

## Installation Instructions

# Internal Mains Fuse Replacement for VLT<sup>®</sup> Drives, 0.25–90 kW (0.3–125 hp) FC 102/FC 103/FC 202/FC 301/FC 302

### 1.1 Introduction

The instructions provide information about the replacement of internal mains fuses for single-phase and 3-phase drives in A, B, and C enclosures. This kit is designed and tested for the North American market.

|              | A2 | A3 | A5 | B1 | B2 | C1 | C2 |
|--------------|----|----|----|----|----|----|----|
| Single-phase | —  | —  | X  | X  | X  | X  | X  |
| 3-phase      | X  | X  | X  | X  | X  | X  | X  |

Table 1.1 Supported Enclosures

### 1.2 Safety Instructions

#### **⚠ WARNING**

##### DISCHARGE TIME

The drive contains DC-link capacitors, which can remain charged even when the drive 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 power supplies, including battery back-ups, UPS, and DC-link connections to other drives.
- Disconnect or lock PM motor.
- Wait for the capacitors to discharge fully. The minimum waiting time is specified in *Table 1.2* and *Table 1.3*, and is also visible on the nameplate on top of the drive.
- 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) |
|-------------|-------------------------|--------------------------------|
| 208–230     | 0.25–3.7 kW (0.3–5 hp)  | 4                              |
|             | 5.5–45 kW (7.5–60 hp)   | 15                             |
| 460–480     | 0.25–7.5 kW (0.3–10 hp) | 4                              |
|             | 11–90 kW (15–125 hp)    | 15                             |
| 575–600     | 0.75–7.5 kW (1.0–10 hp) | 4                              |
|             | 11–90 kW (15–125 hp)    | 15                             |

Table 1.2 Discharge Time for VLT<sup>®</sup> HVAC Drive FC 102,

VLT<sup>®</sup> Refrigeration Drive FC 103, and VLT<sup>®</sup> AQUA Drive FC 202

| Voltage [V] | Power range [kW (hp)]   | Minimum waiting time (minutes) |
|-------------|-------------------------|--------------------------------|
| 208–230     | 0.25–3.7 kW (0.3–5 hp)  | 4                              |
|             | 5.5–37 kW (7.5–50 hp)   | 15                             |
| 460–480     | 0.25–7.5 kW (0.3–10 hp) | 4                              |
|             | 11–75 kW (15–100 hp)    | 15                             |
| 575–600     | 0.75–7.5 kW (1–10 hp)   | 4                              |
|             | 11–75 kW (15–100 hp)    | 15                             |

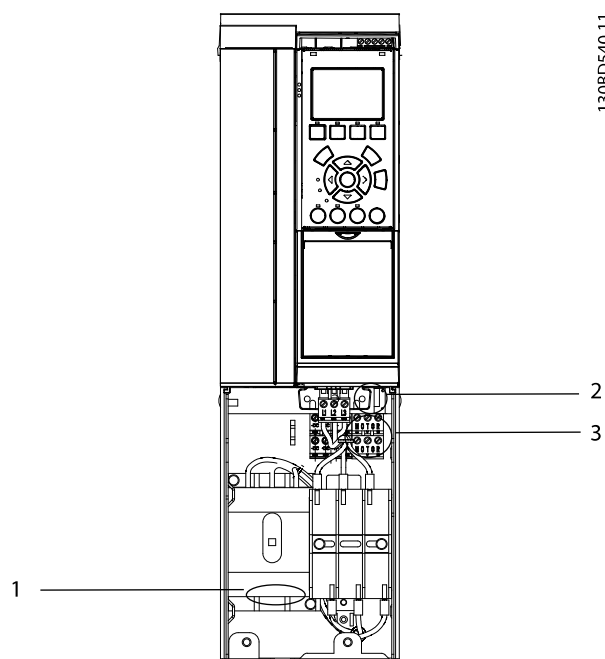
Table 1.3 Discharge Time for VLT<sup>®</sup> AutomationDrive FC 300

### 1.3 Fuse/Relay Locations

#### Enclosure size A

*Illustration 1.1* and *Illustration 1.2* show the mains, motor, and relay connection locations for A2, A3, and A5 enclosures.

