

ENGINEERING  
TOMORROW



Installation Guide

# VLT® Wired Fieldbuses MCA 10x

VLT® FC Series



# 1 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](http://www.danfoss.com).

## 1.2 Qualified Personnel

Only qualified personnel are allowed to install, commission, and maintain Danfoss drives. Qualified personnel are trained individuals who are familiar with and authorized to mount and wire the drive in accordance with pertinent laws and regulations. Also, qualified personnel must be familiar with the instructions and safety measures described in this installation guide.

## 1.3 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.
- Accessory bag (including EMC bracket).
- Installation Guide.

## 1.4 Compatible Product Series

Table 1: Compatible Product Series

Option	FC 102	FC 103	FC 202	FC 301	FC 302	FCD 302
VLT® PROFIBUS DP-V1 MCA 101	X	X	X	X	X	X
VLT® DeviceNet MCA 104	X	–	X	X	X	–
VLT® CANopen MCA 105	–	–	–	X	X	–
VLT® AK-LonWorks MCA 107 for ADAP-Kool®	–	X	–	–	–	–
VLT® LonWorks MCA 108	X	–	–	–	–	–
VLT® BACNet MCA 109	X	–	–	–	–	–

## 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 1 for an exploded view, and for top and bottom cable entry.

### Procedure

1. Check whether the fieldbus option is already mounted in the drive. If already mounted, go to step 6. If not mounted, go to step 2.
2. Remove the LCP or blind cover from the drive.
3. Use a screwdriver to remove the front cover and the LCP cradle.
4. Mount the fieldbus option.
  - Mount the option with the connector facing up for top cable entry, see A in illustration 1.
  - Mount the option with the connector facing down for bottom cable entry, see B in illustration 1.

If an MCB option is already installed, only top cable entry is possible.

5. Remove the knock-out plate from the new LCP cradle.
6. Mount the new LCP cradle.
7. If the drive is the last station on the segment, set the termination switch (shown in illustration 2) on the fieldbus option to ON.

## 1.8 Address Switches

Set the address switches to give the option a unique ID. Select an address range from 0–125 (factory setting 127) according to [Table 2](#).

Table 2: Settings for the Address Switches

Switch	8	7	6	5	4	3	2	1
<b>VLT® PROFIBUS DP-V1 MCA 101</b>								
Address value	Not used	+64	+32	+16	+8	+4	+2	+1
5	Not used	OFF	OFF	OFF	OFF	OFF	OFF	ON
35	Not used	OFF	ON	OFF	OFF	OFF	ON	ON
82	Not used	ON	OFF	ON	OFF	OFF	ON	OFF
<b>VLT® DeviceNet MCA 104</b>								
Adress value	–	–	+32	+16	+8	+4	+2	+1
5	–	–	OFF	OFF	OFF	ON	OFF	ON
20	–	–	OFF	ON	OFF	ON	OFF	OFF
35	–	–	ON	OFF	OFF	OFF	ON	ON
<b>VLT® CANopen MCA 105</b>								
Baudrate								
<i>Parameter 10-01 Baud Rate Select</i>	ON	ON	–	–	–	–	–	–
500 kbps	ON	OFF	–	–	–	–	–	–
250 kbps	ON	ON	–	–	–	–	–	–
125 kbps	ON	OFF	–	–	–	–	–	–
Node ID								

Switch	8	7	6	5	4	3	2	1
Parameter 10-02 MAC ID	–	–	ON	ON	ON	ON	ON	ON
62	–	–	ON	ON	ON	ON	ON	OFF
1	–	–	OFF	OFF	OFF	OFF	OFF	ON

Alternatively, assign a unique ID via *parameter 9-18 Node Address* for PROFIBUS or *parameter 10-02 MAC ID* for CANopen or DeviceNet. For setting the address from *parameter 9-18 Node Address*, ensure that all address switches are set to ON. If the address is already set by using address hardware switches, the address value shown in *parameter 9-18 Node Address* is read-only.

