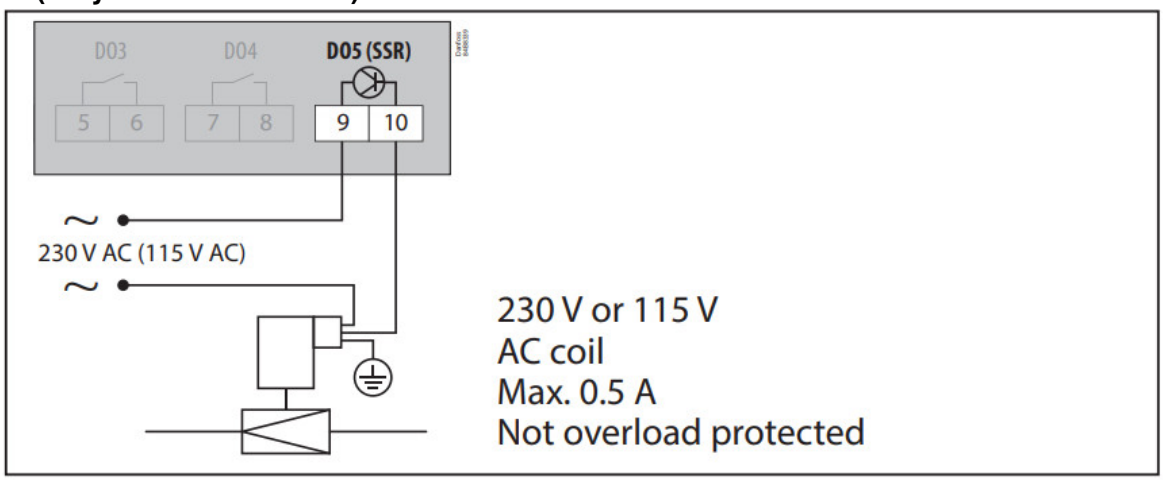
CCM / CCMT / CTR / ETS Colibri® / KVS Colibri® / ETS / KVS

Danfoss M12 cable	White	Black	Red	Green
CCM/ETS/KVS Pins	3	4	1	2
CCMT/CTR/ETS Colibri/KVS Colibri Pins	A1	A2	B1	B2
AS-CX terminals	A1	A2	B1	B2

ETS 6

Wire color	Orange	Yellow	Red	Black	Grey
AS-CX terminals	A1	A2	B1	B2	Not connected

AKV info (only for Mid+ version)



Technical data

Electrical specifications

Electrical data	Value
Supply voltage AC/DC [V]	24V AC/DC, 50/60 Hz (1)(2)
Power supply [W]	22 W @ 24 V AC, min. 60 V A if transformer used or 30 W DC power supply(3)
Electrical cable dimensioning [mm2]	0.2 – 2.5 mm2 for 5 mm pitch connectors 0.14 – 1.5 mm2 for 3.5 mm pitch connectors

1. 477 5×20 Series from LittelFuse (0477 3.15 MXP).
2. A higher DC voltage can be applied if the control is installed in an application where the manufacturer declares a reference standard and a voltage level for accessible SELV/ PELV circuits to be considered non-hazardous by the application standard. That voltage level can be used as power supply input though 60 V DC must not be exceeded.
3. US: Class 2 < 100 VA (3)
4. In short circuit condition DC power supply must be capable of supply 6 A for 5 s or average output power < 15 W

Input/Output specifications

- **Maximum cable length:** 30m
- **Analog input:** AI1, AI2, AI3, AI4, AI5, AI6, AI7, AI8, AI9, AI10