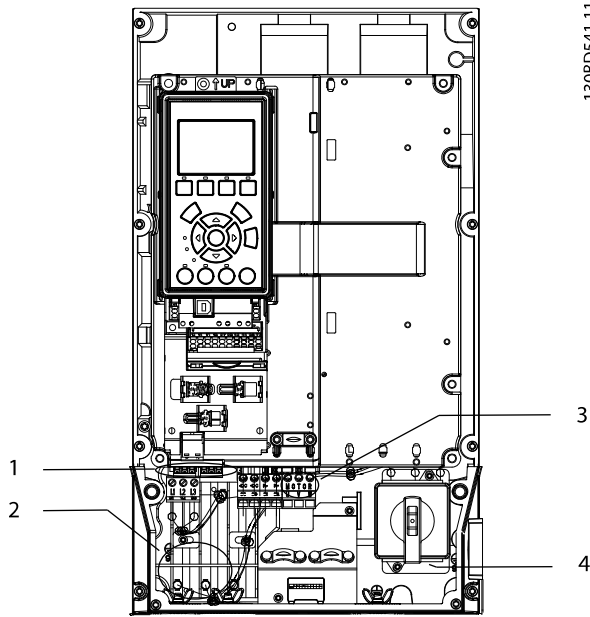
*Illustration 1.2* identifies the fuse locations.



|   |                        |
|---|------------------------|
| 1 | Input/mains connection |
| 2 | Relay connection       |
| 3 | Motor connection       |

Illustration 1.1 A2 and A3 Enclosures (3-phase Only)

130BD541.11



|   |                        |
|---|------------------------|
| 1 | Relay connection       |
| 2 | Fuses                  |
| 3 | Motor connection       |
| 4 | Input/mains connection |

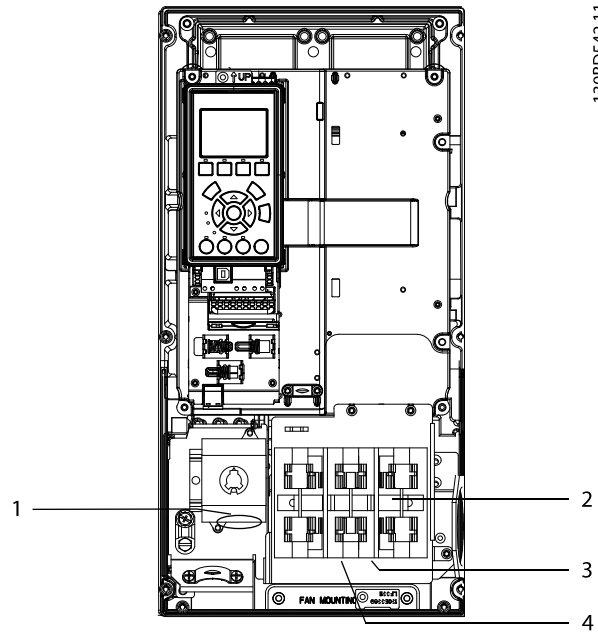
Illustration 1.2 A5 Enclosure (Single-phase and 3-phase)

### Enclosure size B

Illustration 1.3, Illustration 1.4, and Illustration 1.5 show the mains, motor, and relay connection locations for B1 and B2 enclosures.

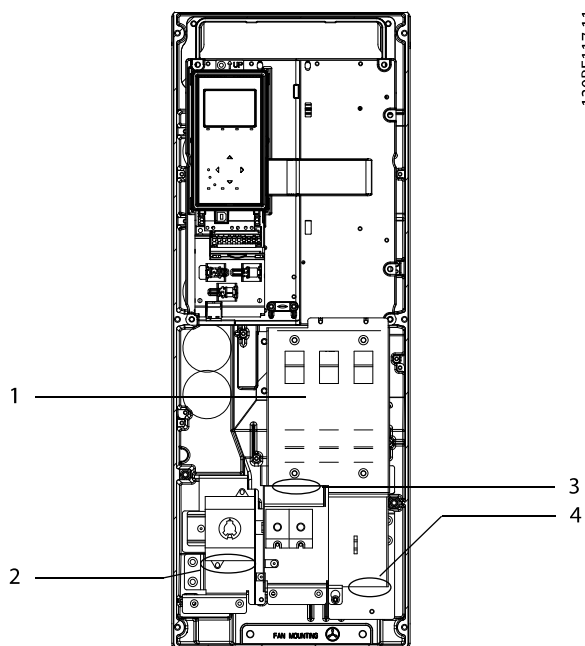
Motor and relay connections are located under the fuse block plate. To access these connectors, remove the 3 T20 screws that are securing the fuse block plate to the drive and lift off the plate. Do not disassemble the fuse block plate.

