

## Installation Instructions

# VLT<sup>®</sup> Line Filter MCC 107 EMC Filter Series

# VLT<sup>®</sup> Midi Drive FC 280 (K1–K3)

These instructions provide technical and installation information for the MCC 107 EMC filter series.

Only Danfoss qualified personnel is allowed to install this equipment. The personnel must be familiar with the instructions and safety measures described in the VLT<sup>®</sup> Midi Drive FC 280 Operating Guide.

## Ordering Numbers

Description	Ordering number
MCC 107 for VLT <sup>®</sup> Midi Drive FC 280 K1S2 <sup>1)</sup>	134B5466
MCC 107 for VLT <sup>®</sup> Midi Drive FC 280 K2S2 <sup>1)</sup>	134B5467
MCC 107 for VLT <sup>®</sup> Midi Drive FC 280 K1T4 <sup>1)</sup>	134B5463
MCC 107 for VLT <sup>®</sup> Midi Drive FC 280 K2T4 <sup>1)</sup>	134B5464
MCC 107 for VLT <sup>®</sup> Midi Drive FC 280 K3T4 <sup>1)</sup>	134B5465

**Table 1.1 Ordering Numbers**

1) K1–K3 is 3 enclosure sizes of VLT<sup>®</sup> Midi Drive FC 280.

S2 represents 1x200–240 V. T4 represents 3x380–480 V.

For VLT<sup>®</sup> Midi Drive FC 280 T4, only H1 version is optimized to operate with the EMC filters installed.

## Tools Required

- SZS 0.6x3.5 mm slot screwdriver for EMC filter terminals.

## Safety Instructions

### **⚠ WARNING**

#### DISCHARGE TIME

The frequency converter contains DC-link capacitors which can remain charged even when the frequency converter is not powered. High voltage can be present even when the warning LED indicator lights are off. Failure to wait the specified time after power has been removed before performing service or repair work can result in death or serious injury.

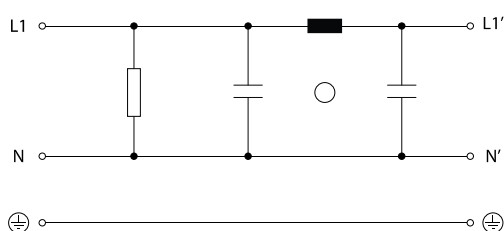
- Stop the motor.
- Disconnect AC mains and remote DC-link supplies, including battery back-ups, UPS, and DC-link connections to other frequency converters.
- Disconnect or lock PM motor.
- Wait for the capacitors to discharge fully. The minimum waiting time is specified in Table 1.2.
- Before performing any service or repair work, use an appropriate voltage measuring device to make sure that the capacitors are fully discharged.

Voltage [V]	Power range [kW (hp)]	Minimum waiting time (minutes)
200–240	0.37–2.2 (0.5–3)	4
380–480	0.37–7.5 (0.5–10)	4

**Table 1.2 Discharge Time**

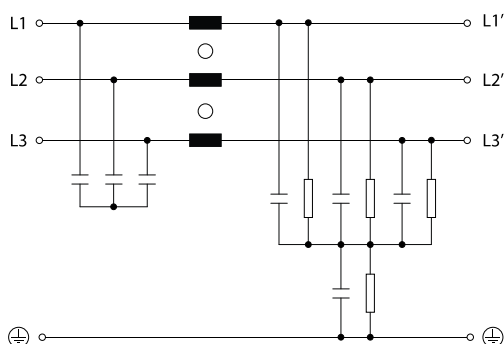
## Product Overview

Illustration 1.1 and Illustration 1.2 show the typical circuit diagram of the EMC filters.



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Illustration 1.1 Circuit Diagram for 1-phase EMC Filter



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Illustration 1.2 Circuit Diagram for 3-phase EMC Filter

Number of phases	1		3		
Rated voltage [V]	1x200–240 ±10%		3x380–480 ±10%		
Rated frequency [Hz]	50–60				
EMC filter ordering number 134B5xxx	466	467	463	464	465
Frequency converter enclosure size	K1S2	K2S2	K1T4	K2T4	K3T4
Rated current in [A]	11	15	5	11.6	16
Power loss [W]	6.0	9.1	3.8	9.4	12.4
Maximum leakage current [mA] <sup>1)</sup>	0	0	187	124.8	124.8
Maximum leakage current [mA] <sup>2)</sup>	0	0	19.5	13	13
High-voltage test [V-]	2100 Line-neutral		2780 Line-line		
	2700 Line-case		2780 Line-case		

Table 1.4 Technical Data

1) Calculated for maximum line voltage tolerance, by loss of 2 phases (typical @ 50 Hz).