## 1.9 Cabling Requirements

- Terminate the nodes at the physical ends of each segment. If the bus segment is branched, the device furthest from the segment connector represents the end of the segment.
- For PROFIBUS, terminals 66 and 67 provide a 5 V DC supply, available for external termination.
- For DeviceNet, terminals 1 and 5 provide a 24 V DC supply.
- For CANopen, terminals 2 and 4 provide signal, and terminal 3 provides shield.

For cable routing, refer to illustration 3.

### NOTICE

The PROFIBUS D-sub 9 adapter also features a termination switch. When the D-sub 9 adapter is used, set the termination switch on the fieldbus option to OFF to avoid double termination.

### NOTICE

When the fieldbus is extended with a repeater, terminate the extension at both ends.

### NOTICE

To avoid impedance mismatch, use the same cable type throughout the entire network.

## 1.10 Cable Specifications

Table 3: Cable Specifications, VLT® PROFIBUS DP-V1 MCA 101

Impedance at a measuring frequency from 3–20 MHz	135–165 Ω
Resistance	<110 Ω/km
Capacitance	<30 pF/m
Damping (total wire length)	Maximum 9 dB over the whole wire length.
Cross-section	Maximum 0.34 mm <sup>2</sup> , AWG 22.
Cable type	Twisted in pairs, 1 x 2, 2 x 2, or 1 x 4 wires.
Shielding	Copper-braided shield, or braided shield and foil shield.

## 1.11 Bus Segment Requirements

A maximum of 32 field devices (nodes) can be connected per fieldbus segment. Field devices include:

- Drive, active node.
- Master, active node.
- Repeater, passive node.

## N O T I C E

A repeater represents a node in each of the 2 segments it connects.

### Maximum fieldbus cable length

To see the maximum number of drives per segment, refer to illustration 4.

**Table 4: Number of Active Nodes per Segment**

Segment	Repeater	Active nodes
1	0	32
2	1	62
3	2	92
4	3	122

**Table 5: Maximum Total Bus Cable Length, including Drop Cables, VLT® PROFIBUS DP-V1 MCA 101**

Transmission speed	1 segment [m (ft)]	2 segments [m (ft)]	3 segments [m (ft)]	4 segments [m]
9.6–187.5 kBaud	1000 (3280)	2000 (6562)	3000 (9842)	4000
500 kBaud	400 (1312)	800 (2624)	1200 (3936)	1600
1.5 MBaud	200 (656)	400 (1312)	600 (1969)	800
3–12 MBaud	100 (328)	200 (656)	300 (984)	400

**Table 6: Maximum Drop Cable Length per Segment, VLT® PROFIBUS DP-V1 MCA 101**

Transmission speed	Maximum drop cable length per segment [m (ft)]
9.6–93.75 kBaud	96 (315)
187.5 kBaud	75 (246)
500 kBaud	30 (98)
1.5 MBaud	10 (33)
3–12 MBaud	None

**Table 7: Maximum Total Bus Cable Length, including Drop Cables, VLT® DeviceNet MCA 104**

Transmission speed	1 segment [m (ft)]
125 kBaud	656 (2152)
250 kBaud	328 (1076)
500 MBaud	139 (456)

**Table 8: Maximum Drop Cable Length, VLT® DeviceNet MCA 104**

Transmission speed	1 segment [m (ft)]
125 kBaud	156 (512)
250 kBaud	78 (256)
500 MBaud	39 (128)

The length statements in [Table 5](#) and [Table 6](#) are valid for bus cables with the properties in [1.10 Cable Specifications](#).

## NOTICE

Do not use drop cables with VLT® CANOpen MCA 105.

