

ENGINEERING  
TOMORROW

*Danfoss*

Installation Guide

# Sine-wave Filter OF7S1

2.4–170 A





## 1 Installation Instructions

### 1.1 Safety and Installation Awareness

Before starting installation, familiarize yourself with all safety guidelines and precautions in this guide. Additional resources – including the drive installation guide and the application guide – can be downloaded at [www.danfoss.com/service-and-support](http://www.danfoss.com/service-and-support).

### 1.2 Target Group and Necessary Qualifications

Correct and reliable transport, storage, installation, operation, and maintenance are required for the trouble-free and safe operation of the product. Only **qualified personnel** are allowed to perform all related activities for these tasks. Qualified personnel are defined as properly trained staff, who are familiar with and authorized to install, commission, and maintain equipment, systems, and circuits in accordance with pertinent laws and regulations. Also, the qualified personnel must be familiar with the instructions and safety measures described in this guide and the other product-specific guides. If you are not a qualified electrician, do not perform any electrical installation, and troubleshooting activities.

Only **Danfoss authorized**, qualified personnel are allowed to repair this equipment. Further training is required to perform the activities related to repair.

### 1.3 Safety Symbols

The following symbols are used in this guide:

#### ⚠ D A N G E R ⚠

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

#### ⚠ W A R N I N G ⚠

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

#### ⚠ C A U T I O N ⚠

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

#### N O T I C E

Indicates information considered important, but not hazard-related (for example, messages relating to property damage).

### 1.4 General Safety Precautions

#### N O T I C E

The Sine-wave Filter OF7S1 is designed and qualified for use only with iC7 frequency converters.

- A specific sine-wave filter must be matched to a specific iC7 frequency converter. For more details, refer to the *iC7-Automation Frequency Converters, 1.3–1260 A Design Guide*.
- Danfoss takes no responsibility for the use of third-party output filters installed with Danfoss frequency converters.

#### ⚠ W A R N I N G ⚠

##### LIFTING HEAVY LOAD

The weight of the filter is heavy and failure to follow local safety regulations for lifting heavy weights may cause death, personal injury, or property damage.

- Follow local regulations for lifting.
- Check the weight of the filter. The weight is provided on the outside of the shipping box and the exterior of the filter.
- If needed, ensure that the lifting equipment is in proper working condition and can safely lift the weight of the filter.
- Use the integrated lifting eyes to lift the filter.
- Test lift the unit to verify the proper center of gravity lift point. Reposition if not level.

## ⚠ WARNING ⚠

### HAZARDOUS VOLTAGE

Sine-wave filters contain hazardous voltage when connected to an iC7 drive. Failure to perform installation, start-up, and maintenance by qualified personnel can result in death or serious injury.

- Only qualified personnel must perform installation, start-up, and maintenance.
- Never work on a filter in operation.

## ⚠ WARNING ⚠

### DISCHARGE TIME

The drive and filter contain capacitors that can remain charged even when the drive is powered off. High voltage can be present in filter terminals even when the drive's warning 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 all power sources, including permanent magnet type motors.
- Wait for the drive capacitors to discharge fully. The discharge time is shown on the exterior of the drive.
- Verify full discharge by measuring the voltage level between the motor phases on the filter's output terminals (U2, V2, W2).

## ⚠ WARNING ⚠

### INDUCED VOLTAGE

Induced voltage from output motor cables that run together can charge equipment capacitors, even with the equipment turned off and locked out. Failure to run output motor cables separately or to use shielded cables could result in death or serious injury.

- Run output motor cables separately or use shielded cables.
- Simultaneously lock out all the drives.

## ⚠ WARNING ⚠

### ELECTRICAL SHOCK HAZARD

Due to the stray capacitance of the shielded motor cable, the leakage currents exceed 3.5 mA. Failure to connect the drive or filter properly to protective earth may result in death or serious injury.

- Ensure minimum size of the ground conductor complies with the local safety regulations for high touch current equipment.
- Ensure reinforced protective earthing (PE) conductor according to IEC 60364-5-54 cl. 543.7 or local safety regulations for equipment with leakage current >3.5 mA.
- The reinforced protective earthing can be done with:
  - PE conductor with a cross-section of at least 10 mm<sup>2</sup> (8 AWG) Cu or 16 mm<sup>2</sup> (6 AWG) Al, or an additional PE conductor of the same cross-sectional area as the original PE conductor as specified by IEC 60364-5-54, with a minimum cross-sectional area of 2.5 mm<sup>2</sup> (14 AWG) mechanically protected or 4 mm<sup>2</sup> (12 AWG) not mechanically protected.
  - PE conductor completely enclosed within an enclosure or otherwise protected throughout its length against mechanical damage.
  - PE conductor that is part of a multi-conductor power cable with a minimum PE conductor cross-section of 2.5 mm<sup>2</sup> (14 AWG) that is permanently connected or plugged in by an industrial connector. The multi-conductor power cable must be installed with an appropriate strain relief.

## ⚠ CAUTION ⚠

### INTERNAL FAILURE HAZARD

An internal failure in the filter can result in serious injury when the filter cover is not properly secured.

- Ensure that all safety covers are in place and securely fastened before applying power.

**⚠ CAUTION ⚠**

**BURN HAZARD**

The IP00/Open Type filter model (S1C02–S1C08) does not have protective covers over all components that may still be hot even after the unit has been powered off. Failure to avoid touching these components can result in serious burns.

- Install the IP00/Open Type filter in an enclosed cabinet.
- Do not touch exterior areas that are marked by the high temperature symbol (yellow triangle). These areas are hot while the drive and filter are in use and immediately after being powered off.

**⚠ WARNING ⚠**

**ELECTRIC SHOCK**

The IP00/Open Type filter model (S1C02–S1C08) does not have protective covers over all high-voltage components. Failure to avoid touching these components can result in death or serious injury.










- Install the IP00/Open Type filter inside a supplementary enclosure or in a restricted-access area that provides protection against electric shock.

**1.5 Tools Needed**

- Lifting aid
- Tape measurer
- Wrench with extension and 10 and 13 mm sockets
- Torx, slotted, and Pozidriv screwdrivers (T20, T30, T50, SL1.2, SL2, PZ3)
- Wire crimper

**1.6 Verifying the Shipment and the Contents**

Make sure that the items supplied and the information on the product label correspond to the order confirmation. The product label is found on the front of the filter.

|   |   |  |  |
|---|---|--|--|
| <p>1 —</p> <p>2 —</p> <p>3 —</p> <p>4 —</p> | <p><b>Sine-wave Filter OF7S1</b></p> <p>T/C: OF7S1-S-AN-25-02A4-070-TX-E20<br/>                 P/N: 132H5070      S/N: DMZZZ65 - 2206 / DM</p> <p>200-240V, 2.4A@70Hz, 2.4A@100Hz, 2.4A@120Hz<br/>                 380-440V, 2.4A@70Hz, 2.4A@100Hz, 2.4A@120Hz<br/>                 441-500V, 2.1A@70Hz, 2.1A@100Hz, 2.1A@120Hz<br/>                 Tamb: -30°C/-22°F - 45°C/113°F<br/>                 ENCL: IP20 / Open type</p> <p> IND.CONT.EQ. 1HD1<br/>                 ta(max)=45°C<br/>                 LISTED E 219022</p> <p></p> | <p></p> <p>L: 22mH<br/>                 Cy: 1.5µF<br/>                 fsw: ≥ 3kHz<br/>                 Ploss: ≤ 30.3W<br/>                 Weight: 5.4kg<br/>                 Terminal torque: 1.2-2Nm<br/>                 Frame: S1A02</p> <p>Danfoss A/S<br/>                 DK-6430 Nordborg<br/>                 www.danfoss.com<br/>                 Danfoss Ltd. Oxford Road,<br/>                 UB94LH Denham, UK<br/>                 MADE IN GERMANY</p> | <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>9</p> <p>10</p> |
|   | <p> <b>DANGER</b><br/>                 See manual/Voir manuel</p> <p>    </p> <p>EN 61558      B 1805019.1      FA-Nr.: 000000</p>   |  |  |

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Illustration 1: Example of a Product Label

|   |   |    |                                  |
|---|---|----|----------------------------------|
| 1 | Product type                                | 6  | Inductance value                 |
| 2 | Type code                                   | 7  | Capacitance value                |
| 3 | Part number                                 | 8  | Minimum switching frequency      |
| 4 | Voltage range, motor frequency, and current | 9  | Terminal torque for motor cables |
| 5 | Serial number                               | 10 | Frame                            |

## 1.7 Installing the Filter

Installation location is important. Full nominal current is available when the following installation conditions are met:

- Maximum surrounding air temperature is 45 °C (113 °F)
- Minimum surrounding air temperature is -30 °C (-22 °F).
- Altitude is less than 1000 m (3280 ft) above sea level.
- There is enough free space above and below the filter.
- Vibration levels according to IEC 60721-3-3:2019 have been considered.

For temperatures and altitudes outside this range, as well as derating values, see [1.11 Specifications](#).

1. Identify the sine-wave filter frame. See [Illustration 1](#).

If the reference in an illustration, text, or table applies to all variants, the second character is replaced with an x, for example S1x02, indicating both S1A02 and S1C02.

2. Make sure that the operating environment and electrical installation meet the environmental conditions according to IEC 61800-2:2021. Unless stated otherwise, the same standards apply for the filters as for the drives.
  - a. Indoor unconditioned/pollution degree 2.
  - b. Overvoltage category 3.
3. Provide required clearance above and below the filter. Refer to [Illustration 5](#) and [Illustration 6](#).
4. Mount the filter on or against a solid, non-combustible mounting surface such as concrete or metal.
5. Install the filter following the numbered steps shown in [Illustration 2](#) through [Illustration 11](#).
  - For S1x02–S1x04, use 4 screws for vibration levels specified in IEC 60721-3-3:2019 3M11 and IEC 60721-3.3:2019 3M12.
  - For S1x05–S1x08, use 4 screws for vibration levels specified in IEC 60721-3-3:2019 3M11.
  - For S1x05–S1x08, use 8 screws for vibration levels specified in IEC 60721-3-3:2019 3M12.

Certain illustrations or steps apply to specific frames and are marked as such.

6. Configure the specific drive parameters (P3.5.1, P3.5.2, and P3.5.3) for sine-wave filter operation. Setting too low a switching frequency can damage the filter. For information on configuring parameters, see the iC7 application guide.

## 1.8 EMC-compliant Installation

Follow the same guidelines for filter installation as for drive installation. For EMC-compliant installation guidelines, refer to the drive design or installation guide, and follow the electrical installation instructions.

- Shielded cables or unshielded cables within metal conduit are required between the filter and the drive, and between the filter and the motor.
- Connect the shield to the filter at both ends.
- Provide a minimum 200 mm (7.9 in) separation, if possible, between mains input, motor cables, and control cables.
- Convey the currents back to the unit using the included EMC plate. Ensure good electrical contact from the EMC plate through the mounting screws to the filter chassis. The EMC plate must be mounted during filter installation.