2) Maximum allowed voltage fluctuation in accordance with IEC 38 ±10%.

Table 1.3 and Table 1.4 show the operating conditions and technical data of the EMC filters.

Enclosure protection rating	IP20
Ambient temperature	50 °C (122 °F)
Climatic category	25/085/21 [in accordance with EN 60068-1]
Type of cooling	Ambient natural air
Operating conditions	Continuous
Derating > 50 °C (122 °F)	-3% / K
Derating > 1000 m (3281 ft)	5% / 1000 m (3281 ft)

Table 1.3 Operating Conditions

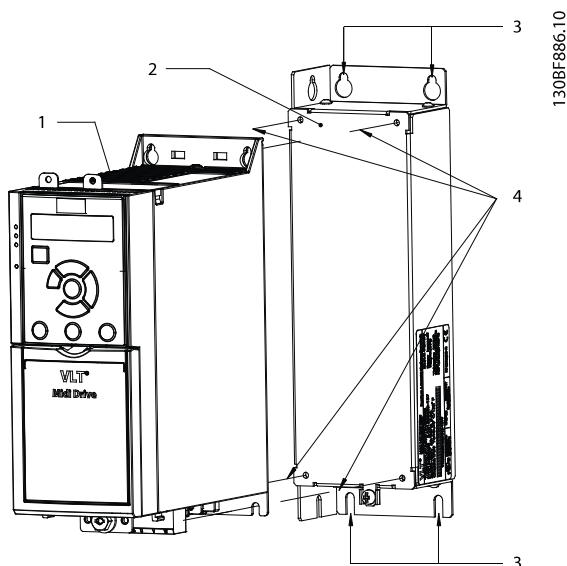
## Mechanical Installation

The EMC filters support 2 mounting styles.

- Footprint installation
- Side-by-side installation

### Footprint installation

1. Mount the EMC filter on the wall, and mount the frequency converter on the EMC filter. Fasten with recommended screws. Refer to *Illustration 1.3*.

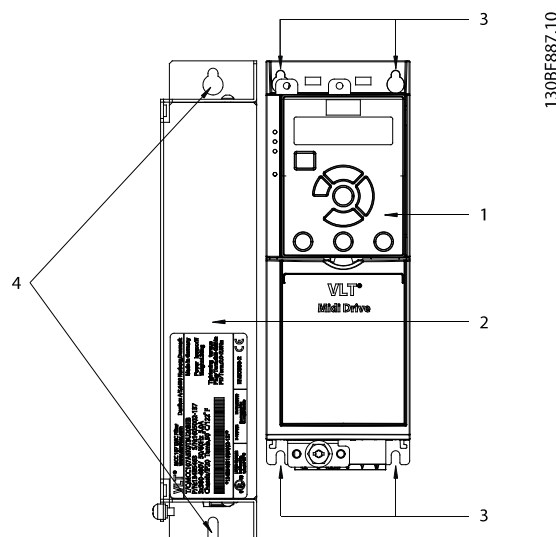


1	Frequency converter
2	EMC filter
3	Recommended screws: 4 pieces M5 screws (Not supplied by Danfoss)
4	Recommended screws (length: 10–20 mm/0.39–0.79 in): 4 pieces M4 screws for K1T4/K1S2, or 4 pieces M5 screws for K2T4/K2S2/K3T4 (Not supplied by Danfoss)

Illustration 1.3 Footprint Installation

### Side-by-side installation

1. Mount the frequency converter and the EMC filter on the wall side by side, and fasten with recommended screws. Refer to *Illustration 1.4*.



1	Frequency converter
2	EMC filter
3	Recommended screws: 4 pieces M4 screws for K1T4/K1S2, or 4 pieces M5 screws for K2T4/K2S2/K3T4 (Not supplied by Danfoss)
4	Recommended screws: 2 pieces M5 screws (Not supplied by Danfoss)

Illustration 1.4 Side-by-side Installation

## Electrical Installation

1. Connect the cables and fasten the screws as shown in *Illustration 1.5* and *Illustration 1.6*. Refer to *Table 1.5* for the tightening torque of EMC filter terminals.

