

ENGINEERING
TOMORROW



Installation Guide

VLT® Ethernet Fieldbuses MCA 12x

VLT® FC Series

1 Installation Instructions

1.1 Safety and Installation Awareness

Before starting installation, review this installation guide and all safety guidelines and precautions in the installation guide delivered with the drive. Additional resources, including option-specific operating guides, drive-specific operating guides, design guides, programming guides, functional safety documentation, MyDrive® ecoSmart®, and PC tools, can be downloaded using the search function at www.danfoss.com.

1.2 Items Supplied

When the fieldbus option is not factory mounted, the following items are supplied:

- Fieldbus option and connector.
- LCP cradle.
- Front covers (in various sizes).
- Stickers for front cover (EtherCAT sticker and IN/OUT stickers).
- Accessory bag (including EMC bracket).
- Strain relief (only for A1 and A2 enclosures).
- Installation Guide.

1.3 Compatible Product Series

Table 1: Compatible Product Series

Option	VLT® HVAC Drive FC 102	VLT® Refrigeration Drive FC 103	VLT® AQUA Drive FC 202	VLT® AutomationDrive FC 301	VLT® AutomationDrive FC 302	VLT® Decentral Drive FCD 302
VLT® PROFINET MCA 120	X	X	X	X	X	X
VLT® EtherNet/IP MCA 121	X	–	X	X	X	X
VLT® Modbus TCP MCA 122	X	X	X	X	X	–
VLT® POWERLINK MCA 123	–	–	–	X	X	X
VLT® EtherCAT MCA 124	–	–	–	X	X	X
VLT® BACnet/IP MCA 125	X	–	X	–	–	–

1.4 More Accessories

To allow more space for Ethernet connectors, Danfoss provides several fixtures. The fixtures are to the right of the control card.

Table 2: Order Numbers for Ethernet Fixtures

Enclosure sizes	Order numbers
A5, B1, B2, C1, and C2	134B7466
A4	130B5612

1.5 EMC-compliant Installation

To obtain an EMC-compliant installation, follow the instructions provided in the drive-specific operating guide and design guide. Refer to the fieldbus master manual from the PLC supplier for further installation guidelines.

1.6 Grounding

- Ensure that all stations connected to the fieldbus network are connected to the same ground potential. When distances between the stations in a fieldbus network are long, connect the individual station to the same ground potential. Install equalizing cables between the system components.
- Establish a grounding connection with low HF impedance, for example, by mounting the drive on a conductive backplate.
- Keep the ground wire connections as short as possible.
- To establish electrical contact between the cable shield and the drive enclosure, use metal grommets or the clamps provided on the equipment.
- Use high-strand wire to reduce burst transient.

1.7 Mounting in an FC Series Drive

Refer to illustration 1A for an exploded view and for Ethernet connectors.

Procedure

1. Remove the LCP or blind cover from the drive.
2. Use a screwdriver to remove the front cover and the LCP cradle.
3. Mount the fieldbus option with the Ethernet port facing upwards for cable entry, see illustration 1A.
4. Remove the knock-out plate from the new LCP cradle.
5. Mount the new LCP cradle.
6. For VLT® EtherCAT MCA 124 only: Stick the EtherCAT label to the left of the EtherCAT LED indicator, see illustration 3.

1.8 The Ethernet Interface for the VLT® Decentral Drive FCD 302

Ethernet port 1 and Ethernet port 2 are placed on the installation board. Ethernet ports MK101 and MK102 are placed on the installation board. MK101 is the Ethernet IN port. See position 1 in illustration 1B for overview.

In the pluggable variant, the fieldbus is connected directly to the M12 connection FB1 and FB2 outside the drive. The M12 connector, see position 3 in illustration 1B, is a female connector. FB1 is connected to port 1. The pluggable solution supports an easy plug-and-play solution where the Ethernet is plugged to the Ethernet interface. Note that the housing of the M12 plug is connected directly to ground. If the shield of the Ethernet cable has to be isolated from ground, mount an isolated reduction ring between the M12 connector and the installation box, see position 2 in illustration 1B.

To obtain an improved ground connection, use the earth bracket kit in stainless steel. Use code number 175N2703 for ordering the bracket.

1.9 Address Switches

Set the address switches to give the option a unique ID. Select an address range according to illustration 2.

1.10 Cabling Requirements

- Select cables suitable for Ethernet data transmission. Normally, CAT5e and CAT6e cables are recommended for industrial applications.
- Both types are available as unshielded twisted pair and shielded twisted pair. Shielded cables are recommended for use in industrial environments and with drives.
- A maximum cable length of 100 m (328 ft) is allowed between the switches.
- Use optical fibers for gapping longer distances and for providing galvanic isolation.