Type	Feature	Data
0/4-20 mA	Accuracy	± 0.5% FS
	Resolution	1 uA
0/5 V Radiometric		Relative to 5 V DC internal supply (10 – 90 %)
	Accuracy	±0.4% FS
	Resolution	1 mV
0 – 1 V 0 – 5 V 0 – 10 V	Accuracy	±0.5% FS (FS intended specifically for each type)
	Resolution	1 mV
	Input resistance	>100 kOhm
PT1000	Meas. range	-60 to 180 °C
	Accuracy	±0.7 K [-20…+60 °C], ±1 K otherwise
	Resolution	0.1 K
PTC1000	Meas. range	-60…+80 °C
	Accuracy	±0.7 K [-20…+60 °C], ±1 K otherwise
	Resolution	0.1 K
NTC10k	Meas. range	-50 to 200 °C
	Accuracy	± 1 K [-30…+200 °C]
	Resolution	0.1 K
NTC5k	Meas. range	-50 to 150 °C
	Accuracy	± 1 K [-35…+150 °C]
	Resolution	0.1 K
Digital Input	Stimulation	Voltage-free contact
	Contact cleaning	20 mA
	Other feature	Pulse counting function 150 ms denounce time

Digital input: DI1, DI2

Type	Feature	Data
Voltage free	Stimulation	Voltage-free contact
	Contact cleaning	20 mA
	Other feature	Pulse counting function max. 2 kHz

Analog output: AO1, AO2, AO3

Type	Feature	Data
	Max. load	15 mA
0 – 10 V	Accuracy	Source: 0.5% FS
		Sink 0.5% FS for Vout > 0.5 V 2% FS whole range (I<=1mA)
	Resolution	0.1% FS
Async PWM	Voltage output	Vout_Lo Max = 0.5 V Vout_Hi Min = 9 V
	Frequency range	15 Hz – 2 kHz
	Accuracy	1% FS
	Resolution	0.1% FS
Sync PWM/ PPM	Voltage output	Vout_Lo Max = 0.4 V Vout_Hi Min = 9 V
	Frequency	Mains frequency x 2
	Resolution	0.1% FS

Digital output

Type	Data
DO1, DO2, DO3, DO4, DO5	
Relay	SPST 3 A Nominal, 250 V AC 10k cycles for resistive loads UL: FLA 2 A, LRA 12 A
DO5 for Mid+	
Solid State Relay	SPST 230 V AC / 110 V AC /24 V AC max 0.5 A
DO6	
Relay	SPDT 3 A Nominal, 250 V AC 10k cycles for resistive loads
Isolation between relay in the DO1-DO5 group is functional. Isolation between DO1-DO5 group and DO6 is rein forced.	
Stepper motor output (A1, A2, B1, B2)	
Bipolar/ Unipolar	Danfoss valves: • ETS / KVS / ETS C / KVS C / CCMT 2–CCMT 42 / CTR • ETS6 / CCMT 0 / CCMT 1 Other valves: • Speed 10 – 300 pps • Drive mode full step – 1/32 microstep • Max. peak phase current: 1 A • Output power: 10 W peak, 5 W average
Battery backup	V battery: 18 – 24 V DC(1), max. power 11 W, min. capacity 0.1 Wh

Aux power output

Type	Feature	Data
+5 V	+5 V DC	Sensor supply: 5 V DC / 80 mA
+15 V	+15 V DC	Sensor supply: 15 V DC / 120 mA

Function data

Function data	Value
Display	LCD 128 x 64 pixel (080G6016)
LED	Green, Orange, Red LED controlled by software application.
External display connection	RJ12
Data communication built-in	MODBUS, BACnet for fieldbus and communication to BMS systems. SMNP for communication to BMS systems. HTTP(S), MQTT(S) for communication to web browsers and cloud.
Clock accuracy	+/- 15 ppm @ 25 °C, 60 ppm @ (-20 to +85 °C)
Clock battery backup power re serve	3 days @ 25 °C
USB-C	USB Version 1.1/2.0 high speed, DRP and DRD support. Max. current 150 mA For connection to pen drive and laptop (refer to User Guide).
Mounting	DIN rail, vertical position
Plastic housing	Self extinguishing V0 and glowing/hot wire test at 960 °C. Ball test: 125 °C Lea kage current: ≥ 250 V according to IEC 60112
Type of control	To be integrated in Class I and/or II appliances
Type of action	1C; 1Y for version with SSR
Period of electric stress across insulating	Long
Pollution	Suitable for use in environments with degree of pollution 2
Immunity against voltage surg es	Category II
Software class and structure	class A