## 1.9 Fuses and Cable Sizes

### NOTICE

#### WIRING GUIDELINES

All wiring must comply with local and national regulations regarding cross-section and ambient temperature requirements. Loose connections can cause equipment faults or reduced performance. Tighten the terminals according to the proper torque value shown in the illustrations.

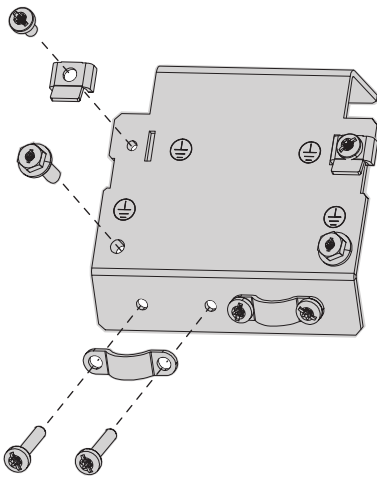
- Minimize interference by keeping control wires as short as possible and separate from high-power cables.
- Tighten the terminals according to the proper torque value shown in the illustrations.
- Follow the same guidelines for filter cables as for drive cables. For more information, refer to the *iC7-Automation Frequency Converters, 1.3–1260 A Design Guide*.

1.10 Illustrations

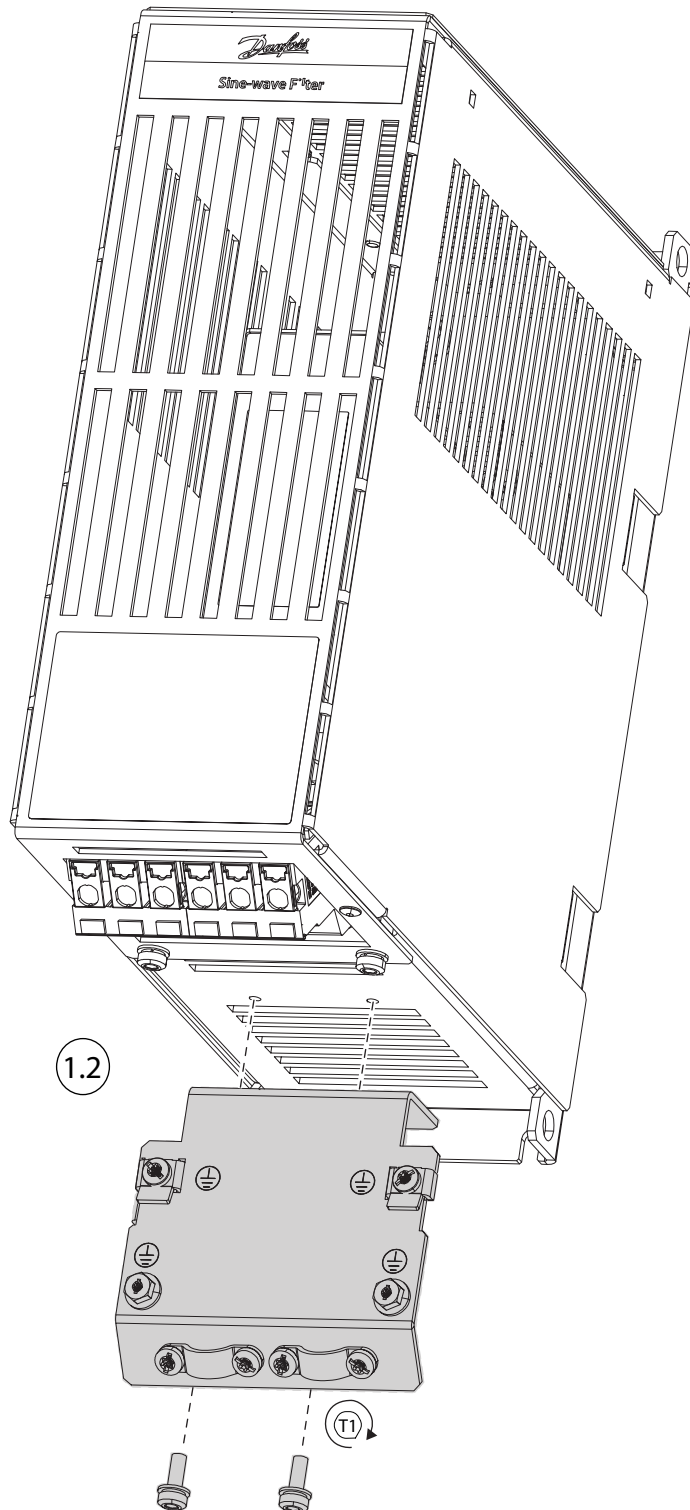
1 S1x02-S1x03

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1.1



1.2



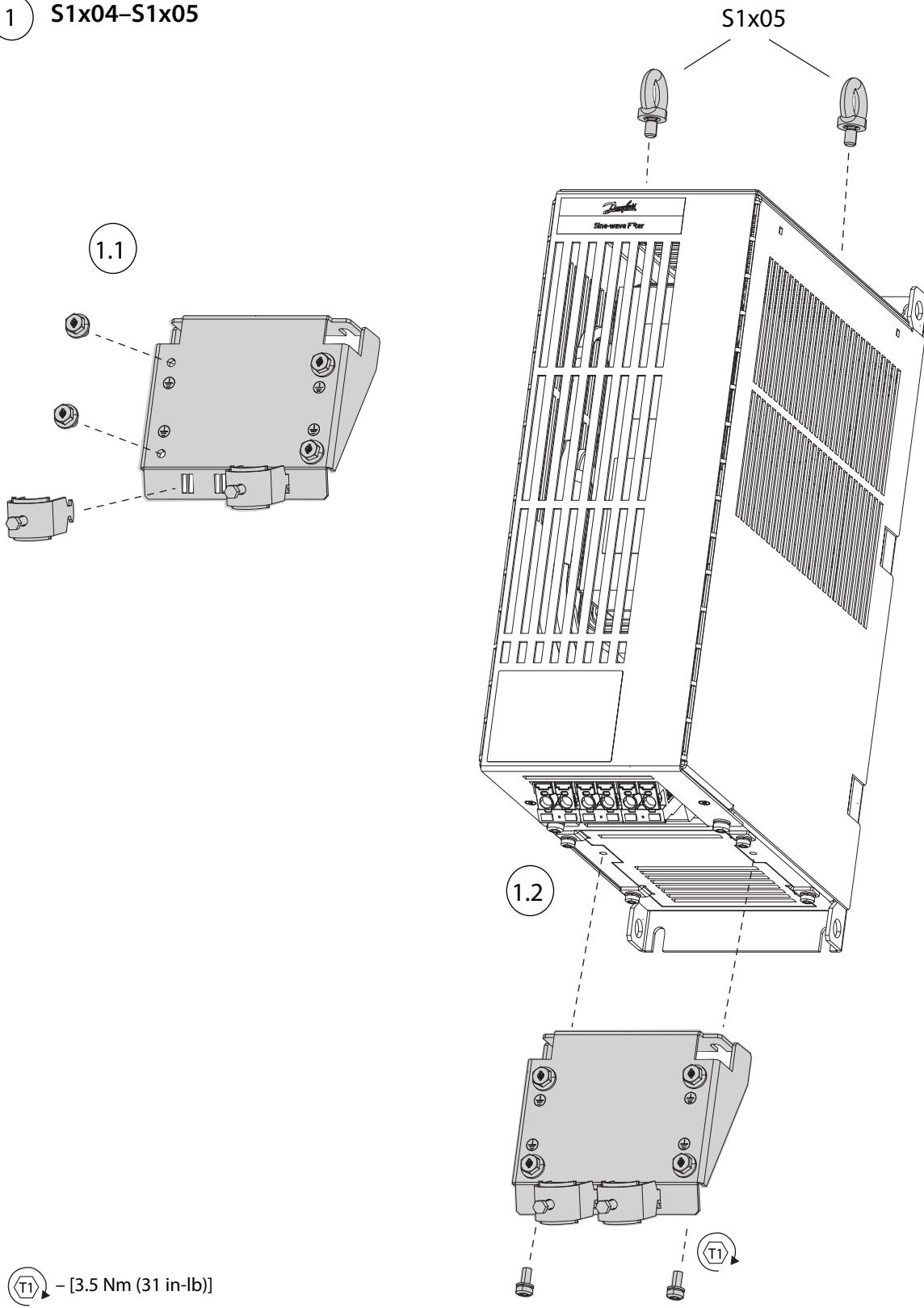
- [1.8 Nm (16 in-lb)]

Illustration 2:



1 S1x04-S1x05

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- [3.5 Nm (31 in-lb)]

Illustration 3:

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1 S1x06-S1x08

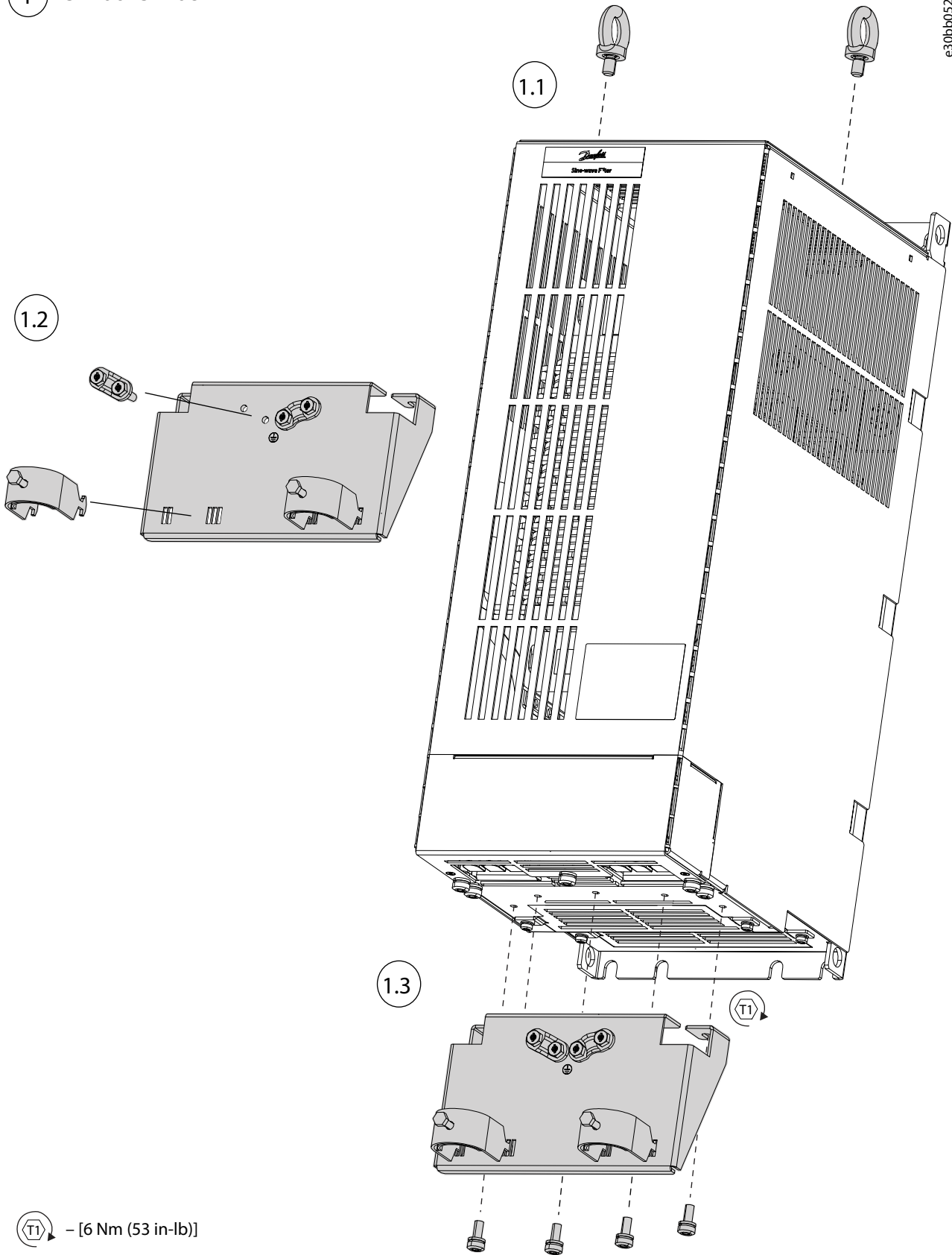



Illustration 4:

2 S1x02–S1x04

| mm (in)   | S1x02      | S1x03      | S1x04      |
|---|------------|------------|------------|
| A   | 257 (10.1) | 257 (10.1) | 380 (15.0) |
| B   | 70 (2.8)   | 94 (3.7)   | 105 (4.1)  |
| C1  | 107 (4.2)  | 107 (4.2)  | 107 (4.2)  |
| C2  | 107 (4.2)  | 107 (4.2)  | 161 (6.3)  |
|  | 4 x M5     | 4 x M5     | 4 x M6     |

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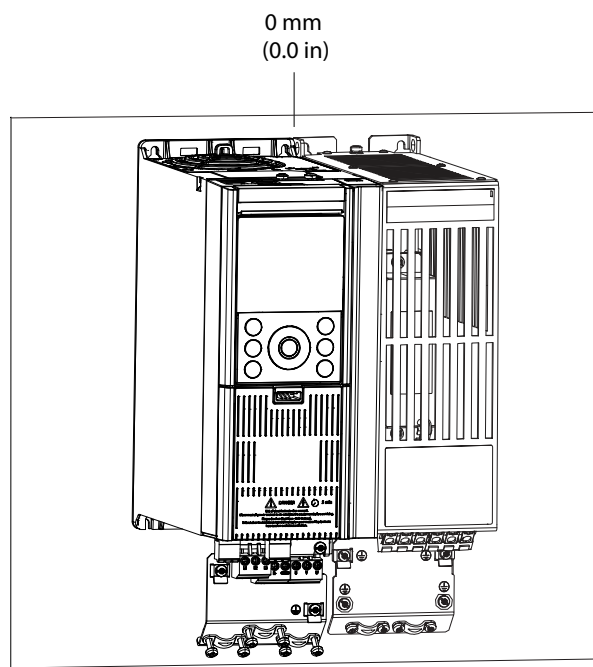
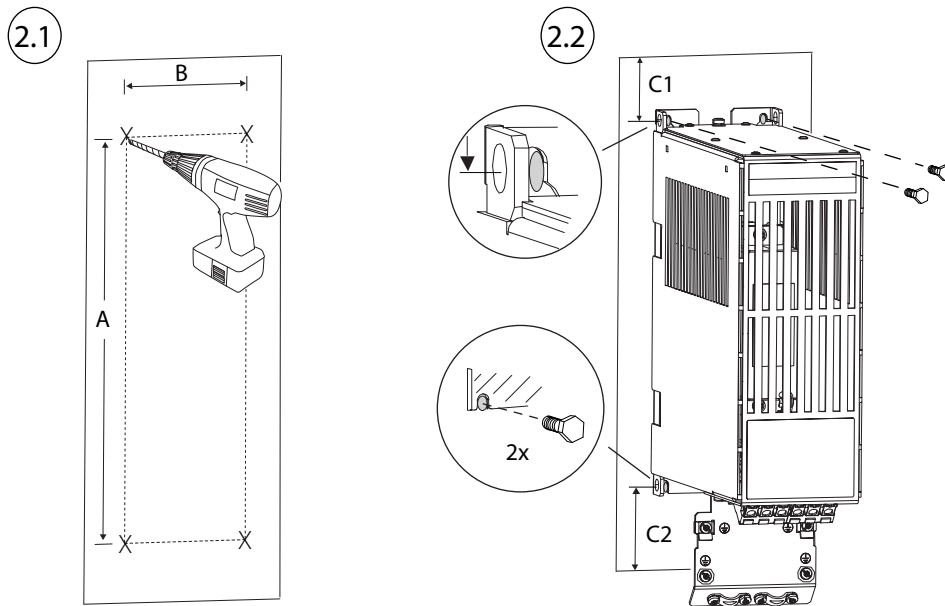



Illustration 5:

2 S1x05–S1x08

| mm (in) | A          | B         | B/2      | C1        | C2         |  |
|---------|------------|-----------|----------|-----------|------------|---|
| S1x05   | 380 (15.0) | 140 (5.5) | 40 (1.6) | 107 (3.9) | 160 (6.2)  | 4–8 x M6  |
| S1x06   | 535 (21.1) | 170 (6.7) | 40 (1.6) | 112 (4.4) | 160 (6.2)  | 4–8 x M8  |
| S1x07   | 580 (22.8) | 200 (7.9) | 45 (1.8) | 112 (4.4) | 208 (8.2)  | 4–8 x M8  |
| S1x08   | 721 (28.4) | 200(7.9)  | 45 (1.8) | 112 (4.4) | 260 (10.2) | 4–8 x M8  |

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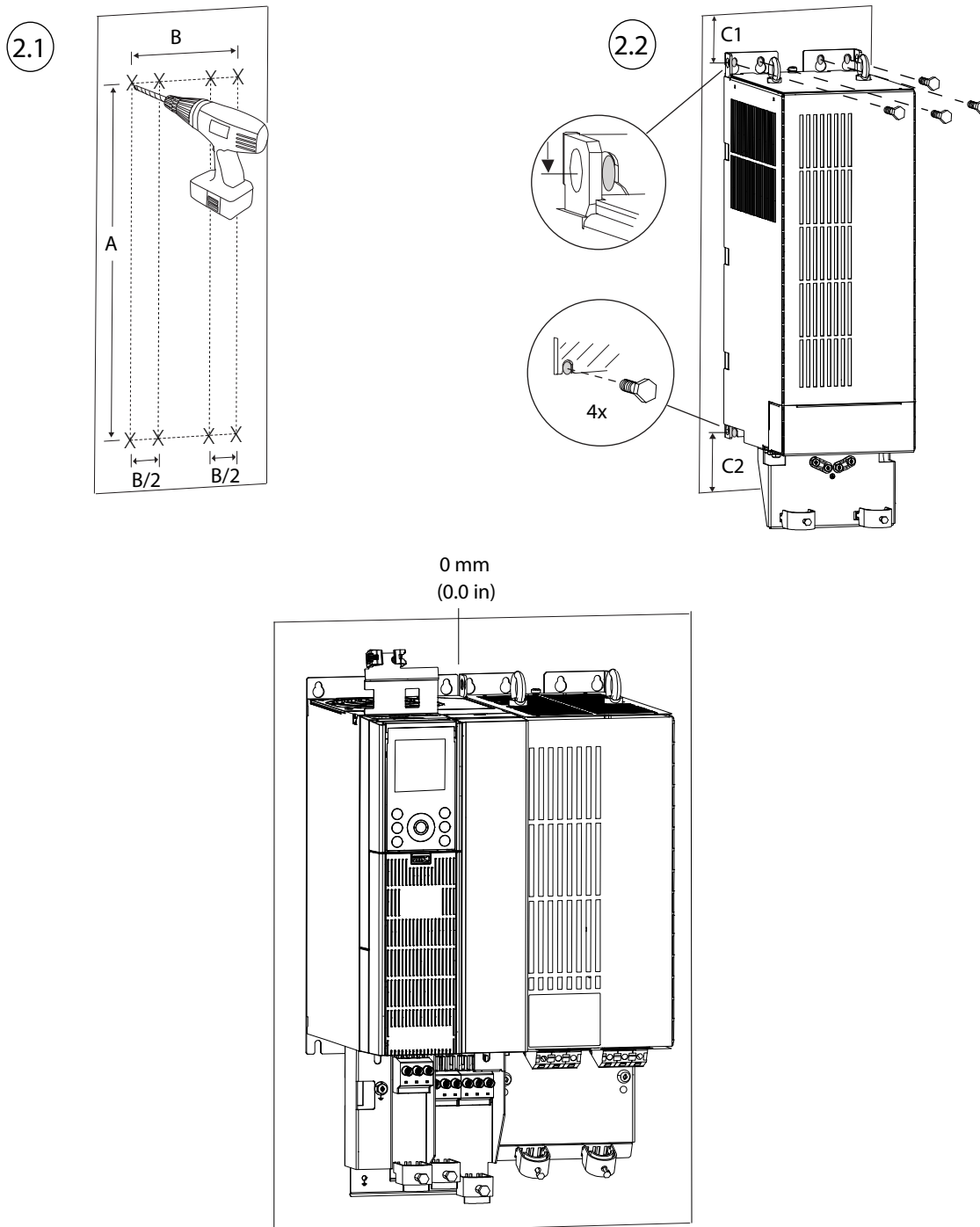
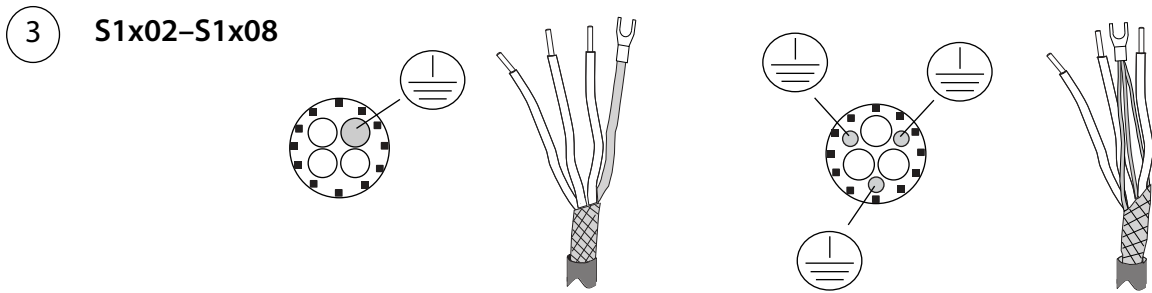
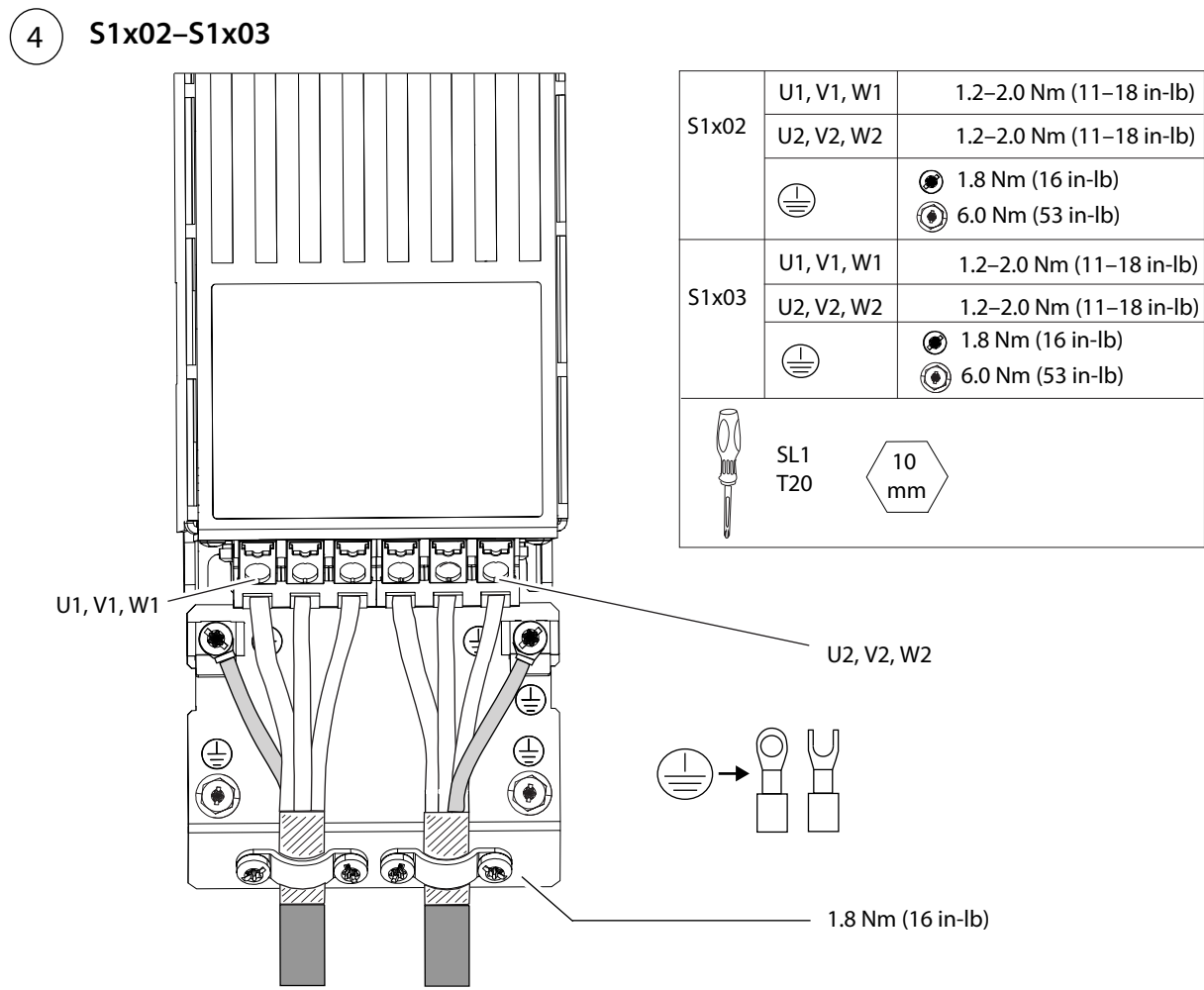