### 1.12 Wiring Procedure, Enclosure Sizes A1–A3

#### Procedure

1. Mount the fieldbus connector on the fieldbus option (terminals 62, 63, 66, and 67). For top cable entry, mount the supplied EMC bracket with 2 screws on top of the drive.
2. Prepare the fieldbus cable by stripping a section of the cable insulation so that the cable shield is in contact with the EMC bracket. Keep the unshielded wire as short as possible. For cable specifications, refer to [1.10 Cable Specifications](#). For fieldbus cable requirements, see [1.11 Bus Segment Requirements](#).
3. Connect the fieldbus cable wires to the terminals according to the color codes of the wires. See illustration 5.
4. To establish mechanical fixation and electrical contact between cable shield and ground, position the stripped cable between the spring loaded metal clamps, see illustration 6.

### 1.13 Wiring Procedure, Enclosure Sizes A4–A5, B, and C

#### Procedure

1. Push the cable through the cable glands.
2. Mount the fieldbus connector on the fieldbus option (terminals 62, 63, 66, and 67).
3. Prepare the fieldbus cable by stripping a section of the cable insulation. Keep the unshielded wire as short as possible. For cable specifications, refer to [1.10 Cable Specifications](#). For fieldbus cable requirements, see [1.11 Bus Segment Requirements](#).
4. Connect the fieldbus cable wires to the terminals according to the color codes of the wires, see illustration 5.
5. Fix the cable shield to the metal base plate using cable clamp or cable tie, see illustration 6.
6. Tighten cable glands securely.

### 1.14 Wiring Procedure, Enclosure Sizes D, E, and F

#### Procedure

1. Mount the fieldbus connector on the fieldbus option (terminals 62, 63, 66, and 67).
2. Prepare the fieldbus cable by stripping a section of the cable insulation. Keep the unshielded wire as short as possible. For cable specifications, refer to [1.10 Cable Specifications](#). For fieldbus cable requirements, see [1.11 Bus Segment Requirements](#).
3. Connect the fieldbus cable wires to the terminals according to the color codes of the wires, see illustration 5.
4. Fix the cable shield to the metal base plate using cable clamp or cable tie, see illustration 6.
5. Tie down the cable and route it with other control wires inside the unit, see illustration 6.