130BD542.11



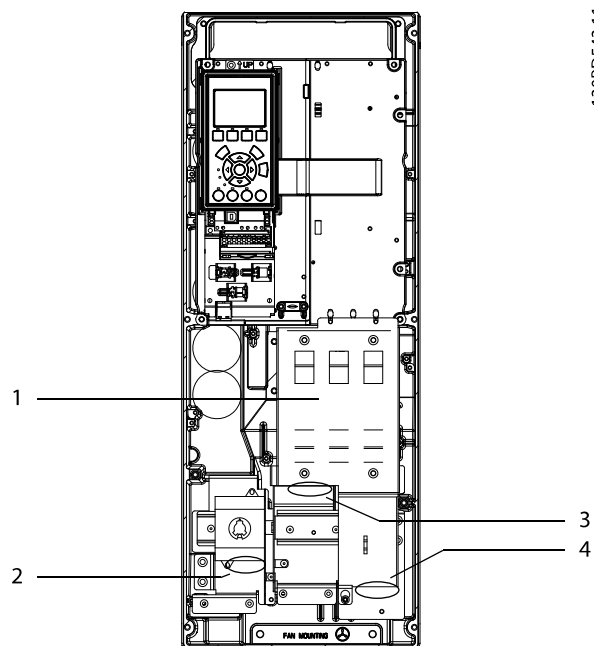
|   |   |
|---|---|
| 1 | Input/mains connection                          |
| 2 | Fuse block plate                                |
| 3 | Motor connection (beneath the fuse block plate) |
| 4 | Relay connection (beneath the fuse block plate) |

Illustration 1.3 B1 Enclosure (Single-phase and 3-phase)



|   |   |
|---|---|
| 1 | Fuse block plate                                |
| 2 | Input/mains connection                          |
| 3 | Relay connection (beneath the mains fuse block) |
| 4 | Motor connection (beneath the mains fuse block) |

Illustration 1.4 B2 Enclosure (Single-phase)

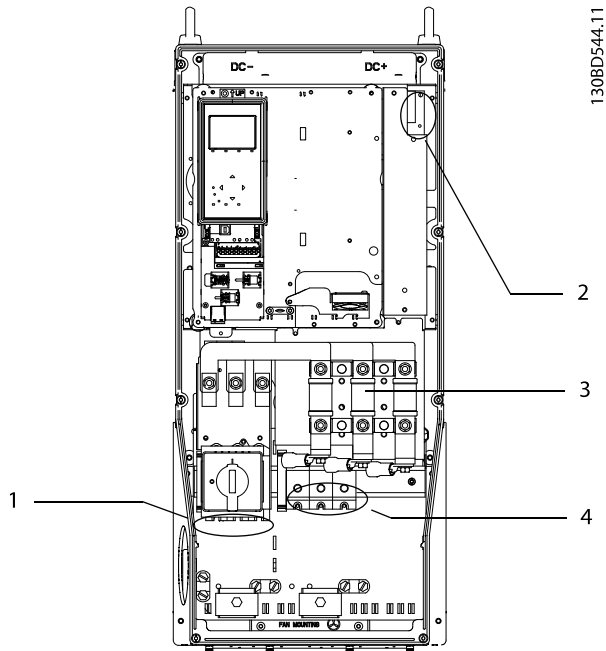


|   |   |
|---|---|
| 1 | Fuse block plate                                |
| 2 | Input/mains connection                          |
| 3 | Relay connection (beneath the fuse block plate) |
| 4 | Motor connection (beneath the mains fuse block) |

Illustration 1.5 B2 Enclosure (3-phase)