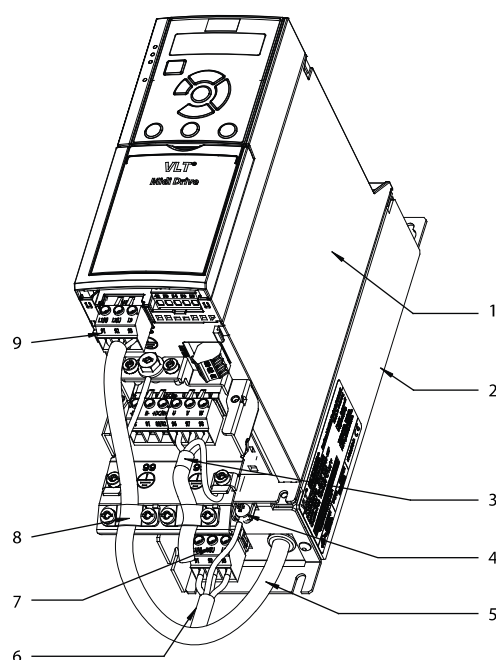
- 1a Connect the EMC filter mains output cable to the frequency converter mains input terminal block (terminals N (91) and L (92) for single-phase, or terminals L1 (91), L2 (92), and L3 (93) for 3-phase).
- 1b Connect the frequency converter mains input terminal block to the frequency converter mains input.
- 1c Secure the cable with the cable clamp.

### **WARNING**

#### **ELECTRICAL HAZARD**

Touching the wires of the mains input while they are not switched off can result in death or serious injury.

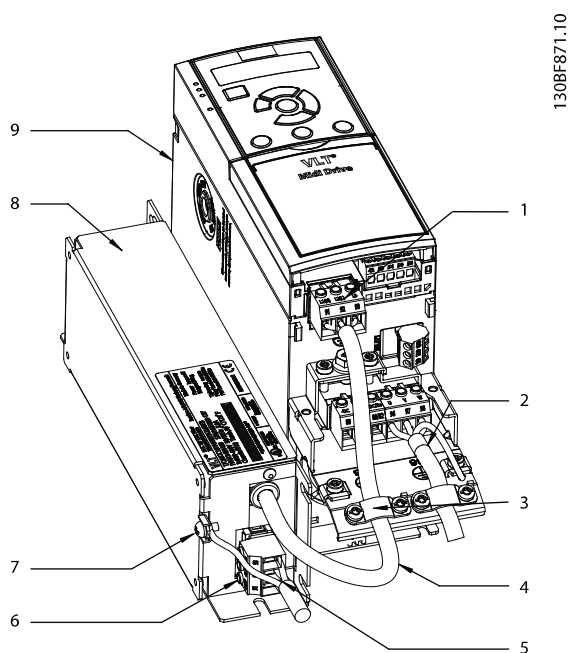
- Before continuing, use an appropriate voltage measuring device to make sure that the mains input is switched off.
  - Ensure that the mains input cannot be switched on by a third party, while you are working.
- 1d Connect the wires of the EMC filter mains input cable to the EMC filter mains input terminal block (terminals N (91) and L (92) for single-phase, or terminals L1 (91), L2 (92), and L3 (93) for 3-phase).
  - 1e Connect the EMC filter mains input terminal block to the EMC filter mains input.
  - 1f Connect the ground wire of the EMC filter mains input cable to the EMC filter PE terminal.



1	Frequency converter
2	EMC filter
3	Cable connecting the frequency converter with the motor
4	EMC filter PE terminal
5	EMC filter mains output cable
6	EMC filter mains input cable
7	EMC filter mains input terminal block
8	Cable clamp
9	Frequency converter mains input terminal block

**Illustration 1.5 Cable Connections for Footprint Installation**

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1	Frequency converter mains input terminal block
2	Cable connecting the frequency converter with the motor
3	Cable clamp
4	EMC filter mains output cable
5	EMC filter mains input cable
6	EMC filter mains input terminal block
7	EMC filter PE terminal
8	EMC filter
9	Frequency converter

Illustration 1.6 Cable Connections for Side-by-side Installation

Mains input terminal	0.5–0.8 Nm (4.4–7.1 in-lb)
PE terminal	2.0–2.5 Nm (17.7–22.1 in-lb)