### 1.15 DeviceNet and CANopen Termination

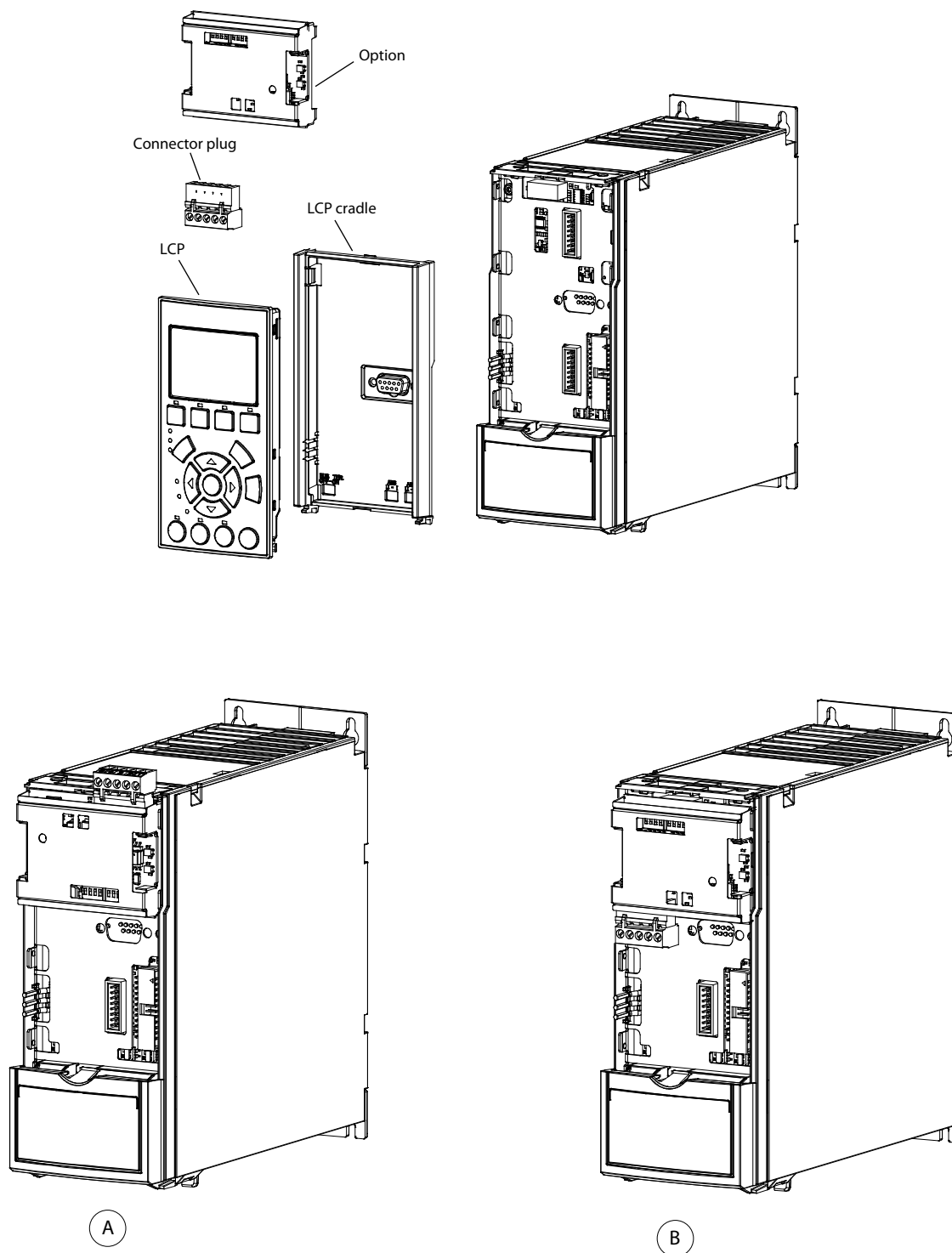
#### Procedure

1. Install the termination resistors at each end of the bus line.
2. Mount the resistor between terminal 2 (CAN\_L) and terminal 4 (CAN\_H), refer to illustration 7.

## 2 Illustrations

1

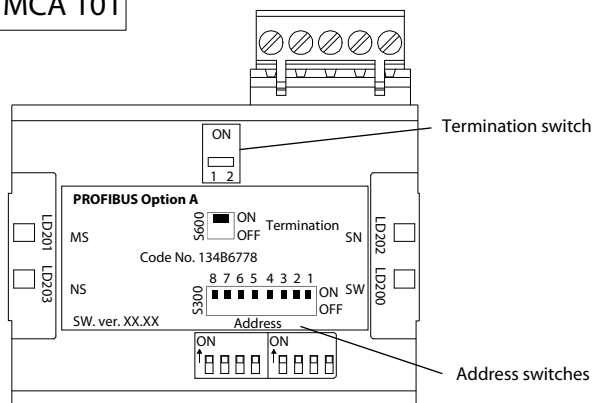
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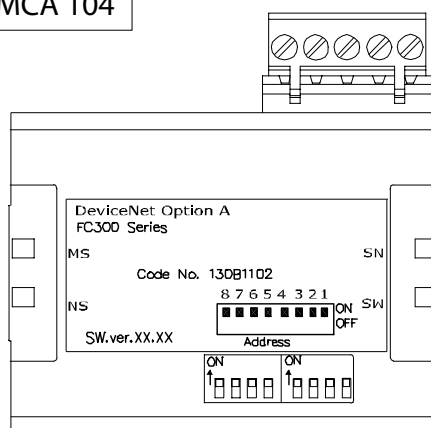