Illustration 6:



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Illustration 7:



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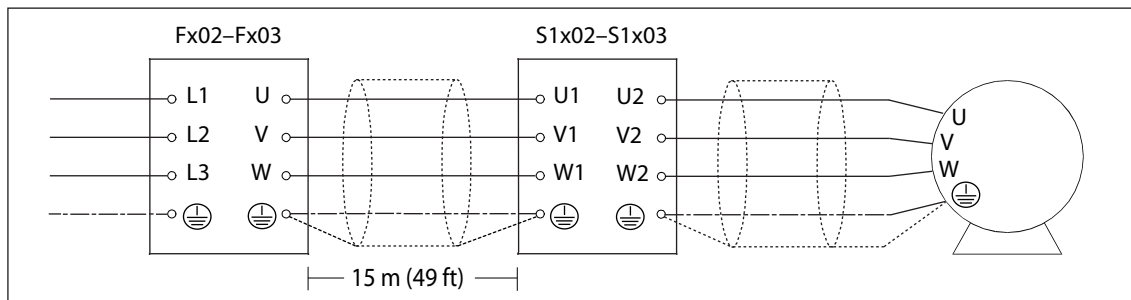


Illustration 8:

4 S1x04–S1x05

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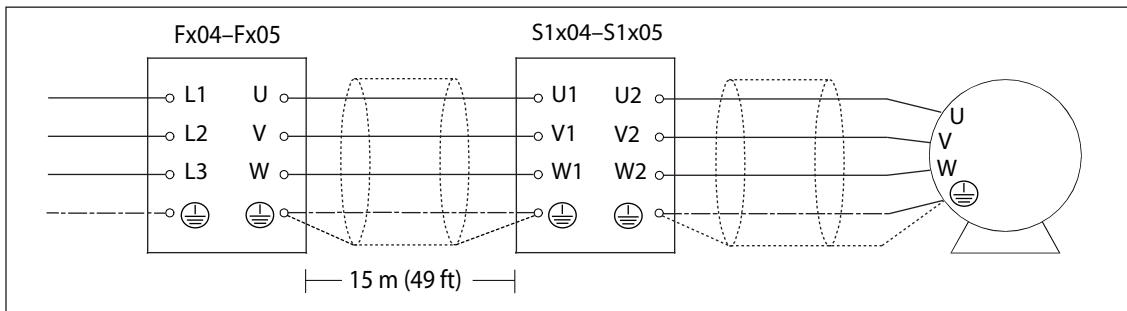
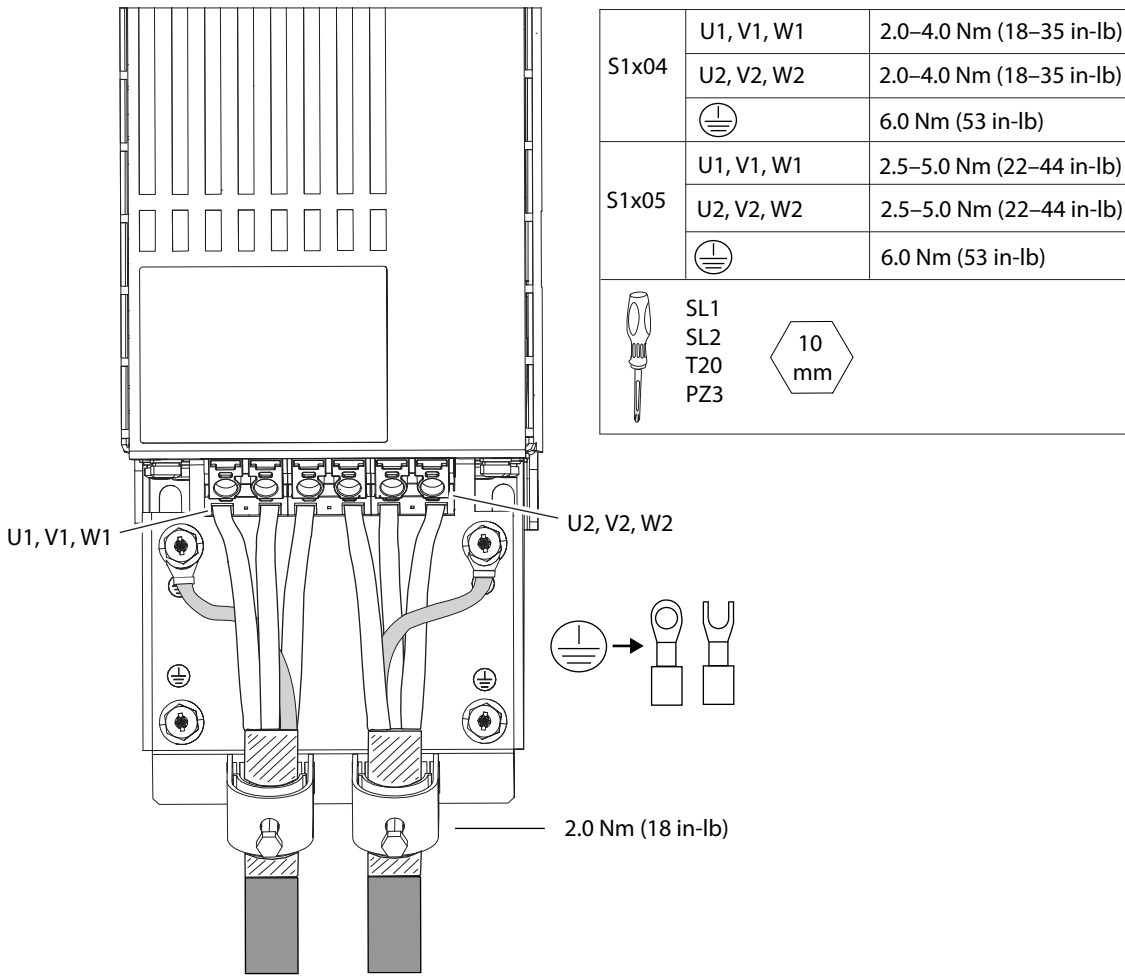
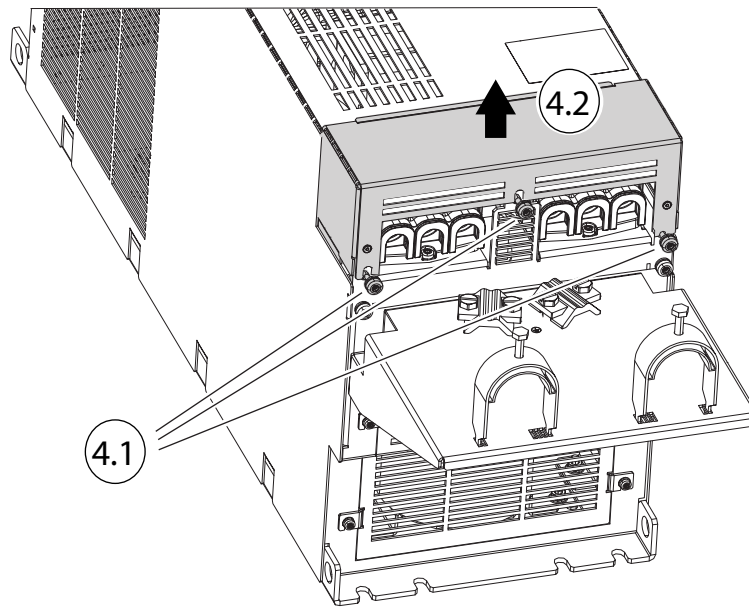