NOTICE

MODBUS TCP

For connecting Modbus TCP devices, both hubs and switches can be used. It is, however, always recommended to use suitable industrial-graded Ethernet switches. For more information regarding IP switching, refer to the VLT® Modbus TCP MCA 122 Programming Guide.

Table 3: Cabling for VLT® PROFINET MCA 120

Cable type	Application type A	Application Type B	Application type C
Design	Data cable	Data cable	Data cable
Cable installation type	Stationary, no movement after installation	Flexible, occasional movement or vibration	Special applications, for example, highly flexible, permanent movement, vibration, or torsion
Cable marking	PROFINET type A	PROFINET type B	PROFINET type C
Core cross-section	AWG 22/1	AWG 22/7	AWG22/..
Outer diameter	5.5–8.0 mm		Application dependent
Core diameter	1.5 ±0.1 mm		Application dependent
Color (outer sheath)	Green (RAL6018)		Application dependent
Core identification (colors) star quad 2 pair	White, yellow, blue, orange Pair 1: White (RXD+), blue (RXD-) Pair 2: Yellow (TXD+), orange (TXD-)		
Number of cores	4		
Cable design	2 pairs or 1 star quad		
Shielding design type	Aluminum foil + Cu braiding		Application
Plug type	RJ45 (IP20 or IP65/67)/M12		

1.11 Wiring Procedure, Enclosure Sizes A1–A3

NOTICE

Do not strip Ethernet cable. Do not ground it via the strain relief plate. Ground the shielded Ethernet cables through the RJ45 connector on the EtherNet/IP interface.

Procedure

1. Add the IN/OUT stickers to the sheet metal plate as shown in step 3.
2. Mount the preconfigured cable wires with the connectors on the fieldbus option.

For A1 and A2 enclosures, mount the supplied strain relief on top of the drive with 2 screws as shown in illustration 4.

3. Position the cable between the spring-loaded metal clamps to establish mechanical fixation and electrical contact between the cable and ground.

1.12 Wiring Procedure, Enclosure Sizes A4–A5, B, and C

NOTICE

Do not strip Ethernet cable. Do not ground it via the strain relief plate. Ground the shielded Ethernet cables through the RJ45 connector on the EtherNet/IP interface.

Procedure

1. Remove the front cover and add the IN/OUT stickers on the control plate as shown in illustration 3.
2. Push the cable through the cable glands.
3. Mount the preconfigured cable wires with the connectors on the fieldbus option, see illustration 4.
4. Fix the cable to the metal base plate using the springs.
5. Tighten the cable glands securely.

1.13 Wiring Procedure, Enclosure Sizes D, E, and F

NOTICE

Do not strip Ethernet cable. Do not ground it via the strain relief plate. Ground the shielded Ethernet cables through the RJ45 connector on the EtherNet/IP interface.

Procedure

1. Open the front door and add the IN/OUT stickers on the control plate as shown in illustration 3.
2. Mount the preconfigured cable wires with the connectors on the fieldbus option.
3. Fix the cable to the metal base plate using the springs, see illustration 4.
4. Tie down the cable and route it with other control wires inside the unit, see illustration 3.

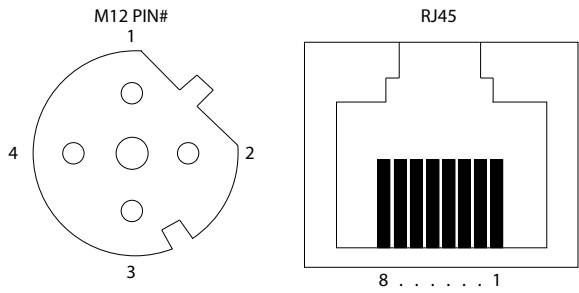
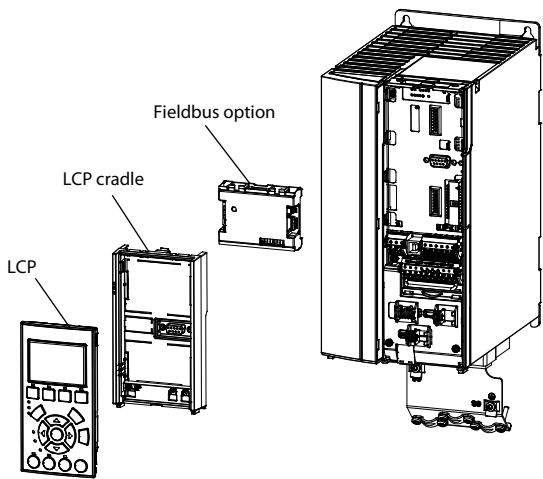
1.14 Checking Network Cabling

The Ethernet cabling can be checked for correct wire connection via the *parameter group 12-1* Ethernet Link Parameters*.