## Address and Termination Switches

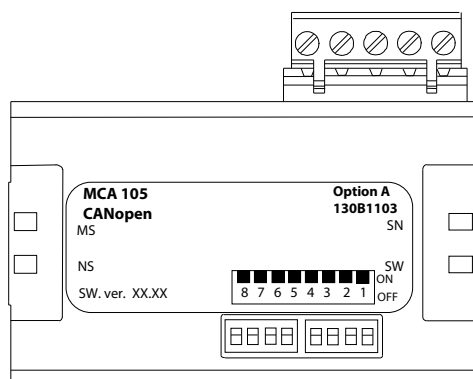
MCA 101



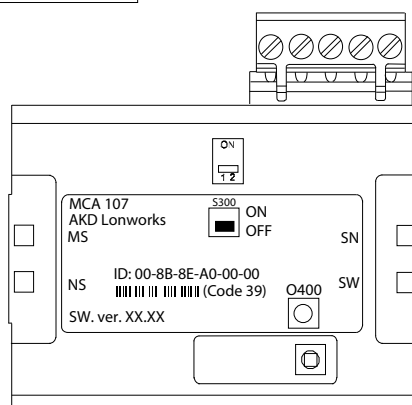
MCA 104



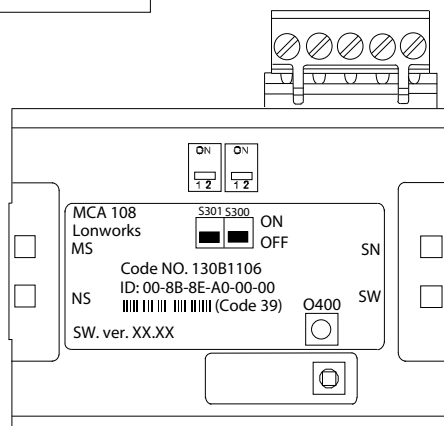