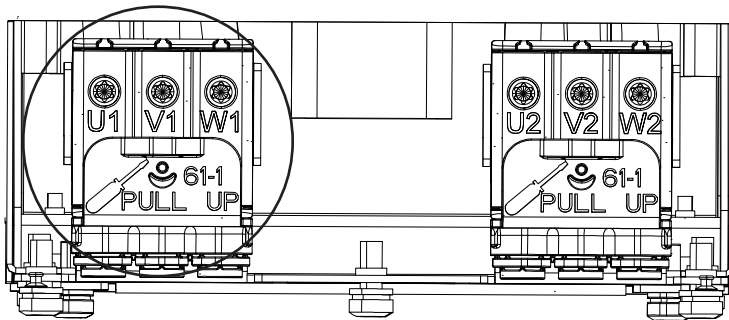
Illustration 9:

4 S1x06-S1x08

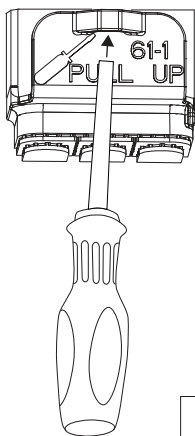


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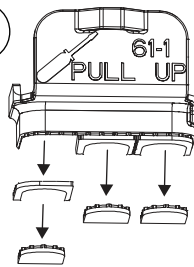
4.3



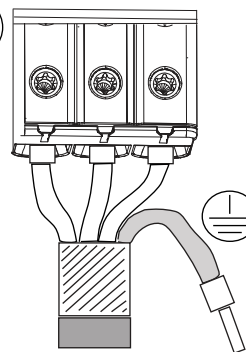
4.4



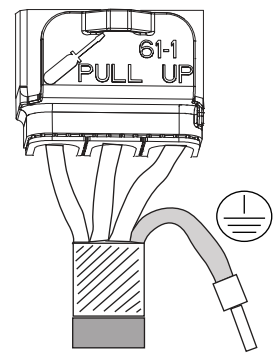
4.5



4.6



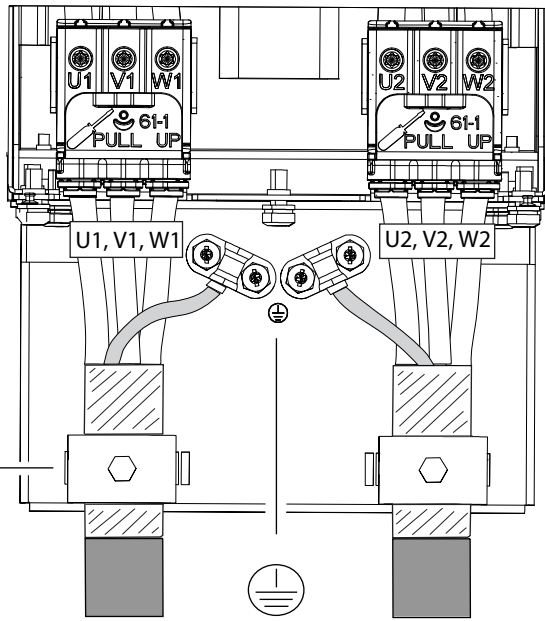
4.7



| S1x06 | 50 mm <sup>2</sup> (1 AWG)    | 16 mm <sup>2</sup> (6 AWG) |
|-------|-------------------------------|----------------------------|
| S1x07 | 95 mm <sup>2</sup> (3/0 AWG)  | 35 mm <sup>2</sup> (2 AWG) |
| S1x08 | 150 mm <sup>2</sup> (300 mcm) | 50 mm <sup>2</sup> (1 AWG) |

Illustration 10:

4.8



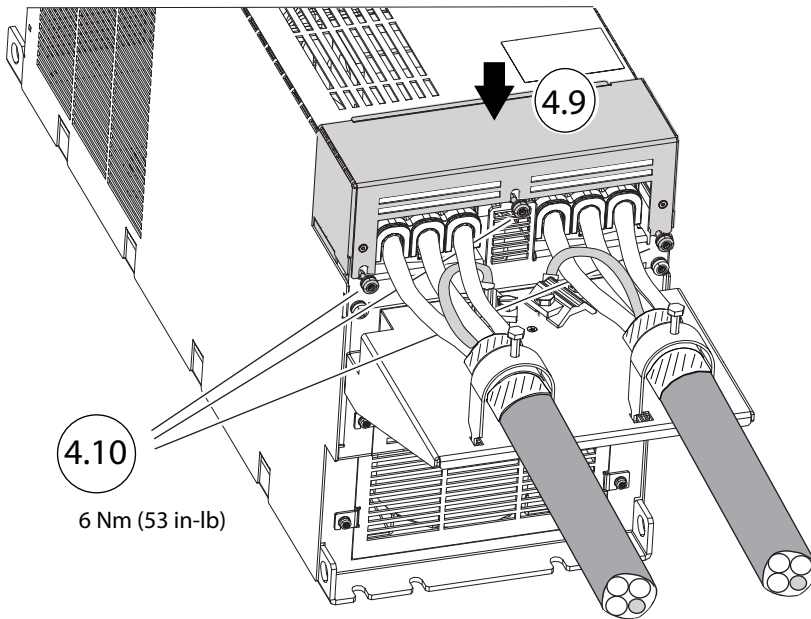
S1x06  
2 Nm (18 in-lb)  
S1x07-S1x08  
4 Nm (35 in-lb)

|       |            |                     |
|-------|------------|---------------------|
| S1x06 | U1, V1, W1 | 14 Nm (124 in-lb)   |
|       | U2, V2, W2 | 14 Nm (124 in-lb)   |
|       | ⊕          | 6 Nm (53 in-lb)     |
| S1x07 | U1, V1, W1 | 14 Nm (124 in-lb)   |
|       | U2, V2, W2 | 14 Nm (124 in-lb)   |
|       | ⊕          | 6 Nm (53 in-lb)     |
| S1x08 | U1, V1, W1 | 20 Nm (177 in-lb)   |
|       | U2, V2, W2 | 20 Nm (177 in-lb)   |
|       | ⊕          | 14.5 Nm (128 in-lb) |

|                                   |       |       |
|-----------------------------------|-------|-------|
| S1x06-S1x07<br>SL1, SL2, PZ3, T30 | 10 mm | 13 mm |
|                                   |       |       |

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4.10

6 Nm (53 in-lb)

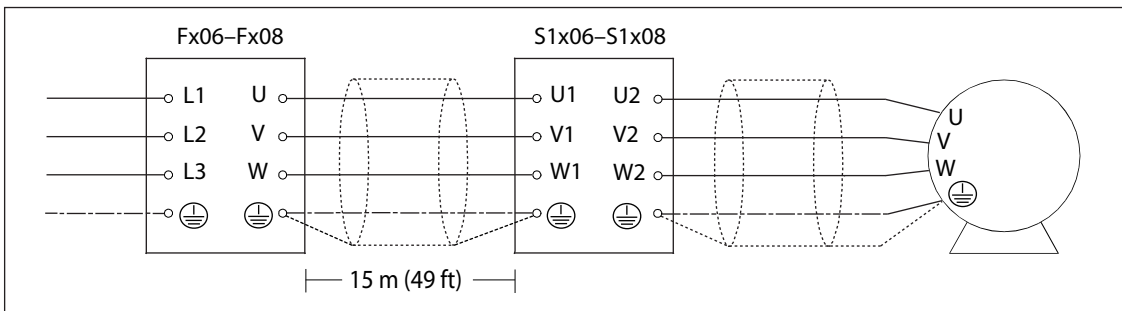


Illustration 11:





## 1.11 Specifications

### 1.11.1 Product Approvals and Certifications

Sine-wave Filter OF7S1 complies with the required standards and directives. For a list of product approvals and certifications, see the product label. Certificates and Declarations of Conformity are available on request or at [www.danfoss.com](http://www.danfoss.com).

Table 1: Approvals and Certifications Applicable to the Sine-wave Filter

| Approval  | Description  |
|---|--|
|  | The sine-wave filter complies with relevant directives and their related standards for the extended Single Market in the European Economic Area. The filter complies with EN/IEC 61558-2-20:2011.  |
|  | The Underwriters Laboratory (UL) mark indicates the safety of products and their environmental claims based on standardized testing. The sine-wave filters are UL-certified up to 500 V. The filter complies with UL 508. For the UL file number, see the product label. |

### 1.11.2 Operating Environment

Table 2: Operating Environment Specifications for the Sine-wave Filter

| Function                             | Data  |
|--------------------------------------|---|
| Ambient temperature during transport | -30 °C...+70 °C (-22 °F...+158 °F)  |
| Ambient temperature during storage   | -30 °C...+70 °C (-22 °F...+158 °F)  |
| Ambient temperature during operation | Minimum (without derating): -30 °C (-22 °F)   |
|                                      | Maximum (without derating): 45 °C (113 °F)  |
|                                      | Maximum (with derating) <sup>(1)</sup> : 60 °C (140 °F)   |
| Altitude                             | Maximum (without derating): 1000 m (3250 ft)  |
|                                      | Maximum (with derating) <sup>(2)</sup> : 5000 m (16400 ft)  |
| Humidity (non-condensing)            | 95 (%)  |
| Chemically active substances         | C3  |
| Pollution degree                     | 3   |
| Vibration                            | IEC 60721-3-3:2019 3M11: Standard classification requires 4 screws to install frames S1x02–S1x08. |
|                                      | IEC 60721-3-3:2019 3M12: Medium classification requires 4 screws to install frames S1x02–S1x04.   |
|                                      | IEC 60721-3-3:2019 3M12: Medium classification requires 8 screws to install frames S1x05–S1x08.   |