By connecting the drive to an active Ethernet switch or a second drive, *parameter 12-10 Link Status* shows the link status. If the connection is incorrect or the cable is damaged, the link status for the port will show "No Link". For correct function, the links must be checked for link speed and for half/full duplex. *Parameter 12-13 Link Speed* holds the information of the link speed for the 2 ports. The link speed must be 100 Mbps to avoid getting a lower network performance. *Parameter 12-14 Link Duplex* holds information about the duplex state of the ports. Running half duplex lowers the performance significantly and must be avoided.

2 Illustrations

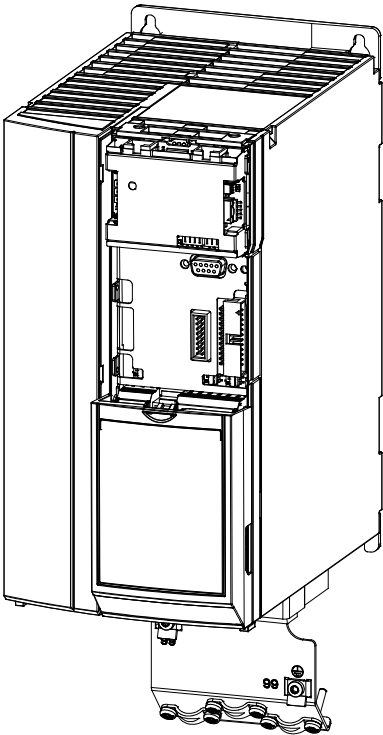
1A



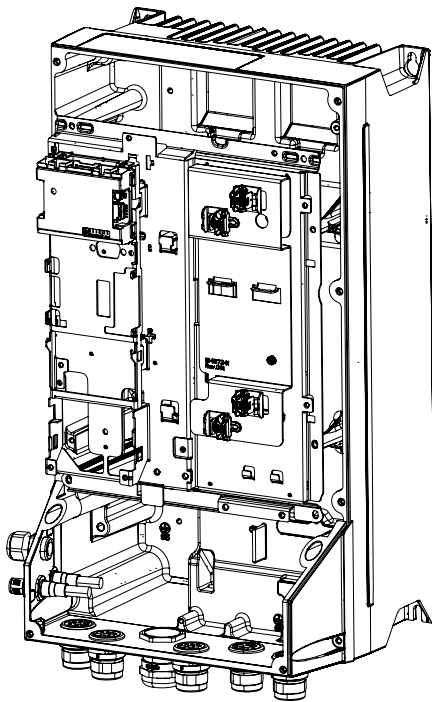
Signal	M12 PIN#	RJ45
TX+	1	1
RX+	2	3
TX-	3	2
RX-	4	6

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A1–A3

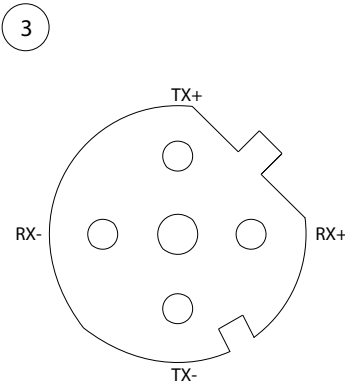
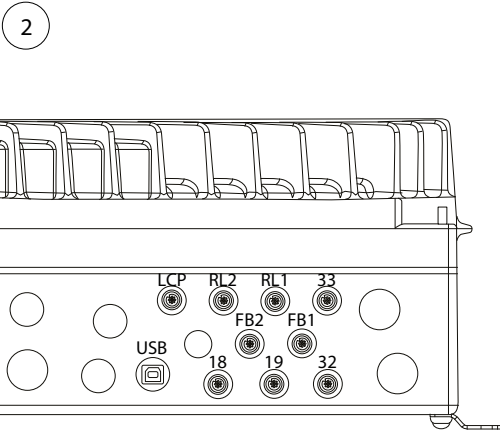
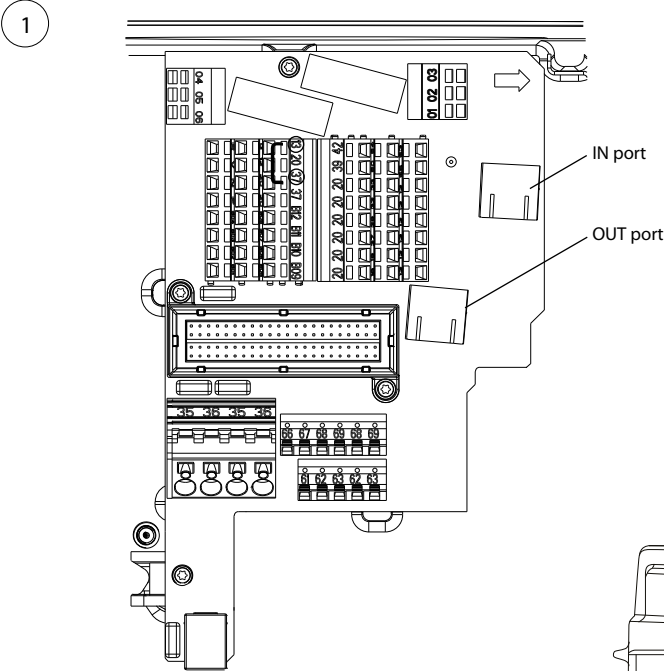