Environmental condition

Environmental condition	Value
Ambient temperature range, operating [°C]	-40 to +70 °C for Lite, Mid, Pro versions. -40 to +70 °C for Mid+, Pro+ versions without I/O expansions att ached. -40 to +65 °C otherwise.
Ambient temperature range, transport [°C]	-40 to +80 °C
Enclosure rating IP	IP20 IP40 on the front when plate or display are mounted
Relative humidity range [%]	5 – 90%, non-condensing
Max. installation height	2000 m

Electric noise
Cables for sensors, low voltage DI inputs and data communication must be kept separate from other electric cables:

- Use separate cable trays
- Keep a distance between cables of at least 10 cm
- Keep I/O cables as short as possible

Installation considerations

- The controller should only be installed, serviced and inspected by qualified personnel and in compliance with national and local regulations.
- Before servicing the equipment, the controller must be disconnected from the power mains by moving the system main switch to OFF.
- Using a supply voltage other than specified can seriously damage the system.
- All the safety extra low voltage connections (analogue and digital inputs, analogue outputs, serial bus connections, power supplies) must have proper insulation from the power mains.
- Avoid touching or nearly touching the electronic components mounted on the boards to avoid electrostatic discharges from the operator to the components, which may cause considerable damage.
- Do not press the screwdriver on the connectors with excessive force, to avoid damaging the controller.
- In order to ensure sufficient convection cooling we recommend not obstructing ventilation openings.
- Accidental damage, poor installation, or site conditions can give rise to malfunctions of the control system, and ultimately lead to a plant breakdown.
- Every possible safeguard is incorporated into our products to prevent this. However, a wrong installation could still present problems. Electronic controls are no substitute for normal, good engineering practice.
- During installation, ensure that proper method is made to prevent a wire to get loose and create a potential risk in regards to shock or fire.
- Danfoss will not be responsible for any goods, or plant components, damaged as a result of the above defects. It is the installer’s responsibility to check the installation thoroughly and to fit the necessary safety devices.
- Your local Danfoss agent will be pleased to assist with further advice.

Certificates, declarations, and approvals (in progress)

Mark(4)	**Country**
CE	EU
cULus (only for AS-PS20)	NAM (US and Canada)
cURus	NAM (US and Canada)
RCM	Australia/New Zealand
EAC	Armenia, Kyrgyzstan, Kazakhstan
UA	Ukraine

The list contains the main possible 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 be still in progress and others may change over time. You can check the most current status at the links indicated below.

EU declaration of conformity can be found in the QR code.

Information about usage with flammable refrigerants and others can be found in the Manufacturer Declaration in the QR code.

Information about usage with flammable refrigerants and others can be found in Manufacturer Declaration in the QR code.

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FAQ

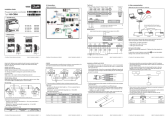
Q: How can I access the web front-end of the AS-CX06?
A: Enter the IP address in your preferred web browser. The default credentials are: Default User: Admin, Default Password: Administrator, Default Numeric Password: 12345 (for LCD screen).

Q: What is the maximum wire length supported by the RS485 and CAN FD connections?

A: The RS485 and CAN FD connections support wire lengths of up to 1000m.

Q: Can the AS-CX06 controller be connected to multiple AS-CX controllers or external devices?
A: Yes, the AS-CX06 controller supports connections to multiple AS-CX controllers, external sensors, fieldbus systems, and more.

Documents / Resources

	**Danfoss AS-CX06 Programmable Controller** [pdf] Installation Guide AS-CX06 Lite, AS-CX06 Mid, AS-CX06 Mid, AS-CX06 Pro, AS-CX06 Pro, AS-CX06 Programmable Controller, AS-CX06, Programmable Controller, Controller

References

- Engineering Tomorrow | Danfoss
- User Manual