MCA 105



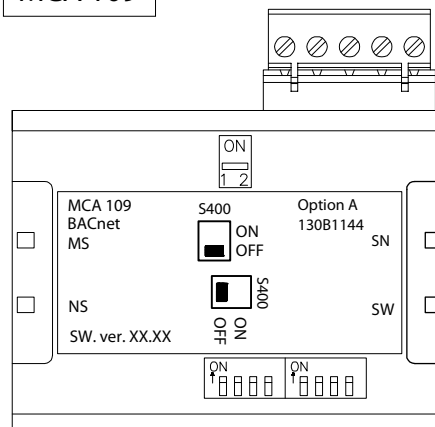
MCA 107



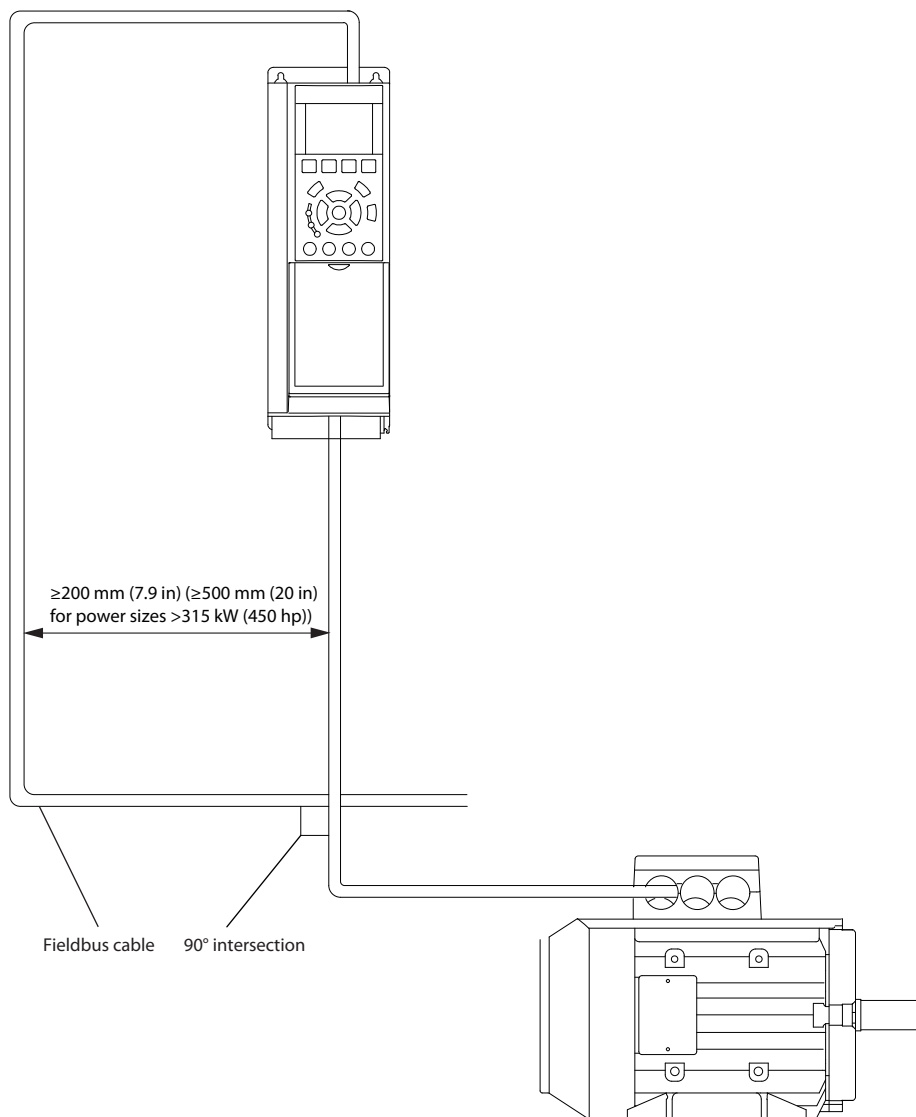
MCA 108



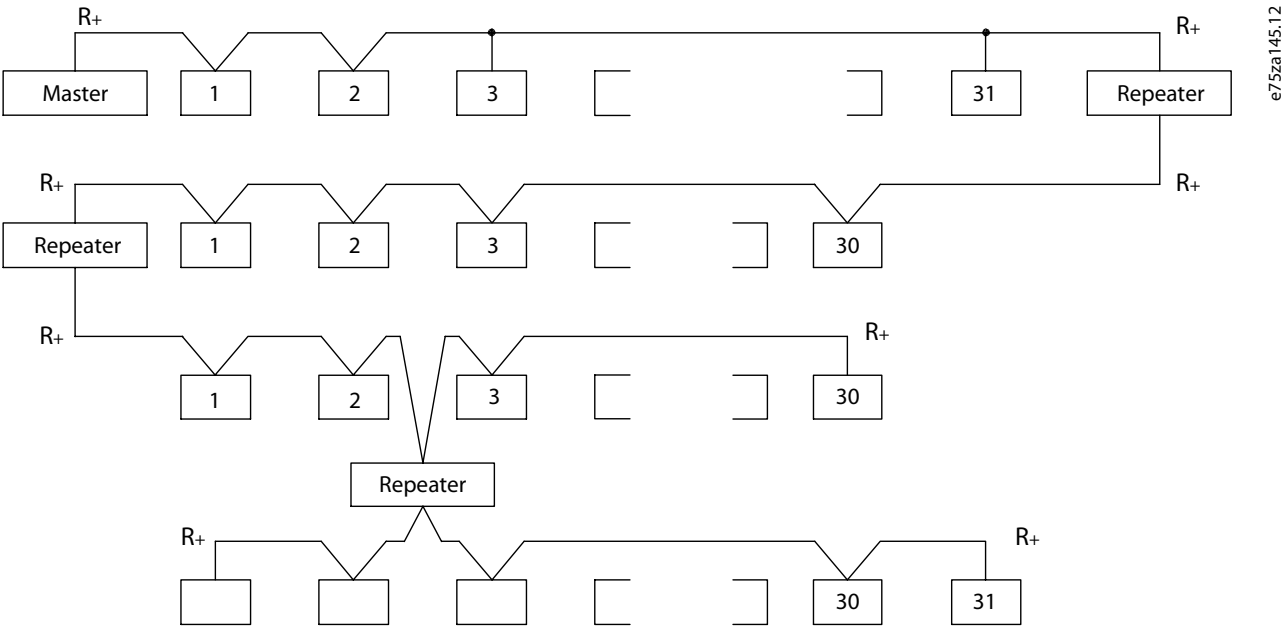