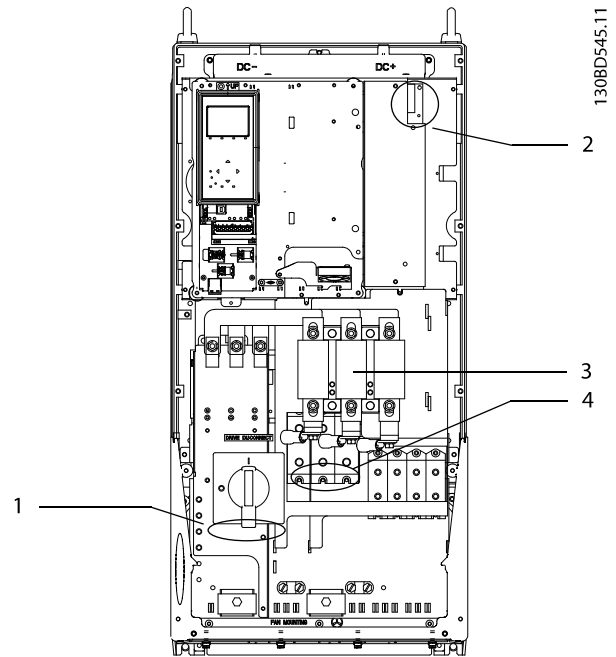
**Enclosure size C**

Illustration 1.6 and Illustration 1.7 show the mains, motor, and relay connection locations for C1 and C2 enclosures.



|   |                        |
|---|------------------------|
| 1 | Input/mains connection |
| 2 | Relay connection       |
| 3 | Fuses                  |
| 4 | Motor connection       |

**Illustration 1.6 C1 Enclosure**



|   |                        |
|---|------------------------|
| 1 | Input/mains connection |
| 2 | Relay connection       |
| 3 | Fuses                  |
| 4 | Motor connection       |

**Illustration 1.7 C2 Enclosure**

## 1.4 Mains Voltage Ratings

### Single-phase drives

|         | FC 102/FC 103 | FC 202    | FC 301/FC 302 [NO] | FC 301/FC 302 [HO] |
|---------|---------------|-----------|--------------------|--------------------|
| [V]     | kW (hp)       | kW (hp)   | kW (hp)            | kW (hp)            |
| 208–230 | 1.1 (1.5)     | 1.1 (1.5) | —                  | —                  |
| 460–480 | —             | —         | —                  | —                  |
| 575–600 | —             | —         | —                  | —                  |

Table 1.4 A5 Enclosure (Single-phase)

|         | FC 102/FC 103   | FC 202          | FC 301/FC 302 [NO] | FC 301/FC 302 [HO] |
|---------|-----------------|-----------------|--------------------|--------------------|
| [V]     | kW (hp)         | kW (hp)         | kW (hp)            | kW (hp)            |
| 208–230 | 1.5–5.5 (2–7.5) | 1.5–5.5 (2–7.5) | —                  | —                  |
| 460–480 | —               | —               | —                  | —                  |
| 575–600 | —               | —               | —                  | —                  |

Table 1.5 B1 Enclosure (Single-phase)

|         | FC 102/FC 103 | FC 202   | FC 301/FC 302 [NO] | FC 301/FC 302 [HO] |
|---------|---------------|----------|--------------------|--------------------|
| [V]     | kW (hp)       | kW (hp)  | kW (hp)            | kW (hp)            |
| 208–230 | 7.5 (10)      | 7.5 (10) | —                  | —                  |
| 460–480 | —             | —        | —                  | —                  |
| 575–600 | —             | —        | —                  | —                  |

Table 1.6 B2 Enclosure (Single-phase)

|         | FC 102/FC 103 | FC 202  | FC 301/FC 302 [NO] | FC 301/FC 302 [HO] |
|---------|---------------|---------|--------------------|--------------------|
| [V]     | kW (hp)       | kW (hp) | kW (hp)            | kW (hp)            |
| 208–230 | 15 (20)       | 15 (20) | —                  | —                  |
| 460–480 | —             | —       | —                  | —                  |
| 575–600 | —             | —       | —                  | —                  |

Table 1.7 C1 Enclosure (Single-phase)

|         | FC 102/FC 103 | FC 202  | FC 301/FC 302 [NO] | FC 301/FC 302 [HO] |
|---------|---------------|---------|--------------------|--------------------|
| [V]     | kW (hp)       | kW (hp) | kW (hp)            | kW (hp)            |
| 208–230 | 22 (30)       | 22 (30) | —                  | —                  |
| 460–480 | —             | —       | —                  | —                  |
| 575–600 | —             | —       | —                  | —                  |

Table 1.8 C2 Enclosure (Single-phase)