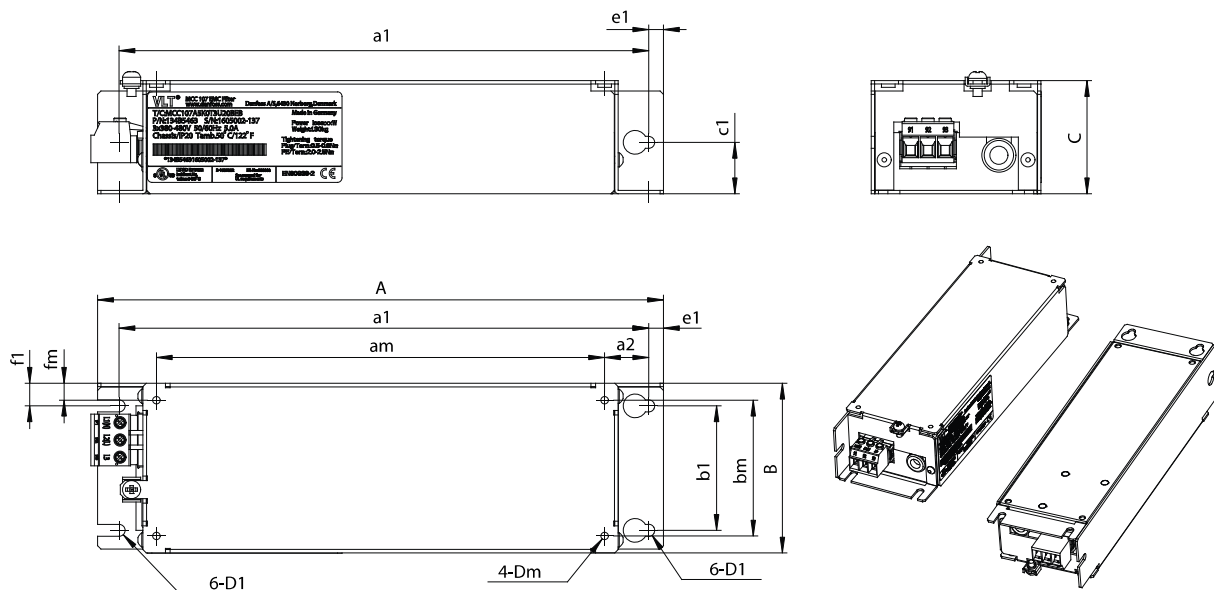
Table 1.5 Tightening Torque for EMC Filter Terminals

EMC filter ordering number 134B5xxx	466	467	463	464	465
Frequency converter enclosure size	K1S2	K2S2	K1T4	K2T4	K3T4
Input [mm <sup>2</sup> (AWG)]	3x4 (12)				
Output [mm <sup>2</sup> (AWG)]	1.5 (16)	4 (12)	0.75 (18)	1.5 (16)	4 (12)
	Cable length for L1'/L2'/L3'(L1'/N'): 280±5 mm (11.0±0.2 in). Cable length for PE terminal: 220±5 mm (8.7±0.2 in).				
Mains input terminal	M3				
PE terminal	M4				

Table 1.6 Specifications for EMC Filter Terminals

## Mechanical Data

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EMC filter ordering number	134B5466	134B5467	134B5463	134B5464	134B5465
Frequency converter enclosure size	K1S2	K2S2	K1T4	K2T4	K3T4
Dimensions A [mm (in)]	250 (9.8)	312.5 (12.3)	250 (9.8)	312.5 (12.3)	
Dimensions a1 [mm (in)]	234 (9.2)	303 (11.9)	234 (9.2)	303 (11.9)	
Dimensions a2 [mm (in)]	19.5 (0.77)	21.3 (0.84)	19.5 (0.77)	21.3 (0.84)	
Dimensions am [mm (in)]	198 (7.8)	260 (10.2)	198 (7.8)	260 (10.2)	
Dimensions B [mm (in)]	75 (2.95)	90 (3.54)	75 (2.95)	90 (3.54)	115 (4.53)
Dimensions b1 [mm (in)]	55 (2.17)	70 (2.76)	55 (2.17)	70 (2.76)	90 (3.54)
Dimensions bm [mm (in)]	60 (2.36)	70 (2.76)	60 (2.36)	70 (2.76)	90 (3.54)
Dimensions C [mm (in)]	50 (1.97)				
Dimensions c1 [mm (in)]	22.7 (0.89)				
Dimensions D1 [mm (in)]	Ø5.3 (Ø0.21)				
Dimensions Dm [mm (in)]	M4	M5	M4	M5	
Dimensions e1 [mm (in)]	6.5 (0.26)	5 (0.20)	6.5 (0.26)	5 (0.20)	
Dimensions f1 [mm (in)]	10 (0.39)				12.5 (0.49)
Dimensions fm [mm (in)]	7.5 (0.30)	10 (0.39)	7.5 (0.30)	10 (0.39)	12.5 (0.49)
Mounting screws for EMC filter	M5				
Mounting screws for frequency converter	M4	M5	M4	M5	
Weight [kg (lb)]	1.10 (2.43)	1.50 (3.31)	1.20 (2.65)	1.90 (4.19)	2.10 (4.63)

**Illustration 1.7 Mechanical Data**

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