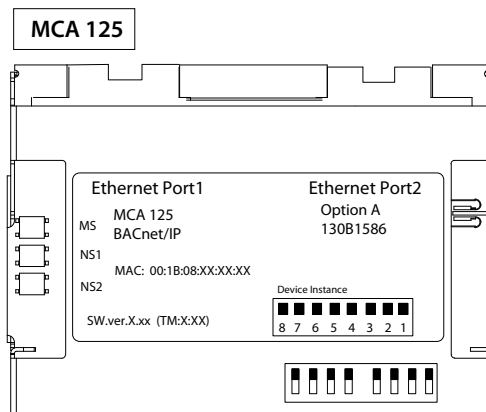
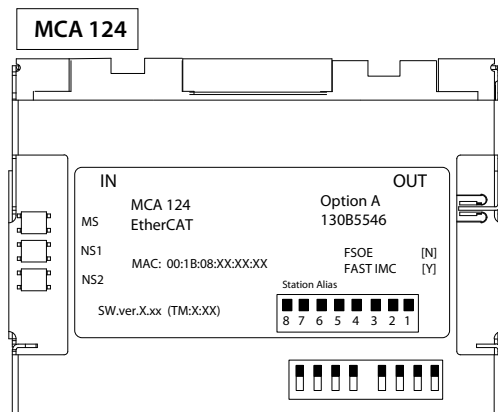
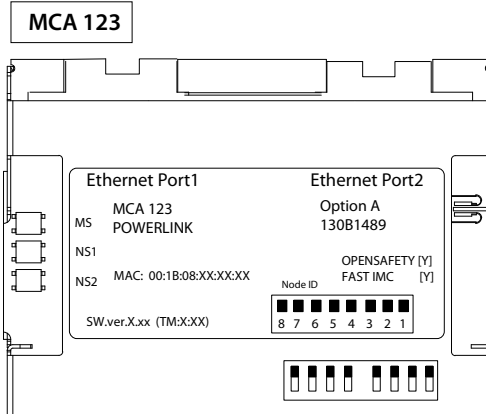
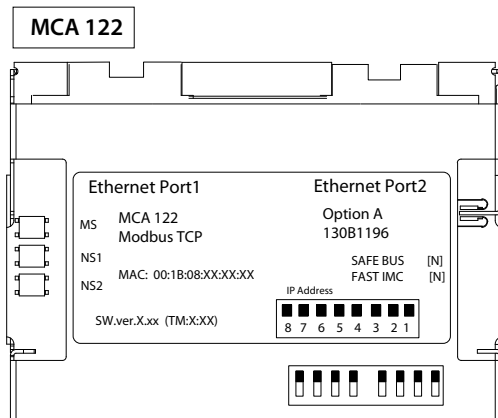
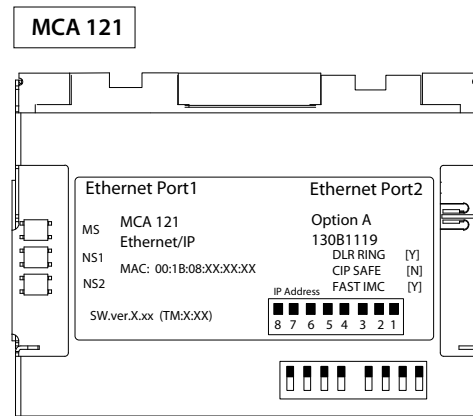
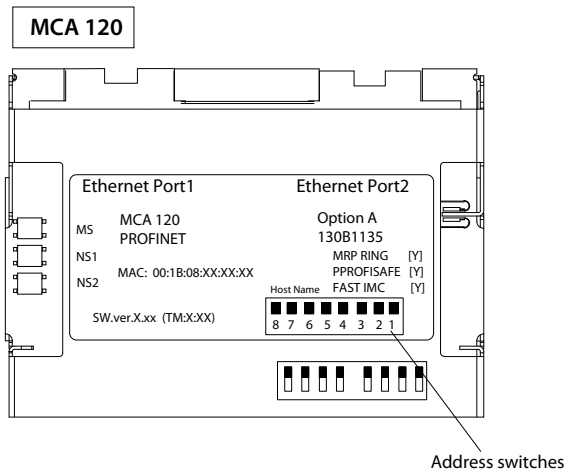
A4–A5, B, C, D, E, F