3-phase drives

|         | FC 102/FC 103    | FC 202            | FC 301/FC 302 [NO] | FC 301/FC 302 [HO] |
|---------|------------------|-------------------|--------------------|--------------------|
| [V]     | kW (hp)          | kW (hp)           | kW (hp)            | kW (hp)            |
| 208–230 | 1.1–3.7 (1.5–5)  | 0.25–3.7 (0.3–5)  | —                  | 0.25–3.7 (0.34–5)  |
| 460–480 | 1.1–7.5 (1.5–10) | 0.37–7.5 (0.5–10) | —                  | 0.37–7.5 (0.5–10)  |
| 575–600 | 1.1–7.5 (1.5–10) | 0.75–7.5 (1–10)   | —                  | 0.75–7.5 (1–10)    |

Table 1.9 A2//A3/A5 Enclosures (3-phase)

|         | FC 102/FC 103   | FC 202          | FC 301/FC 302 [NO] | FC 301/FC 302 [HO] |
|---------|-----------------|-----------------|--------------------|--------------------|
| [V]     | kW (hp)         | kW (hp)         | kW (hp)            | kW (hp)            |
| 208–230 | 5.5–11 (7.5–15) | 5.5–11 (7.5–15) | 7.5–11 (10–15)     | 5.5–7.5 (7.5–10)   |
| 460–480 | 11–18.5 (15–25) | 11–18.5 (15–25) | 15–18 (20–25)      | 11–15 (15–20)      |
| 575–600 | 11–18.5 (15–25) | 11–18.5 (15–25) | 11–18 (15–25)      | 11–15 (15–20)      |

Table 1.10 B1 Enclosure (3-phase)

|         | FC 102/FC 103 | FC 202        | FC 301/FC 302 [NO] | FC 301/FC 302 [HO] |
|---------|---------------|---------------|--------------------|--------------------|
| [V]     | kW (hp)       | kW (hp)       | kW (hp)            | kW (hp)            |
| 208–230 | 15 (20)       | 15 (20)       | 15 (20)            | 11 (15)            |
| 460–480 | 22–30 (30–40) | 22–30 (30–40) | 22–30 (30–40)      | 18.5–22 (25–30)    |
| 575–600 | 22–30 (30–40) | 22–30 (30–40) | 22–30 (30–40)      | 18.5–22 (25–30)    |

Table 1.11 B2 Enclosure (3-phase)

|         | FC 102/FC 103   | FC 202          | FC 301/FC 302 [NO] | FC 301/FC 302 [HO] |
|---------|-----------------|-----------------|--------------------|--------------------|
| [V]     | kW (hp)         | kW (hp)         | kW (hp)            | kW (hp)            |
| 208–230 | 18.5–30 (25–40) | 18.5–30 (25–40) | 18.5–22 (25–30)    | 15–22 (20–30)      |
| 460–480 | 37–55 (50–75)   | 37–55 (50–75)   | 37–55 (50–75)      | 30–45 (40–60)      |
| 575–600 | 37–55 (50–75)   | 37–55 (50–75)   | 37–55 (50–75)      | 30–45 (40–60)      |

Table 1.12 C1 Enclosure (3-phase)

|         | FC 102/FC 103   | FC 202          | FC 301/FC 302 [NO] | FC 301/FC 302 [HO] |
|---------|-----------------|-----------------|--------------------|--------------------|
| [V]     | kW (hp)         | kW (hp)         | kW (hp)            | kW (hp)            |
| 208–230 | 37–45 (50–60)   | 37–45 (50–60)   | 30–45 (40–60)      | 30–37 (40–50)      |
| 460–480 | 75–90 (100–125) | 75–90 (100–125) | 75–90 (100–125)    | 55–75 (75–100)     |
| 575–600 | 75–90 (100–125) | 75–90 (100–125) | 75–90 (100–125)    | 55–75 (75–100)     |

Table 1.13 C2 Enclosure (3-phase)

## 1.5 Mains Fuse Replacement Table

### Single-phase drives

To replace the same type of mains fuse installed in the unit, refer to *Table 1.14*. For a list of maximum mains fuse sizes that can be installed in the unit, or for hp/kW sizes not shown in this chart, refer to the operating guide.