MCA 109



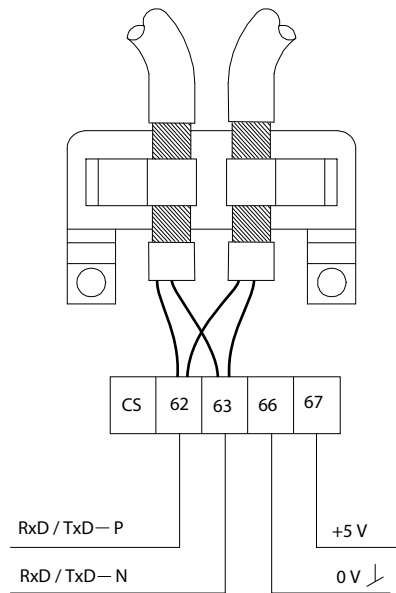
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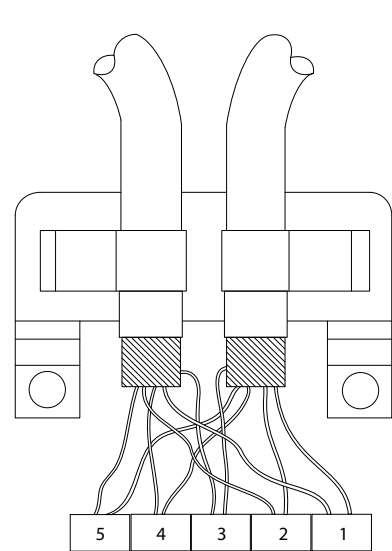
4