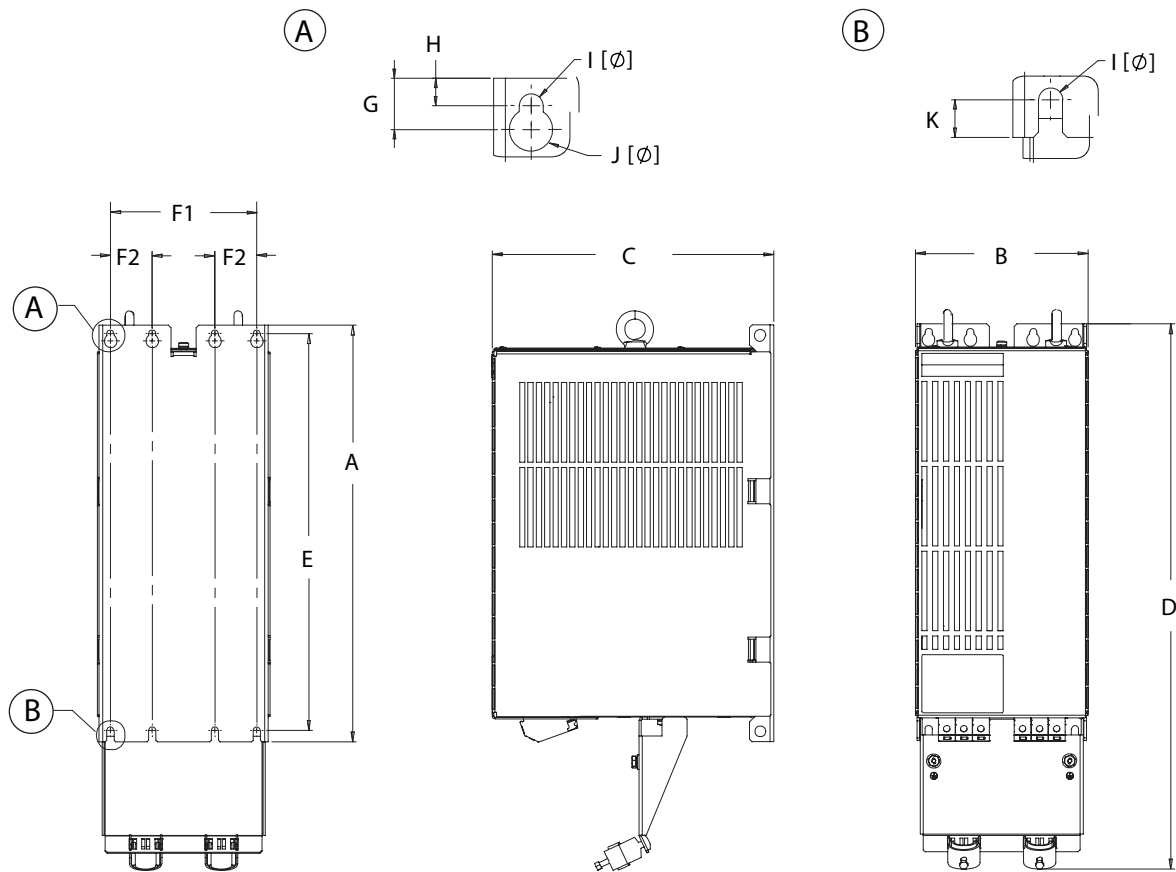
<sup>1</sup> Derating: 1%/K from 45 °C (113 °F)

<sup>2</sup> Derating: 5% of nominal filter current per every 1000 m (3250 ft)

### 1.11.3 Mechanical Specifications

Table 3: Weight and Terminal Cable Size for the Sine-wave Filter

| P/N      | Weight [kg (lb)] | Terminal cable size [mm <sup>2</sup> (AWG)] |           |
|----------|------------------|---|-----------|
|          |                  | Minimum                                     | Maximum   |
| 132H4239 | 3.9 (9)          | 0.2 (22)                                    | 10 (10)   |
| 132H5061 | 4.5 (10)         | 0.2 (22)                                    | 10 (10)   |
| 132H5062 | 7.1 (16)         | 0.2 (22)                                    | 10 (10)   |
| 132H5063 | 8.9 (20)         | 0.2 (22)                                    | 10 (10)   |
| 132H5064 | 12.4 (27)        | 0.2 (22)                                    | 10 (10)   |
| 132H5065 | 22.7 (50)        | 1.0 (18)                                    | 16 (4)    |
| 132H5066 | 30.9 (68)        | 2.5 (12)                                    | 35 (2)    |
| 132H5067 | 55.6 (123)       | 2.5 (6)                                     | 50 (1/0)  |
| 132H5068 | 81.8 (180)       | 16 (4)                                      | 95 (4/0)  |
| 132H5069 | 104.8 (231)      | 35 (2)                                      | 150 (300) |
| 132H5070 | 5.4 (12)         | 0.2 (22)                                    | 10 (10)   |
| 132H5071 | 6.0 (13)         | 0.2 (22)                                    | 10 (10)   |
| 132H5072 | 8.6 (19)         | 0.2 (22)                                    | 10 (10)   |
| 132H5073 | 10.4 (23)        | 0.2 (22)                                    | 10 (10)   |
| 132H5074 | 14.0 (31)        | 0.2 (22)                                    | 10 (10)   |
| 132H5075 | 25.2 (56)        | 1.0 (18)                                    | 16 (6)    |
| 132H5077 | 33.6 (74)        | 2.5 (12)                                    | 35 (2)    |
| 132H5078 | 60.3 (133)       | 2.5 (6)                                     | 50 (1/0)  |
| 132H5080 | 87.0 (192)       | 16 (4)                                      | 95 (4/0)  |
| 132H5081 | 112.5 (248)      | 35 (2)                                      | 150 (300) |



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Illustration 12: Example of a Sine-wave Filter Cabinet

Table 4: Exterior Dimensions for the Sine-wave Filter, [mm (in)]

| P/N      | A             | B            | C                      | D             | E             | F1 <sup>(1)</sup> | F2 <sup>(1)</sup> | G             | H            | I            | J             | K            |
|----------|---------------|--------------|------------------------|---------------|---------------|-------------------|-------------------|---------------|--------------|--------------|---------------|--------------|
| 132H4239 | 270<br>(10.6) | 87 (3.4)     | 202 (7.9)<br>218 (8.5) | 340<br>(13.3) | 257<br>(10.1) | 70<br>(2.7)       | –                 | 14.5<br>(0.5) | 6.5<br>(0.2) | 5.5<br>(0.2) | 11<br>(0.4)   | 6.5<br>(0.2) |
| 132H5061 | 270<br>(10.6) | 87 (3.4)     | 202 (7.9)<br>218 (8.5) | 340<br>(13.3) | 257<br>(10.1) | 70<br>(2.7)       | –                 | 14.5<br>(0.5) | 6.5<br>(0.2) | 5.5<br>(0.2) | 11<br>(0.4)   | 6.5<br>(0.2) |
| 132H5062 | 270<br>(10.6) | 87 (3.4)     | 202 (7.9)<br>218 (8.5) | 340<br>(13.3) | 257<br>(10.1) | 70<br>(2.7)       | –                 | 14.5<br>(0.5) | 6.5<br>(0.2) | 5.5<br>(0.2) | 11<br>(0.4)   | 6.5<br>(0.2) |
| 132H5063 | 270<br>(10.6) | 87 (3.4)     | 202 (7.9)<br>218 (8.5) | 340<br>(13.3) | 257<br>(10.1) | 70<br>(2.7)       | –                 | 14.5<br>(0.5) | 6.5<br>(0.2) | 5.5<br>(0.2) | 11<br>(0.4)   | 6.5<br>(0.2) |
| 132H5064 | 270<br>(10.6) | 111<br>(4.3) | 211 (8.3)              | 340<br>(13.3) | 257<br>(10.1) | 94<br>(3.7)       | –                 | 14.5<br>(0.5) | 6.5<br>(0.2) | 5.5<br>(0.2) | 11<br>(0.4)   | 6.5<br>(0.2) |
| 132H5065 | 399<br>(15.7) | 127<br>(5.0) | 237 (9.3)              | 503<br>(19.8) | 380<br>(14.9) | 105<br>(4.1)      | –                 | 15<br>(0.5)   | 8 (0.3)      | 7 (0.2)      | 12.5<br>(0.4) | 11<br>(0.4)  |
| 132H5066 | 399<br>(15.7) | 162<br>(6.3) | 256 (10.0)             | 522<br>(20.5) | 380<br>(14.9) | 140<br>(5.5)      | 40<br>(1.5)       | 15<br>(0.5)   | 8 (0.3)      | 7 (0.2)      | 12.5<br>(0.4) | 11<br>(0.4)  |
| 132H5067 | 555<br>(21.8) | 197<br>(7.7) | 276 (10.8)             | 668<br>(26.2) | 535<br>(21.0) | 170<br>(6.6)      | 40<br>(1.5)       | 23<br>(0.9)   | 12<br>(0.4)  | 10<br>(0.3)  | 16<br>(0.6)   | 8 (0.3)      |
| 132H5068 | 600<br>(23.6) | 227<br>(8.9) | 292 (11.4)             | 760<br>(29.9) | 580<br>(22.8) | 200<br>(7.8)      | 45<br>(1.7)       | 23<br>(0.9)   | 12<br>(0.4)  | 10<br>(0.3)  | 16<br>(0.6)   | 8 (0.3)      |