1B

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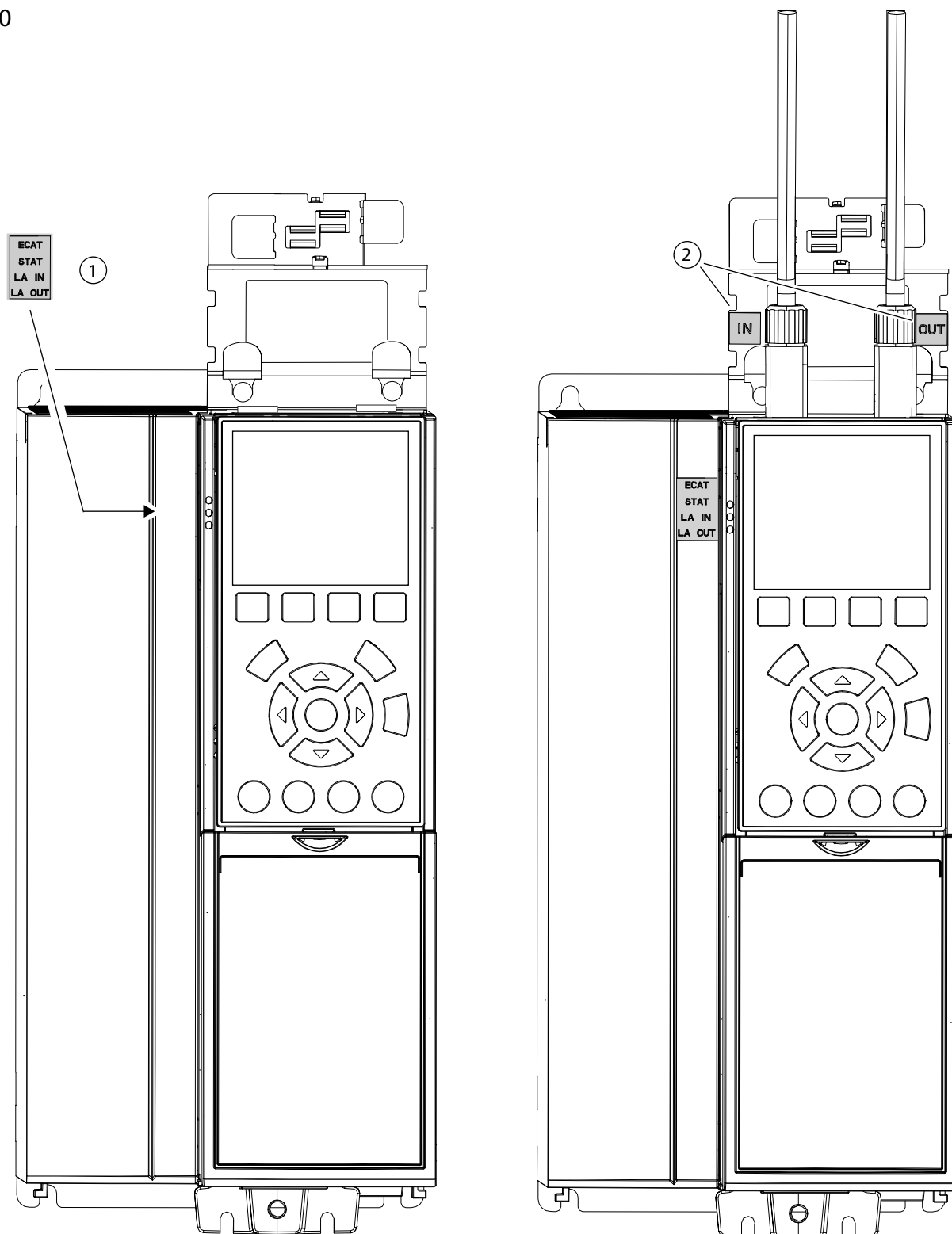