| Unit rating |      | FC 102/FC 103/FC 202           |           |           | FC 301/FC 302 |           |           |
|-------------|------|--------------------------------|-----------|-----------|---------------|-----------|-----------|
| [kW]        | [hp] | 208–230 V                      | 460–480 V | 575–600 V | 208–230 V     | 460–480 V | 575–600 V |
| 0.37        | 0.5  | —                              | —         | —         | —             | —         | —         |
| 0.55        | 0.75 | —                              | —         | —         | —             | —         | —         |
| 0.75        | 1    | —                              | —         | —         | —             | —         | —         |
| 1.1         | 1.5  | LP-CC-15 15 A, 600 V, Class CC | —         | —         | —             | —         | —         |
| 1.5         | 2    | JJN-20 20 A, 300 V, Class T    | —         | —         | —             | —         | —         |
| 2.2         | 3    | JJN-30 30 A, 300 V, Class T    | —         | —         | —             | —         | —         |
| 3           | 4    | JJN-35 35 A, 300 V, Class T    | —         | —         | —             | —         | —         |
| 3.7/4       | 5    | JJN-50 50 A, 300 V, Class T    | —         | —         | —             | —         | —         |
| 5.5         | 7.5  | JJN-60 60 A, 300 V, Class T    | —         | —         | —             | —         | —         |
| 7.5         | 10   | JJN-80 80 A, 300 V, Class T    | —         | —         | —             | —         | —         |
| 11          | 15   | —                              | —         | —         | —             | —         | —         |
| 15          | 20   | FWX-150 150 A, 250 V           | —         | —         | —             | —         | —         |
| 18.5        | 25   | —                              | —         | —         | —             | —         | —         |
| 22          | 30   | FWX-200 200 A, 250 V           | —         | —         | —             | —         | —         |
| 30          | 40   | —                              | —         | —         | —             | —         | —         |
| 37          | 50   | —                              | —         | —         | —             | —         | —         |
| 45          | 60   | —                              | —         | —         | —             | —         | —         |
| 55          | 75   | —                              | —         | —         | —             | —         | —         |
| 75          | 100  | —                              | —         | —         | —             | —         | —         |
| 90          | 125  | —                              | —         | —         | —             | —         | —         |

Table 1.14 Mains Fuse Replacement (Single-phase)

### 3-phase drives

To replace the same type of mains fuse installed in the unit, refer to *Table 1.15*. For a list of maximum mains fuse sizes that can be installed in the unit, or for hp/kW sizes not shown in this chart, refer to the operating guide.