| P/N      | A             | B             | C          | D             | E             | F1 <sup>(1)</sup> | F2 <sup>(1)</sup> | G             | H            | I            | J             | K            |
|----------|---------------|---------------|------------|---------------|---------------|-------------------|-------------------|---------------|--------------|--------------|---------------|--------------|
| 132H5069 | 743<br>(29.2) | 255<br>(10.0) | 367 (14.4) | 943<br>(37.1) | 721<br>(28.3) | 200<br>(7.8)      | 45<br>(1.7)       | 23<br>(0.9)   | 12<br>(0.4)  | 10<br>(0.3)  | 16<br>(0.6)   | 10<br>(0.3)  |
| 132H5070 | 270<br>(10.6) | 90 (3.5)      | 221 (8.7)  | 340<br>(13.3) | 257<br>(10.1) | 70<br>(2.7)       | –                 | 14.5<br>(0.5) | 6.5<br>(0.2) | 5.5<br>(0.2) | 11<br>(0.4)   | 6.5<br>(0.2) |
| 132H5071 | 270<br>(10.6) | 90 (3.5)      | 221 (8.7)  | 340<br>(13.3) | 257<br>(10.1) | 70<br>(2.7)       | –                 | 14.5<br>(0.5) | 6.5<br>(0.2) | 5.5<br>(0.2) | 11<br>(0.4)   | 6.5<br>(0.2) |
| 132H5072 | 270<br>(10.6) | 90 (3.5)      | 221 (8.7)  | 340<br>(13.3) | 257<br>(10.1) | 70<br>(2.7)       | –                 | 14.5<br>(0.5) | 6.5<br>(0.2) | 5.5<br>(0.2) | 11<br>(0.4)   | 6.5<br>(0.2) |
| 132H5073 | 270<br>(10.6) | 90 (3.5)      | 221 (8.7)  | 340<br>(13.3) | 257<br>(10.1) | 70<br>(2.7)       | –                 | 14.5<br>(0.5) | 6.5<br>(0.2) | 5.5<br>(0.2) | 11<br>(0.4)   | 6.5<br>(0.2) |
| 132H5074 | 270<br>(10.6) | 114<br>(4.4)  | 221 (8.7)  | 340<br>(13.3) | 257<br>(10.1) | 94<br>(3.7)       | –                 | 14.5<br>(0.5) | 6.5<br>(0.2) | 5.5<br>(0.2) | 11<br>(0.4)   | 6.5<br>(0.2) |
| 132H5075 | 399<br>(15.7) | 130<br>(5.1)  | 262 (10.3) | 503<br>(19.8) | 380<br>(14.9) | 105<br>(4.1)      | –                 | 15<br>(0.5)   | 8 (0.3)      | 7 (0.2)      | 12.5<br>(0.4) | 11<br>(0.4)  |
| 132H5077 | 399<br>(15.7) | 165<br>(6.4)  | 269 (10.5) | 522<br>(20.5) | 380<br>(14.9) | 140<br>(5.5)      | 40<br>(1.5)       | 15<br>(0.5)   | 8 (0.3)      | 7 (0.2)      | 12.5<br>(0.4) | 11<br>(0.4)  |
| 132H5078 | 555<br>(21.8) | 200<br>(7.8)  | 294 (11.5) | 668<br>(26.2) | 535<br>(21.0) | 170<br>(6.6)      | 40<br>(1.5)       | 23<br>(0.9)   | 12<br>(0.4)  | 10<br>(0.3)  | 16<br>(0.6)   | 8 (0.3)      |
| 132H5080 | 600<br>(23.6) | 230<br>(9.0)  | 308 (12.1) | 760<br>(29.9) | 580<br>(22.8) | 200<br>(7.8)      | 45<br>(1.7)       | 23<br>(0.9)   | 12<br>(0.4)  | 10<br>(0.3)  | 16<br>(0.6)   | 8 (0.3)      |
| 132H5081 | 743<br>(29.2) | 255<br>(10.0) | 354 (13.9) | 943<br>(37.1) | 721<br>(28.3) | 200<br>(7.8)      | 45<br>(1.7)       | 23<br>(0.9)   | 12<br>(0.4)  | 10<br>(0.3)  | 16<br>(0.6)   | 10<br>(0.3)  |

<sup>1</sup> For S1x02–S1x04, use 4 screws (F1) for vibration levels according to IEC 60721-3-3:2019 3M11 + IEC 60721-3-3:2019 3M12. For S1x05–S1x08, use 4 screws (F1) for vibration levels according to IEC 60721-3-3:2019 3M11. For S1x05–S1x08, use 8 screws (F1+F2) for vibration levels according to IEC 60721-3-3:2019 3M12.

### 1.11.4 Electrical Specifications

Table 5: Electrical Specifications for the Sine-wave Filter

| Function                           | Data   |
|------------------------------------|--|
| Cooling                            | AN, natural convection   |
| Overload rating                    | 160% for 1 min every 10 min / 200% for 3 s every 1 min                                       |
| Maximum motor cable length         | 150 m (492 ft) shielded cable without derating   |
|                                    | 300 m (984 ft) shielded cable with derating 3.3% per every 50 m (164 ft) from 150 m (492 ft) |
|                                    | 300 m (984 ft) unshielded cable without derating   |
| Switching frequency <sup>(1)</sup> | S1x02–S1x05: 3–16 KHz  |
|                                    | S1x06–S1x08: 2–12 KHz  |
| Discharge time                     | <5 s from motor standstill to voltage is below 60 V DC phase-phase                           |
| Filter impedance                   | Average 7% at 400 V, nominal current and 50 Hz motor frequency                               |

| Function                   | Data   |
|----------------------------|--|
| Acoustical switching noise | <70 dB (A) at 50 Hz motor frequency and nominal current                  |
| Lifetime                   | 60000 operating hours following the load profile <sup>(2)</sup>          |
|                            | 10 years with 2/3 operation per day with the load profile <sup>(2)</sup> |

<sup>1</sup> The maximum switching frequency is the maximum setting of the iC7 drive.

<sup>2</sup> Load profile: 40 °C (104 °F) ambient temperature, 40 Hz motor speed, 80% of nominal current, nominal switching frequency, line voltage 400 V

### 1.1.1.5 Ratings

Table 6: Ratings for the Sine-wave Filter

| P/N      | Frame <sup>(1)</sup> | Nominal current and motor frequency |        |        |               |        |        | P <sub>max</sub> |           | L     |       | Cy   |
|----------|----------------------|-------------------------------------|--------|--------|---------------|--------|--------|------------------|-----------|-------|-------|------|
|          |                      | 380–440 V [A]                       |        |        | 441–500 V [A] |        |        |                  |           |       |       |      |
|          |                      | 70 Hz                               | 100 Hz | 120 Hz | 70 Hz         | 100 Hz | 120 Hz | 400 V [W]        | 500 V [W] | [mΩ]  | [mH]  | [μF] |
| 132H4239 | S1C02                | 2.4                                 | 2.4    | 2.4    | 2.1           | 2.1    | 2.1    | 30               | 30.3      | 1004  | 22    | 1.5  |
| 132H5070 | S1A02                | 2.4                                 | 2.4    | 2.4    | 2.1           | 2.1    | 2.1    | 30               | 30.3      | 1004  | 22    | 1.5  |
| 132H5061 | S1C02                | 4.0                                 | 4.0    | 4.0    | 3.4           | 3.4    | 3.4    | 40.7             | 42.3      | 440   | 12.25 | 3.3  |
| 132H5071 | S1A02                | 4.0                                 | 4.0    | 4.0    | 3.4           | 3.4    | 3.4    | 40.7             | 42.3      | 440   | 12.25 | 3.3  |
| 132H5062 | S1C02                | 7.2                                 | 7.2    | 7.2    | 6.3           | 6.3    | 6.3    | 56.3             | 63        | 169.4 | 6.89  | 4.95 |
| 132H5072 | S1A02                | 7.2                                 | 7.2    | 7.2    | 6.3           | 6.3    | 6.3    | 56.3             | 63        | 169.4 | 6.89  | 4.95 |
| 132H5063 | S1C02                | 12.5                                | 12.5   | 12.5   | 11            | 11     | 11     | 79               | 94        | 88    | 4.4   | 10.2 |
| 132H5073 | S1A02                | 12.5                                | 12.5   | 12.5   | 11            | 11     | 11     | 79               | 94        | 88    | 4.4   | 10.2 |
| 132H5064 | S1C03                | 16                                  | 16     | 16     | 14.5          | 14.5   | 14.5   | 104.2            | 115.5     | 61.8  | 3.24  | 12.3 |
| 132H5074 | S1A03                | 16                                  | 16     | 16     | 14.5          | 14.5   | 14.5   | 104.2            | 115.5     | 61.8  | 3.24  | 12.3 |
| 132H5065 | S1C04                | 31                                  | 31     | 31     | 27            | 27     | 27     | 152              | 179       | 23.5  | 1.76  | 18   |
| 132H5075 | S1A04                | 31                                  | 31     | 31     | 27            | 27     | 27     | 152              | 179       | 23.5  | 1.76  | 18   |
| 132H5066 | S1C05                | 43                                  | 43     | 43     | 40            | 40     | 40     | 205              | 253       | 12.3  | 1.15  | 27   |
| 132H5077 | S1A05                | 43                                  | 43     | 43     | 40            | 40     | 40     | 205              | 253       | 12.3  | 1.15  | 27   |
| 132H5067 | S1C06                | 73                                  | 62.1   | 62.1   | 66            | 56     | 56     | 373              | 398       | 6.41  | 0.74  | 90   |
| 132H5078 | S1A06                | 73                                  | 62.1   | 62.1   | 66            | 56     | 56     | 373              | 398       | 6.41  | 0.74  | 90   |
| 132H5068 | S1C07                | 106                                 | 95.4   | 95.4   | 96            | 86     | 86     | 350              | 426.2     | 3.39  | 0.48  | 135  |
| 132H5080 | S1A07                | 106                                 | 95.4   | 95.4   | 96            | 86     | 86     | 350              | 426.2     | 3.39  | 0.48  | 135  |
| 132H5069 | S1C08                | 170                                 | 153    | 153    | 156           | 140    | 140    | 488              | 540       | 2.3   | 0.32  | 210  |
| 132H5081 | S1A08                | 170                                 | 153    | 153    | 156           | 140    | 140    | 488              | 540       | 2.3   | 0.32  | 210  |

<sup>1</sup> The 3<sup>rd</sup> character in the frame designation indicates the protection rating: A= IP20/UL Open Type and C= IP00/UL Open Type.

### 1.11.6 Ordering a Sine-wave Filter

Table 7: Terminology Used in the Sine-wave Filter Selection Table

| Term                 | Description   |
|----------------------|---|
| Product code         | The drive's product code consisting of the mains voltage code, current rating code, and model code.   |
| Overload setting     | The overload setting of the drive.  |
| Rated output current | The rated output current of the drive in the given voltage supply range and selected overload capability.   |
| Rated current        | The rated current of the filter in the given voltage supply range.  |
| Code no.             | Code number of the sine-wave filter's matching iC7 drive operating conditions. Protection ratings are IP00 or IP20 and UL Open Type. An IP21/UL Type 1 upgrade kit is available for added protection. |
| Frame                | The frame designation of the filter, which is also used as the reference in mechanical drawings.  |