Switch	8	7	6	5	4	3	2	1
VLT® PROFINET MCA 120								
Host name	+128	+64	+32	+16	+8	+4	+2	+1
FC-302-005	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON
FC-302-035	OFF	OFF	ON	OFF	OFF	OFF	ON	ON
FC-302-082	OFF	ON	OFF	ON	OFF	OFF	ON	OFF
FC-302-212	ON	ON	OFF	ON	OFF	ON	OFF	OFF
VLT® EtherNet/IP MCA 121, VLT® Modbus TCP MCA 122, VLT® BACnet/IP MCA 125								
IP address	+128	+64	+32	+16	+8	+4	+2	+1
192.168.1.5	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON
192.168.1.35	OFF	OFF	ON	OFF	OFF	OFF	ON	ON
192.168.1.82	OFF	ON	OFF	ON	OFF	OFF	ON	OFF
192.168.1.147	ON	OFF	OFF	ON	OFF	OFF	ON	ON
VLT® POWERLINK MCA 123, VLT® EtherCAT 124								
Address value	+128	+64	+32	+16	+8	+4	+2	+1
5	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON
35	OFF	OFF	ON	OFF	OFF	OFF	ON	ON
82	OFF	ON	OFF	ON	OFF	OFF	ON	OFF
157	ON	OFF	OFF	ON	ON	ON	OFF	ON

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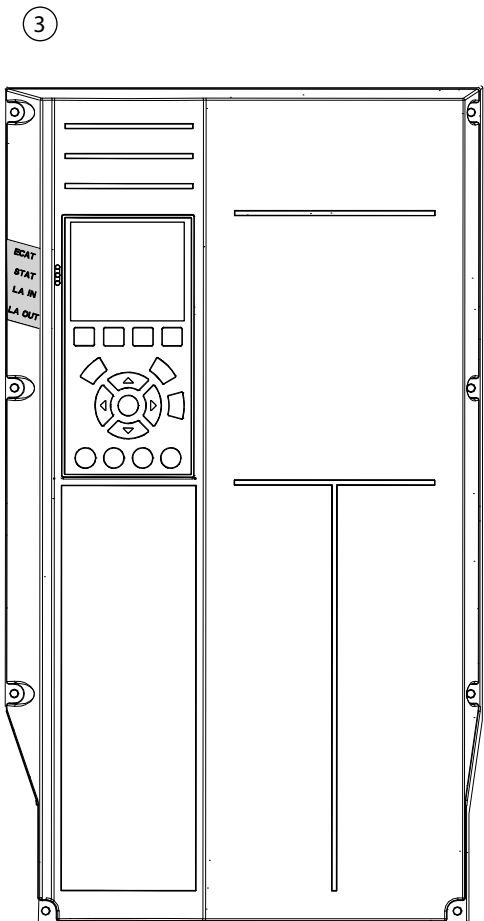
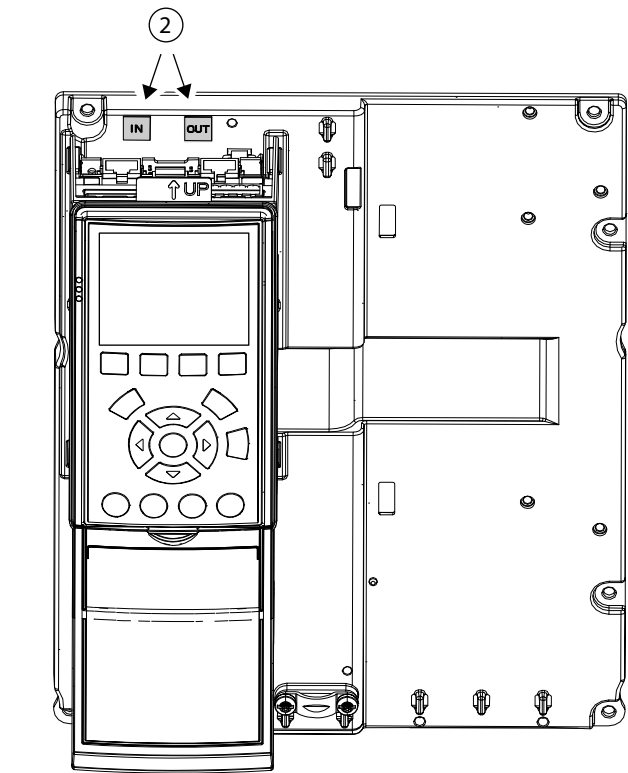
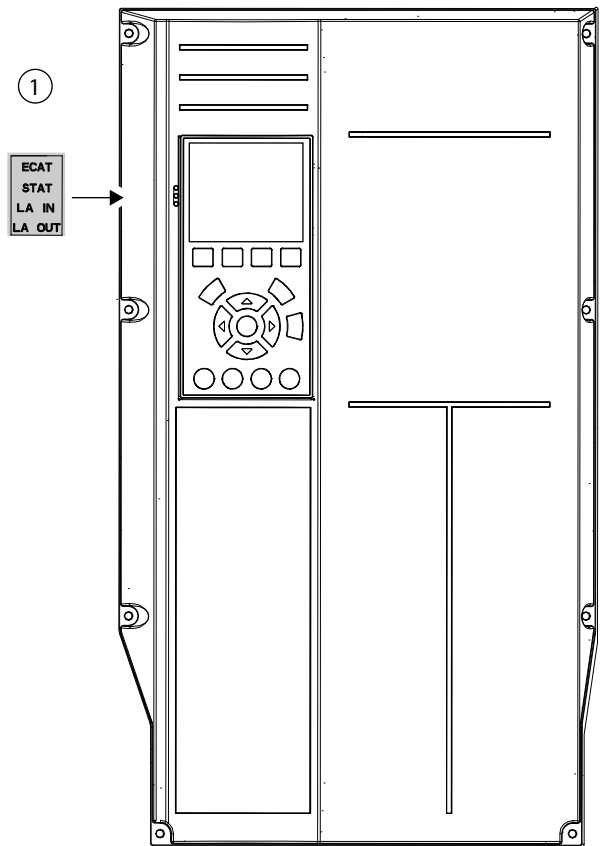
3