| Unit rating |      | FC 102/FC 103/FC 202           |                                |                                | FC 301/FC 302                  |                                |                                |
|-------------|------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| [kW]        | [hp] | 208–230 V                      | 460–480 V                      | 575–600 V                      | 208–230 V                      | 460–480 V                      | 575–600 V                      |
| 0.37        | 0.5  | —                              | —                              | —                              | LP-CC-5 5 A, 600 V, Class CC   | LP-CC-6 6 A, 600 V, Class CC   | —                              |
| 0.55        | 0.75 | —                              | —                              | —                              | LP-CC-10 10 A, 600 V, Class CC | LP-CC-6 6 A, 600 V, Class CC   | —                              |
| 0.75        | 1    | —                              | —                              | —                              | LP-CC-10 10 A, 600 V, Class CC | LP-CC-6 6 A, 600 V, Class CC   | LP-CC-5 5 A, 600 V, Class CC   |
| 1.1         | 1.5  | LP-CC-10 10 A, 600 V, Class CC | LP-CC-6 6 A, 600 V, Class CC   | LP-CC-5 5 A, 600 V, Class CC   | LP-CC-10 10 A, 600 V, Class CC | LP-CC-6 6 A, 600 V, Class CC   | LP-CC-5 5 A, 600 V, Class CC   |
| 1.5         | 2    | LP-CC-15 15 A, 600 V, Class CC | LP-CC-10 10 A, 600 V, Class CC | LP-CC-10 10 A, 600 V, Class CC | LP-CC-15 15 A, 600 V, Class CC | LP-CC-10 10 A, 600 V, Class CC | LP-CC-10 10 A, 600 V, Class CC |
| 2.2         | 3    | LP-CC-20 20 A, 600 V, Class CC | LP-CC-10 10 A, 600 V, Class CC | LP-CC-10 10 A, 600 V, Class CC | LP-CC-20 20 A, 600 V, Class CC | LP-CC-10 10 A, 600 V, Class CC | LP-CC-10 10 A, 600 V, Class CC |
| 3           | 4    | LP-CC-25 25 A, 600 V, Class CC | LP-CC-15 15 A, 600 V, Class CC | LP-CC-15 15 A, 600 V, Class CC | LP-CC-25 25 A, 600 V, Class CC | LP-CC-15 15 A, 600 V, Class CC | LP-CC-15 15 A, 600 V, Class CC |
| 3.7/4       | 5    | LP-CC-30 30 A, 600 V, Class CC | LP-CC-20 20 A, 600 V, Class CC | LP-CC-20 20 A, 600 V, Class CC | LP-CC-30 30 A, 600 V, Class CC | LP-CC-20 20 A, 600 V, Class CC | LP-CC-20 20 A, 600 V, Class CC |
| 5.5         | 7.5  | JJN-50 50 A, 300 V, Class T    | LP-CC-25 25 A, 600 V, Class CC | LP-CC-25 25 A, 600 V, Class CC | JJN-50 50 A, 600 V, Class CC   | LP-CC-25 25 A, 600 V, Class CC | LP-CC-25 25 A, 600 V, Class CC |
| 7.5         | 10   | JJN-50 50 A, 300 V, Class T    | LP-CC-30 30 A, 600 V, Class CC | LP-CC-30 30 A, 600 V, Class CC | JJN-60 60 A, 300 V, Class T    | LP-CC-30 30 A, 600 V, Class CC | LP-CC-30 30 A, 600 V, Class CC |
| 11          | 15   | JJN-60 60 A, 300 V, Class T    | JJS-40 40 A, 600 V, Class T    | JJS-35 35 A, 600 V, Class T    | JJN-80 80 A, 300 V, Class T    | JJS-40 40 A, 600 V, Class T    | JJS-35 35 A, 600 V, Class T    |
| 15          | 20   | JJN-80 80 A, 300 V, Class T    | JJS-40 40 A, 600 V, Class T    | JJS-35 35 A, 600 V, Class T    | JJN-125 125 A, 300 V, Class T  | JJS-50 50 A, 600 V, Class T    | JJS-45 45 A, 600 V, Class T    |
| 18.5        | 25   | JJN-125 125 A, 300 V, Class T  | JJS-50 50 A, 600 V, Class T    | JJS-45 45 A, 600 V, Class T    | JJN-125 125 A, 300 V, Class T  | JJS-60 60 A, 600 V, Class T    | JJS-50 50 A, 600 V, Class T    |
| 22          | 30   | JJN-125 125 A, 300 V, Class T  | JJS-60 60 A, 600 V, Class T    | JJS-50 50 A, 600 V, Class T    | FWX-150A 150 A, 250 V          | JJS-80 80 A, 600 V, Class T    | JJS-60 60 A, 600 V, Class T    |
| 30          | 40   | FWX-150A 150 A, 250 V          | JJS-80 80 A, 600 V, Class T    | JJS-60 60 A, 600 V, Class T    | FWX-200A 200 A, 250 V          | JJS-100 100 A, 600 V, Class T  | JJS-80 80 A, 600 V, Class T    |
| 37          | 50   | FWX-200A 200 A, 250 V          | JJS-100 100 A, 600 V, Class T  | JJS-80 80 A, 600 V, Class T    | FWX-250A 250 A, 250 V          | JJS-125 125 A, 600 V, Class T  | JJS-100 100 A, 600 V, Class T  |
| 45          | 60   | FWX-250A 250 A, 250 V          | JJS-125 125 A, 600 V, Class T  | JJS-100 100 A, 600 V, Class T  | —                              | JJS-150 150 A, 600 V, Class T  | JJS-125 125 A, 600 V, Class T  |
| 55          | 75   | —                              | JJS-150 150 A, 600 V, Class T  | JJS-125 125 A, 600 V, Class T  | —                              | FWH-200B 200 A, 500 V          | JJS-150 150 A, 600 V, Class T  |
| 75          | 100  | —                              | FWH-200B 200 A, 500 V          | JJS-150 150 A, 600 V, Class T  | —                              | FWH-250A 250 A, 500 V          | JJS-175 175 A, 600 V, Class T  |
| 90          | 125  | —                              | FWH-250A 250 A, 500 V          | JJS-175 175 A, 600 V, Class T  | —                              | —                              | —                              |

**Table 1.15 Mains Fuse Replacement (3-phase)**

Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without consequential changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.