Table 8: Selection Table for a Sine-wave Filter

| iC7 drive    |                 |                      |               | Sine-wave filter |               |                |       |                               |       |
|--------------|-----------------|----------------------|---------------|------------------|---------------|----------------|-------|-------------------------------|-------|
| Product code | Overload rating | Rated output current |               | Rated current    |               | IP00/Open Type |       | IP20/Open Type <sup>(1)</sup> |       |
|              |                 | 380–440 V [A]        | 441–500 V [A] | 380–440 V [A]    | 441–500 V [A] | Code no.       | Frame | Code no.                      | Frame |
| 05-01A3      | LO              | 1.3                  | 1.2           | 2.4              | 2.1           | 132H4239       | S1C02 | 132H5070                      | S1A02 |
|              | HO1             | 1.3                  | 1.2           | 2.4              | 2.1           | 132H4239       | S1C02 | 132H5070                      | S1A02 |
|              | HO2             | 0.9                  | 0.8           | 2.4              | 2.1           | 132H4239       | S1C02 | 132H5070                      | S1A02 |
| 05-01A8      | LO              | 1.8                  | 1.6           | 2.4              | 2.1           | 132H4239       | S1C02 | 132H5070                      | S1A02 |
|              | HO1             | 1.8                  | 1.6           | 2.4              | 2.1           | 132H4239       | S1C02 | 132H5070                      | S1A02 |
|              | HO2             | 1.3                  | 1.1           | 2.4              | 2.1           | 132H4239       | S1C02 | 132H5070                      | S1A02 |
| 05-02A4      | LO              | 2.4                  | 2.1           | 2.4              | 2.1           | 132H4239       | S1C02 | 132H5070                      | S1A02 |
|              | HO1             | 2.4                  | 2.1           | 2.4              | 2.1           | 132H4239       | S1C02 | 132H5070                      | S1A02 |
|              | HO2             | 1.8                  | 1.6           | 2.4              | 2.1           | 132H4239       | S1C02 | 132H5070                      | S1A02 |
| 05-003A      | LO              | 3.0                  | 2.1           | 4.0              | 3.4           | 132H5061       | S1C02 | 132H5061                      | S1A02 |
|              | HO1             | 3.0                  | 2.7           | 4.0              | 3.4           | 132H5061       | S1C02 | 132H5061                      | S1A02 |
|              | HO2             | 2.4                  | 2.1           | 4.0              | 3.4           | 132H5061       | S1C02 | 132H5061                      | S1A02 |
| 05-004A      | LO              | 4.0                  | 3.4           | 4.0              | 3.4           | 132H5061       | S1C02 | 132H5061                      | S1A02 |
|              | HO1             | 4.0                  | 3.4           | 4.0              | 3.4           | 132H5061       | S1C02 | 132H5061                      | S1A02 |
|              | HO2             | 3.4                  | 3.0           | 4.0              | 3.4           | 132H5061       | S1C02 | 132H5061                      | S1A02 |
| 05-05A6      | LO              | 5.6                  | 4.8           | 7.2              | 6.3           | 132H5062       | S1C02 | 132H5072                      | S1A02 |
|              | HO1             | 5.6                  | 4.8           | 7.2              | 6.3           | 132H5062       | S1C02 | 132H5072                      | S1A02 |
|              | HO2             | 4.3                  | 3.4           | 7.2              | 6.3           | 132H5062       | S1C02 | 132H5072                      | S1A02 |
| 05-07A2      | LO              | 7.2                  | 6.3           | 7.2              | 6.3           | 132H5062       | S1C02 | 132H5072                      | S1A02 |

| iC7 drive    |                 |                      |               | Sine-wave filter |               |                |       |                               |       |
|--------------|-----------------|----------------------|---------------|------------------|---------------|----------------|-------|-------------------------------|-------|
| Product code | Overload rating | Rated output current |               | Rated current    |               | IP00/Open Type |       | IP20/Open Type <sup>(1)</sup> |       |
|              |                 | 380–440 V [A]        | 441–500 V [A] | 380–440 V [A]    | 441–500 V [A] | Code no.       | Frame | Code no.                      | Frame |
|              | HO1             | 7.2                  | 6.3           | 7.2              | 6.3           | 132H5062       | S1C02 | 132H5072                      | S1A02 |
|              | HO2             | 5.6                  | 4.8           | 7.2              | 6.3           | 132H5062       | S1C02 | 132H5072                      | S1A02 |
| 05-09A2      | LO              | 9.2                  | 8.2           | 12.5             | 11            | 132H5063       | S1C02 | 132H5073                      | S1A02 |
|              | HO1             | 9.2                  | 8.2           | 12.5             | 11            | 132H5063       | S1C02 | 132H5073                      | S1A02 |
|              | HO2             | 8                    | 6.3           | 12.5             | 11            | 132H5063       | S1C02 | 132H5073                      | S1A02 |
| 05-12A5      | LO              | 12.5                 | 11            | 12.5             | 11            | 132H5063       | S1C02 | 132H5073                      | S1A02 |
|              | HO1             | 12.5                 | 11            | 12.5             | 11            | 132H5063       | S1C02 | 132H5073                      | S1A02 |
|              | HO2             | 10                   | 7.6           | 12.5             | 11            | 132H5063       | S1C02 | 132H5073                      | S1A02 |
| 05-16A0      | LO              | 16                   | 14.5          | 16               | 14.5          | 132H5064       | S1C03 | 132H5074                      | S1A03 |
|              | HO1             | 16                   | 14.5          | 16               | 14.5          | 132H5064       | S1C03 | 132H5074                      | S1A03 |
|              | HO2             | 13                   | 11            | 16               | 14.5          | 132H5064       | S1C03 | 132H5074                      | S1A03 |
| 05-24A0      | LO              | 24                   | 21            | 31               | 27            | 132H5065       | S1C04 | 132H5075                      | S1A04 |
|              | HO1             | 24                   | 21            | 31               | 27            | 132H5065       | S1C04 | 132H5075                      | S1A04 |
|              | HO2             | 17                   | 14.5          | 31               | 27            | 132H5065       | S1C04 | 132H5075                      | S1A04 |
| 05-31A0      | LO              | 31                   | 27            | 31               | 27            | 132H5065       | S1C04 | 132H5075                      | S1A04 |
|              | HO1             | 31                   | 27            | 31               | 27            | 132H5065       | S1C04 | 132H5075                      | S1A04 |
|              | HO2             | 25                   | 21            | 31               | 27            | 132H5065       | S1C04 | 132H5075                      | S1A04 |
| 05-38A0      | LO              | 38                   | 34            | 43               | 40            | 132H5066       | S1C05 | 132H5077                      | S1A05 |
|              | HO1             | 38                   | 34            | 43               | 40            | 132H5066       | S1C05 | 132H5077                      | S1A05 |
|              | HO2             | 32                   | 27            | 43               | 40            | 132H5066       | S1C05 | 132H5077                      | S1A05 |
| 05-43A0      | LO              | 43                   | 40            | 43               | 40            | 132H5066       | S1C05 | 132H5077                      | S1A05 |
|              | HO1             | 43                   | 40            | 43               | 40            | 132H5066       | S1C05 | 132H5077                      | S1A05 |
|              | HO2             | 38                   | 34            | 43               | 40            | 132H5066       | S1C05 | 132H5077                      | S1A05 |
| 05-61A0      | LO              | 61                   | 55            | 73               | 66            | 132H5067       | S1C05 | 132H5078                      | S1A06 |
|              | HO1             | 61                   | 55            | 73               | 66            | 132H5067       | S1C05 | 132H5078                      | S1A06 |
|              | HO2             | 46                   | 40            | 73               | 66            | 132H5067       | S1C05 | 132H5078                      | S1A06 |
| 05-73A0      | LO              | 73                   | 66            | 73               | 66            | 132H5067       | S1C05 | 132H5078                      | S1A06 |
|              | HO1             | 73                   | 66            | 73               | 66            | 132H5067       | S1C05 | 132H5078                      | S1A06 |
|              | HO2             | 61                   | 55            | 73               | 66            | 132H5067       | S1C05 | 132H5078                      | S1A06 |
| 05-90A0      | LO              | 90                   | 81            | 106              | 96            | 132H5068       | S1C07 | 132H5080                      | S1A07 |

| iC7 drive    |                 |                      |               | Sine-wave filter |               |                |       |                               |       |
|--------------|-----------------|----------------------|---------------|------------------|---------------|----------------|-------|-------------------------------|-------|
| Product code | Overload rating | Rated output current |               | Rated current    |               | IP00/Open Type |       | IP20/Open Type <sup>(1)</sup> |       |
|              |                 | 380–440 V [A]        | 441–500 V [A] | 380–440 V [A]    | 441–500 V [A] | Code no.       | Frame | Code no.                      | Frame |
|              | HO1             | 90                   | 81            | 106              | 96            | 132H5068       | S1C07 | 132H5080                      | S1A07 |
|              | HO2             | 73                   | 66            | 106              | 96            | 132H5068       | S1C07 | 132H5080                      | S1A07 |
| 05-106A      | LO              | 106                  | 96            | 106              | 96            | 132H5068       | S1C07 | 132H5080                      | S1A07 |
|              | HO1             | 106                  | 96            | 106              | 96            | 132H5068       | S1C07 | 132H5080                      | S1A07 |
|              | HO2             | 90                   | 81            | 106              | 96            | 132H5068       | S1C07 | 132H5080                      | S1A07 |
| 05-147A      | LO              | 147                  | 133           | 170              | 156           | 132H5069       | S1C08 | 132H5081                      | S1A08 |
|              | HO1             | 147                  | 133           | 170              | 156           | 132H5069       | S1C08 | 132H5081                      | S1A08 |
|              | HO2             | 106                  | 96            | 170              | 156           | 132H5069       | S1C08 | 132H5081                      | S1A08 |
| 05-170A      | LO              | 170                  | 156           | 170              | 156           | 132H5069       | S1C08 | 132H5081                      | S1A08 |
|              | HO1             | 170                  | 156           | 170              | 156           | 132H5069       | S1C08 | 132H5081                      | S1A08 |
|              | HO2             | 147                  | 133           | 170              | 156           | 132H5069       | S1C08 | 132H5081                      | S1A08 |

<sup>1</sup> Optional IP21/UL Type 1 kit available.

### 1.11.7 Ordering IP21/UL Type 1 Upgrade Kits for S1A02–S1A08 Sine-wave Filters

Table 9: Selection Table for IP21/UL Type 1 Upgrade Kits

| Sine-wave filter (IP20/Open type) |       | IP21/UL Type 1 accessory kits |                             |        |
|-----------------------------------|-------|-------------------------------|-----------------------------|--------|
| Code no.                          | Frame | Code no.                      | Description                 | Frame  |
| 132H5070                          | S1A02 | 136B2782                      | IP21/UL Type 1 kit - S1K02b | S1K02b |
| 132H5061                          | S1A02 | 136B2782                      | IP21/UL Type 1 kit - S1K02b | S1K02b |
| 132H5072                          | S1A02 | 136B2782                      | IP21/UL Type 1 kit - S1K02b | S1K02b |
| 132H5073                          | S1A02 | 136B2782                      | IP21/UL Type 1 kit - S1K02b | S1K02b |
| 132H5074                          | S1A03 | 136B2783                      | IP21/UL Type 1 kit - S1K03b | S1K03b |
| 132H5075                          | S1A04 | 136B2784                      | IP21/UL Type 1 kit - S1K04b | S1K04b |
| 132H5077                          | S1A05 | 136B2785                      | IP21/UL Type 1 kit - S1K05b | S1K05b |
| 132H5078                          | S1A06 | 136B2786                      | IP21/UL Type 1 kit - S1K06b | S1K06b |
| 132H5080                          | S1A07 | 136B2787                      | IP21/UL Type 1 kit - S1K07b | S1K07b |
| 132H5081                          | S1A08 | 136B2788                      | IP21/UL Type 1 kit - S1K08b | S1K08b |





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