IP20

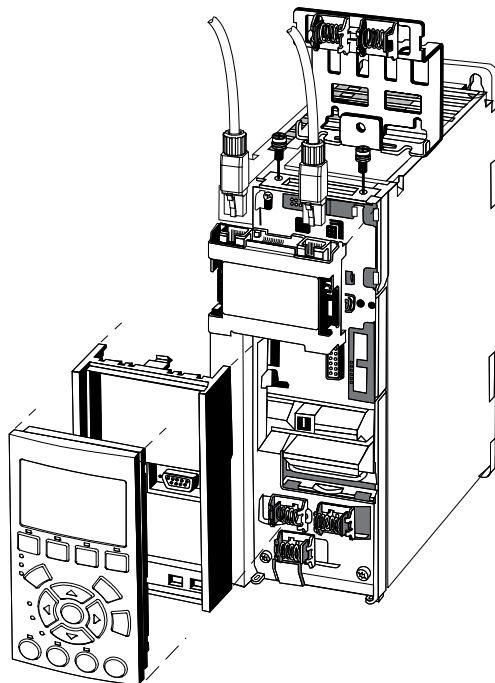


IP21/IP54/IP55/IP66

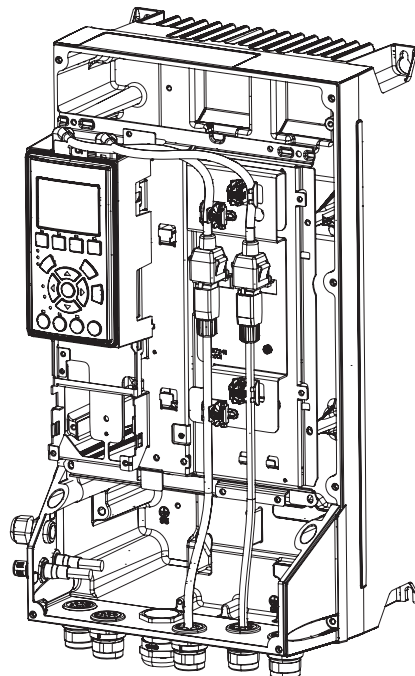
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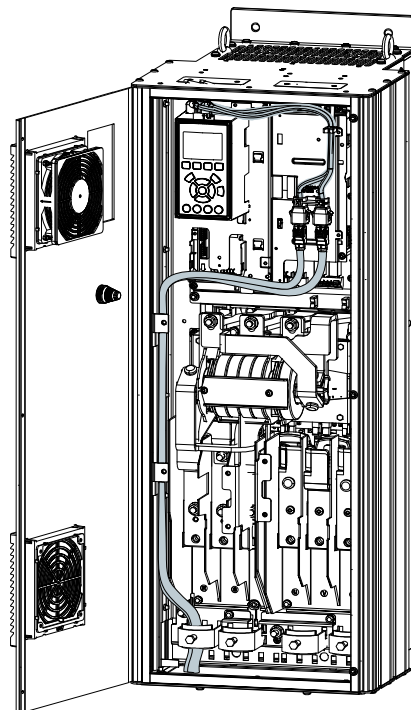
A1–A3