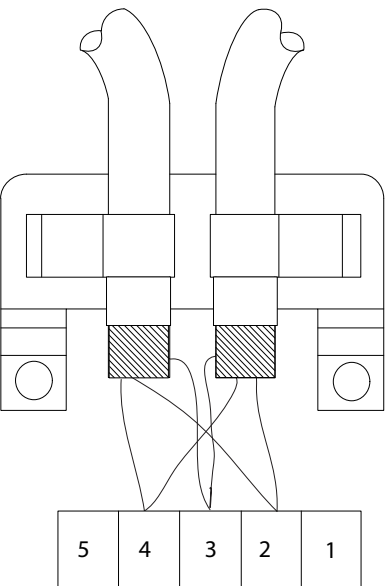
MCA 101 & 109



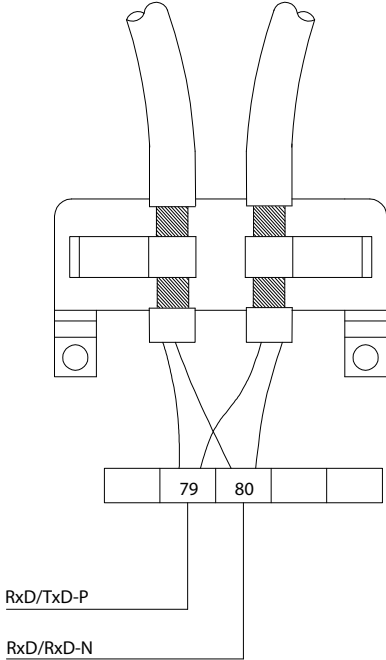
MCA 104



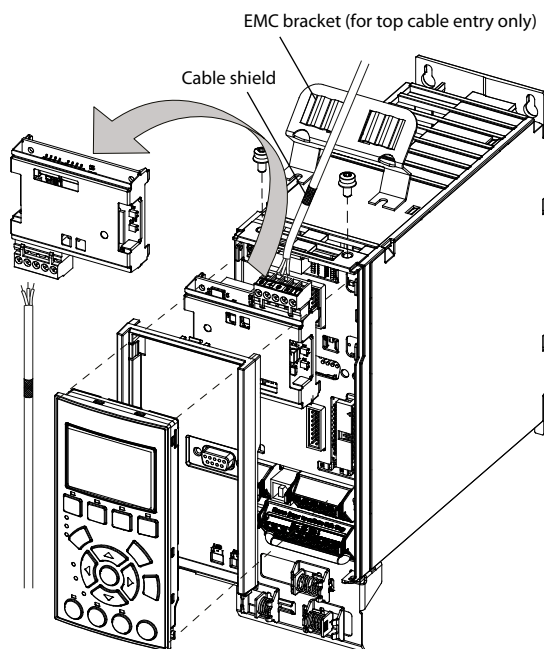
MCA 105



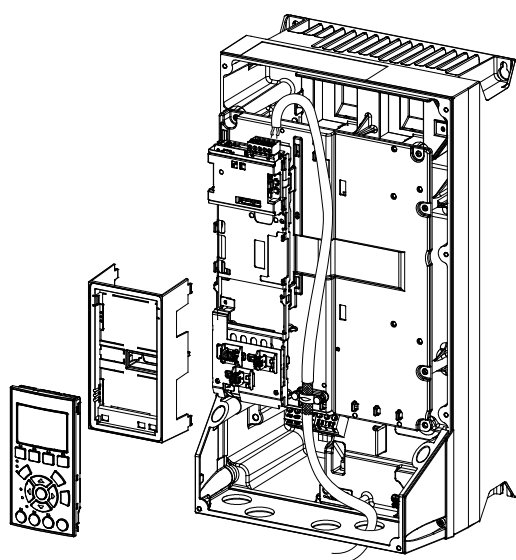
MCA 107 & 108



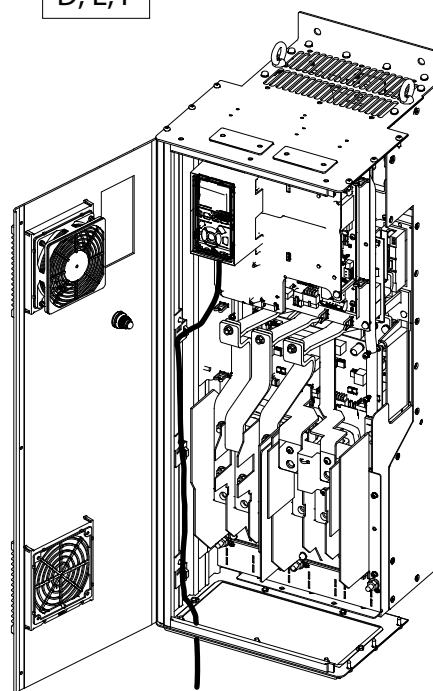
A1–A3



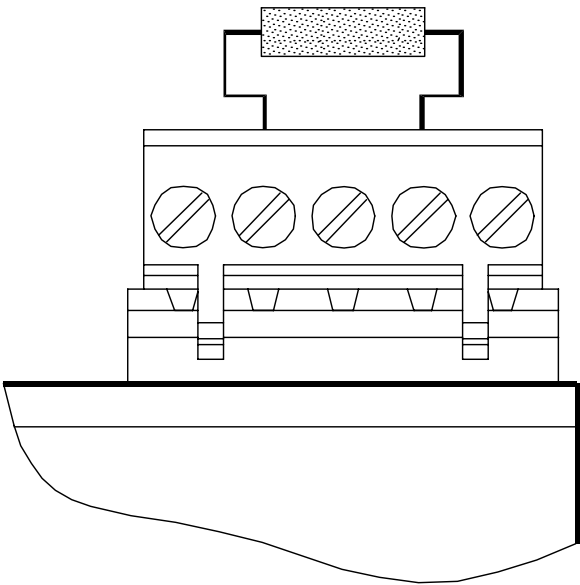
A4–A5, B, C



D, E, F



7



Resistor specifications
120 Ω
1% metal film
1/4 W

e30bj422.10



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