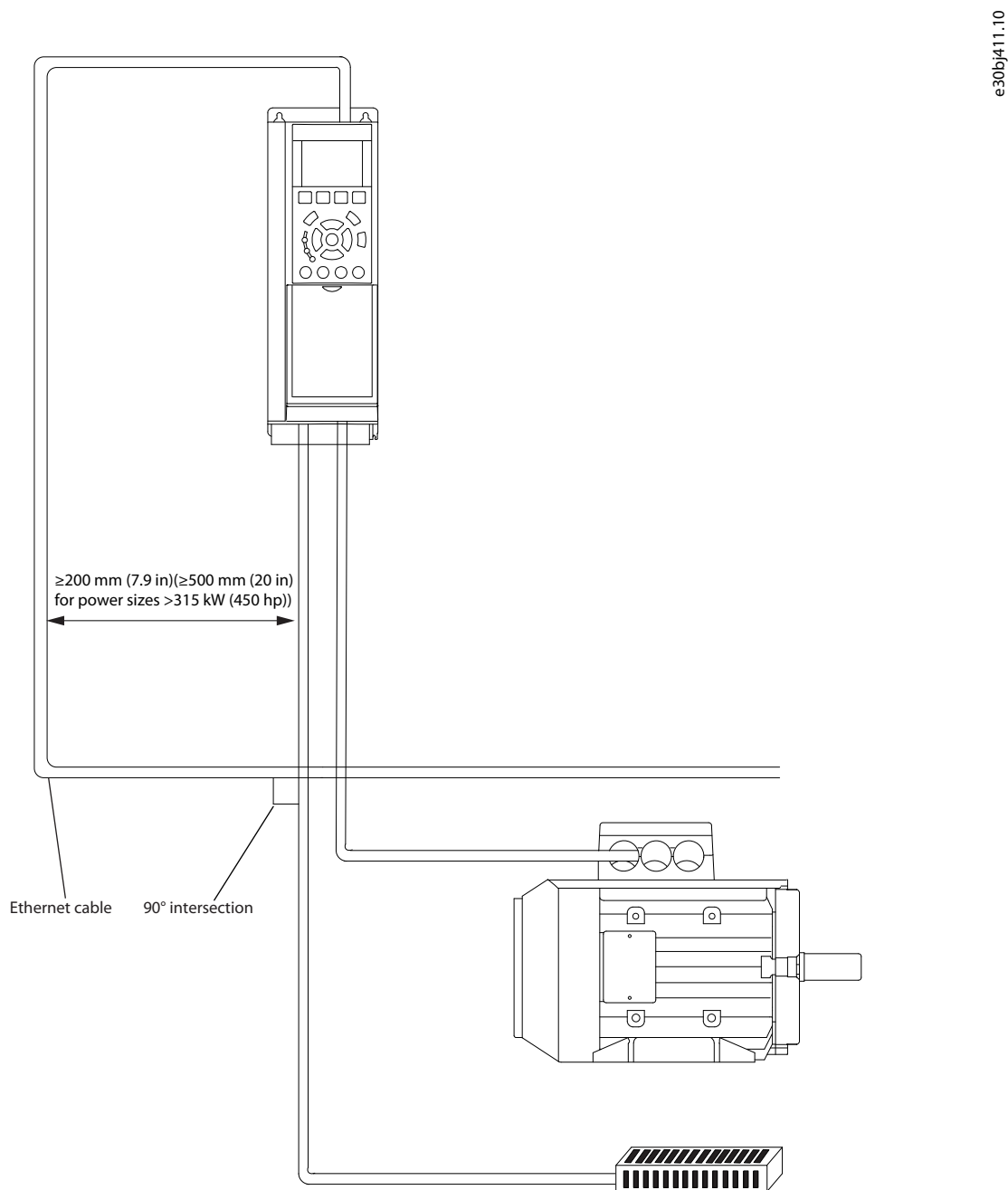
A4–A5, B, C



D, E, F



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